JOHN DEERE
WORLDWIDE COMMERCIAL & CONSUMER EQUIPMENT DIVISION

1829

Sprayer Attachment for ProGator HD200 and HD300

TM1829 DECEMBER 2004

TECHNICAL MANUAL

JOHN DEERE

North American Version
Litho in U.S.A.

INTRODUCTION

Manual Description

This technical manual is written for an experienced technician and contains sections that are specifically for this product. It is a part of a total product support program.

The manual is organized so that all the information on a particular system is kept together. The order of grouping is as follows:

- Table of Contents
- Specifications and Information
- Identification Numbers
- Tools and Materials
- Component Location
- Schematics and Harnesses
- Theory of Operation
- Operation and Diagnostics
- Diagnostics
- Tests and Adjustments
- Repair
- Other

NOTE: Depending on the particular section or system being covered, not all of the above groups may be used.

The bleed tabs for the pages of each section will align with the sections listed on this page. Page numbering is consecutive from the beginning of the Safety section through the last section.

We appreciate your input on this manual. If you find any errors or want to comment on the layout of the manual please contact us.

Safety

Specifications and Information

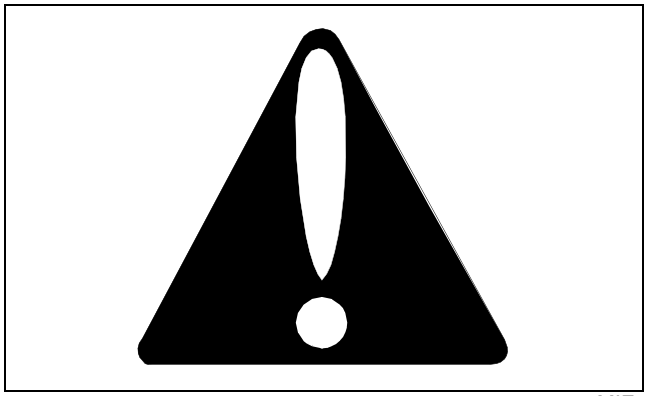
Electrical

Pump

Sprayer

Miscellaneous

Recognize Safety Information



MIF

This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

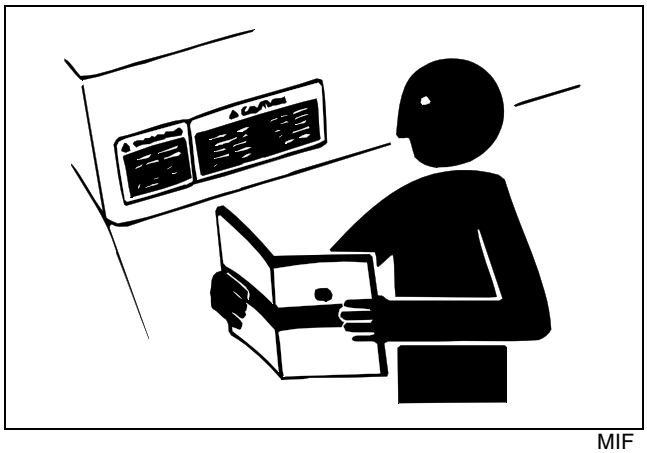
Follow recommended precautions and safe servicing practices.

Understand Signal Words

A signal word - DANGER, WARNING, or CAUTIon - is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTIon safety signs. CAUTIon also calls attention to safety messages in this manual.

Replace Safety Signs



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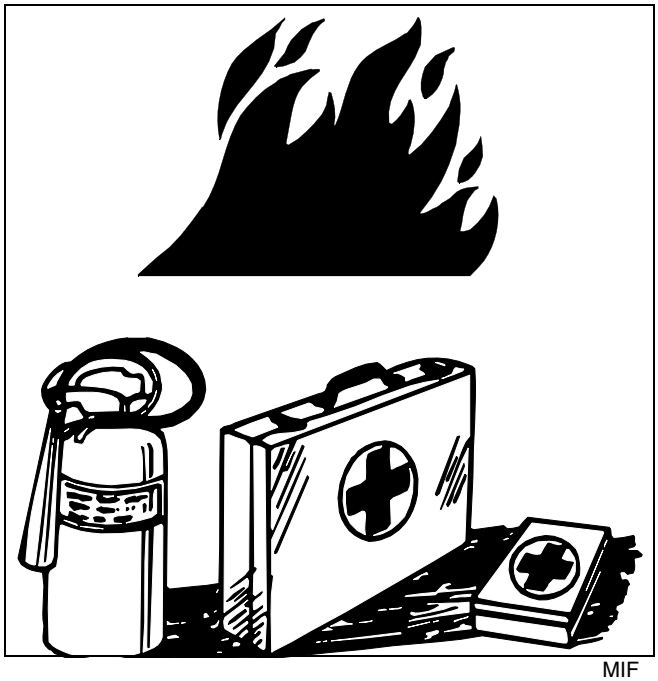
Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

Handle Fluids Safely - Avoid Fires

Be Prepared For Emergencies



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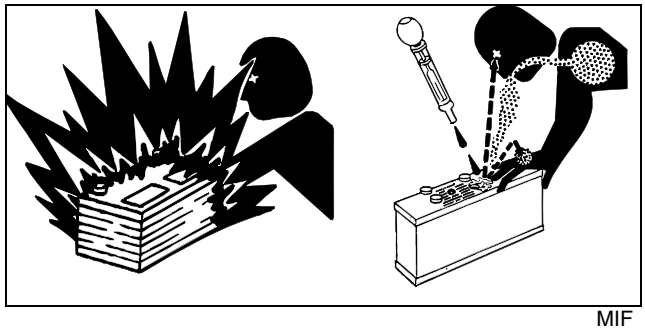
- When you work around fuel, do not smoke or work near heaters or other fire hazards.
- Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.
- Make sure machine is clean of trash, grease, and debris.
- Do not store oily rags; they can ignite and burn spontaneously.
- Be prepared if a fire starts.
- Keep a first aid kit and fire extinguisher handy.
- Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.

Use Care In Handling and Servicing Batteries



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Prevent Battery Explosions

- Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.
- Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.
- Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

Prevent Acid Burns

- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid acid burns by:

1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

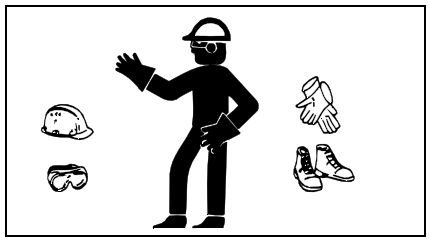
If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 10 - 15 minutes.
4. Get medical attention immediately.

If acid is swallowed:

1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.

Wear Protective Clothing



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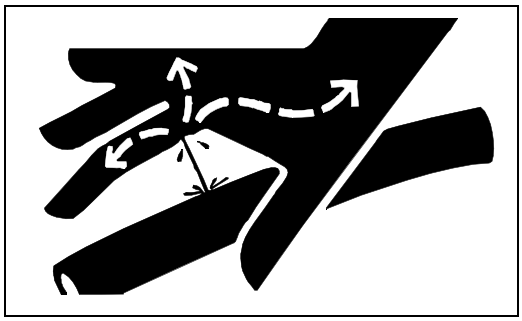
Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

Use Care Around High-Pressure Fluid Lines

Avoid High-Pressure Fluids



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Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid injury from escaping fluid under pressure by stopping the engine and relieving pressure in the system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

Avoid Heating Near Pressurized Fluid Lines

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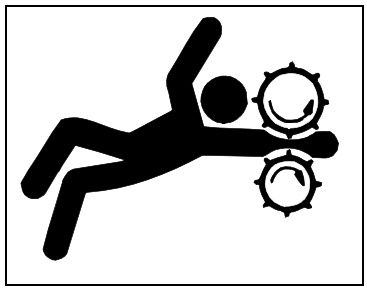
Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area.

Service Machines Safely



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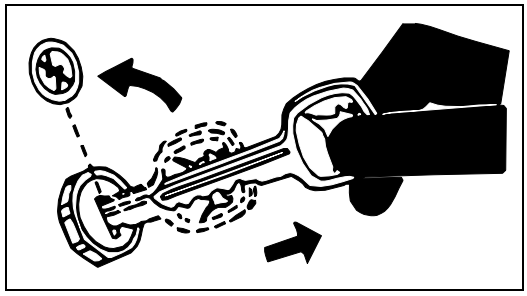
Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards. Use power tools only to loosen threaded parts and fasteners. For loosening and tightening hardware, use the correct size tools. Do not use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

Park Machine Safely



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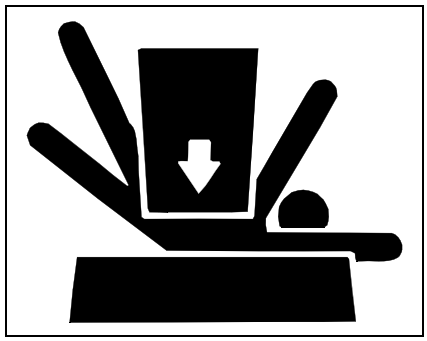
Before working on the machine:

1. Lower all equipment to the ground.
2. Stop the engine and remove the key.
3. Disconnect the battery ground strap.
4. Hang a “Do Not Operate” tag in operator station.

Support Machine Properly and Use Proper Lifting Equipment



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If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

Lifting heavy components incorrectly can cause severe injury or machine damage. Follow recommended procedure for removal and installation of components in the manual.

Work In Clean Area

Before starting a job:

1. Clean work area and machine.
2. Make sure you have all necessary tools to do your job.
3. Have the right parts on hand.
4. Read all instructions thoroughly; do not attempt shortcuts.

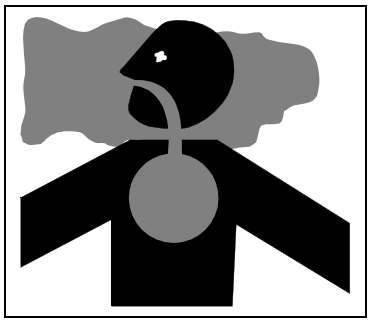
Using High Pressure Washers

Directing pressurized water at electronic/electrical components or connectors, bearings, hydraulic seals, fuel injection pumps or other sensitive parts and components may cause product malfunctions. Reduce pressure and spray at a 45 to 90 degree angle.

Illuminate Work Area Safely

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

Work In Ventilated Area



MIF

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

Warning: California Proposition 65 Warning

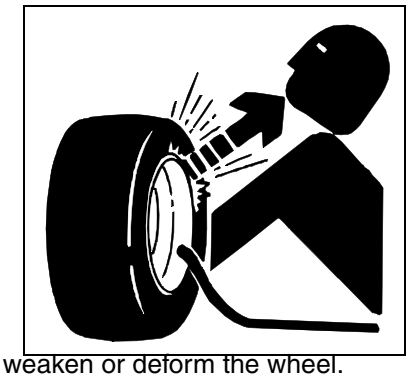
Gasoline engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Remove Paint Before Welding or Heating

Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. Do all work outside or in a well ventilated area. Dispose of paint and solvent properly. Remove paint before welding or heating: If you sand or grind paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

Service Tires Safely



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Explosive separation of a tire and rim parts can cause serious injury or death.

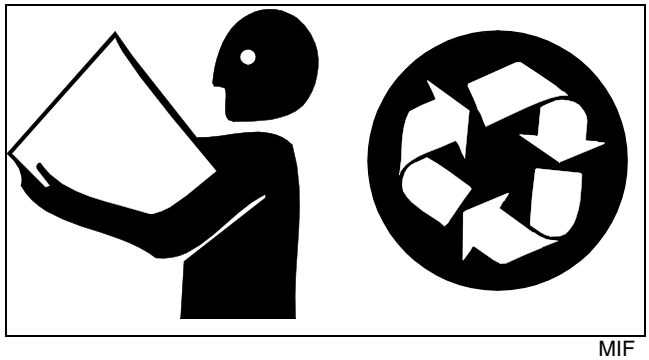
Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and not in front of or over the tire assembly. Use a safety cage if available.

