

New Holland/Miller After- Market Recirculating Boom Installation and Operation Manual

016-0171-726 Rev. A

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SAFETY

NOTICE

Follow the operation and safety instructions included with the implement and/or controller and read this manual carefully before installing or operating this Raven system.

- Follow all safety information presented within this manual. Review implement operation with your local dealer.
- Contact a local Raven dealer for assistance with any portion of the installation, service, or operation of Raven equipment.
- Follow all safety labels affixed to system components. Be sure to keep safety labels in good condition and replace any missing or damaged labels. Contact a local Raven dealer to obtain replacements for safety labels.

Observe the following safety measures when operating the implement after installing this Raven system:

- Do not operate this Raven system or any agricultural equipment while under the influence of alcohol or an illegal substance.
- Be alert and aware of surroundings and remain in the operator seat at all times when operating this Raven system.
 - Do not operate the implement on any public road with this Raven system enabled.
 - Disable this Raven system before exiting the operator seat.
 - Determine and remain a safe working distance from obstacles and bystanders. The operator is responsible for disabling the system when a safe working distance has diminished.
 - Disable this Raven system prior to starting any maintenance work on the implement or components of this Raven system.
- Do not attempt to modify or lengthen any of the system control cables. Extension cables are available from a local Raven dealer.

WARNING

AGRICULTURAL CHEMICAL SAFETY

Follow all federal, state, and local regulations regarding the handling, use, and disposal of agricultural chemicals, products, and containers. Triple-rinse and puncture or crush empty containers before properly disposing of them. Contact a local environmental agency or recycling center for additional information.

- Always follow safety labels and instructions provided by the chemical manufacturer or supplier.
- Always wear appropriate personal protective equipment as recommended by the chemical and/or equipment manufacturer.
- When storing unused agricultural chemicals:
 - Store agricultural chemicals in the original container and do not transfer chemicals to unmarked containers or containers used for food or drink.
 - Store chemicals in a secure, locked area away from human and livestock food.
 - Keep children away from chemical storage areas.
- Fill, flush, calibrate, and decontaminate chemical application systems in an area where runoff will not reach ponds, lakes, streams, livestock areas, gardens, or populated areas.
- Follow all label instructions for chemical mixing, handling, and disposal.
- Avoid direct contact with agricultural chemicals or inhaling chemical dust or spray particulate. Seek immediate medical attention if symptoms of illness occur during, or soon after, use of agricultural chemicals or products.
- After handling or applying agricultural chemicals:
 - Thoroughly wash hands and face after using agricultural chemicals and before eating, drinking, or using the restroom.
 - Thoroughly flush or rinse equipment used to mix, transfer, or apply chemicals with water after use or before servicing any component of the application system.

CAUTION

ELECTRICAL SAFETY

- Always verify that power leads are connected to the correct polarity as marked. Reversing the power leads could cause severe damage to the Raven system or other components.
- To prevent personal injury or fire, replace defective or blown fuses with only fuses of the same type and amperage.
- Do not connect the power leads to the battery until all system components are mounted and all electrical connections are completed.
- Always start the machine before initializing this Raven system to prevent power surges or peak voltage.
- To avoid tripping and entanglement hazards, route cables and harnesses away from walkways, steps, grab bars, and other areas used by the operator or service personnel when operating or servicing the equipment.

RECOMMENDATIONS AND BEST PRACTICES

HOSE ROUTING

The word “hose” is used to describe any flexible, fluid carrying components. Use the following guidelines and recommendations when connecting and routing hoses while installing or maintaining this Raven system:

- Leave protective caps/covers over hose ends until connecting the end into the hydraulic system to help prevent contaminants from entering the system.
- Follow existing hose runs already routed on the implement as much as possible. Proper hose routing should:
 - Secure hoses and prevent hoses from hanging below the implement.
 - Provide sufficient clearance from moving components and operational zones around shafts; universal joints and suspension components; pulleys, gears, belts, and chains; moving linkages, cylinders, articulation joints, etc.
 - Protect hoses from field debris and surrounding hazards (e.g. tree limbs, fence posts, crop stubble, dirt clumps or rocks that may fall or be thrown by the implement).
 - Protect hoses from sharp bends, twisting, or flexing over short distances and normal implement operation.
 - Ensure sufficient length for free movement of the implement during normal operation and prevent pulling, pinching, catching, or rubbing, especially in articulation and pivot points. Clamp hoses securely to force controlled movement of the hose.
 - Avoid abrasive surfaces and sharp edges such as sheared or flame cut corners, fastener threads or cap screw heads, hose clamp ends, etc.
 - Avoid areas where the operator or service personnel might step or use as a grab bar.
- Do not over tighten threaded joints.
- Use thread sealant on all threaded joints.
- Do not connect, affix, or allow hoses to come into contact with components with high vibration forces, hot surfaces, or components carrying hot fluids beyond the temperature rating of hose components.
 - Hoses should be protected or shielded if routing requires the hose to be exposed to conditions beyond hose component specifications.
- Avoid routing hoses in areas where damage may occur due to build up of material (e.g. dirt, mud, snow, ice, etc.).

HARNESS ROUTING

The word “harness” is used to describe any electrical cables and leads, both bundled and unbundled. Use the following guidelines and recommendations when connecting and routing harnesses while installing or maintaining this Raven system:

- Leave protective caps/covers over harness connectors until needed to avoid dirt and moisture from contaminating electrical circuits.
- Secure the harness to the frame or solid structural members at least every 12 in [30 cm].
- Follow existing harness runs already routed on the implement as much as possible. Proper harness routing should:
 - Secure harnessing and prevent the harness from hanging below the implement.
 - Provide sufficient clearance from moving components and operational zones around shafts; universal joints and suspension components; pulleys, gears, belts, and chains; moving linkages, cylinders, articulation joints, etc.

- Protect harnessing from field debris and surrounding hazards (e.g. tree limbs, fence posts, crop stubble, dirt clumps or rocks that may fall or be thrown by the implement).
- Protect harnessing from sharp bends, twisting, or flexing over short distances and normal implement operation.
- Connectors and splices should not be located at bending points or in harness sections that move.
- Ensure sufficient length for free movement of the implement during normal operation and prevent pulling, pinching, catching, or rubbing, especially in articulation and pivot points. Clamp harnessing securely to force controlled movement of the harness.
- Avoid abrasive surfaces and sharp edges such as sheared or flame cut corners, fastener threads or cap screw heads, hose clamp ends, etc.
- Do not connect, affix, or allow harnessing to come into contact with components with high vibration forces, hot surfaces, or components carrying hot fluids beyond the temperature rating of harness components.
 - Harnessing should be protected or shielded if routing requires the hose to be exposed to conditions beyond harnessing component specifications.
- Avoid routing harnesses in areas where damage may occur due to build up of material (e.g. dirt, mud, snow, ice, etc.).
- Avoid routing harnesses in areas where the operator or service personnel might step or use as a grab bar.

IMPORTANT: Avoid applying direct spray or pressure washing of electrical components and connections. High pressure streams and sprays can penetrate seals, cause corrosion, or otherwise damage electrical components.
When performing maintenance:

- Inspect electrical components and connectors for corrosion, damaged pins or housings, etc. Repair or replace components or harnessing as necessary.
- Ensure connectors are kept clean and dry. Apply dielectric grease to the sealing surfaces of all connections exposed to moisture, dirt, debris, and other contaminants. Repair or replace harnessing as necessary.
- Clean electrical components with pressurized air, aerosol electrical cleaning agent, or low pressure rinse.
- Remove visible surface water from electrical components and connections using pressurized air or an aerosol cleaning agent. Allow components to dry thoroughly before reconnecting cables.

Thank you for purchasing the boom recirculation system. This system is designed to allow the equipment operator to prime the boom or agitate chemical in the boom plumbing without spraying chemical on the ground. This system allows the operator to adjust the recirculation flow based upon the spray system or the chemical needs and will automatically disengage when normal application is started or if a chemical injection system is in use.

NOTE: Fluid will only be circulated in the main, front spray sections and will not be circulated in any rear spray bar or rear tire nozzle circuits.

This manual applies to the following machines:

Make. New Holland or Miller - Model Years 2017 and Newer

New Holland Model. SP.200, SP.300, SP.400 and SP200, SP300, and SP400 series sprayer platforms with Raven Hawkeye® 2 or IntelliSpray

Miller Model. 5000, 6000, and 7000 series sprayer platforms with Raven Hawkeye® 2 or IntelliSpray

Boom Configurations. 120'/15" MonoBeam, 120'/20" MonoBeam, 120'/15" Truss Boom, 120'/20" Truss Boom, or 135'/20" Truss Boom with 10 Section Boom Plumbing Configuration

System Requirements:

- One of the following combinations:
 - IntelliSpray with Product Controller II (PCII)
 - Hawkeye® 2 with Raven Control Module - Sprayer (RCM-S)
- Boom plumbing kit installed
- Product cable with electronic recirculation valve connection required:
 - Cable for IntelliSpray with PCII (P/N 115-7303-468). For cabling connections, refer to the system diagram in Figure 26 on page 34.
 - Cable for Hawkeye® 2 with RCM-S (P/N 115-2005-344). For cabling connections, refer to the system diagram in Figure 28 on page 36.

NOTE: For cabling connections, the PCII or RCM-S is located between the machine cab and product tank.

- Software version:
 - For IntelliSpray with PCII, utilize version 21.3.1.4 or newer
 - For Hawkeye® 2 with RCM-S, utilize version 21.2.2.40 or newer

THEORY OF OPERATION

When the recirculation system is active, the spray system is not spraying, and NCVs are off, the electric return valve opens fully. The main pump circulates the spray liquid from the main tank through the existing supply plumbing to the section valves.

Section valves actuate open in pairs, starting with the outermost left and right sections and progressing inward. The section valves turn on and off to circulate fluid for the user-defined auto-operation time for each section of the spray system. This keeps the liquid circulating, allowing the system to purge any air, break up chemical deposits, and agitate any separated chemicals through the system without having to spray out of the nozzles.

Product returns through the throttling valve and electric return valve until the electric return valve automatically turns off when spraying resumes. The throttling valve is used to dampen the pressure spike affects of the electric return valve closing when spraying resumes and to isolate the tank from any direct injection products when direct injection is in use. The individual recirculation hand valves should be used to separate sections when not using NCVs (Bypass and High Flow/High Flow VP Modes) and to isolate boom plumbing sections if maintenance is required, such as when damage to a plumbing component occurs that causes a leak.

PREPARING FOR INSTALLATION

Before installing boom recirculation, park the machine where the ground is level, clean, and dry. Leave the machine turned off with the booms unfolded for the duration of the installation process. Drain the machine as thoroughly as possible before beginning the install including the tank, product hoses, and boom tubes.

During the installation process, follow good safety practices. Be sure to carefully read the instructions in this manual as you complete the installation process.

TOOLS NEEDED

The following tools are recommended for installation of the boom recirculation system:

- Pipe thread compound or thread tape for threaded joints (supplied)
- Tape measure
- Hose cutter for up to 2" OD spray hose
- 2 Slip Joint Pliers (approx. 10" size)
- Wrench Set
- 5/16" Nut Drivers for hose and flange clamps
- Side cutters
- Corrosion X-HD spray

POINT OF REFERENCE

The instructions in this manual assume that you are standing behind the machine, looking toward the cab.

KIT CONTENTS

This section contains a list of the components that are included in the recirculating boom kit. This kit applies to machines that do not have a recirculating boom installed. Before beginning the installation, compare the items in the kit with the components on this list. If you have questions about the kit, contact your Raven dealer.

FIGURE 1. Recirculating Boom Upgrade Kit Contents for New Holland/Miller Front Boom Sprayer with IntelliSpray and Product Controller II ECU (P/N 117-0171-897 Rev. A)

THIS KIT TO CONTAIN THE FOLLOWING ITEMS LISTED BELOW:

ITEM #	QTY	PART #	DESCRIPTION
1	1	053-0159-012	BOX, SHIPPING, (LABELED BOX 1 OF 2)
2	1	115-7303-468	CABLE, BOOM RECIRCULATION TEE, PCII, NH/MILLER, MY17+
3	1	107-0172-739	BRACKET, MOUNTING, RECIRCULATION VALVE, NH/MILLER
4	1	334-0001-081	VALVE, ASSEMBLY, ON/OFF, POLY, M200, 1"SS BL, CLOSE, FB
5	20	214-3000-001	GUARD, HYDRAULIC HOSE, 6", WITH THREE CABLE TIES
6	1	053-0159-110	ENVELOPE, PLASTIC
7	2	311-4050-180K	HEX BOLT, ISO4014, M8 X 25MM, 8.8 STEEL, ZINC PLATED
8	2	312-6001-028K	HEX NUT, NYLOCK, DIN985, M8, CLASS 10, ZINC PLATED
9	4	313-2300-121	WASHER, FLAT, STEEL, M8, ZINC PLATED
10	4	312-4000-061	NUT, LOCK, NYLON INSERT, 3/8"-16UNC, ZINC PLATED
11	1	053-0159-015	ENVELOPE, PLASTIC
12	1	016-0171-726	MANUAL, RECIRCULATING BOOM, NH/MILLER, MY17+
13	1	117-0171-898	(LABELED BOX 2 AND 2) KIT, NPT & FLANGED BOOM PLUMBING, NH/MILLER

FIGURE 2. Recirculating Boom Upgrade Kit Contents for New Holland/Miller Front Boom Sprayer with Hawkeye® 2 and RCM - Sprayer ECU (P/N 117-2005-058 Rev. A)

THIS KIT TO CONTAIN THE FOLLOWING ITEMS LISTED BELOW:

ITEM #	QTY	PART #	DESCRIPTION
1	1	053-0159-012	BOX, SHIPPING (LABELED BOX 1 OF 2)
2	1	115-2005-344	CABLE, ADAPTER, 12', 12P DT TO 4P DT, BOOM RECIRC
3	1	107-0172-739	BRACKET, MOUNTING, RECIRCULATION VALVE, NH/MILLER
4	1	334-0001-081	VALVE, ASSEMBLY, ON/OFF, POLY, M200, 1"SS BL, CLOSE, FB
5	20	214-3000-001	GUARD, HYDRAULIC HOSE, 6", WITH THREE CABLE TIES
6	1	053-0159-110	ENVELOPE PLASTIC
7	2	311-4050-180K	HEX BOLT, ISO4014, M8 X 25MM, 8.8 STEEL, ZINC PLATED
8	2	312-6001-028K	HEX NUT, NYLOCK, DIN985, M8, CLASS 10, ZINC PLATED
9	4	313-2300-121	WASHER, FLAT, STEEL, M8, ZINC PLATED
10	4	312-4000-061	NUT, LOCK, NYLON INSERT, 3/8"-16UNC, ZINC PLATED
11	1	053-0159-015	ENVELOPE, PLASTIC
12	1	016-0171-726	MANUAL, RECIRCULATING BOOM, NH/MILLER, MY17+
13	1	077-0180-296	CODE, AUTHORIZATION, RAVEN RCM-SPRAYER, BOOM RECIR
14	1	117-0171-898	(LABELED BOX 2 OF 2) KIT, NPT & FLANGED BOOM PLUMBING, NH/MILLER

