



PRO-FORCE 50-SERIES DRY FERTILIZER APPLICATOR



DRY SPREADER
WITH PULL-TYPE UNDERCARRIAGE

PRO-FORCE 50-SERIES DRY FERTILIZER SPREADER MAINTENANCE MANUAL

FERTILIZER APPLICATION

**INNOVATING
THE FUTURE OF
AGRICULTURE**

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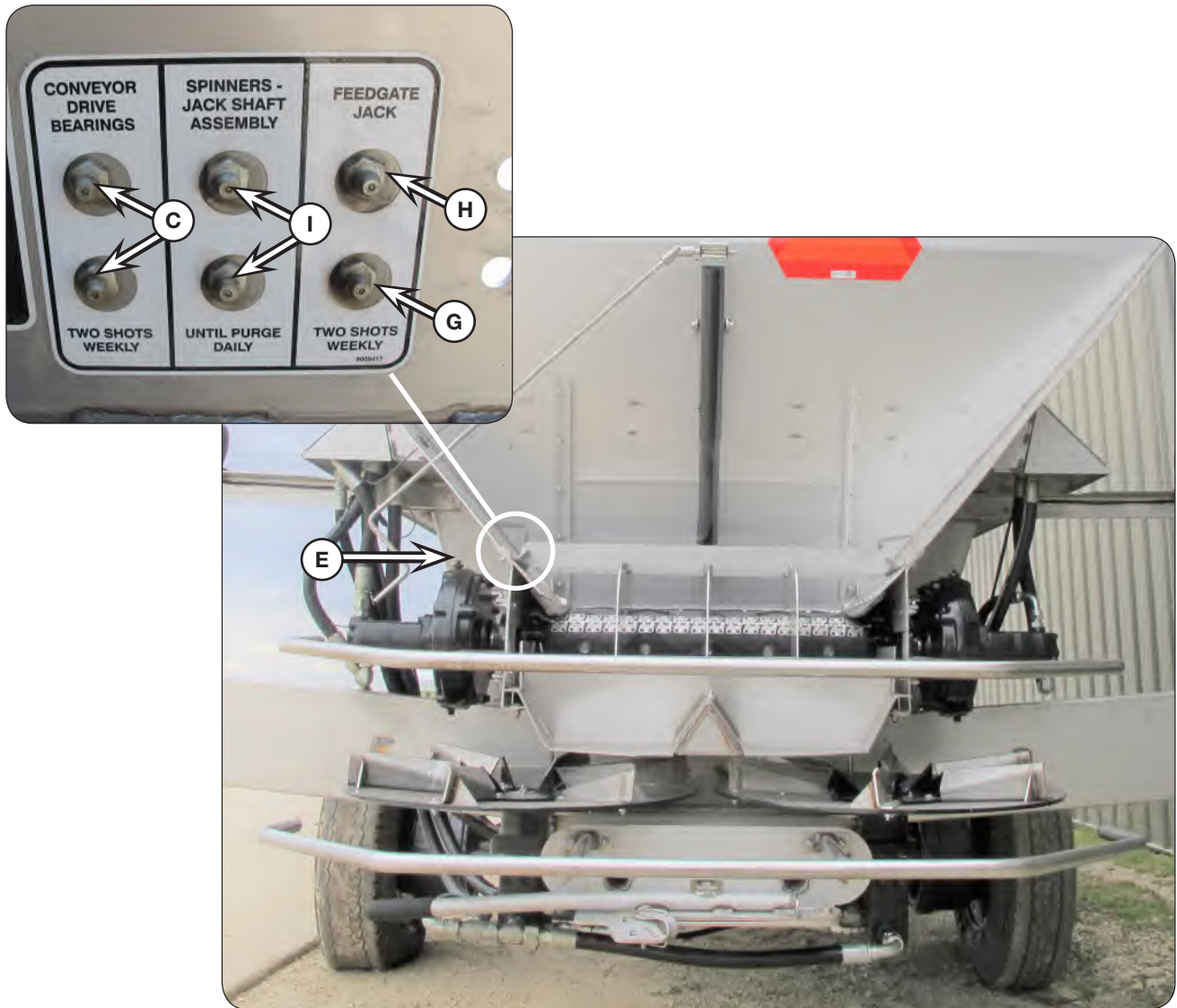
FOR SCALE, AUTO GREASER, AND / OR ELECTRIC TARP
INFORMATION, PLEASE REFER TO THE INDIVIDUAL MANUALS.

Lubrication

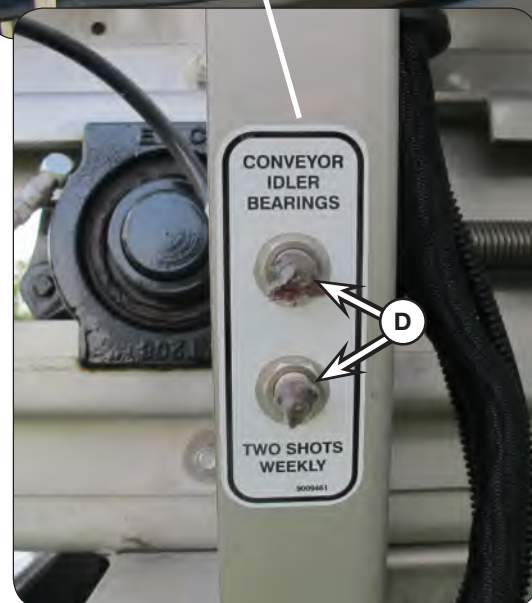
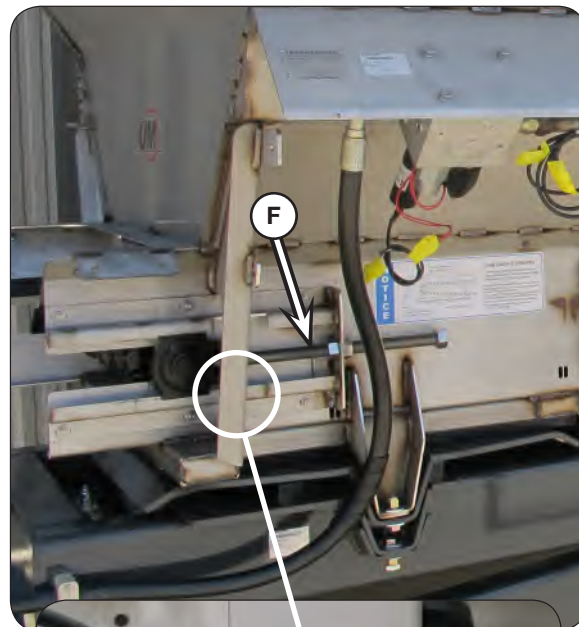
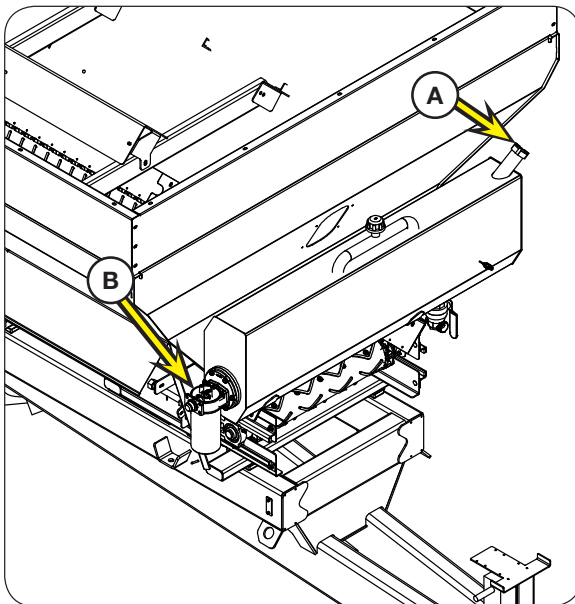
To keep your spreader in top operating condition and to assure its proper performance and reliability for a long period of time, periodic inspection and lubrication is a must.

Unverferth Mfg. recommends use of NLGI #2 Extreme Pressure grease.

The lubrication locations and recommended schedule are as follows:



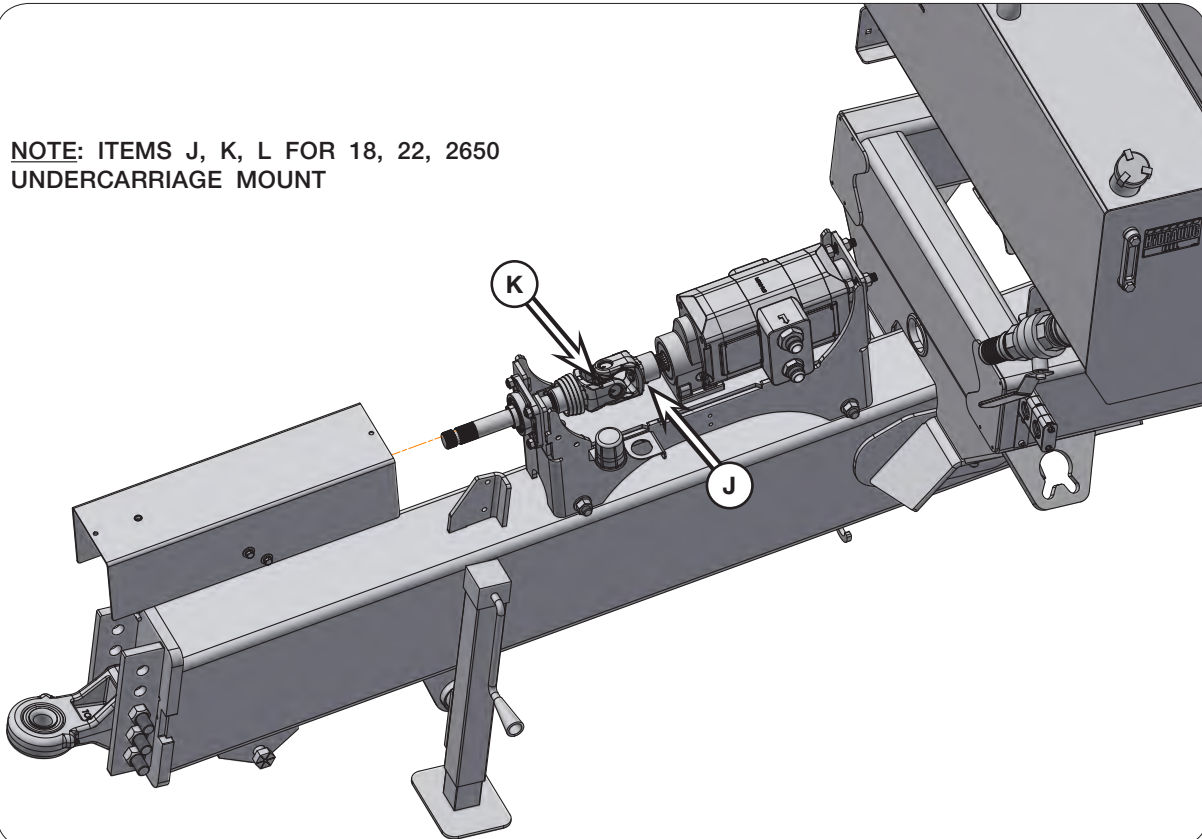
Lubrication (continued)



(Continued on next page)

Lubrication (continued)

NOTE: ITEMS J, K, L FOR 18, 22, 2650
UNDERCARRIAGE MOUNT



Lubrication (continued)

ITEM	DESCRIPTION	POINT	LUBRICANT	QTY.	INTERVAL
A	Reservoir Tank	1	Hydraulic Oil SAE 15W-40	Tank Capacity 36 1/2 gal. (For Chassis Units) 69 gal. (For 18', 22', 26' Undercarriage Units)	Check Daily, Change Every 2-3 years
B	Filter	1			Check Weekly, See Next Pages
C	Grease Bank For Bearings - Conveyor Drive	2	EP-2	2 Shots	Weekly
D	Grease Bank For Bearings - Conveyor Idler	2	EP-2	2 Shots	Weekly
E	Gearbox	1	Synthetic SAE 80W90	Approx. 46 oz.	Check Monthly, Change Annually
F	Bolt, Take-Up	2	Never Seize	Recoat	Annually
G	Grease Bank For Gears - Feedgate Jack	1	EP-2	2 Shots	Weekly
H	Grease Bank For Tube - Feedgate Jack	1	EP-2	2 Shots	Weekly
I	Grease Bank For Spinner - Jack Shaft Assembly	2	EP-2	Until Purge	Daily
J	Splined Yoke - PTO Dual Pump U-Joint (18, 22, 2650 Undercarriage)	1	EP-2	3 Shots	Weekly
K	U-Joint Cross Bearing - PTO Dual Pump U-Joint (18, 22, 2650 Undercarriage)	1	EP-2	1 Shot	8 Hours
L	PTO Driveshaft (18, 22, 2650 Undercarriage)	5	EP-2	Varies	See Next Page

NOTE: Low viscosity hydraulic oils 10W and lower are not recommended.

NOTE: Grease Bearings, Feedgate Jack & Jack Shaft Assembly until grease purges.

NOTE: After any period of unused time, unit should be greased and operated to check function of conveyor drive bearings, spinners - jack shaft assembly, and feedgate jack.

NOTE: Completely lubricate all locations and check oil levels at the end of the season.

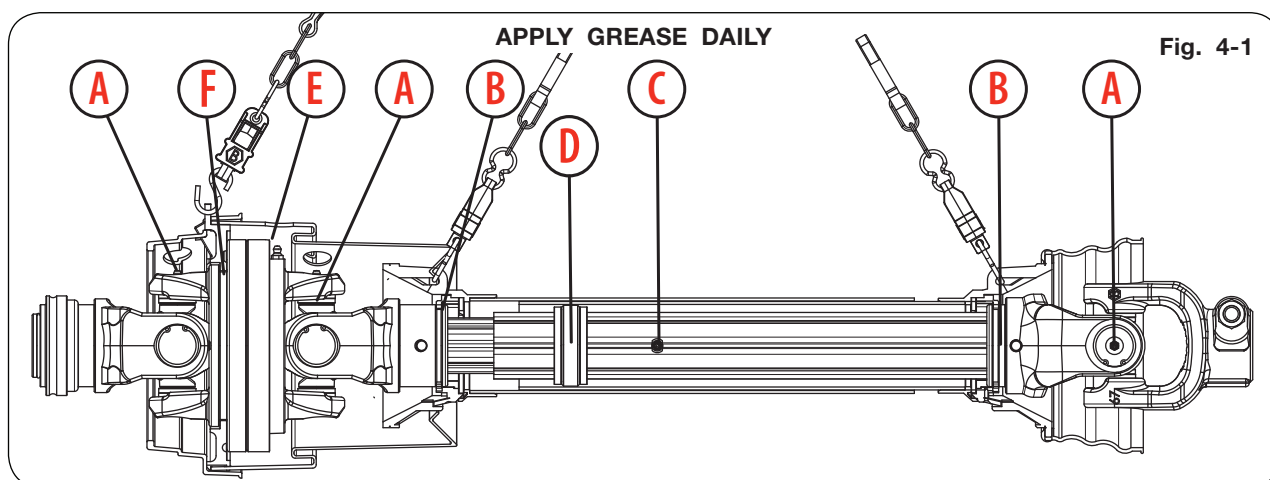
Lubrication (continued)

PTO Driveshaft Lubrication - Benzi PTO

Lubricate with NLGI grade 2 grease before starting work and every 8 operating hours. Clean and grease PTO driveshaft before each prolonged period of non-use. Molded nipples on the shield near each shield bearing are intended as grease fittings and should be lubricated every 8 hours of operation! Check and grease the guard tubes in winter to prevent freezing.

NOTE: Inner & outer profile tubes must have lubrication to operate successfully regardless of whether a grease fitting is provided for that purpose! Inner & outer profile tubes without fittings should be pulled apart and grease should be added manually.

- Grease the constant velocity joint, Item E, on front half driveline assembly every 8 operating hours. Contact your dealer for more greasing information.

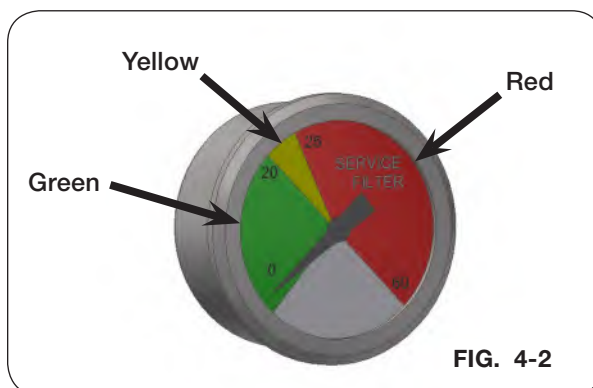


ITEM	DESCRIPTION	POINT	LUBRICANT	QTY.	HOURS
A	U-Joint Cross Kit	3	EP-2	1 Shot	8 Hours
B	Inner & Outer Yoke Groove	1	EP-2	1 Shot	8 Hours
C	Inner & Outer Profile Tube	1	EP-2	26 Shots	Start and End of Each Season 50 Hours
D	Anti-Vibration Bushing	1	EP-2	6 Shots	Start and End of Each Season 50 Hours
E	Constant Velocity Joint Body	1	EP-2	11 Shots	8 Hours
F	Wideangle Retainer & CV Joint Body Groove	1	EP-2	1 Shots	8 Hours

Lubrication (continued)

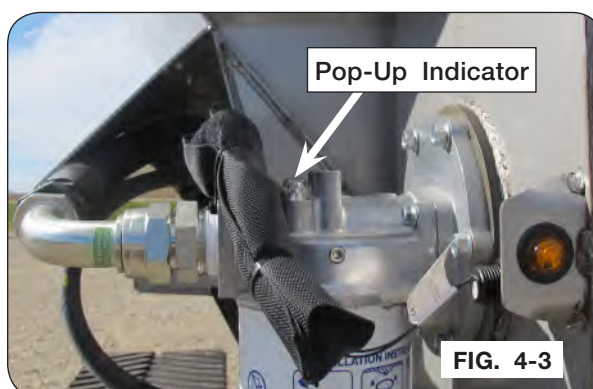
Checking In-Line Filter (1150 & 1250 Chassis Mount)

Check filter indicator with hydraulic system warm and equipment running at full RPM. Indicator will show RED if filter needs to be changed. (FIG. 4-2)



Checking Reservoir Filter

(If equipped, for chassis units.)
(Standard for 18, 22, 2650 undercarriage units.)
Check reservoir filter housing pop-up indicator. Indicator is tripped when filter needs to be changed. (FIG. 4-3)



Conveyor Chain

Pressure wash to clean chain, then oil the conveyor chain monthly and at the end of the season.

A mixture of 50% used motor oil and diesel fuel is recommended. Use a hand sprayer and do not get the mixture on the belt.

Changing Gearbox Oil

Refer to "Gearbox Removal and Oil Change" in MAINTENANCE section for details.

Hydraulic Reservoir Tank

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.
- 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.
- HYDRAULIC COOLER RADIATOR AND OIL MUST BE COOL BEFORE DISCONNECTING ELECTRICAL COMPONENTS AND CLEANING TO PREVENT SERIOUS INJURY.

Chassis Mount (If Equipped)

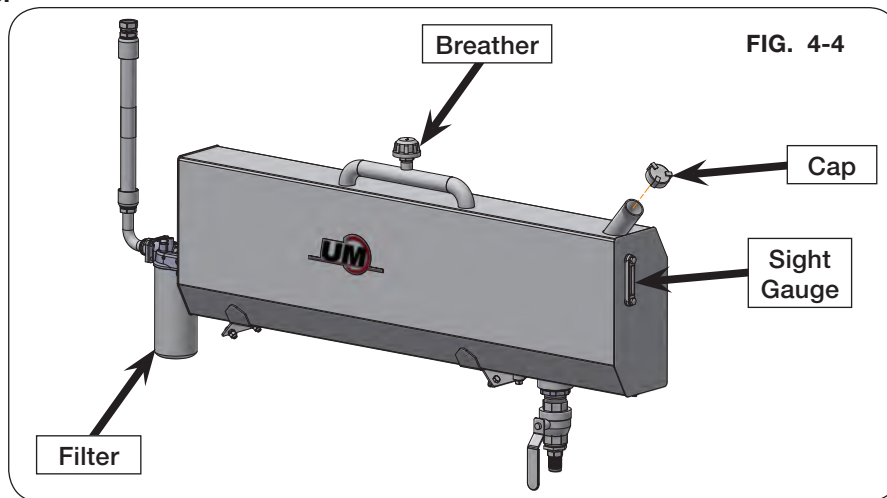
FILLING RESERVOIR TANK:

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.



2. Remove cap (PF1220-475). (FIG. 4-4)

NOTE: The reservoir tank capacity is 36 1/2 gal. Check hydraulic oil daily and change every 2-3 years.



Hydraulic Reservoir Tank (continued)

FILLING RESERVOIR TANK (Continued):

3. Fill reservoir tank centered on sight gauge with SAE 15W-40 hydraulic oil or equivalent. (FIG. 4-5)
4. Reattach cap.
5. Refill as required.

IMPORTANT

- Running the PTO pump without oil will result in pump damage.

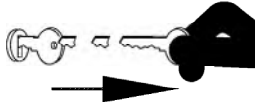


Hydraulic Reservoir Tank (continued)

18, 22, 2650 Undercarriage Mount

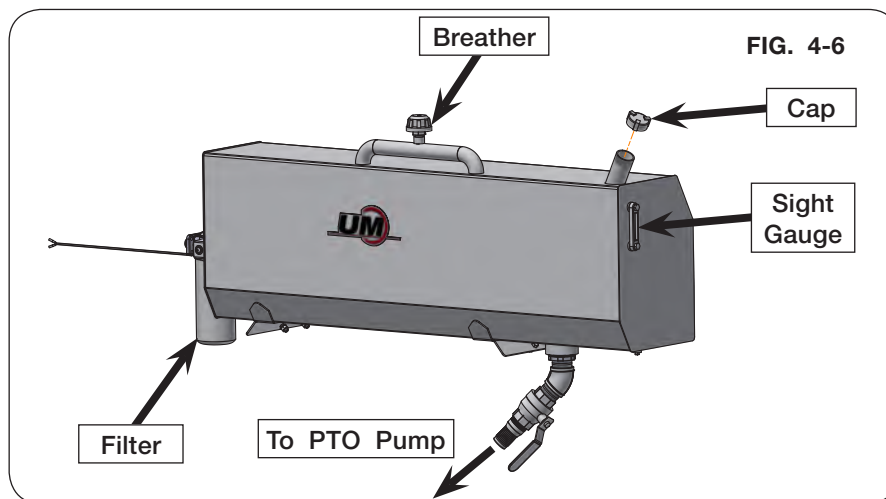
FILLING RESERVOIR TANK:

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.