Check wheels for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.

Handle Chemical Products Safely



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Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

It is best to wear full cover clothing and always wear protective goggles and rubber gloves to protect yourself while handling chemicals or using sprayer unit.

Prohibit all smoking, drinking and eating food in chemical-handling area.

Decontaminate all spraying equipment before servicing. Decontamination should be done in a safe area by washing with water, neutralization, or by means recommended by the manufacturer of the chemical last used.

Spray solutions or vapors may be extremely dangerous. Treat all spray chemicals, solutions, or solution residues with great caution. Don't take chances. When in doubt, proceed as though contamination is present.

Keep spray material from contacting your skin. If spray material contacts skin, wash off immediately with clean water and detergent or follow the instructions of manufacturer of chemical last used.

Dispose Of Waste Properly

Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries. Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them. Do not pour waste onto the ground, down a drain, or into any water source. Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.

Live With Safety

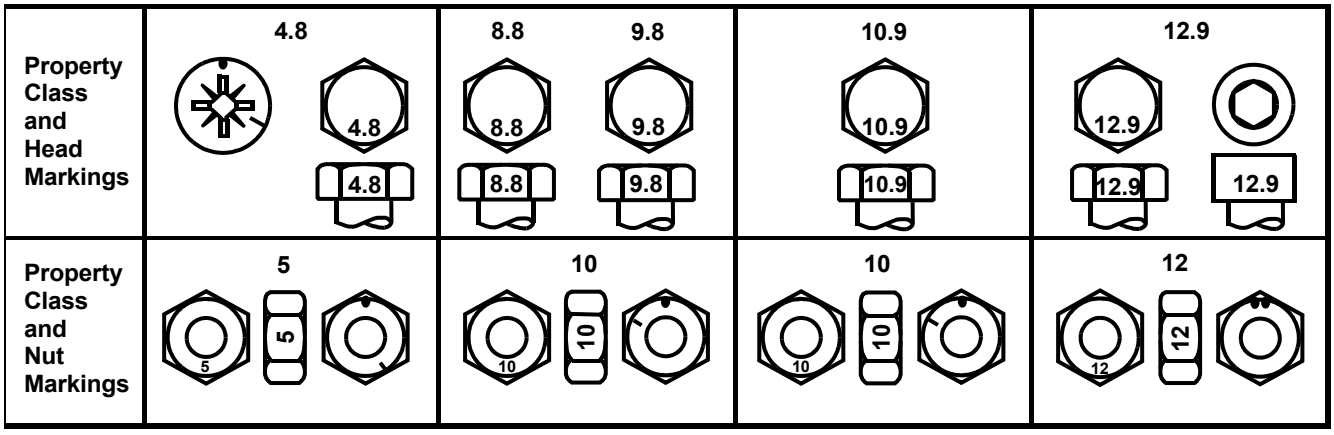
MIF

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

Table of Contents

General Specifications

Metric Fastener Torque Values



	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
SIZE	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

- Do not use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ± 10% variance factor. Check tightness of fasteners periodically. Do not use air powered wrenches.
- Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.
- Fasteners should be replaced with the same class. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.
- When bolt and nut combination fasteners are used, torque values should be applied to the nut instead of the bolt head.
- Tighten toothed or serrated-type lock nuts to the full torque value.

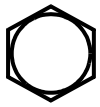
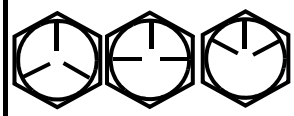
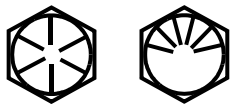
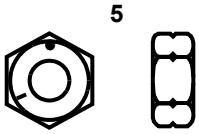
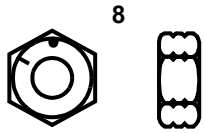
[a] **"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated (yellow dichromate - Specification JDS117) without any lubrication.**

Reference: JDS-200

Metric Fastener Torque Values - Grade 7

Size	Steel or Gray Iron Torque	Aluminum Torque
	N•m (lb-ft)	N•m (lb-ft)
M6	11 (8)	8 (6)
M8	24 (18)	19 (14)
M10	52 (38)	41 (30)
M12	88 (65)	70 (52)
M14	138 (102)	111 (82)
M16	224 (165)	179 (132)

Inch Fastener Torque Values

SAE Grade and Head Markings	**No Marks**  **1 or 2[b]**	 **5 5.1 5.2**	 **8 8.2**
SAE Grade and Nut Markings	**No Marks**  **2**	 **5**	 **8**

	Grade 1				Grade 2[b]				Grade 5, 5.1 or 5.2				Grade 8 or 8.2			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
SIZE	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	215	160	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	470	300	510	375	470	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

- Do not use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ± 10% variance factor. Check tightness of fasteners periodically. Do not use air powered wrenches.
- Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.
- Fasteners should be replaced with the same class. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.
- When bolt and nut combination fasteners are used, torque values should be applied to the nut instead of the bolt head.
- Tighten toothed or serrated-type lock nuts to the full torque value.

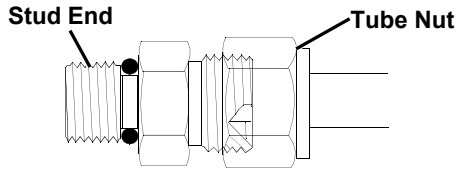
[a] **"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated (yellow dichromate - Specification JDS117) without any lubrication.**

[b] **"Grade 2" applies for hex cap screws (not hex bolts) up to 152 mm (6 in.) long "Grade 1" applies for hex cap screws over 152 mm (6 in.) long, and for all other types of bolts and screws of any length.**

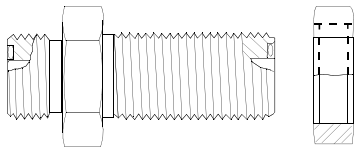
Reference: JDS-G200

O-Ring Seal Service Recommendations

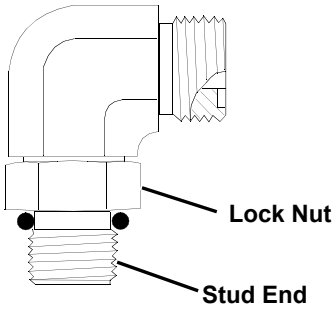
Face Seal Fittings with Inch Stud Ends Torque



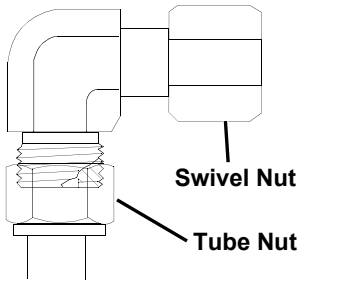
Straight Stud and Tube Nut



Bulkhead Union and Bulkhead Lock Nut



90° Adjustable Stud Elbow



90° Swivel Elbow and Tube Nut

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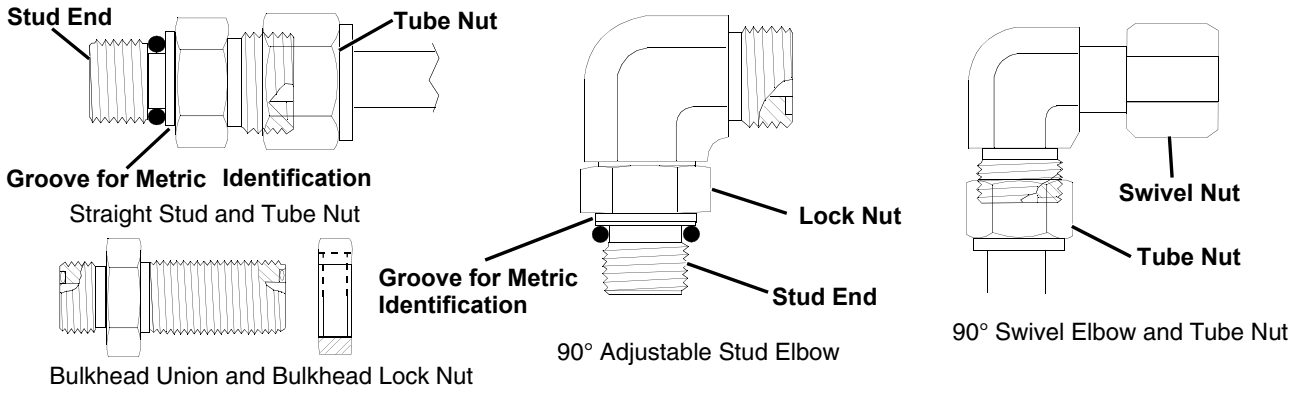
Nominal Tube OD/Hose ID				Face Seal Tube/Hose End					O-Ring Stud Ends		
Metric Tube OD	Inch Tube OD			Thread Size	Tube Nut/ Swivel Nut Torque		Bulkhead Lock Nut Torque		Thread Size	Straight Fitting or Lock Nut Torque	
mm	Dash Size	in.	mm	in.	N•m	lb-ft	N•m	lb-ft	in.	N•m	lb-ft
	-3	0.188	4.76						3/8-24	8	6
6	-4	0.250	6.35	9/16-18	16	12	12	9	7/16-20	12	9
8	-5	0.312	7.94						1/2-20	16	12
10	-6	0.375	9.52	11/16-16	24	18	24	18	9/16-18	24	18
12	-8	0.500	12.70	13/16-16	50	37	46	34	3/4-16	46	34
16	-10	0.625	15.88	1-14	69	51	62	46	7/8-14	62	46
	-12	0.750	19.05	1-3/16-12	102	75	102	75	1-1/16-12	102	75
22	-14	0.875	22.22	1-3/16-12	102	75	102	75	1-3/16-12	122	90
25	-16	1.000	25.40	1-7/16-12	142	105	142	105	1-5/16-12	142	105
32	-20	1.25	31.75	1-11/16-12	190	140	190	140	1-5/8-12	190	140
38	-24	1.50	38.10	2-12	217	160	217	160	1-7/8-12	217	160

NOTE: Torque tolerance is +15%, -20%

Face Seal Fittings with Metric Stud Ends Torque

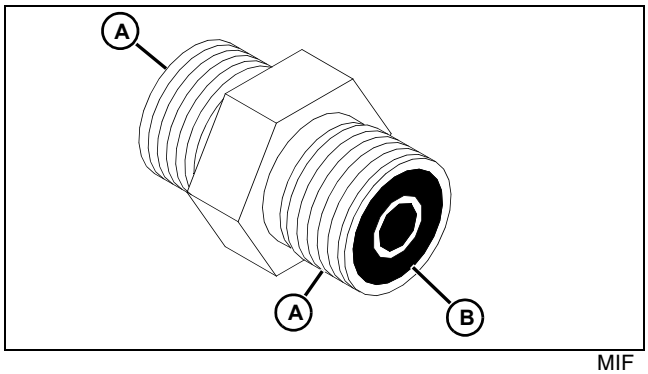


MIF

Nominal Tube OD/Hose ID				Face Seal Tube/Hose End						O-Ring Stud Ends, Straight Fitting or Lock Nut					
Metric Tube OD	Inch Tube OD			Thread Size	Hex Size	Tube Nut/ Swivel Nut Torque		Bulkhead Lock Nut Torque		Thread Size	Hex Size	Steel or Gray Iron Torque		Aluminum Torque	
mm	Dash Size	in.	mm	in.	mm	N•m	lb-ft	N•m	lb-ft	mm	mm	N•m	lb-ft	N•m	lb-ft
6	-4	0.250	6.35	9/16-18	17	16	12	12	9	M12X1.5	17	21	15.5	9	6.6
8	-5	0.312	7.94												
										M14X1.5	19	33	24	15	11
10	-6	0.375	9.52	11/16-16	22	24	18	24	18	M16X1.5	22	41	30	18	13
12	-8	0.500	12.70	13/16-16	24	50	37	46	34	M18X1.5	24	50	37	21	15
16	-10	0.625	15.88	1-14	30	69	51	62	46	M22X1.5	27	69	51	28	21
	-12	0.750	19.05	1-3/16-12	36	102	75	102	75	M27X2	32	102	75	46	34
22	-14	0.875	22.22	1-3/16-12	36	102	75	102	75	M30X2	36				
25	-16	1.000	25.40	1-7/16-12	41	142	105	142	105	M33X2	41	158	116	71	52
28										M38X2	46	176	130	79	58
32	-20	1.25	31.75	1-11/16-12	50	190	140	190	140	M42X2	50	190	140	85	63
38	-24	1.50	38.10	2-12	60	217	160	217	160	M48X2	55	217	160	98	72