FIGURE 3. Boom Recirculation New Holland/Miller Truss Boom Tip Protection Brackets (P/N 117-0171-899 Rev. A)

THIS KIT TO CONTAIN THE FOLLOWING ITEMS LISTED BELOW:

ITEM #	QTY	PART #	DESCRIPTION
1	1	053-0159-135	BOX, SHIPPING
2	1	107-0172-740	BRACKET, TIP PROTECTOR, LEFT, RECIRCULATION, NH/MILLER
3	1	107-0172-741	BRACKET, TIP PROTECTOR, RIGHT, RECIRCULATION, NH/MILLE
4	1	053-0159-109	ENVELOPE, PLASTIC
5	8	311-4050-181K	HEX BOLT, ISO4014, M8 X 25MM, 8.8 STEEL, ZINC PLATED
6	8	312-6001-028K	HEX NUT, NYLOCK, DIN985, M8, CLASS 10, ZINC PLATED
7	16	313-2300-121	WASHER, FLAT, STEEL, M8, ZINC PLATED
8	8	104-1000-256	SPACER, ROUND, .375" I.D. X .75" O.D. X .50" L

FIGURE 4. Kit, Recirculating Boom, NPT & Flange Plumbing, NH/Miller MY17+, 10 Section (P/N 117-0171-898 Rev. A)

THIS KIT TO CONTAIN THE FOLLOWING ITEMS LISTED BELOW:

ITEM #	QTY	PART #	DESCRIPTION
1	100'	X	(LABELED BOX 1 OF 2) EPDM DOUBLE BRAIDED HOSE, 1"
2	25'	X	EPDM DOUBLE BRAIDED HOSE, 1-1/4"
3	1	X	(LABELED BOX 2 OF 2) (BOOM FLANGE & NPT FITTINGS) TRU-BLU, 8 OZ, FAST DRY SEALANT
4	1	X	520" TAPE, PIPE SEALANT
5	100	X	CABLE TIE STRAP, 14 1/4"
6	50	X	CABLE TIE STRAP, 36"
7	14	X	FLANGED TEE, 1"
8	4	X	M100 X 1" HB
9	12	X	M100 X 1" HB 90 ELBOW
10	10	X	M100 X 1" FPT ADAPTER
11	4	X	M100 X 1" MPT ADAPTER
12	10	X	M100 X 1-1/4" MPT ADAPTER
13	10	X	PIPE TEE, 1" FPT
14	2	X	STREET ELBOW, 1"
15	18	X	1" MPT X 1" HB
16	14	X	1" MPT X 1" HB 90 ELBOW
17	6	X	1" MPT X 1" MPT NIPPLE
18	8	X	1-1/4" MPT X 1" MPT REDUCER NIPPLE
19	4	X	HOSE MENDER, 1"
20	1	X	FLANGED TEE, 2"
21	2	X	M200 X 1" HB
22	1	X	M200 X 1-1/4" HB
23	1	X	M200 X 1-1/4" HB 90 ELBOW
24	1	X	M200 X M200 45 ELBOW
25	1	X	2" MPT X 1-1/4" FPT REDUCER BUSHING
26	1	X	1-1/4" MPT X 1-1/4" HB
27	1	X	(CHASSIS FLANGE FITTINGS & COMMON PARTS) FLANGED TEE, 2"FP X 2"FP X 1"
28	2	X	M100 X M100 45 ELBOW
29	1	X	M220 X M220 90 ELBOW
30	1	X	M220 X 2" HB 45 ELBOW
31	1	X	M220 X 2" HB 90 ELBOW
32	2	X	M100 X 1-1/4" HB
33	2	X	M100 X 1-1/4" HB 90 ELBOW
34	50	X	HOSE CLAMP, #24, 1-1/4"
35	48	X	FLANGE GASKET, VITON, 1"
36	48	X	FLANGE CLAMP, 1"
37	6	X	FLANGE GASKET, VITON, 2"
38	6	X	FLANGE CLAMP, 2"
39	3	X	FLANGE GASKET, VITON, 2" FP
40	3	X	FLANGE CLAMP, 2" FP (CONTINUED...)

FIGURE 5. Kit, Recirculating Boom, NPT & Flange Plumbing, NH/Miller MY17+, 10 Section (P/N 117-0171-898 Rev. A) Cont.

THIS KIT TO CONTAIN THE FOLLOWING ITEMS LISTED BELOW:

ITEM #	QTY	PART #	DESCRIPTION
			(CONTINUED BOX 2 OF 2) (VALVES)
41	10	X	SINGLE UNION POLY BALL VALVE, 1" FPT
42	1	X	STUBBY VALVE, 2" FLANGE X 2" MALE CAM
43	1	X	POLY CAM LOCK, 2" FEMALE CAM X 2" FPT
44	1	X	3-WAY FLANGE BALL VALVE, 1", SIDE LOAD
45	1	X	FLANGED POLY CHECK VALVE, 1", 1 PSI
46	14	X	BEFV, 1"

UPDATES

Updates for Raven manuals as well as software updates for Raven consoles, and product controllers are available at the Applied Technology Division web site:

<https://portal.ravenprecision.com>

The Raven Service Tool and a laptop PC are required to perform software updates to the ECU. Refer to the Raven Service Tool Operation manual for additional assistance with updating the ECU.

Sign up for e-mail alerts to receive notifications when updates for your Raven products are available on the Raven web site.

At Raven Industries, we strive to make your experience with our products as rewarding as possible. One way to improve this experience is to provide us with feedback on this manual.

Your feedback will help shape the future of our product documentation and the overall service we provide. We appreciate the opportunity to see ourselves as our customers see us and are eager to gather ideas on how we have been helping or how we can do better.

To serve you best, please send an email with the following information to

techwriting@ravenind.com

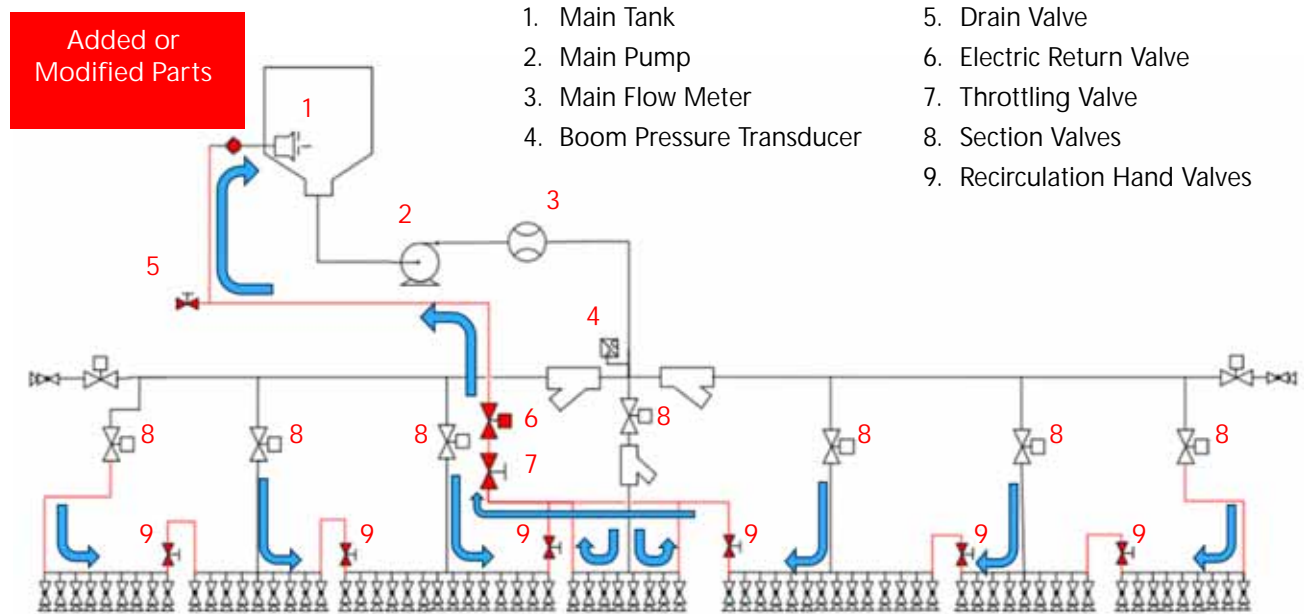
- New Holland/Miller After-Market Recirculating Boom Installation and Operation Manual -016-0171-726 Rev. A
- Any comments or feedback (include chapter or page numbers if applicable).
- Let us know how long have you been using this or other Raven products.

We will not share your email or any information you provide with anyone else. Your feedback is valued and extremely important to us.


Thank you for your time.

OVERVIEW

FIGURE 1. 7 Example of the Boom Recirculation Update System



CAUTION



- Use thread sealant on all threaded joints.
- Do not over tighten threaded joints.
- Use provided hose-protectors where sharp edges contact hoses.
- Hose lengths shown are for reference only. Ensure hoses are routed to prevent interference, pinching, or stretching while folding or unfolding the booms.

MOUNT THE RETURN AND THROTTLING VALVE

1. Mount the valve-mounting bracket (P/N 107-0172-739) along the left parallel arm of the center rack. Use the 5/16" hardware from the existing hose clamp bracket.

NOTE: The valve-mounting bracket is slotted to provide adjustability for parallel arm cylinder clearance and hose routing.

If the boom has a cam lock disconnect at the center rack, mount the valve bracket to the existing mounting tab or directly to the disconnect valve by replacing two of the existing standard 3/8" nuts with the provided 3/8" nyloc nuts.

2. Mount the throttling valve to the valve mounting bracket (P/N 107-0172-739) by replacing two of the existing standard 3/8" nuts on the throttling valve with the provided 3/8" nyloc nuts.
3. Mount the electronic recirculating valve to the throttling valve using provided flange clamps.

NOTE: Set the throttling valve to 1/2 open to dampen the pressure changes when the electronic recirculating valve opens or closes. This can also be adjusted based on the operator preference by following the procedure described in the *Auto Mode for Throttling Valve / Standby PWM* section on page 40.

Assemble with the cable of the electronic recirculating valve facing up towards the cab and the handle of the throttling valve turns to the inside of the parallel arms when in the open position.

4. Assemble the cam lock with the reducer bushing and 1-1/4" hose barb threaded fitting for the hose from the boom. For angled parallel arms, place a 45° elbow between the electronic recirculation valve and a 1-1/4" hose barb flange fitting for the hose to the tank/drain.

FIGURE 2. Throttling Valve and Electronic Recirculation Valve Mounting

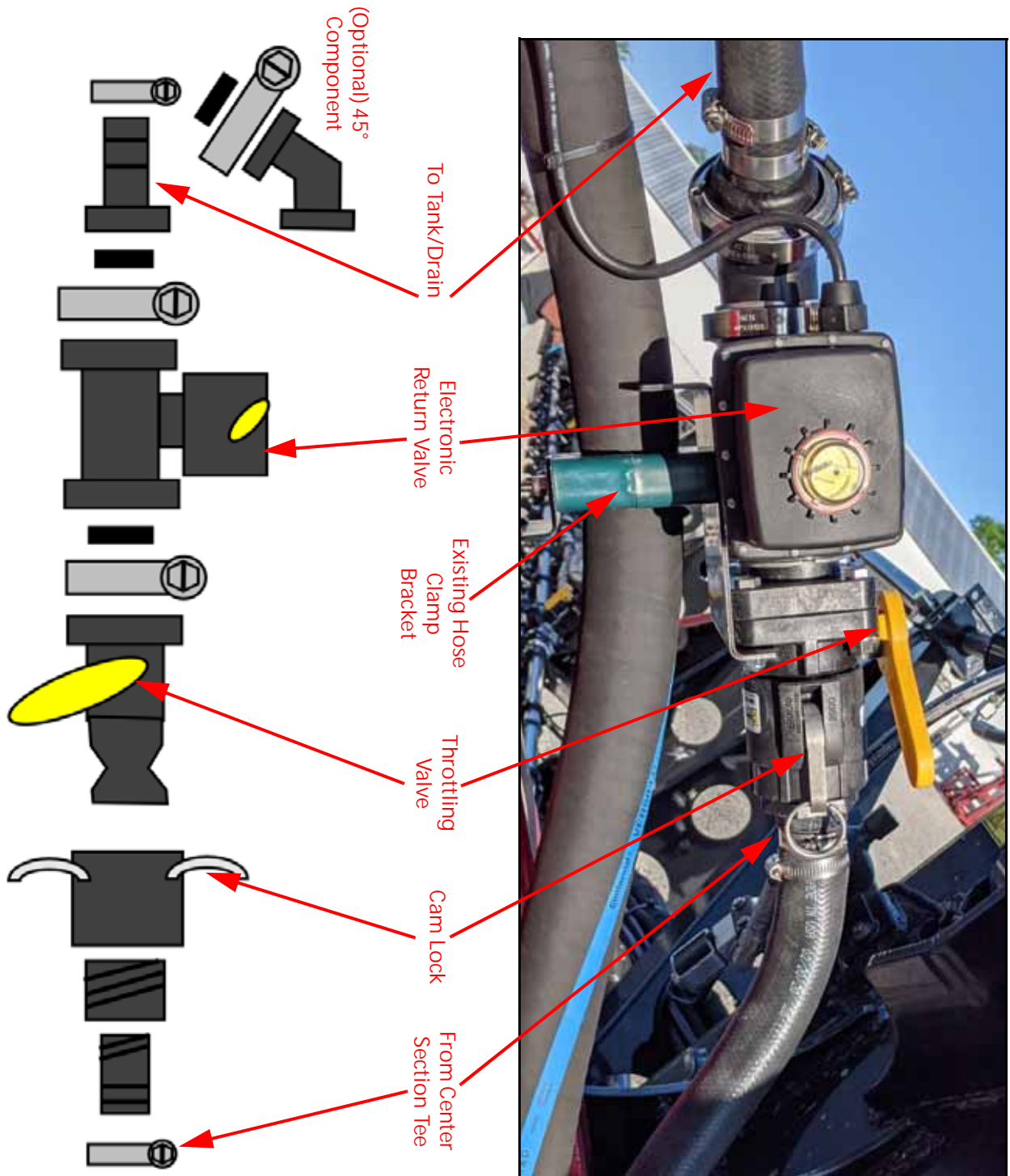


FIGURE 3. Throttling Valve and Electronic Recirculation Valve Mounting Options and Examples



Flip existing hose-clamp to bottom of bracket for clearance



PLUMB THE DRAIN AND TANK RETURN

Depending on which machine platform and which options are on the machine, several different plumbing configurations may be used to connect the boom recirculation return line to the machines product tank.

On large frame machines, with or without the eductor, the tank return tee, check valve, return line, and drain can be installed directly to the M220 flange on the bottom of the tank. See the “Large Frame with Eductor” in Figure 5 on page 17 for reference.

On small frame machines, without the eductor, the tank return tee, check valve, return line, and drain can be installed directly to the M220 flange on the bottom of the tank. See the “Small Frame without Eductor” in Figure 5 on page 17 for reference.


On small frame machines, with the eductor, the tank return tee, check valve, return line, and drain can be installed in-line in the existing eductor plumbing. See Figure 7 on page 18 for reference.

To plumb the drain and tank return:

1. If the remote eductor return option is not to be used, assemble and attach the tee, check valve, and 3-way valve to the existing eductor tank inlet or plugged tank port on the front, bottom portion of the product tank as shown in Figure 4 on page 16.

