



# RENEGADE NH<sub>3</sub> APPLICATOR



**MODEL 3500 ANHYDROUS AMMONIA APPLICATOR MAINTENANCE**

**MODEL 2500 ANHYDROUS AMMONIA APPLICATOR MAINTENANCE**

**MODEL 1500 ANHYDROUS AMMONIA APPLICATOR MAINTENANCE**

**FERTILIZER APPLICATORS**

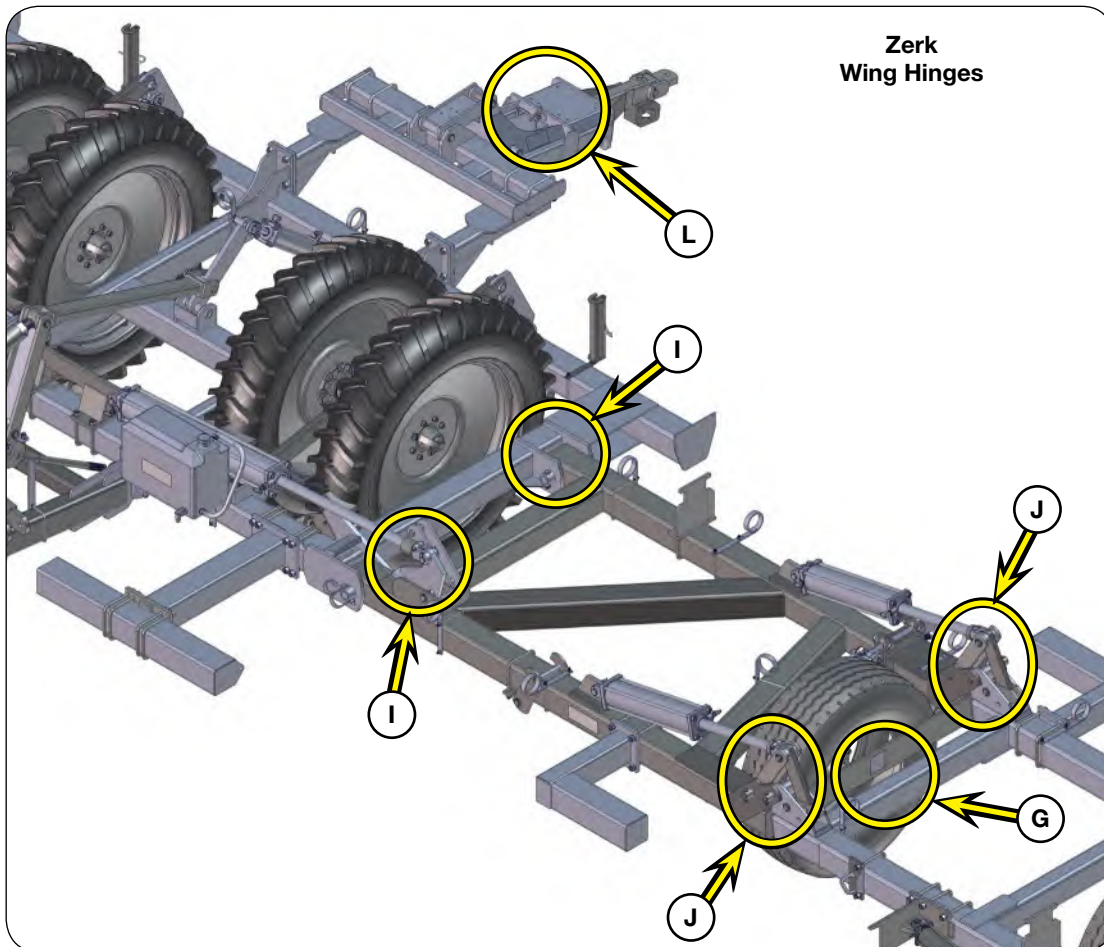
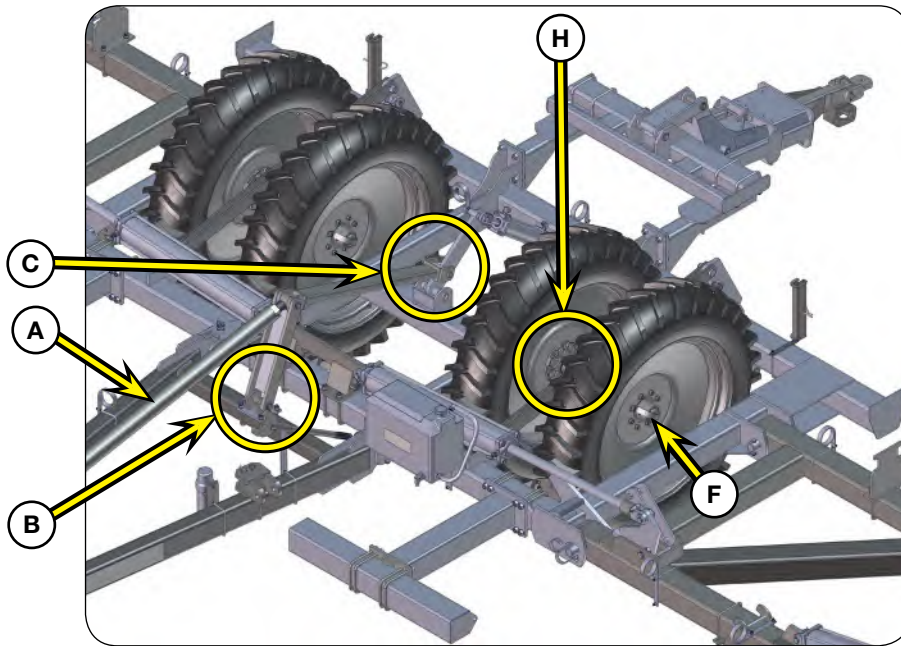
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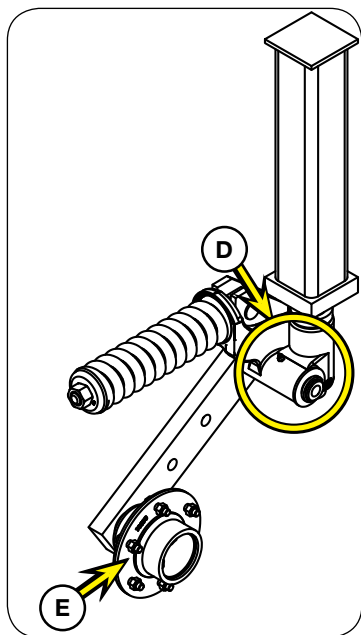
## **Section IV Maintenance**

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## Lubrication



## Lubrication (continued)



To keep your applicator in top operating condition and to assure its proper performance and reliability for a long period of time, periodic inspection and lubrication is a must.

Use EP-2 lubricant at the locations described in the chart.

All exposed cylinder rods should be coated with grease before seasonal storage to prevent rusting. Remove depth collars and lubricate exposed cylinder rods.

After seasonal storage, check wing latch for freedom of movement.

The lubrication locations and recommended schedule are as follows:

| ITEM | DESCRIPTION                                                               | POINT | QTY.     | HOURS             |
|------|---------------------------------------------------------------------------|-------|----------|-------------------|
| A    | Depth Control Turnbuckle Assembly*                                        | 2     | 2 Shots  | 50 Hours          |
| B    | Stop Arm with Plunger Assembly                                            | 1     | 1 Shot   | Weekly            |
| C    | Tongue Cylinder Arm Linkage                                               | 4     | 1 Shot   | Weekly            |
| D    | Coulter Arm Pivot Zerk & Zerk on Front of Pivot Casting for Coulter Swing | 2     | 2 Shots  | Weekly            |
| E    | Coulter Hub                                                               | -     | 10 Shots | Once Every Season |
| F    | Main Frame Transport Wheel Hub                                            | 2     | Repack   | Once Every Season |
| G    | Wing Gauge Wheel Hub                                                      | 4     | Repack   | Once Every Season |
| H    | Main Frame Gauge Wheel Pivot                                              | 8     | 5 Shots  | Weekly            |
| I    | Main Frame to Primary Wing Hinge                                          | 4     | 5 Shots  | Weekly            |
| J    | Primary Wing to Secondary Wing Hinge & Linkage                            | 6     | 5 Shots  | Weekly            |
| K    | Hitch                                                                     | 2     | 2 Shots  | Weekly            |
| L    | Nurse Tank - Under Hitch                                                  | 1     | 2 Shots  | Weekly            |

**\*NOTE - ITEM A:** Turn adjustable link two full turns in each direction to ensure threads do not seize.

## **Renegade 3500 Maintenance**

### **DANGER**

- **ELECTROCUTION WILL CAUSE SERIOUS INJURY OR DEATH. THE IMPLEMENT IS NOT INSULATED. KEEP AWAY FROM ALL ELECTRICAL LINES AND DEVICES. ELECTROCUTION CAN OCCUR WITHOUT DIRECT CONTACT.**
- 

### **WARNING**

- **TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.**
  - **EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.**
  - **KEEP HANDS CLEAR OF PINCH POINT AREAS.**
  - **ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING WITH OR NEAR CHEMICALS. THIS EQUIPMENT INCLUDES, BUT IS NOT LIMITED TO: PROTECTIVE EYE WEAR, GLOVES, SHOES, SOCKS, LONG-SLEEVED SHIRT, AND LONG PANTS. ADDITIONAL PROTECTION MAY BE REQUIRED FOR MANY TYPES OF CHEMICALS.**
  - **AVOID BREATHING SPRAY MIST OR VAPOR.**
  - **WASH HANDS BEFORE EATING, DRINKING, CHEWING GUM, OR USING TOILET.**
  - **NEW HYDRAULIC SYSTEMS OR SYSTEMS THAT HAVE BEEN MAINTAINED MUST BE PURGED OF AIR BEFORE OPERATING OR MOVING MACHINE TO PREVENT SERIOUS INJURY OR DEATH.**
- 

### **CAUTION**

- **SHARP EDGES ON COULTER BLADES AND KNIVES CAN CAUSE SERIOUS INJURY. BE CAREFUL WHEN WORKING AROUND COULTER BLADES AND KNIVES.**
- 

## **Seasonal Storage**

Check coultter swivel for wear. Replace as needed. See FIG. 4-1 on next page.

Always open all valves to remove any fluids and to allow moisture to dry.

Immediately after season is finished, completely wash machine to remove corrosive fertilizer inside and out before storing. When using pressure washers maintain an adequate distance so not to force water into bearings, hydraulic seals, or electrical connections.

Repaint all areas where paint has been removed to keep rust from developing. Coat areas of coultter blades and knives, if equipped, and coultter posts with rust preventative material.

### Renegade 3500 Maintenance (continued)

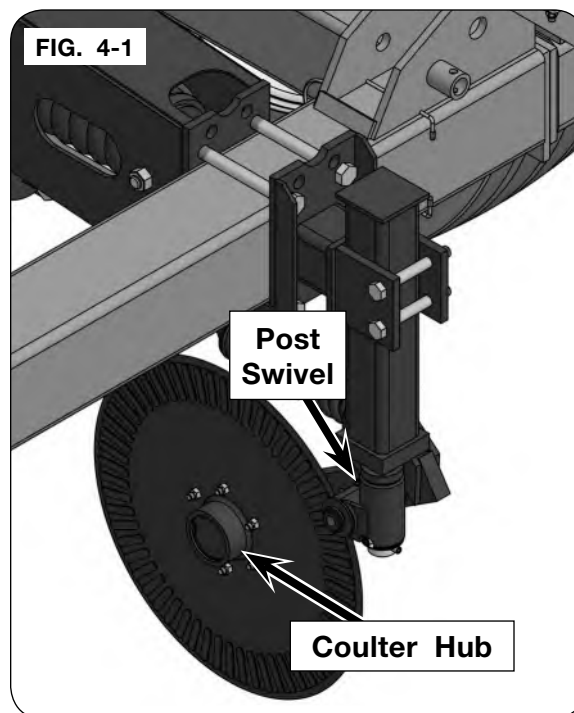
Coat exposed cylinder piston rods with rust preventative material.

Inspect machine for parts that may need to be replaced so they may be ordered in the off season.

Lubricate machine at all points outlined.

Check coultter hubs for free rotation. If blade hubs do not rotate, replace and/or pack bearings with grease. Replace coultter arm if spindle is damaged. (FIG. 4-1)

Check coultter post swivel for free movement. If post swivel does not move, free the swivels and grease. Grease the coultter post swivel until fresh grease purges top or bottom of swivel casting to prevent the coultter pivot from seizing on post. (FIG. 4-1) Refer to "Lubrication" in this section.



### Purging A Hydraulic System

#### **WARNING**

- RELIEVE HYDRAULIC SYSTEM OF ALL PRESSURE BEFORE ADJUSTING OR SERVICING. SEE TRACTOR OPERATOR'S MANUAL FOR PROPER PROCEDURES.
- HIGH-PRESSURE FLUIDS CAN PENETRATE THE SKIN AND CAUSE SERIOUS INJURY OR DEATH. SEEK MEDICAL TREATMENT IMMEDIATELY IF INJURED BY HIGH-PRESSURE FLUIDS. USE CARDBOARD OR WOOD TO DETECT LEAKS IN THE HYDRAULIC SYSTEM.
- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.

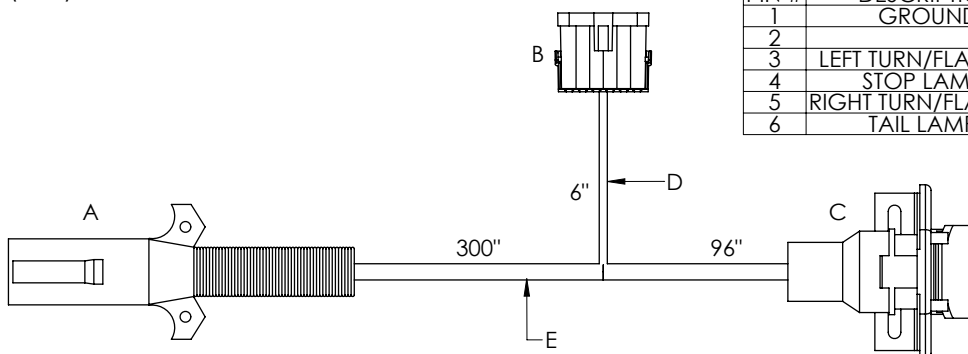
#### 1. Purge air from system as follows:

- A. Disconnect the rod end of all cylinders in a circuit. Block up all rod end of each hydraulic cylinders in each circuit so the rod can completely extend and retract without contacting any other component.
- B. Pressurize the system and maintain system at full pressure for at least 5 seconds after cylinder rods stop moving. Check that all cylinders have fully extended or retracted.
- C. Check oil reservoir in hydraulic power source and re-fill as needed.
- D. Pressurize system again to reverse the motion of step B. Maintain pressure on system for at least 5 seconds after cylinder rods stop moving. Check that cylinders have fully extended or retracted.
- E. Check for hydraulic leaks using cardboard or wood. Tighten connections according to directions in Torque Specifications in MAINTENANCE section.
- F. Repeat steps B, C, D, and E 10-12 times.
- G. De-pressurize hydraulic system and connect cylinder rods clevises to their mating lugs.

## Schematics - Electrical

### Electrical Harness - Main 33' (JAP3221)

- A. CONNECTOR: 7 F-TERMINAL PLUG CONFORMING TO SAE J560  
 B. CONNECTOR: PACKARD, FLAT 6 M-TERMINAL WEATHER-PACK SHROUD  
 C. CONNECTOR: 7 M-TERMINAL SOCKET CONFORMING TO SAE J560  
 D. CABLE: 5-WIRE 16AWG, (WHT, YEL, RED, GRN, BRN)  
 E. TRAILER CABLE: 7-WIRE, 12AWG (BLK, YEL, GRN, BRN), 10AWG (RED, BLU), 8AWG (WHT)



| PIN # | DESCRIPTION         | WIRE COLOR |
|-------|---------------------|------------|
| 1     | GROUND              | WHITE      |
| 2     |                     |            |
| 3     | LEFT TURN/FLASHING  | YELLOW     |
| 4     | STOP LAMPS          | RED        |
| 5     | RIGHT TURN/FLASHING | GREEN      |
| 6     | TAIL LAMPS          | BROWN      |

| PIN # | DESCRIPTION         | WIRE COLOR |
|-------|---------------------|------------|
| 1     | GROUND              | WHITE      |
| 2     | CLEARANCE/MARKER    | BLACK      |
| 3     | LEFT TURN/FLASHING  | YELLOW     |
| 4     | STOP LAMPS          | RED        |
| 5     | RIGHT TURN/FLASHING | GREEN      |
| 6     | TAIL LAMPS          | BROWN      |
| 7     | AUX/ABS POWER       | BLUE       |

| PIN # | DESCRIPTION         | WIRE COLOR |
|-------|---------------------|------------|
| 1     | GROUND              | WHITE      |
| 2     | CLEARANCE/MARKER    | BLACK      |
| 3     | LEFT TURN/FLASHING  | YELLOW     |
| 4     | STOP LAMPS          | RED        |
| 5     | RIGHT TURN/FLASHING | GREEN      |
| 6     | TAIL LAMPS          | BROWN      |
| 7     | AUX/ABS POWER       | BLUE       |

### Electrical Harness - Rear 27' (JAP3222)

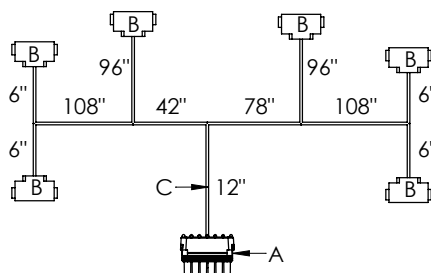
- A. CONNECTOR: PACKARD, FLAT 6-F TERMINAL WEATHER-PACK TOWER  
 B. CONNECTOR: 3 M-TERMINAL RIGHT ANGLE LIGHT PLUG  
 C. WIRE: 16AWG-COLORS: WHITE, YELLOW, RED, GREEN, BROWN

| PIN # | DESCRIPTION | WIRE COLOR |
|-------|-------------|------------|
| 1     | GROUND      | WHITE      |
| 2     | STOP LAMPS  | RED        |
| 3     | TAIL LAMPS  | BROWN      |

| PIN # | DESCRIPTION | WIRE COLOR |
|-------|-------------|------------|
| 1     | GROUND      | WHITE      |
| 2     | STOP LAMPS  | RED        |
| 3     | TAIL LAMPS  | BROWN      |

| PIN # | DESCRIPTION         | WIRE COLOR |
|-------|---------------------|------------|
| 1     | GROUND              | WHITE      |
| 2     | RIGHT TURN/FLASHING | GREEN      |

| PIN # | DESCRIPTION         | WIRE COLOR |
|-------|---------------------|------------|
| 1     | GROUND              | WHITE      |
| 2     | RIGHT TURN/FLASHING | GREEN      |



| PIN # | DESCRIPTION        | WIRE COLOR |
|-------|--------------------|------------|
| 1     | GROUND             | WHITE      |
| 2     | LEFT TURN/FLASHING | YELLOW     |

| PIN # | DESCRIPTION        | WIRE COLOR |
|-------|--------------------|------------|
| 1     | GROUND             | WHITE      |
| 2     | LEFT TURN/FLASHING | YELLOW     |

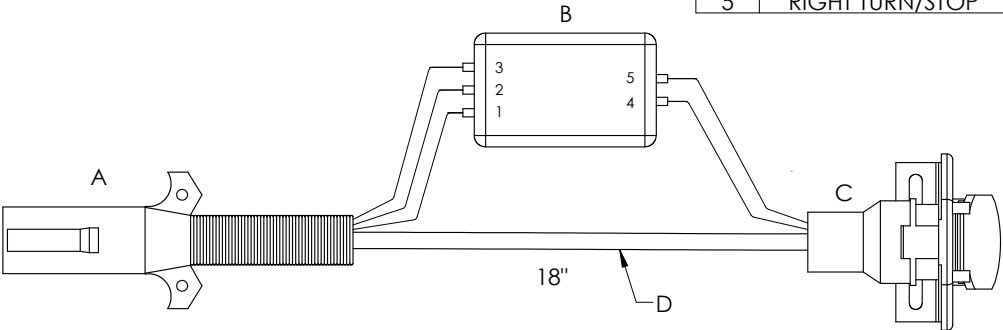
| PIN # | DESCRIPTION         | WIRE COLOR |
|-------|---------------------|------------|
| 1     | GROUND              | WHITE      |
| 2     |                     |            |
| 3     | LEFT TURN/FLASHING  | YELLOW     |
| 4     | STOP LAMPS          | RED        |
| 5     | RIGHT TURN/FLASHING | GREEN      |
| 6     | TAIL LAMPS          | BROWN      |

Schematic — Electrical (continued)

Electrical Harness AG Plug to RV Socket (JAP3223)

- A. CONNECTOR: 7 F-TERMINAL PLUG CONFORMING TO SAE J560
- B. TAIL LIGHT CONVERTER: POLLAK 12-752
- C. CONNECTOR: 7 M-TERMINAL SOCKET, RV BLADE STYLE
- D. CABLE: 2-WIRE 12AWG, (WHITE, BLACK)

| TAIL LIGHT CONVERTER |                     |        |
|----------------------|---------------------|--------|
| WIRE                 | DESCRIPTION         | COLOR  |
| 1                    | LEFT TURN/FLASHING  | YELLOW |
| 2                    | STOP LAMPS          | RED    |
| 3                    | RIGHT TURN/FLASHING | GREEN  |
| 4                    | LEFT TURN/STOP      | YELLOW |
| 5                    | RIGHT TURN/STOP     | GREEN  |

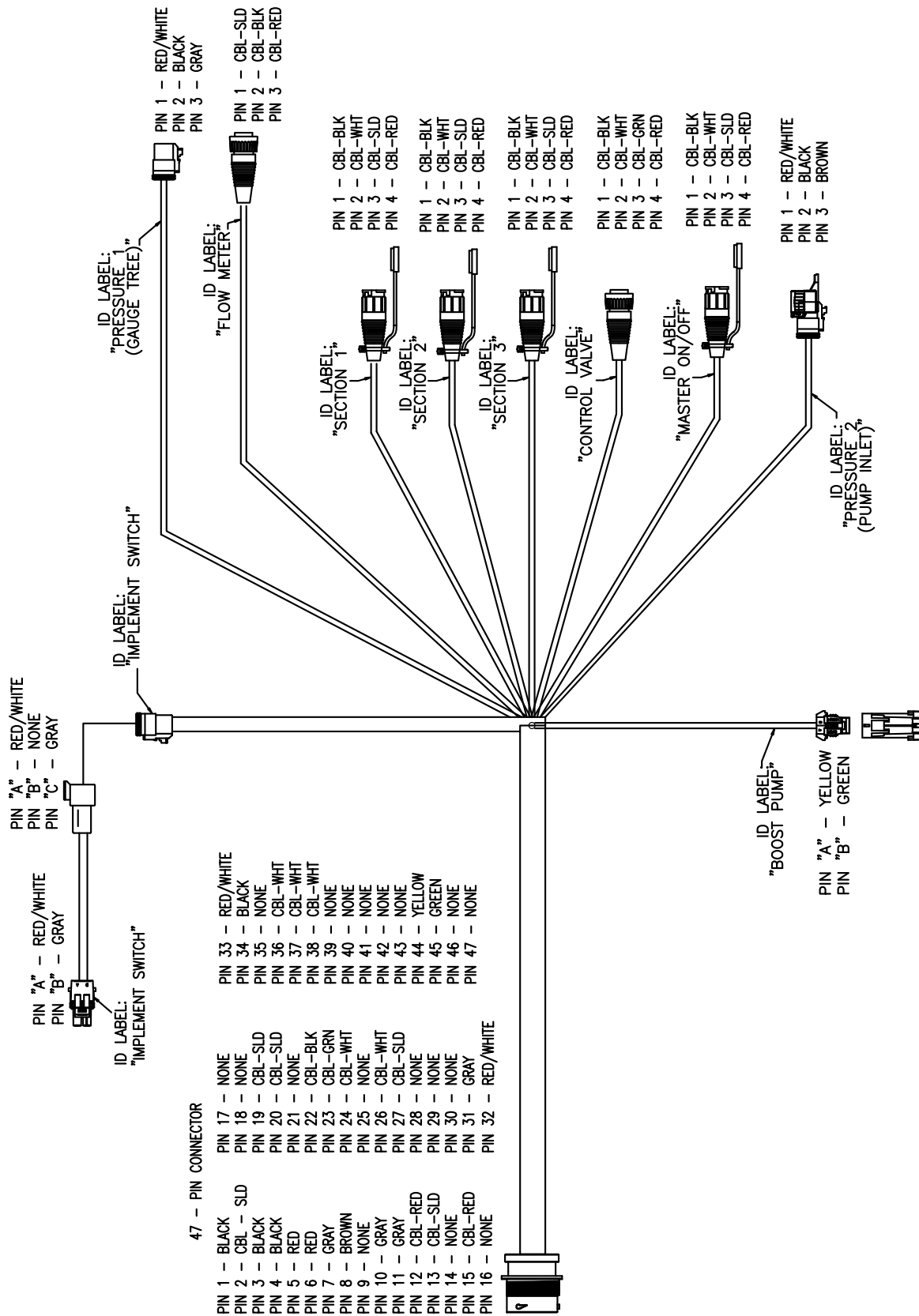


| 7 F-TERMINAL SAE J560 PLUG |                     |            |
|----------------------------|---------------------|------------|
| PIN #                      | DESCRIPTION         | WIRE COLOR |
| 1                          | GROUND              | WHITE      |
| 2                          | CLEARANCE/MARKER    | BLACK      |
| 3                          | LEFT TURN/FLASHING  | YELLOW     |
| 4                          | STOP LAMPS          | RED        |
| 5                          | RIGHT TURN/FLASHING | GREEN      |
| 6                          | TAIL LAMPS          | BROWN      |
| 7                          |                     |            |

| 7 M-TERMINAL RV BLADE SOCKET |                     |            |
|------------------------------|---------------------|------------|
| PIN #                        | DESCRIPTION         | WIRE COLOR |
| 1                            | GROUND              | WHITE      |
| 2                            |                     |            |
| 3                            | TAIL/RUNNING LIGHTS | BROWN      |
| 4                            | +12V SWITCHED PWR   | BLACK      |
| 5                            | LEFT TURN/STOP      | YELLOW     |
| 6                            | RIGHT TURN/STOP     | GREEN      |
| 7                            |                     |            |