NOTE: Torque tolerance is +15%, -20%

O-Ring Face Seal Fittings



MIF

1. Inspect the fitting sealing surfaces (A). They must be free of dirt or defects.

2. Inspect the O-ring (B). It must be free of damage or defects.

3. Lubricate O-rings and install into groove using petroleum jelly to hold in place.

4. Push O-ring into the groove with plenty of petroleum jelly so O-ring is not displaced during assembly.

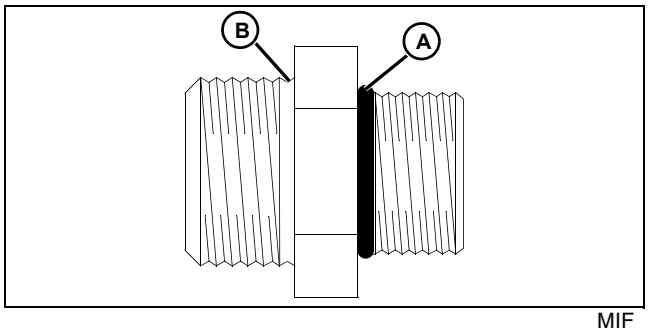
5. Index angle fittings and tighten by hand-pressing joint together to ensure O-ring remains in place.

IMPORTANT: Avoid damage! Do not allow hoses to twist when tightening fittings. Use two wrenches to tighten hose connections; one to hold the hose, and the other to tighten the swivel fitting.

6. Tighten fitting or nut to torque value shown on the chart per dash size stamped on the fitting.

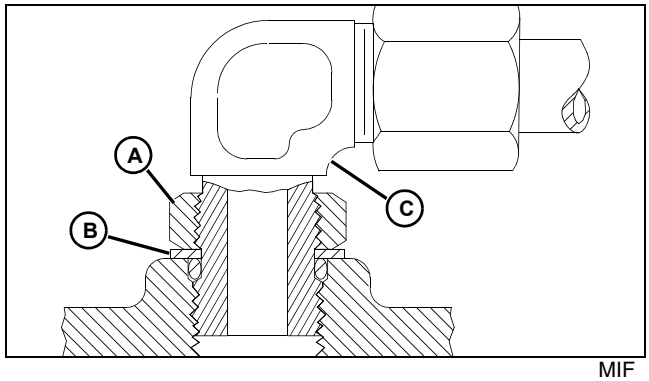
O-Ring Boss Fittings

1. Inspect boss O-ring boss seat. It must be free of dirt and defects. If repeated leaks occur, inspect for defects with a magnifying glass. Some raised defects can be removed with a slip stone.



MIF

2. Put hydraulic oil or petroleum jelly on the O-ring (A). Place electrical tape over the threads to protect O-ring from nicks. Slide O-ring over the tape and into the groove (B) of fitting. Remove tape.



MIF

3. For angle fittings, loosen special nut (A) and push special washer (B) against threads so O-ring can be installed into the groove of fitting.

4. Turn fitting into the boss by hand until special washer or washer face (straight fitting) contacts boss face and O-ring is squeezed into its seat.

5. To position angle fittings (C), turn the fitting counter-clockwise a maximum of one turn.

6. Tighten straight fittings to torque value shown on chart. For angle fittings, tighten the special nut to value shown in the chart while holding body of fitting with a wrench.

Thread Size	Torque[a]		Number of Flats[b]
	N•m	lb-ft	
3/8-24 UNF	8	6	2
7/16-20 UNF	12	9	2
1/2-20 UNF	16	12	2
9/16-18 UNF	24	18	2
3/4-16 UNF	46	34	2
7/8-14 UNF	62	46	1-1/2
1-1/16-12 UN	102	75	1
1-3/16-12 UN	122	90	1
1-5/16-12 UN	142	105	3/4
1-5/8-12 UN	190	140	3/4
1-7/8-12 UN	217	160	1/2

[a]Torque tolerance is ± 10 percent.

[b]To be used if a torque wrench cannot be used. After tightening fitting by hand, put a mark on nut or boss; then tighten special nut or straight fitting the number of flats shown.

Oil and Lubricant Specifications

Hydraulic Oil

Use the appropriate oil viscosity based on these air temperature ranges. Operating outside of these recommended oil air temperature ranges may cause premature hydrostatic transmission or hydraulic system failures.

IMPORTANT: Avoid damage! Mixing of LOW VISCOSITY HY - GARD® and HY - GARD® oils is permitted. DO NOT mix any other oils in this transmission. DO NOT use engine oil or "Type F" (Red) Automatic Transmission Fluid.

The following John Deere transmission and hydraulic oil is **PREFERRED**:

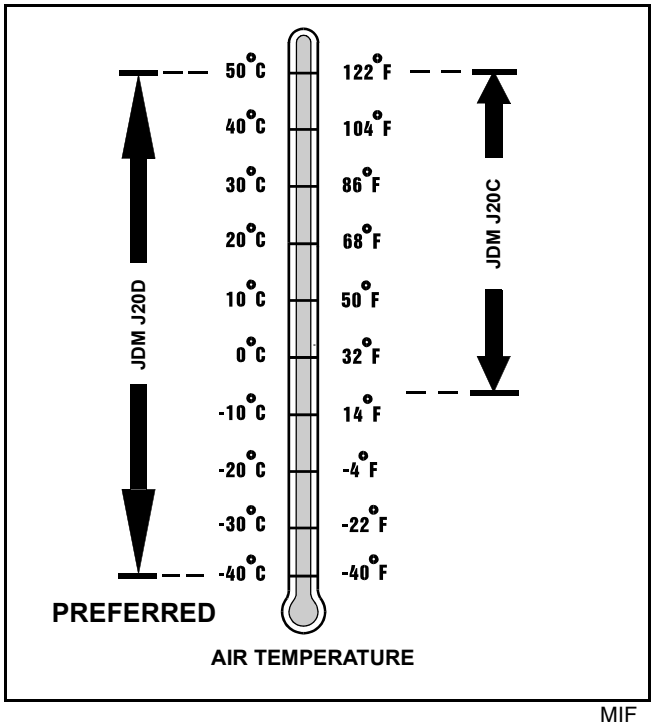
- **LOW VISCOSITY HY - GARD® - JDM J20D**.

The following John Deere oil is also recommended if above preferred oil is not available:

- **HY - GARD® - JDM J20C.**

Other oils may be used if above recommended John Deere oils are not available, provided they meet one of the following specifications:

- John Deere Standard JDM J20D;
- John Deere Standard JDM J20C.



MIF

Anti-Corrosion Grease

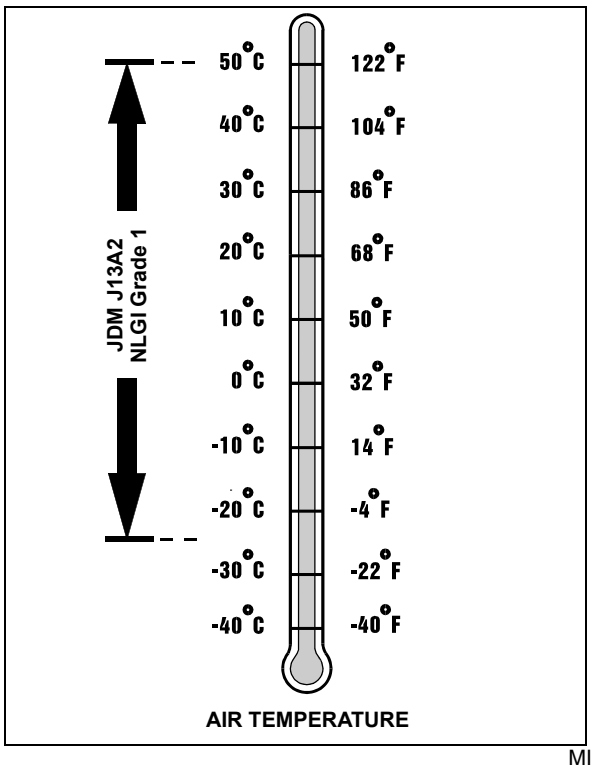
This anti-corrosion grease is formulated to provide the best protection against absorbing moisture, which is one of the major causes of corrosion. This grease is also superior in its resistance to separation and migration.

The following anti-corrosion grease is **preferred:**

- **MOLY HIGH-TEMPERATURE EP GREASE® - JDM J25C, NLGI Grade 2**
- **HIGH-TEMPERATURE EP GREASE® - JDM J13E4, NLGI Grade 2**
- **GREASE–GARD™ - JDM J25C, NLGI Grade 2**

Other greases may be used if they meet or exceed the following specification:

- John Deere Standard JDM J13A2, NLGI Grade 1.



MIF

Alternative Lubricants

Use of alternative lubricants could cause reduced life of the component.

If alternative lubricants are to be used, it is recommended that the factory fill be thoroughly removed before switching to any alternative lubricant.

Synthetic Lubricants

Synthetic lubricants may be used in John Deere equipment if they meet the applicable performance requirements (industry classification and/or military specification) as shown in this manual.

The recommended air temperature limits and service or lubricant change intervals should be maintained as shown in the operator's manual, unless otherwise stated on lubricant label.

Avoid mixing different brands, grades, or types of oil. Oil manufacturers blend additives in their oils to meet certain specifications and performance requirements. Mixing different oils can interfere with the proper functioning of these additives and degrade lubricant performance.

Lubricant Storage

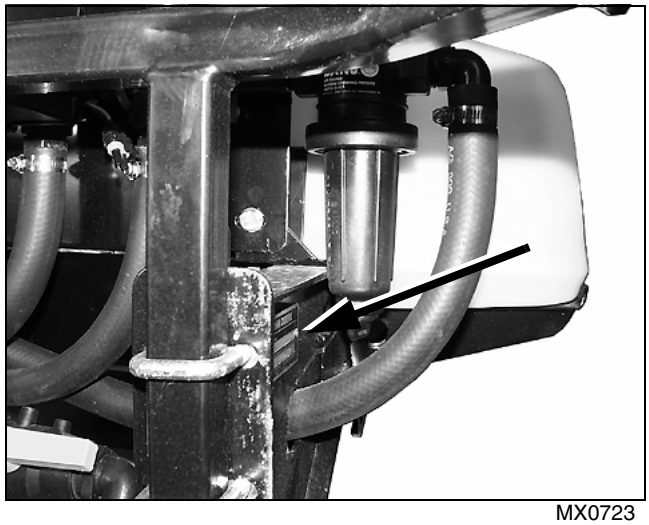
All machines operate at top efficiency only when clean lubricants are used. Use clean storage containers to handle all lubricants. Store them in an area protected from dust, moisture, and other contamination. Store drums on their sides. Make sure all containers are properly marked as to their contents. Dispose of all old, used containers and their contents properly.