NOTE: Eductor hose may need to be shortened to accommodate assembly.

2. Route a hose from the electronic return valve to the common port of the 3-way valve.

	<p style="text-align: center;">CAUTION</p> <p>Route hose away from moving parts and pinch points, generally following existing hose routing.</p> <p>Install hose protectors as needed along sharp edges.</p>
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3. Route a hose from the remaining open port on the 3-way valve to serve as a drain.
4. If the machine is equipped with the on-board eductor option, connect the existing eductor plumbing to the open port on the M220 tee. If there is no on-board eductor option, reuse the M220 cap that was removed from the bottom of the product tank.

FIGURE 4. Tank and Drain Recirculation Plumbing Diagram

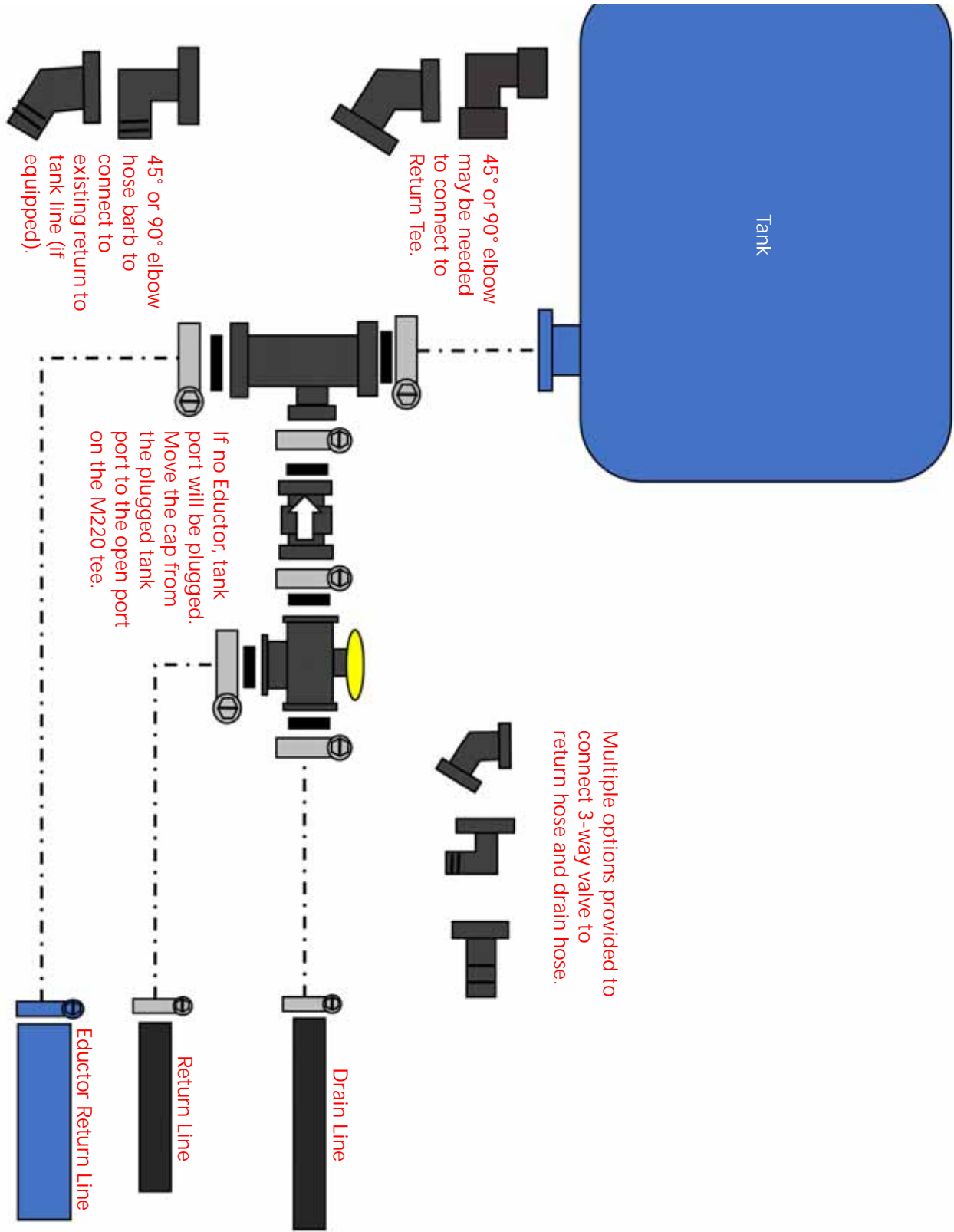


FIGURE 5. Eductor Tee and Check Valve Assembly Installation for Tank Mounting Location

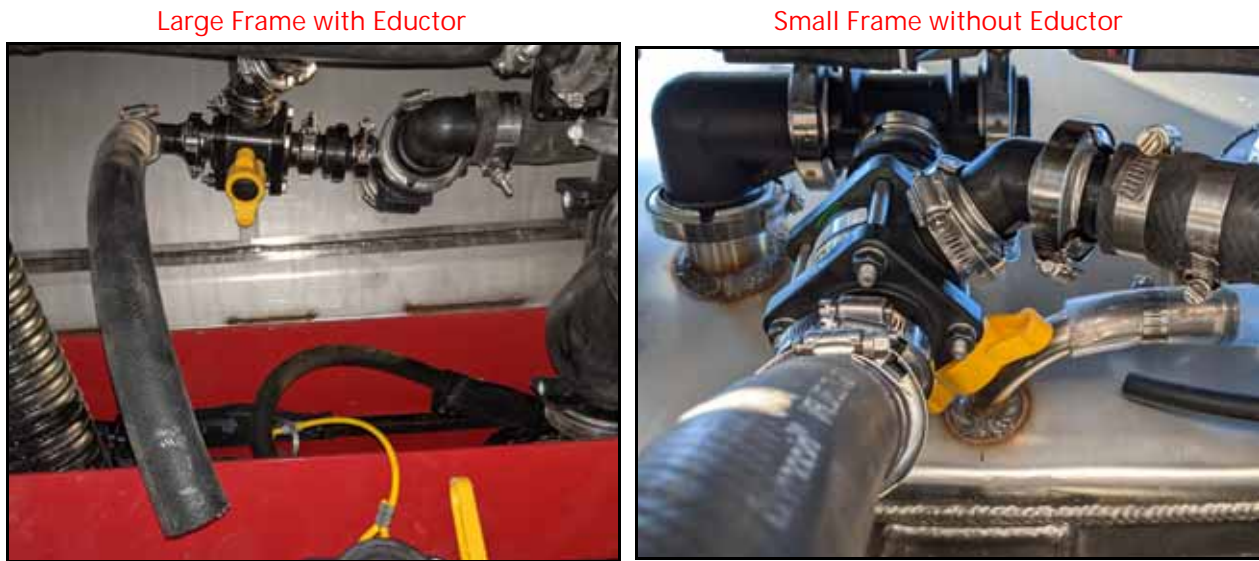
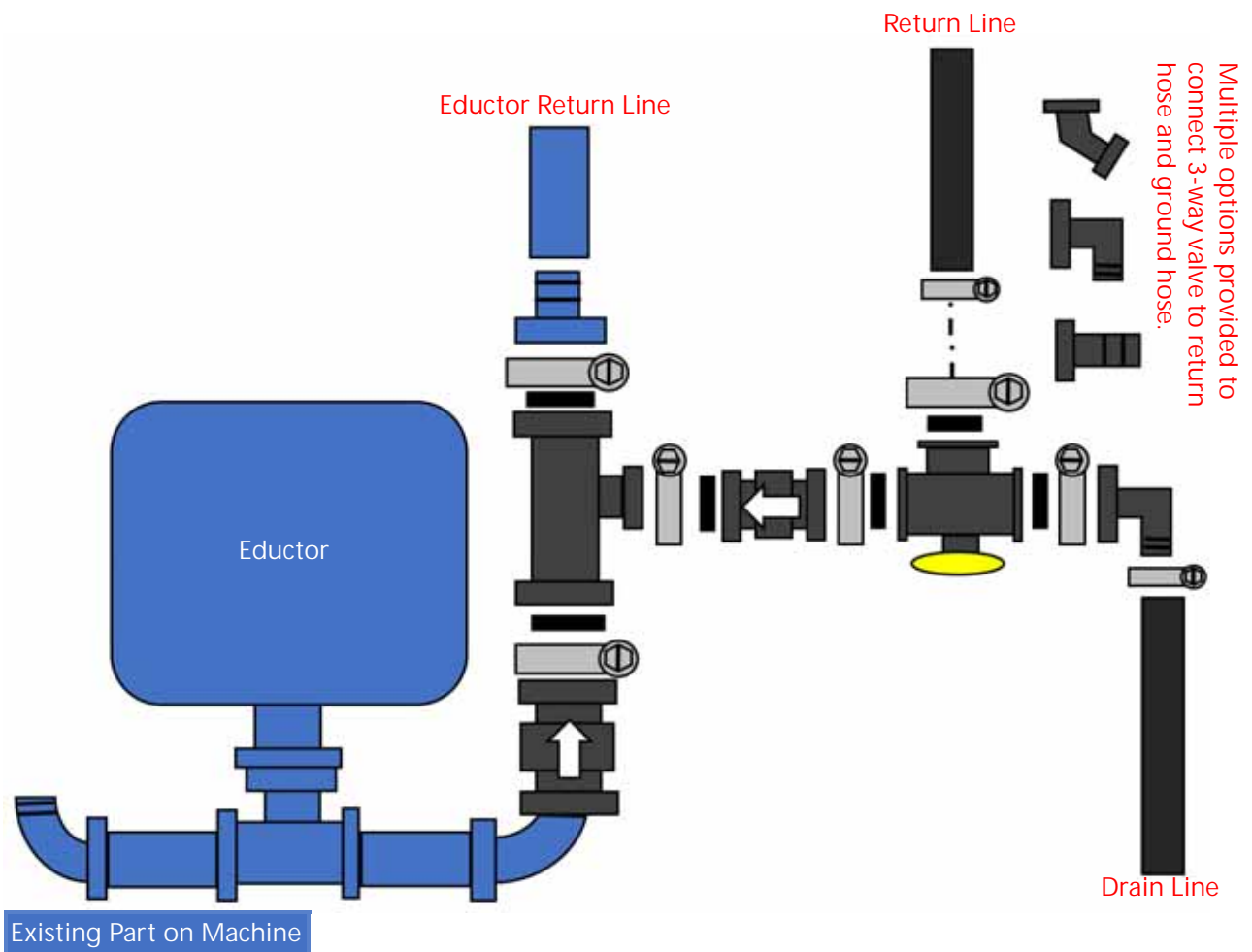


FIGURE 6. Tank and Drain Recirculation Plumbing Diagram for Remote Mounting Option



NOTE: If the machine has a door-located eductor and room allows, the plumbing shown above can be used for the return-to-tank/drain function.

FIGURE 7. Drain Valve and Drain Hose for Remote Educator Mounting Option



CENTER BOOM SECTIONS

NOTE: Use thread sealant for boom end flush valve joint only. Do not over-tighten the flush valve as the fitting can split.

All plumbing is 1"-based except where noted.

Interference may occur at the ends of the boom-tube sections between the new plumbing components and the existing nozzle bodies, or nozzle control valves, depending on the boom width and spacing configuration. Eliminate the interference by rotating the nozzle body, by moving the nozzle control valve to a different nozzle body port, or by replacing the nozzle body.

1. Assemble the plumbing for the center section as shown in Figure 8, "Center Boom Plumbing for 10 Section (135', 132', 120') MonoBeam and Truss Boom Configurations," seen below.

FIGURE 8. Center Boom Plumbing for 10 Section (135', 132', 120') MonoBeam and Truss Boom Configurations