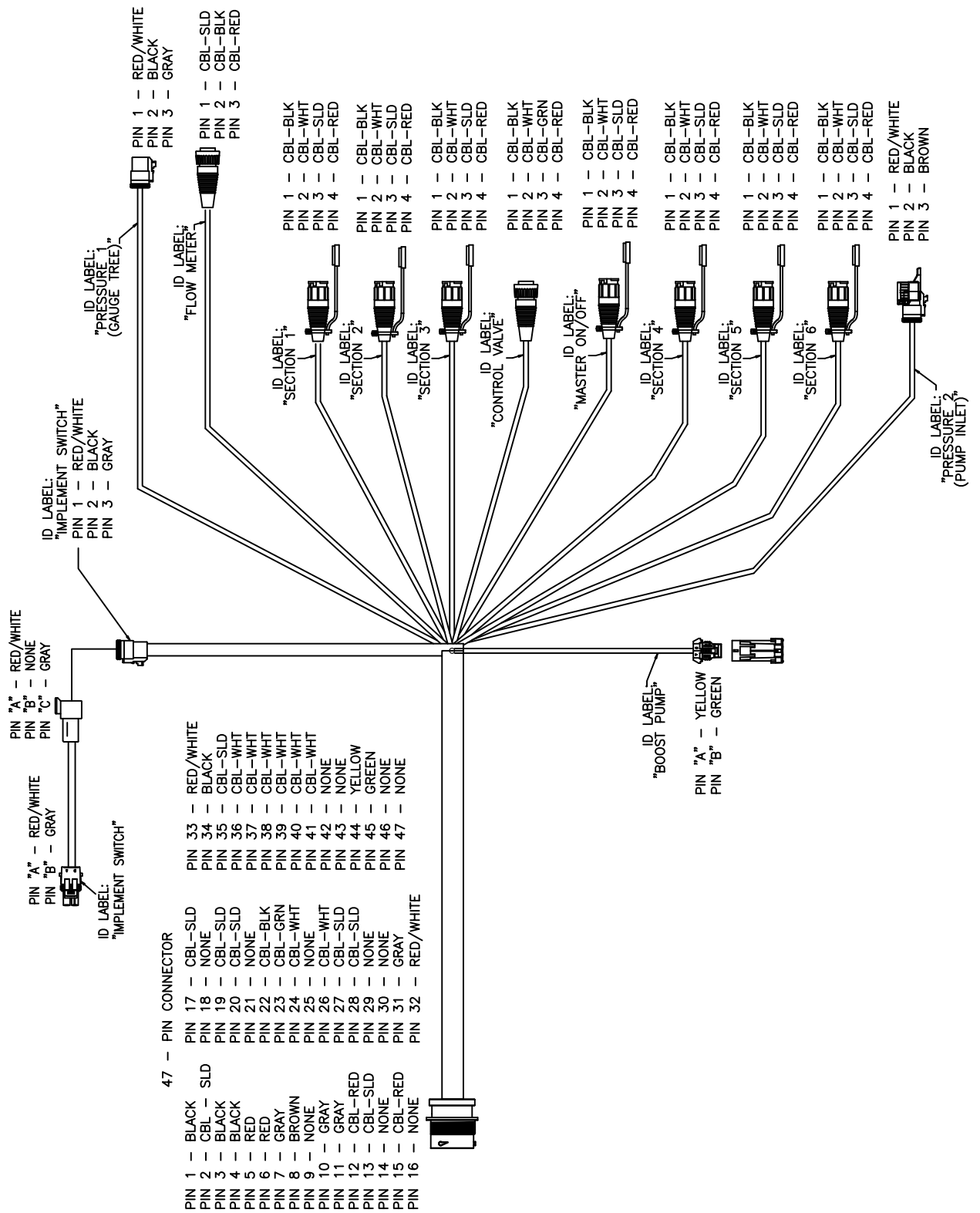
# Schematic — Electrical (continued)

## Electrical Harness RCM Accu-Flow HP (9503394)



# Schematic — Electrical (continued)

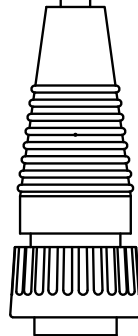
## Electrical Harness RCM Accu-Flow HP (9503389)



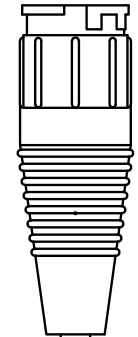
Schematic — Electrical (continued)

**Electrical Harness 12 Ft. Extension (9503392) - For On/Off Valve**  
**Electrical Harness 24 Ft. Extension (9503393) - For On/Off Valve**

4-Pin Connector  
Pin 1 — CBL-SLD  
Pin 2 — CBL-BLK  
Pin 3 — CBL-WHT  
Pin 4 — CBL-RED



4-Pin Connector  
Pin 1 — CBL-SLD  
Pin 2 — CBL-BLK  
Pin 3 — CBL-WHT  
Pin 4 — CBL-RED

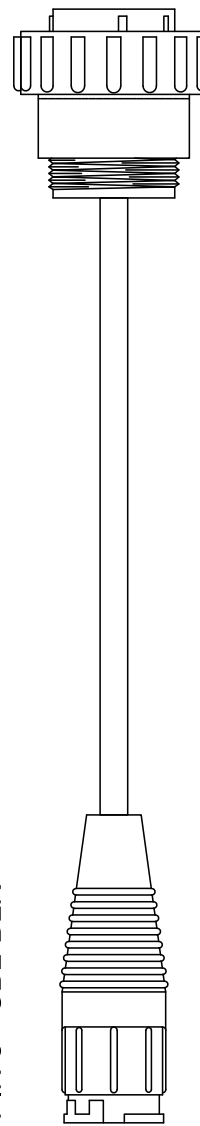


Schematic — Electrical (continued)

Electrical Harness Console 10 Ft. (9503395) - Transducer to Console

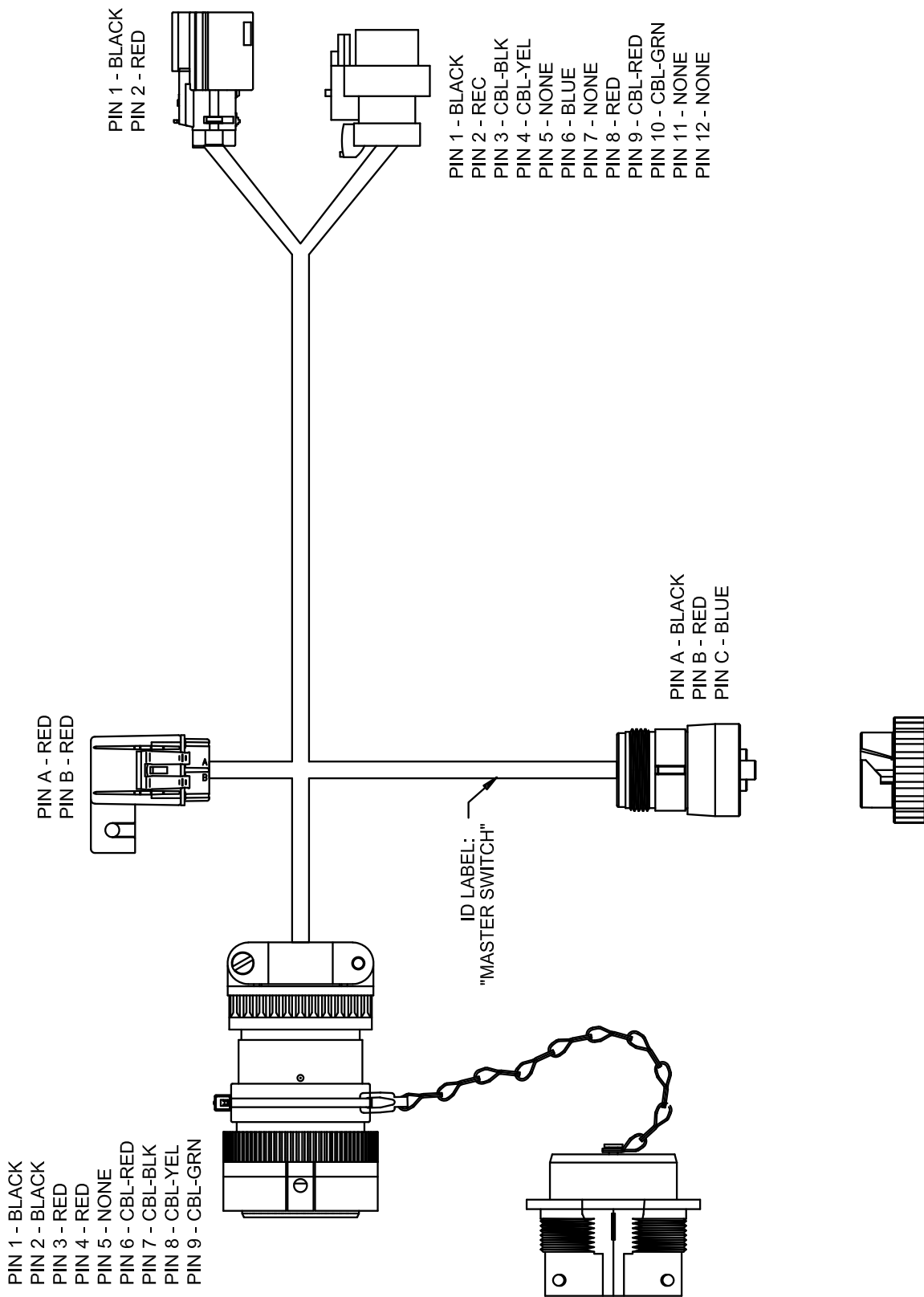
PIN 1 - NONE  
PIN 2 - NONE  
PIN 3 - NONE  
PIN 4 - NONE  
PIN 5 - NONE  
PIN 6 - NONE  
PIN 7 - NONE  
PIN 8 - CBL-RED  
PIN 9 - CBL-WHT  
PIN 10 - CBL-BLK  
PIN 11 - NONE  
PIN 12 - NONE  
PIN 13 - NONE  
PIN 14 - NONE

PIN 1 - CBL-WHT  
PIN 2 - CBL-RED  
PIN 3 - CBL-BLK



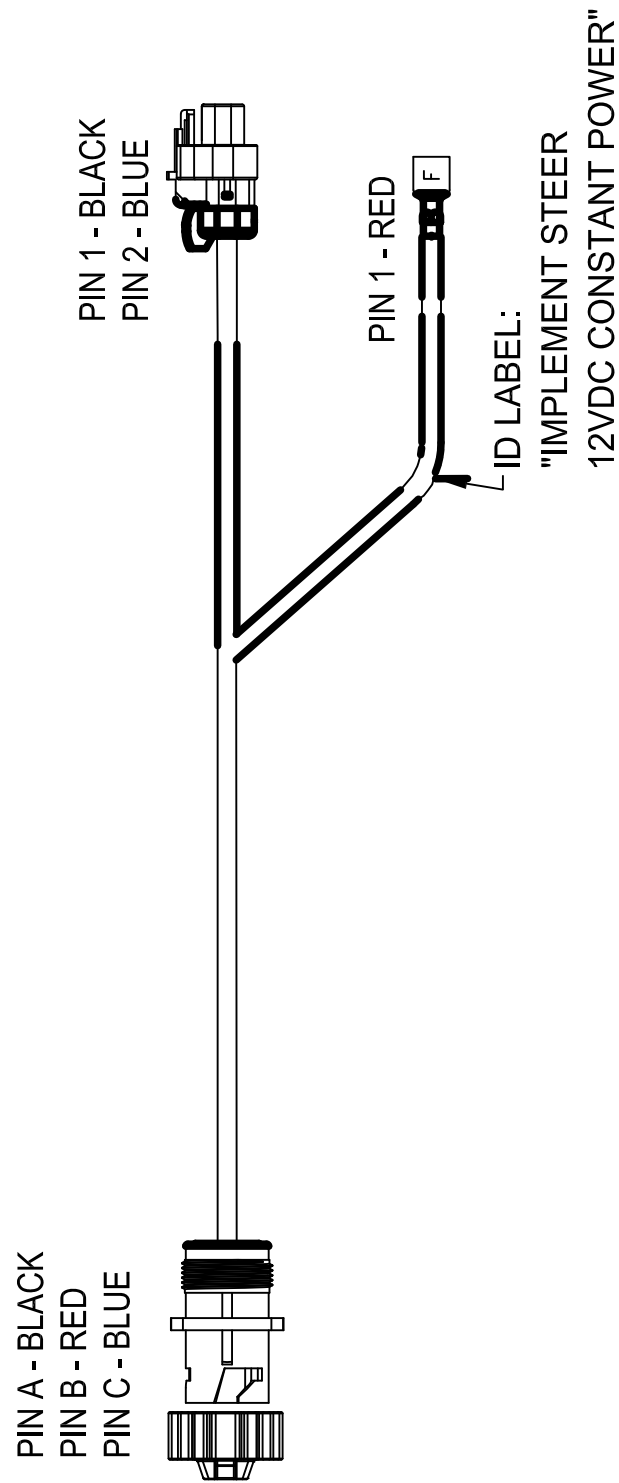
Schematic — Electrical (continued)

Electrical Harness Console 12 Ft. Adapter 9 Pin IBIC to Gen 1, Hitch Cable (9503387)



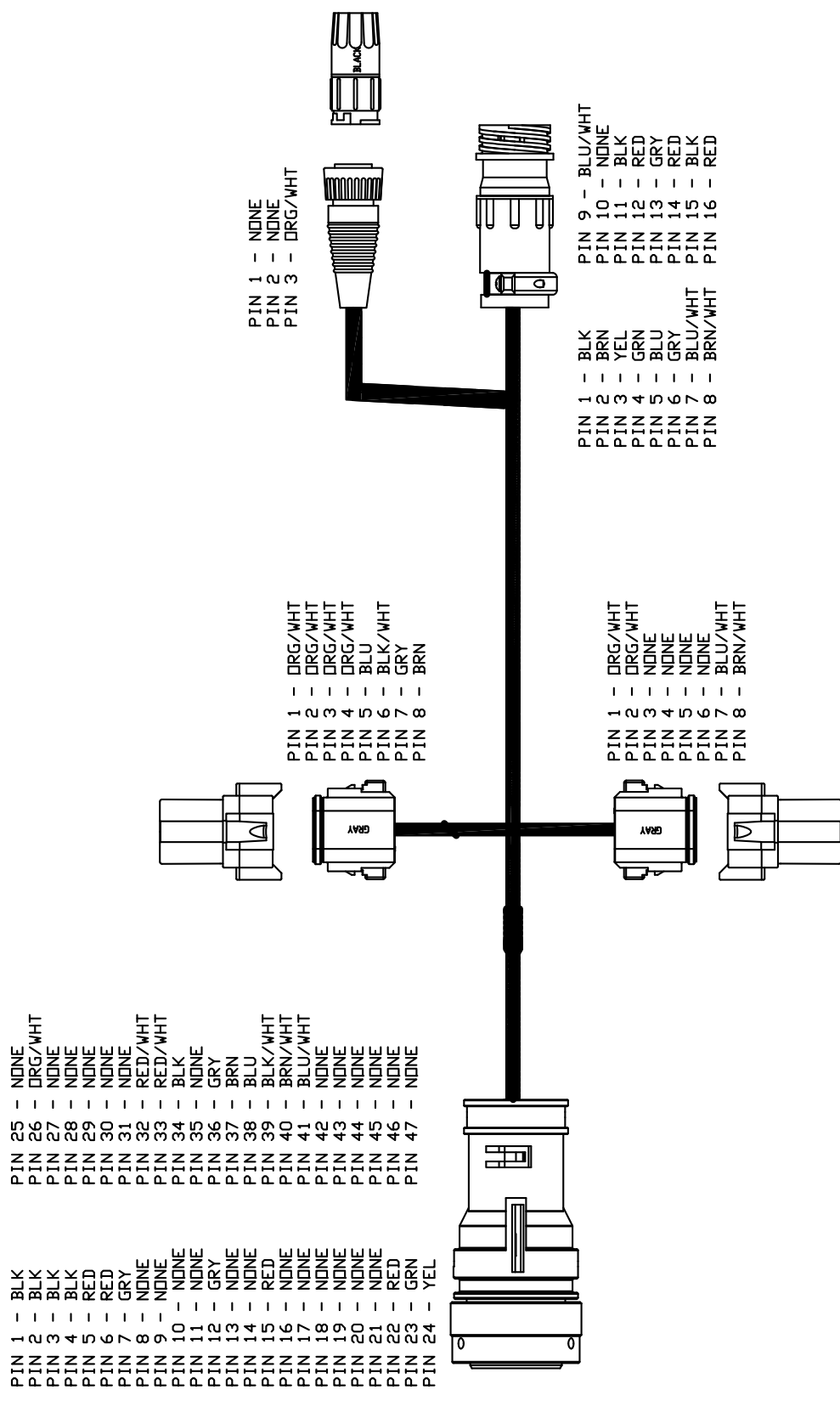
Schematic — Electrical (continued)

Electrical Harness Foot Switch 23 Ft. (95033390)



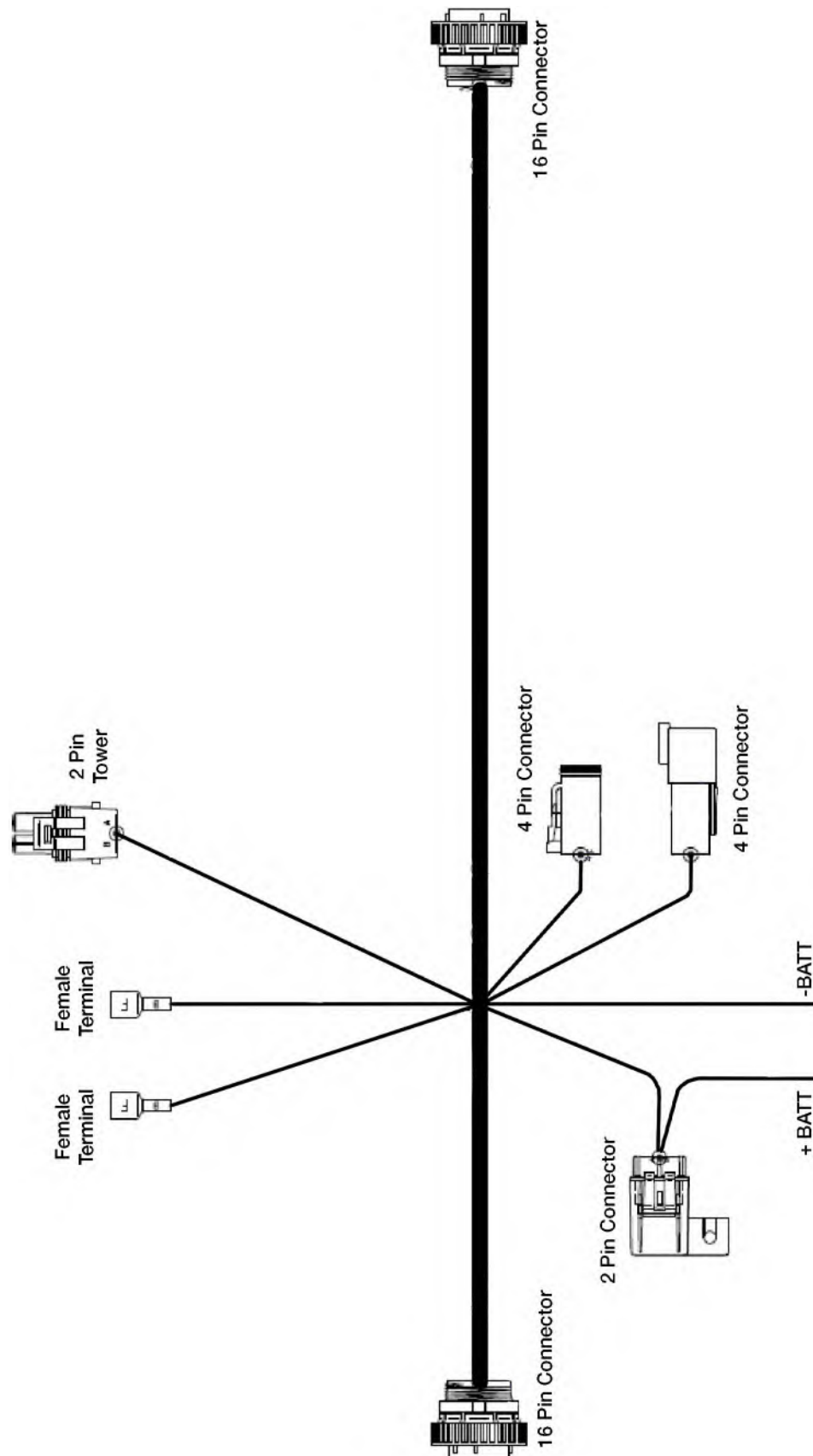
Schematic — Electrical (continued)

Electrical Harness - 16 Pin Console to 47 Pin Connector (9503396)



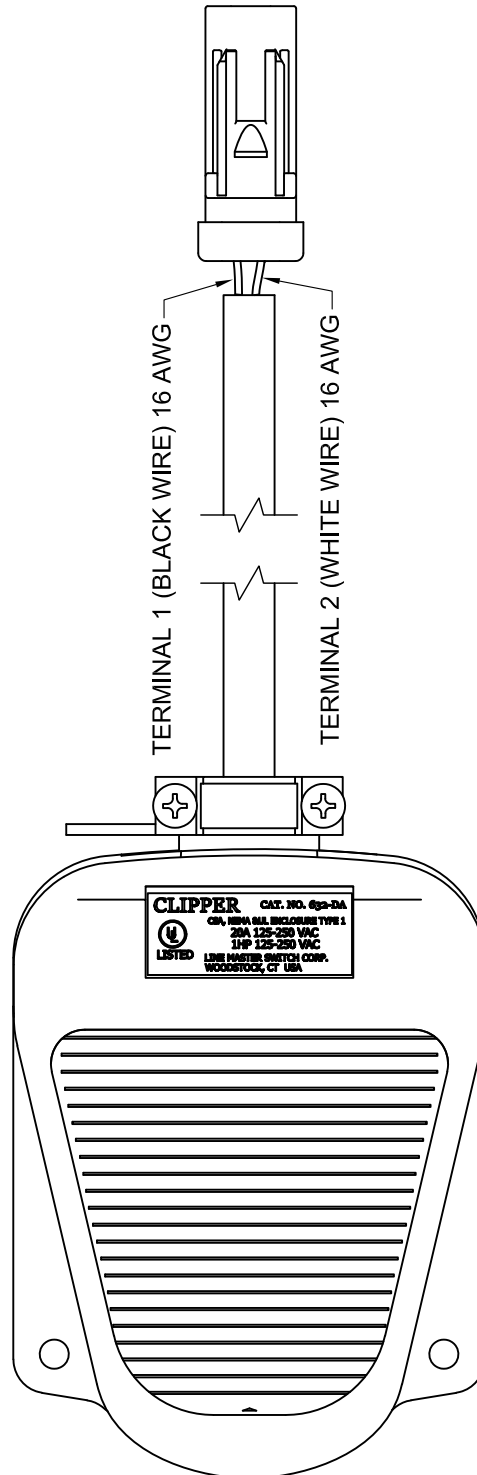
**Schematic — Electrical (continued)**

**Electrical Harness - 450 Console Controller (9007549)**



Schematic — Electrical (continued)

Electrical Harness - Foot Switch, ISO Node w/Harness (9005916)



## Wheel, Hub and Spindle Disassembly and Assembly

### **WARNING**

- TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.
- FALLING OBJECTS CAN CAUSE SERIOUS INJURY OR DEATH. DO NOT WORK UNDER THE MACHINE AT ANY TIME WHILE BEING HOISTED. BE SURE ALL LIFTING DEVICES AND SUPPORTS ARE RATED FOR THE LOADS BEING HOISTED. THESE ASSEMBLY INSTRUCTIONS WILL REQUIRE SAFE LIFTING DEVICES UP TO 30,000 LBS. SPECIFIC LOAD RATINGS FOR INDIVIDUAL LOADS WILL BE GIVEN AT THE APPROPRIATE TIME IN THE INSTRUCTIONS.
- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.
- KEEP HANDS CLEAR OF PINCH POINT AREAS.

### **CAUTION**

- IMPROPERLY TORQUED WHEEL NUTS/BOLTS CAN CAUSE A LOSS OF IMPLEMENT CONTROL AND MACHINE DAMAGE. TORQUE WHEEL NUTS/BOLTS TO VALUES IN TABLE. CHECK TORQUE BEFORE USE, AFTER ONE HOUR OF UNLOADED USE OR AFTER FIRST LOAD, AND EACH LOAD UNTIL WHEEL NUTS/BOLTS MAINTAIN TORQUE VALUE. CHECK TORQUE EVERY 10 HOURS OF USE THERE-AFTER. AFTER EACH WHEEL REMOVAL START TORQUE PROCESS FROM BEGINNING. WARRANTY DOES NOT COVER FAILURES CAUSED BY IMPROPERLY TORQUED WHEEL NUTS/BOLTS.

### **IMPORTANT**

- *Remove only one wheel and tire from a side at any given time in the following procedure.*
1. Hitch implement to tractor. Park on a firm, level surface. Set the tractor's parking brake, shut off engine and remove key.
  2. Use a safe lifting device rated at 30,000 lbs. to support the weight of your implement. Place the safe lifting device under the axle closest to the tire.
  3. Use a 300 lbs. safe lifting device to support the wheel and tire during removal.
  4. If only removing wheel and tire, skip to Step 8; otherwise continue with Step 4.



Remove the hardware retaining the hubcap. Next, remove the hubcap, gasket, cotter pin, castle nut and spindle washer. Remove hub with bearings from old spindle using a 200 lbs. lifting device.

### Wheel, Hub and Spindle Disassembly and Assembly (continued)

5. Inspect the spindle and replace if necessary. If spindle does not need to be replaced, skip to Step 6; otherwise continue with Step 5.

Remove the bolt and lock nut that retain the spindle to the axle. Using a lifting device rated for 200 lbs., remove the old spindle. Coat spindle shaft with anti-seize lubricant prior to installation. Reuse bolt and lock nut to retain spindle to axle. Torque as outlined in Maintenance Section.

6. Remove seal and inspect bearings, spindle washer, castle nut and cotter pin. Replace if necessary. Pack both bearings with Extreme Pressure NLGI #2 grease and reinstall inner bearing. Install new seal in hub with garter spring facing inward to the hub by tapping on flat plate that completely covers seal while driving it square to hub. Install until flush with back face of hub. Using a 200 lb. rated lifting device, install hub assembly onto spindle. Install outer bearing, spindle washer and castle nut.

#### IMPORTANT

- *Do not use an impact wrench!*
7. Slowly tighten castle/slotted nut while spinning the hub until hub stops rotating. Turn castle nut counterclockwise until the hole in the spindle aligns with the next notch in castle nut. Hub should spin smoothly with minimal drag and no end play. If play exists, tighten to next notch of castle nut. If drag exists, then back castle nut to next notch. Spin and check again. Install cotter pin. Clean face for hub cap gasket and install gasket, grease- filled hub cap and retain hubcap with hardware removed. Tighten hubcap hardware in alternating pattern.
  8. Attach the wheel(s) and tire(s) to the hub using the same rated safe lifting device for removal. Tighten wheel nuts to appropriate requirements and recheck as outlined in the Wheels and Tires section of this manual.
  9. Raise implement, remove lifting device and lower tire to the ground.

## Wheels and Tires

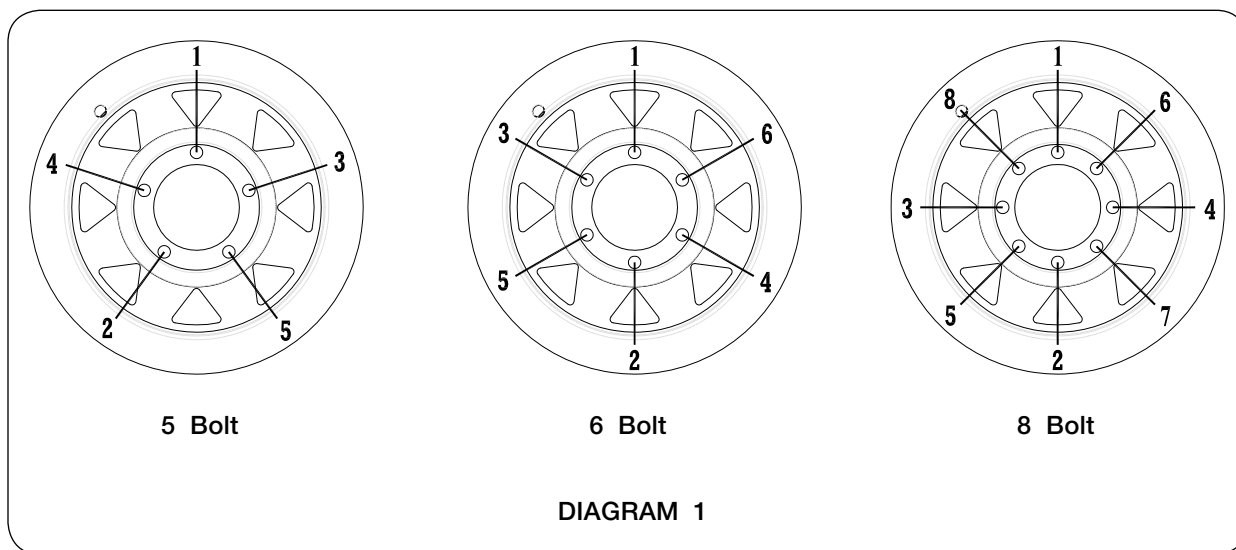
### Wheel Nut Torque Requirements

#### **CAUTION**

- IMPROPERLY TORQUED WHEEL NUTS/BOLTS CAN CAUSE A LOSS OF IMPLEMENT CONTROL AND MACHINE DAMAGE. TORQUE WHEEL NUTS/BOLTS TO VALUES IN TABLE. CHECK TORQUE BEFORE USE, AFTER ONE HOUR OF UNLOADED USE OR AFTER FIRST LOAD, AND EACH LOAD UNTIL WHEEL NUTS/BOLTS MAINTAIN TORQUE VALUE. CHECK TORQUE EVERY 10 HOURS OF USE THEREAFTER. AFTER EACH WHEEL REMOVAL START TORQUE PROCESS FROM BEGINNING. WARRANTY DOES NOT COVER FAILURES CAUSED BY IMPROPERLY TORQUED WHEEL NUTS/BOLTS.