2. Remove cap (PF1220-475). (FIG. 4-6)

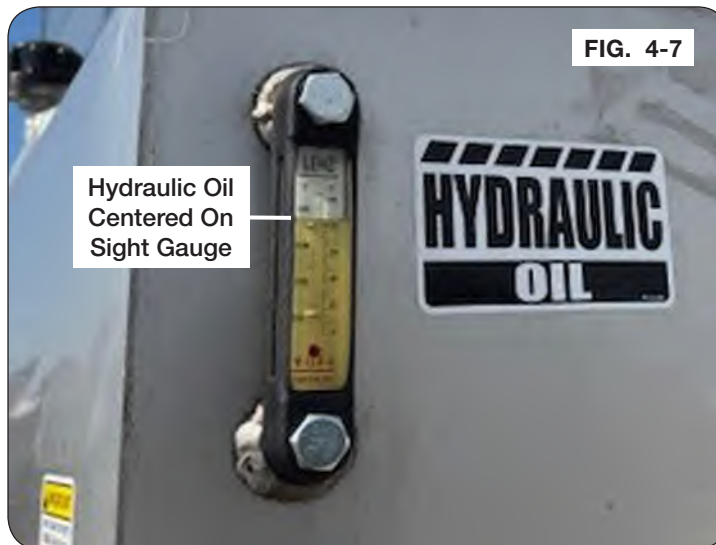
NOTE: The reservoir tank capacity is 69 gal. Check hydraulic oil daily and change every 2-3 years.



Hydraulic Reservoir Tank (continued)

FILLING RESERVOIR TANK (Continued):

3. Fill reservoir tank centered on sight gauge with SAE 15W-40 hydraulic oil or equivalent. (FIG. 4-7)



NOTE: When amber light LED is “ON”, oil in the reservoir tank is low. (FIG. 4-8)

4. If oil is low, fill reservoir tank before operating. (FIG. 4-8)
5. Reattach cap.
6. Refill as required.

IMPORTANT

- Running the PTO pump without oil will result in pump damage.



Chain Tension

WARNING

- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.

IMPORTANT

- Straighten or replace bent or distorted crossbars immediately.
- Proper chain tension is an essential factor in chain & sprocket life.
- Chains that are TOO TIGHT tend to stretch & will cause excess sprocket wear & eventually breakage.
- Chains that are TOO LOOSE present the possibility of catching on the subframe parts which will cause damage to the chain and body.
- Worn sprockets will cause excessive chain wear, skipping, and chain hooking.

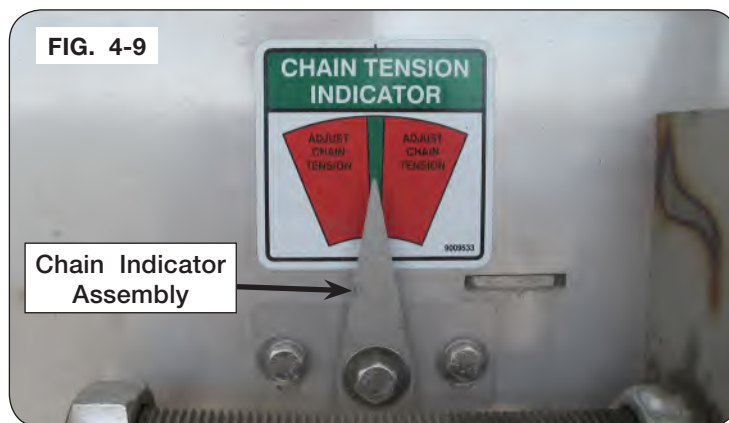
NOTE: When repairing or replacing chain links, install a cotter key & tack weld the cotter key side of the pin to each connector link.

NOTE: See the “Lubrication” section located on the previous pages for chain lubrication.

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.

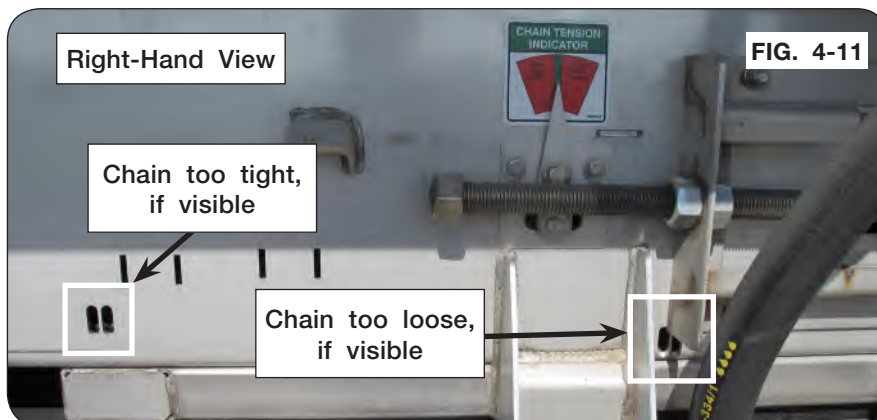
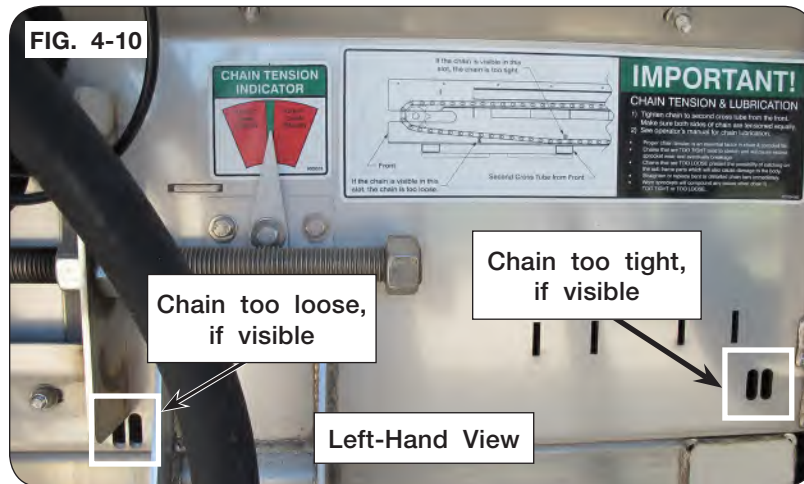


2. Adjust the chain to align the chain indicator assembly (416057 - left-hand; 416058 - right-hand) with the middle of the chain tension indicator decal (9009533). (FIG. 4-9)



Chain Tension (continued)

3. If the chain tension indicator decal is not present, illegible, or is inoperable, use the slots to perform a visual check of the chain tension as shown in figures 4-10 and 4-11.



4. After adjusting chain, verify chain tension using visible slots as indicated on FIG. 4-10 and 4-11.
5. Check for possible feedgate interference with belt/chain before operation.

Gearbox Removal & Oil Change

WARNING

- TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.
- KEEP HANDS CLEAR OF PINCH POINT AREAS.
- 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 100 LBS. SPECIFIC LOAD RATINGS FOR INDIVIDUAL LOADS WILL BE GIVEN AT THE APPROPRIATE TIME IN THE INSTRUCTIONS.

Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.



GEARBOX REMOVAL:

1. Remove check plug (95826). (FIG. 4-12)
2. Using 1/4" allen wrench, remove socket head capscrew (99888-034). (FIG. 4-12)
3. Using a safe lifting device rated for 100 lbs., slide off gearbox from shaft.

GEARBOX INSTALL:

NOTE: Coat all parts with anti-seize.

NOTE: When installing gearbox, ensure keys are in the down position.

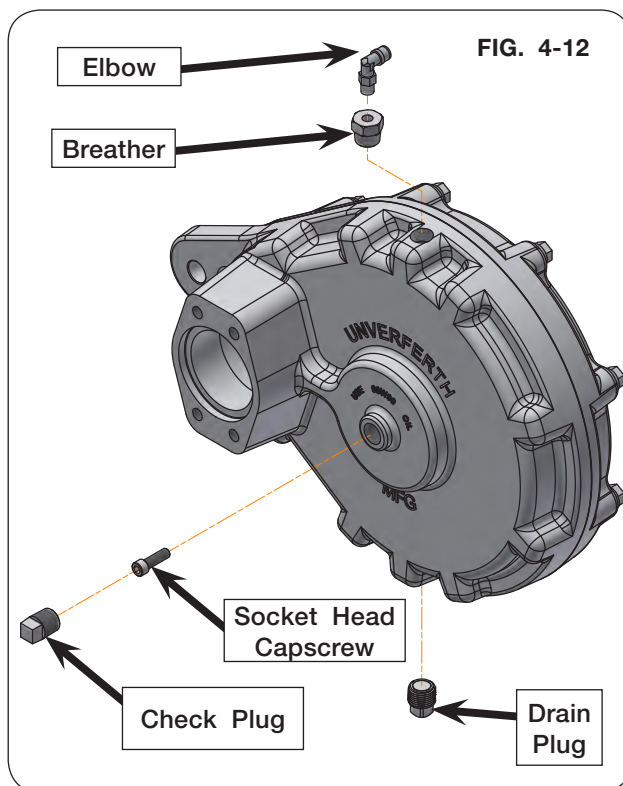
1. Using a safe lifting device rated for 100 lbs., slide gearbox onto shaft.
2. Insert socket head capscrew into gearbox. Tighten capscrew with 1/4" allen wrench and attach check plug. (FIG. 4-12)

CHANGING GEARBOX OIL:

1. Remove drain plug (PF1201-238M), breather (9003453), and elbow (9005072). (FIG. 4-12)
2. Clean any metal shavings off of magnetic square head plug.
3. After oil has drained, reattach drain plug.
4. Remove check plug.

NOTE: The gearbox capacity is approx. 46 oz. Check oil monthly and change oil annually.

5. Fill gearbox through breather hole with synthetic SAE 80W90 oil until the oil starts to run out of the check plug hole.
6. Reattach check plug, breather, and elbow.



Spreader Maintenance

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 CHEMICALS AND FUMES.
- 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.
- HYDRAULIC COOLER RADIATOR AND OIL MUST BE COOL BEFORE DISCONNECTING ELECTRICAL COMPONENTS AND CLEANING TO PREVENT SERIOUS INJURY.

CAUTION

- SHARP EDGES ON DRY SPREADER CAN CAUSE SERIOUS INJURY. BE CAREFUL WHEN WORKING AROUND DRY SPREADER.

Seasonal Storage

Before storing the spreader in freezing climates, refer to “Winterizing” outlined in MAINTENANCE section.

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

After washing machine, spray an oil/diesel mixture inside hopper to avoid corrosion.

Clean debris from hydraulic cooler radiator and fan.

Repaint all areas where paint has been removed to keep rust from developing.

Inspect machine for parts that may need to be replaced so they may be ordered in the off season. Perform seasonal cleaning of strainer located on the reservoir / pump hydraulics.

See the “Lubrication” section for machine lubrication.

Check hydraulic hoses for weather cracks and replace accordingly.

After any period of unused time, unit should be operated to check function of hydraulic system.

Ensure ladder is latched and in storage position.

Keep tarp open, if equipped.

Spreader Maintenance (continued)

Purging Hydraulic System

WARNING

- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.
- RELIEVE HYDRAULIC SYSTEM OF ALL PRESSURE BEFORE ADJUSTING OR SERVICING. SEE CHASSIS OPERATOR'S MANUAL FOR PROPER PROCEDURES.
- HIGH-PRESSURE FLUIDS CAN PENETRATE THE SKIN AND CAUSE SERIOUS INJURY OR DEATH. LEAKS OF HIGH-PRESSURE FLUIDS MAY NOT BE VISIBLE. USE CARDBOARD OR WOOD TO DETECT LEAKS IN THE HYDRAULIC SYSTEM. SEEK MEDICAL TREATMENT IMMEDIATELY IF INJURED BY HIGH-PRESSURE FLUIDS.

1. Purge air from system as follows:

- A. Turn on SCVs and engage hydraulic oil supply lines with engine at low idle. Allow 1 minute for oil to fill the spreader hydraulic system.
- B. Turn on the spinner and conveyor. Check that all hydraulic valves have opened.
- C. Start hydraulic system and run for 1 minute or until hydraulic motor starts turning.
- D. Check oil reservoir in hydraulic power source and re-fill as needed.
- E. Check for hydraulic oil leaks using cardboard or wood. Tighten connections according to directions in Torque Specifications in MAINTENANCE section.
- F. De-pressurize hydraulic system.
- G. Check hydraulic reservoir oil level and fill as needed. See "Lubrication" and "Hydraulic Reservoir Tank" for oil specifications.

IMPORTANT

- *Running the PTO pump without oil will result in pump damage.*

Setting Hydraulic System Flow

1. Set system flow as follows:

- A. Set spinner speed to 650 RPM.
- B. Reduce SCV flowrate equally between the two SCV remotes.
- C. Once spinner speed starts to decrease below 650 RPM, increase SCV flowrate slightly until spinners maintain 700 RPM.
- D. Check for hydraulic oil leaks using cardboard or wood. Tighten connections according to directions in Torque Specifications in MAINTENANCE section.

Driveline Removal (If Equipped With PTO Hydraulic System)

DANGER

- ENTANGLEMENT WITH THE DRIVELINE WILL CAUSE SERIOUS INJURY OR DEATH. KEEP ALL GUARDS AND SHIELDS IN GOOD CONDITION AND PROPERLY INSTALLED AT ALL TIMES. AVOID PERSONAL ATTIRE SUCH AS LOOSE FITTING CLOTHING, SHOE STRINGS, DRAWSTRINGS, PANTS CUFFS, LONG HAIR, ETC. THAT CAN BECOME ENTANGLED IN A ROTATING DRIVELINE.

WARNING

- MOVING OR ROTATING COMPONENTS CAN CAUSE SERIOUS INJURY OR DEATH. ENSURE SERVICE COVERS AND CONVEYOR CHAIN/BELT COVERS ARE IN PLACE AND SECURELY FASTENED BEFORE OPERATING UNIT.
 - 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 REMOVAL INSTRUCTIONS WILL REQUIRE SAFE LIFTING DEVICES UP TO 100 LBS. SPECIFIC LOAD RATINGS FOR INDIVIDUAL LOADS WILL BE GIVEN AT THE APPROPRIATE TIME IN THE INSTRUCTIONS.
1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.

 2. Remove and retain four 3/8"-16UNC x 1" capscrews (900900-055), four 3/8" lock washers (900903-021), and 3/8" flat washers (900902-038) from PTO cover (417402B). (FIG. 4-13)
 3. Store wiring harnesses and tractor SCV hoses, if present, to prevent kinking and rubbing against other parts or sharp edges. (FIGS. 4-13 & 4-14)
 4. Remove and retain PTO cover from pump mount weldment (417007B). (FIGS. 4-13 & 4-14)

Fig. 4-13

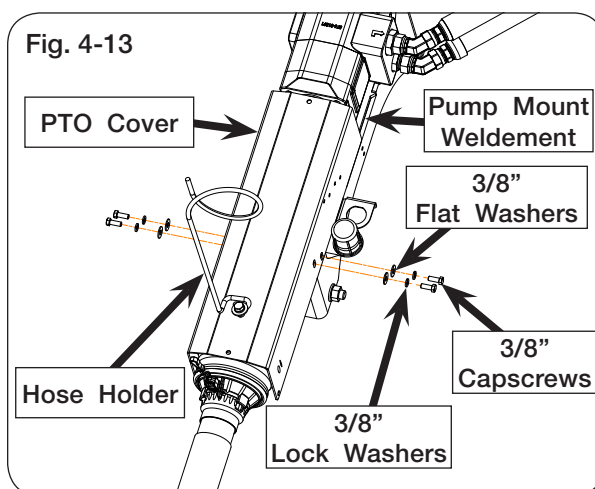
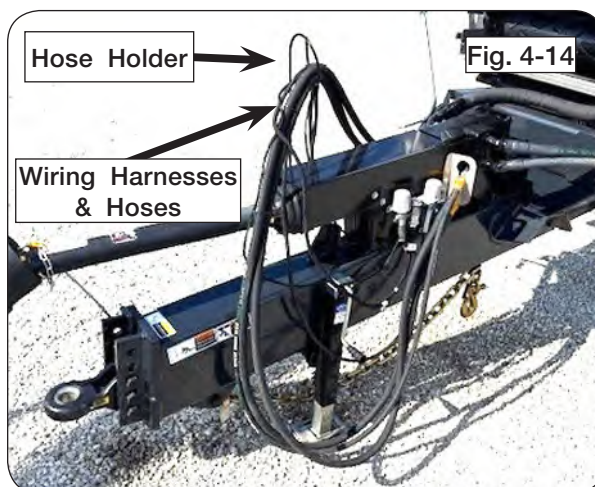
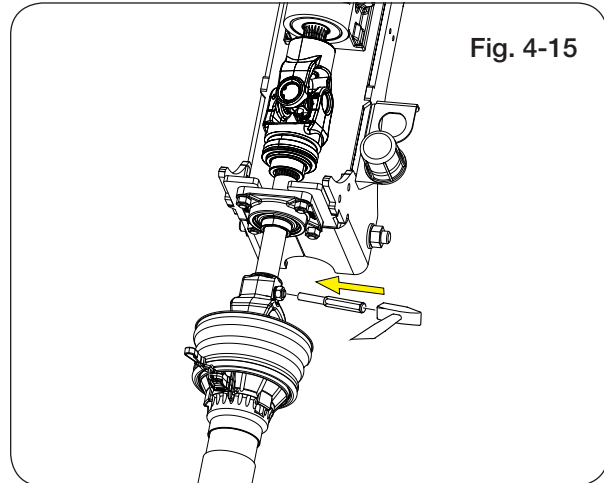


Fig. 4-14

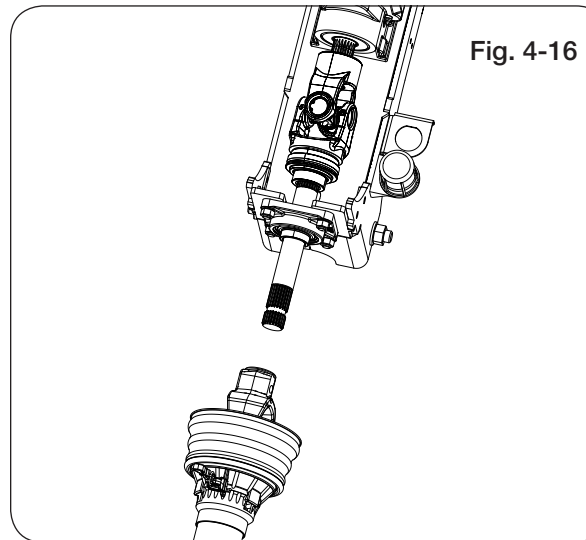


Driveline Removal (If Equipped With PTO Hyd. System) (continued)

5. Use a hammer and punch, if needed, to moderately hit the end of conic bolt, as shown. (FIG. 4-15)
6. Remove and retain conic bolt, lock washer, and nut.



7. Support driveline using a safe lifting device rated for 100 lbs., slide driveline yoke off implement PTO splined driveshaft. (FIG. 4-16)



Verify Telescoping PTO Shaft Length

WARNING

- PROPER EXTENDED AND COLLAPSED LENGTHS OF THE TELESCOPING PTO SHAFT MUST BE VERIFIED BEFORE FIRST OPERATION WITH EACH TRACTOR. IF THE EXTENDED LENGTH OF THE PTO SHAFT IS NOT SUFFICIENT, IT MAY BECOME UNCOUPLED IN OPERATION AND CAUSE SERIOUS INJURY OR DEATH FROM CONTACT WITH UNCONTROLLED FLAILING OF PTO SHAFT ASSEMBLY COMPONENTS.

IMPORTANT

- Check the length of the telescoping members to ensure the driveline will not bottom out or separate when turning and/or going over rough terrain.

An excessive collapsed length can result in damage to the PTO driveline and attached components. This is most likely to occur during extreme turning angles and/or travel over rough terrain. Conditions are amplified on tractors with tracks operating in uneven terrain, particularly rice levies. Damaged driveline components can result in unsafe operation and severely reduced driveline component life.

NOTE: Do not exceed 10 degrees beyond a straight pull line while operating the PTO. To verify proper extended and collapsed lengths, use the following procedure:

1. Fully collapse PTO shaft and measure length “L” (Figure 4-17).

Enter here: _____(1)

(Verify that outer tube does not bottom out on surrounding plastic shield components).

2. Pull apart PTO telescoping shaft ends and measure lengths “T” & “C” (Figure 4-18)

Add “T” + “C” measurements together

Enter total here: _____(2)

3. Calculate maximum recommended extended length:

- a. Subtract line 1 from line 2

Enter here: _____(a)

- b. Divide line (a) by 2

Enter here: _____(b)

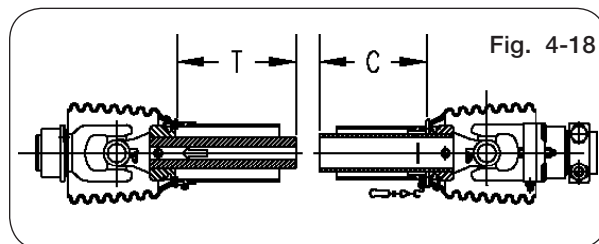
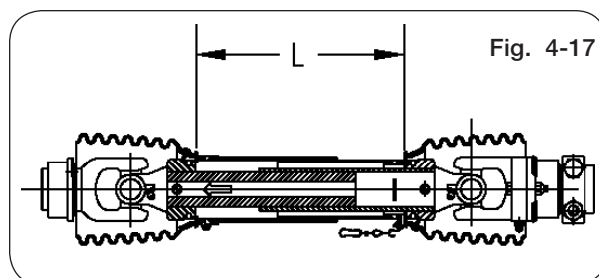
- c. Add line (b) to line 1.