Mixing of Lubricants

In general, avoid mixing different brands or types of lubricants. Manufacturers blend additives in their lubricants to meet certain specifications and performance requirements. Mixing different lubricants can interfere with the proper functioning of these additives and lubricant properties which will downgrade their intended specified performance.

Serial Number Locations

Machine Identification Number



MX0723

Picture Note: HD200 Sprayer Shown

The machine identification number is located on the rear frame plate.

ELECTRICAL TABLE OF CONTENTS

Table of Contents

General Information

Reading Electrical Schematics

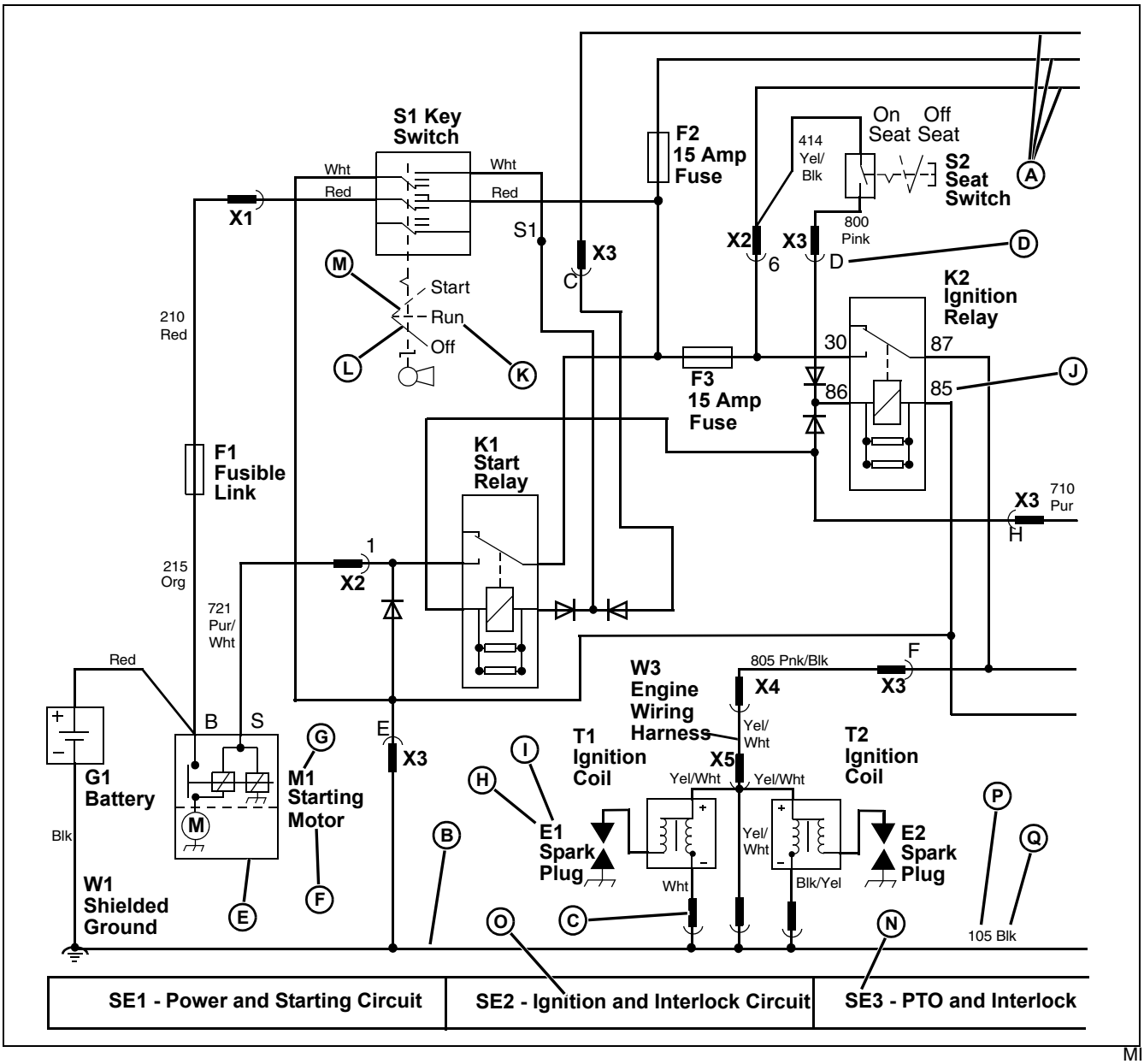
The schematic is made up of individual circuits laid out in a sequence of related functions. It is formatted with all power wires (A) across the top and all ground wires (B) across the bottom. Current flow is generally from top to bottom through each circuit and component. All components are shown in the off position. The diagram does not list connector (C) information unless needed to avoid confusion. If the connector is shown, the number next to it is the terminal pin location (D) in the connector.

Each component is shown by a symbol (E), its name (F), and an identification code (G). The identification code contains a device identifying letter (H) and number (I).

The identifying letter is always the same for a specific component, but the identifying numbers are numbered consecutively from upper left to lower right. The terminal designation (J) is placed directly outside the symbol next to the connecting wire path. Switch positions (K) are also placed directly outside the symbol. The solid line (L) shows the position the switch is currently in and dash lines (M) represent other switch positions.

Each circuit is identified at the bottom of the drawing by a section number (N) and section name (O).

The circuit number (P) and wire color (Q) of the wires are shown directly next to the wire path.



MIF

The same component name and identification code are used consistently on all diagrams in this section. Components can be easily cross-referenced.

Theory Of Operation Information

The theory of operation stories divide the electrical system into individual circuits by function. Each circuit is isolated from the main wiring schematic and only shows the components that are used in it. The story contains information on function, operating conditions, and theory of operation. The circuit schematics are drawn with the components in the operating position, with the power, or battery positive, into them across the top and the ground, or battery negative, across the bottom.

Diagnostic Information

The diagnostic procedure is used to test the complete circuit regardless of the problem or complaint. Select a symptom or system from the quick check or troubleshooting chart and follow the test procedures under that heading.

The diagnostic procedure lists:

- Test conditions
- Test sequence
- Test location
- Normal reading
- Check or test to perform if reading is not normal

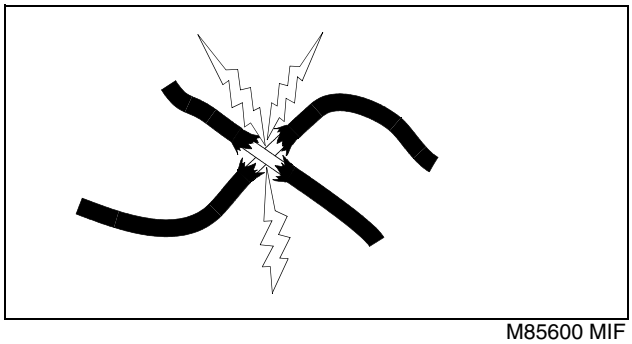
When performing the test or check, be sure to set your machine up to the TEST POINT/PROCEDURES listed in the first column and follow the sequence carefully. The middle RESULTS column gives the reading or condition that should be obtained in **BOLD** print. If the results of the test or check are not normal, perform the test, check, or adjustment listed below the **BOLD** print. The system diagram that accompanies each test procedure is drawn to resemble machine components. The leader line points to the exact point the test is to be made.

Wire Color Abbreviation Chart

Blk . . . . . Black
Blu . . . . . Blue
Brn . . . . . Brown
Grn . . . . . Green
Gry . . . . . Gray
Org . . . . . Orange
Pnk . . . . . Pink
Pur . . . . . Purple
Red . . . . . Red
Tan . . . . . Tan
Wht . . . . . White
Yel . . . . . Yellow
Blk/Wht . . . . . Black/White
Blu/Wht . . . . . Blue/White
Brn/Wht . . . . . Brown/White
Brn/Yel . . . . . Brown/Yellow
Dk Blu . . . . . Dark Blue
Dk Brn/Lt Grn . . . . . Dark Brown/Light Green
Dk Brn/Red . . . . . Dark Brown/Red
Dk Brn/Yel . . . . . Dark Brown/Yellow
Dk Grn . . . . . Dark Green
Lt Blue . . . . . Light Blue
Lt Grn . . . . . Light Green
Org/Wht . . . . . Orange/White
Pnk/Blk . . . . . Pink/Black
Pur/Wht . . . . . Purple/White
Red/Blk . . . . . Red/Black
Red/Wht . . . . . Red/White
Wht/Blk . . . . . White/Black
Wht/Red . . . . . White/Red
Yel/Blk . . . . . Yellow/Black
Yel/Red . . . . . Yellow/Red
Yel/Wht . . . . . Yellow/White

Common Circuit Tests

Shorted Circuit:



M85600 MIF

A shorted circuit may result in the wrong component operating (i.e. improper wire-to-wire contact). To test for a shorted or improperly wired circuit:

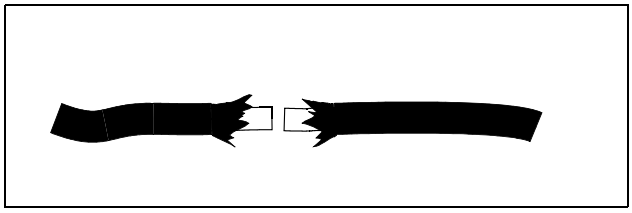
1. Turn component switch on.

2. Start at the controlling switch of the component that should not be operating.

3. Follow the circuit and disconnect wires at connectors until component stops operating.

4. Shorted or improper connections will be the last two wires disconnected.

High Resistance or Open Circuit:



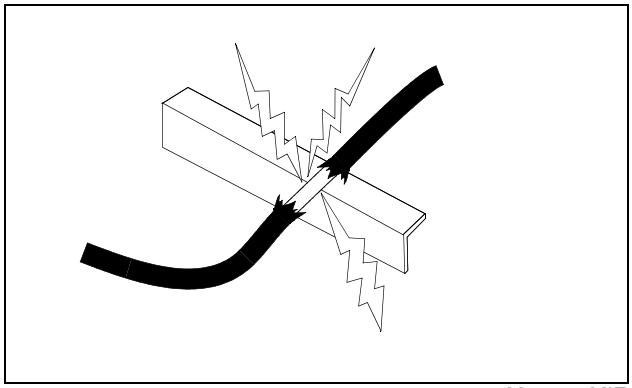
M85601 MIF

High resistance or open circuits usually result in slow, dim or no component operation (i.e. poor, corroded, or disconnected connections). Voltage at the component will be low when the component is in operation. To test for high resistance and open circuits:

1. Check all terminals and grounds of the circuit for corrosion.

2. If terminals are not corroded or loose, the problem is in the component or wiring.

Grounded Circuit:



M85602 MIF

Grounded circuits usually result in no component operation or a blown fuse.