Failure to check torque before first load may damage wheel nut/bolt seats. Once seats are damaged, it will become impossible to keep nuts/bolts tight. Tighten nuts/bolts to applicable torque value shown in table. Start all nuts/bolts by hand to prevent cross threading. Torque nuts/bolts in the recommended sequence as shown in Diagram 1.

| WHEEL HARDWARE       |              |
|----------------------|--------------|
| SIZE                 | FOOT-POUNDS  |
| 1/2"-20(UNF) Grade 5 | 75 Ft.-Lbs.  |
| 5/8"-18(UNF) Grade 5 | 165 Ft.-Lbs. |
| 5/8"-18(UNF) Grade 8 | 175 Ft.-Lbs. |



## Wheels and Tires (continued)

### Tire Pressure

The following is to be used as a general guide for tire inflation and figures can vary depending on specific brand of tire used. It is important that tires are inspected after unit is loaded. The tire should stand up with no side-wall buckling or distress as tire rolls. Record the pressure needed to support the full load and maintain this pressure to achieve proper tire life. Do not exceed maximum recommended tire pressure.

| Tire Pressure for Renegade Anhydrous Applicators |         |                   |                         |         |
|--------------------------------------------------|---------|-------------------|-------------------------|---------|
| Tire Make                                        | Part #  | Tire Size         | Load Index / Ply Rating | Max PSI |
| Carlisle                                         | 99136   | 20.5x8.0B10       | F-Ply                   | 35      |
|                                                  | 99311   | 11L15 I-1         | F-Ply                   | 90      |
| Firestone                                        | 9502097 | VF385/65R22.5 I-1 | 163D                    | 70      |
|                                                  | 9502085 | VF295/75R22.5 I-1 | 151D                    | 64      |
| Goodyear                                         | 9503244 | 12.4R38 R-1       | 14-Ply                  | 56      |
| Mitas                                            | 9503228 | 380/85R34 R-1W    | 146A8                   | 44      |
| Titan                                            | 9503246 | 7.50-15 HF-1      | 6-Ply                   | 45      |
|                                                  | 94557   | 27-9.50x15 HF-1   | 6-ply                   | 45      |

\*Each tire must be inflated to 35 PSI max to seat the beads, deflated to 5-10 PSI, then reinflated to the tire's max PSI.

(All tire pressures in psi)

### Tire Warranty

For questions regarding new tire warranty, please contact your local original equipment tire dealer. Used tires carry no warranty. Following are phone numbers and Websites for your convenience:

**Firestone**                      [www.firestoneag.com](http://www.firestoneag.com)  
Phone 800-847-3364

**Continental/Mitas**            [www.mitas-tires.com](http://www.mitas-tires.com)  
Phone 704-542-3422  
Fax 704-542-3474

**Titan**                              [www.titan-intl.com](http://www.titan-intl.com)  
or Phone 800-USA-BEAR  
**Goodyear**                      Fax 515-265-9301

**Carlisle/Ironman**            [www.carlisletire.com](http://www.carlisletire.com)  
Phone 800-260-7959  
Fax 800-352-0075

## Complete Torque Chart

### Capscrews - Grade 5

**NOTE:**

- Grade 5 capscrews can be identified by three radial dashes on the head.
- For wheel torque requirements, refer to Wheels and Tires.
- Tighten U-bolts evenly and equally to have the same number of threads exposed on each end.



| SIZE     | FOOT<br>POUNDS | NEWTON<br>METERS |
|----------|----------------|------------------|
| 1/4-20   | 8-10           | 11-13            |
| 1/4-28   | 9-11           | 12-15            |
| 5/16-18  | 15-17          | 20-23            |
| 5/16-24  | 17-19          | 23-26            |
| 3/8-16   | 25-28          | 34-38            |
| 3/8-24   | 28-31          | 38-42            |
| 7/16-14  | 40-45          | 54-61            |
| 7/16-20  | 45-50          | 61-68            |
| 1/2-13   | 62-68          | 84-92            |
| 1/2-20   | 68-75          | 92-102           |
| 9/16-12  | 90-98          | 122-133          |
| 9/16-18  | 100-110        | 134-148          |
| 5/8-11   | 120-135        | 162-183          |
| 5/8-18   | 124-137        | 168-186          |
| 3/4-10   | 200-220        | 270-300          |
| 3/4-16   | 210-230        | 285-310          |
| 7/8-9    | 330-350        | 425-475          |
| 7/8-14   | 360-380        | 460-515          |
| 1-8      | 500-525        | 675-710          |
| 1-14     | 540-560        | 730-760          |
| 1 1/8-7  | 600-635        | 815-860          |
| 1 1/8-12 | 665-700        | 920-950          |
| 1 1/4-7  | 850-895        | 1150-1215        |
| 1 1/4-12 | 940-990        | 1275-1340        |
| 1 3/8-6  | 1125-1175      | 1525-1590        |
| 1 3/8-12 | 1280-1335      | 1735-1810        |
| 1 1/2-6  | 1500-1560      | 2035-2115        |
| 1 1/2-12 | 1685-1755      | 2285-2380        |

### IMPORTANT

- Follow these torque recommendations except when specified in text.

## Complete Torque Chart

### Capscrews - Grade 8

**NOTE:**

- Grade 8 capscrews can be identified by six radial dashes on the head.
- For wheel torque requirements, refer to Wheels and Tires.
- Tighten U-bolts evenly and equally to have the same number of threads exposed on each end.



| SIZE     | FOOT<br>POUNDS | NEWTON<br>METERS |
|----------|----------------|------------------|
| 5/16-18  | 20-22          | 27-30            |
| 5/16-24  | 21-23          | 28-31            |
| 3/8-16   | 35-39          | 47-53            |
| 3/8-24   | 36-41          | 49-55            |
| 7/16-14  | 54-58          | 73-78            |
| 7/16-20  | 55-60          | 75-80            |
| 1/2-13   | 82-88          | 110-120          |
| 1/2-20   | 94-99          | 125-135          |
| 9/16-12  | 127-134        | 170-180          |
| 9/16-18  | 147-155        | 199-210          |
| 5/8-11   | 160-170        | 215-230          |
| 5/8-18   | 165-175        | 225-235          |
| 3/4-10   | 280-295        | 380-400          |
| 3/4-16   | 330-365        | 445-495          |
| 7/8-9    | 410-430        | 555-580          |
| 7/8-14   | 420-440        | 570-595          |
| 1-8      | 630-650        | 850-880          |
| 1-14     | 680-700        | 920-950          |
| 1 1/8-7  | 900-930        | 1220-1260        |
| 1 1/8-12 | 930-950        | 1260-1290        |
| 1 1/4-7  | 1250-1300      | 1695-1760        |
| 1 1/4-12 | 1280-1320      | 1735-1790        |

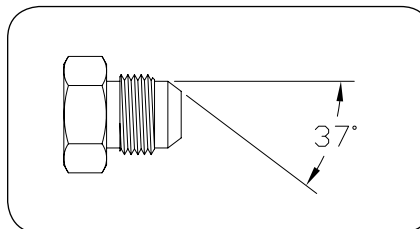
### IMPORTANT

- Follow these torque recommendations except when specified in text.

## **Hydraulic Fittings – Torque and Installation**

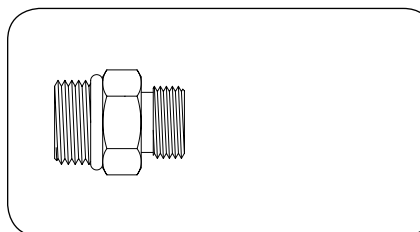
### **SAE Flare Connection (J. I. C.)**

1. Tighten nut with finger until it bottoms the seat.
2. Using a wrench, rotate nut to tighten. Turn nut 1/3 turn to apply proper torque.



### **SAE Straight Thread O-Ring Seal**

1. Back off jam nut and washer to expose smooth surface for O-ring seal.
2. Lubricate o-ring.
3. Thread into port until washer bottoms onto spot face.
4. Position elbows by backing up adapter.
5. Tighten jam nut.



## NH3 Fittings - Torque and Installation

### NPT - NPTF Threads

The proper method of assembling pipe threaded connectors is to assemble them finger tight and then wrench tighten further to the specified number of turns from finger tight (T.F.F.T.) given in the table below. The assembly procedure given below is recommended to minimize the risk of leakage and/or damage to components.

1. Inspect port and connectors to ensure that threads on both are free of dirt, burrs and excessive nicks.
2. Apply thread sealant approved for anhydrous ammonia to male pipe threads. The first one to two threads should be left uncovered to avoid system contamination. If PTFE tape is used, it should be wrapped 1 ½ -2 turns in clockwise direction when viewed from the pipe thread end.



### CAUTION

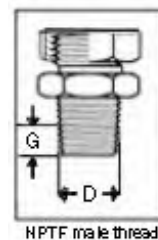
- MORE THAN TWO TURNS OF TAPE MAY CAUSE DISTORTION OR CRACKING OF THE PORT.

3. Screw the connector into the port to the finger tight position.
4. Wrench tighten the connector to the appropriate turns from finger tight (T.F.F.T) values shown in the table, making sure that the tube end of a shaped connector is aligned to receive the incoming tube or hose assembly.

### IMPORTANT

- Never back off (loosen) pipe threaded connectors to achieve alignment.
5. If leakage persists after following the above steps, check for damaged threads and total number of threads engaged.

| Thread Size<br>NPTF | Inches<br>Millimeter          | Threads<br>Per Inch | Pitch                | D                    | G                   | Assembly Turns<br>(Steel) |
|---------------------|-------------------------------|---------------------|----------------------|----------------------|---------------------|---------------------------|
|                     |                               |                     |                      |                      |                     | T.F.F.T.                  |
| 1/8"                | $\frac{\text{in}}{\text{mm}}$ | 27                  | $\frac{0.037}{0.94}$ | $\frac{0.40}{10.24}$ | $\frac{0.16}{4.1}$  | 2 - 3                     |
| 1/4"                | $\frac{\text{in}}{\text{mm}}$ | 18                  | $\frac{0.056}{1.41}$ | $\frac{0.54}{13.61}$ | $\frac{0.23}{5.8}$  | 2 - 3                     |
| 3/8"                | $\frac{\text{in}}{\text{mm}}$ | 18                  | $\frac{0.056}{1.41}$ | $\frac{0.67}{17.05}$ | $\frac{0.24}{6.1}$  | 2 - 3                     |
| 1/2"                | $\frac{\text{in}}{\text{mm}}$ | 14                  | $\frac{0.071}{1.81}$ | $\frac{0.84}{21.22}$ | $\frac{0.32}{8.1}$  | 2 - 3                     |
| 3/4"                | $\frac{\text{in}}{\text{mm}}$ | 14                  | $\frac{0.071}{1.81}$ | $\frac{1.05}{26.56}$ | $\frac{0.34}{8.6}$  | 1.5 - 2.5                 |
| 1 1/4"              | $\frac{\text{in}}{\text{mm}}$ | 11 1/2              | $\frac{0.087}{2.21}$ | $\frac{1.33}{33.78}$ | $\frac{0.42}{10.7}$ | 1.5 - 2.5                 |
| 1 1/2"              | $\frac{\text{in}}{\text{mm}}$ | 11 1/2              | $\frac{0.087}{2.21}$ | $\frac{1.89}{48.05}$ | $\frac{0.42}{10.7}$ | 1.5 - 2.5                 |

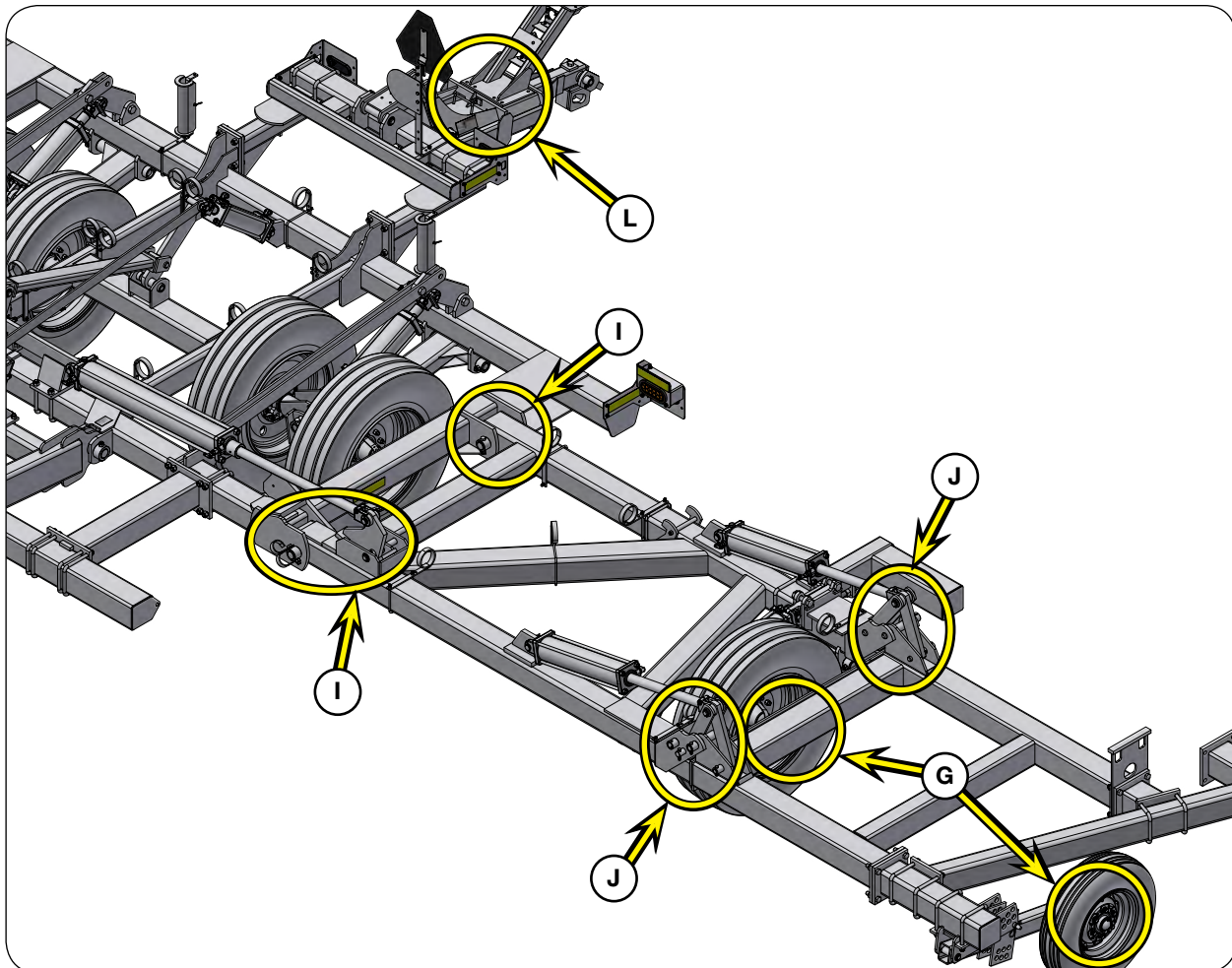
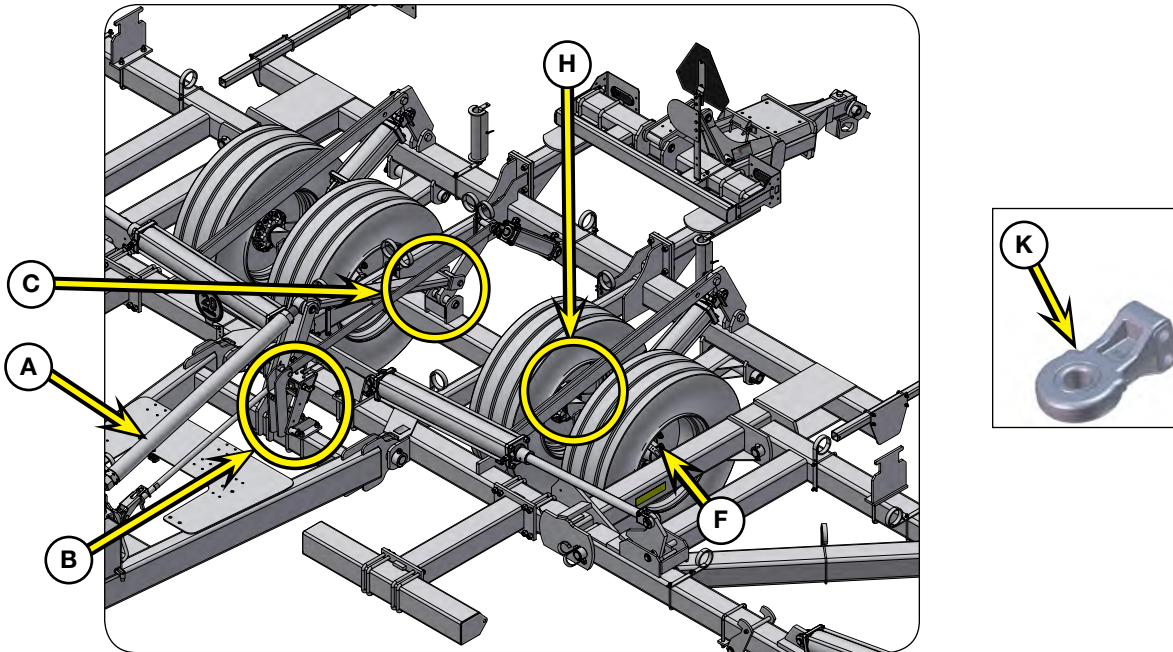


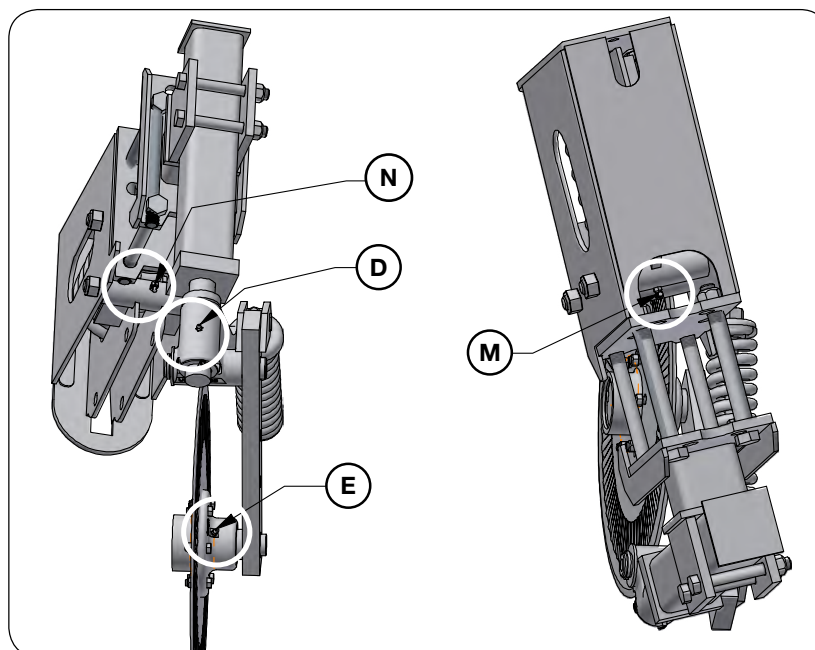
## Section IV

### Maintenance

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## Lubrication



**Lubrication (continued)**

To keep your applicator in top operating condition and to assure its proper performance and reliability for a long period of time, periodic inspection and lubrication is a must.

Use EP-2 lubricant at the locations described in the chart.

All exposed cylinder rods should be coated with grease before seasonal storage to prevent rusting. Remove depth collars and lubricate exposed cylinder rods.

The lubrication locations and recommended schedule are as follows:

| ITEM | DESCRIPTION                                    | POINT | QTY.     | HOURS             |
|------|------------------------------------------------|-------|----------|-------------------|
| A    | Depth Control Turnbuckle Assembly*             | 2     | 2 Shots  | 50 Hours          |
| B    | Stop Arm with Plunger Assembly                 | 1     | 1 Shot   | Weekly            |
| C    | Tongue Cylinder Arm Linkage                    | 4     | 1 Shot   | Weekly            |
| D    | Coulter Arm Pivot                              | 2     | 2 Shots  | Weekly            |
| E    | Coulter Hub                                    | -     | 10 Shots | Once Every Season |
| F    | Main Frame Transport Wheel Hub                 | 2     | Repack   | Once Every Season |
| G    | Wing Gauge Wheel Hub                           | 4     | Repack   | Once Every Season |
| H    | Main Frame Gauge Wheel Pivot                   | 8     | 5 Shots  | Weekly            |
| I    | Main Frame to Primary Wing Hinge               | 4     | 5 Shots  | Weekly            |
| J    | Primary Wing to Secondary Wing Hinge & Linkage | 6     | 5 Shots  | Weekly            |
| K    | Hitch                                          | 2     | 2 Shots  | Weekly            |
| L    | Nurse Tank - Under Hitch                       | 1     | 2 Shots  | Weekly            |
| M    | Spring Retainer                                | 1     | 1 Shot   | Once Every Season |
| N    | Shank Holder                                   | 1     | 1 Shot   | Once Every Season |

**\*NOTE - ITEM A:** Turn adjustable link two full turns in each direction to ensure threads do not seize.

## Hydraulics

### Purging A Hydraulic System

#### **WARNING**

- RELIEVE HYDRAULIC SYSTEM OF ALL PRESSURE BEFORE ADJUSTING OR SERVICING. SEE TRACTOR OPERATOR'S MANUAL FOR PROPER PROCEDURES.
- HIGH-PRESSURE FLUIDS CAN PENETRATE THE SKIN AND CAUSE SERIOUS INJURY OR DEATH. SEEK MEDICAL TREATMENT IMMEDIATELY IF INJURED BY HIGH-PRESSURE FLUIDS. USE CARDBOARD OR WOOD TO DETECT LEAKS IN THE HYDRAULIC SYSTEM.
- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.

1. Purge air from system as follows:

- A. Clear all personnel and objects from the area, including where the machine will have full range of motion during the hydraulic movement. Remove transport locks from the machine.
- B. Pressurize the system and maintain the system at full pressure for at least 5 seconds after the cylinder rods stop moving, or hydraulic motors have completed the required movement. Check that all movements are fully completed.
- C. Check oil reservoir in the hydraulic power source and refill as needed.
- D. Pressurize the system again to reverse the motion of step B. Maintain pressure on the system for at least 5 seconds after the cylinder rods stop moving, or hydraulic motors have completed the required movement. Check that all movements are fully completed.
- E. Check for hydraulic oil leaks using cardboard or wood. Tighten connections according to directions in the Torque Specifications in the MAINTENANCE section.
- F. Repeat steps in B, C, D, and E 10-12 times.

## 2500 Maintenance

### **DANGER**

- ELECTROCUTION WILL CAUSE SERIOUS INJURY OR DEATH. THE IMPLEMENT IS NOT INSULATED. KEEP AWAY FROM ALL ELECTRICAL LINES AND DEVICES. ELECTROCUTION CAN OCCUR WITHOUT DIRECT CONTACT.
- 

### **WARNING**

- TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.
- 
- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.
- 
- KEEP HANDS CLEAR OF PINCH POINT AREAS.
- 
- ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING WITH OR NEAR CHEMICALS. THIS EQUIPMENT INCLUDES, BUT IS NOT LIMITED TO: PROTECTIVE EYE WEAR, GLOVES, SHOES, SOCKS, LONG-SLEEVED SHIRT, AND LONG PANTS. ADDITIONAL PROTECTION MAY BE REQUIRED FOR MANY TYPES OF CHEMICALS.
- 
- AVOID BREATHING SPRAY MIST OR VAPOR.
- 
- WASH HANDS BEFORE EATING, DRINKING, CHEWING GUM, OR USING TOILET.
- 
- NEW HYDRAULIC SYSTEMS OR SYSTEMS THAT HAVE BEEN MAINTAINED MUST BE PURGED OF AIR BEFORE OPERATING OR MOVING MACHINE TO PREVENT SERIOUS INJURY OR DEATH.
- 

### **CAUTION**

- SHARP EDGES ON COULTER BLADES AND KNIVES CAN CAUSE SERIOUS INJURY. BE CAREFUL WHEN WORKING AROUND COULTER BLADES AND KNIVES.
-

**2500 Maintenance (continued)****Seasonal Storage**

Check coulter swivel for wear. Replace as needed. See FIG. 4-1 on next page.

Always open all valves to remove any fluids and to allow moisture to dry.

Immediately, after the season is finished, completely wash machine to remove corrosive fertilizer inside and out before storing. When using pressure washers maintain an adequate distance so not to force water into bearings, hydraulic seals, or electrical connections.

Repaint all areas where paint has been removed to keep rust from developing. Coat areas of coulter blades and knives, if equipped, and coulter posts with rust preventative material.

Coat exposed cylinder piston rods with rust preventative material.

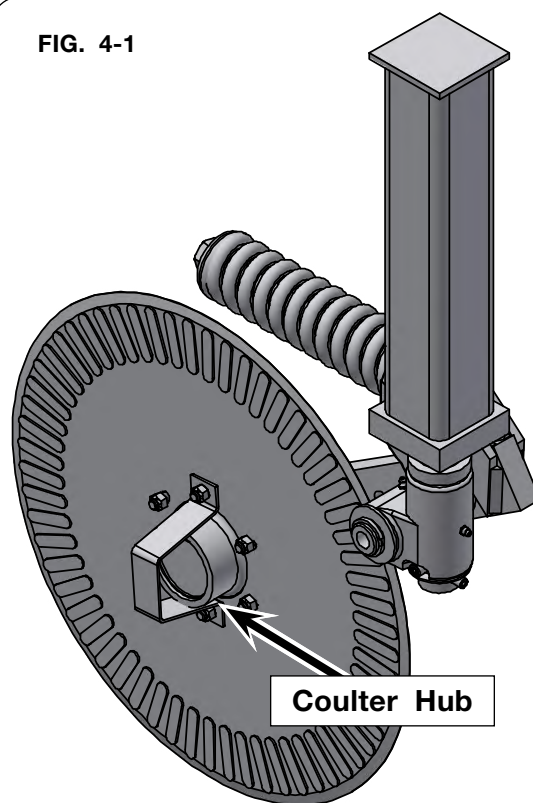
Inspect machine for parts that may need to be replaced so they may be ordered in the off season.

Lubricate machine at all points outlined.

Check coulter hubs for free rotation. If blade hubs do not rotate, replace and/or pack bearings with grease. Replace coulter arm if spindle is damaged. (FIG. 4-1)

After period of unused time, unit should be unfolded and refolded to check function of hydraulic system.