Enter here: _____(c)

- d. Subtract 3 inches from line (c)

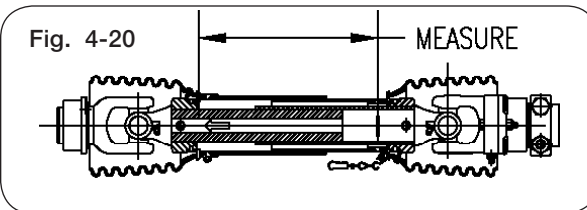
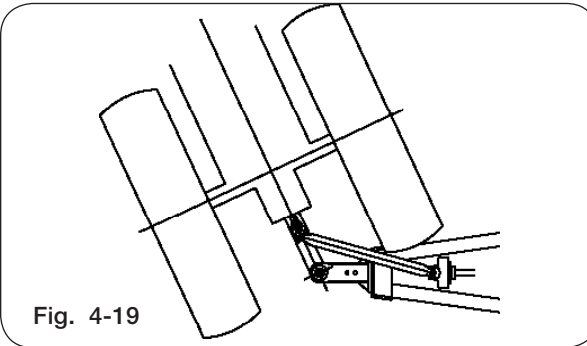
Enter here: _____(d)

This is the maximum recommended extended length.



Verify Telescoping PTO Shaft Length (continued)

4. Hitch tractor drawbar to spreader, ensuring that tractor and spreader are on level ground and coupled as straight as practical.
5. Connect PTO shaft to tractor, and measure length “L” from same points as used in step 1. Ensure that this measurement does not exceed the maximum recommended extended length calculated in step 3 above. If necessary, choose a shorter drawbar position, or obtain a longer PTO shaft assembly before operating spreader.
6. Position the tractor to obtain the tightest turning angle, relative to the spreader (Figure 4-19).
7. Measure the length “L” from the same points as used in step 1. **This distance must be at least 1.5 inches greater than the distance measured in step 1.** If necessary, adjust the length of the PTO shaft by cutting the inner and outer plastic guard tubes and inner and outer sliding profiles by the same length. Round off all sharp edges and remove burrs before greasing and reassembling shaft halves. (FIG. 4-20)



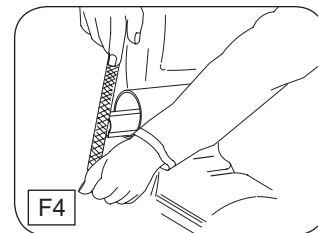
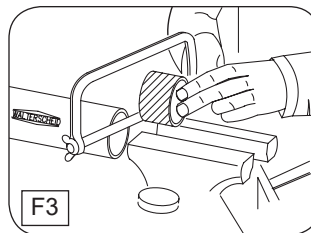
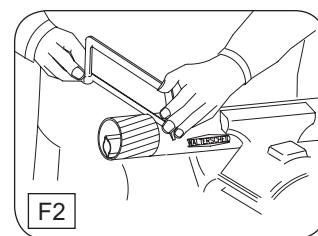
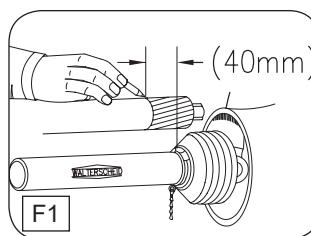
PTO Shaft Length Adjustment

WARNING

- CHECK THE LENGTH OF THE TELESCOPING MEMBERS TO ENSURE THE DRIVELINE WILL NOT BOTTOM OUT OR SEPARATE WHEN TURNING AND/OR GOING OVER ROUGH TERRAIN.

NOTE: Maximum operating length LB. (Refer to “Verify Telescoping PTO Shaft Length” in this section for LB length.)

1. To adjust length, hold the half-shafts next to each other in the shortest working position and mark them.
2. Shorten inner and outer guard tubes equally.
3. Shorten inner and outer sliding profiles by the same length as the guard tubes.
4. Round off all sharp edges and remove burrs. Grease sliding profiles.



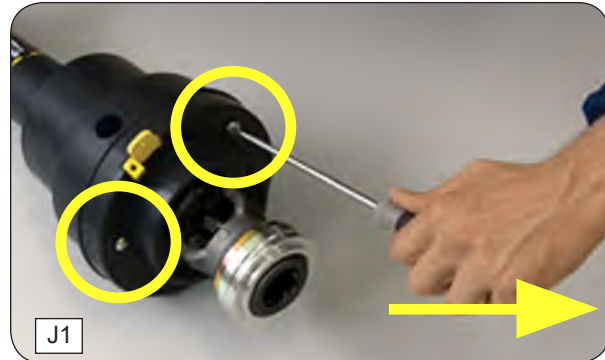
PTO Shaft and CV Joint Body - Benzi PTO

WARNING

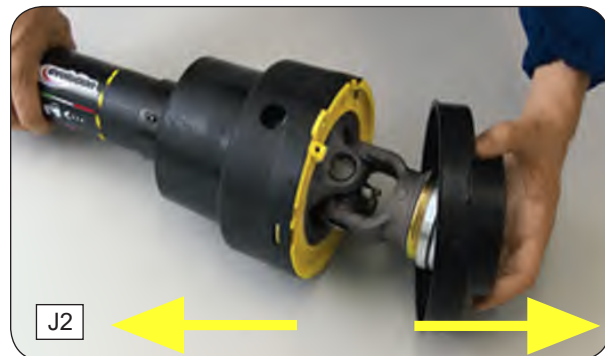
- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.
- KEEP HANDS CLEAR OF PINCH POINT AREAS.

To Dismantle CV Joint Body Cone (Figs. J1 - J3)

1. Remove screws on the outer cone. (FIG. J1)



2. Remove outer and inner cone. (FIG. J2)



3. Open the wideangle retainer and remove from the CV joint body groove. (FIG. J3)



PTO Shaft and CV Joint Body - Benzi PTO (continued)

To Assemble CV Joint Body Cone (Figs. K1 - K3)

1. Clean and grease the wideangle retainer and CV joint body groove. (FIG. K1)
2. Grease the CV joint body. (FIG. K1)

NOTE: See “PTO Driveshaft Lubrication - Benzi PTO” for retainer and CV joint body lubrication.



3. Fit wideangle retainer in CV joint body groove. (FIG. K2)
4. Assemble retainer with Benzi logo positioned outward. (FIG. K2)



5. Slip on inner cone to retainer by aligning the inner cone holes with the retainer tabs.
6. Insert outer cone through yoke and retainer chain tab. Align screw holes. (FIGS. K3 & K4)



7. Attach screws to the outer cone. (FIG. K4)



Jack Shaft Disassembly and Replacement

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.
- 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 100 LBS. SPECIFIC LOAD RATINGS FOR INDIVIDUAL LOADS WILL BE GIVEN AT THE APPROPRIATE TIME IN THE INSTRUCTIONS.

CAUTION

- SHARP EDGES ON DRY SPREADER CAN CAUSE SERIOUS INJURY. BE CAREFUL WHEN WORKING AROUND DRY SPREADER.

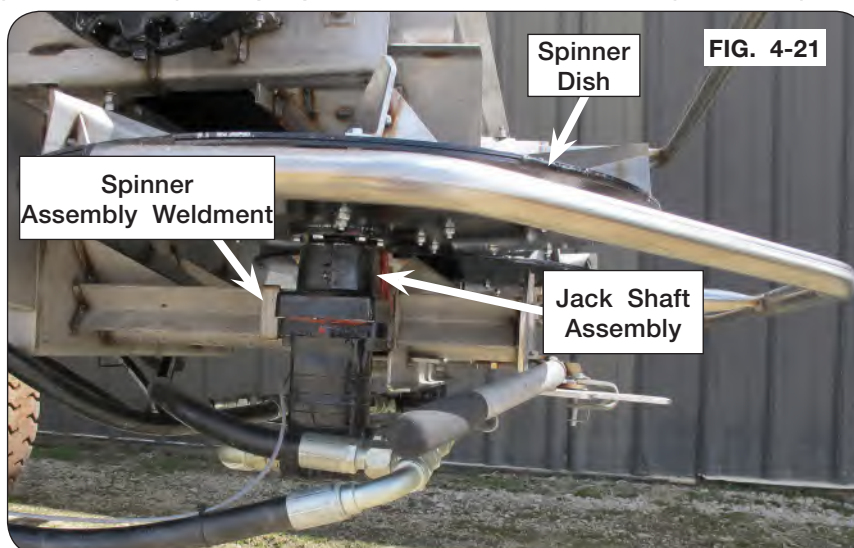
IMPORTANT

- *Stainless steel hardware has a natural tendency to cold weld/gall when installed/uninstalled at high speeds and/or high torques. It is recommended to apply a thread lubricant approved for stainless steel such as graphite-based anti-seize or molybdenum disulfide based anti-seize when performing an assembly/disassembly of stainless steel hardware. Unverferth PN 9504206 or equivalent.*
1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.



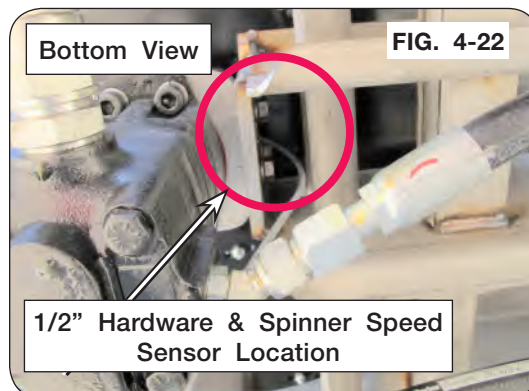
Jack Shaft Disassembly and Replacement (continued)

2. Support spinner dish using a safe lifting device rated for 100 lbs.
3. Remove six 5/16"-18UNC x 1 1/4" capscrews (900900-031; for 2650 to 1050 units) or 5/16"-18UNC x 1" capscrews (900900-030; for 1250 & 1150 chassis), six 5/16"-18UNC elastic stop nuts (900905-010), one 1/2"-13UNC x 1 1/4" capscrew (900900-100), one 1/2" lock washer (900903-025), and one 2" washer (PF1218-06) from the spinner dish and jack shaft assembly (PF1238-732B). Keep spinner dish and hardware. (FIG. 4-21)



4. Remove four 1/2"-13UNC x 1 1/4" capscrews (900900-100) and four 1/2" lock washers (900903-025) from spinner weldment. Keep hardware. (FIG. 4-22)
5. Remove the spinner speed sensor body and 1/4"-20UNC x 7/16" capscrew from the sensor hole of the jack shaft assembly. Keep capscrew. (FIG. 4-22)

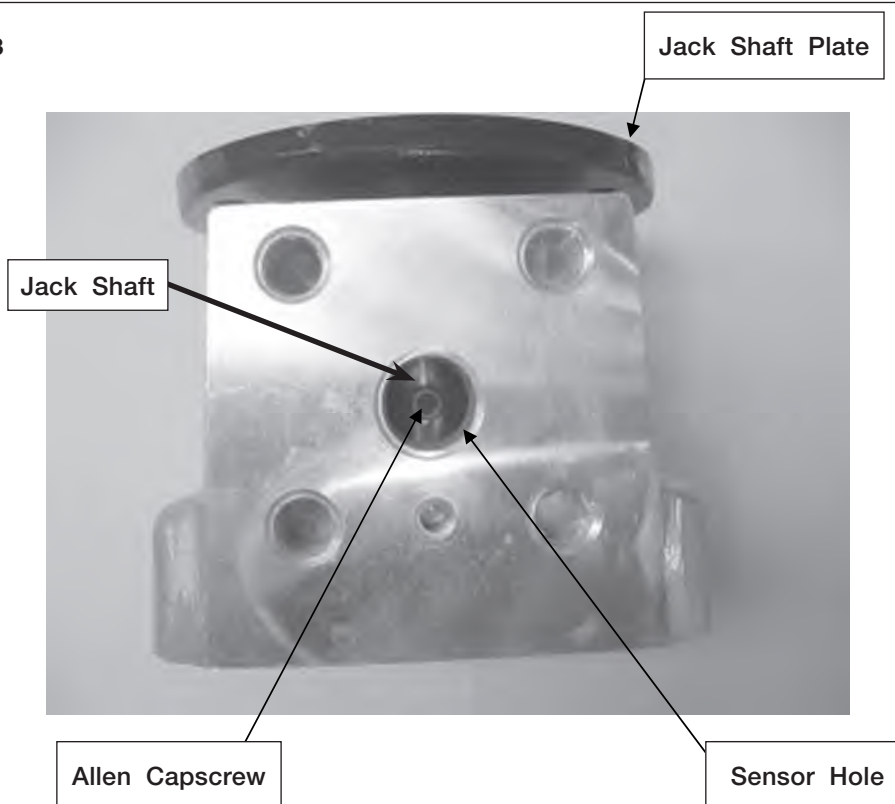
(Continued on next page)



Jack Shaft Disassembly and Replacement (continued)

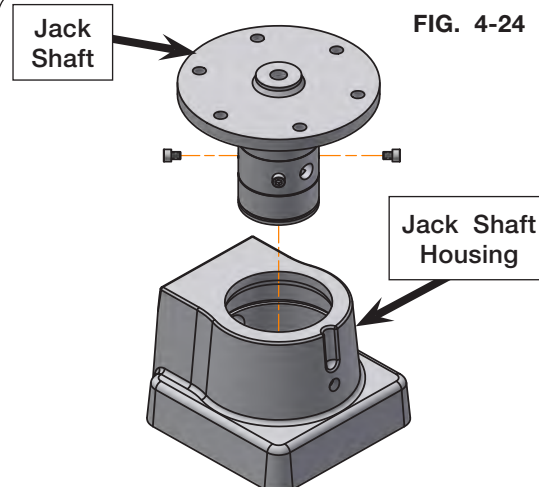
6. To disassemble jack shaft assembly, remove four allen capscrews (PF1200-245) from jack shaft by rotating jack shaft plate until the allen capscrew can be seen through sensor hole. (FIG. 4-23)
7. Once four allen capscrews are removed from the jack shaft, add blue thread locker to the allen capscrews.

FIG. 4-23



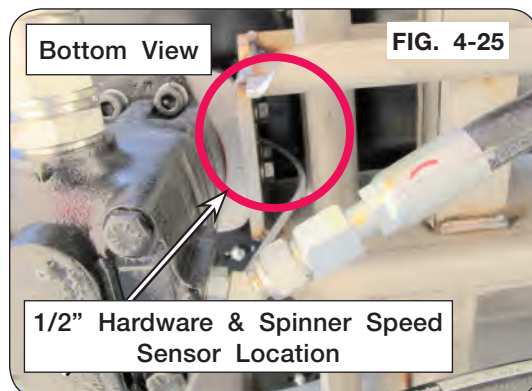
8. Remove and discard jack shaft from jack shaft housing (PF1218-732H). (FIG. 4-24)
9. Insert new jack shaft into jack shaft housing. (FIG. 4-24)
10. Reinsert four allen capscrews with blue thread locker to jack shaft by rotating jack shaft plate until the allen capscrew hole can be seen through sensor hole. (FIG. 4-23)
11. Tighten allen capscrews.

FIG. 4-24

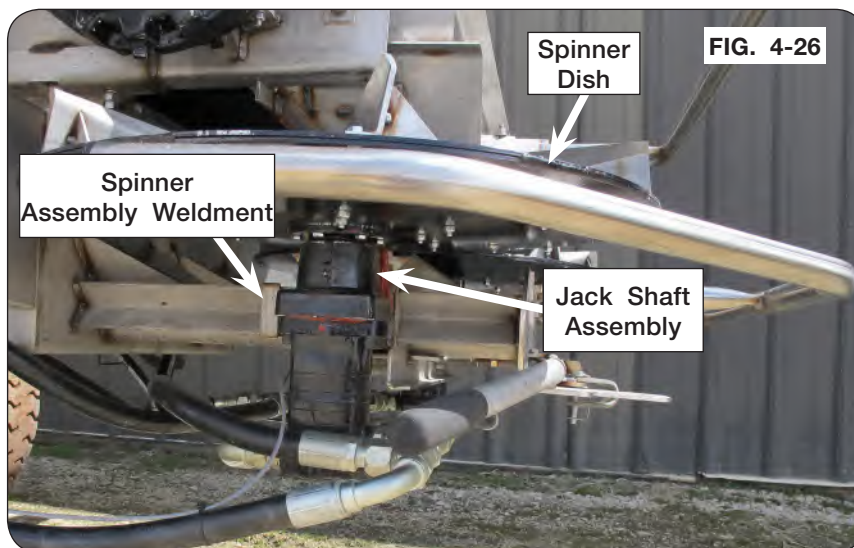


Jack Shaft Disassembly and Replacement (continued)

12. Reattach the spinner speed sensor body and 1/4"-20UNC x 7/16" capscrew to the sensor hole of the jack shaft assembly. (FIG. 4-25)
13. Reattach jack shaft assembly to the spinner assembly weldment using 1/2" hardware from step 4. (FIG. 4-25)



14. Using a safe lifting device rated for 100 lbs., lift spinner dish on top of jack shaft assembly. (FIG. 4-26)
15. Reattach spinner dish to jack shaft assembly using hardware from step 3. (FIG. 4-26)
16. Torque hardware to specification. See "Complete Torque Chart" in this section.



Fixed Depth Conveyor Speed Sensor Replacement

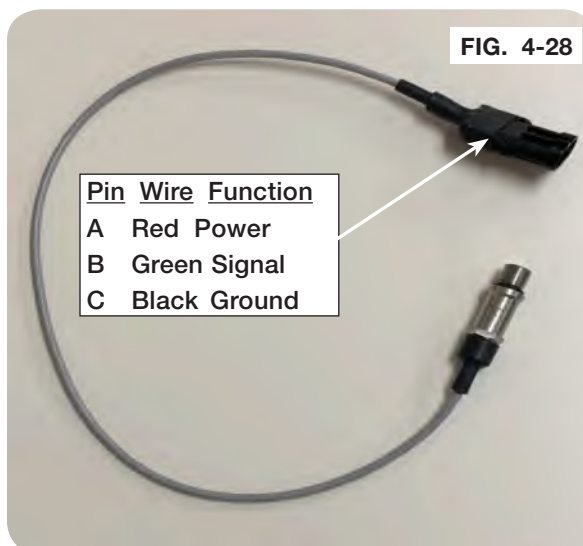
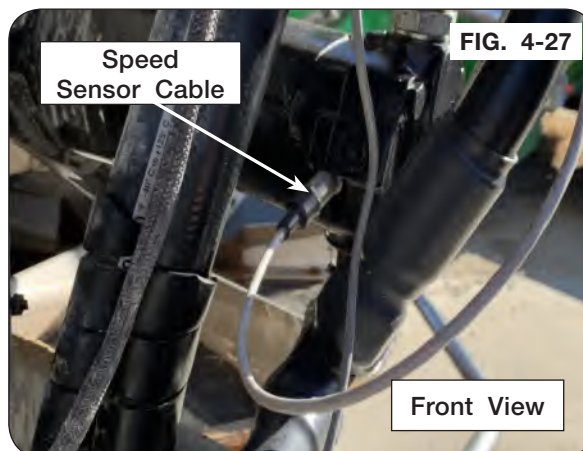
WARNING

- 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.

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.

NOTE: Torque values below are for clean dry threads.

2. Install sensor into conveyor motor housing by hand. See FIG. 4-27.
3. Once sensor is hand tight, torque sensor to 75–125 in-lb.
4. Connect speed sensor cable to the speed sensor, and attach other end of cable to the wiring harness. See FIG. 4-28.



Spinner Motor Speed Sensor Replacement

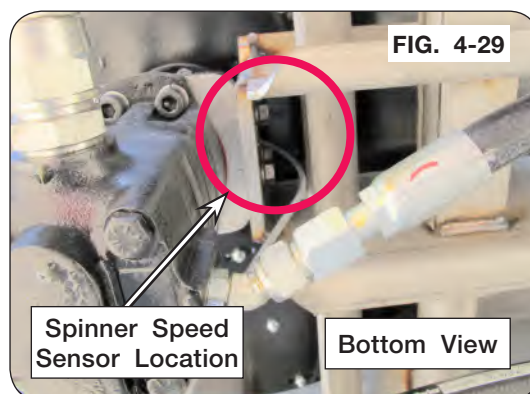
WARNING

- 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.

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.

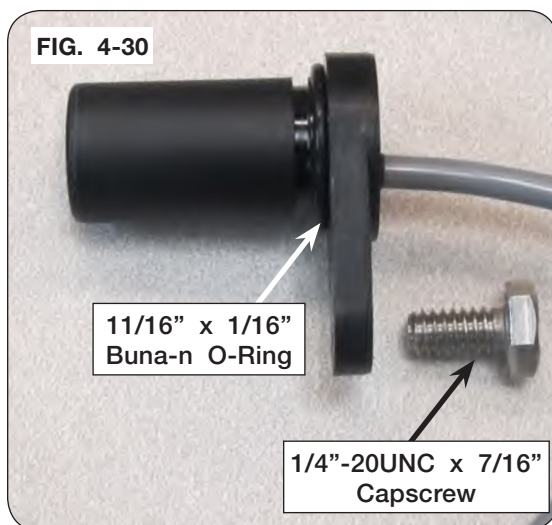


2. Remove the spinner speed sensor body from the sensor hole of the jack shaft assembly. Discard spinner speed sensor. (FIG. 4-29)



3. On new spinner speed sensor, move the o-ring flush against the speed sensor flange as shown in FIG. 4-30.

(Continued on next page.)