Conductors For 12 Volt Circuits

Stranded Conductors For 12 Volt Circuits						
SAE Wire Size (Gauge)	20	18	16	14	12	10
Metric Wire Size (mm)	0.5	0.8	1.0	2.0	3.0	5.0
Typical Stranding	7 X 28	16 X 30	19 X 29	19 X 27	19 X 25	19 X 23
Minimum Conductor Area In Circular Mils	1072	1537	2336	3702	5833	9343

Specifications

General Specifications

Operating Voltage	**12 VDC**
Main Fuse	**40-amp Circuit Breaker (Automatic-Reset)**
Boom Valve Circuit Fuse	**15 Amp**
Boom Valve Fuse	**Current Limiting Breaker (Re-settable)**
Boom Actuator Fuse (SN -35000)	**30 amp**
Boom Actuator Fuse (SN 35001-)	**20 amp**
ARC/GPS Option Fuse	**5 amp**
Foam Marker Option Fuse	**15 amp**
Hose Reel Option Fuse (fuse or circuit breaker)	**40-amp**

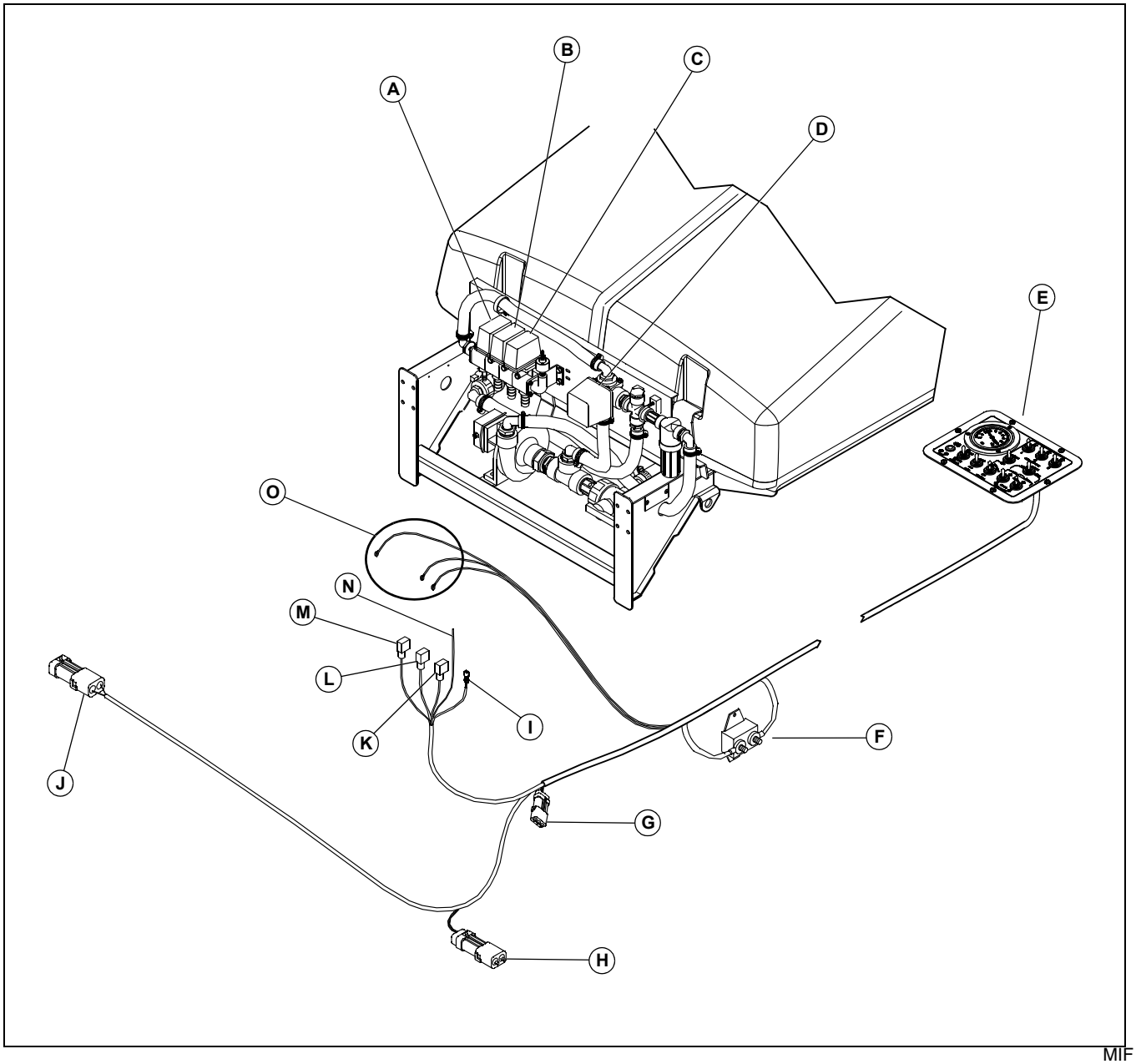
Torques Specifications

Boom Lift Actuator:

Gear Case Housing Cap Screws	**8 N•m (70 lb-in.)**
Gear Case Housing Screw	**2.3 N•m (20 lb-in.)**
Motor Mounting Nuts	**8 N•m (70 lb-in.)**

Component Location

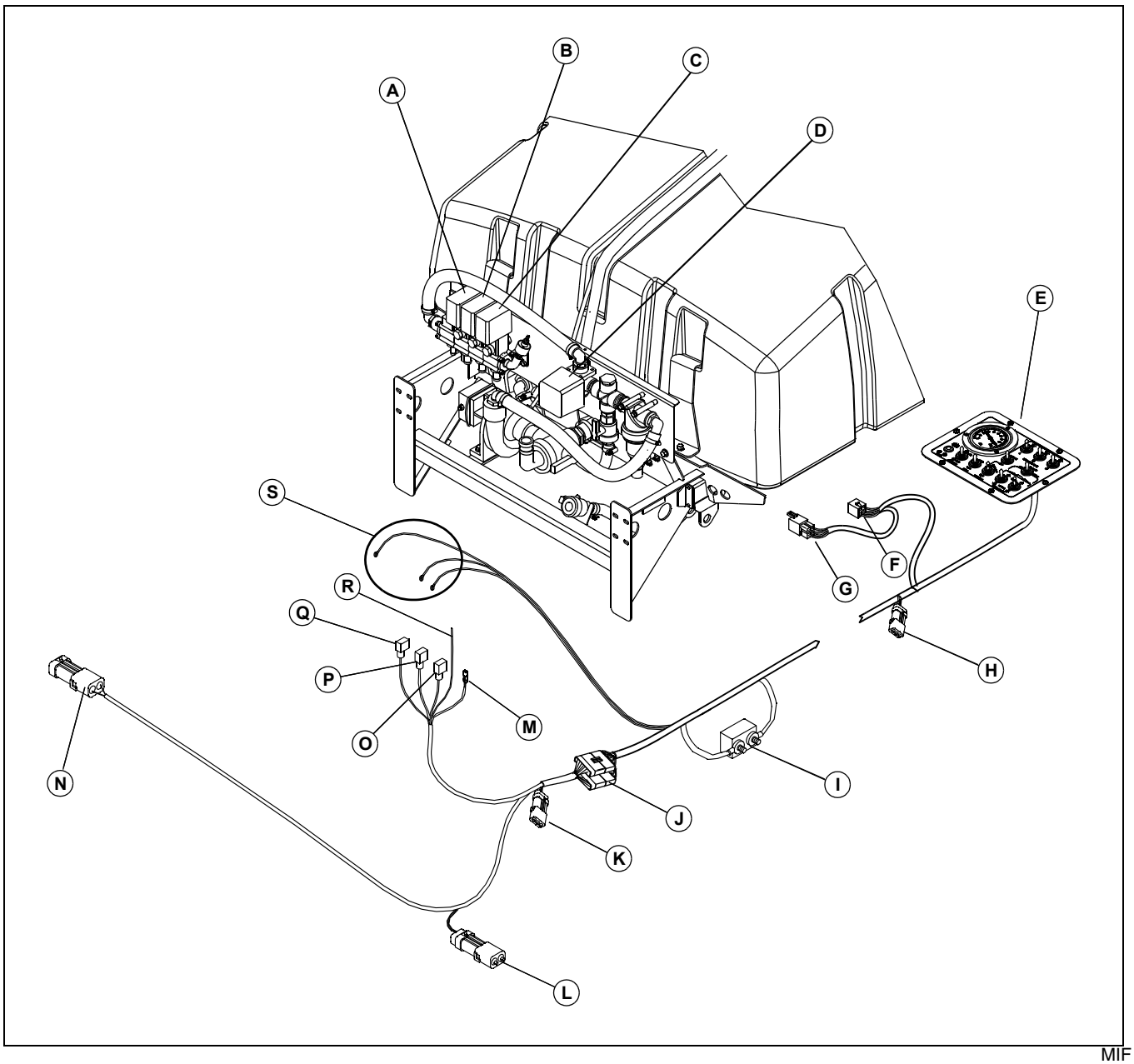
Electrical Components - HD200 (SN -035000)



MIF

A - Left Boom Regulator Valve
B - Center Boom Regulator Valve
C - Right Boom Regulator Valve
D - Pump Pressure Regulator
E - Control Panel
F - F1 Circuit Breaker 50 Amp
G - X12 to X11
H - X5 to M2 Right Boom Actuator Motor
I - X2 to Pump Pressure Regulator
J - X4 to M1 Left Boom Actuator
K - X9 to Right Boom Regulator Valve
L - X8 to Center Boom Regulator Valve
M - X7 to Left Boom Regulator Valve
N - Tubing
O - Battery Connections

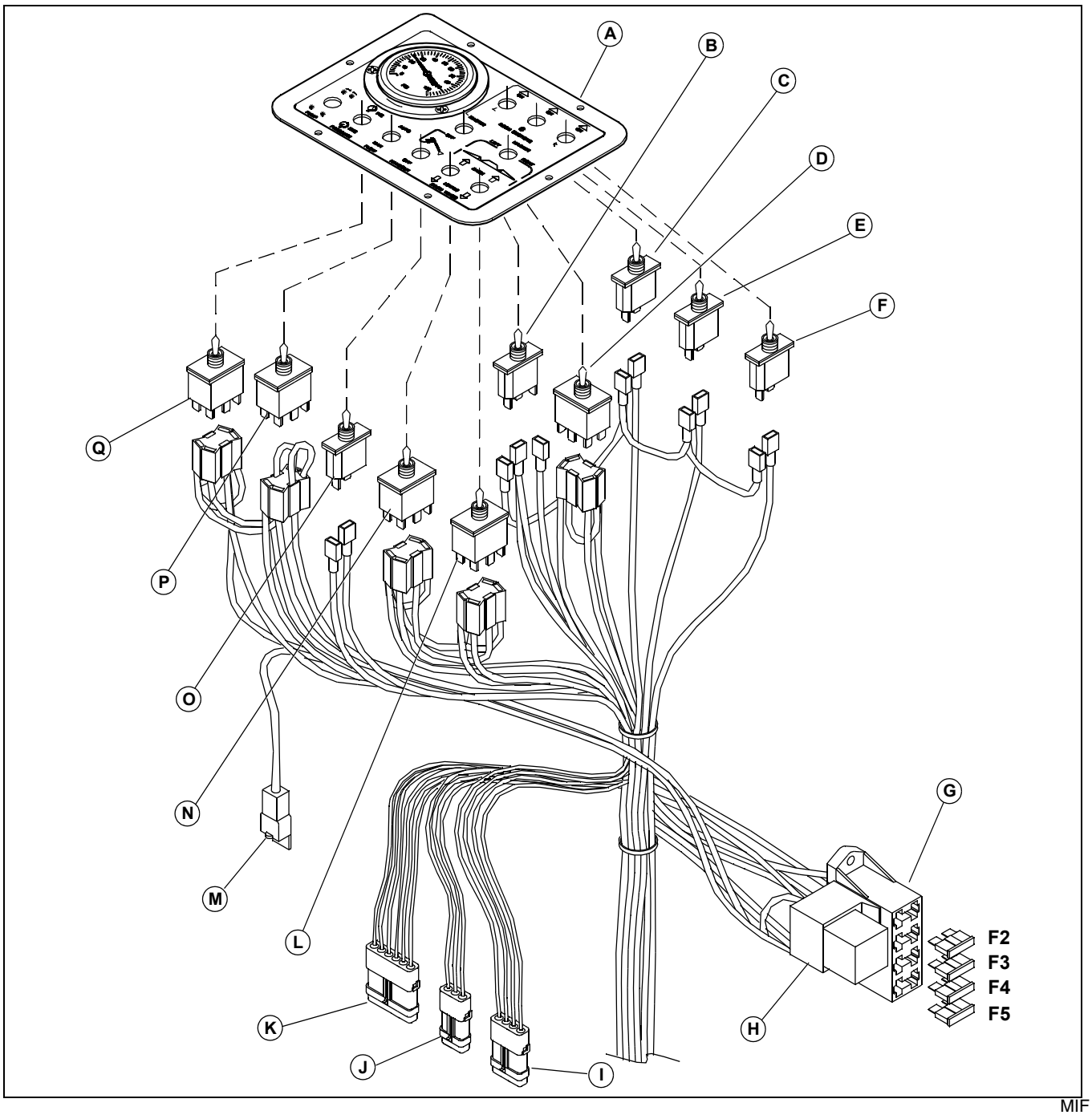
Electrical Components - HD200 (SN 035001-) and HD300