FIG. 4-1



**NH3 Bleed Procedure**

- ELECTROCUTION WILL CAUSE SERIOUS INJURY OR DEATH. THE IMPLEMENT IS NOT INSULATED. KEEP AWAY FROM ALL ELECTRICAL LINES AND DEVICES. ELECTROCUTION CAN OCCUR WITHOUT DIRECT CONTACT.



- TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.
- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.
- KEEP HANDS CLEAR OF PINCH POINT AREAS.
- ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING WITH OR NEAR CHEMICALS. THIS EQUIPMENT INCLUDES, BUT IS NOT LIMITED TO: PROTECTIVE EYE WEAR, GLOVES, SHOES, SOCKS, LONG-SLEEVED SHIRT, AND LONG PANTS. ADDITIONAL PROTECTION MAY BE REQUIRED FOR MANY TYPES OF CHEMICALS.
- AVOID BREATHING SPRAY MIST OR VAPOR.
- WASH HANDS BEFORE EATING, DRINKING, CHEWING GUM, OR USING TOILET.

**Changing Anhydrous Tanks**

1. Park the machine on a firm level surface. Ensure the machine is downwind of where you will be working on it. Lower the machine to the ground or transport stands and set the tractor parking brake.
2. Put on the appropriate PPE including long sleeve shirt, protective gloves, and chemical splash goggles. Ensure the water tank is filled.

Protective gloves: Gauntlet-style made of rubber or other material impervious to anhydrous ammonia with sufficient length to allow for cuffing and which provide thermal protection suitable for anhydrous ammonia exposure.

Chemical splash goggles: Flexible fitting chemical-protective goggles with a hooded indirect ventilation system to provide primary protection of the eyes and eye sockets from the splash of hazardous liquids. Designed to meet the requirements of ANSI Z87.1.

### NH3 Bleed Procedure (continued)

3. Completely close the feed valve that is attached to the tank.



4. Completely close the hose end valve attached to the feed line going to applicator.



5. Crack the bleeder attached to the ACME coupler and allow anhydrous to bleed out.

6. Once anhydrous stops bleeding out, shake the line to make sure it is completely empty. If more gas bleeds out, allow it to finish and repeat this step.



7. Carefully loosen ACME nut and unthread slowly until the threaded hose connection is completely disconnected from the tank valve.
8. Store the ACME connector on the parking plug provided on the applicator.
9. Unhook the tank from the applicator.
10. Inspect the ACME gasket on the connectors for damage and replace if needed.
11. Hook up the next Anhydrous tank to the applicator and ensure the transport chain is attached.

**NH3 Bleed Procedure (continued)**

12. Unhook the ACME coupler from the parking plug.



- **DAMAGED ACME GASKETS OR LACK OF ONE COULD CAUSE INADEQUATE SEALING RESULTING IN INJURY OR DEATH**

13. Thread the ACME coupler onto the new tank.

- Always check to make sure there is a good ACME gasket seal on the tank connection.

14. Hook up the ACME coupler to the tank connection.

15. Close all bleeder valves.

16. Slowly crack open the main valve on the tank. Before opening the hose-end valve, the pressure will not reach the feed hose. Allow the pressure to equalize. Once you stop hearing flow, open the valve the rest of the way. Repeat this process for the hose-end valve on the feed line to the applicator.

**NOTE:** There won't be flow into the hose until the hose-end valve is opened.

17. Resume anhydrous ammonia application.

**Complete Bleeding Procedure for Toolbar**

- Park the unit on a firm, level surface. Ensure the potential release points for anhydrous ammonia are downwind of where you will be working. Note that some bleed valves exhaust to the applicator's vapor knives. Lower the toolbar to the ground and allow the knives to engage into the ground. Shut off the tractor and remove the ignition key.
- Put on the appropriate PPE including long-sleeve shirt, protective gloves, and chemical splash goggles. Ensure the water tank is filled.



- **ADDITIONAL PPE WOULD BE APPROPRIATE FOR ANY MAINTENANCE OR REPAIR ACTIVITIES WHICH MAY RESULT IN UNEXPECTED RELEASE OF ANHYDROUS AMMONIA (SUCH AS THE REPLACEMENT OF A SYSTEM COMPONENT OR THE RECONNECTION OF A BREAK-AWAY COUPLER). A HALF-FACE OR ESCAPE RESPIRATOR SUITABLE FOR ANHYDROUS AMMONIA WOULD PROVIDE PROTECTION AGAINST INHALATION HAZARDS.**

- Completely close tank withdraw valve on the anhydrous tank and hose-end valve on feed line to toolbar.
- Bleed the system down by opening the bleeder valves on applicator and supply hoses.
- Allow the valves to completely bleed. Shake all hoses to ensure they are completely bled.

## Coupler Operations



- EXPOSURE TO ANHYDROUS AMMONIA (NH<sub>3</sub>) WILL CAUSE SERIOUS INJURY OR DEATH.
  - AVOID BREATHING NH<sub>3</sub> VAPORS. ALWAYS REMAIN UPWIND WHEN WORKING ON NH<sub>3</sub> SYSTEM.
  - IMMEDIATELY FLUSH EXPOSED AREAS WITH CLEAN WATER AND SEEK MEDICAL TREATMENT.
  - ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT (PPE) WHEN WORKING WITH OR NEAR NH<sub>3</sub>. THIS INCLUDES BUT IS NOT LIMITED TO APPROPRIATE GAUNTLET STYLE GLOVES, INDIRECT VENT CHEMICAL SPLASH GOGGLES, SHOES, SOCKS, LONG SLEEVED SHIRT AND LONG PANTS.
- 
- EXPOSURE TO ANHYDROUS AMMONIA (NH<sub>3</sub>) WILL CAUSE SERIOUS INJURY OR DEATH. ONLY OPEN A NURSE TANK VALVE DURING APPLICATION. DO NOT TRANSPORT, PARK, OR LEAVE THE APPLICATOR UNATTENDED WITH THE VALVE OPEN.

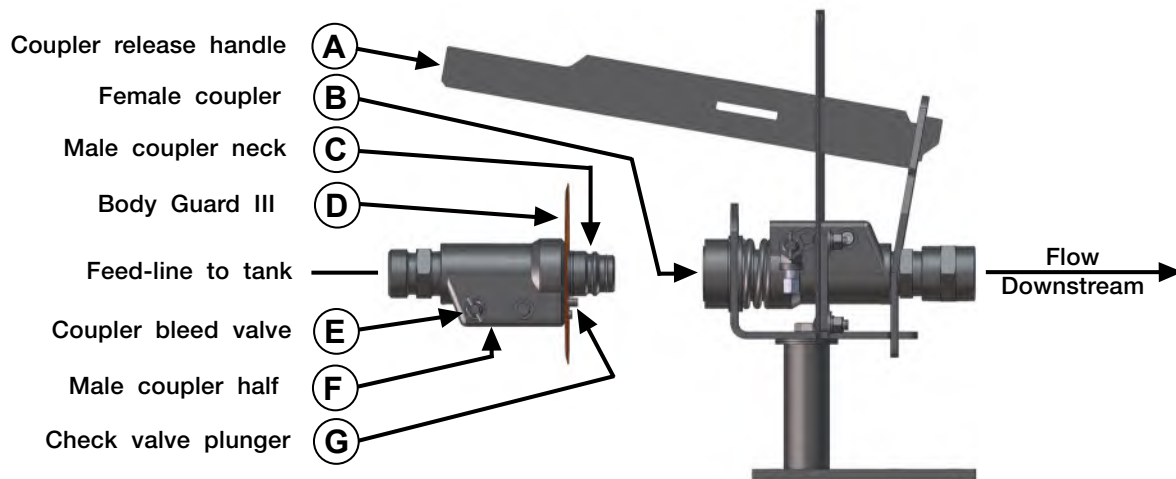


FIG. 4-2

## Connecting

1. Stand on the upwind side. Close all feed-line valves and inspect all components for proper condition.
2. Relieve pressure between male coupler (F) and first shutoff valve towards nurse tank by carefully opening coupler bleed valve (E). The Flo-Max coupler is designed to re-couple safely with pressure on the female coupler half (B). (FIG. 4-2)

**NOTE:** Leave coupler bleed valve (E) open for now. (FIG. 4-2)

## Coupler Operations (continued)

3. While holding and pointing the hose and male coupler (F) downwind and away from your person, depress check valve plunger (G) with gloved finger to ensure proper operation (FIG. 4-2 & FIG. 4-3). Wipe foreign debris from coupler neck (C) with clean cloth.
4. Make certain BodyGuard III (D) is installed fully with slot oriented around check valve plunger (G) to protect against ammonia spray-back during coupling (FIG. 4-2 & FIG. 4-4).
5. Insert male coupler neck (C) into female coupler half (B) as far as possible (FIG. 4-2 & FIG. 4-4).

**NOTE:** Then, while applying insertion pressure, pull downward on coupler release handle (A) to complete the coupling process. Release handle (A) after engagement of coupler neck (C) (FIG. 4-2 & FIG. 4-5).

6. Lightly pull on male coupler (F) to ensure proper engagement.
7. Close bleed valve (E) and others if open. Open tank and hose valves just prior to applying ammonia.

FIG. 4-3

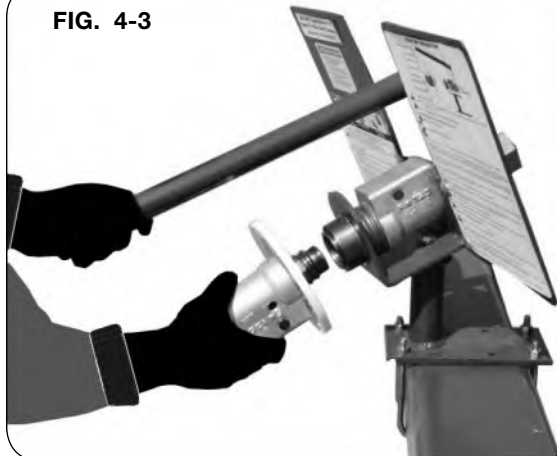
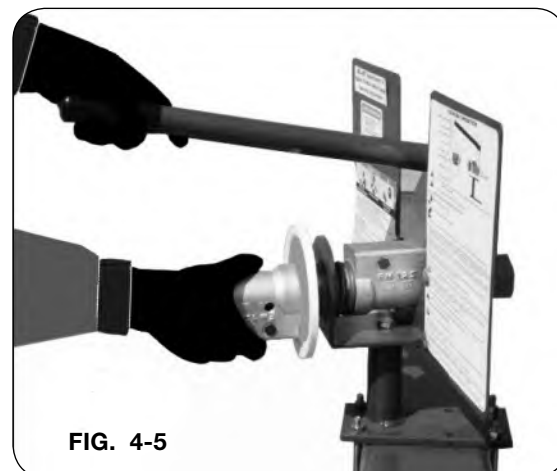


FIG. 4-4



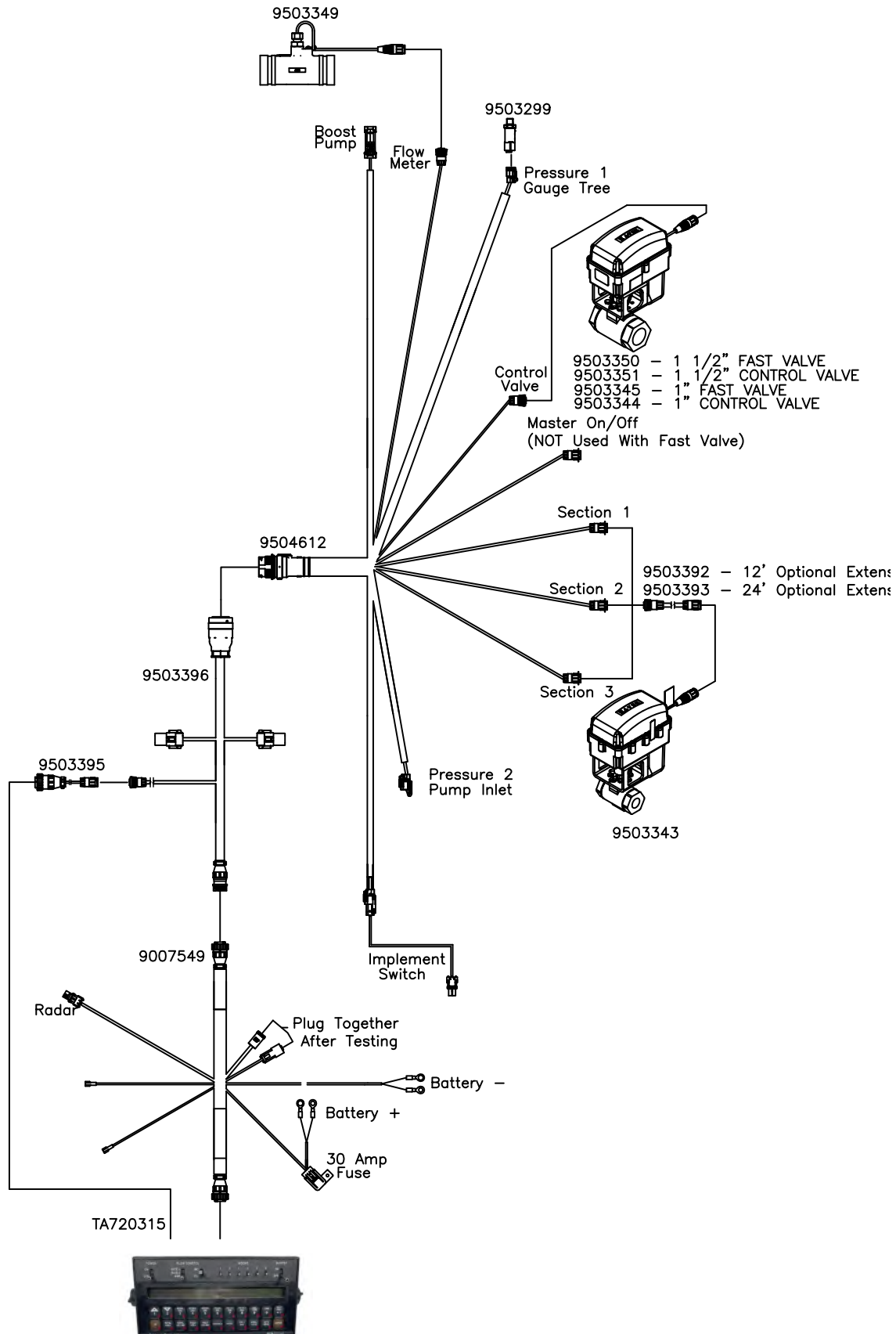
FIG. 4-5

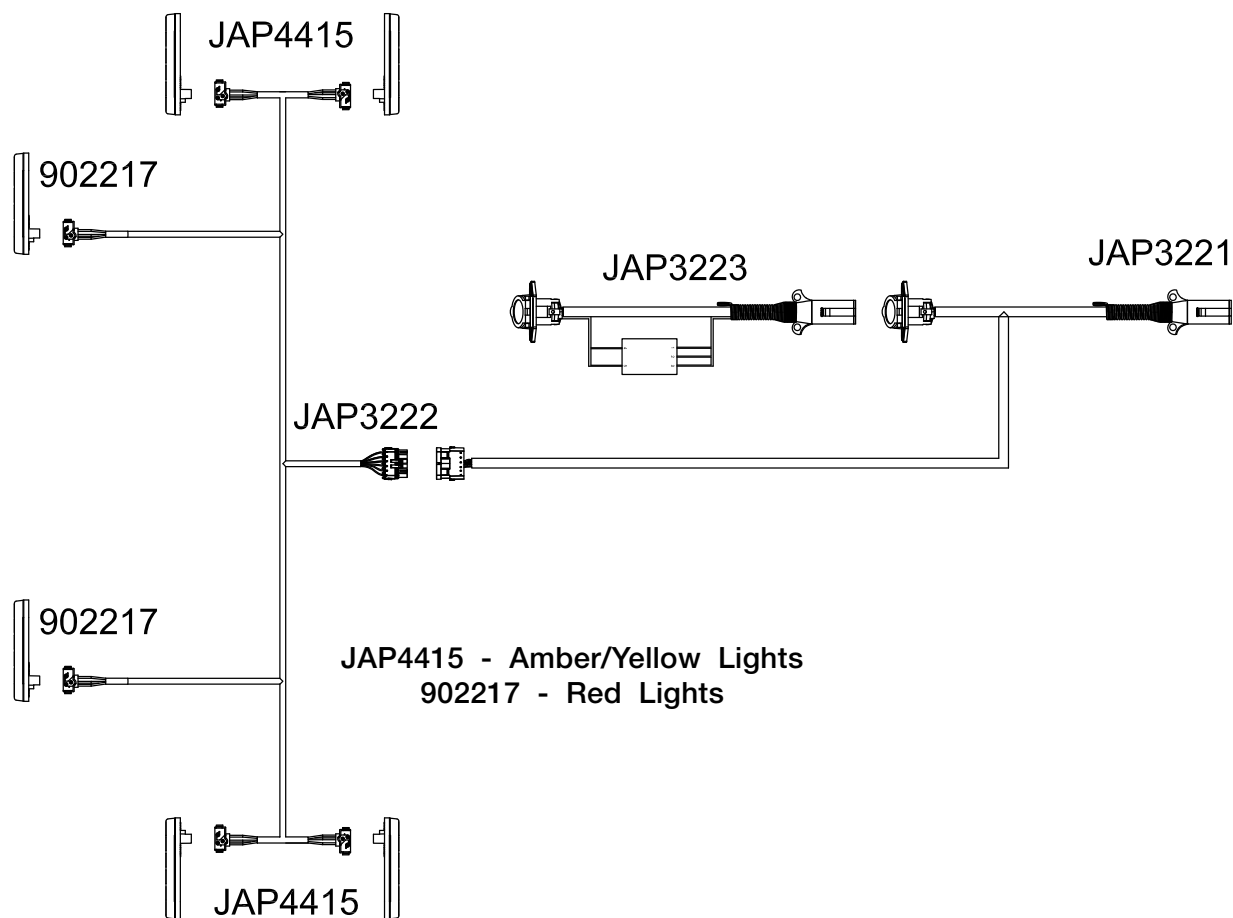


## Disconnect

1. After closing all valves, bleed pressure from male coupler half (F) by opening coupler bleed valve (E). Leave bleed valve (E) open. (FIG. 4-2)
2. Then, pull down on coupler release handle (A) and remove male coupler half (F).

## Electrical Layout - Raven 450 Rate Controller

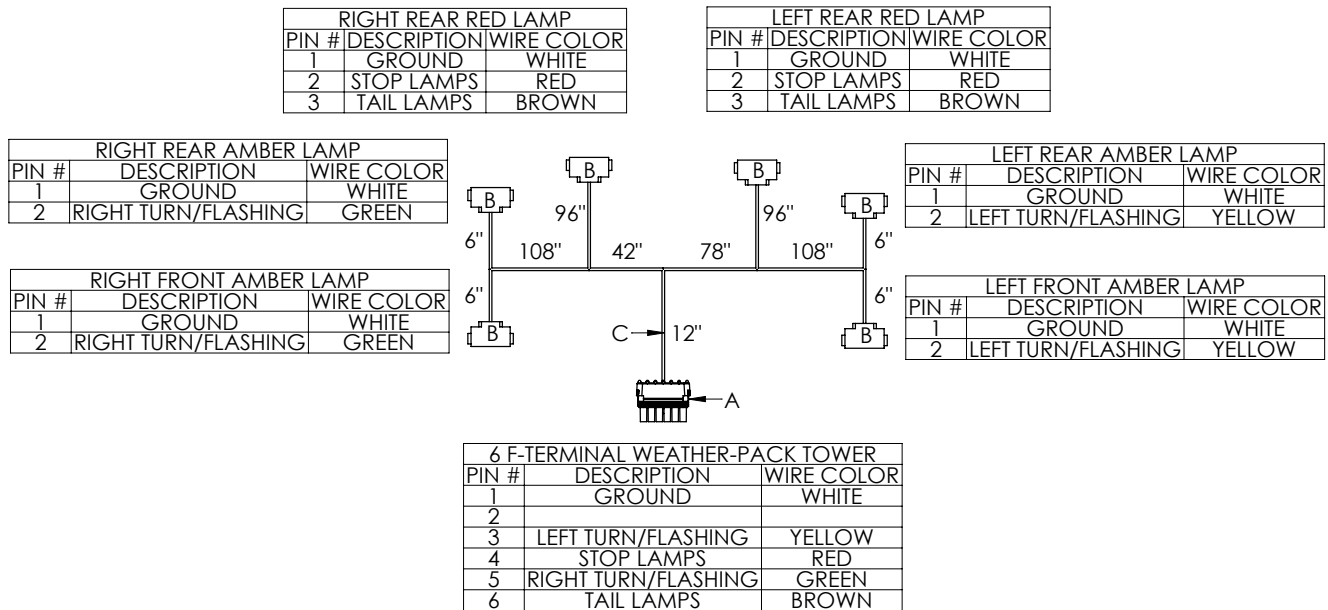


**Electrical Layout - Lighting**

## Schematic — Electrical

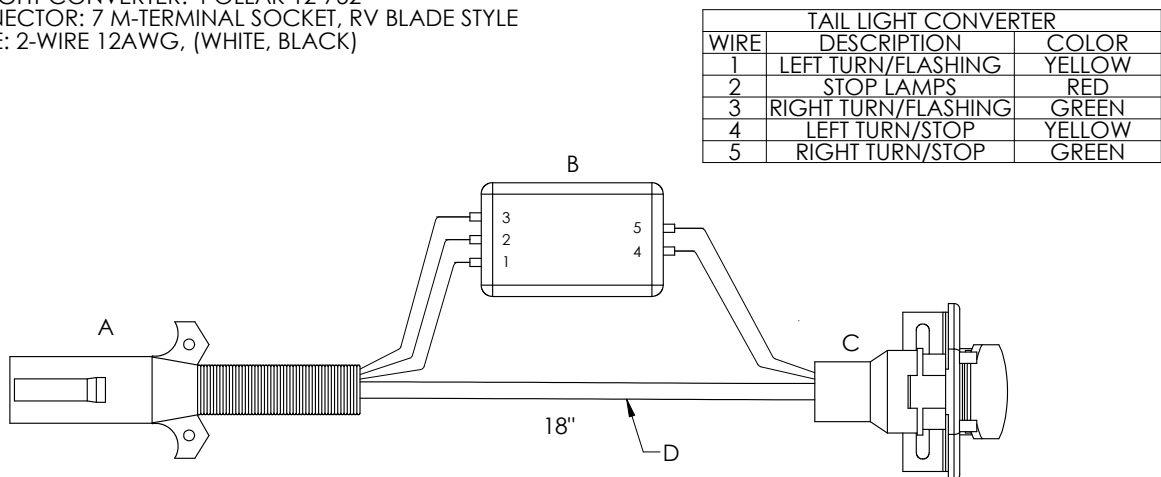
### Electrical Harness - Rear 27' (JAP3222)

- A. CONNECTOR: PACKARD, FLAT 6-F TERMINAL WEATHER-PACK TOWER  
 B. CONNECTOR: 3 M-TERMINAL RIGHT ANGLE LIGHT PLUG  
 C. WIRE: 16AWG-COLORS: WHITE, YELLOW, RED, GREEN, BROWN



### Electrical Harness - AG Plug to RV Socket (JAP3223)

- A. CONNECTOR: 7 F-TERMINAL PLUG CONFORMING TO SAE J560  
 B. TAIL LIGHT CONVERTER: POLLAK 12-752  
 C. CONNECTOR: 7 M-TERMINAL SOCKET, RV BLADE STYLE  
 D. CABLE: 2-WIRE 12AWG, (WHITE, BLACK)

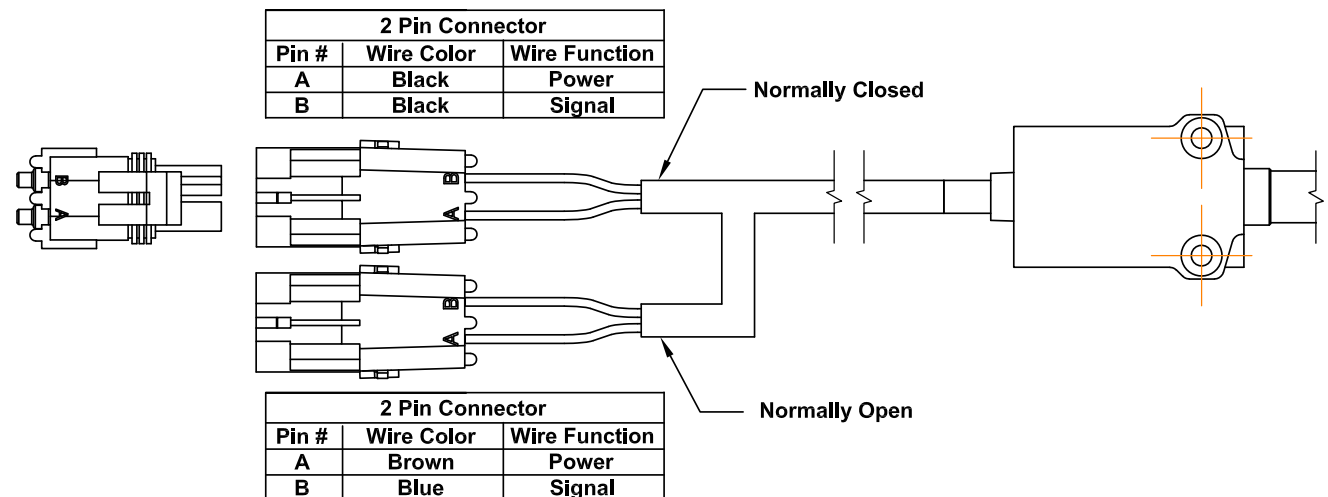


| 7 F-TERMINAL SAE J560 PLUG |                     |            |
|----------------------------|---------------------|------------|
| PIN #                      | DESCRIPTION         | WIRE COLOR |
| 1                          | GROUND              | WHITE      |
| 2                          | CLEARANCE/MARKER    | BLACK      |
| 3                          | LEFT TURN/FLASHING  | YELLOW     |
| 4                          | STOP LAMPS          | RED        |
| 5                          | RIGHT TURN/FLASHING | GREEN      |
| 6                          | TAIL LAMPS          | BROWN      |
| 7                          |                     |            |