Spinner Motor Speed Sensor Replacement (continued)

IMPORTANT

- Do not force the sensor against the gear/target tooth, damage may occur.
4. Gently insert the spinner speed sensor body into the sensor hole of the jack shaft assembly until the sensor touches against the motor (gear/target) tooth. (FIG. 4-32)
 5. Apply anti-seize to provided 1/4"-20UNC x 7/16" capscrew (SS).
 6. Attach spinner speed sensor to the jack shaft assembly using provided 1/4"-20UNC x 7/16" capscrew (SS). (FIG. 4-32)
 7. Connect speed sensor cable to the wiring harness. (FIG. 4-33)

FIG. 4-32

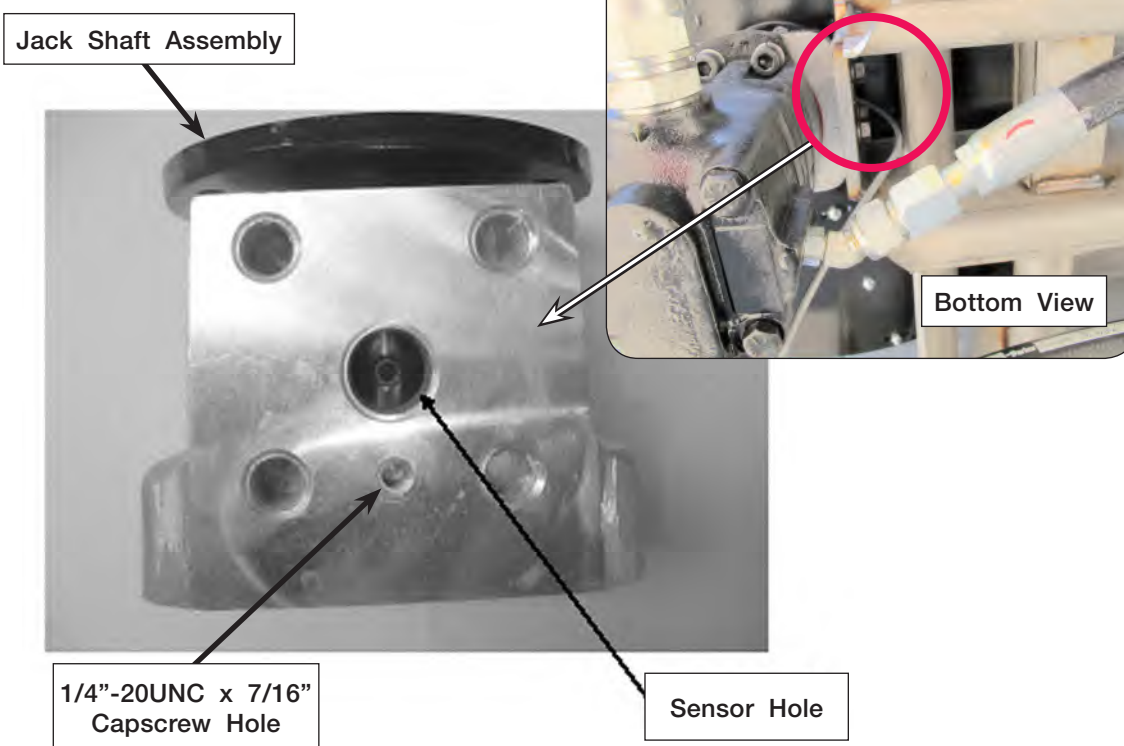


FIG. 4-33



Pressure Compensator Cartridge Valve Disassembly

WARNING

- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING IMPLEMENT.
- KEEP HANDS CLEAR OF PINCH POINT AREAS.

IMPORTANT

- Running the PTO pump without oil will result in pump damage.

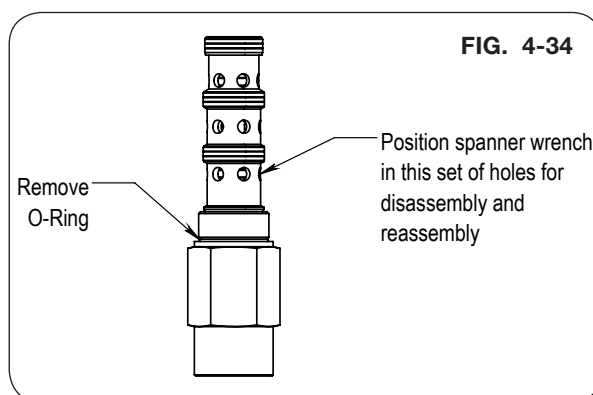
TOOLS REQUIRED:

- Spanner wrench
- Vise
- 1/4" Allen Wrench
- Red Thread Lock
- Thread Sealant

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.

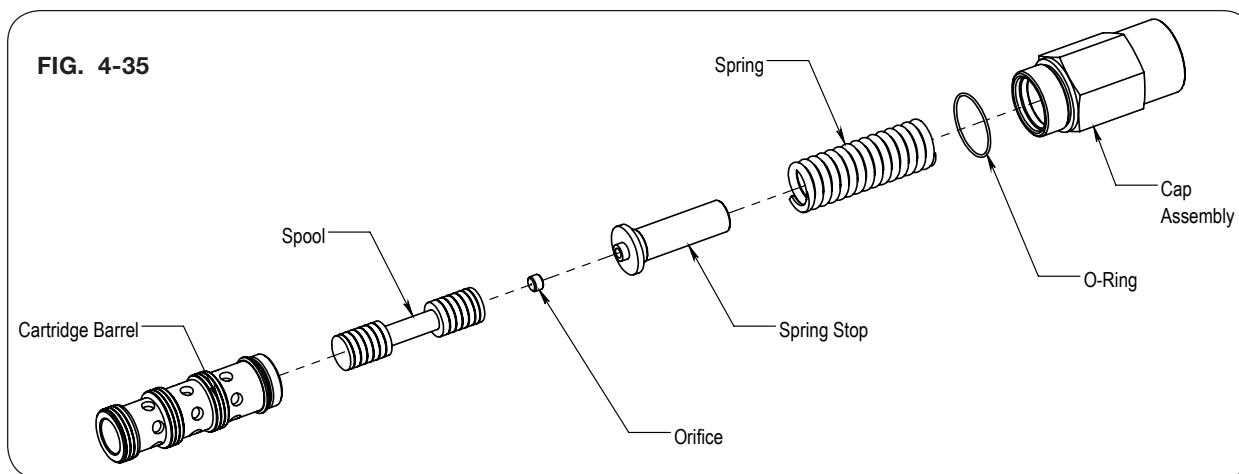


2. Remove O-ring from cap assembly. (FIG. 4-34)



3. Secure the cartridge in vise by the hex on cap and remove cartridge barrel using spanner wrench. Position spanner wrench on cartridge barrel in hole set closest to cap (FIG. 4-34)
4. Disassemble cartridge valve as shown figure 4-35. Clean and inspect all parts thoroughly. Replace worn or damaged parts.

(Continued on next page)



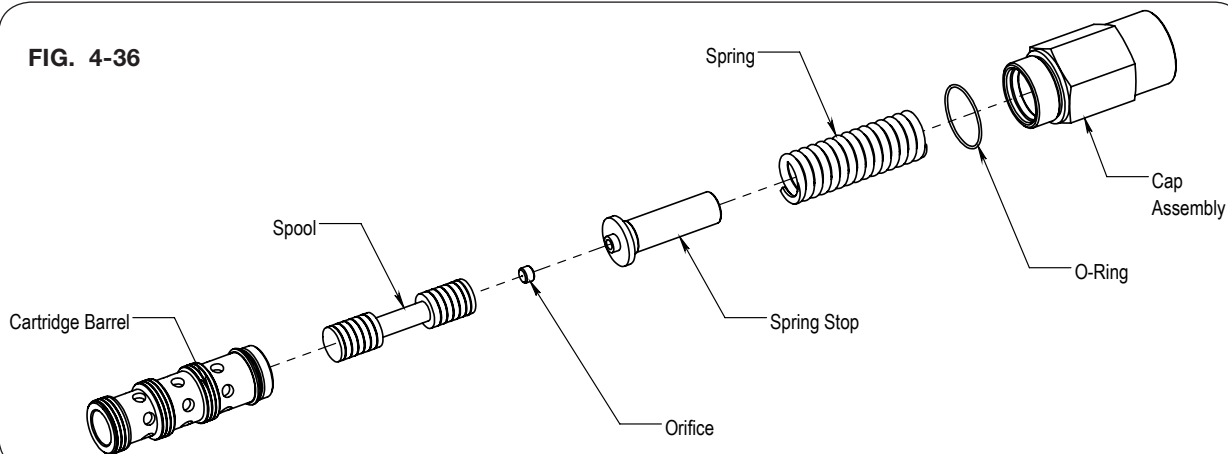
Pressure Compensator Cartridge Valve Disassembly (continued)

5. Once clean, reassemble orifice to the spring stop as shown in Figure 4-36.
6. Insert spring stop into spring. (FIG. 4-36)
7. Insert spool into cartridge. (FIG. 4-36)
8. Insert cartridge into spring. (FIG. 4-36)
9. Reassemble cartridge to cap assembly as shown in Figure 4-36.
10. Torque cap assembly to 70 Ft.-Lbs.
11. Check hydraulic reservoir oil level and fill as needed. See “Lubrication” and “Hydraulic Reservoir Tank” for oil specifications.

IMPORTANT

- *Running the PTO pump without oil will result in pump damage.*

FIG. 4-36



Hydraulic Servo Valve Manual Override & Timing

WARNING

- MOVING CONVEYOR OR ROTATING SPINNER COMPONENTS CAN CAUSE SERIOUS INJURY OR MACHINE DAMAGE. BEFORE OPERATING MANUAL OVERRIDE(S), ENSURE EVERYONE IS AWAY FROM THE DRY SPREADER.
- HIGH-PRESSURE FLUIDS CAN PENETRATE THE SKIN AND CAUSE SERIOUS INJURY OR DEATH. LEAKS OF HIGH-PRESSURE FLUIDS MAY NOT BE VISIBLE. USE CARDBOARD OR WOOD TO DETECT LEAKS IN THE HYDRAULIC SYSTEM. SEEK MEDICAL TREATMENT IMMEDIATELY IF INJURED BY HIGH-PRESSURE FLUIDS.

NOTE: Manual override operation is intended for emergency use ONLY and is not intended for continuous operation.

NOTE: Servo valve (PF1211-01A) adjusts through full range in 90° rotation. Never turn more than a total of 1 turn counter clockwise.

NOTE: Never remove valve by the electrical wiring hex. This can damage the valve electrical wiring. (FIG. 4-37)

NOTE: Figure 4-24 shows an uninstalled servo valve and provides locations of locking collar, hex head bolt and servo valve hex. (FIG. 4-37)

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake and shut off engine.
2. Unplug and locate locking collar on valve. (FIG. 4-37)
3. Draw a line on valve and lock collar. This allows the valve to be returned to the proper location. (FIG. 4-38)
4. Loosen hex head bolt on lock collar using 3/16" hex wrench. (FIG. 4-38)



Hydraulic Servo Valve Manual Override & Timing (continued)

WARNING

- MOVING CONVEYOR OR ROTATING SPINNER COMPONENTS CAN CAUSE SERIOUS INJURY OR MACHINE DAMAGE. BEFORE OPERATING MANUAL OVERRIDE(S), ENSURE EVERYONE IS AWAY FROM THE DRY SPREADER.

5. Run engine at desired RPM and engage hydraulics.
6. Hold the valve motor housing by hand and slowly turn the body clockwise to the desired flow setting. (FIG. 4-39)
7. Tighten lock collar to hold position.
8. If further adjustments are necessary, repeat steps 3 through 6 as required.
9. Re-time the valve after manual adjustments before returning to automated operation.
10. To re-time valve, turn off control switch and adjust valve motor housing slowly counter clockwise until conveyor or fans stop.
11. To manually override and operate the conveyor for cleanout, utilize the Raven system “cleanout” function under the test screen. This function runs the conveyor only. Turn on the spinner by entering a “test speed” into the rate controller. Refer to “RCM Spreader Set Up” in SET UP section for more information.



FIG. 4-39

Hydraulic PWM Valve Manual Override For 1050 To 2250 Units With 9009773 PWM Valve

WARNING

- MOVING CONVEYOR OR ROTATING SPINNER COMPONENTS CAN CAUSE SERIOUS INJURY OR MACHINE DAMAGE. BEFORE OPERATING MANUAL OVERRIDE(S), ENSURE EVERYONE IS AWAY FROM THE DRY SPREADER.
- HIGH-PRESSURE FLUIDS CAN PENETRATE THE SKIN AND CAUSE SERIOUS INJURY OR DEATH. LEAKS OF HIGH-PRESSURE FLUIDS MAY NOT BE VISIBLE. USE CARDBOARD OR WOOD TO DETECT LEAKS IN THE HYDRAULIC SYSTEM. SEEK MEDICAL TREATMENT IMMEDIATELY IF INJURED BY HIGH-PRESSURE FLUIDS.

NOTE: Manual override operation is intended for emergency use ONLY and is not intended for continuous operation.

To Manually Override PWM Valve (9009773):

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake and shut off engine.
2. Locate PWM valve on valve block. (FIG. 4-40)
3. Run engine at desired RPM and engage hydraulics.
4. Loosen jam nut using 1/2" wrench. (FIG. 4-41)
5. Turn in 5/32" hex head stem until flow starts (up to 4 turns). (FIG. 4-41)

NOTE: As hex head stem is turned in, the controlled function starts to receive oil and operates.

To Reset:

1. Turn out 5/32" hex head stem until flow stops. (FIG. 4-41)
2. While holding the 5/32" hex head stem in place, tighten the jam nut. (FIG. 4-41)

FIG. 4-40

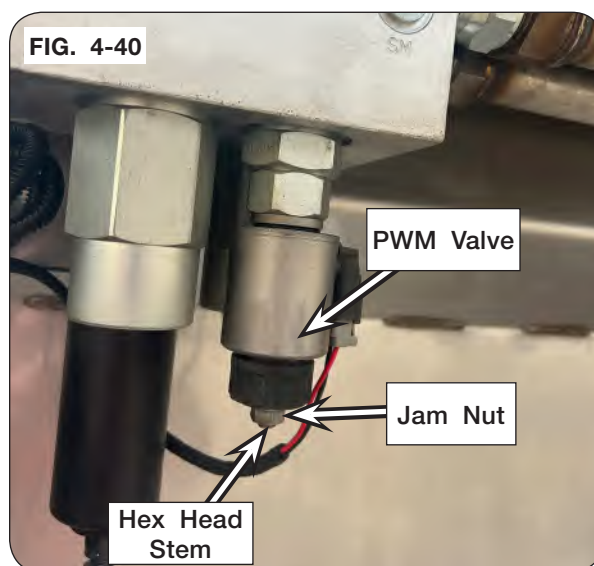
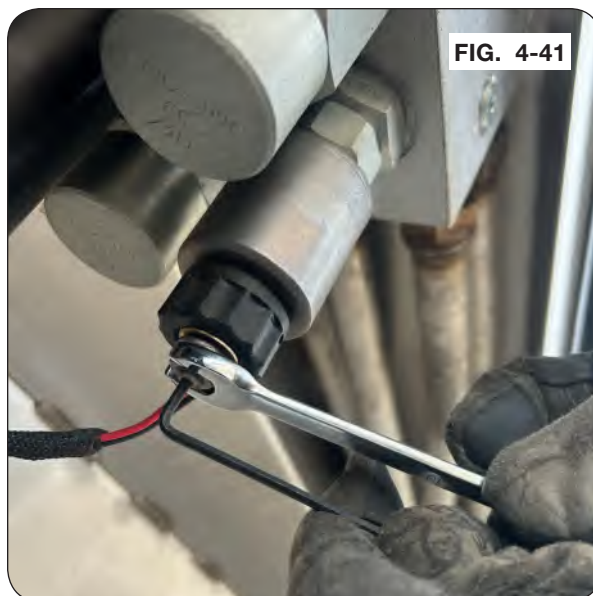


FIG. 4-41



Hydraulic PWM Valve Manual Override For 1150 & 1250 Chassis Mounted Units

WARNING

- MOVING CONVEYOR OR ROTATING SPINNER COMPONENTS CAN CAUSE SERIOUS INJURY OR MACHINE DAMAGE. BEFORE OPERATING MANUAL OVERRIDE(S), ENSURE EVERYONE IS AWAY FROM THE DRY SPREADER.
- HIGH-PRESSURE FLUIDS CAN PENETRATE THE SKIN AND CAUSE SERIOUS INJURY OR DEATH. LEAKS OF HIGH-PRESSURE FLUIDS MAY NOT BE VISIBLE. USE CARDBOARD OR WOOD TO DETECT LEAKS IN THE HYDRAULIC SYSTEM. SEEK MEDICAL TREATMENT IMMEDIATELY IF INJURED BY HIGH-PRESSURE FLUIDS.

To Manually Override PWM Valve (9009589):

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake and shut off engine.
2. Remove cap and locate knurled nut on PWM valve. Keep cap. (FIG. 4-42)
3. Run engine at desired RPM and engage hydraulics.
4. Turn in knurled nut stem until flow starts. (FIG. 4-43)

NOTE: As knurled nut stem is turned in, the controlled function starts to receive oil and operates. (FIG. 4-44)

To Reset:

1. Turn out knurled nut stem until flow stops.
2. Reattach cap.

FIG. 4-42

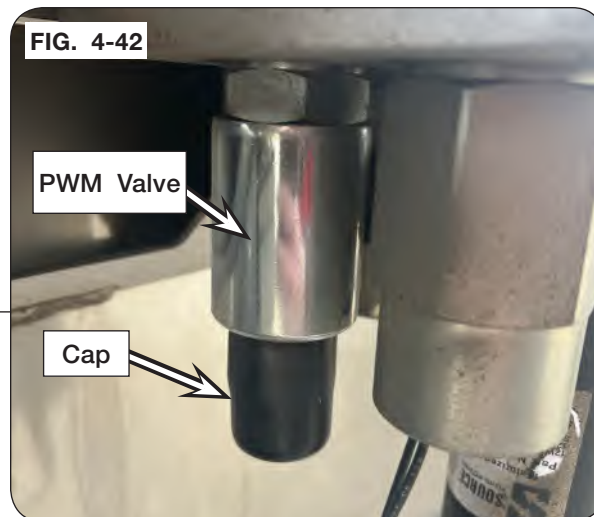


FIG. 4-43

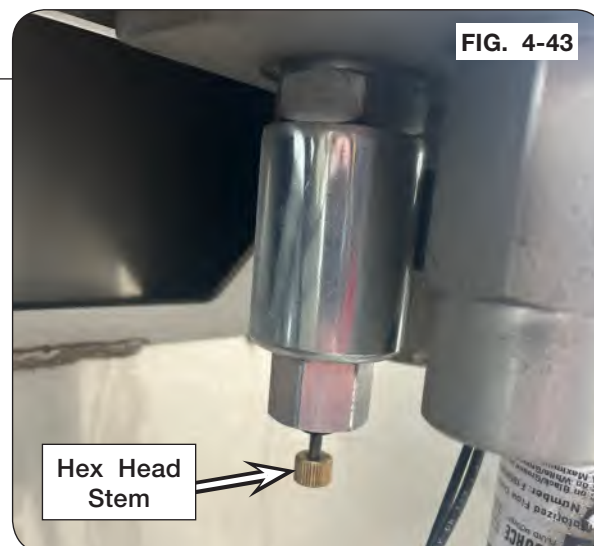
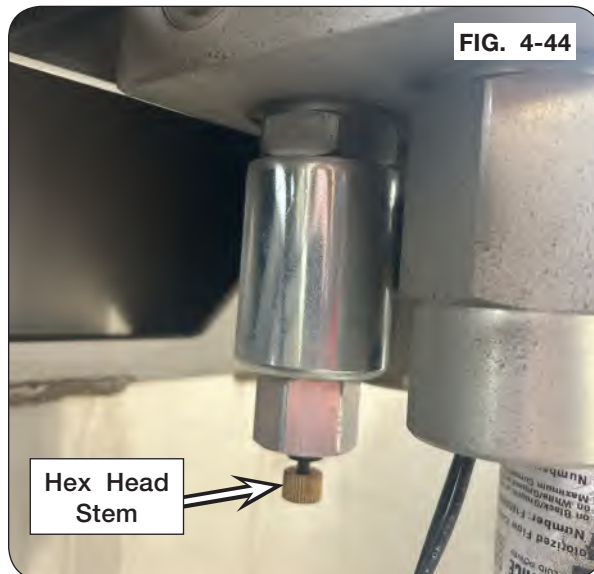


FIG. 4-44



Chain Shield Seal Strip Replacement

WARNING

- TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.
- ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING WITH OR NEAR CHEMICALS. THIS EQUIPMENT INCLUDES, BUT IS NOT LIMITED TO: PROTECTIVE EYEWEAR, GLOVES, SHOES, SOCKS, LONG-SLEEVED SHIRT AND LONG PANTS. ADDITIONAL PROTECTION MAY BE REQUIRED FOR MANY TYPES OF CHEMICALS.
- TO PREVENT PERSONAL INJURY OR DEATH, ALWAYS ENSURE THAT THERE ARE PEOPLE WHO REMAIN OUTSIDE THE DRY SPREADER TO ASSIST THE PERSON WORKING INSIDE, AND THAT ALL SAFE WORKPLACE PRACTICES ARE FOLLOWED. THERE IS RESTRICTED MOBILITY AND LIMITED EXIT PATHS WHEN WORKING INSIDE THE IMPLEMENT.

IMPORTANT

- *Stainless steel hardware has a natural tendency to cold weld/gall when installed/uninstalled at high speeds and/or high torques. It is recommended to apply a thread lubricant approved for stainless steel such as graphite-based anti-seize or molybdenum disulfide based anti-seize when performing an assembly/disassembly of stainless steel hardware. Unverferth PN 9504206 or equivalent.*

NOTE: Refer to “Chain Shield” in PARTS section for chain shield box length part numbers.

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle’s parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.