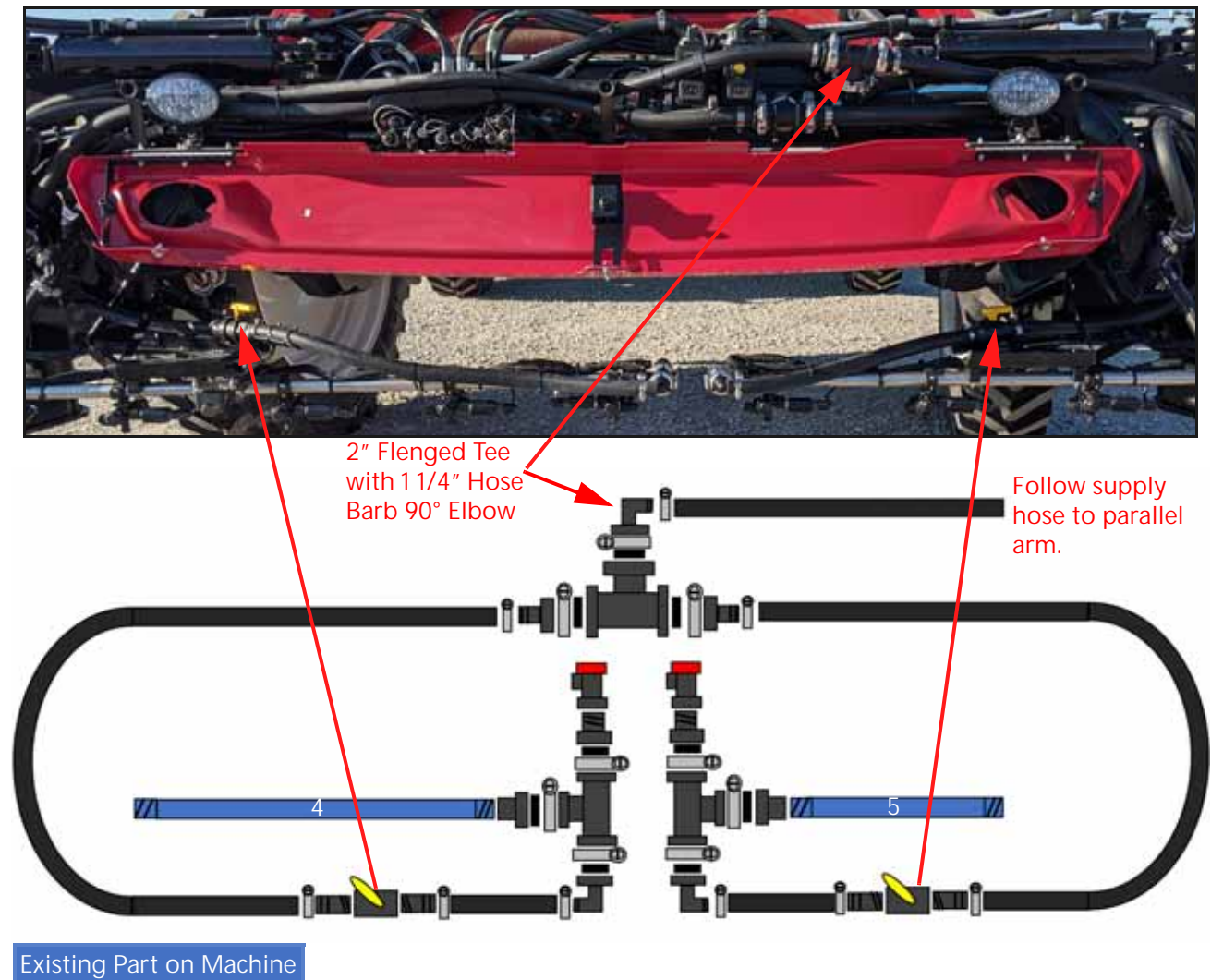


FIGURE 9. Center Boom Section Plumbing Assembly Example



FIGURE 10. Center Boom Section Plumbing Routing Example

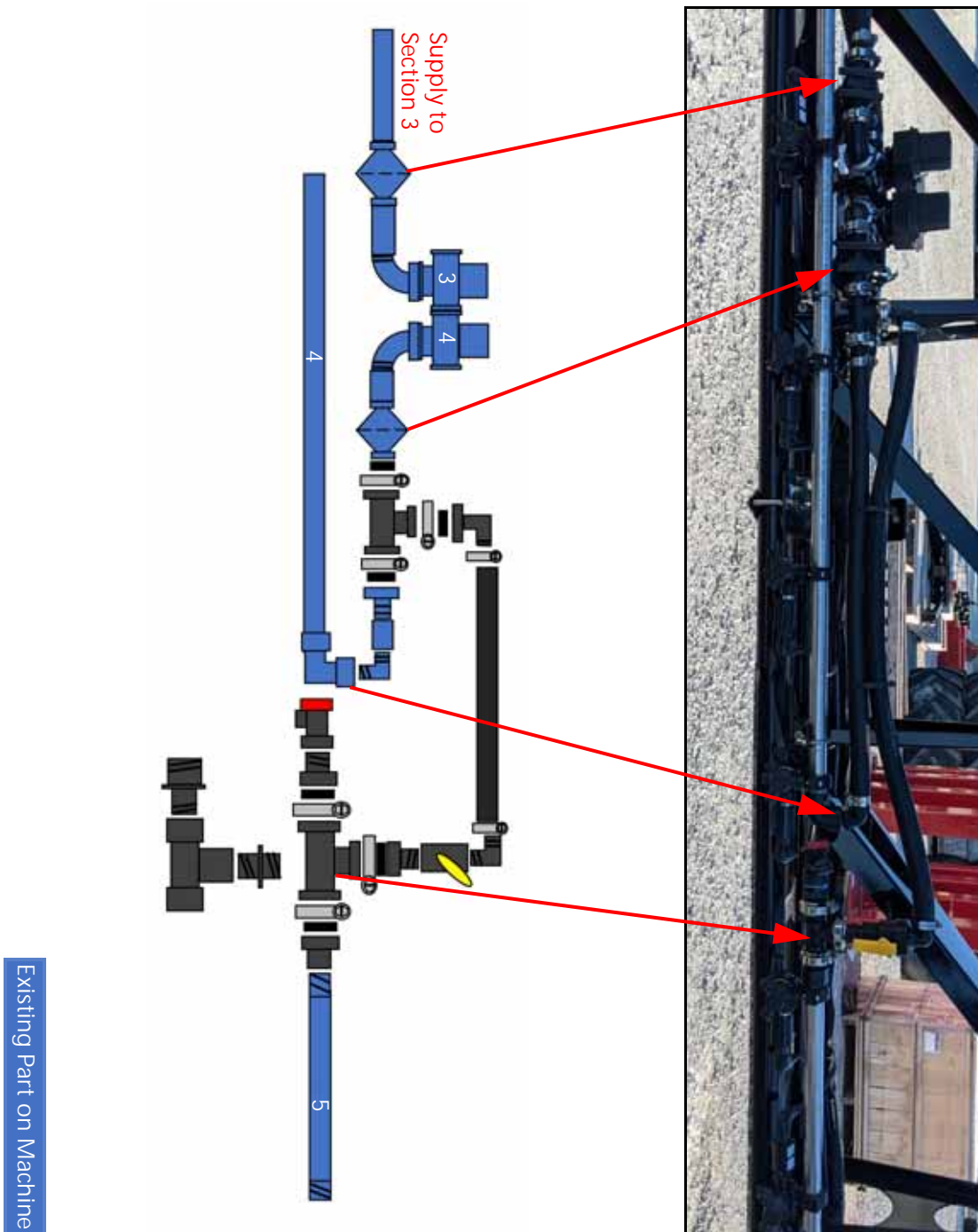


TRUSS BOOM SECTIONS

NOTE: The following figures show either the left or right side of the boom plumbing for each section. Be cautious of each section orientation related to this installation manual when replicating the plumbing on the opposite side of the boom.

1. Assemble the plumbing for section 5 on the left boom and section 6 on the right boom according to Figure 11, "Truss Boom Section 5 and Section 6," seen below. The left-side boom assembly is shown.

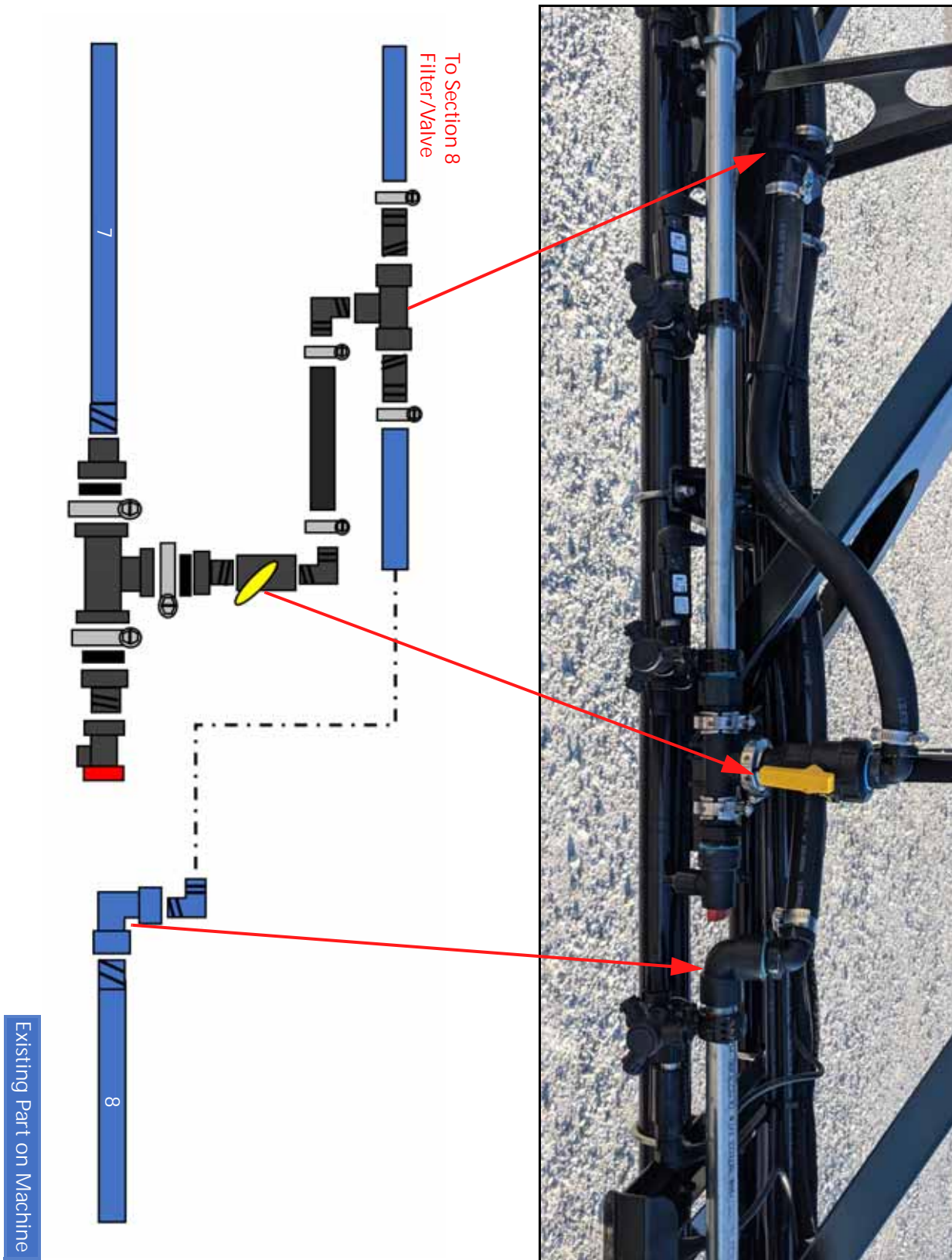
FIGURE 11. Truss Boom Section 5 and Section 6



NOTE: It may be necessary to use threaded fittings due to space constraints.

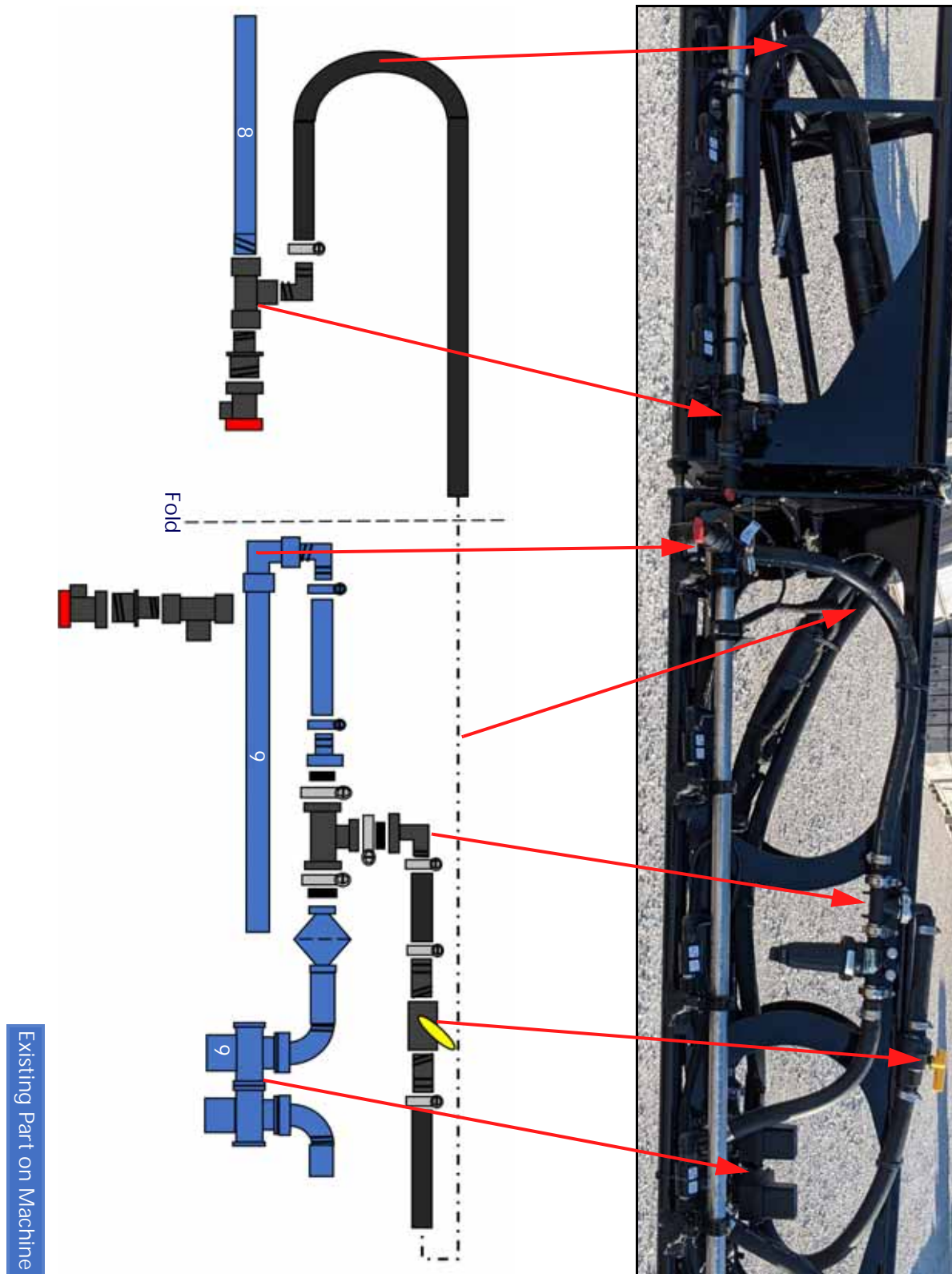
2. Assemble the plumbing for section 4 on the left boom and section 7 on the right boom according to Figure 12, "Truss Boom Section 4 and Section 7," seen below. The right-side boom assembly is shown.

FIGURE 12. Truss Boom Section 4 and Section 7



3. Assemble the plumbing for section 3 on the left boom and section 8 on the right boom according to Figure 13, "Truss Boom Section 3 and Section 8," seen below. The right-side boom assembly is shown.

FIGURE 13. Truss Boom Section 3 and Section 8



NOTE: It may be necessary to place the BEFV using a threaded tee at the end of this section of boom.

4. Assemble the plumbing for sections 1 and 2 on the left boom breakaway and sections 9 and 10 on the right boom breakaway according to Figure 14 on page 24, Figure 15 on page 25, and Figure 16 on page 26. Assemble according to the model year and boom configuration of the machine.