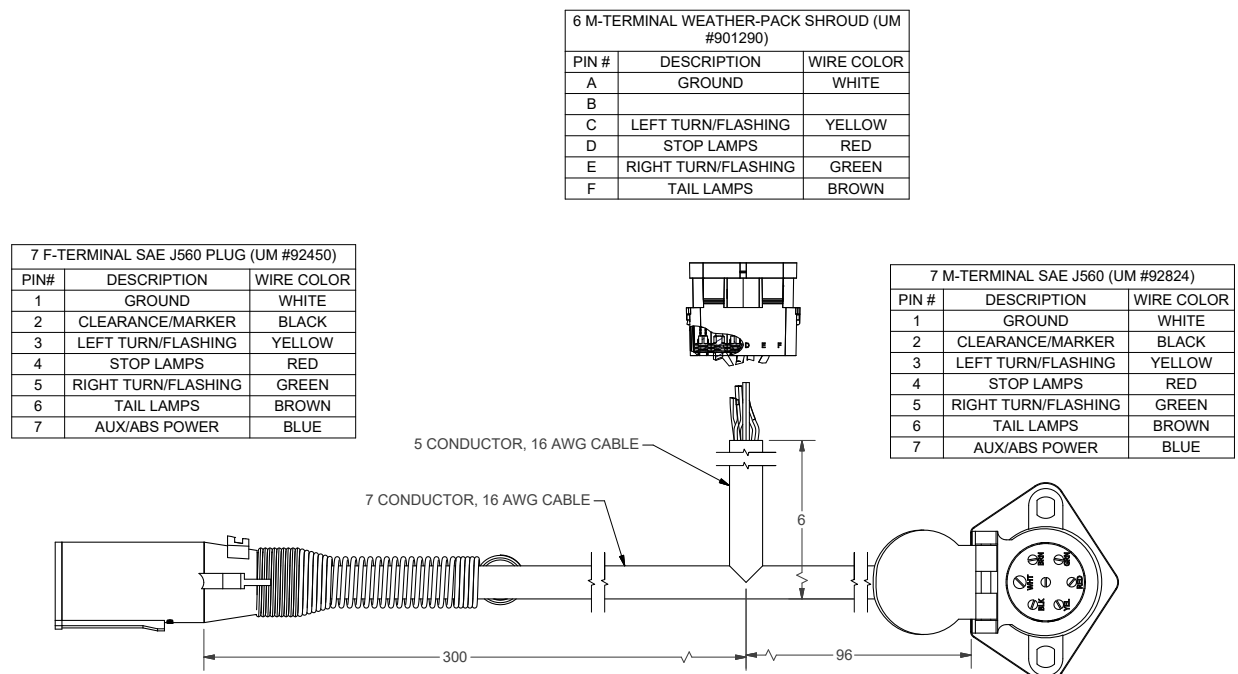
| 7 M-TERMINAL RV BLADE SOCKET |                     |            |
|------------------------------|---------------------|------------|
| PIN #                        | DESCRIPTION         | WIRE COLOR |
| 1                            | GROUND              | WHITE      |
| 2                            |                     |            |
| 3                            | TAIL/RUNNING LIGHTS | BROWN      |
| 4                            | +12V SWITCHED PWR   | BLACK      |
| 5                            | LEFT TURN/STOP      | YELLOW     |
| 6                            | RIGHT TURN/STOP     | GREEN      |
| 7                            |                     |            |

**Schematic — Electrical (continued)**

**Electrical Harness - Limit Switch Assembly (416395)**

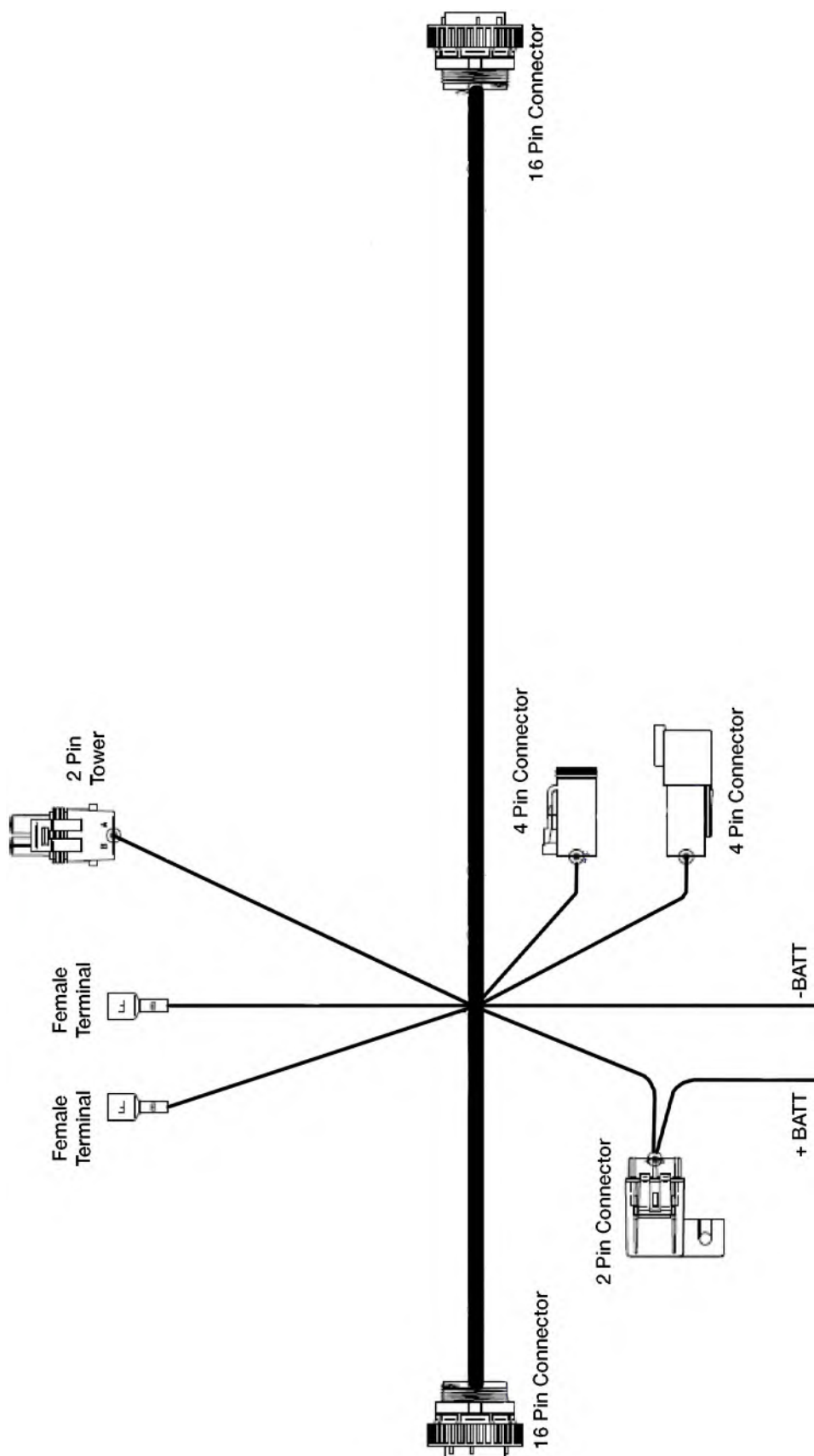


**Electrical Harness - Main Lighting, 33' (JAP3221)**



**Schematic — Electrical (continued)**

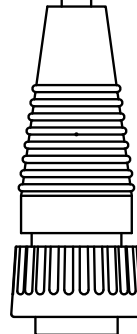
**Electrical Harness - 450 Console Controller (9007549)**



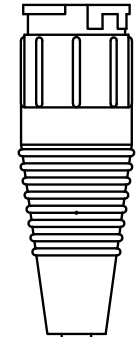
**Schematic — Electrical (continued)**

**Electrical Harness - 12 Ft. Extension (9503392) - For On/Off Valve**  
**Electrical Harness - 24 Ft. Extension (9503393) - For On/Off Valve**

4-Pin Connector  
Pin 1 — CBL-SLD  
Pin 2 — CBL-BLK  
Pin 3 — CBL-WHT  
Pin 4 — CBL-RED



4-Pin Connector  
Pin 1 — CBL-SLD  
Pin 2 — CBL-BLK  
Pin 3 — CBL-WHT  
Pin 4 — CBL-RED

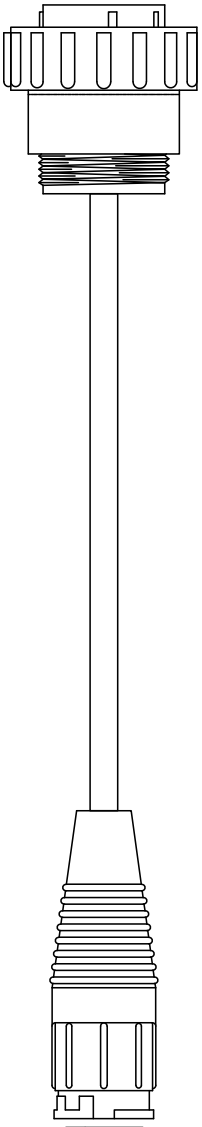


**Schematic — Electrical (continued)**

**Electrical Harness - Console 10 Ft. (9503395) - Transducer to Console**

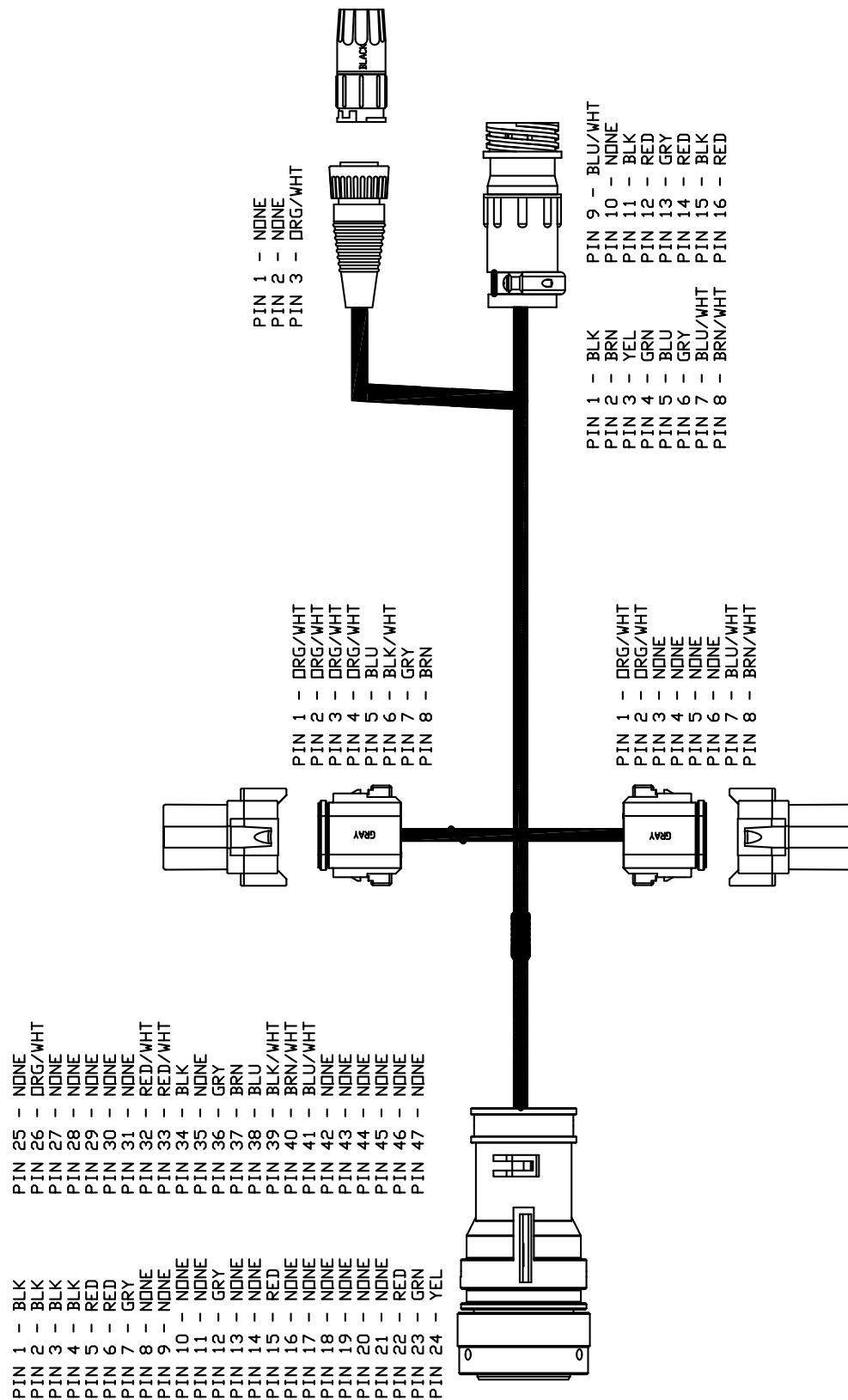
PIN 1 - NONE  
PIN 2 - NONE  
PIN 3 - NONE  
PIN 4 - NONE  
PIN 5 - NONE  
PIN 6 - NONE  
PIN 7 - NONE  
PIN 8 - CBL-RED  
PIN 9 - CBL-WHT  
PIN 10 - CBL-BLK  
PIN 11 - NONE  
PIN 12 - NONE  
PIN 13 - NONE  
PIN 14 - NONE

PIN 1 - CBL-WHT  
PIN 2 - CBL-RED  
PIN 3 - CBL-BLK



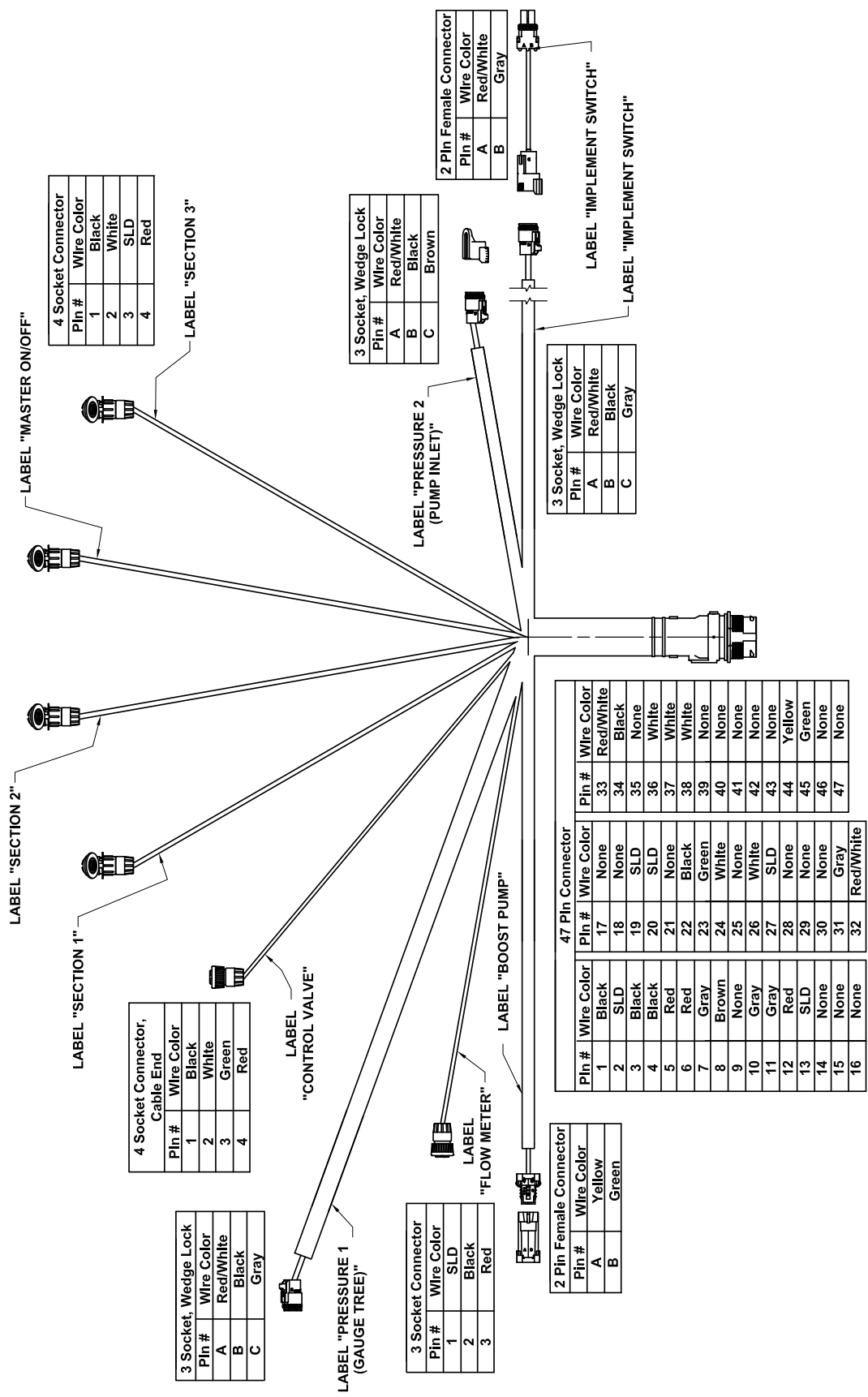
Schematic — Electrical (continued)

Electrical Harness - 16 Pin Console to 47 Pin Connector (9503396)



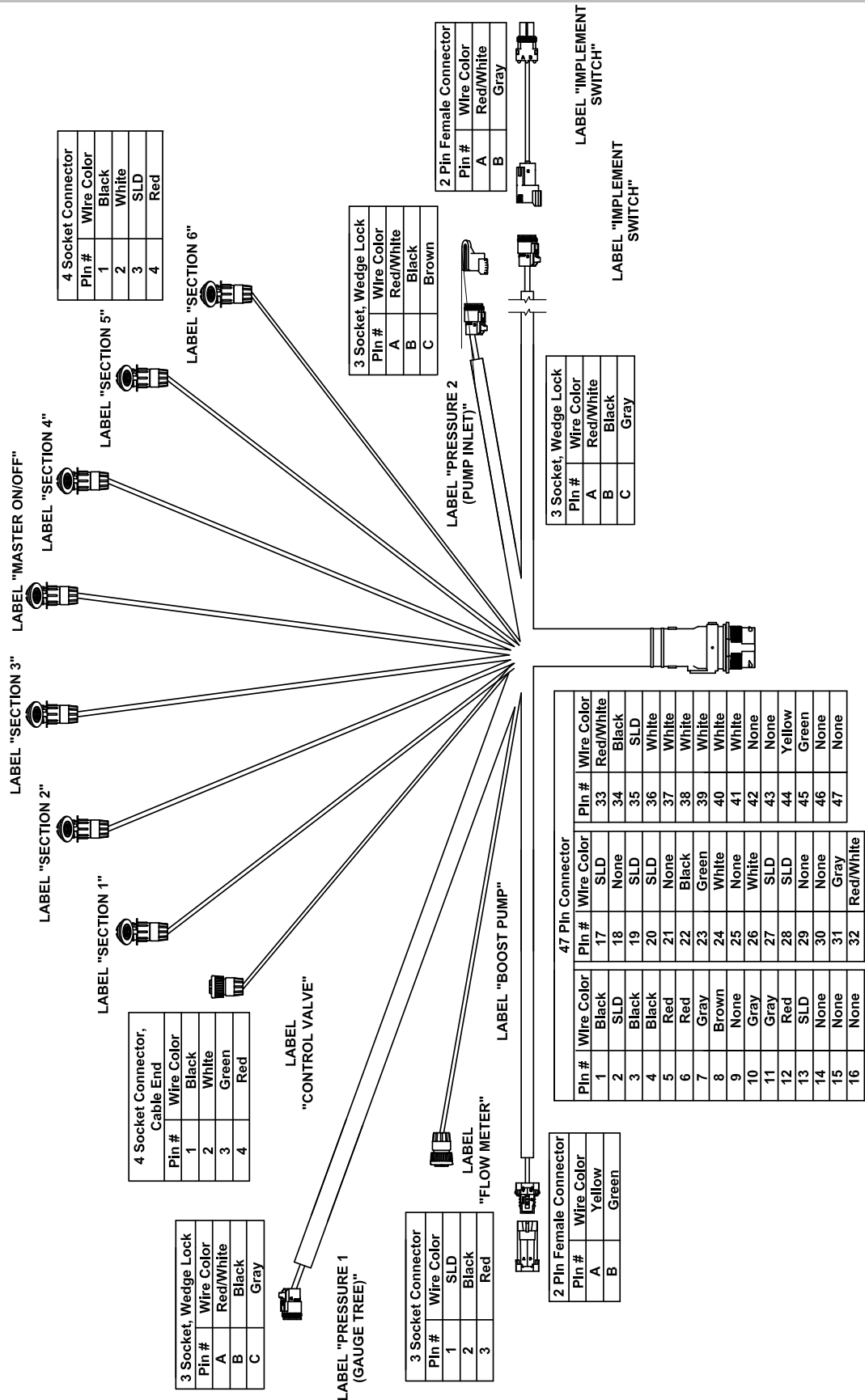
Schematic — Electrical (continued)

Electrical Harness - RCM Accu-Flow - 3 Section (9504612)



Schematic — Electrical (continued)

Electrical Harness - RCM Accu-Flow - 6 Section (9504613)



## Wheel, Hub and Spindle Disassembly and Assembly

### **WARNING**

- TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.
- FALLING OBJECTS CAN CAUSE SERIOUS INJURY OR DEATH. DO NOT WORK UNDER THE MACHINE AT ANY TIME WHILE BEING HOISTED. BE SURE ALL LIFTING DEVICES AND SUPPORTS ARE RATED FOR THE LOADS BEING HOISTED. THESE ASSEMBLY INSTRUCTIONS WILL REQUIRE SAFE LIFTING DEVICES UP TO 30,000 LBS. SPECIFIC LOAD RATINGS FOR INDIVIDUAL LOADS WILL BE GIVEN AT THE APPROPRIATE TIME IN THE INSTRUCTIONS.
- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.
- KEEP HANDS CLEAR OF PINCH POINT AREAS.

### **CAUTION**

- IMPROPERLY TORQUED WHEEL NUTS/BOLTS CAN CAUSE A LOSS OF IMPLEMENT CONTROL AND MACHINE DAMAGE. TORQUE WHEEL NUTS/BOLTS TO VALUES IN TABLE. CHECK TORQUE BEFORE USE, AFTER ONE HOUR OF UNLOADED USE OR AFTER FIRST LOAD, AND EACH LOAD UNTIL WHEEL NUTS/BOLTS MAINTAIN TORQUE VALUE. CHECK TORQUE EVERY 10 HOURS OF USE THERE-AFTER. AFTER EACH WHEEL REMOVAL START TORQUE PROCESS FROM BEGINNING. WARRANTY DOES NOT COVER FAILURES CAUSED BY IMPROPERLY TORQUED WHEEL NUTS/BOLTS.

### **IMPORTANT**

- *Remove only one wheel and tire from a side at any given time in the following procedure.*
1. Hitch implement to tractor. Park on a firm, level surface. Set the tractor's parking brake, shut off engine and remove key.
  2. Use a safe lifting device rated at 30,000 lbs. to support the weight of your implement. Place the safe lifting device under the axle closest to the tire.
  3. Use a 300 lbs. safe lifting device to support the wheel and tire during removal.
  4. If only removing wheel and tire, skip to Step 8; otherwise continue with Step 4.



Remove the hardware retaining the hubcap. Next, remove the hubcap, gasket, cotter pin, castle nut and spindle washer. Remove hub with bearings from old spindle using a 200 lbs. lifting device.

**Wheel, Hub and Spindle Disassembly and Assembly (continued)**

5. Inspect the spindle and replace if necessary. If spindle does not need to be replaced, skip to Step 6; otherwise continue with Step 5.

Remove the bolt and lock nut that retain the spindle to the axle. Using a lifting device rated for 200 lbs., remove the old spindle. Coat spindle shaft with anti-seize lubricant prior to installation. Reuse bolt and lock nut to retain spindle to axle. Torque as outlined in Maintenance Section.

6. Remove seal and inspect bearings, spindle washer, castle nut and cotter pin. Replace if necessary. Pack both bearings with Extreme Pressure NLGI #2 grease and reinstall inner bearing. Install new seal in hub with garter spring facing inward to the hub by tapping on flat plate that completely covers seal while driving it square to hub. Install until flush with back face of hub. Using a 200 lb. rated lifting device, install hub assembly onto spindle. Install outer bearing, spindle washer and castle nut.

**IMPORTANT**

- *Do not use an impact wrench!*
7. Slowly tighten castle/slotted nut while spinning the hub until hub stops rotating. Turn castle nut counterclockwise until the hole in the spindle aligns with the next notch in castle nut. Hub should spin smoothly with minimal drag and no end play. If play exists, tighten to next notch of castle nut. If drag exists, then back castle nut to next notch. Spin and check again. Install cotter pin. Clean face for hub cap gasket and install gasket, grease-filled hub cap and retain hubcap with hardware removed. Tighten hubcap hardware in alternating pattern.
  8. Attach the wheel(s) and tire(s) to the hub using the same rated safe lifting device for removal. Tighten wheel nuts to appropriate requirements and recheck as outlined in the Wheels and Tires section of this manual.
  9. Raise implement, remove lifting device and lower tire to the ground.

## Wheels and Tires

### Wheel Nut Torque Requirements

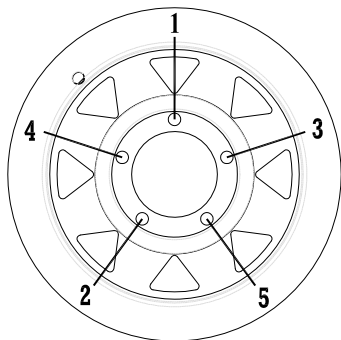


## CAUTION

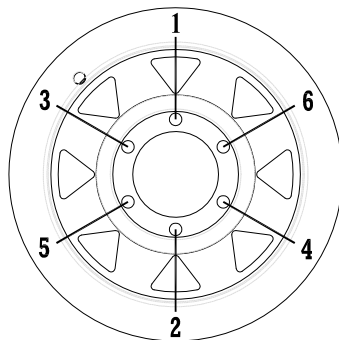
- IMPROPERLY TORQUED WHEEL NUTS/BOLTS CAN CAUSE A LOSS OF IMPLEMENT CONTROL AND MACHINE DAMAGE. TORQUE WHEEL NUTS/BOLTS TO VALUES IN TABLE. CHECK TORQUE BEFORE USE, AFTER ONE HOUR OF UNLOADED USE OR AFTER FIRST LOAD, AND EACH LOAD UNTIL WHEEL NUTS/BOLTS MAINTAIN TORQUE VALUE. CHECK TORQUE EVERY 10 HOURS OF USE THEREAFTER. AFTER EACH WHEEL REMOVAL START TORQUE PROCESS FROM BEGINNING. WARRANTY DOES NOT COVER FAILURES CAUSED BY IMPROPERLY TORQUED WHEEL NUTS/BOLTS.

Failure to check torque before first use may damage wheel nut/bolt seats. Once seats are damaged, it will become impossible to keep nuts/bolts tight. Tighten nuts/bolts to applicable torque value shown in table. Start all nuts/bolts by hand to prevent cross threading. Torque nuts/bolts in the recommended sequence as shown in Diagram 1.