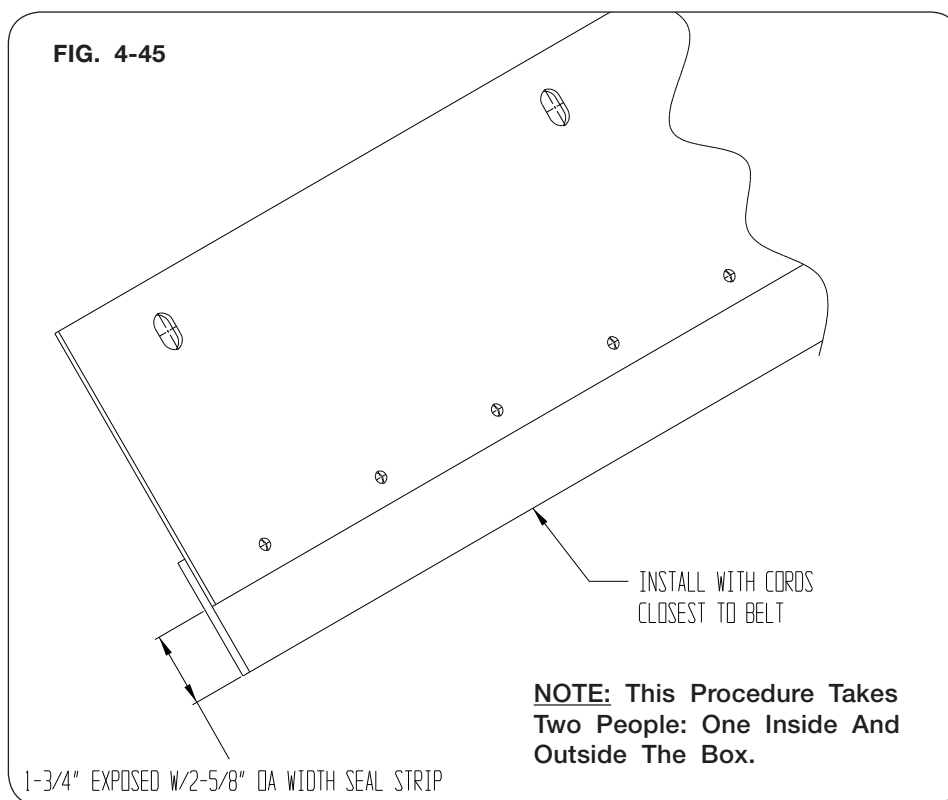


2. Remove and discard seal strips.

(Continued on next page.)

Chain Shield Seal Strip Replacement

3. Ensure the new seal strips are exposed 1 3/4" as shown in FIG 4-45.
4. Inside the spreader box, insert 3/8"16UNC x 1" SS carriage bolts (9007908-051) through the slotted holes on the chain shield and the holes on the spreader box.
5. Insert button head socket capscrews (PF1200-086SS) through the chain shield and the seal strip (standard seal strip PF1000-37 or high temperature seal strip PF1000-38).
6. Attach the seal strip to the chain shield with tee prong nuts (PF1205-86).
7. Repeat steps 2 through 6 for the other side of the spreader box.
8. Outside of the spreader box, attach the chain shields with 3/8" SS lock washers (900903-021) and 3/8"-16UNC SS nuts (9005640) to both sides of the spreader box.



Bin Level Sensor Replacement

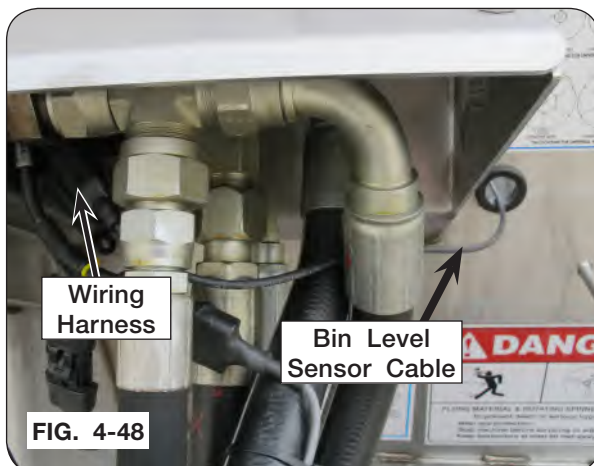
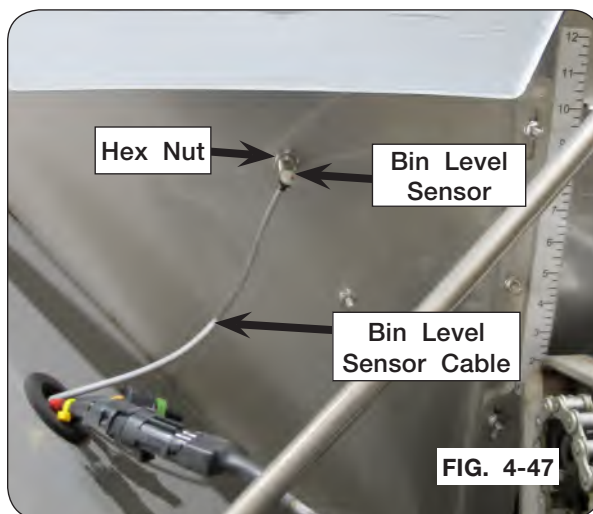
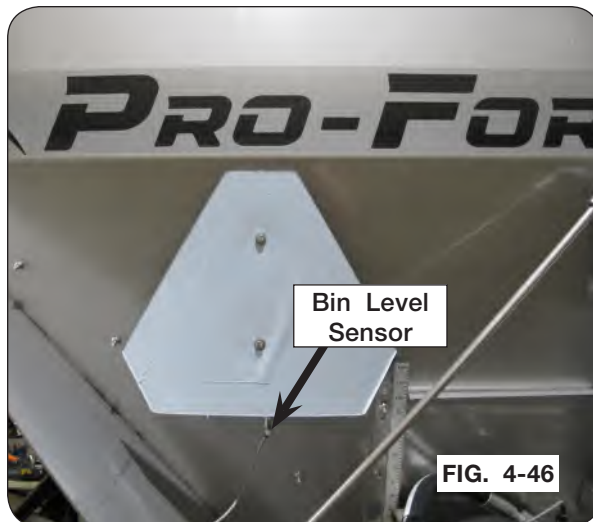
WARNING

- TO PREVENT PERSONAL INJURY OR DEATH, ALWAYS ENSURE THAT THERE ARE PEOPLE WHO REMAIN OUTSIDE THE DRY SPREADER TO ASSIST THE PERSON WORKING INSIDE, AND THAT ALL SAFE WORKPLACE PRACTICES ARE FOLLOWED. THERE IS RESTRICTED MOBILITY AND LIMITED EXIT PATHS WHEN WORKING INSIDE THE IMPLEMENT.

1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.



2. Disconnect previous bin level sensor cable from the bin level sensor and other end from the wiring harness.
3. Remove previous bin level sensor and hardware from the spreader box. Discard bin level sensor and hardware. (FIG. 4-46)
4. Outside of the spreader box, slide one hex nut (9008808) onto new bin level sensor (9009180). (FIGS. 4-46 & 4-47)
5. Insert bin level sensor through the rear panel with connector end out of the spreader box. (FIG. 4-47)
6. Inside the spreader box, attach bin level sensor to the inside rear panel using remaining hex nut (9008808).
7. Route bin level sensor cable as shown in figures 4-47 and 4-48 and connect to wiring harness.

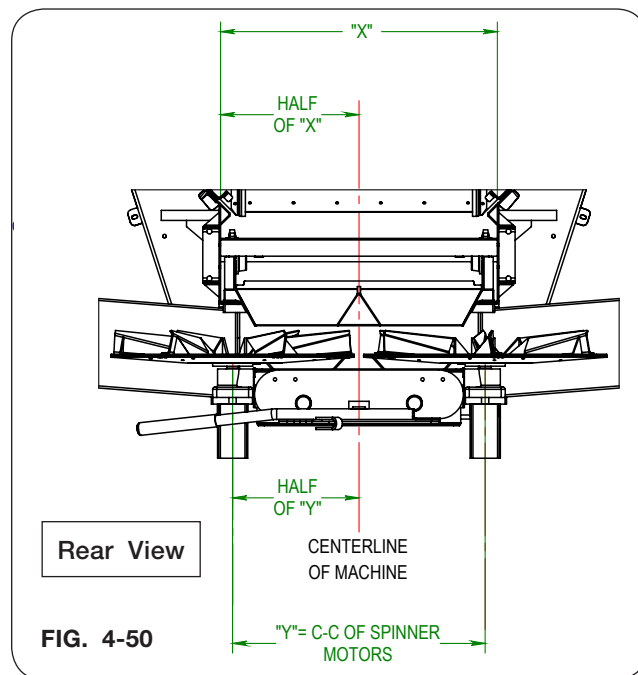
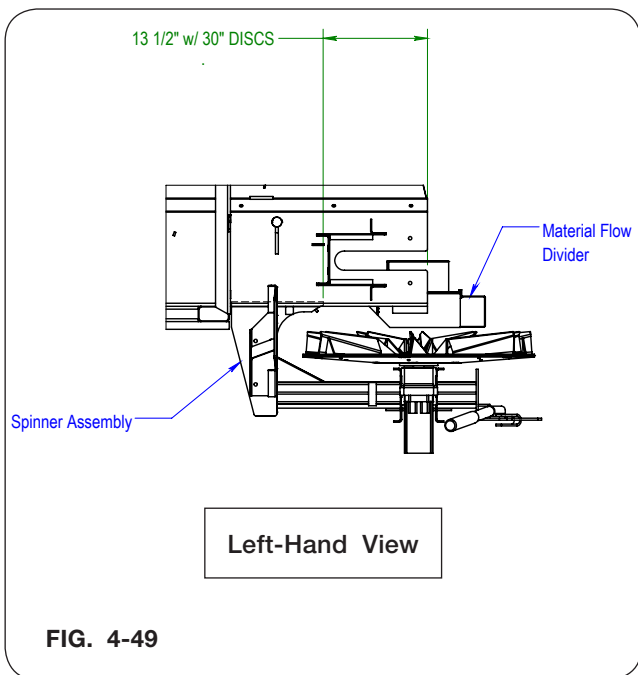


Spinner and Material Flow Divider Assembly

WARNING

- TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.
- KEEP HANDS CLEAR OF PINCH POINT AREAS.
- 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 600 LBS. SPECIFIC LOAD RATINGS FOR INDIVIDUAL LOADS WILL BE GIVEN AT THE APPROPRIATE TIME IN THE INSTRUCTIONS.

NOTE: Verify all dimensions to ensure squareness of spinner assembly and material flow divider. If these items are not located properly, the spread pattern will be affected. The material flow divider and spinner assembly **MUST** be centered in the flow of material to get an adequate spread pattern.



1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.



2. Measure from rear edge of spinner frame to end of conveyor frame rail to verify correct spinner location. (FIG. 4-49)
3. Verify that dimension is the same on both the driver's side and the passenger's side to ensure squareness. (FIG. 4-50)
4. If the dimension is not the same, using a safe lifting device rated for 600 lbs., adjust the spinner assembly.

Rear Feedgate Door Replacement

WARNING

- TIPPING OR MOVEMENT OF THE MACHINE CAN CAUSE SERIOUS INJURY OR DEATH. BE SURE MACHINE IS SECURELY BLOCKED.
- 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 EYEWEAR, GLOVES, SHOES, SOCKS, LONG-SLEEVED SHIRT AND LONG PANTS. ADDITIONAL PROTECTION MAY BE REQUIRED FOR MANY TYPES OF CHEMICALS.
- TO PREVENT PERSONAL INJURY OR DEATH, ALWAYS ENSURE THAT THERE ARE PEOPLE WHO REMAIN OUTSIDE THE MACHINE TO ASSIST THE PERSON WORKING INSIDE, AND THAT ALL SAFE WORKPLACE PRACTICES ARE FOLLOWED. THERE IS RESTRICTED MOBILITY AND LIMITED EXIT PATHS WHEN WORKING INSIDE THE IMPLEMENT.

IMPORTANT

- *Stainless steel hardware has a natural tendency to cold weld/gall when installed/uninstalled at high speeds and/or high torques. It is recommended to apply a thread lubricant approved for stainless steel such as graphite-based anti-seize or molybdenum disulfide based anti-seize when performing an assembly/disassembly of stainless steel hardware. Unverferth PN 9504206 or equivalent.*
1. Park the empty spreader on a firm, level surface. Block the machine to keep it from moving. Set the vehicle's parking brake, shut off the engine, remove the ignition key, disconnect PTO and hydraulics from the vehicle to the spreader.
 2. Remove and discard the 1/4" hardware from the feedgate slides. (FIG. 4-51)
 3. Remove and retain internal feedgate baffle (416673), if equipped. (FIG. 4-51)
 4. Remove and discard the 3/8" hardware attaching the feedgate jack to the gate. (FIG. 4-52)

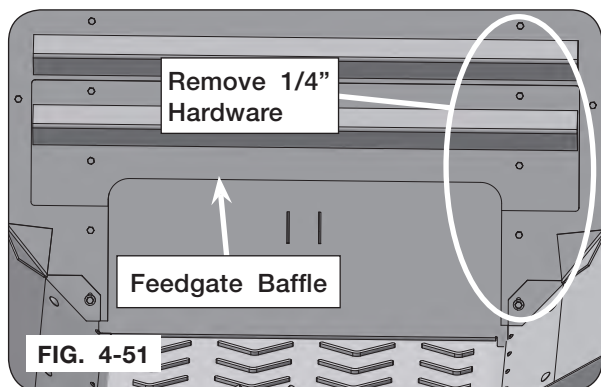


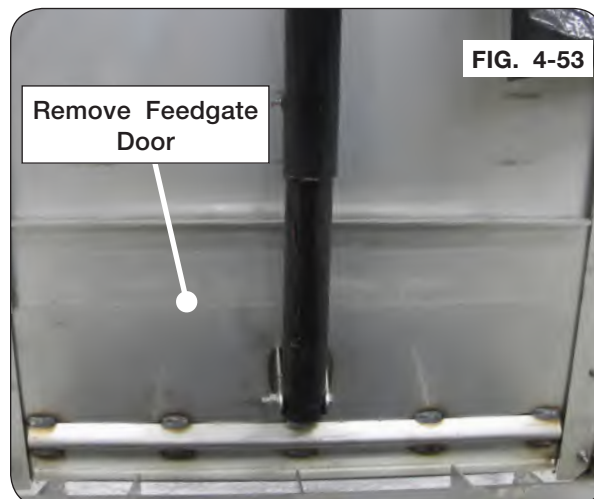
FIG. 4-51



FIG. 4-52

Rear Feedgate Door Replacement (continued)

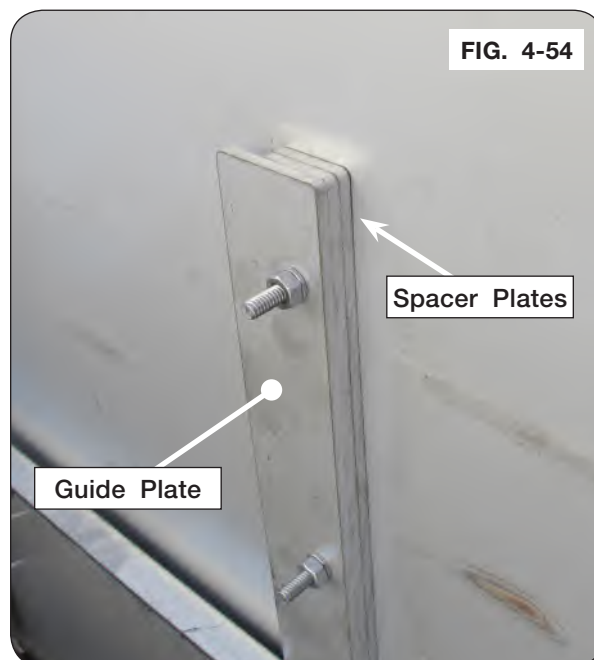
5. Remove and discard the current feedgate door (416608) from the spreader. (FIG. 4-53)



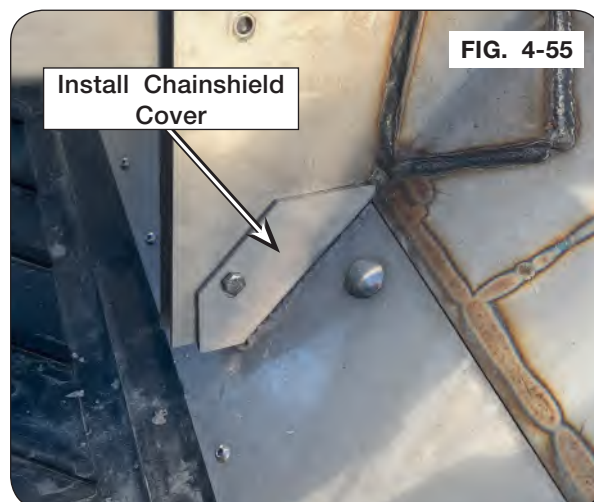
6. Align 2 feedgate guide spacer plates (416669) against the hopper and 1 feedgate guide plate (416670) against the spacer plates on both sides of the door. (FIG. 4-54)

NOTE: Do not install capscrews in the bottom position on both sides and do not install bolts in the top and middle positions of the left-hand side.

7. From inside the spreader box and using internal feedgate baffle from step 3, insert 1/4"-20UNC x 1-1/2" SS capscrews (900900-007) through the holes on the internal feedgate baffle, spreader box, feedgate guide spacer plates and feedgate guide plate to the right-hand and left-hand sides. Secure the plates to the hopper by using 1/4"-20UNC hex nuts. (FIG. 4-54)



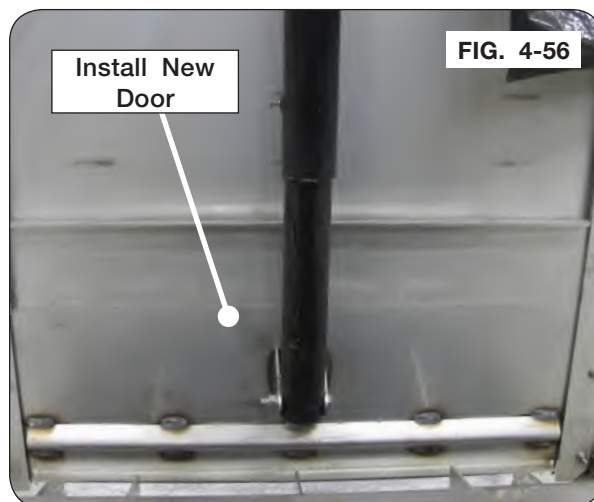
8. On the inside of the spreader, position a chainshield cover (415236) at a lower corner of the feed gate opening. The cover should take up any gap between the rear wall and the chain shield. Use the provided 1/4" hardware to secure the cover to the rear wall. (FIG. 4-55) Repeat the process for the other side. The silicone seal in this area may need to be removed and re-applied once the cover is installed.



Rear Feedgate Door Replacement (continued)

9. Slide the new feedgate weldment (416608) into position between the hopper and the guide plates. (FIG. 4-56)

10. Attach feedgate weldment to the bottom of feedgate jack using the provided 3/8" hardware.

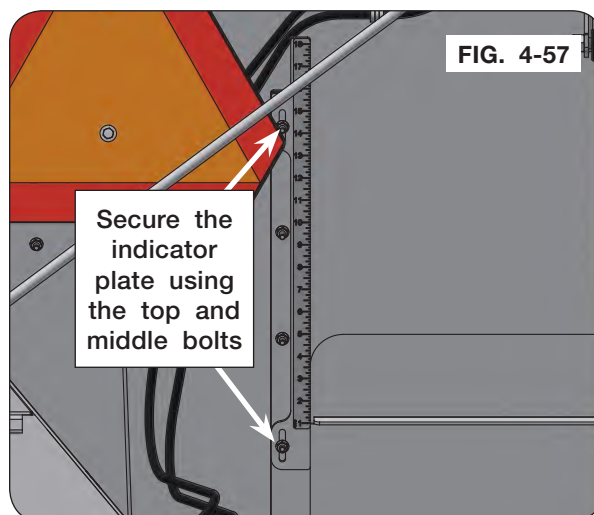


11. On the outside of the spreader, position the indicator plate (413828) so the slotted holes are over the top and middle bolt holes on the left-hand side. The ruler edge of the plate will be near the rear feedgate door. (FIG. 4-57)

12. Measure from the top of the conveyor belt to the bottom of the feedgate. Make sure the feedgate indicator decal ruler (9010124) at the top of the feedgate matches that measurement. Once the ruler is properly adjusted, secure using the provided 1/4" hardware. (FIG. 4-57)

13. Torque the 1/4" hardware to 8-10 ft. lbs. and the 3/8" hardware to 25-28 ft. lbs.

14. Test feedgate for proper working motion.



Winterizing

WARNING

- ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT WHEN WORKING WITH OR NEAR FERTILIZERS AND/OR 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 FERTILIZERS AND/OR CHEMICALS.

Before storing the spreader in freezing climates, perform the following winterizing procedure:

1. Remove as much water, debris, fertilizer and chemicals from the hopper as possible.
2. Wash the spreader thoroughly inside and out with a high-pressure washer. When using pressure washers, maintain an adequate distance so not to force water into bearings, hydraulic connections or electrical connections.
3. After washing machine, spray an oil/diesel mixture on conveyor chain to avoid corrosion. Refer to “Lubrication” outlined in “MAINTENANCE” section.

Tarp Troubleshooting Inspection & Maintenance

PROBLEM	SOLUTION
TARP SAGS IN MIDDLE AREAS	1. BOWS MAY BE BENT OR ADJUSTED TOO LOW 2. MISSING OR LOOSE RIDGE STRAP REPLACE OR RETIGHTEN 3. TENSION MAY BE TOO LOOSE. TARP SPOOL CABLE MAY NEED TO BE ADJUSTED ON FRONT AND REAR CABLE SPOOLS TO PROVIDE MORE TENSION
HOLES OR TEARS IN TARP	1. CONSULT YOUR LOCAL DEALER FOR REPAIRS 2. ORDER NEW TARP FROM DEALER 3. WHEN NEW TARP OR PARTS ARE NEEDED ALWAYS REPLACE WITH ORIGINAL PARTS

Inspection and Maintenance

WARNING

- TO PREVENT PERSONAL INJURY OR DEATH, DO NOT ALLOW ANYONE ON A CLOSED TARP. TARP SYSTEM IS NOT DESIGNED TO SUPPORT A PERSON.
- FALLING OBJECTS CAN CAUSE SERIOUS INJURY OR DEATH. REMOVE ACCUMULATED WATER/SNOW/ICE OR ANY OTHER OBJECTS FROM TARP BEFORE OPENING TARP.

IMPORTANT

- *Do not open or close tarp while moving or in high wind conditions. Damage to the tarp may occur.*
- *Tarp should not be used if it is torn or the spool cables are frayed or show damage. Fully close tarp with tension on the tarp stops to prevent water from pooling.*

Periodic preventive maintenance should be practiced. Inspect tarp and hardware often for abrasions or loosened bolts that may need adjustment and/or repair. Check spool cables for wear and adjust tension at the beginning of the season and again half way through the season.

Tears in tarp should be addressed before further tarp operation. If water pools on tarp, adjust tension of tarp cables and/or crank handle tension.