MIF

A - Left Boom Regulator Valve
B - Center Boom Regulator Valve
C - Right Boom Regulator Valve
D - Pump Pressure Regulator
E - Control Panel
F - X19 PTO Connector
G - X20 PTO Connector
H - Hose Reel Connector
I - F1 Circuit Breaker 40 Amp
J - X15 and X16 Front to Rear Wiring Harness Connectors
K - X12 to X11
L - X5 to M2 Right Boom Actuator Motor
M - X2 to Pump Pressure Regulator
N - X4 to M1 Left Boom Actuator
O - X9 to Right Boom Regulator Valve
P - X8 to Center Boom Regulator Valve
Q - X7 to Left Boom Regulator Valve
R - Tubing
S - Battery Connections

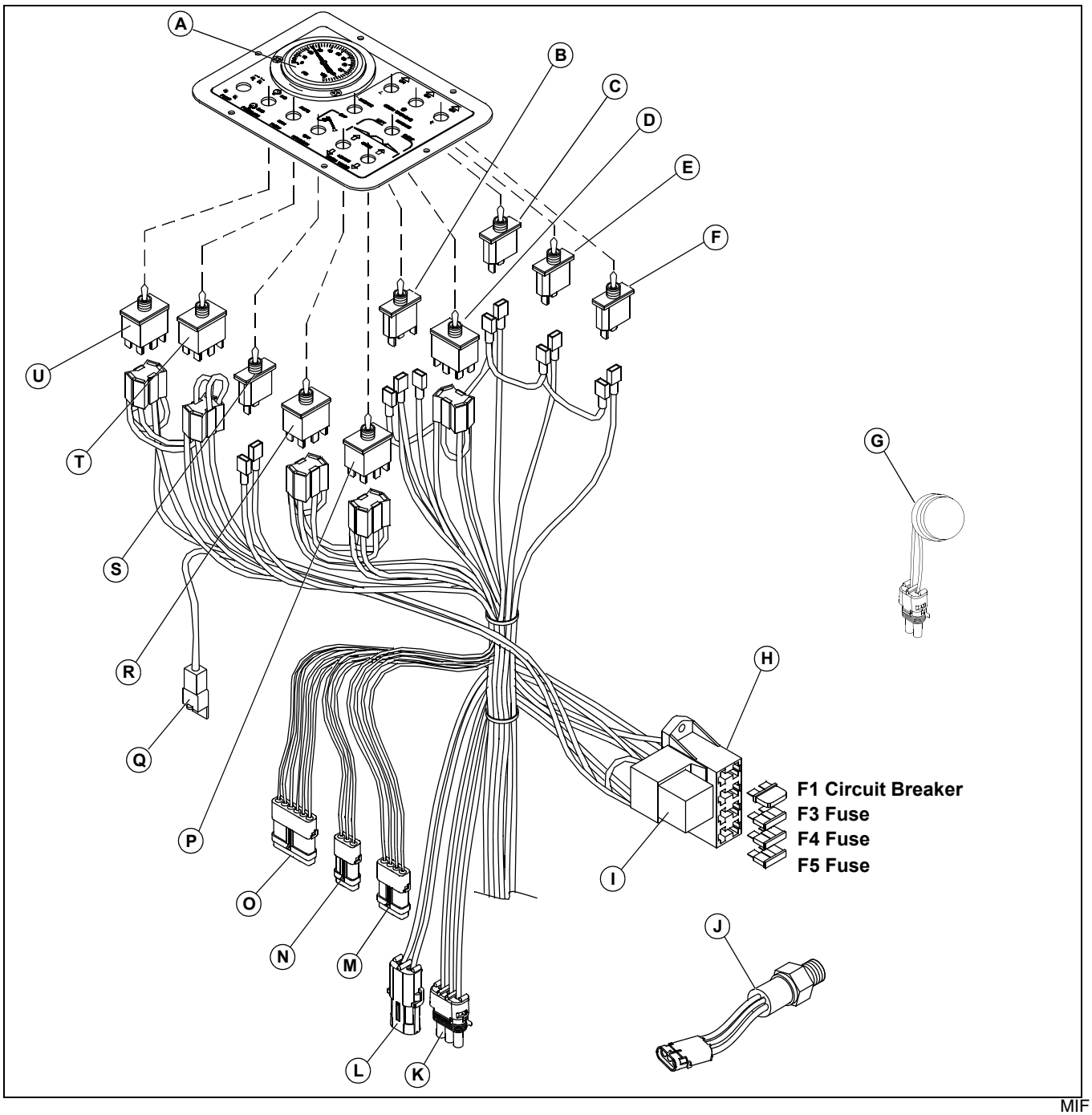
Control Panel Components - HD200 (SN -035000)



MIF

A - Pressure Gauge
B - S6 Master Boom On/Off Switch
C - S7 Left Boom On/Off Switch
D - S10 Foam Marker Switch
E - S8 Center Boom On/Off Switch
F - S9 Right Boom On/Off Switch
G - Fuse Block
H - K1 Main Disconnect Relay
I - X10 to Handgun (Option)
J - X3 (Reserved - Optional Equipment)
K - X11 to X12 (Reserved - Optional Equipment)
L - S5 Right Boom Raise/Lower Switch
M - S11 Handgun On/Off Switch
N - S4 Left Boom Raise/Lower Switch
O - S11 Handgun On/Off Switch
P - S3 Flow Auto/Man Switch
Q - S2 Pressure Inc/Off/Dec Switch

Control Panel Components - HD200 (SN 035001-) and HD300



MIF

A - Pressure Gauge
B - S6 Master Boom On/Off Switch
C - S7 Left Boom On/Off Switch
D - S10 Foam Marker Switch
E - S8 Center Boom On/Off Switch
F - S9 Right Boom On/Off Switch
G - H1 Low Pressure Buzzer
H - Fuse Block
I - K1 Main Disconnect Relay
J - B1 Pressure Sensor Switch
K - X18 to B1 Pressure Sensor Switch
L - X17 to H1 Buzzer
M - X10 to Handgun (Option)
N - X3 (Reserved - Optional Equipment)
O - X11 to X12 (Reserved - Optional Equipment)
P - S5 Right Boom Raise/Lower Switch
Q - S11 Handgun On/Off Switch
R - S4 Left Boom Raise/Lower Switch

S - S11 Handgun On/Off Switch

T - S3 Flow Auto/Man Switch

U - S2 Pressure Inc/Off/Dec Switch

Schematics and Harnesses

Electrical Schematic and Wiring Harness Legend

A1 - Speed Controller (SE3, W1)

A2 Time Delay Module (HD200 [SN 035001-] and HD300)

B1 - Pressure Sensor Switch (HD200 [SN 035001-] and HD300)

F1 - Circuit Breaker - 50 amp (SE1, W1)

F1 - Circuit Breaker - 40 amp (SE1, W1) (HD200 [SN 035001-] and HD300)

F2 - Fuse - 30A (SE1, W1) (SN -35000)

F2 - Circuit Breaker - 20A (SE1, W1) (HD200 [SN 035001-] and HD300)

F3 - Fuse - 5A (SE1, W1)

F4 - Fuse - 15A (SE1, W1)

F5 - Fuse - 15A (SE1, W1)

G1 - Battery (SE1, W1)

H1 - Buzzer (HD200 [SN 035001-] and HD300)

K1 - Main Disconnect Relay (SE1, W1)

K2 - Hose Reel Relay (SE4, W3)

K3 - Pressure Switch Relay (SE2, W1) (HD200 [SN 035001-] and HD300)

M1 - Left Boom Actuator Motor (SE2, W1)

M2 - Right Boom Actuator Motor (SE2, W1)

M3 - Foam Marker Air Pump Motor (SE3, W1)

M4 - Foam Marker Liquid Pump Motor (SE3, W1)

M5 - Hose Reel Rewind Motor (SE4, W3)

S1 - Vehicle Key Switch (SE1, W1)

S2 - Pressure Inc/Off/Dec Switch (SE1, W1)

S3 - Flow Auto/Man Switch (SE1, W1)

S4 - Left Boom Raise/Lower Switch (SE2, W1)

S5 - Right Boom Raise/Lower Switch (SE2, W1)

S6 - Master Boom On/Off Switch (SE2, W1)

S7 - Left Boom On/Off Switch (SE2, W1)

S8 - Center Boom On/Off Switch (SE2, W1)

S9 - Right Boom On/Off Switch (SE2, W1)

S10 - Foam Marker Switch (SE3, W1)

S11 - Handgun On/Off Switch (SE4, W1)

S12 - Hose Reel Switch (SE4, W3)

W1 - Battery Frame Ground (SE1, W1)

Y1 - Foam Marker Directional Solenoid (SE3, W1)

Connectors:

X1 - Vehicle S1 Key Switch to Sprayer W1 Main Wiring Harness (SE1, W1)

X2 - W1 Main Wiring Harness to Pressure Regulator (SE1, W1)

X3 - W1 Main Wiring Harness to Optional Equipment (*Reserved*) (SE1, W1)

X4 - W1 Main Wiring Harness to M1 Left Boom Actuator Motor (SE2, W1)

X5 - W1 Main Wiring Harness to M2 Right Boom Actuator Motor (SE2, W1)

X6 - W1 Main Wiring Harness to W2 Foam Marker Wiring Harness (SE2, W1)

X7 - W1 Main Wiring Harness to Left Boom Regulator Valve (SE3, W1)

X8 - W1 Main Wiring Harness to Center Boom Regulator Valve (SE3, W1)

X9 - W1 Main Wiring Harness to Right Boom Regulator Valve (SE3, W1)

X10 - W1 Main Wiring Harness to W3 Handgun (Optional) Wiring Harness (SE4, W1)

X11 - W2 Foam Marker Wiring Harness to M3 Air Pump Motor (SE3, W2)

X12 - W2 Foam Marker Wiring Harness to A1 Speed Controller (SE3, W2)

X13 - W2 Foam Marker Wiring Harness to M4 Liquid Pump Motor (SE3, W2)

X14 - W1 Main Wiring Harness to A2 Time Delay Module (SE2, W1) (HD200 [SN 035001-] and HD300)

X15 - W1 Front to Rear Wiring Harness (SE2, W1) (HD200 [SN 035001-] and HD300)

X16 - W1 Front to Rear Wiring Harness (SE3 and SE4, W1) (HD200 [SN 035001-] and HD300)

X17 - W1 Main Wiring Harness to H1 Buzzer (SE2, W1) (HD200 [SN 035001-] and HD300)

X18 - W1 Main Wiring Harness to P1 Pressure Sensor Switch (SE2, W1) (HD200 [SN 035001-] and HD300)

X19 - W1 Main Wiring Harness to S7 PTO Engaged Sensor Switch (SE3, W1) (HD200 [SN 035001-] and HD300)

X20 - S7 PTO Engaged Sensor Switch to ProGator Main

Wiring Harness (SE3) (HD200 [SN 035001-] and HD300)