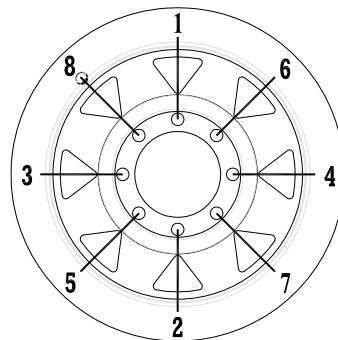
| WHEEL HARDWARE       |              |
|----------------------|--------------|
| SIZE                 | FOOT-POUNDS  |
| 1/2"-20(UNF) Grade 5 | 75 Ft.-Lbs.  |
| 5/8"-18(UNF) Grade 5 | 165 Ft.-Lbs. |
| 5/8"-18(UNF) Grade 8 | 175 Ft.-Lbs. |



5 Bolt



6 Bolt



8 Bolt

DIAGRAM 1

## Wheels and Tires (continued)

### Tire Pressure

The following is to be used as a general guide for tire inflation and figures can vary depending on specific brand of tire used. It is important that tires are inspected after unit is loaded. The tire should stand up with no side-wall buckling or distress as tire rolls. Record the pressure needed to support the full load and maintain this pressure to achieve proper tire life. Do not exceed maximum recommended tire pressure.

| Tire Pressure for Renegade NH3 Applicators |               |                         |       |         |
|--------------------------------------------|---------------|-------------------------|-------|---------|
| Tire Make                                  | Tire Size     | Load Index / Ply Rating | Tread | Max PSI |
| Carlisle                                   | 20.5x8.0B10   |                         |       |         |
|                                            | 11L15         | F-Ply                   | I-1   | 90      |
| Firestone                                  | VF385/65R22.5 | 163D                    | I-1   | 70      |
|                                            | VF295/75R22.5 | 151D                    | I-1   | 64      |
|                                            | 30.5R32       | 16-Ply                  | R-3   | 26      |
| Goodyear                                   | 12.4R38       | 14-Ply                  | R-1   | 56      |
|                                            | 12.5LB15      |                         |       | 90      |
| Mitas                                      | 380/85R34     | 146A8                   |       | 44      |
|                                            | VF380/90R46   | 173D                    | R-1   | 64      |
| Titan                                      | 7.50-15       | 6-Ply                   | HF-1  | 44      |
|                                            | 155/80R12     |                         |       |         |

(All tire pressures in psi)

### Tire Warranty

For questions regarding new tire warranty, please contact your local original equipment tire dealer. Used tires carry no warranty. Following are phone numbers and Websites for your convenience:

**Firestone**                      [www.firestoneag.com](http://www.firestoneag.com)  
Phone 800-847-3364

**Titan**                              [www.titan-intl.com](http://www.titan-intl.com)  
or Phone 800-USA-BEAR  
**Goodyear**                      Fax 515-265-9301

**Carlisle/Ironman**              [www.carlisletire.com](http://www.carlisletire.com)  
Phone 800-260-7959  
Fax 800-352-0075

## Complete Torque Chart

### Capscrews - Grade 5

**NOTE:**

- Grade 5 capscrews can be identified by three radial dashes on the head.
- For wheel torque requirements, refer to Wheels and Tires.
- Tighten U-bolts evenly and equally to have the same number of threads exposed on each end.



| SIZE     | FOOT<br>POUNDS | NEWTON<br>METERS |
|----------|----------------|------------------|
| 1/4-20   | 8-10           | 11-13            |
| 1/4-28   | 9-11           | 12-15            |
| 5/16-18  | 15-17          | 20-23            |
| 5/16-24  | 17-19          | 23-26            |
| 3/8-16   | 25-28          | 34-38            |
| 3/8-24   | 28-31          | 38-42            |
| 7/16-14  | 40-45          | 54-61            |
| 7/16-20  | 45-50          | 61-68            |
| 1/2-13   | 62-68          | 84-92            |
| 1/2-20   | 68-75          | 92-102           |
| 9/16-12  | 90-98          | 122-133          |
| 9/16-18  | 100-110        | 134-148          |
| 5/8-11   | 120-135        | 162-183          |
| 5/8-18   | 124-137        | 168-186          |
| 3/4-10   | 200-220        | 270-300          |
| 3/4-16   | 210-230        | 285-310          |
| 7/8-9    | 330-350        | 425-475          |
| 7/8-14   | 360-380        | 460-515          |
| 1-8      | 500-525        | 675-710          |
| 1-14     | 540-560        | 730-760          |
| 1 1/8-7  | 600-635        | 815-860          |
| 1 1/8-12 | 665-700        | 920-950          |
| 1 1/4-7  | 850-895        | 1150-1215        |
| 1 1/4-12 | 940-990        | 1275-1340        |
| 1 3/8-6  | 1125-1175      | 1525-1590        |
| 1 3/8-12 | 1280-1335      | 1735-1810        |
| 1 1/2-6  | 1500-1560      | 2035-2115        |
| 1 1/2-12 | 1685-1755      | 2285-2380        |

### IMPORTANT

- Follow these torque recommendations except when specified in text.

## Complete Torque Chart

### Capscrews - Grade 8

**NOTE:**

- Grade 8 capscrews can be identified by six radial dashes on the head.
- For wheel torque requirements, refer to Wheels and Tires.
- Tighten U-bolts evenly and equally to have the same number of threads exposed on each end.



| SIZE     | FOOT<br>POUNDS | NEWTON<br>METERS |
|----------|----------------|------------------|
| 5/16-18  | 20-22          | 27-30            |
| 5/16-24  | 21-23          | 28-31            |
| 3/8-16   | 35-39          | 47-53            |
| 3/8-24   | 36-41          | 49-55            |
| 7/16-14  | 54-58          | 73-78            |
| 7/16-20  | 55-60          | 75-80            |
| 1/2-13   | 82-88          | 110-120          |
| 1/2-20   | 94-99          | 125-135          |
| 9/16-12  | 127-134        | 170-180          |
| 9/16-18  | 147-155        | 199-210          |
| 5/8-11   | 160-170        | 215-230          |
| 5/8-18   | 165-175        | 225-235          |
| 3/4-10   | 280-295        | 380-400          |
| 3/4-16   | 330-365        | 445-495          |
| 7/8-9    | 410-430        | 555-580          |
| 7/8-14   | 420-440        | 570-595          |
| 1-8      | 630-650        | 850-880          |
| 1-14     | 680-700        | 920-950          |
| 1 1/8-7  | 900-930        | 1220-1260        |
| 1 1/8-12 | 930-950        | 1260-1290        |
| 1 1/4-7  | 1250-1300      | 1695-1760        |
| 1 1/4-12 | 1280-1320      | 1735-1790        |

### IMPORTANT

- Follow these torque recommendations except when specified in text.

## Hydraulic Fittings - Torque and Installation

### Tightening O-Ring Fittings

1. Inspect components for damage or contamination. Do not connect any other type of fitting to an O-ring fitting.
2. For adjustable fittings, insure the jam nut and washer are fully backed up.
3. Lubricate the O-ring and threads on the fitting.
4. Turn the fitting into the port until it is finger tight.
5. For adjustable fittings, set in the desired position.
6. Using a wrench, torque the fitting to the value in the below table. For adjustable fittings the jam nut will be tightened.

**NOTE:** Never use a power tool to install a fitting.

| Dash Size | Thread Size | Straight Stud Torque (Ft-Lbs) | Adjustable Stud Torque (Ft-Lbs) |
|-----------|-------------|-------------------------------|---------------------------------|
| -5        | 1/2-20      | 14-19                         | 10-14                           |
| -6        | 9/16-18     | 18-24                         | 12-16                           |
| -8        | 3/4-16      | 27-43                         | 20-30                           |
| -10       | 7/8-14      | 36-48                         | 30-36                           |
| -12       | 1-1/16-12   | 65-75                         | 44-54                           |
| -14       | 1-3/16-12   | 75-99                         | 53-70                           |
| -16       | 1-5/16-12   | 85-123                        | 59-80                           |
| -20       | 1-5/8"-12   | 115-161                       | 75-100                          |
| -24       | 1-7/8"-12   | 125-170                       | 105-125                         |

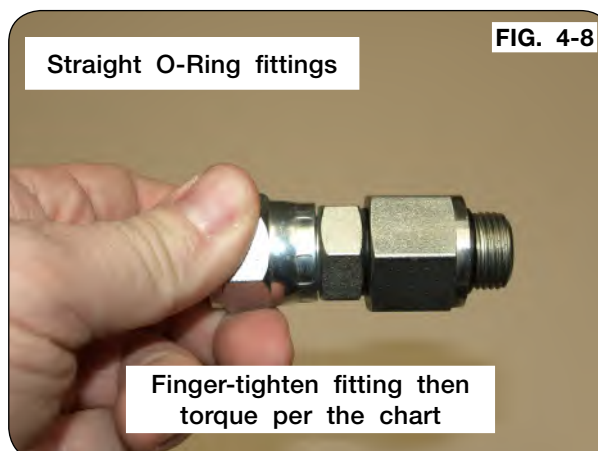
O-Ring fittings

FIG. 4-7



Straight O-Ring fittings

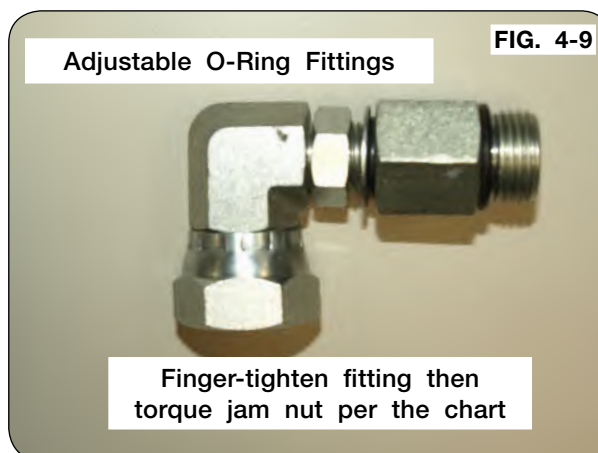
FIG. 4-8



Finger-tighten fitting then torque per the chart

Adjustable O-Ring Fittings

FIG. 4-9

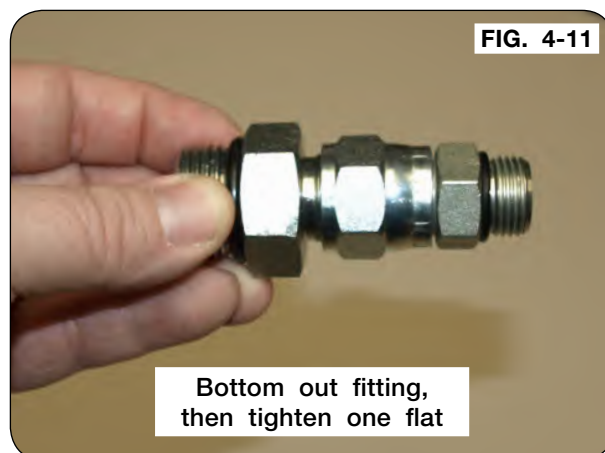
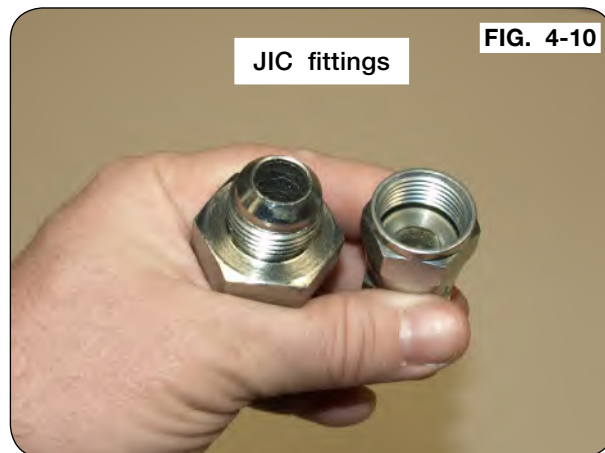


Finger-tighten fitting then torque jam nut per the chart

**Hydraulic Fittings - Torque and Installation (continued)****Tightening O-Ring Fittings**

1. Inspect all components for damage or contamination. Do not connect any other type of fitting to a JIC fitting.
2. Lubricate the threads.
3. Turn the fitting into the port until it bottoms out.
4. Use one wrench on the fixed hex on the hose to prevent twisting and a second on the swivel. Tighten the fitting another 60 degrees (or one flat)

**NOTE:** Never use a power tool to install a fitting.



## NH3 Forged Steel Fittings – Torque and Installation

### NH3 Connections

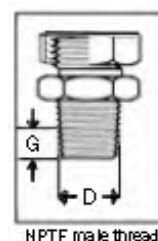
The proper method of assembling pipe threaded connectors is to assemble them finger tight and then wrench tighten further to the specified number of turns from finger tight (T.F.F.T.) given in the table below. The assembly procedure given below is recommended to minimize the risk of leakage and/or damage to components.

1. Inspect port and connectors to ensure that threads on both are free of dirt, burrs and excessive nicks.
2. Apply thread sealant approved for anhydrous ammonia to male pipe threads. The first one to two threads should be left uncovered to avoid system contamination. Apply sealant as directed by the manufacturer.
3. Screw the connector into the port to the finger tight position.
4. Wrench tighten the connector to the appropriate turns from finger tight (T.F.F.T) values shown in the table, making sure that the tube end of a shaped connector is aligned to receive the incoming tube or hose assembly.

### IMPORTANT

- *Never back off (loosen) pipe threaded connectors to achieve alignment.*
5. If leakage persists after following the above steps, check for damaged threads and total number of threads engaged.

| Thread Size<br>NPTF | $\frac{\text{Inches}}{\text{Millimeter}}$ | Threads Per Inch | Pitch                | D                    | G                   | Assembly Turns (Steel) |
|---------------------|-------------------------------------------|------------------|----------------------|----------------------|---------------------|------------------------|
|                     |                                           |                  |                      |                      |                     | T.F.F.T.               |
| 1/8"                | $\frac{\text{in}}{\text{mm}}$             | 27               | $\frac{0.037}{0.94}$ | $\frac{0.40}{10.24}$ | $\frac{0.16}{4.1}$  | 2 - 3                  |
| 1/4"                | $\frac{\text{in}}{\text{mm}}$             | 18               | $\frac{0.056}{1.41}$ | $\frac{0.54}{13.61}$ | $\frac{0.23}{5.8}$  | 2 - 3                  |
| 3/8"                | $\frac{\text{in}}{\text{mm}}$             | 18               | $\frac{0.056}{1.41}$ | $\frac{0.67}{17.05}$ | $\frac{0.24}{6.1}$  | 2 - 3                  |
| 1/2"                | $\frac{\text{in}}{\text{mm}}$             | 14               | $\frac{0.071}{1.81}$ | $\frac{0.84}{21.22}$ | $\frac{0.32}{8.1}$  | 2 - 3                  |
| 3/4"                | $\frac{\text{in}}{\text{mm}}$             | 14               | $\frac{0.071}{1.81}$ | $\frac{1.05}{26.56}$ | $\frac{0.34}{8.6}$  | 1.5 - 2.5              |
| 1-1/4"              | $\frac{\text{in}}{\text{mm}}$             | 11-1/2           | $\frac{0.087}{2.21}$ | $\frac{1.33}{33.78}$ | $\frac{0.42}{10.7}$ | 1.5 - 2.5              |
| 1-1/2"              | $\frac{\text{in}}{\text{mm}}$             | 11-1/2           | $\frac{0.087}{2.21}$ | $\frac{1.89}{48.05}$ | $\frac{0.42}{10.7}$ | 1.5 - 2.5              |



## Polyethylene Fittings – Torque and Installation

The assembly procedure given below is recommended to minimize the risk of leakage, breakage and/or damage to components.

### Polyethylene Fitting Sealant

- Use pipe thread sealant appropriate for the material and chemicals being handled.
- Do not use pipe tape as this causes excessive thread interference that could cause fittings to split.
- Threads should be clean and free of nicks and burrs.
- Apply to threads in thick consistent coat, filling the threads.
- Pipe size thread sealant application:
  - 1 1/4" and less, apply to male threads.
  - 1 1/4" and larger, apply to male and female threads.

### Polyethylene Fitting Torque

1. Inspect port and connectors to ensure that threads on both are free of dirt, burrs and excessive nicks.
2. Apply thread sealant approved for material and chemicals being handled to pipe threads. The first one to two threads should be left uncovered to avoid system contamination. Apply sealant as directed by the manufacturer.
3. Screw the connector into the port. Hand tighten plus an additional  $\frac{1}{2}$  to  $\frac{3}{4}$  of a turn to fully seal to the connection, making sure that the connector is aligned to receive any incoming assembly.
4. Check for leaks.

### IMPORTANT

- *Never back off (loosen) pipe threaded connectors to achieve alignment.*
5. If leakage persists after following the above steps, check for damaged threads and total number of threads engaged.

## NH3 Fittings - Torque and Installation

### NH3 Connections

The proper method of assembling pipe threaded connectors is to assemble them finger tight and then wrench tighten further to the specified number of turns from finger tight (T.F.F.T.) given in the table below. The assembly procedure given below is recommended to minimize the risk of leakage and/or damage to components.

1. Inspect port and connectors to ensure that threads on both are free of dirt, burrs and excessive nicks.
2. Apply thread sealant approved for anhydrous ammonia to male pipe threads. The first one to two threads should be left uncovered to avoid system contamination. Apply sealant as directed by the manufacturer.



### CAUTION

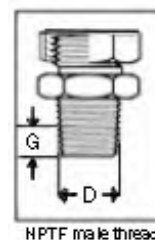
- MORE THAN TWO TURNS OF TAPE MAY CAUSE DISTORTION OR CRACKING OF THE PORT.

3. Screw the connector into the port to the finger tight position.
4. Wrench tighten the connector to the appropriate turns from finger tight (T.F.F.T) values shown in the table, making sure that the tube end of a shaped connector is aligned to receive the incoming tube or hose assembly.

### IMPORTANT

- *Never back off (loosen) pipe threaded connectors to achieve alignment.*
5. If leakage persists after following the above steps, check for damaged threads and total number of threads engaged.

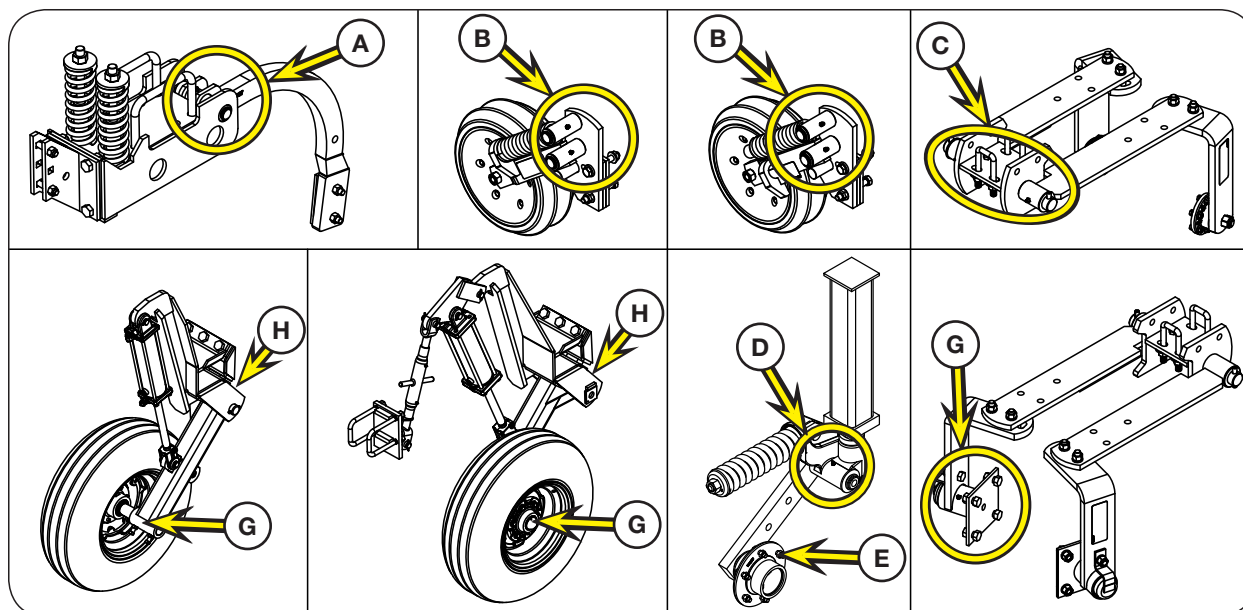
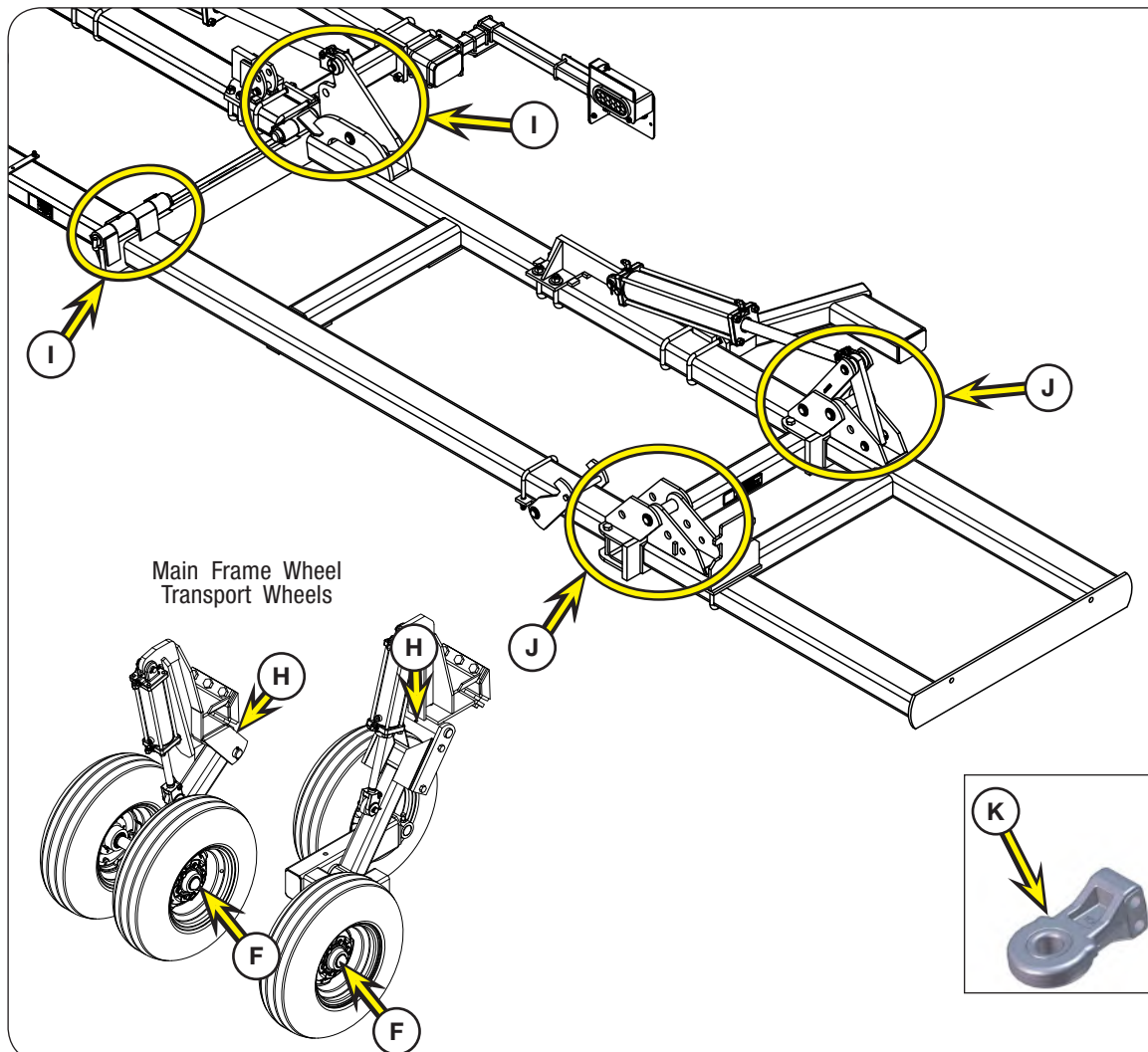
| Thread Size<br>NPTF |          | Threads Per Inch | Pitch         | D             | G            | Assembly Turns (Steel) |
|---------------------|----------|------------------|---------------|---------------|--------------|------------------------|
|                     |          |                  |               |               |              | T.F.F.T.               |
| 1/8"                | in<br>mm | 27               | 0.037<br>0.94 | 0.40<br>10.24 | 0.16<br>4.1  | 2 - 3                  |
| 1/4"                | in<br>mm | 18               | 0.056<br>1.41 | 0.54<br>13.61 | 0.23<br>5.8  | 2 - 3                  |
| 3/8"                | in<br>mm | 18               | 0.056<br>1.41 | 0.67<br>17.05 | 0.24<br>6.1  | 2 - 3                  |
| 1/2"                | in<br>mm | 14               | 0.071<br>1.81 | 0.84<br>21.22 | 0.32<br>8.1  | 2 - 3                  |
| 3/4"                | in<br>mm | 14               | 0.071<br>1.81 | 1.05<br>26.56 | 0.34<br>8.6  | 1.5 - 2.5              |
| 1 1/4"              | in<br>mm | 11 1/2           | 0.087<br>2.21 | 1.33<br>33.78 | 0.42<br>10.7 | 1.5 - 2.5              |
| 1 1/2"              | in<br>mm | 11 1/2           | 0.087<br>2.21 | 1.89<br>48.05 | 0.42<br>10.7 | 1.5 - 2.5              |



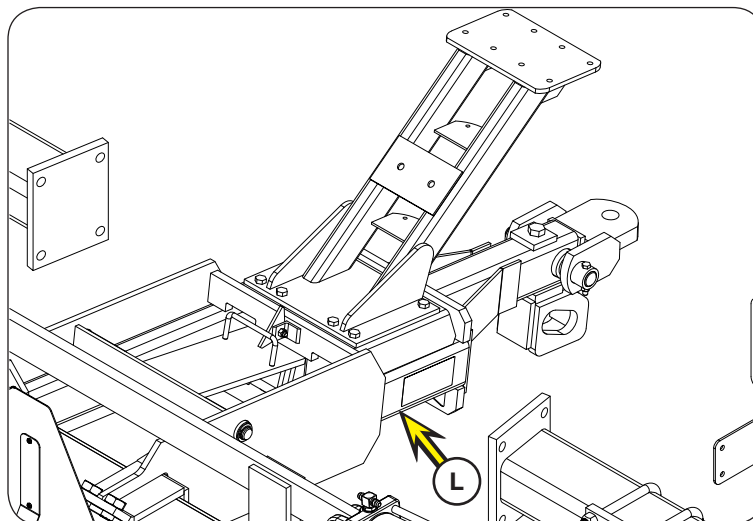
## **Section IV Maintenance**

|                                                       |      |
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| Lubrication.....                                      | 4-2  |
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## Lubrication



## Lubrication (continued)



To keep your applicator in top operating condition and to assure its proper performance and reliability for a long period of time, periodic inspection and lubrication is a must.

Use EP-2 lubricant at the locations described in the chart.

All exposed cylinder rods should be coated with grease before seasonal storage to prevent rusting. Remove depth collars and lubricate exposed cylinder rods.

After seasonal storage, check wing latch for freedom of movement.

The lubrication locations and recommended schedule are as follows:

| ITEM | DESCRIPTION                                    | POINT | QTY.     | HOURS             |
|------|------------------------------------------------|-------|----------|-------------------|
| A    | Twin Spring Shank Assembly                     | 1     | 1 Shot   | Weekly            |
| B    | Press Wheel Assembly                           | 2     | 1 Shot   | Weekly            |
| C    | DiscCover Sealer                               | 2     | 1 Shot   | Weekly            |
| D    | Coulter Arm Pivot                              | 2     | 2 Shots  | Weekly            |
| E    | Coulter Hub                                    | -     | 10 Shots | Once Every Season |
| F    | Main Frame Transport Wheel Hub                 | 4     | Repack   | Once Every Season |
| G    | Wing Gauge Wheel Hub                           | 2/4   | Repack   | Once Every Season |
| H    | Main Frame Wheel & Gauge Wheel Pivot           | 8     | 5 Shots  | Weekly            |
| I    | Main Frame to Primary Wing Hinge               | 4     | 5 Shots  | Weekly            |
| J    | Primary Wing to Secondary Wing Hinge & Linkage | 6     | 5 Shots  | Weekly            |
| K    | Hitch                                          | 2     | 2 Shots  | Weekly            |
| L    | Nurse Tank - Under Hitch                       | 1     | 2 Shots  | Weekly            |

### Renegade 1500 Maintenance

#### **DANGER**

- **ELECTROCUTION WILL CAUSE SERIOUS INJURY OR DEATH. THE IMPLEMENT IS NOT INSULATED. KEEP AWAY FROM ALL ELECTRICAL LINES AND DEVICES. ELECTROCUTION CAN OCCUR WITHOUT DIRECT CONTACT.**

#### **WARNING**

- **TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.**
- **EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.**
- **KEEP HANDS CLEAR OF PINCH POINT AREAS.**
- **ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING WITH OR NEAR CHEMICALS. THIS EQUIPMENT INCLUDES, BUT IS NOT LIMITED TO: PROTECTIVE EYE WEAR, GLOVES, SHOES, SOCKS, LONG-SLEEVED SHIRT, AND LONG PANTS. ADDITIONAL PROTECTION MAY BE REQUIRED FOR MANY TYPES OF CHEMICALS.**
- **AVOID BREATHING SPRAY MIST OR VAPOR.**
- **WASH HANDS BEFORE EATING, DRINKING, CHEWING GUM, OR USING TOILET.**
- **NEW HYDRAULIC SYSTEMS OR SYSTEMS THAT HAVE BEEN MAINTAINED MUST BE PURGED OF AIR BEFORE OPERATING OR MOVING MACHINE TO PREVENT SERIOUS INJURY OR DEATH.**

#### **CAUTION**

- **SHARP EDGES ON COULTER BLADES AND KNIVES CAN CAUSE SERIOUS INJURY. BE CAREFUL WHEN WORKING AROUND COULTER BLADES AND KNIVES.**

### Seasonal Storage

Check coultter swivel for wear. Replace as needed. See FIG. 4-1 on next page.