If installed correctly, tarp should always operate as well as when first installed. If tarp does not pass this simple inspection, make all appropriate repairs or adjustments immediately before serious damage occurs.

Troubleshooting

Problem	Possible Cause	Corrective Action
Spinner will not run	Incorrect start up sequence	Refer to “Spreader Start Up Procedure” section in OPERATION.
	No hydraulic flow	Verify hydraulic connectors are fully engaged into the SCVs. Verify flow is in constant and the pressure side is on the hoses marked “+”. If equipped with PTO, ensure PTO is running at 1,000 RPM. Pressure check if necessary.
	Faulty speed signal	Swap spinner and conveyor speed sensor connections on the harness. If the issue now shows up on the conveyor, replace spinner speed sensor and return wiring to original. If the issue remains with the spinner, inspect harness and repair or replace.
	Servo valve not responding	Increase control effort in control valve settings.
		Manually override servo valve. Refer to the “Hydraulic Servo Valve Manual Override & Timing” section in MAINTENANCE. If the spinners spin when valve is overridden, issue is electrical. If the spinners do not spin, issue is hydraulic.
	Faulty control valve	Replace valve.
	No voltage at control valve	Verify spinner RPM control is ON and master switch is ON.
		Verify spinner RPM target is entered.
		Verify valve type and settings are correctly configured.
		Verify harness is in good working condition.
Spinners not achieving target speed	Master Switch OFF	Cycle Master Switch to ON. Allow 3–4 seconds for the spinners to achieve target speed.
	Oil flow too low	Flow requirement for a combined hydraulic system (2 SCV sets used) is 46 GPM. Flow requirement for a split hydraulic system (4 SCV sets used) is 76 GPM.
	Control valve settings incorrect	Adjust control valve settings to correct spinner speed.
		Manually override servo valve to verify. Refer to the “Hydraulic Servo Valve Manual Override & Timing” section in MAINTENANCE. If the spinners operate smoothly, issue is in electronics. Verify valve type and settings are correctly configured. NOTE: Verify Control Effort and Response Rate settings. If spinners continue to operate erratically, issue is in hydraulics.
	Conveyor hydraulic demand too high	Lower conveyor hyd. requirements by opening feedgate 1” and re-calibrating flow. See “RCM Spreader Set Up” section.
	Faulty speed signal	Ensure retaining bolt is properly holding sensor in place.
		Verify there are 4 screws installed in the jack shaft assembly for the speed sensor to read.
		Swap spinner and conveyor speed sensor connections on the harness. If the issue now shows up on the conveyor, replace spinner speed sensor and return wiring to original. If the issue remains with the spinner, inspect harness and repair or replace.
Spinners running separate RPMs	Faulty control valve	Replace valve.
	Boundary Control ON	Turn Boundary Control OFF.
	50/50 valve malfunction	Disassemble valve and clean out any debris. Replace if necessary.
	Fault in jack shaft assembly	Inspect jackshaft assembly. Grease or replace bearings.
Spinners will not turn off	Valve is manually overridden or out of time	Re-time valve. See “Hydraulic Servo Valve Manual Override & Timing” in MAINTENANCE.
	Faulty control valve	Replace valve.

Troubleshooting (continued)

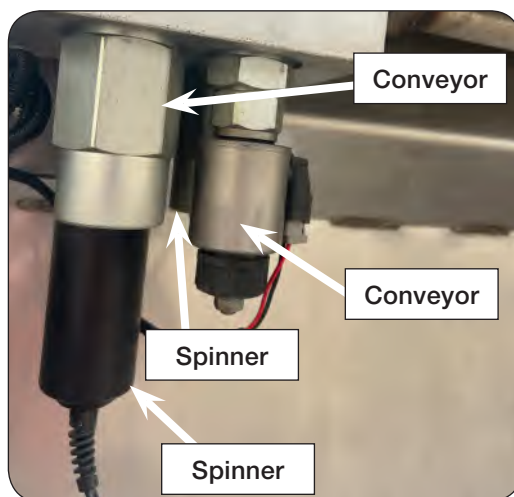
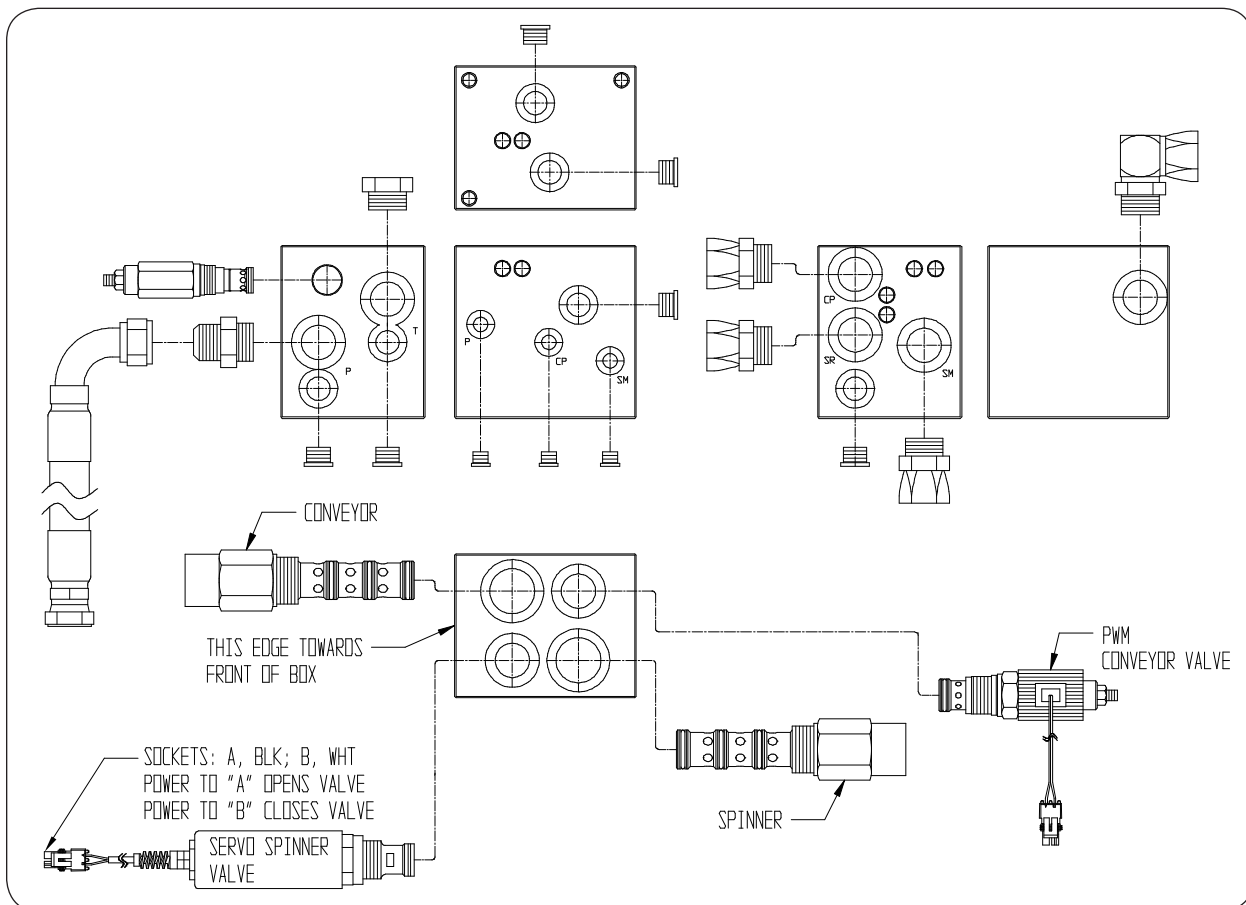
Problem	Possible Cause	Corrective Action
Spinners running erratic	Oil flow too high	Flow requirement for a combined hydraulic system (2 SCV sets used) is 46 GPM. Flow requirement for a split hydraulic system (4 SCV sets used) is 76 GPM. Flow requirement for a spinner circuit hydraulic system is 38 – 46 GPM.
	Control valve settings incorrect	Adjust control valve settings to correct spinner speed.
		Manually override servo valve to verify. Refer to the “Hydraulic Servo Valve Manual Override & Timing” section in MAINTENANCE. If the spinners operate smoothly, issue is in electronics. Verify valve type and settings are correctly configured. NOTE: Verify Control Effort and Response Rate settings. If spinners continue to operate erratically, issue is in hydraulics.
	Faulty speed signal	Ensure retaining bolt is properly holding sensor in place.
		Verify there are 4 screws installed in the jackshaft assembly for the speed sensor to read.
		Swap spinner and conveyor speed sensor connections on the harness. If the issue now shows up on the conveyor, replace spinner speed sensor and return wiring to original. If the issue remains with the spinner, inspect harness and repair or replace.
Conveyor will not run	Incorrect start up sequence	Refer to “Spreader Start Up Procedure” section in OPERATION.
	No hydraulic flow	Verify hydraulics are hooked up correctly and engaged in the proper direction. If equipped with PTO, ensure PTO is running at 1,000 RPM. Pressure check if necessary.
	No travel speed present	Ensure machine is moving or a test speed is entered.
	Swath control boundary or applied area	Ensure machine is within a boundary and not in a previously applied area.
	Prescription rate	Ensure machine is within a boundary and not in a 0-rate area.
	PWM valve not responding	Manually override PWM valve to verify. Refer to the “Hydraulic Servo Valve Manual Override & Timing” section in MAINTENANCE. If the conveyor operates smoothly, issue is in electronics. Verify valve type and settings are correctly configured. If conveyor does not operate smoothly, issue is in hydraulics.
	Conveyor hydraulic demand too high	Lower conveyor hyd. requirements by opening feed gate 1” and re-calibrating flow. See “RCM Spreader Set Up” section.
Conveyor not achieving target rate	Incorrect spreader set up	Perform a product density test and verify setting.
		Measure gate height and verify setting.
		Verify spreader constant setting.
	Faulty speed signal	Ensure retaining bolt is properly holding sensor in place.
		Swap spinner and conveyor speed sensor connections on the harness. If the issue now shows up on the spinner, replace conveyor speed sensor and return wiring to original. If the issue remains with the conveyor, inspect harness and repair or replace.
	Faulty control valve	Replace valve.
	Conveyor hydraulic demand too high	Slow down application speed.
		Lower conveyor hyd. requirements by opening feed gate 1” and re-calibrating flow. See “RCM Spreader Set Up” section.

(Continued on next page)

Troubleshooting (continued)

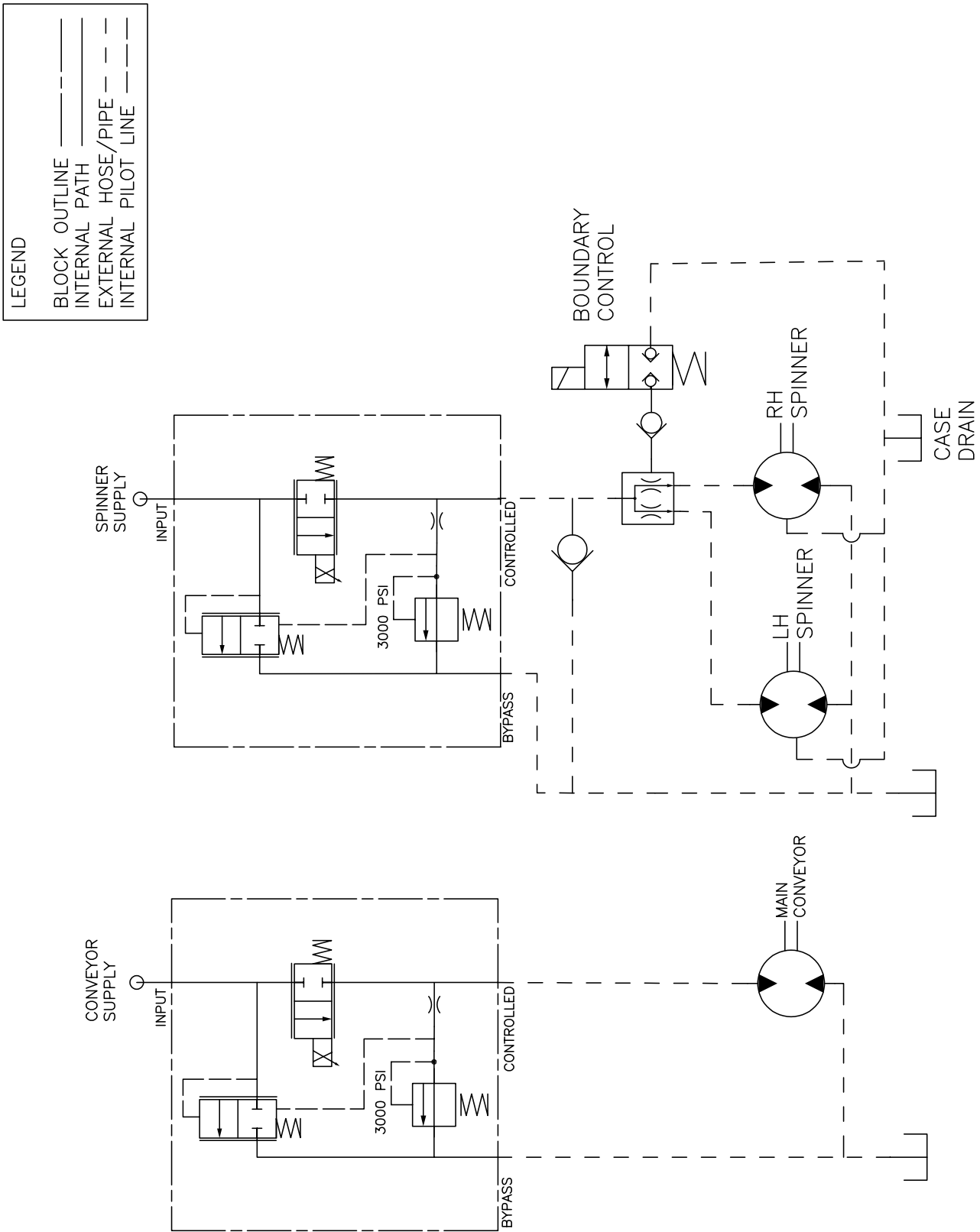
Problem	Possible Cause	Corrective Action
Conveyor running erratic	Control valve settings incorrect	Adjust control valve settings to correct conveyor speed.
		Manually override servo valve to verify. Refer to the “Hydraulic Servo Valve Manual Override & Timing” section in MAINTENANCE. If the conveyor operate smoothly, issue is in electronics. Verify valve type and settings are correctly configured. NOTE: Verify Control Effort and Response Rate settings. If conveyor continue to operate erratically, issue is in hydraulics.
	Faulty speed signal	Ensure retaining bolt is properly holding sensor in place.
		Swap spinner and conveyor speed sensor connections on the harness. If the issue now shows up on the spinner, replace conveyor speed sensor and return wiring to original. If the issue remains with the conveyor, inspect harness and repair or replace.
Conveyor will not shut off	Faulty control valve	Replace valve.
	Servo valve installed and manual overridden or out of time	Re-time valve. See “Hydraulic Servo Valve Manual Override & Timing” section in MAINTENANCE.
	Faulty control valve	Replace valve.

Main Valve Block Assembly - Spinner & Conveyor (Chassis Mount)

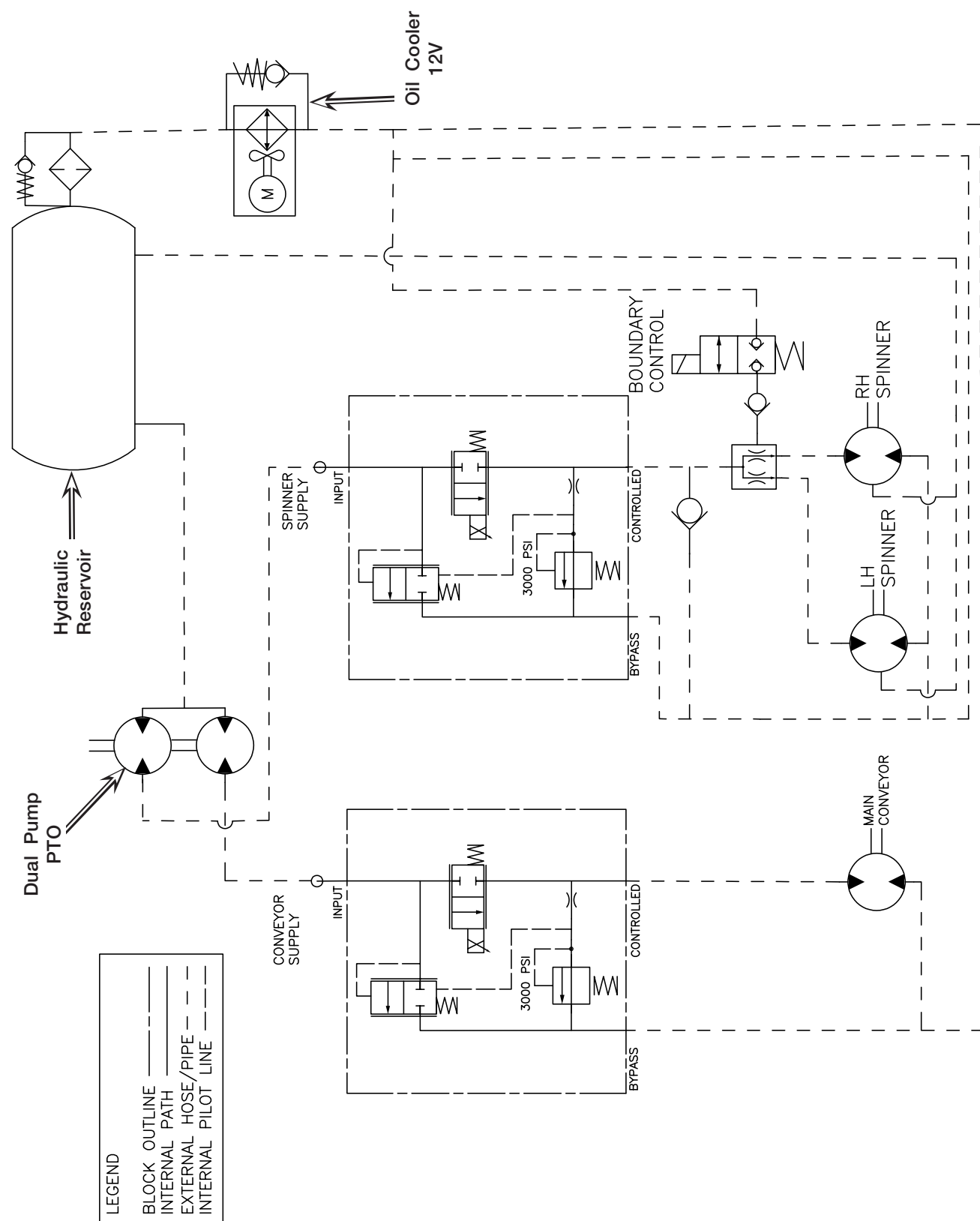


See "Hydraulic Fittings" and "Hydraulic System Valves & Steel Pipe Adapters" in the MAINTENANCE section for torque specifications.