Wiring Harnesses

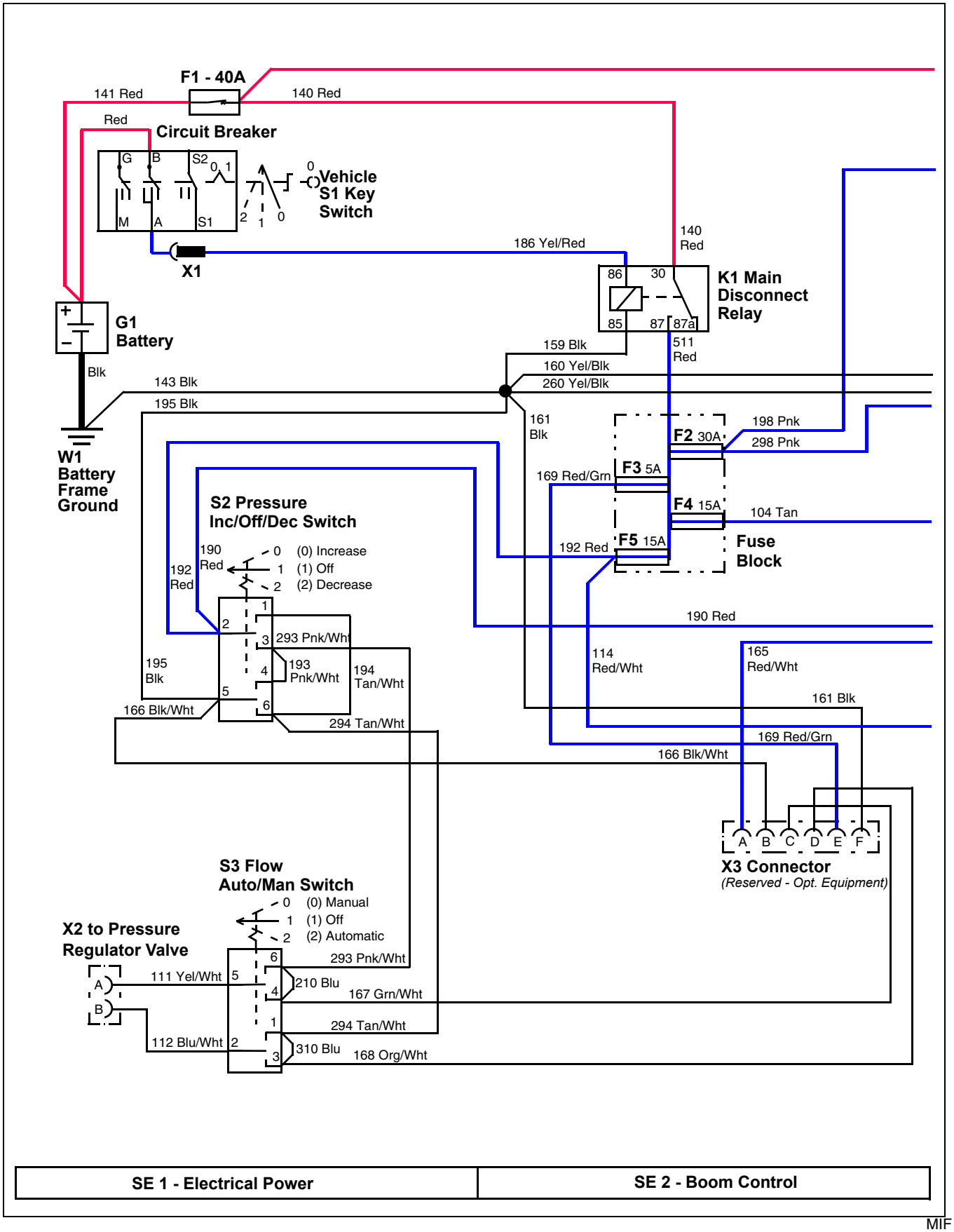
W1 - Main Wiring Harness

W2 - Foam Marker Wiring Harness

W3 - Hose Reel Wiring Harness

W4 - Handgun (Optional) Wiring Harness

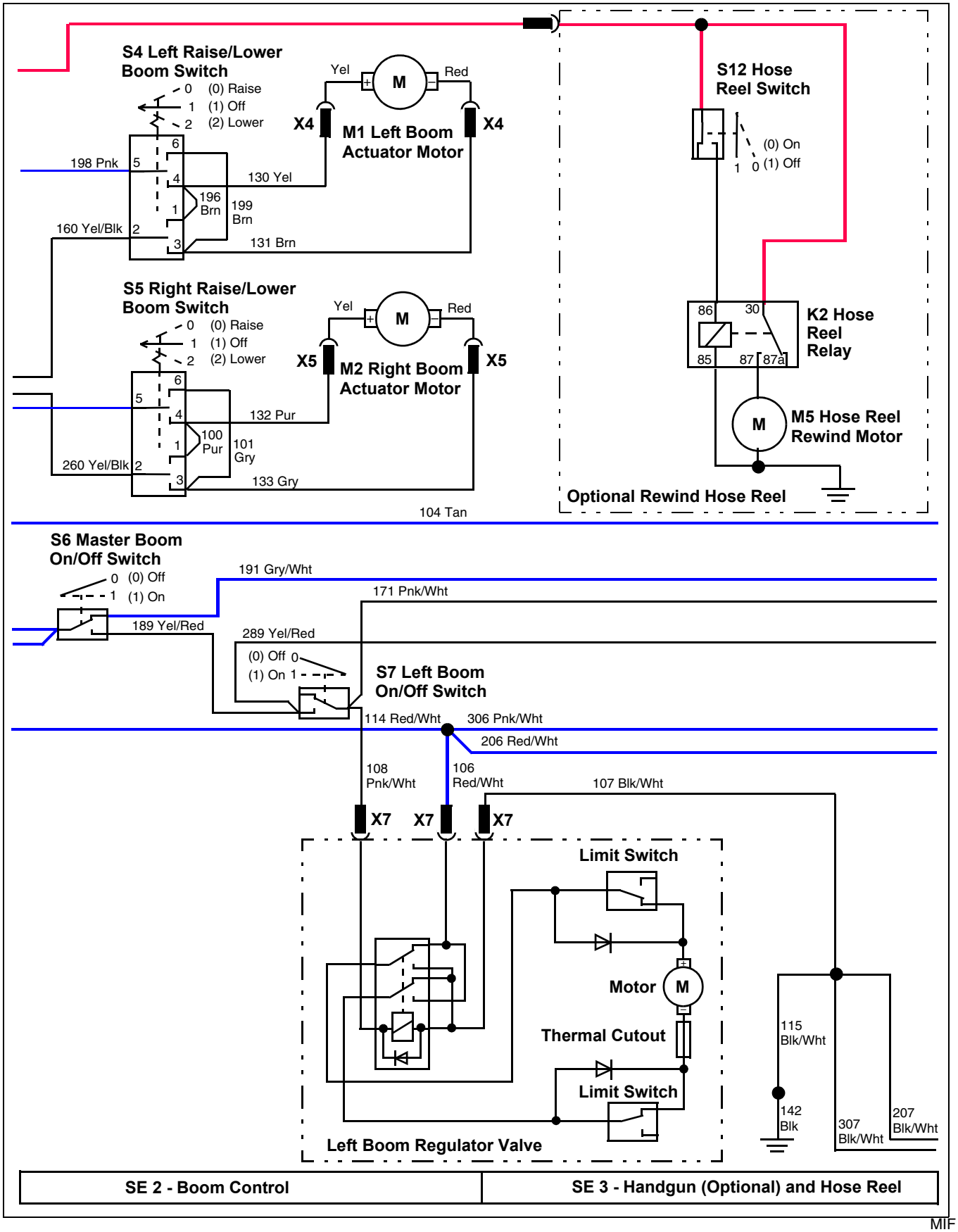
Electrical Schematic HD200 (SN -035000)



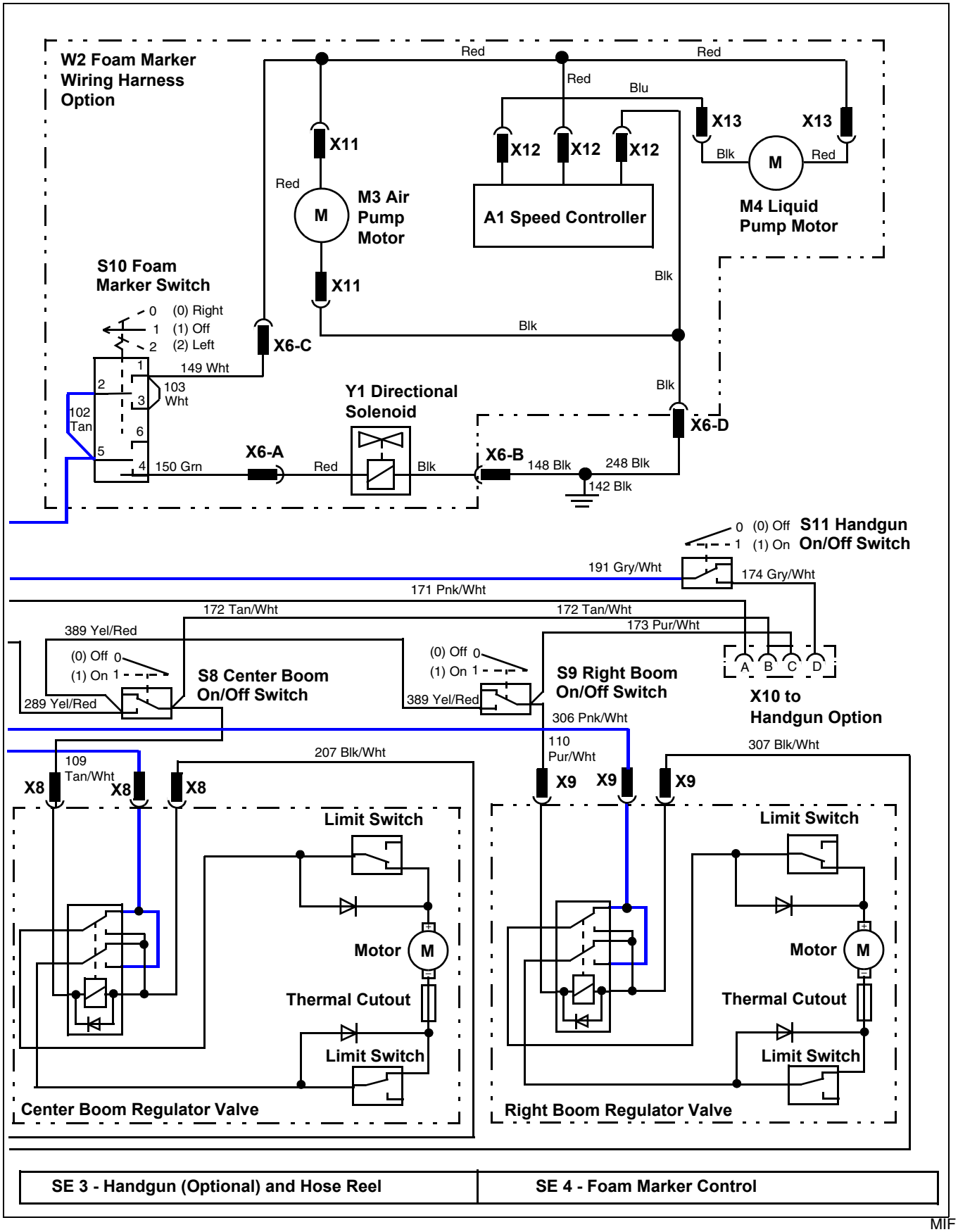
SE 1 - Electrical Power	SE 2 - Boom Control

MIF

Electrical Schematic HD200 (SN -035000)