Always open all valves to remove any fluids and to allow moisture to dry.

Immediately after season is finished, completely wash machine to remove corrosive fertilizer inside and out before storing. When using pressure washers maintain an adequate distance so not to force water into bearings, hydraulic seals, or electrical connections.

Repaint all areas where paint has been removed to keep rust from developing. Coat areas of coultter blades and knives, if equipped, and coultter posts with rust preventative material.

### Renegade 1500 Maintenance (continued)

Coat exposed cylinder piston rods with rust preventative material.

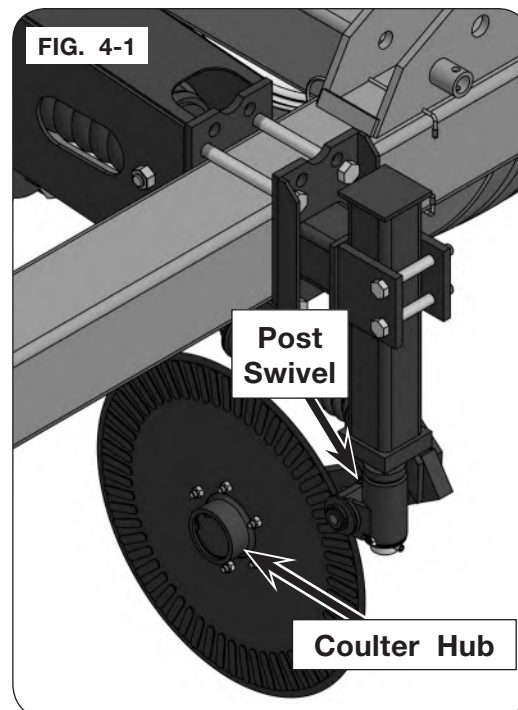
Inspect machine for parts that may need to be replaced so they may be ordered in the off season.

Lubricate machine at all points outlined.

Check coultter hubs for free rotation. If blade hubs do not rotate, replace and/or pack bearings with grease. Replace coultter arm if spindle is damaged. (FIG. 4-1)

Check coultter post swivel for free movement. If post swivel does not move, free the swivels and grease. Grease the coultter post swivel until fresh grease purges top or bottom of swivel casting to prevent the coultter pivot from seizing on post. (FIG. 4-1) Refer to "Lubrication" in this section.

After period of unused time, unit should be unfolded and refolded to check function of hydraulic system.



### Purging A Hydraulic System

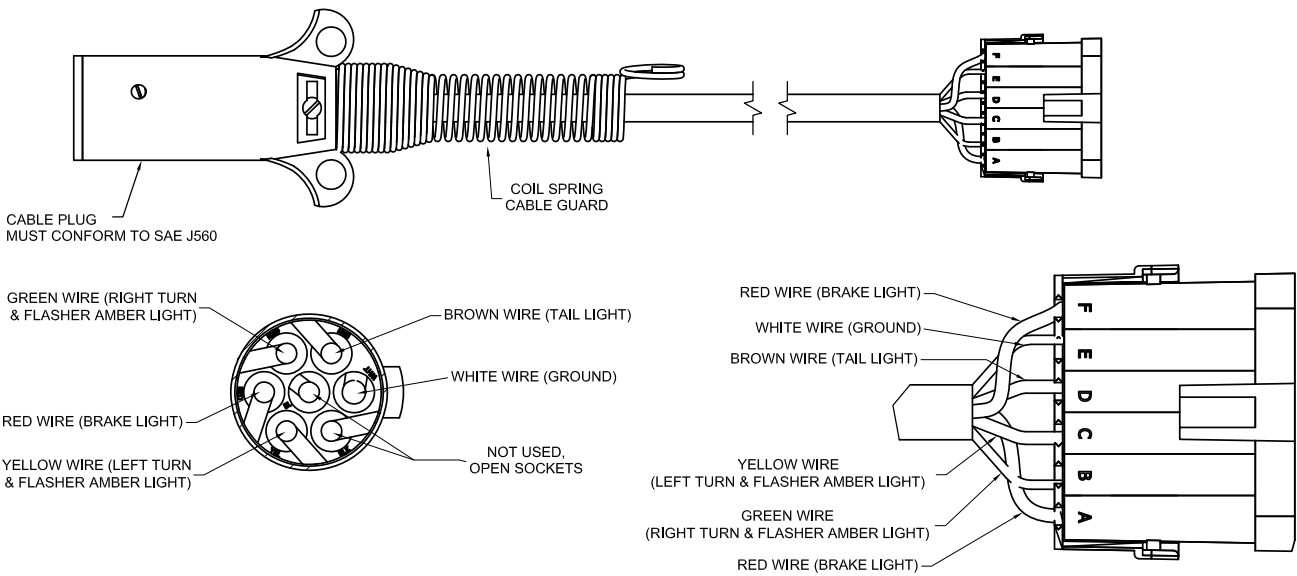
#### **WARNING**

- RELIEVE HYDRAULIC SYSTEM OF ALL PRESSURE BEFORE ADJUSTING OR SERVICING. SEE TRACTOR OPERATOR'S MANUAL FOR PROPER PROCEDURES.
- HIGH-PRESSURE FLUIDS CAN PENETRATE THE SKIN AND CAUSE SERIOUS INJURY OR DEATH. SEEK MEDICAL TREATMENT IMMEDIATELY IF INJURED BY HIGH-PRESSURE FLUIDS. USE CARDBOARD OR WOOD TO DETECT LEAKS IN THE HYDRAULIC SYSTEM.
- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.

1. Purge air from system as follows:
  - A. Disconnect the rod end of all cylinders in a circuit. Block up all rod end of each hydraulic cylinders in each circuit so the rod can completely extend and retract without contacting any other component.
  - B. Pressurize the system and maintain system at full pressure for at least 5 seconds after cylinder rods stop moving. Check that all cylinders have fully extended or retracted.
  - C. Check oil reservoir in hydraulic power source and re-fill as needed.
  - D. Pressurize system again to reverse the motion of step B. Maintain pressure on system for at least 5 seconds after cylinder rods stop moving. Check that cylinders have fully extended or retracted.
  - E. Check for hydraulic leaks using cardboard or wood. Tighten connections according to directions in Torque Specifications in MAINTENANCE section.
  - F. Repeat steps B, C, D, and E 10-12 times.
  - G. De-pressurize hydraulic system and connect cylinder rods clevises to their mating lugs.

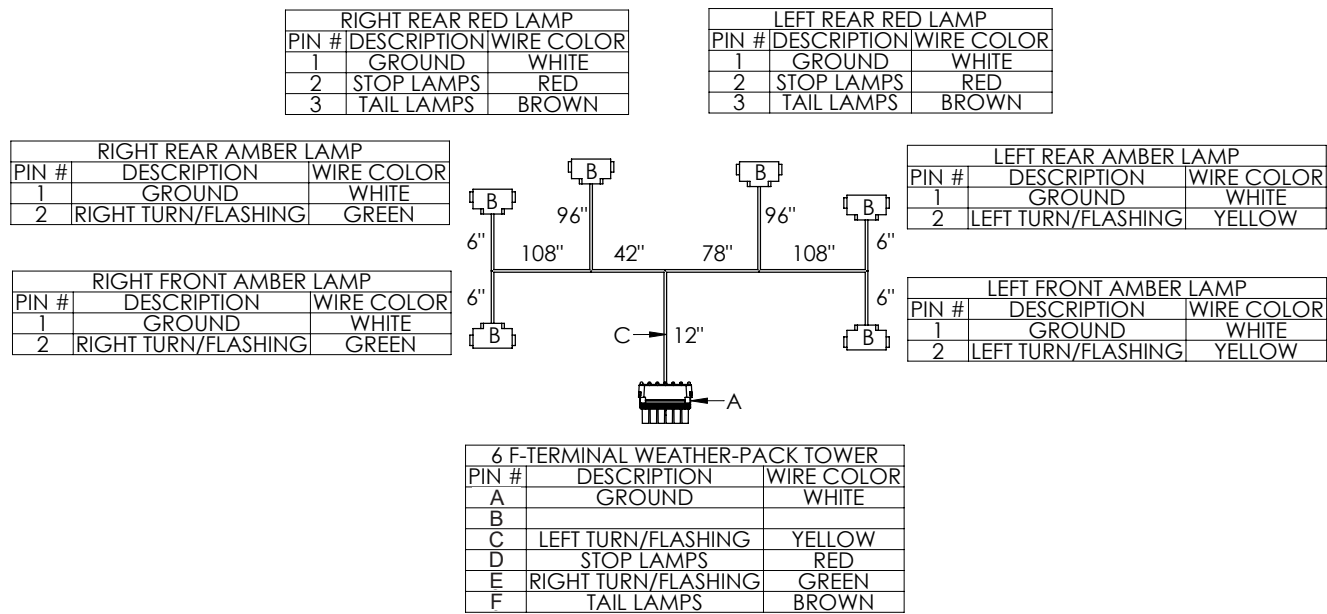
Schematics - Electrical

Electrical Harness - Main 10' (JAP3142)



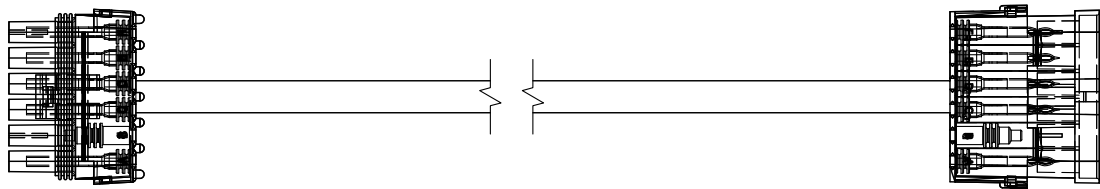
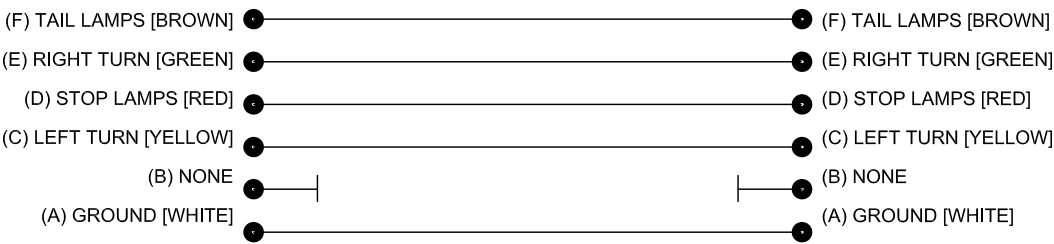
Electrical Harness - Rear 27' (JAP3222)

- A. CONNECTOR: PACKARD, FLAT 6-F TERMINAL WEATHER-PACK TOWER  
B. CONNECTOR: 3 M-TERMINAL RIGHT ANGLE LIGHT PLUG  
C. WIRE: 16AWG-COLORS: WHITE, YELLOW, RED, GREEN, BROWN



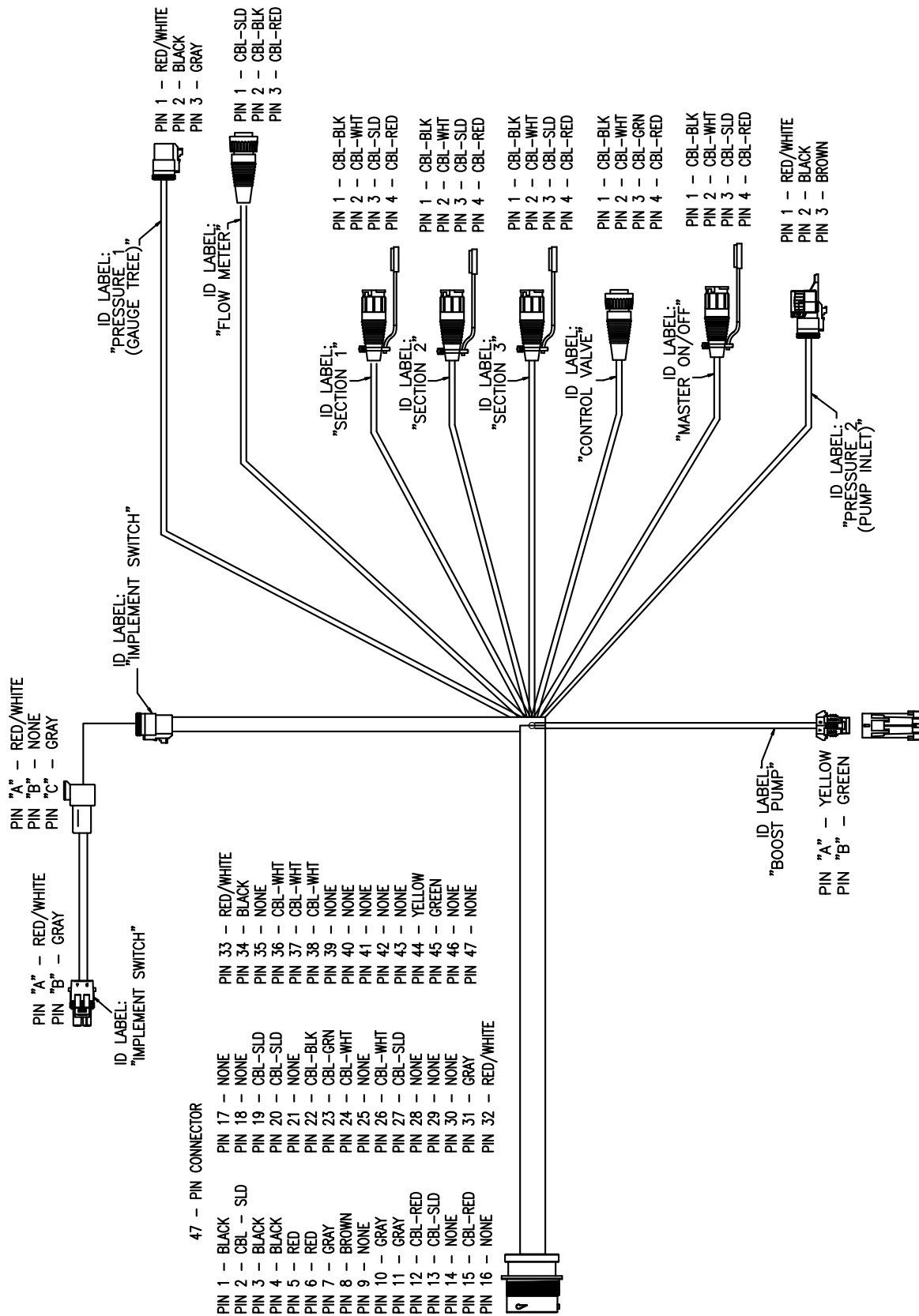
Schematic — Electrical (continued)

Electrical Harness - Main 15' (JAP3146)



# Schematic — Electrical (continued)

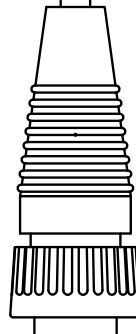
## Electrical Harness RCM Accu-Flow HP (9503394)



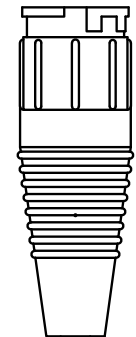
Schematic — Electrical (continued)

Electrical Harness 24 Ft. Extension (9503393) - For On/Off Valve

4-Pin Connector  
Pin 1 — CBL-SLD  
Pin 2 — CBL-BLK  
Pin 3 — CBL-WHT  
Pin 4 — CBL-RED



4-Pin Connector  
Pin 1 — CBL-SLD  
Pin 2 — CBL-BLK  
Pin 3 — CBL-WHT  
Pin 4 — CBL-RED

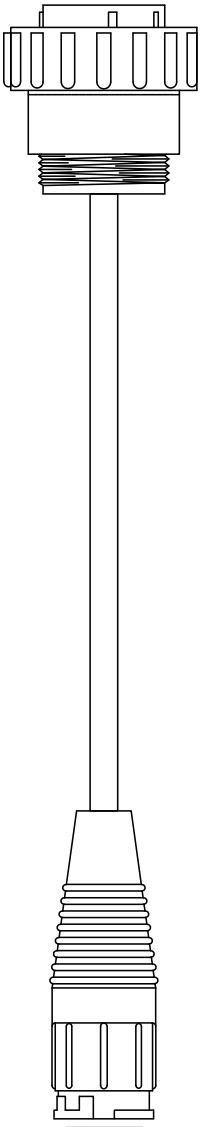


Schematic — Electrical (continued)

Electrical Harness Console 10 Ft. (9503395) - Transducer to Console

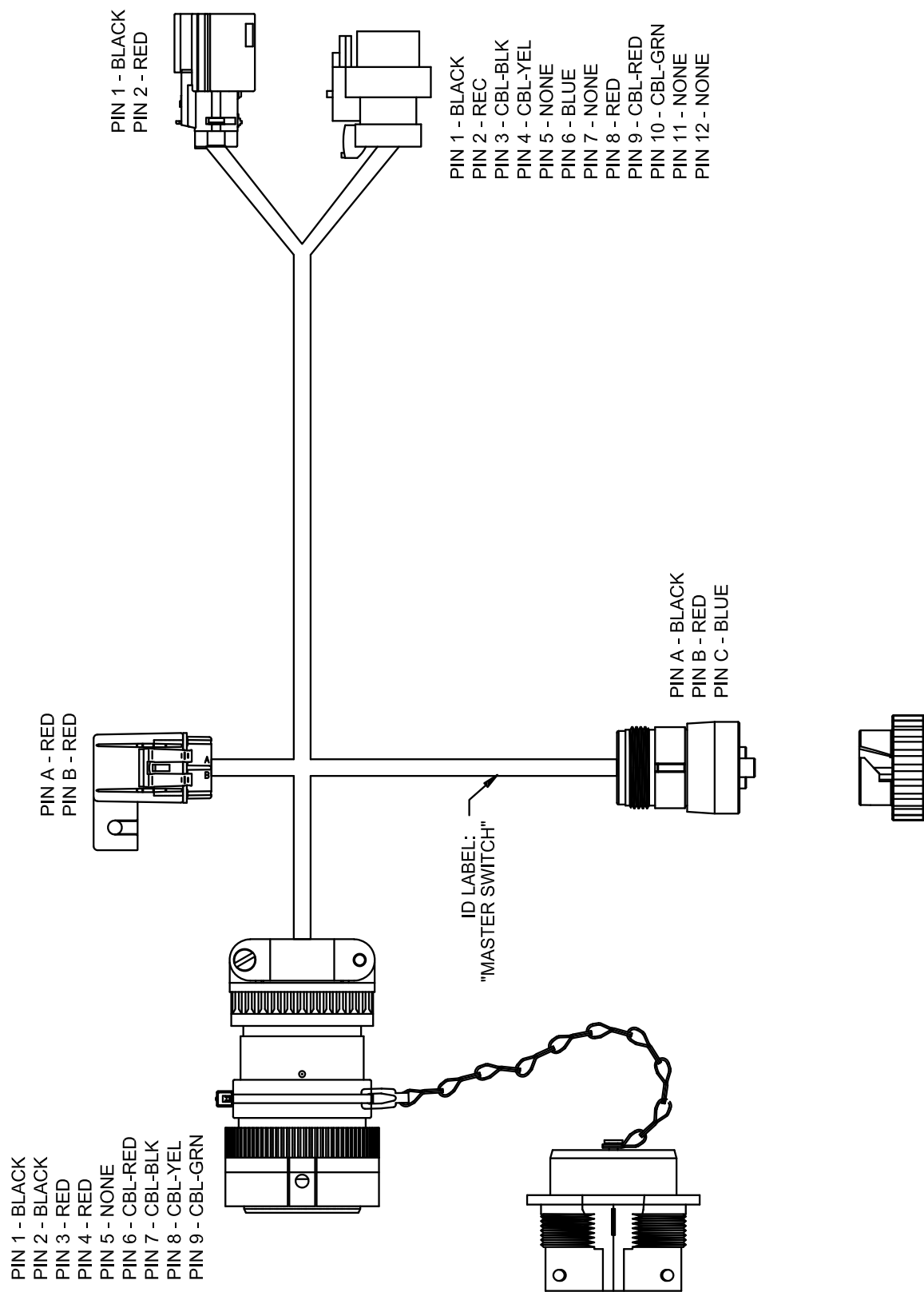
PIN 1 - NONE  
PIN 2 - NONE  
PIN 3 - NONE  
PIN 4 - NONE  
PIN 5 - NONE  
PIN 6 - NONE  
PIN 7 - NONE  
PIN 8 - CBL-RED  
PIN 9 - CBL-WHT  
PIN 10 - CBL-BLK  
PIN 11 - NONE  
PIN 12 - NONE  
PIN 13 - NONE  
PIN 14 - NONE

PIN 1 - CBL-WHT  
PIN 2 - CBL-RED  
PIN 3 - CBL-BLK



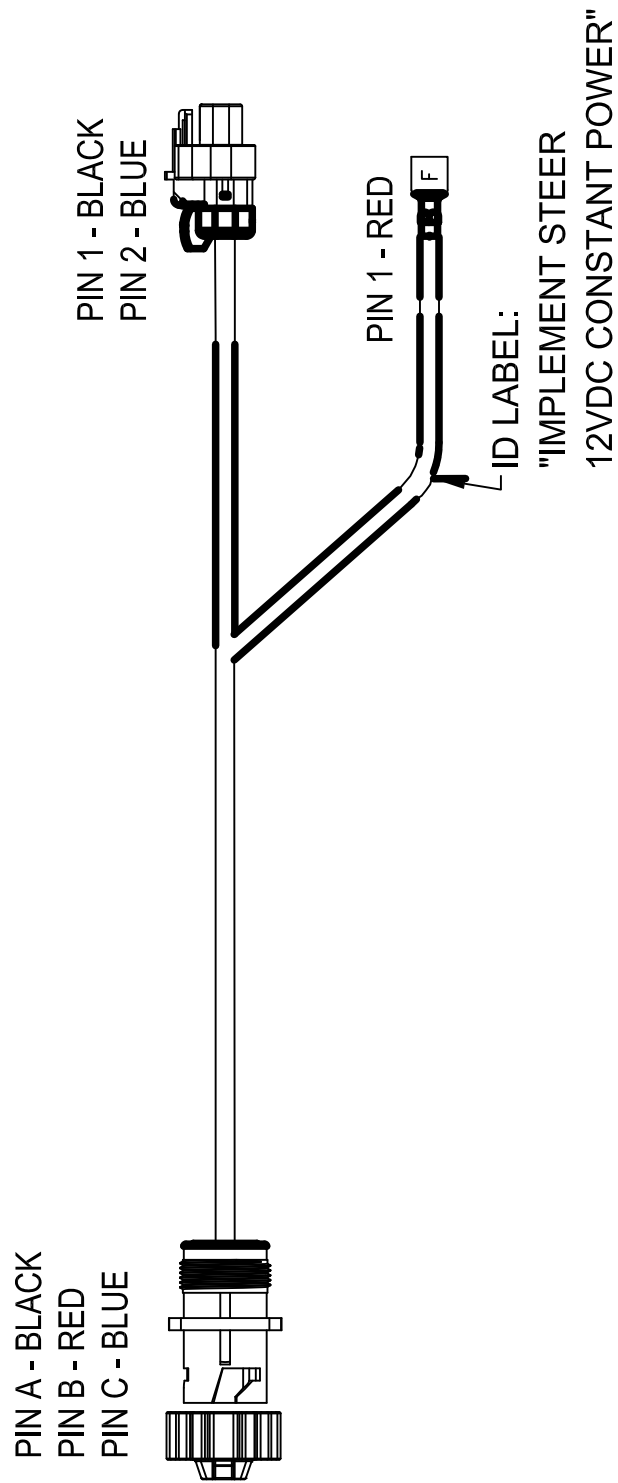
Schematic — Electrical (continued)

Electrical Harness Console 12 Ft. Adapter 9 Pin IBIC to Gen 1, Hitch Cable (9503387)



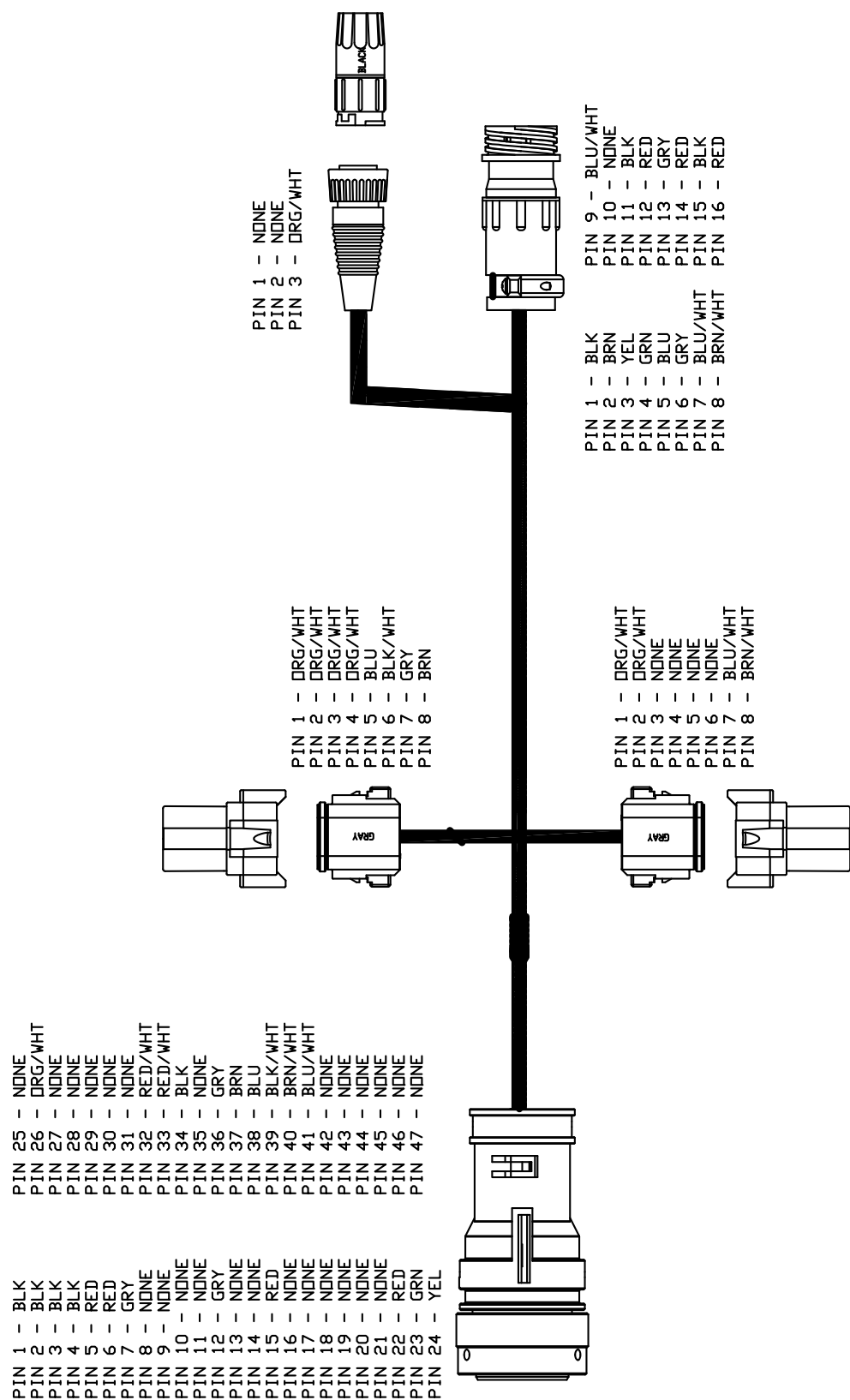
Schematic — Electrical (continued)