FIGURE 14. Truss Boom Section Breakaway - Model Year 2017-2019

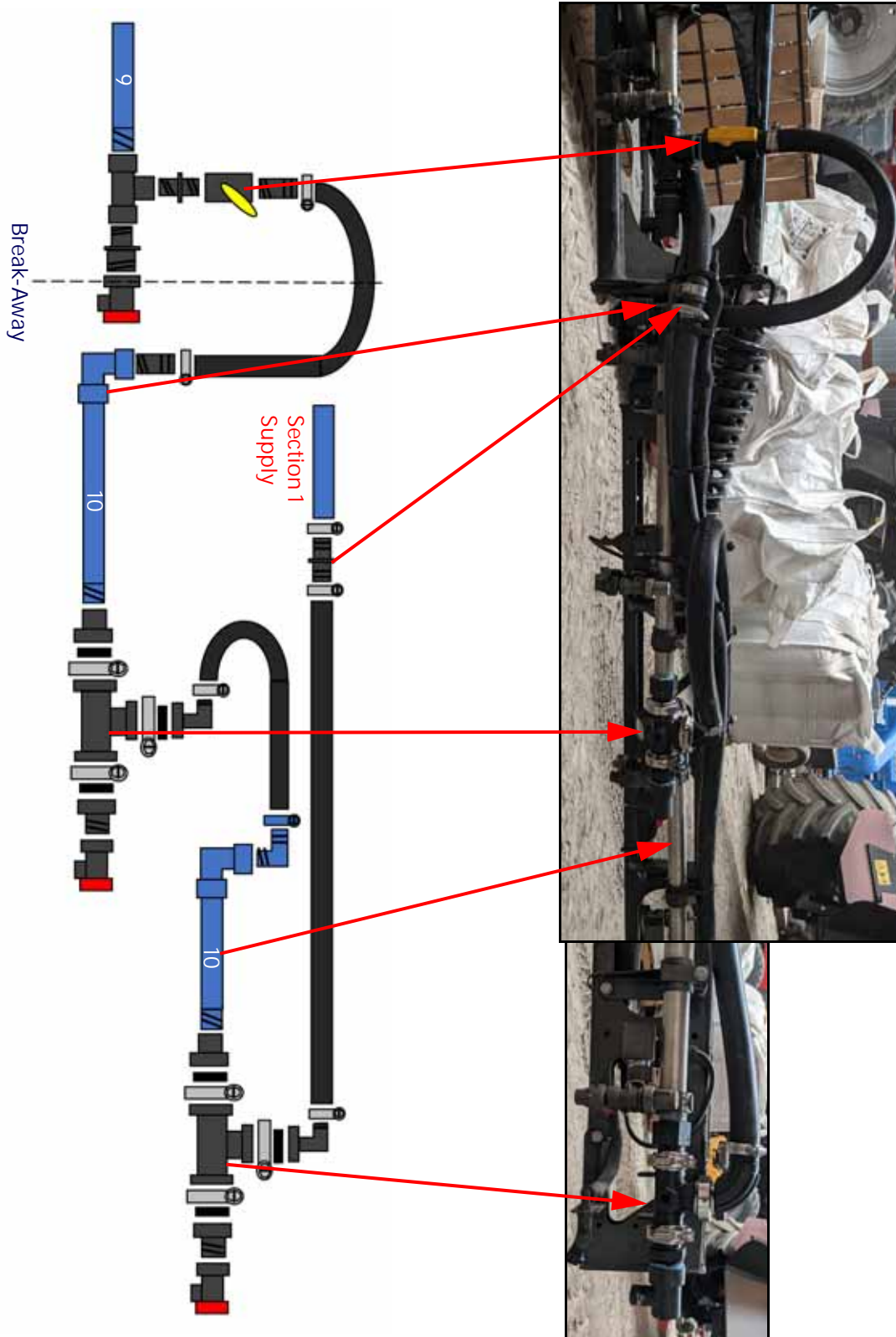


FIGURE 15. Truss Boom Section Breakaway - Model Year 2020 and Newer

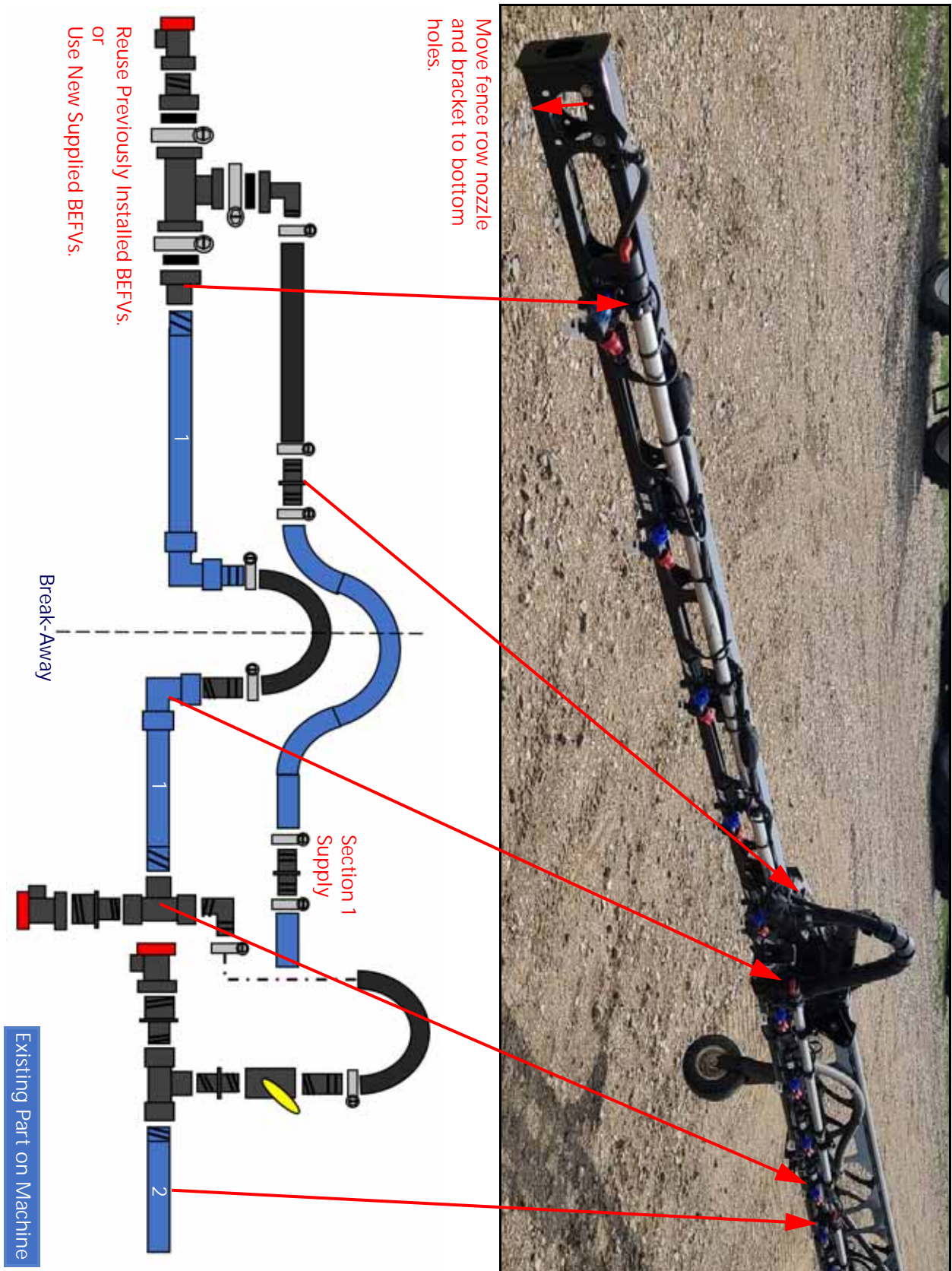
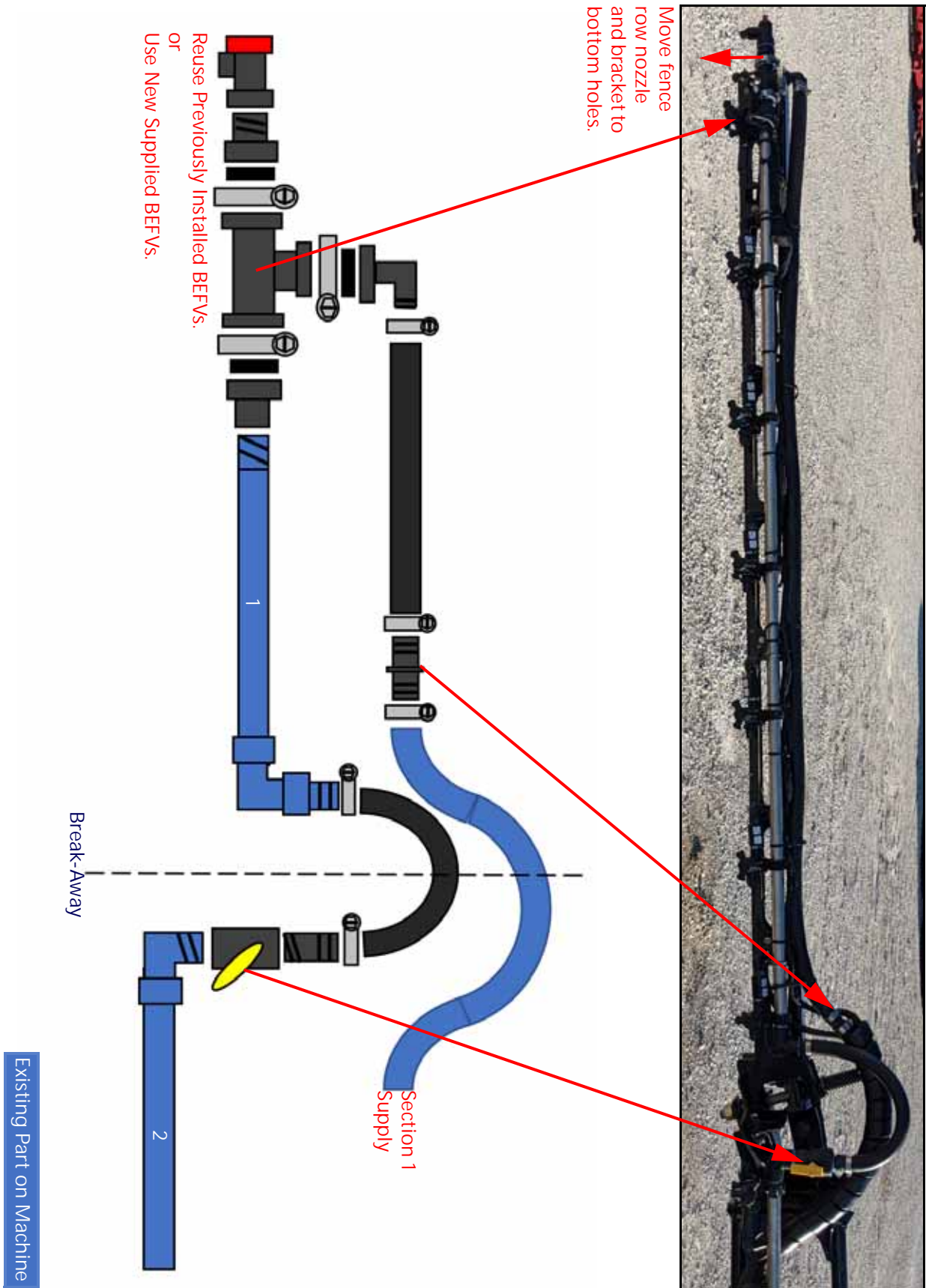


FIGURE 16. Truss Boom Section Breakaway - 120'/15" Model Year 2020 and Newer



TIP PROTECTOR BRACKET

NOTE: Tip protector brackets (P/N 107-0172-740 and 107-0172-741) are not used on MonoBeam boom configurations, but are recommended to be used on all truss boom configurations.

1. Locate the truss tip protector kit (P/N 117-0171-899). This will include a left and right side bracket and the required hardware.

NOTE: If the machine is equipped with foam marker brackets and hardware, the tip protector brackets may not fit depending on the model year of the boom and foam marker.

FIGURE 17. Foam Marker Hardware



2. For machines model year 2017-2019, utilize the offset four hole bolt pattern. For machines model year 2020 and newer, utilize the square bolt pattern. This will match up to an existing bolt pattern at the tip of the truss boom.
3. Utilize the provided hardware to secure the bracket to the boom structure. The provided 1/4" spacers are required between the bracket and boom to accommodate the end plate of the boom as shown in Figure 18, "Tip Protector Bracket Spacers," below.

FIGURE 18. Tip Protector Bracket Spacers



FIGURE 19. Tip Brackets Installed

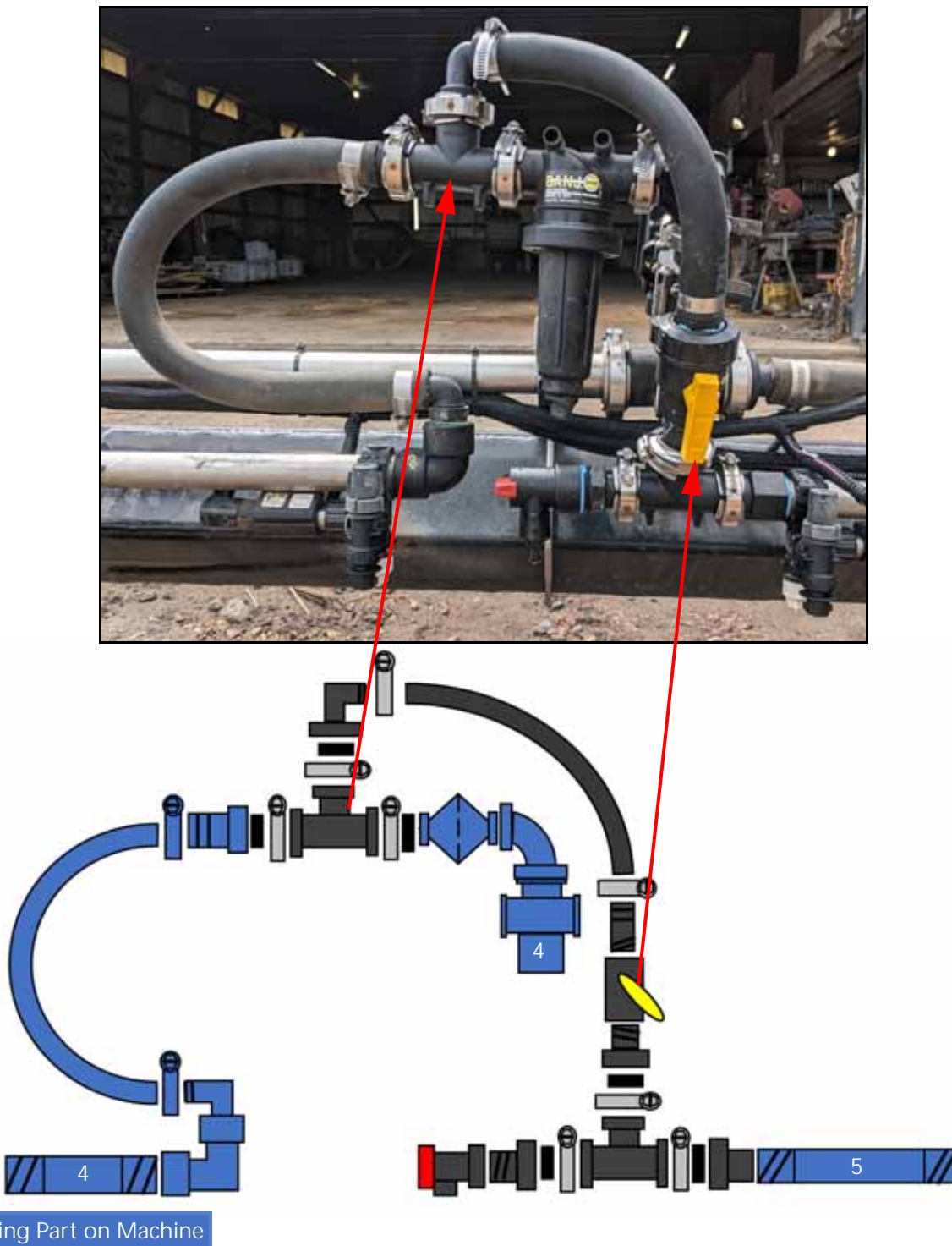


MONOBEAM BOOM SECTIONS

NOTE: The following figures show either the left or right side of the boom plumbing for each section. Be cautious of each section orientation related to this installation manual when replicating the plumbing on the opposite side of the boom.