**Schematics - SCV Split Hydraulics With Boundary Control (Opt.)
(18, 22, & 2650 Undercarriage Mount)**

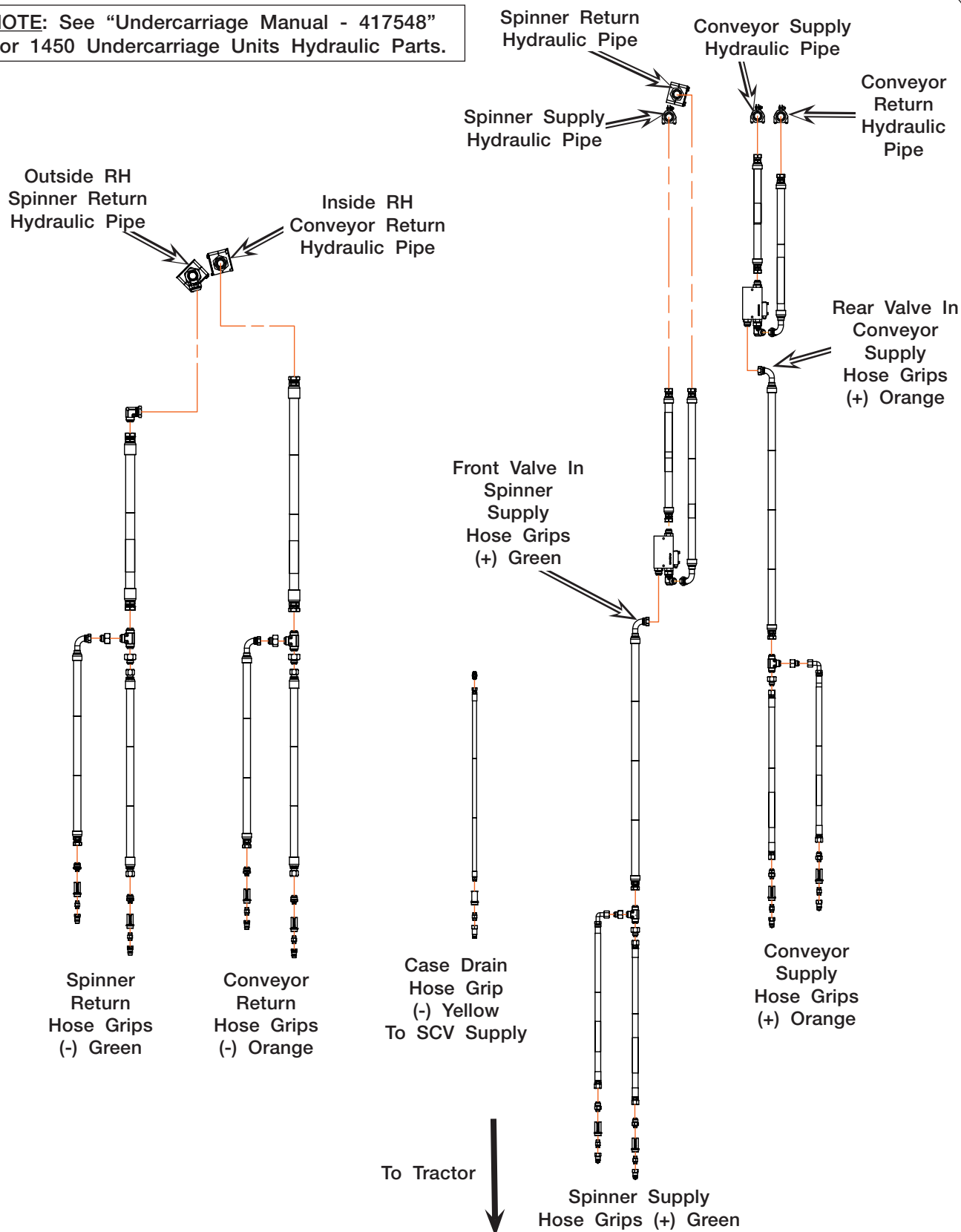


**Schematics - Dual Pump PTO Hydraulic Drive
(18, 22, & 2650 Undercarriage Mount)**

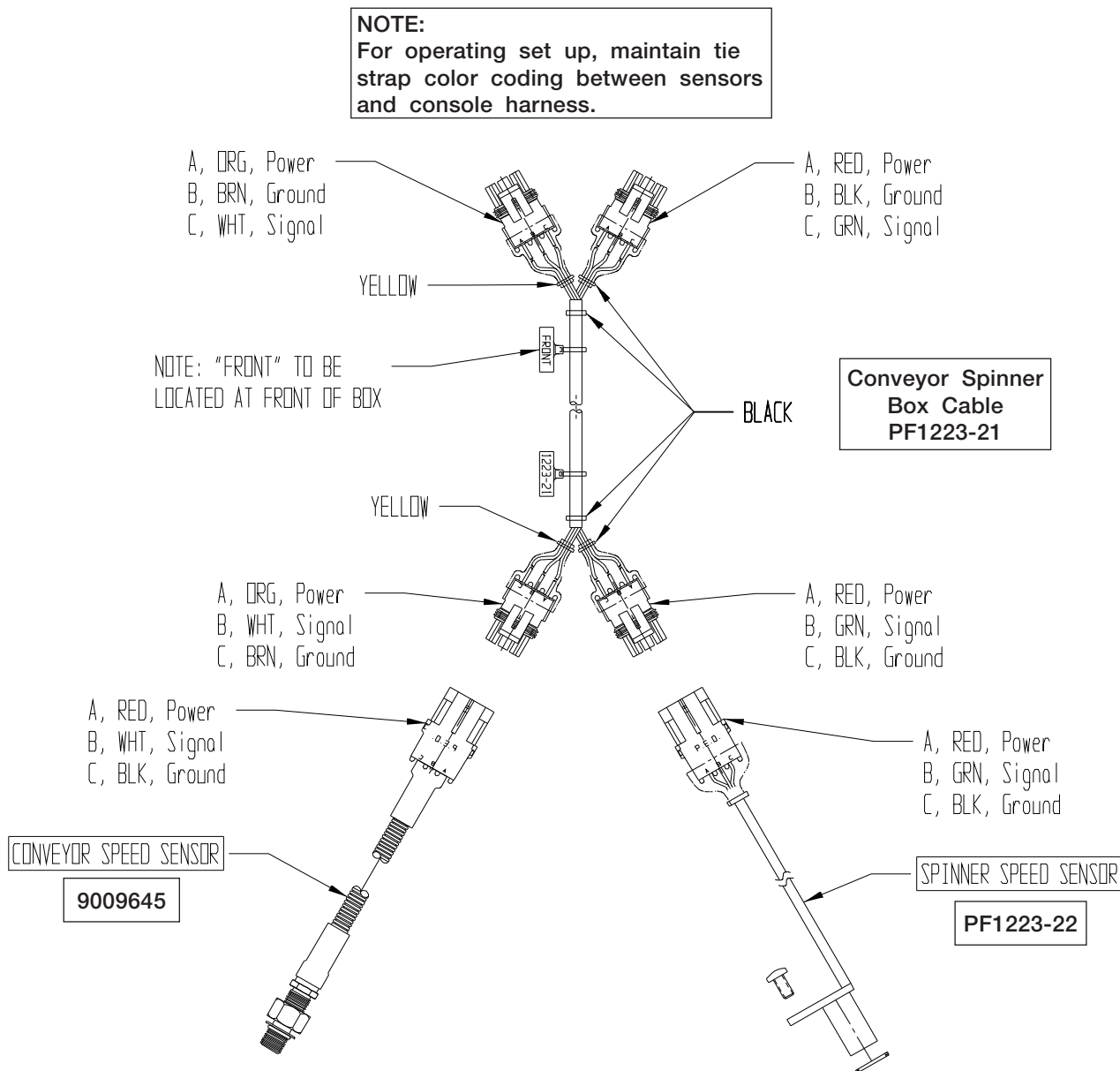


Hose Connections — SCV Split Hydraulics (Opt.) (18, 22, & 2650 Undercarriage Mount)

NOTE: See “Undercarriage Manual - 417548”
For 1450 Undercarriage Units Hydraulic Parts.



Schematic — Electrical — Troubleshooting Spinner & Conveyor Speed Sensor Wiring Harness

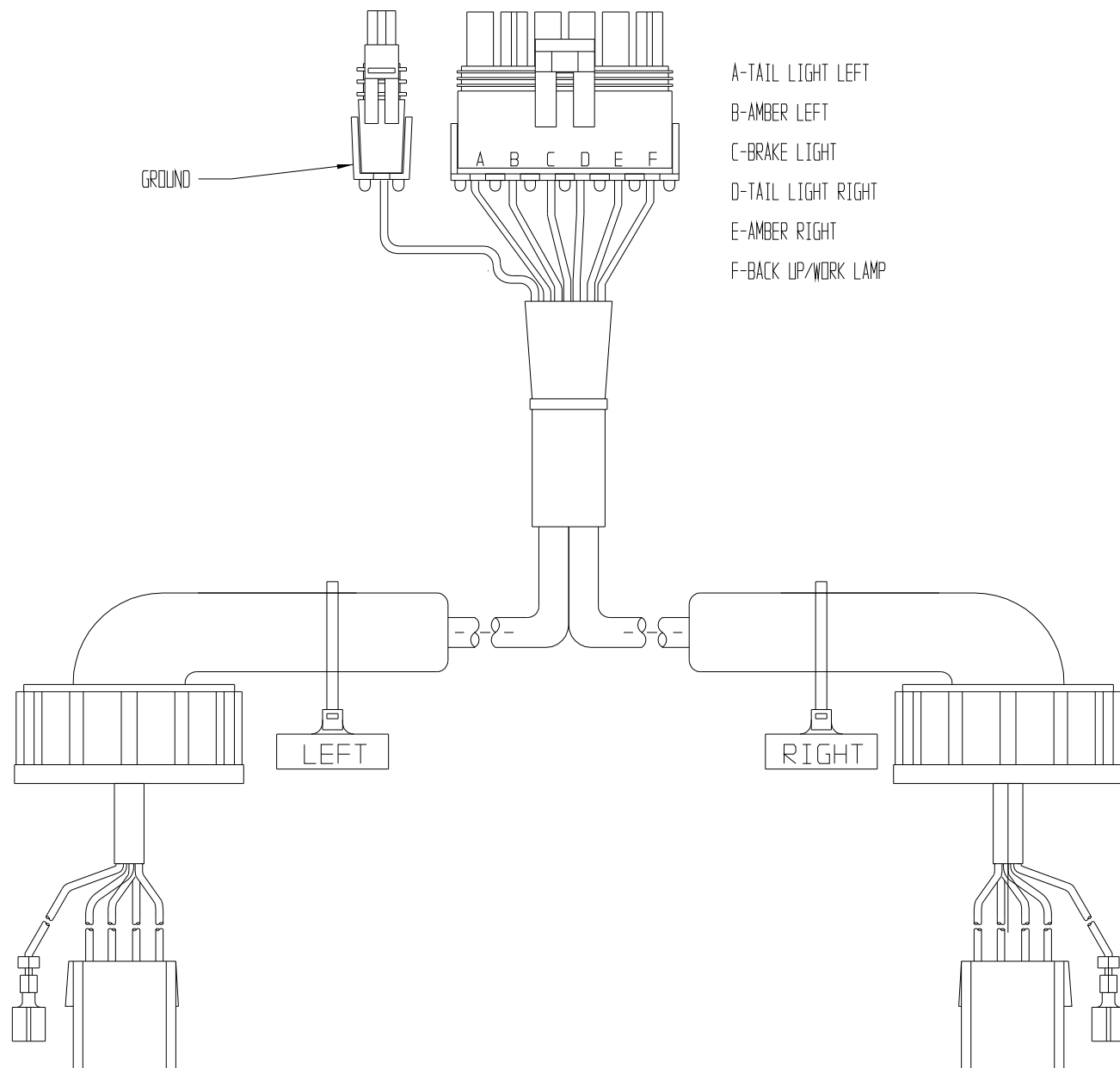


If console loses rate or spinner speed and the function is moving, the connectors shown on this page can be swapped at the rear of the spreader to troubleshoot the system.

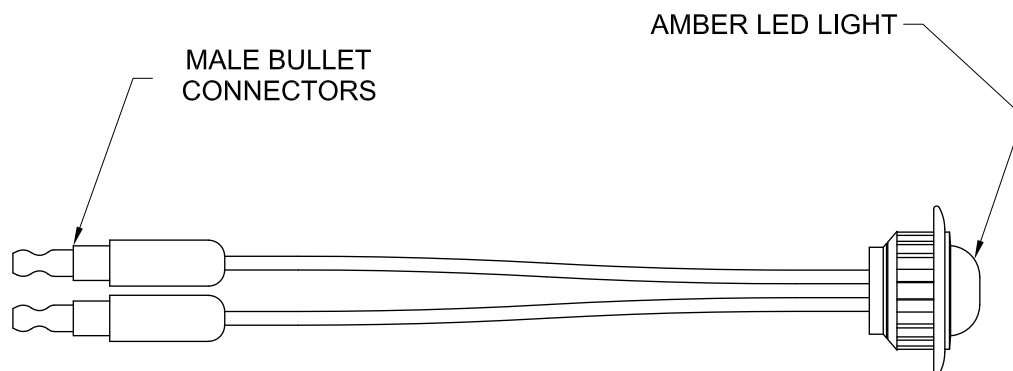
EXAMPLE: If the spinner's speed is working and the connectors are switched, the spinners should show up as an application rate. If the application rate still is not reading, there is a controller or cable problem. Check the programming numbers and cables. If a rate reading is received, the sensor could be bad.

Different controllers supply different voltages. There should be at least 5 volts on the power and signal leads

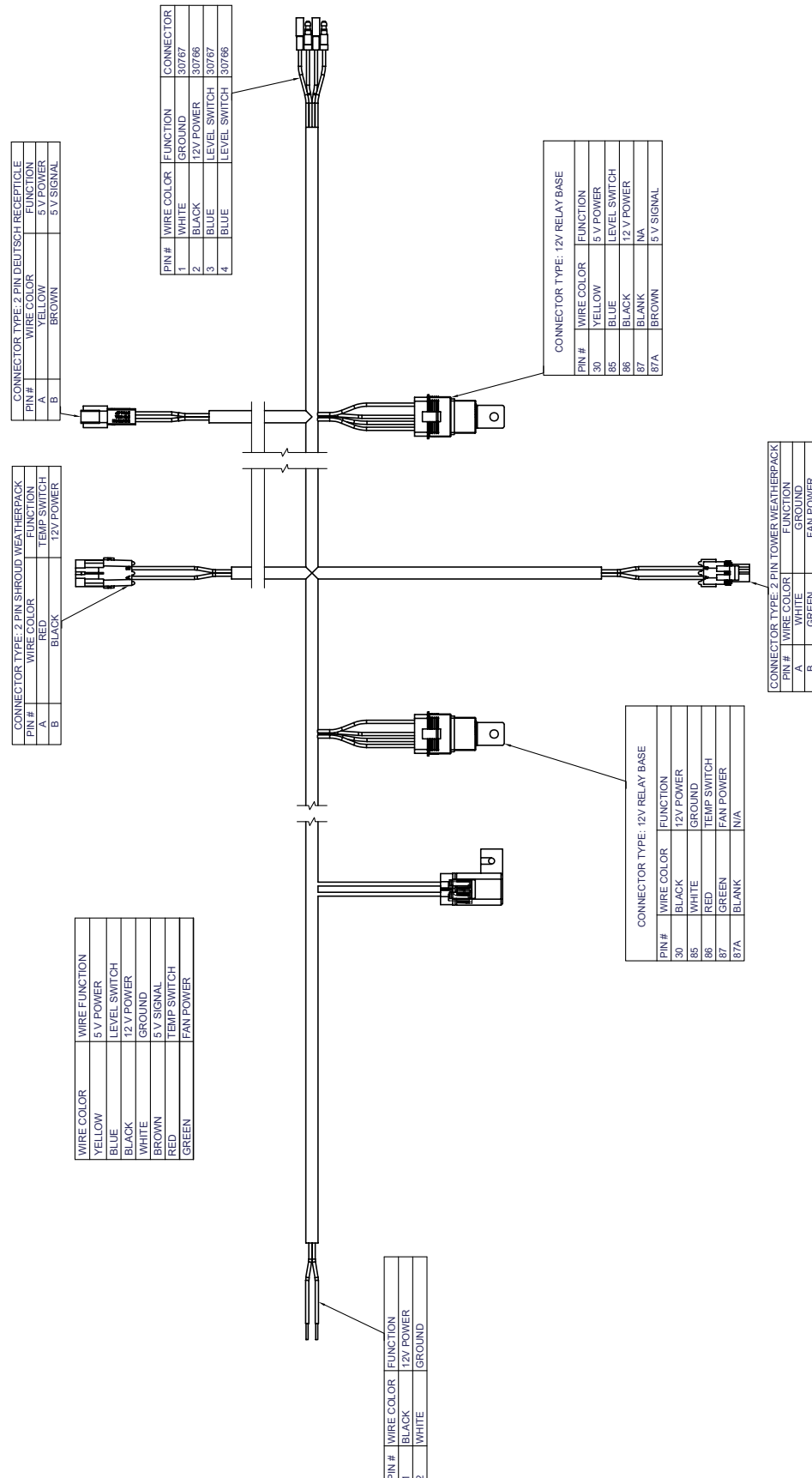
**Schematic — Electrical — Chassis Mounted Unit
Tail Light Wiring Harness (PF1223-752)**



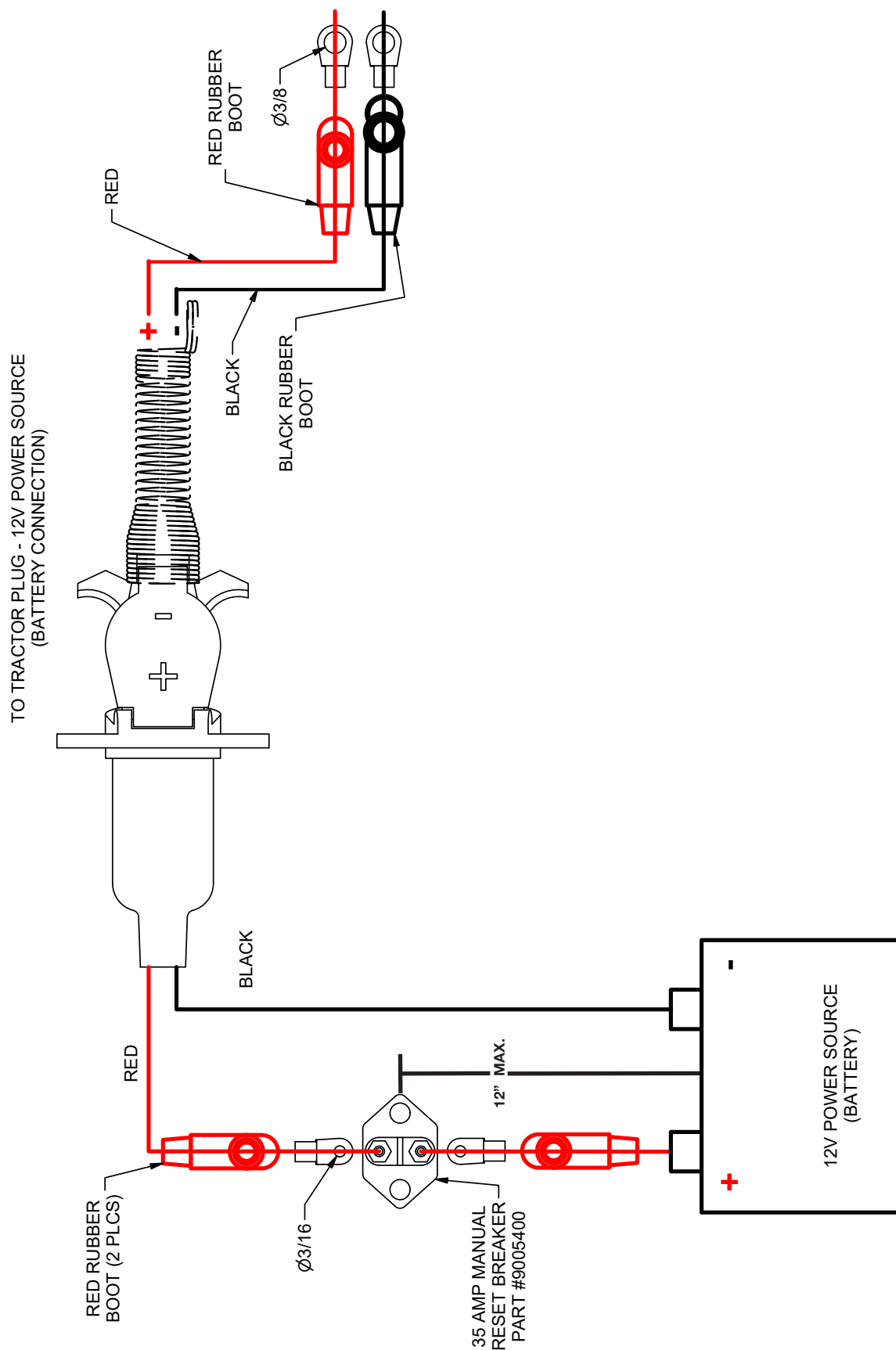
**Schematic — Electrical — (18, 22, 2650 Undercarriage Mount)
Micro Dot, LED Light #9006107**



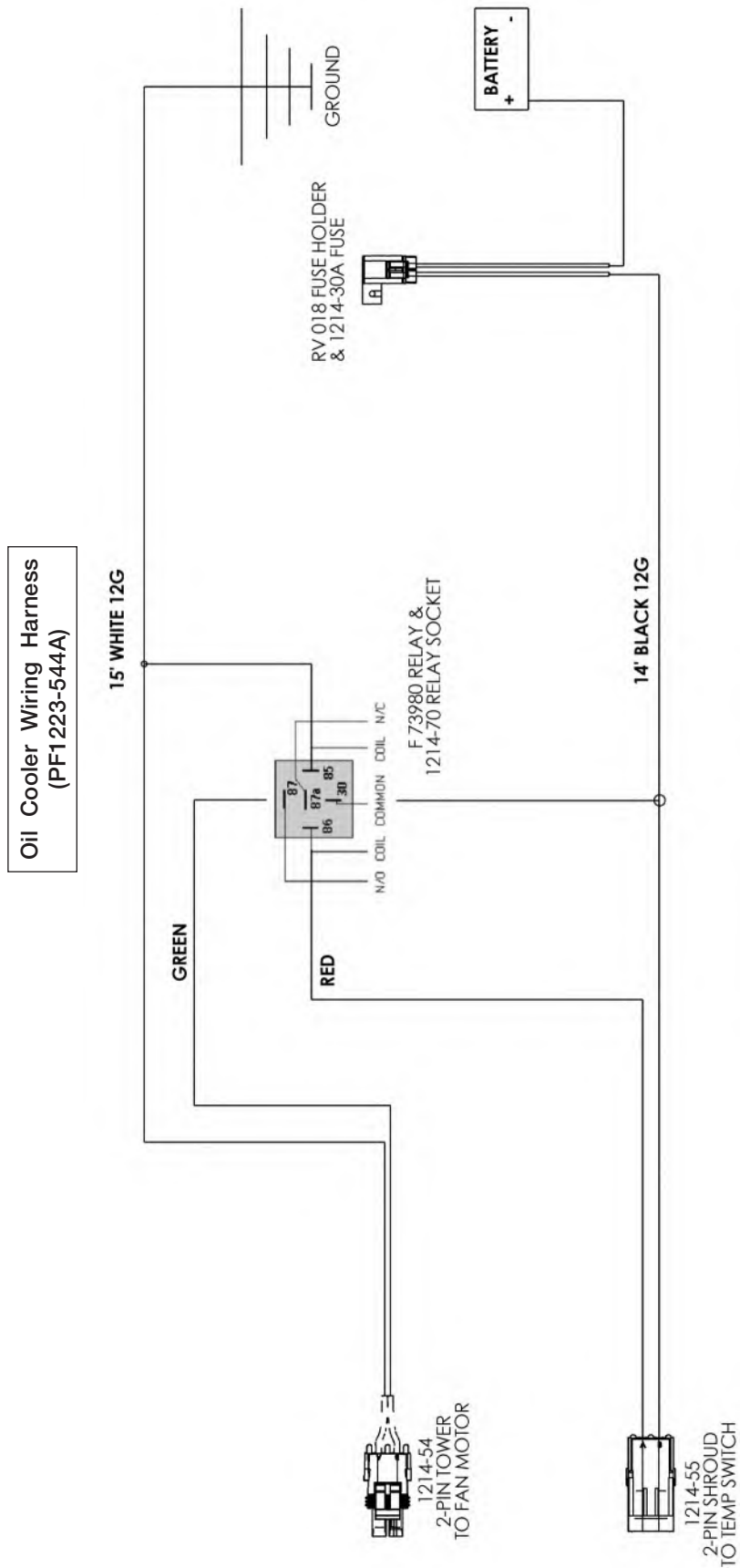
Schematic — Electrical — (18, 22, 2650 Undercarriage Mount)
PTO Oil Cooler Fan #9010277