Electrical Harness Foot Switch 23 Ft. (9503390)



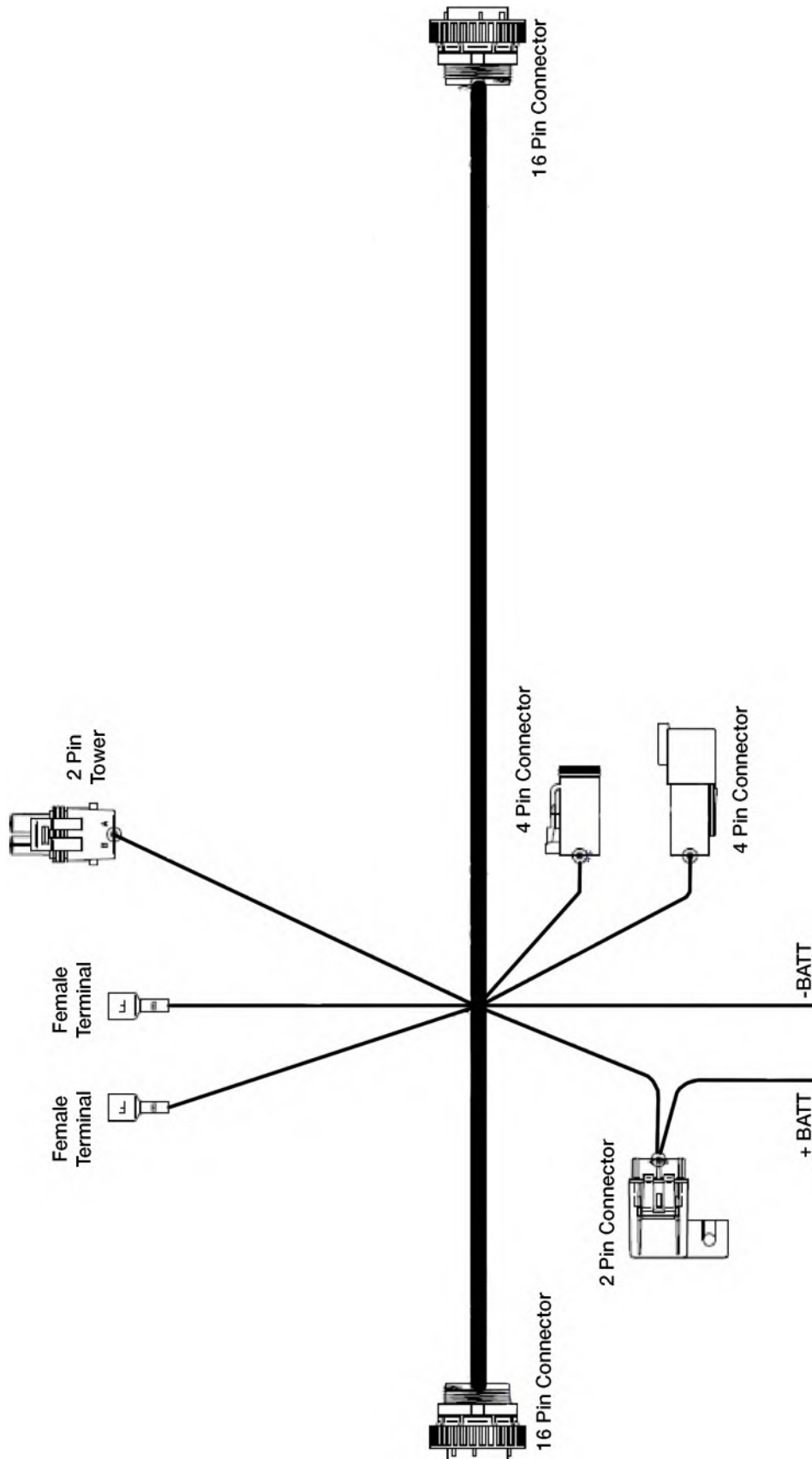
Schematic — Electrical (continued)

Electrical Harness - 16 Pin Console to 47 Pin Connector (9503396)

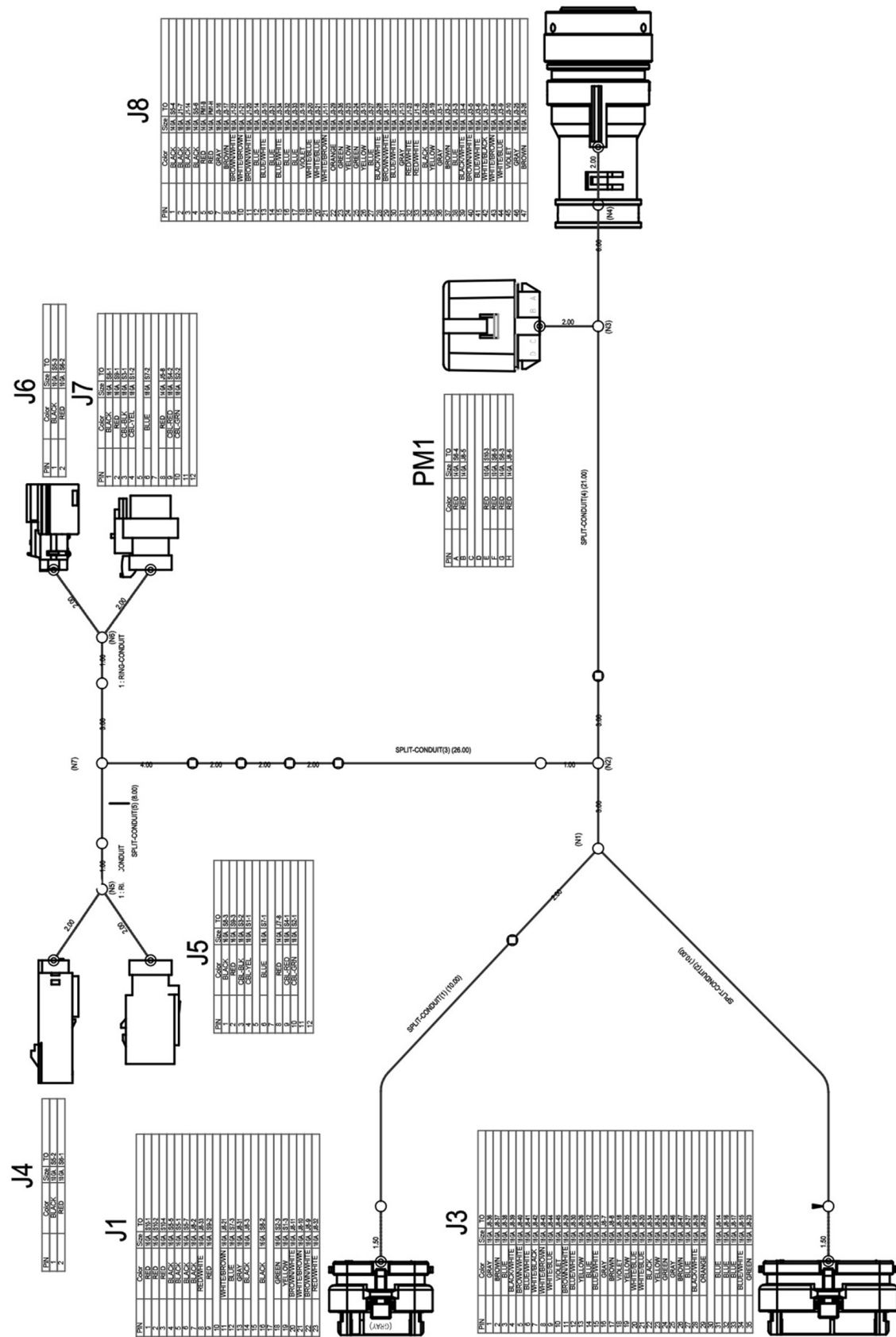


Schematic — Electrical (continued)

Electrical Harness - 450 Console Controller (9007549)

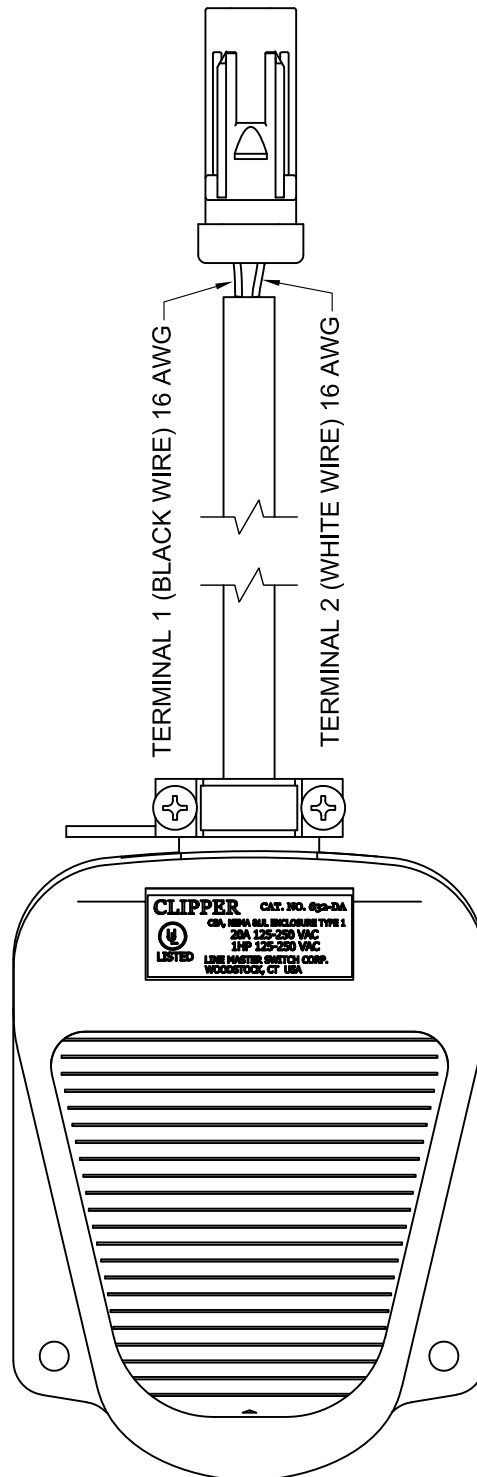


Schematics — ISOBUS Controller ECU Wire Harness (9008095)



Schematic — Electrical (continued)

Electrical Harness - Foot Switch, ISO Node w/Harness (9005916)



## Wheel, Hub and Spindle Disassembly and Assembly

### **WARNING**

- TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.
- FALLING OBJECTS CAN CAUSE SERIOUS INJURY OR DEATH. DO NOT WORK UNDER THE MACHINE AT ANY TIME WHILE BEING HOISTED. BE SURE ALL LIFTING DEVICES AND SUPPORTS ARE RATED FOR THE LOADS BEING HOISTED. THESE ASSEMBLY INSTRUCTIONS WILL REQUIRE SAFE LIFTING DEVICES UP TO 30,000 LBS. SPECIFIC LOAD RATINGS FOR INDIVIDUAL LOADS WILL BE GIVEN AT THE APPROPRIATE TIME IN THE INSTRUCTIONS.
- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.
- KEEP HANDS CLEAR OF PINCH POINT AREAS.

### **CAUTION**

- IMPROPERLY TORQUED WHEEL NUTS/BOLTS CAN CAUSE A LOSS OF IMPLEMENT CONTROL AND MACHINE DAMAGE. TORQUE WHEEL NUTS/BOLTS TO VALUES IN TABLE. CHECK TORQUE BEFORE USE, AFTER ONE HOUR OF UNLOADED USE OR AFTER FIRST LOAD, AND EACH LOAD UNTIL WHEEL NUTS/BOLTS MAINTAIN TORQUE VALUE. CHECK TORQUE EVERY 10 HOURS OF USE THERE-AFTER. AFTER EACH WHEEL REMOVAL START TORQUE PROCESS FROM BEGINNING. WARRANTY DOES NOT COVER FAILURES CAUSED BY IMPROPERLY TORQUED WHEEL NUTS/BOLTS.

### **IMPORTANT**

- *Remove only one wheel and tire from a side at any given time in the following procedure.*
1. Hitch implement to tractor. Park on a firm, level surface. Set the tractor's parking brake, shut off engine and remove key.
  2. Use a safe lifting device rated at 30,000 lbs. to support the weight of your implement. Place the safe lifting device under the axle closest to the tire.
  3. Use a 300 lbs. safe lifting device to support the wheel and tire during removal.
  4. If only removing wheel and tire, skip to Step 8; otherwise continue with Step 4.



Remove the hardware retaining the hubcap. Next, remove the hubcap, gasket, cotter pin, castle nut and spindle washer. Remove hub with bearings from old spindle using a 200 lbs. lifting device.

### Wheel, Hub and Spindle Disassembly and Assembly (continued)

5. Inspect the spindle and replace if necessary. If spindle does not need to be replaced, skip to Step 6; otherwise continue with Step 5.

Remove the bolt and lock nut that retain the spindle to the axle. Using a lifting device rated for 200 lbs., remove the old spindle. Coat spindle shaft with anti-seize lubricant prior to installation. Reuse bolt and lock nut to retain spindle to axle. Torque as outlined in Maintenance Section.

6. Remove seal and inspect bearings, spindle washer, castle nut and cotter pin. Replace if necessary. Pack both bearings with Extreme Pressure NLGI #2 grease and reinstall inner bearing. Install new seal in hub with garter spring facing inward to the hub by tapping on flat plate that completely covers seal while driving it square to hub. Install until flush with back face of hub. Using a 200 lb. rated lifting device, install hub assembly onto spindle. Install outer bearing, spindle washer and castle nut.

#### **IMPORTANT**

- *Do not use an impact wrench!*
7. Slowly tighten castle/slotted nut while spinning the hub until hub stops rotating. Turn castle nut counterclockwise until the hole in the spindle aligns with the next notch in castle nut. Hub should spin smoothly with minimal drag and no end play. If play exists, tighten to next notch of castle nut. If drag exists, then back castle nut to next notch. Spin and check again. Install cotter pin. Clean face for hub cap gasket and install gasket, grease- filled hub cap and retain hubcap with hardware removed. Tighten hubcap hardware in alternating pattern.
  8. Attach the wheel(s) and tire(s) to the hub using the same rated safe lifting device for removal. Tighten wheel nuts to appropriate requirements and recheck as outlined in the Wheels and Tires section of this manual.
  9. Raise implement, remove lifting device and lower tire to the ground.

## Wheels and Tires

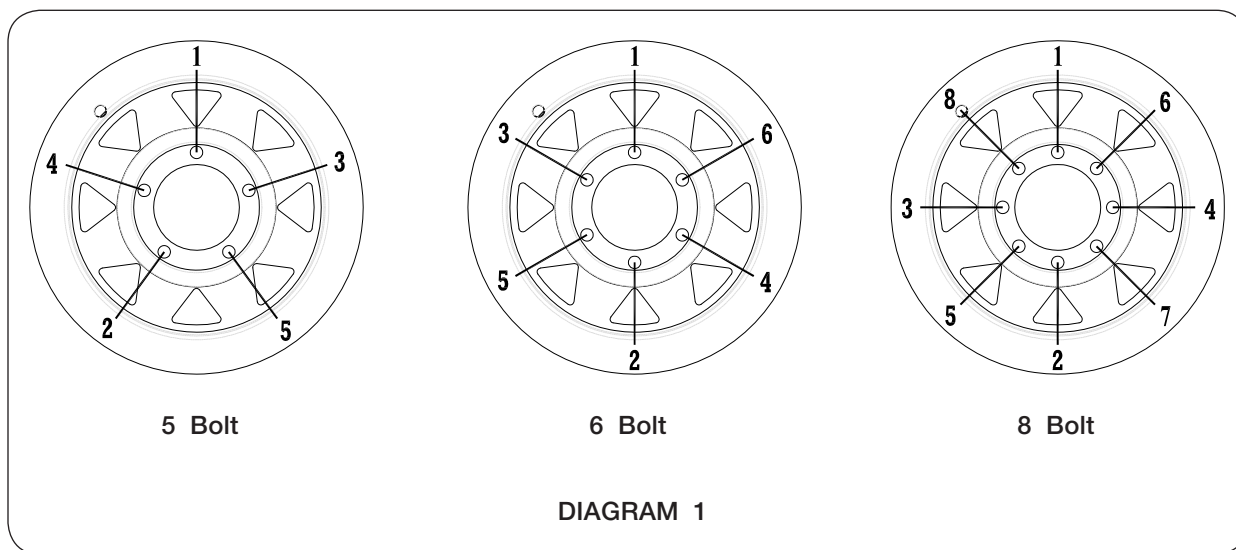
### Wheel Nut Torque Requirements

#### **CAUTION**

- IMPROPERLY TORQUED WHEEL NUTS/BOLTS CAN CAUSE A LOSS OF IMPLEMENT CONTROL AND MACHINE DAMAGE. TORQUE WHEEL NUTS/BOLTS TO VALUES IN TABLE. CHECK TORQUE BEFORE USE, AFTER ONE HOUR OF UNLOADED USE OR AFTER FIRST LOAD, AND EACH LOAD UNTIL WHEEL NUTS/BOLTS MAINTAIN TORQUE VALUE. CHECK TORQUE EVERY 10 HOURS OF USE THEREAFTER. AFTER EACH WHEEL REMOVAL START TORQUE PROCESS FROM BEGINNING. WARRANTY DOES NOT COVER FAILURES CAUSED BY IMPROPERLY TORQUED WHEEL NUTS/BOLTS.

Failure to check torque before first load may damage wheel nut/bolt seats. Once seats are damaged, it will become impossible to keep nuts/bolts tight. Tighten nuts/bolts to applicable torque value shown in table. Start all nuts/bolts by hand to prevent cross threading. Torque nuts/bolts in the recommended sequence as shown in Diagram 1.

| WHEEL HARDWARE       |              |
|----------------------|--------------|
| SIZE                 | FOOT-POUNDS  |
| 1/2"-20(UNF) Grade 5 | 75 Ft.-Lbs.  |
| 5/8"-18(UNF) Grade 5 | 165 Ft.-Lbs. |
| 5/8"-18(UNF) Grade 8 | 175 Ft.-Lbs. |



**Wheels and Tires (continued)****Tire Pressure**

The following is to be used as a general guide for tire inflation and figures can vary depending on specific brand of tire used. It is important that tires are inspected after unit is loaded. The tire should stand up with no side-wall buckling or distress as tire rolls. Record the pressure needed to support the full load and maintain this pressure to achieve proper tire life. Do not exceed maximum recommended tire pressure.

| Tire Pressure for Renegade Anhydrous Applicators |                   |                  |         |
|--------------------------------------------------|-------------------|------------------|---------|
| Tire Make                                        | Tire Size         | Load Index / Ply |         |
|                                                  |                   | Rating           | Max PSI |
| Carlisle                                         | 20.5x8.0B10       | F-Ply            | 35      |
|                                                  | 11L15 I-1         | F-Ply            | 90      |
| Firestone                                        | VF385/65R22.5 I-1 | 163D             | 70      |
|                                                  | VF295/75R22.5 I-1 | 151D             | 64      |
| Goodyear                                         | 12.4R38 R-1       | 14-Ply           | 56      |
| Mitas                                            | 380/85R34 R-1W    | 146A8            | 44      |
| Titan                                            | 7.50-15 HF-1      | 6-Ply            | 45      |
|                                                  | 27-9.50x15 HF-1   | 6-ply            | 45      |

(All tire pressures in psi)

**Tire Warranty**

For questions regarding new tire warranty, please contact your local original equipment tire dealer. Used tires carry no warranty. Following are phone numbers and Websites for your convenience:

**Firestone**                      [www.firestoneag.com](http://www.firestoneag.com)  
Phone 800-847-3364

**Continental/Mitas**            [www.mitas-tires.com](http://www.mitas-tires.com)  
Phone 704-542-3422  
Fax 704-542-3474

**Titan**                              [www.titan-intl.com](http://www.titan-intl.com)  
or Phone 800-USA-BEAR  
**Goodyear**                      Fax 515-265-9301

**Carlisle/Ironman**            [www.carlisletire.com](http://www.carlisletire.com)  
Phone 800-260-7959  
Fax 800-352-0075

## Complete Torque Chart

### Capscrews - Grade 5

**NOTE:**

- Grade 5 capscrews can be identified by three radial dashes on the head.
- For wheel torque requirements, refer to Wheels and Tires.
- Tighten U-bolts evenly and equally to have the same number of threads exposed on each end.



| SIZE     | FOOT<br>POUNDS | NEWTON<br>METERS |
|----------|----------------|------------------|
| 1/4-20   | 8-10           | 11-13            |
| 1/4-28   | 9-11           | 12-15            |
| 5/16-18  | 15-17          | 20-23            |
| 5/16-24  | 17-19          | 23-26            |
| 3/8-16   | 25-28          | 34-38            |
| 3/8-24   | 28-31          | 38-42            |
| 7/16-14  | 40-45          | 54-61            |
| 7/16-20  | 45-50          | 61-68            |
| 1/2-13   | 62-68          | 84-92            |
| 1/2-20   | 68-75          | 92-102           |
| 9/16-12  | 90-98          | 122-133          |
| 9/16-18  | 100-110        | 134-148          |
| 5/8-11   | 120-135        | 162-183          |
| 5/8-18   | 124-137        | 168-186          |
| 3/4-10   | 200-220        | 270-300          |
| 3/4-16   | 210-230        | 285-310          |
| 7/8-9    | 330-350        | 425-475          |
| 7/8-14   | 360-380        | 460-515          |
| 1-8      | 500-525        | 675-710          |
| 1-14     | 540-560        | 730-760          |
| 1 1/8-7  | 600-635        | 815-860          |
| 1 1/8-12 | 665-700        | 920-950          |
| 1 1/4-7  | 850-895        | 1150-1215        |
| 1 1/4-12 | 940-990        | 1275-1340        |
| 1 3/8-6  | 1125-1175      | 1525-1590        |
| 1 3/8-12 | 1280-1335      | 1735-1810        |
| 1 1/2-6  | 1500-1560      | 2035-2115        |
| 1 1/2-12 | 1685-1755      | 2285-2380        |

### IMPORTANT

- Follow these torque recommendations except when specified in text.

## Complete Torque Chart

### Capscrews - Grade 8

**NOTE:**

- Grade 8 capscrews can be identified by six radial dashes on the head.
- For wheel torque requirements, refer to Wheels and Tires.
- Tighten U-bolts evenly and equally to have the same number of threads exposed on each end.



| SIZE     | FOOT<br>POUNDS | NEWTON<br>METERS |
|----------|----------------|------------------|
| 5/16-18  | 20-22          | 27-30            |
| 5/16-24  | 21-23          | 28-31            |
| 3/8-16   | 35-39          | 47-53            |
| 3/8-24   | 36-41          | 49-55            |
| 7/16-14  | 54-58          | 73-78            |
| 7/16-20  | 55-60          | 75-80            |
| 1/2-13   | 82-88          | 110-120          |
| 1/2-20   | 94-99          | 125-135          |
| 9/16-12  | 127-134        | 170-180          |
| 9/16-18  | 147-155        | 199-210          |
| 5/8-11   | 160-170        | 215-230          |
| 5/8-18   | 165-175        | 225-235          |
| 3/4-10   | 280-295        | 380-400          |
| 3/4-16   | 330-365        | 445-495          |
| 7/8-9    | 410-430        | 555-580          |
| 7/8-14   | 420-440        | 570-595          |
| 1-8      | 630-650        | 850-880          |
| 1-14     | 680-700        | 920-950          |
| 1 1/8-7  | 900-930        | 1220-1260        |
| 1 1/8-12 | 930-950        | 1260-1290        |
| 1 1/4-7  | 1250-1300      | 1695-1760        |
| 1 1/4-12 | 1280-1320      | 1735-1790        |

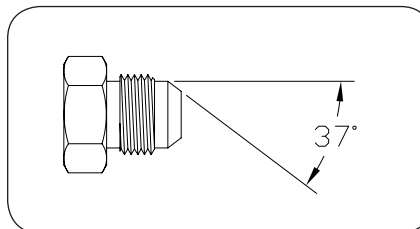
### IMPORTANT

- Follow these torque recommendations except when specified in text.

### Hydraulic Fittings – Torque and Installation

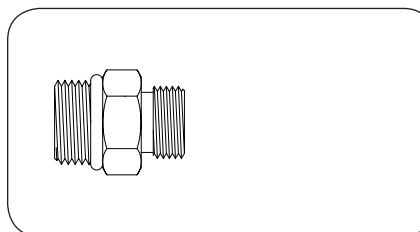
#### SAE Flare Connection (J. I. C.)

1. Tighten nut with finger until it bottoms the seat.
2. Using a wrench, rotate nut to tighten. Turn nut 1/3 turn to apply proper torque.



#### SAE Straight Thread O-Ring Seal

1. Back off jam nut and washer to expose smooth surface for O-ring seal.
2. Lubricate o-ring.
3. Thread into port until washer bottoms onto spot face.
4. Position elbows by backing up adapter.
5. Tighten jam nut.



## NH3 Fittings - Torque and Installation

### NPT - NPTF Threads

The proper method of assembling pipe threaded connectors is to assemble them finger tight and then wrench tighten further to the specified number of turns from finger tight (T.F.F.T.) given in the table below. The assembly procedure given below is recommended to minimize the risk of leakage and/or damage to components.

1. Inspect port and connectors to ensure that threads on both are free of dirt, burrs and excessive nicks.
2. Apply thread sealant approved for anhydrous ammonia to male pipe threads. The first one to two threads should be left uncovered to avoid system contamination. If PTFE tape is used, it should be wrapped 1 ½ -2 turns in clockwise direction when viewed from the pipe thread end.



### CAUTION

- MORE THAN TWO TURNS OF TAPE MAY CAUSE DISTORTION OR CRACKING OF THE PORT.

3. Screw the connector into the port to the finger tight position.
4. Wrench tighten the connector to the appropriate turns from finger tight (T.F.F.T) values shown in the table, making sure that the tube end of a shaped connector is aligned to receive the incoming tube or hose assembly.

### IMPORTANT

- Never back off (loosen) pipe threaded connectors to achieve alignment.
5. If leakage persists after following the above steps, check for damaged threads and total number of threads engaged.

| Thread Size<br>NPTF |          | Threads Per Inch | Pitch         | D             | G            | Assembly Turns (Steel) |
|---------------------|----------|------------------|---------------|---------------|--------------|------------------------|
|                     |          |                  |               |               |              | T.F.F.T.               |
| 1/8"                | in<br>mm | 27               | 0.037<br>0.94 | 0.40<br>10.24 | 0.16<br>4.1  | 2 - 3                  |
| 1/4"                | in<br>mm | 18               | 0.056<br>1.41 | 0.54<br>13.61 | 0.23<br>5.8  | 2 - 3                  |
| 3/8"                | in<br>mm | 18               | 0.056<br>1.41 | 0.67<br>17.05 | 0.24<br>6.1  | 2 - 3                  |
| 1/2"                | in<br>mm | 14               | 0.071<br>1.81 | 0.84<br>21.22 | 0.32<br>8.1  | 2 - 3                  |
| 3/4"                | in<br>mm | 14               | 0.071<br>1.81 | 1.05<br>26.56 | 0.34<br>8.6  | 1.5 - 2.5              |
| 1 1/4"              | in<br>mm | 11 1/2           | 0.087<br>2.21 | 1.33<br>33.78 | 0.42<br>10.7 | 1.5 - 2.5              |
| 1 1/2"              | in<br>mm | 11 1/2           | 0.087<br>2.21 | 1.89<br>48.05 | 0.42<br>10.7 | 1.5 - 2.5              |