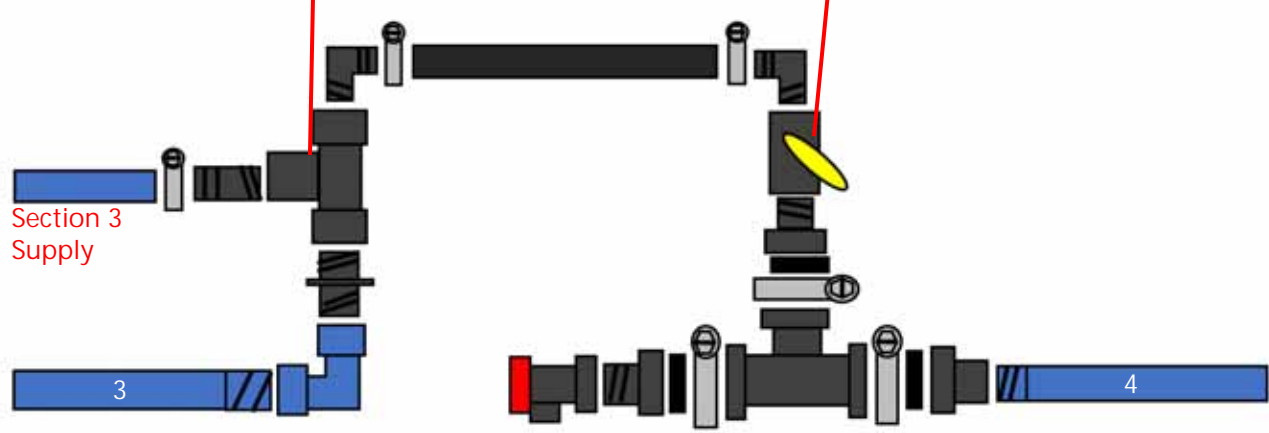
1. Assemble the plumbing for section 5 on the left boom and section 6 on the right boom according to Figure 20, "MonoBeam Boom Section 5 and Section 6," seen below. The left boom assembly is shown.

FIGURE 20. MonoBeam Boom Section 5 and Section 6



- Assemble the plumbing for section 4 on the left boom and section 7 on the right boom according to Figure 21, "MonoBeam Boom Section 4 and Section 7," seen below. The left boom assembly is shown.

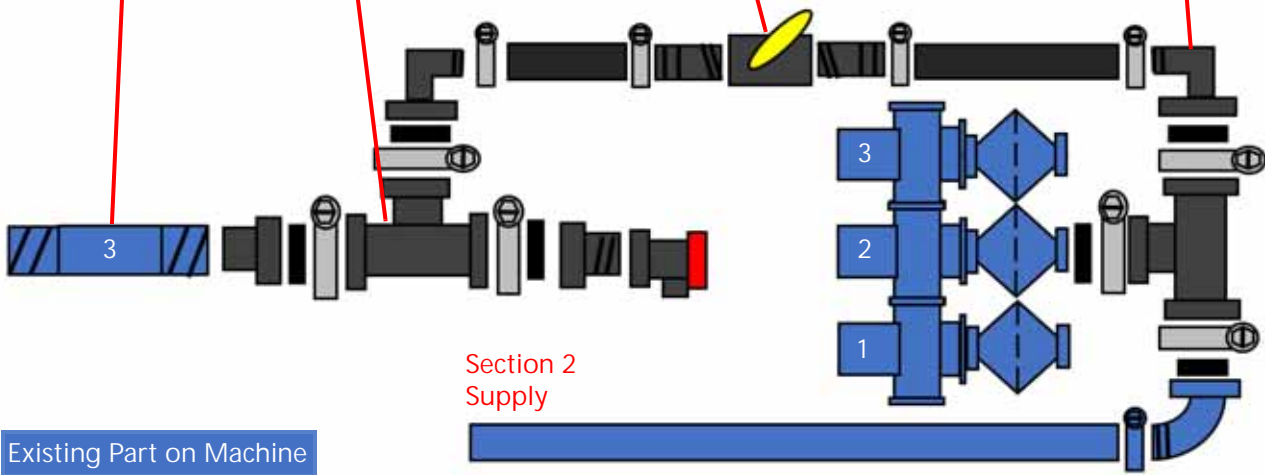
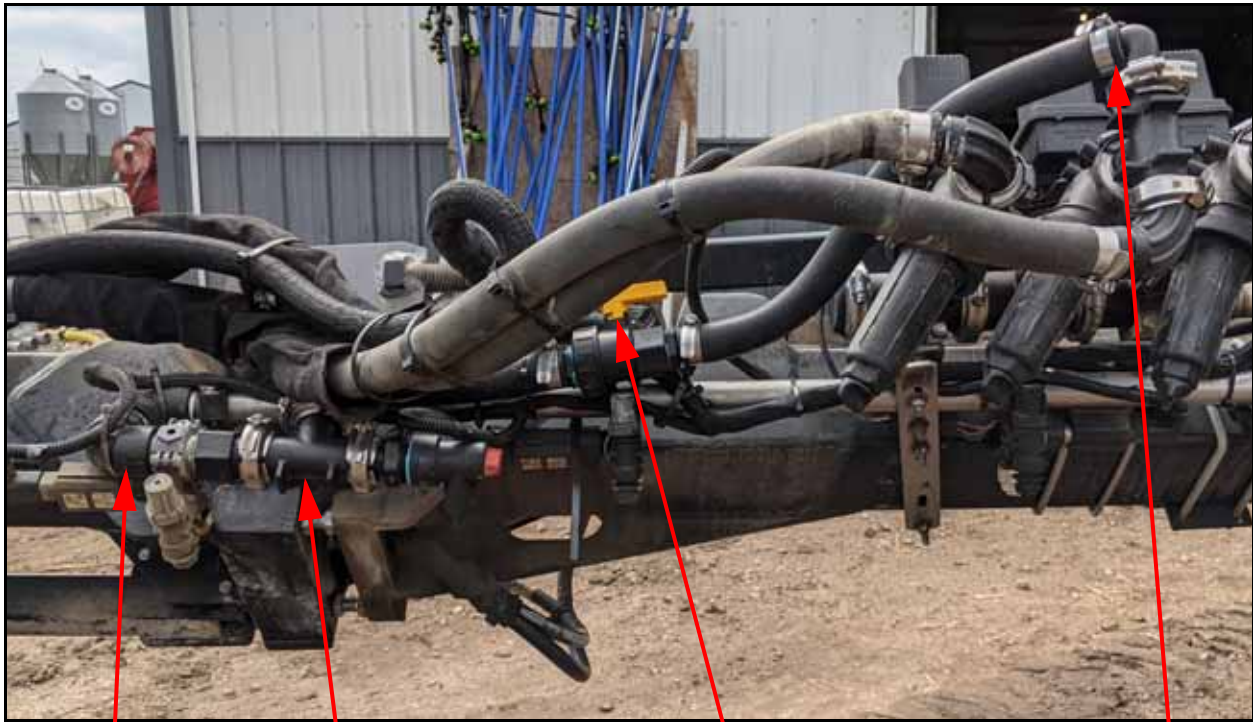
FIGURE 21. MonoBeam Boom Section 4 and Section 7



Existing Part on Machine

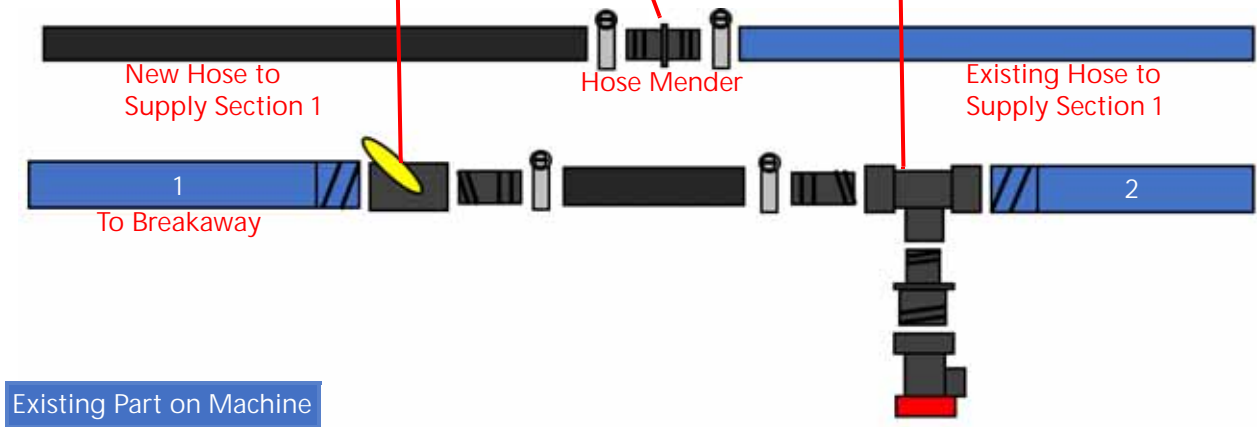
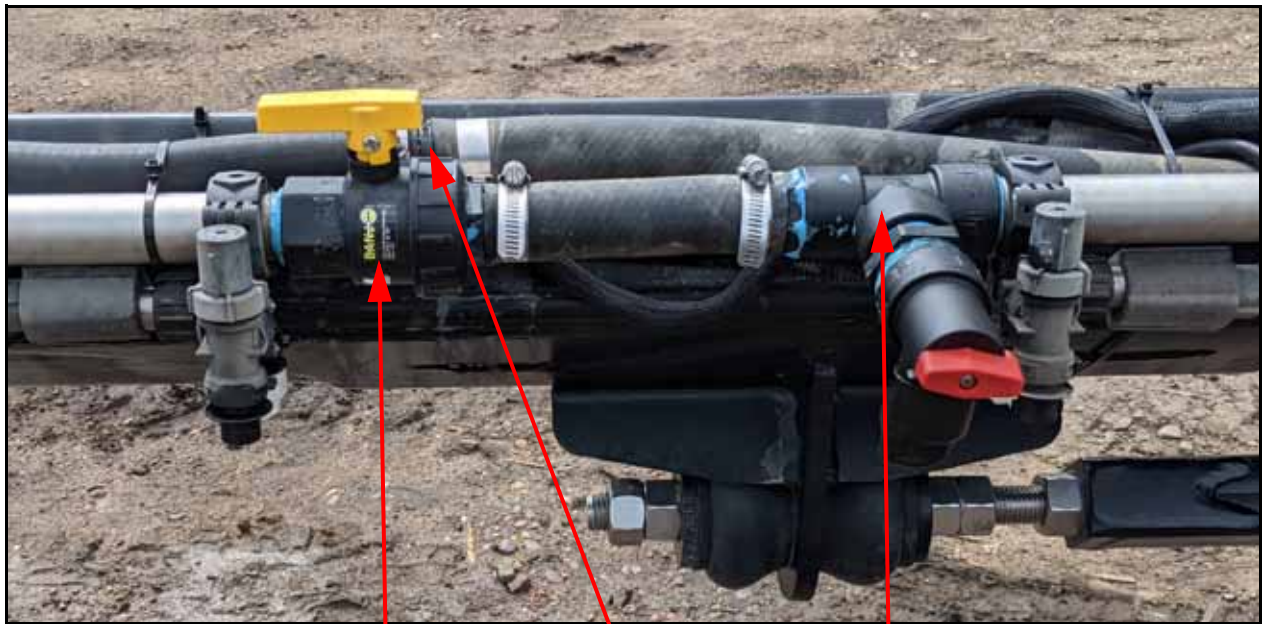
3. Assemble the plumbing for section 3 on the left boom and section 8 on the right boom according to Figure 22, "MonoBeam Boom Section 3 and Section 8," seen below. The left boom assembly is shown.

FIGURE 22. MonoBeam Boom Section 3 and Section 8



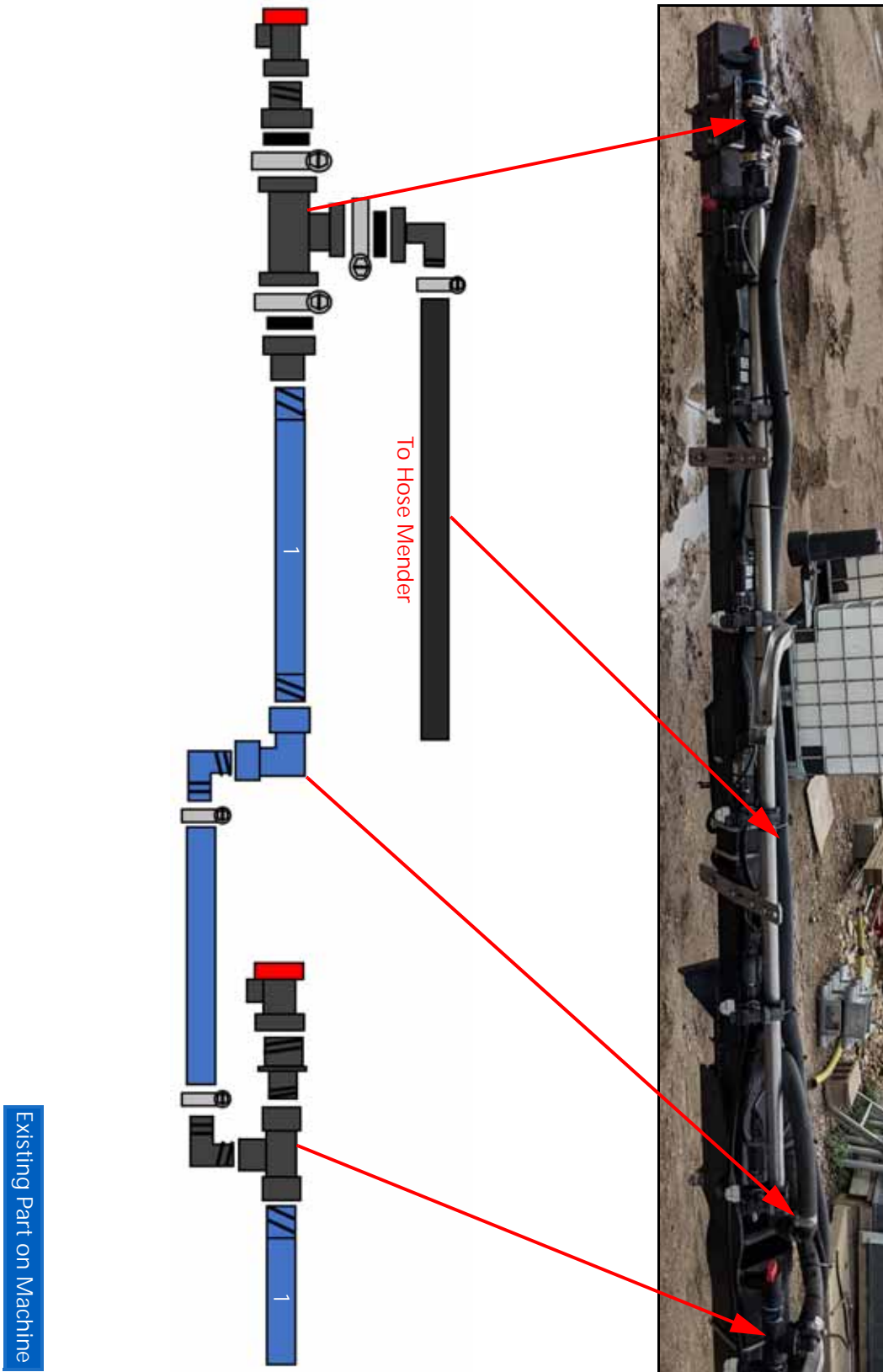
- Assemble the plumbing for section 3 on the left boom and section 9 on the right boom according to Figure 23, "MonoBeam Boom Section 2 and Section 9," seen below. The left boom assembly is shown.