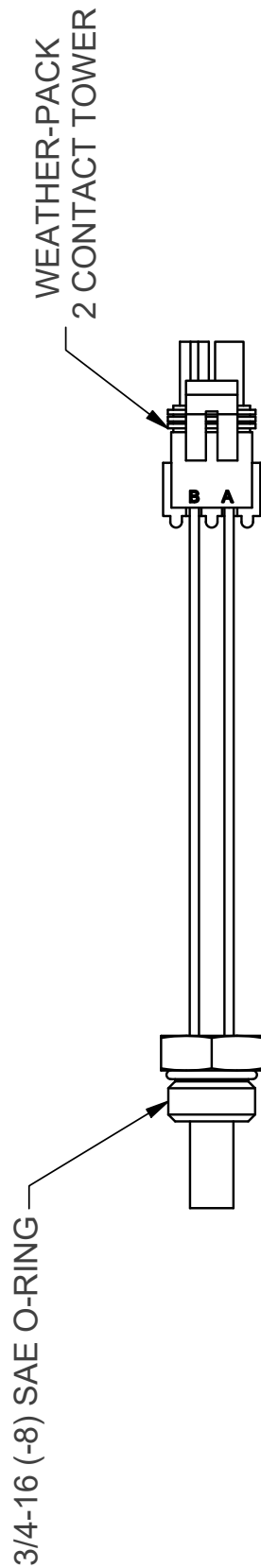
**Schematic — Electrical — (18, 22, 2650 Undercarriage Mount)
PTO Oil Cooler Wiring Harness Connection**



Schematic — Electrical — (Chassis Mount)
Oil Cooler Fan #PF1223-544A

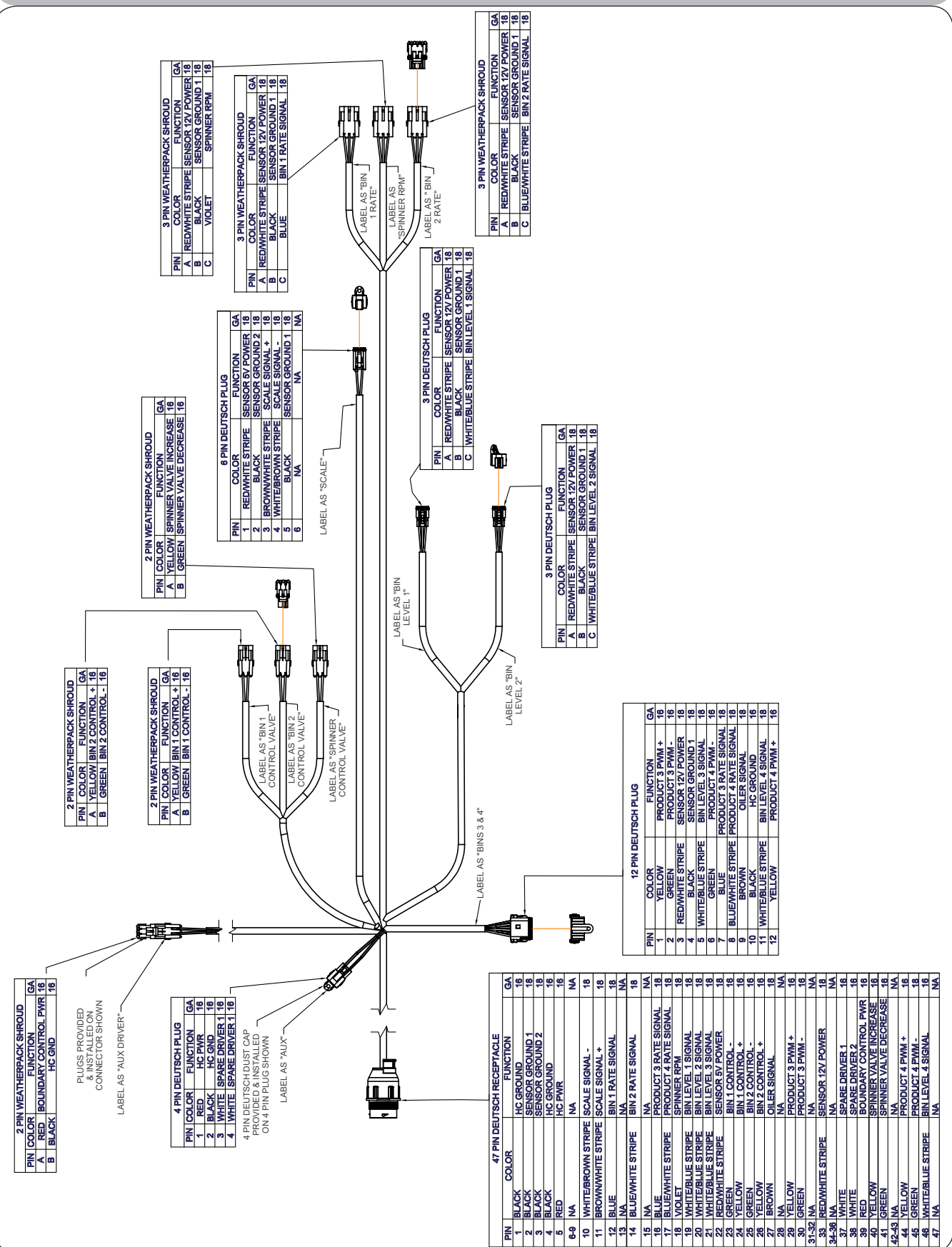


**Schematic — Electrical — (Chassis Mount)
Temperature Switch #9009169**

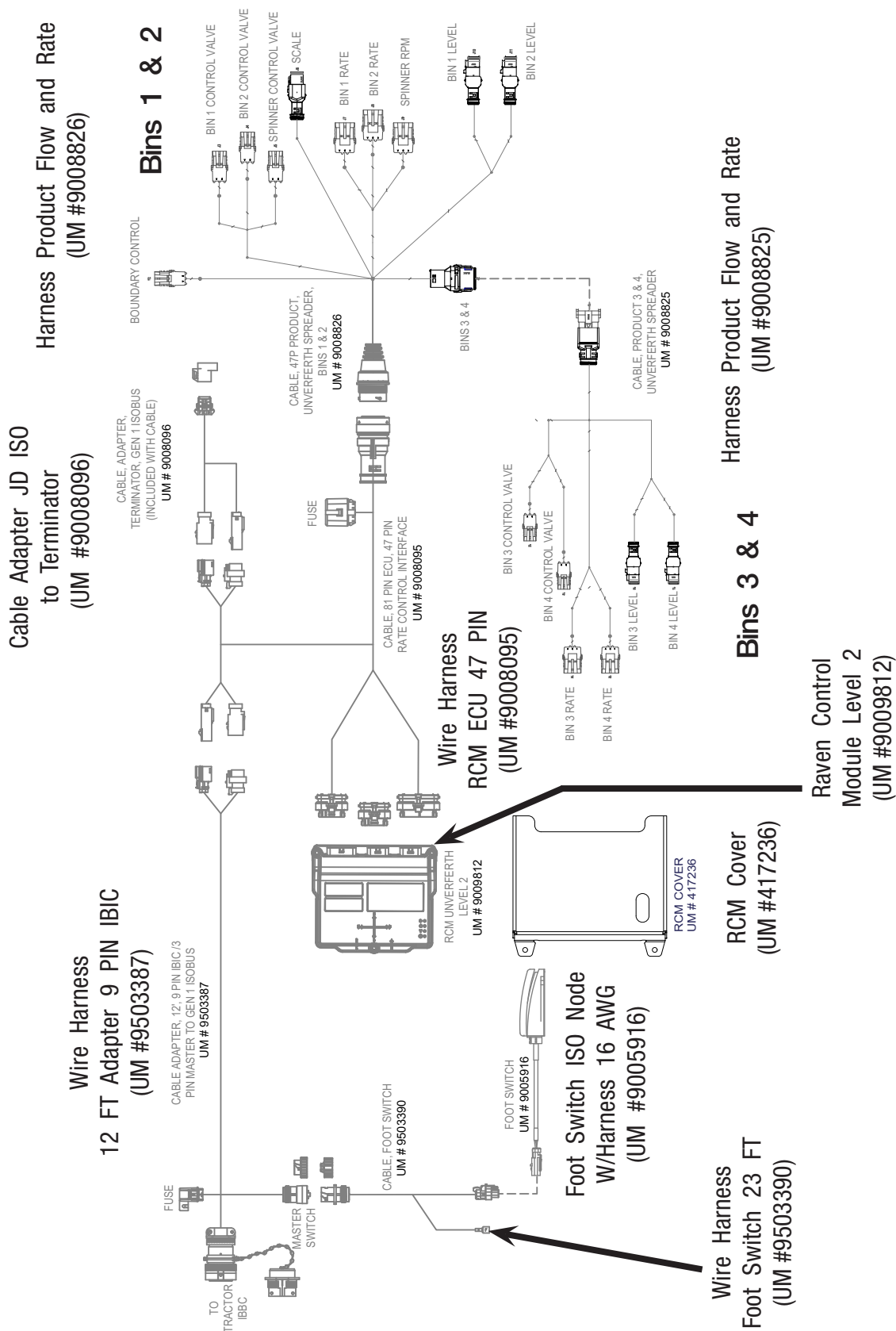


PROBE LENGTH: 3/4"
CIRCUIT FORM: A (SPST-NO)
FIXED SET POINT: 120°
SET POINT DIRECTION: RISING
CONTACTS: GOLD DIFFUSED, FINE SILVER
CONTACTS (3A @ 240 VAC-2A @ 24 VDC)

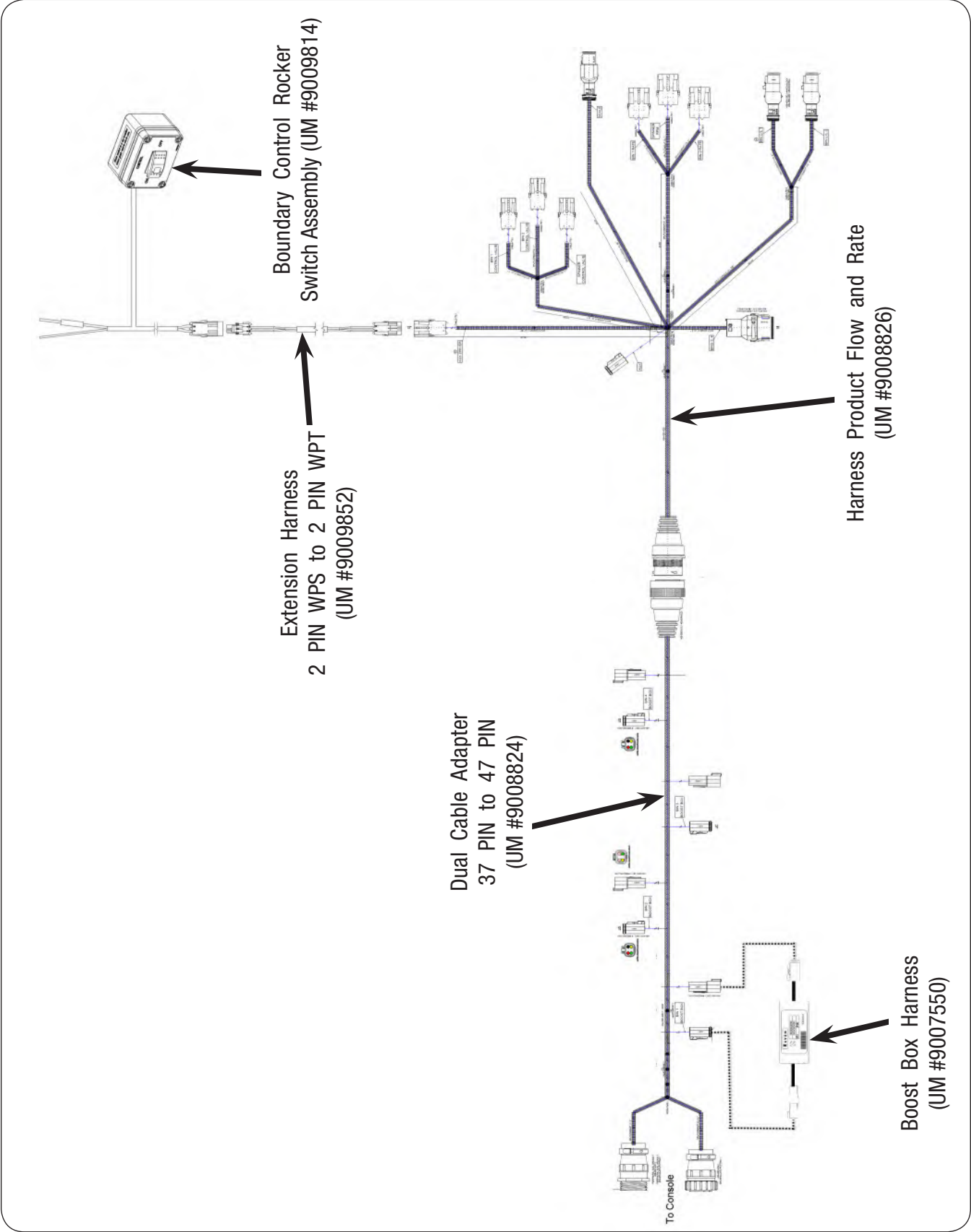
Schematic — Product Flow & Rate Harness (9008826)



Schematic — RCM Wiring Harness



Schematic — Less Raven ISOBUS Rate Control Wiring Harness



Fertilizer Density Chart

Fertilizer	Density (Lbs./Cu.Ft.)
Prilled Urea	45-51
Granular Urea	45-51
Prilled Ammonium Nitrate	53-61
Crystalline Ammonium Sulfate	62-69
Ammonium Sulfate	49-65
Diammonium Phosphate (DAP)	54-66
Granular Monoammonium Phosphate (MAP)	54-66
Powdered Monoammonium Phosphate (MAP)	53-62
Granular Triple Superphosphate (TSP)	59-75
Ammonium Phosphate	56-75

Complete Torque Chart

Stainless Steel Capscrews - ASTM F593

IMPORTANT

- Stainless steel hardware has a natural tendency to cold weld/gall when installed/uninstalled at high speeds and/or high torques. It is recommended to apply a thread lubricant approved for stainless steel such as graphite-based anti-seize or molybdenum disulfide based anti-seize when performing an assembly/disassembly of stainless steel hardware. Unverferth PN 9504206 or equivalent.
- The torque recommendations below are for lubricated stainless steel hardware.

SIZE	INCH POUNDS	NEWTON METERS
1/4-20	62	7
1/4-28	71	8
5/16-18	128	15
5/16-24	142	16

SIZE	FOOT POUNDS	NEWTON METERS
3/8-16	19	26
3/8-24	21	29
7/16-14	30	41
7/16-20	34	46
1/2-13	46	63
1/2-20	52	71
9/16-12	67	91
9/16-18	74	100
5/8-11	92	125
5/8-18	104	141
3/4-10	113	153
3/4-16	126	171
7/8-9	182	247
7/8-14	201	273
1-8	273	370
1-14	306	415
1 1/4-7	545	739
1 1/4-12	604	819
1 3/8-6	715	970
1 3/8-12	813	1102
1 1/2-6	949	1287
1 1/2-12	1067	1447

Complete Torque Chart (continued)

Capscrews - Grade 5

NOTE:

- Grade 5 capscrews can be identified by three radial dashes on the head.
- Capscrews have a yellow or clear appearance.



SIZE	FOOT POUNDS	NEWTON 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 (continued)

Capscrews - Grade 5 MagniCoated SAE J429

NOTE:

- Grade 5 capscrews can be identified by three radial dashes on the head.
- Capscrews have a black appearance.
- Capscrews have a K value of 0.15



SIZE	INCH POUNDS	NEWTON METERS
1/4-20	76	9
1/4-28	87	10
5/16-18	157	18
5/16-24	174	20

SIZE	FOOT POUNDS	NEWTON METERS
3/8-16	23	32
3/8-24	26	36
7/16-14	37	51
7/16-20	41	56
1/2-13	57	78
1/2-20	64	87
9/16-12	82	112
9/16-18	91	124
5/8-11	113	154
5/8-18	127	173
3/4-10	200	272
3/4-16	223	303
7/8-9	322	437
7/8-14	355	482
1-8	483	655
1-14	542	735
1 1/4-7	840	1139
1 1/4-12	930	1261
1 3/8-6	1102	1495
1 3/8-12	1254	1701
1 1/2-6	1462	1983
1 1/2-12	1645	2231

IMPORTANT

- Follow these torque recommendations except when specified in text.

Complete Torque Chart (continued)

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.



SIZE	FOOT POUNDS	NEWTON 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.

Complete Torque Chart (continued)

Capscrews - Grade 8 MagniCoated SAE J429

NOTE:

- Grade 8 capscrews can be identified by six radial dashes on the head.
- Capscrews have a black appearance.
- Capscrews have a K value of 0.15



SIZE	INCH POUNDS	NEWTON METERS
1/4-20	107	13
1/4-28	123	14
5/16-18	221	25
5/16-24	245	28

SIZE	FOOT POUNDS	NEWTON METERS
3/8-16	33	45
3/8-24	37	51
7/16-14	52	71
7/16-20	58	79
1/2-13	80	109
1/2-20	90	123
9/16-12	115	156
9/16-18	128	174
5/8-11	159	216
5/8-18	180	245
3/4-10	282	383
3/4-16	315	428
7/8-9	455	617
7/8-14	502	681
1-8	681	924
1-14	765	1038
1 1/4-7	1363	1848
1 1/4-12	1509	2046
1 3/8-6	1786	2422
1 3/8-12	2034	2758
1 1/2-6	2371	3215
1 1/2-12	2668	3618

IMPORTANT

- Follow these torque recommendations except when specified in text.

Hydraulic Fittings - Torque and Installation

WARNING

- EYE PROTECTION AND OTHER APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHILE SERVICING THE IMPLEMENT.
- HIGH-PRESSURE FLUIDS CAN PENETRATE THE SKIN AND CAUSE SERIOUS INJURY OR DEATH. LEAKS OF HIGH-PRESSURE FLUIDS MAY NOT BE VISIBLE. USE CARDBOARD OR WOOD TO DETECT LEAKS IN THE HYDRAULIC SYSTEM. SEEK MEDICAL TREATMENT IMMEDIATELY IF INJURED BY HIGH-PRESSURE FLUIDS.
- HYDRAULIC SYSTEM MUST BE PURGED OF AIR BEFORE OPERATING TO PREVENT SERIOUS INJURY OR DEATH.
- RELIEVE HYDRAULIC SYSTEM OF ALL PRESSURE BEFORE ADJUSTING OR SERVICING. SEE TRACTOR OPERATOR'S MANUAL FOR PROPER PROCEDURES.



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, ensure the jam nut and washer are fully backed up.
3. Lubricate the O-ring and threads on the fitting with hydraulic oil.
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

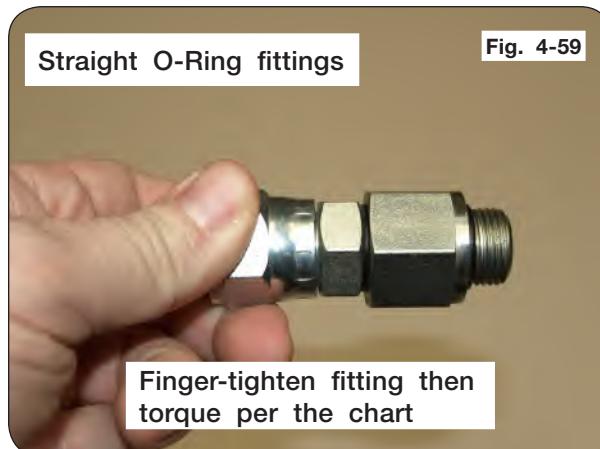
O-Ring fittings

Fig. 4-58



Straight O-Ring fittings

Fig. 4-59



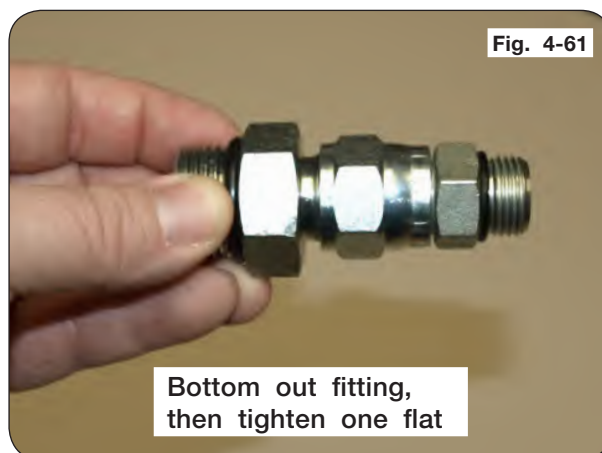
Finger-tighten fitting then torque per the chart

Hydraulic Fittings – Torque and Installation (continued)

Tightening JIC 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 with hydraulic oil.
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



Steel 37° JIC Adapters		
DASH SIZE	FLARED THREAD SIZE	TORQUE FT.-LBS
-6	9/16"-18	18-20
-8	3/4"-16	27-39
-10	7/8"-14	36-63
-12	1 1/16"-12	65-88
-14	1 3/16"-12	75-103
-16	1 5/16"-12	85-113
-20	1 5/8"-12	115-133
-24	1 7/8"-12	125-167

Hydraulic System Valves & Steel Pipe Adapters - Torque

Hydraulic System Valves

Hydraulic System Valves		
PART NUMBER	TORQUE FT.-LBS.	COIL NUT TORQUE
PF1211-01 (Valve - Hyd Servo)	46-54	
PF1211-08 (Proportional Valve - 10 NC)	55-60	Hand Tighten
416452 (Proportional Valve - 16 NC)	70-75	Hand Tighten
PF1211-80 (Cartridge - PSI Compensator)	65-75	
PF1211-945 (3500 PSI Relief Valve)	45-50	9 Ft.-Lbs.
PF1211-95 (4000 PSI Relief Valve)	45-50	9 Ft.-Lbs.
PF1222-108 (Valve - Cartridge, Logic Element)	65-75	
1222-109 (Solenoid Valve)	18-20	4-5 Ft.-Lbs.

Steel Pipe Adapters

Steel Pipe Adapters		
DASH SIZE	FLARED THREAD SIZE	TORQUE FT.-LBS
-4	1/4"-18	25
-6	3/8"-18	40
-8	1/2"-14	54
-12	3/4"-14	78
-16	1"-11 1/2	112
-20	1 1/4"-11 1/2	154
-24	1 1/2"-11 1/2	211