FIGURE 23. MonoBeam Boom Section 2 and Section 9



5. Assemble the plumbing for section 1 on the left boom and section 10 on the right boom according to Figure 23, "MonoBeam Boom Section 2 and Section 9," seen below. The left boom assembly is shown.

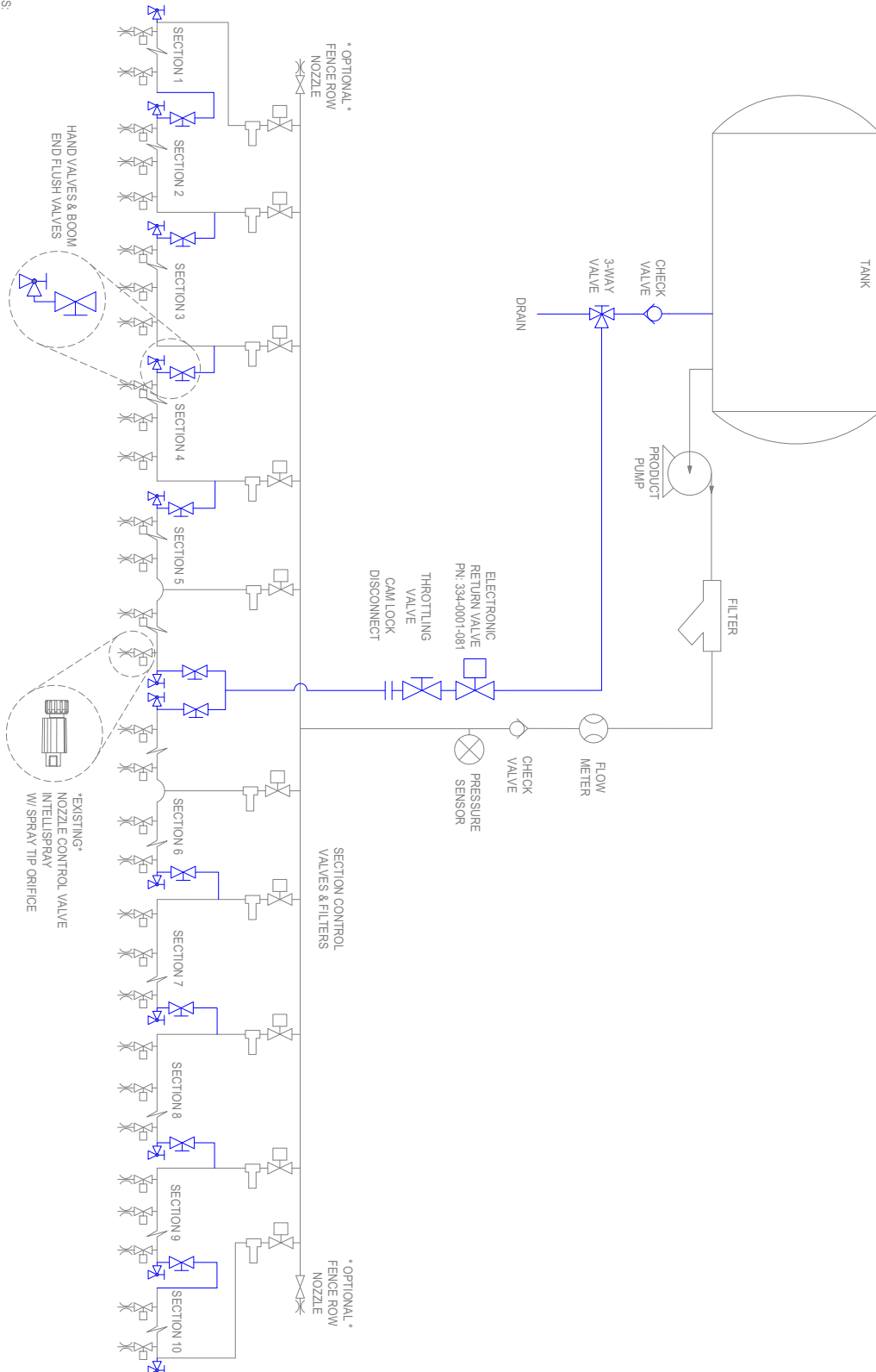
FIGURE 24. MonoBeam Boom Section 1 and Section 10



SYSTEM DIAGRAMS

FIGURE 25. System Drawing, IntelliSpray, Recirculating Boom, New Holland / Miller, MY17+, 10-Section, Plumbing Components (P/N 054-1005-026 Rev. A)

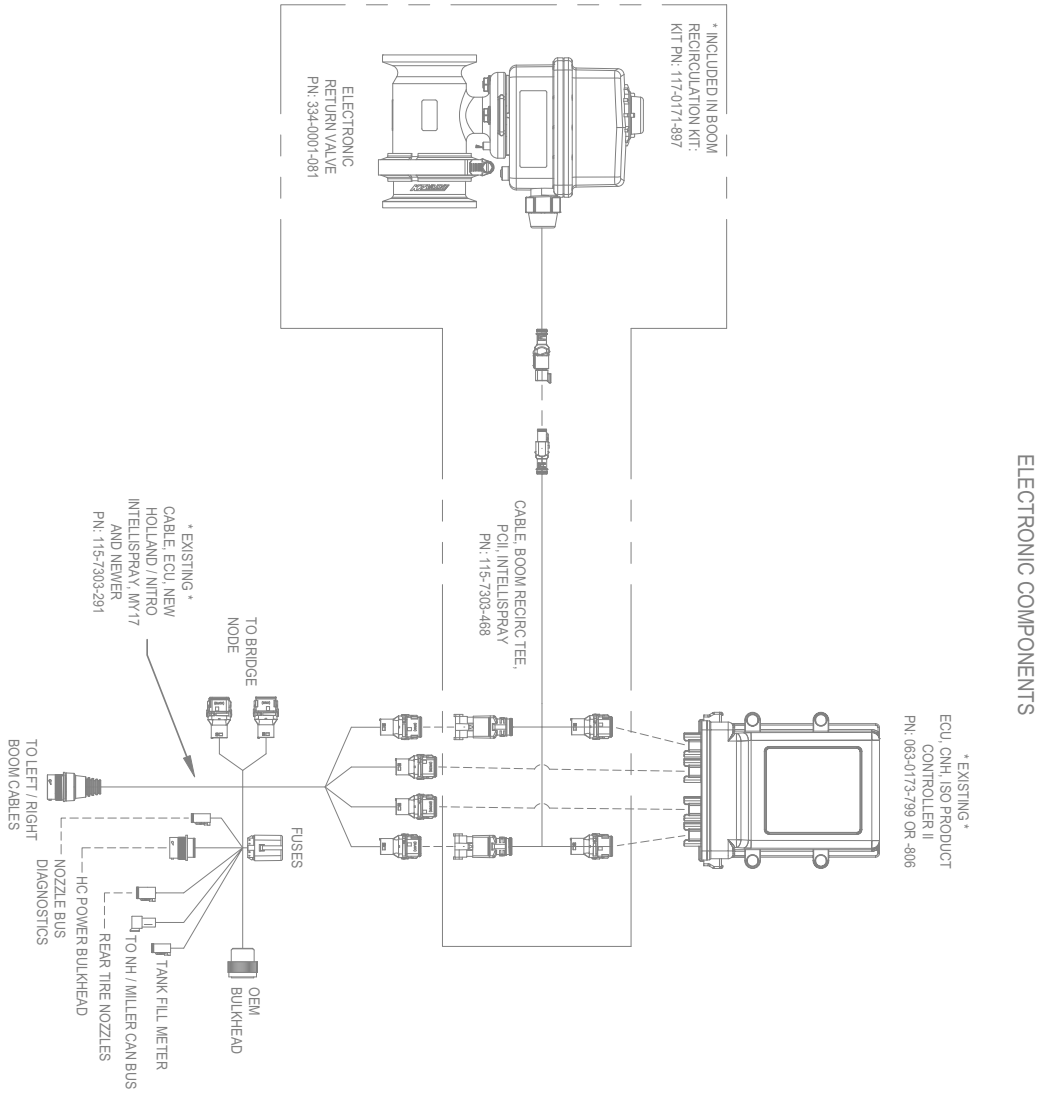
- NOTES:
1. BLUE LINES INDICATE NEW COMPONENTS
 2. GRAY LINES INDICATE EXISTING COMPONENTS



SYSTEM DRAWING, INTELLISPRAY, RECIRCULATING BOOM, NEW HOLLAND/MILLER, MY17+, 10-SECTION
PLUMBING COMPONENTS

FIGURE 26. System Drawing, IntelliSpray, Recirculating Boom, New Holland / Miller, MY17+, 10-Section, Electronic Components (P/N 054-1005-026 Rev. A)

- NOTES:
1. NOT ALL INTELLISPRAY BOOM COMPONENTS DEPICTED.
 2. REFER TO SYSTEM DRAWING P/N: 054-1005-016 FOR ADDITIONAL INTELLISPRAY BOOM CABLING OPTIONS.



SYSTEM DRAWING, INTELLISPRAY, RECIRCULATING BOOM, NEW HOLLAND/MILLER, MY17+, 10-SECTION

ELECTRONIC COMPONENTS

FIGURE 27. System Drawing, Hawkeye 2, Recirculating Boom New Holland/ Miller, MY17+, 10-Section, Plumbing Components (P/N 054-2005-026 Rev. A)

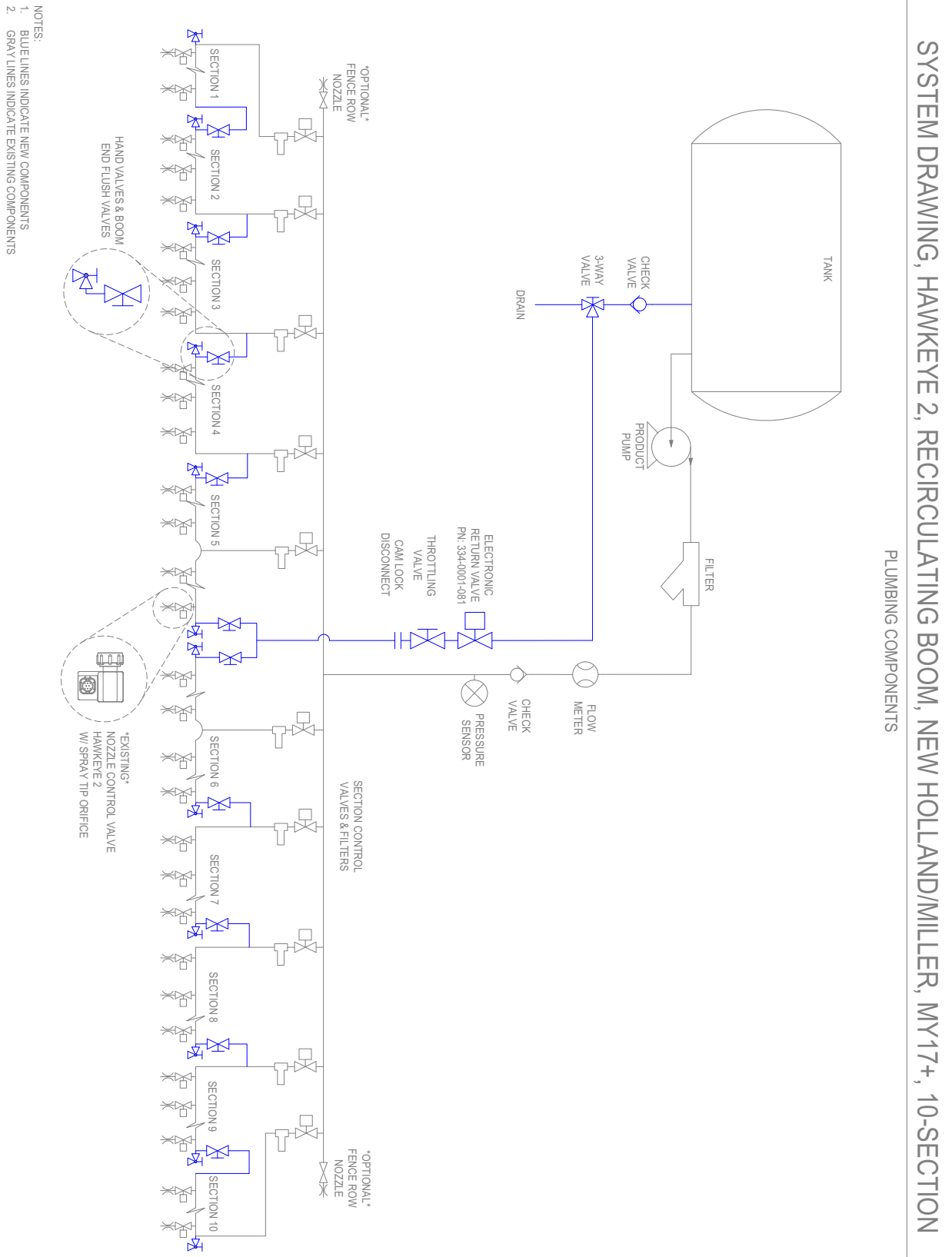
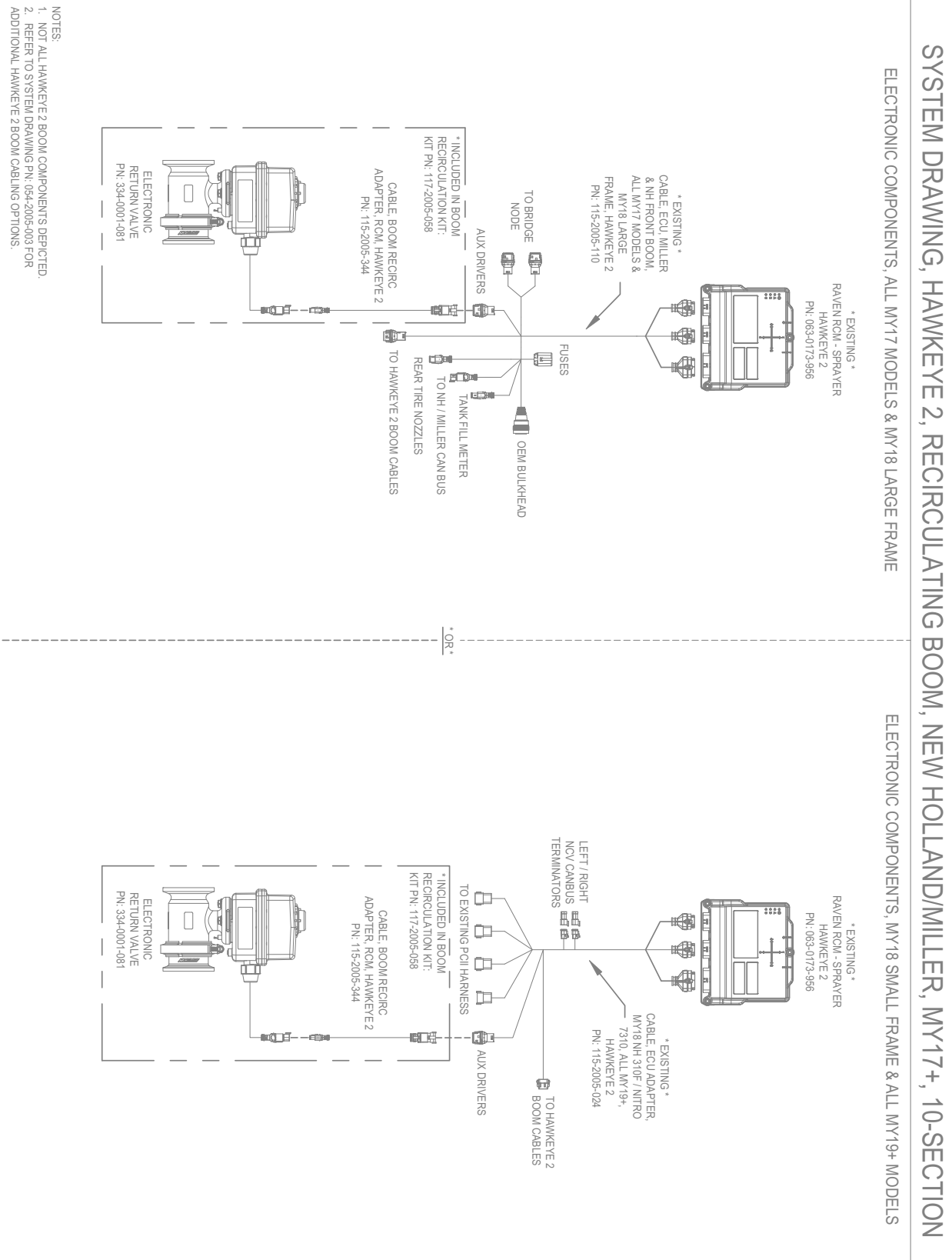


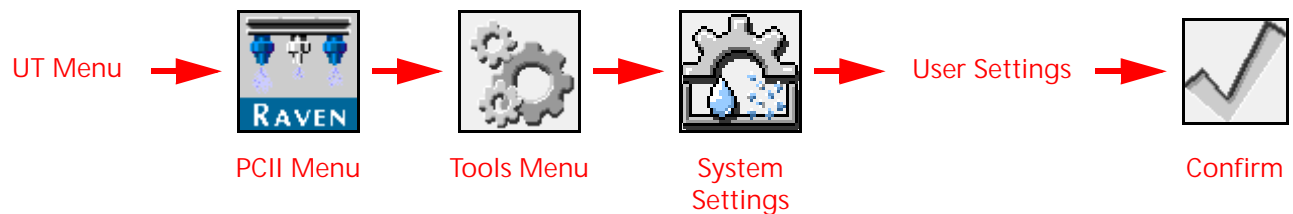
FIGURE 28. System Drawing, Hawkeye 2, Recirculating Boom New Holland/ Miller, MY17+, 10-Section, Electronic Components (P/N 054-2005-026 Rev. A)



SETUP FOR PRODUCT CONTROLLER II (PCII)

ENABLE MAIN PRODUCT RECIRCULATION - PCII

To turn on main product recirculation:



1. Open the UT Menu and select the Product Controller II Menu softkey.
2. Select the Tools Menu softkey along the right side of the display.
3. Select the System Settings softkey along the top of the display.
4. Select the User Settings softkey and select the Next softkey in the lower, right corner twice to display the Boom Recirculation check box option.
5. Enable the Boom Recirculation feature.

NOTE: The system will display a prompt for the operator to confirm that the plumbing of the system will support boom recirculation features, that all manual valves are in the correct position, and that any chemical from direct injection systems is rinsed from the boom. Once confirmed, the Boom Recirculation softkey will be displayed on the Home page.

If a direct injection product is turned on, the recirculation function will be disabled and the softkey will disappear until the injection product is turned off. When injection is turned on, close the manual throttling valve near the electronic return valve to prevent injected chemical from entering tank. When recirculation is re-enabled, drain any injected chemical from the boom and open the throttling valve to the desired position.

6. Enable the Auto Recirculate feature to allow the system to automatically initiate the recirculation system any time the system is not spraying.

NOTE: Recirculation will always stop automatically when normal spraying is initiated or when tank fill operations are started.

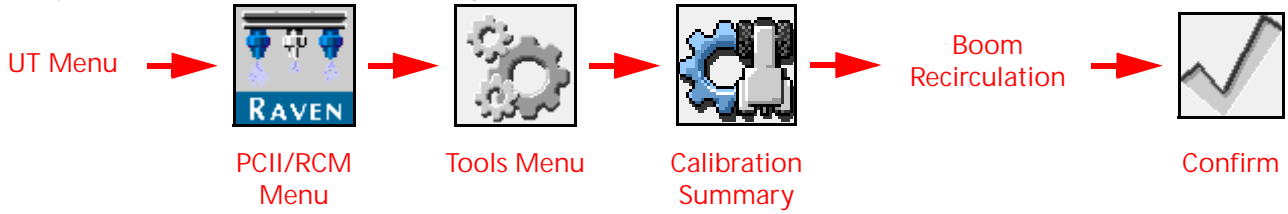
The operator may also manually stop recirculation by selecting the Recirculation softkey on the Home page. Pressing this button disables the Auto Recirculation feature and returns the system to Manual Recirculation Mode.

If it is desired to resume use of Auto Recirculation, the operator must navigate to User Settings and re-check the Auto Recirculation check box.

7. The Boom Recirculation softkey will be displayed on the Home page.

ADJUST RECIRCULATION TIMES - PCII

To adjust the time allowed for recirculating each section:



1. Open the UT Menu and select the Product Controller II Menu softkey.
2. Select the Tools Menu softkey along the right side of the display.
3. Select the Calibration Summary softkey along the top of the display.
4. Use the Next softkey to access the Section Auto-Operation Times page.
5. This page allows the operator to adjust the section recirculation times for the specific application system or current chemical suspension.

SETUP FOR RATE CONTROL MODULE - SPRAYER (RCM-S)

ENABLE MAIN PRODUCT RECIRCULATION - RCM-S

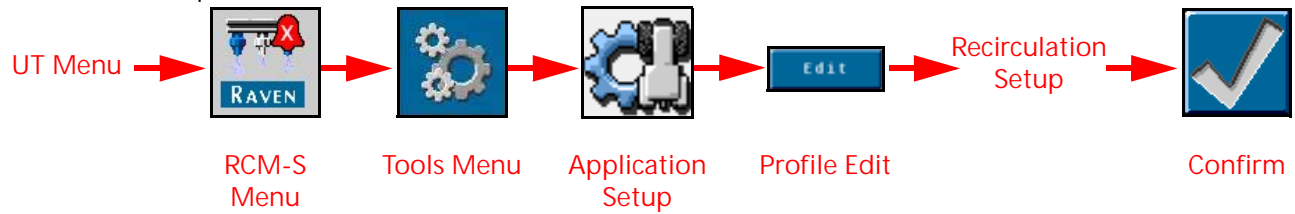
NOTE: Boom Recirculation must be unlocked by an activation key.

FIGURE 1. Feature Unlocks



NOTE: To enable Boom Recirculation for an existing machine profile, enter the setup wizard and edit the profile to select the Boom Recirculation check box. No additional changes are necessary when editing an existing profile.

To turn on main product recirculation:



1. Open the UT Menu and select the RCM-S Menu softkey.
2. Select the Tools Menu softkey along the right side of the display.
3. Select the Application Setup softkey along the top of the display.
4. Press the Edit softkey and accept the prompt.
5. Advance to the Recirculation Setup page.
6. Select the Boom Recirculation check box and press the Next softkey.
7. Accept the Boom Recirculation confirmation prompt.
8. If desired, enable Auto Recirculate.

NOTE: Auto Recirculate can also be enabled after exiting the setup wizard.

Recirculation will always start or stop automatically when initiating normal spraying or when starting tank-fill operations.

The operator may also manually stop recirculation by selecting the Recirculation softkey on the Home page. Pressing this button disables the Auto Recirculation feature and returns the system to Manual Recirculation mode.

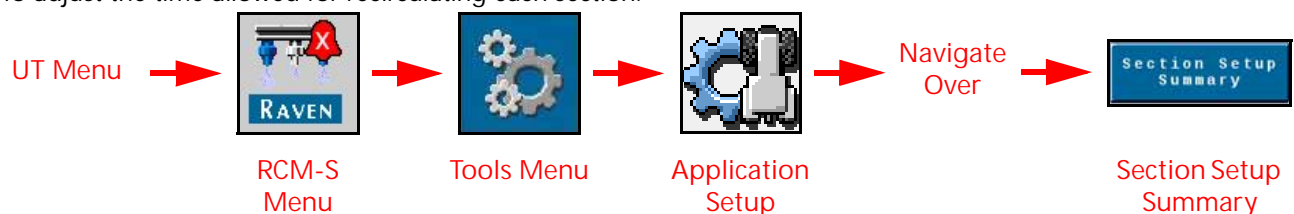
If it is desired to resume use of Auto Recirculation, the operator must navigate to User Settings and re-check the Auto Recirculation check box.

9. Press the Next softkey to navigate to the end of the setup wizard and return to the Home page.
10. The Boom Recirculation softkey will be displayed on the Home page.



ADJUST RECIRCULATION TIMES - RCM-S

To adjust the time allowed for recirculating each section:



1. Open the UT Menu and select the RCM-S Menu softkey.
2. Select the Tools Menu softkey along the right side of the display.
3. Select the Application Setup softkey along the top of the display.
4. Select the Section Setup Summary softkey.
5. Use the Next softkey to access the Section Auto-Operation Times page.
6. This page allows the operator to adjust the section recirculation times for the specific application system or current chemical suspension.

OPERATION

REQUIRED CONDITIONS FOR RECIRCULATION

The following conditions are required to initiate the boom recirculation feature:

- Confirm that any direct injection products are turned off.
- Confirm that the Boom Recirculation feature is enabled.
- Ensure the tank fill feature is not enabled.
- Toggle the product pump on (switch/softkey).
- Ensure all boom sections are toggled on.
- Ensure the active spray width is zero.
- Throttling valve is opened.
- Drain valves are closed.
- Recirculation hand valves between sections must be open.

NOTE: Boom Recirculation is not supported in Bypass, High-Flow, or High-Flow VP control modes. The crossover hand valves need to be manually closed when operating in one of those previously listed control modes.

- Either enable the Auto Recirculate feature or manually initiate recirculation by selecting the Recirculation softkey on the Home page.

AUTO MODE FOR THROTTLING VALVE / STANDBY PWM

To set the throttling valve or standby PWM to Auto mode:

1. Fill the sprayer with water.
2. Turn on the pump and set to Auto Spray Application mode.
3. Set the target rate and target pressure for expected sprayer application (e.g. 10 gpa @ 40 psi).
4. Set the self-test speed for expected headland entry/exit speed (e.g. 5 mph).
5. Turn on the master spray switch and all boom switches to spray product. Allow enough time to pass for the rate and pressure to stabilize.
6. Ensure the Auto Recirculate option is enabled so the product begins to recirculate in the boom when not spraying and the pump is on.
7. Turn off the master spray switch and observe the pressure setting.
8. While not spraying, adjust the Standby PWM % so that the pressure is approximately 5 psi higher than the pressure when spraying.
9. Turn on the master spray switch and watch the application rate gauge with Display Smoothing off.
10. Observe the rate spike above the target once and then settle to within 10% of the target within 2 seconds of turning on the master switch. If this does not occur, close down the throttling valve.
11. If necessary, repeat step 5 through 10 until the rate and pressure are within 10% of the target within 2 seconds of turning on the master switch.

NOTE: The throttling valve is large, so it may not be fully open after completing the above steps, but it will still allow for enough product to flow for recirculation.

12. If injection is installed, close the throttling valve completely to prevent injected chemical from entering the recirculation return circuit.

WHAT TO EXPECT WHILE RECIRCULATION IS ACTIVE

NOTE: When operating in Auto Recirculation Mode, it is recommended to adjust the Standby PWM% value so that recirculation pressure is close to the application pressure used during application.

When recirculation is active:

- The main product pump runs at the “Standby PWM%” value.
- Section valves will cycle “On” sequentially in pairs from the outermost to innermost sections for the user-defined recirculation time.

NOTE: NCVs on each section will remain off.

- The system will continue to monitor the main flow meter to ensure product is circulating. If the product recirculation is less than the low limit of the flow meter, the system will display an alert, but recirculation will continue.
- The boom pressure transducer is monitored to ensure the system pressure stays within the minimum and maximum allowable pressures. The main product pump will shutdown if the boom pressure exceeds the minimum (6 PSI) or maximum (150 PSI) pressure.
- Section valves will continue to cycle sequentially unless spraying or shutdown conditions are met.
- The drain valve will be used to drain out any product in the recirculation line when rinsing the boom.

NOTE: It is recommended to operate the recirculation system with the boom unfolded to prevent circulating with pinched supply hoses.

LIMITED WARRANTY

WHAT DOES THIS WARRANTY COVER?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service when used for intended purpose.

HOW LONG IS THE COVERAGE PERIOD?

Raven Applied Technology products are covered by this warranty for 12 months from the date of retail sale. In no case will the Limited Warranty period exceed 24 months from the date the product was issued by Raven Industries Applied Technology Division. This warranty coverage applies only to the original owner and is non-transferable.

HOW CAN I GET SERVICE?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including proof of purchase) must be included inside the box to be sent to Raven Industries.

WHAT WILL RAVEN INDUSTRIES DO?

Upon confirmation of the warranty claim, Raven Industries will (at our discretion) repair or replace the defective product and pay for the standard return freight, regardless of the inbound shipping method. Expedited freight is available at the customer's expense.

WHAT IS NOT COVERED BY THIS WARRANTY?

Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit, labor, or other damages. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.

EXTENDED WARRANTY

WHAT DOES THIS WARRANTY COVER?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service when used for intended purpose.

DO I NEED TO REGISTER MY PRODUCT TO QUALIFY FOR THE EXTENDED WARRANTY?

Yes. Products/systems must be registered within 30 days of retail sale to receive coverage under the Extended Warranty. If the component does not have a serial tag, the kit it came in must be registered instead.

WHERE CAN I REGISTER MY PRODUCT FOR THE EXTENDED WARRANTY?

To register, go online to www.ravenhelp.com and select Product Registration.

HOW LONG IS THE EXTENDED WARRANTY COVERAGE PERIOD?

Raven Applied Technology products that have been registered online are covered for an additional 12 months beyond the Limited Warranty for a total coverage period of 24 months from the date of retail sale. In no case will the Extended Warranty period exceed 36 months from the date the product was issued by Raven Industries Applied Technology division. This Extended Warranty coverage applies only to the original owner and is non-transferable.

HOW CAN I GET SERVICE?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including proof of purchase) must be included inside the box to be sent to Raven Industries. In addition, the words "Extended Warranty" must appear on the box and all documentation if the failure is between 12 and 24 months from the retail sale.

WHAT WILL RAVEN INDUSTRIES DO?

Upon confirmation of the product's registration for the Extended Warranty and the claim itself, Raven Industries will (at our discretion) repair or replace the defective product and pay for the standard return freight, regardless of the inbound shipping method. Expedited freight is available at the customer's expense.

WHAT IS NOT COVERED BY THE EXTENDED WARRANTY?

Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit, labor, or other damages. Cables, hoses, software enhancements, and remanufactured items are not covered by this Extended Warranty. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.