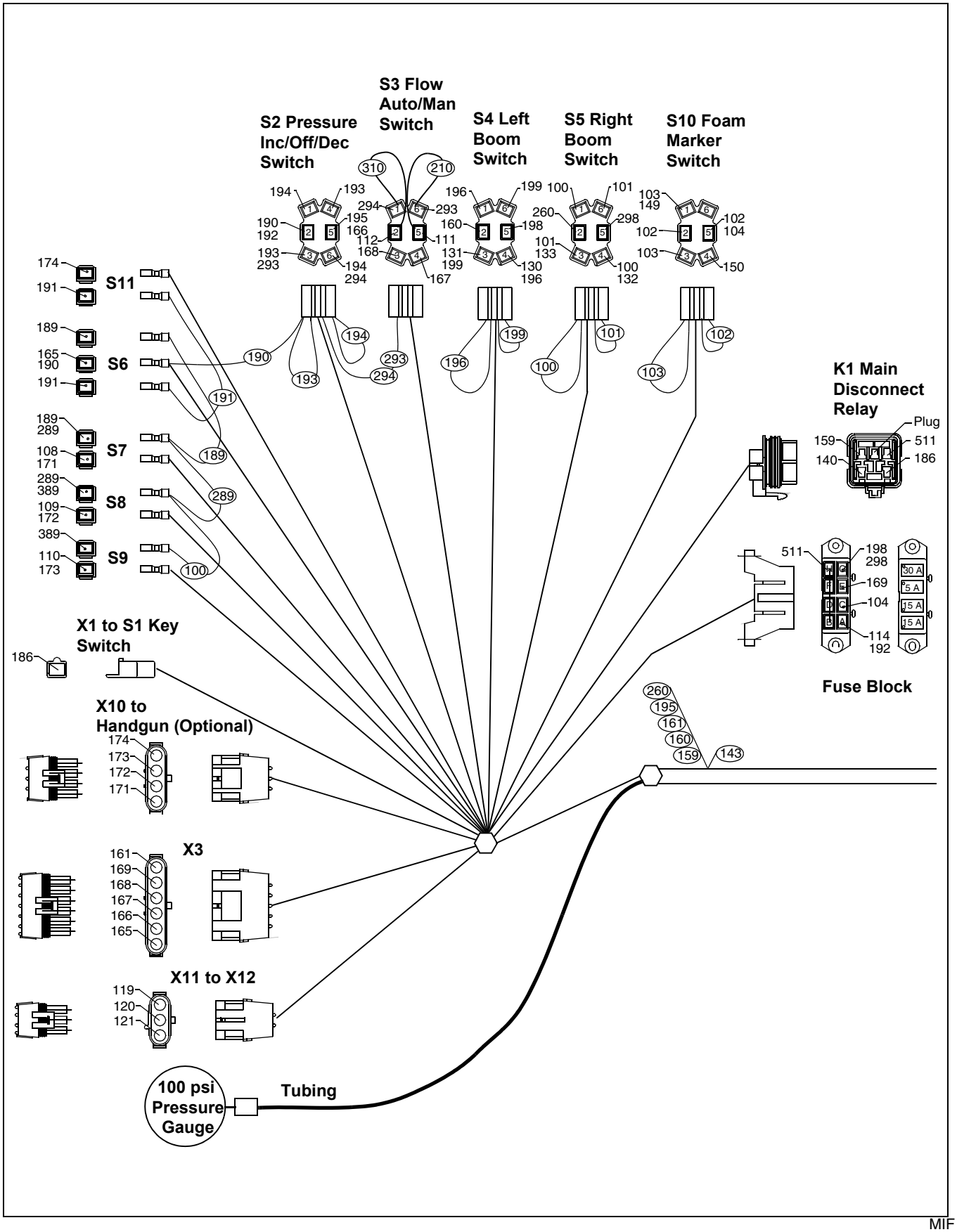
Electrical SchematicHD200 (SN -035000)



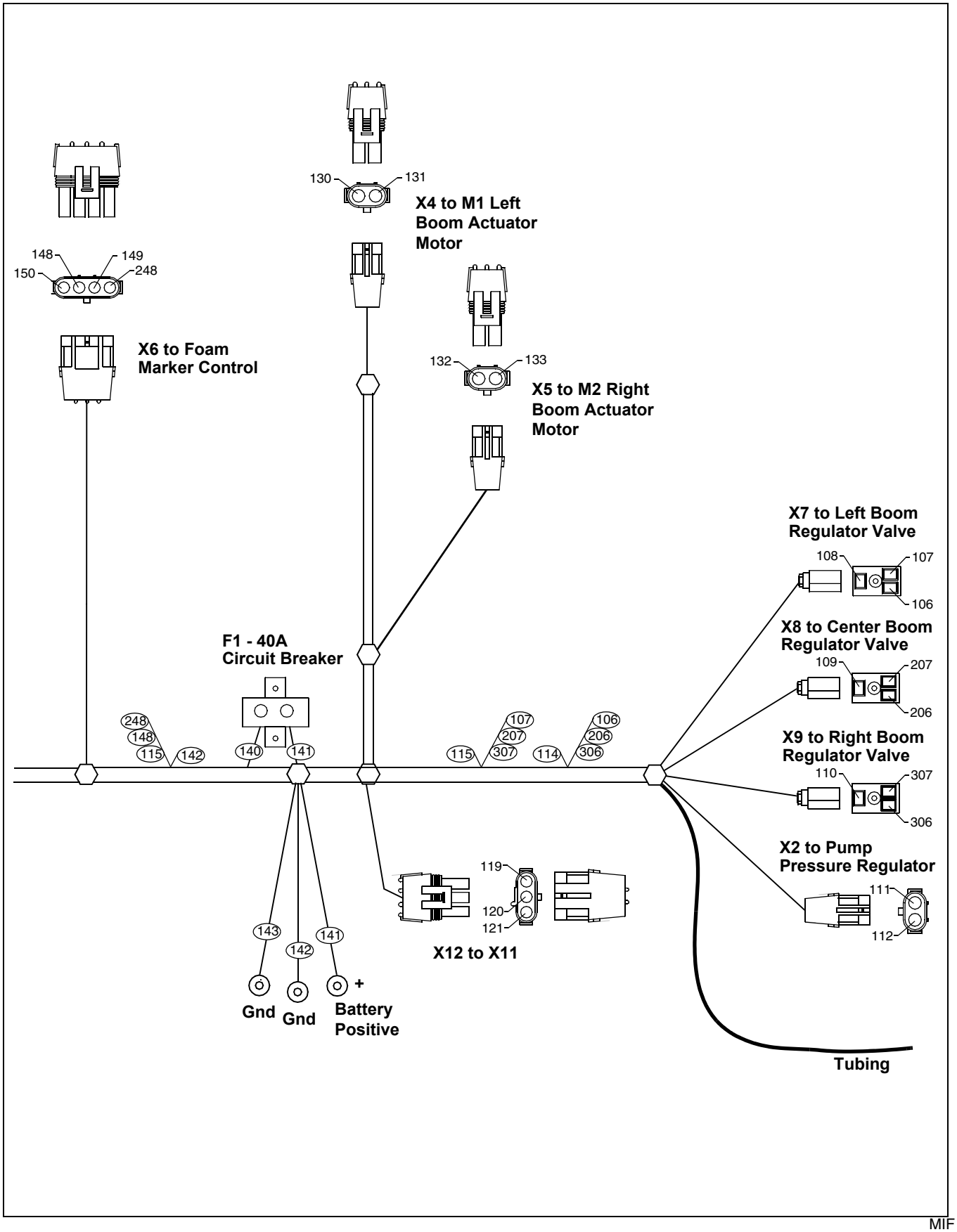
SE 3 - Handgun (Optional) and Hose Reel	SE 4 - Foam Marker Control

MIF

Electrical Wiring Harness HD200 (SN -035000)



Electrical Wiring Harness HD200 (SN -035000)



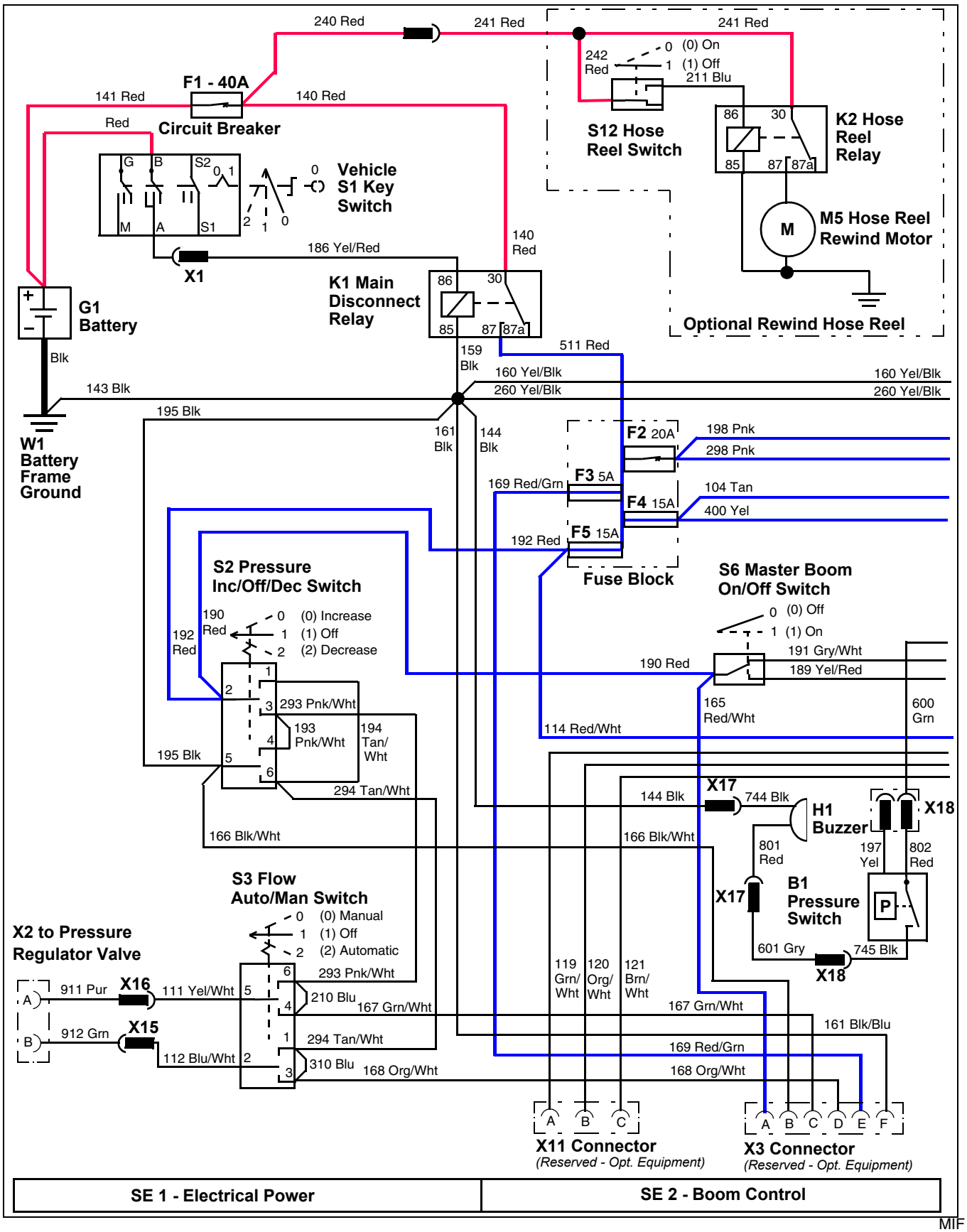
MIF

Wire Color Codes HD200 (SN -035000)

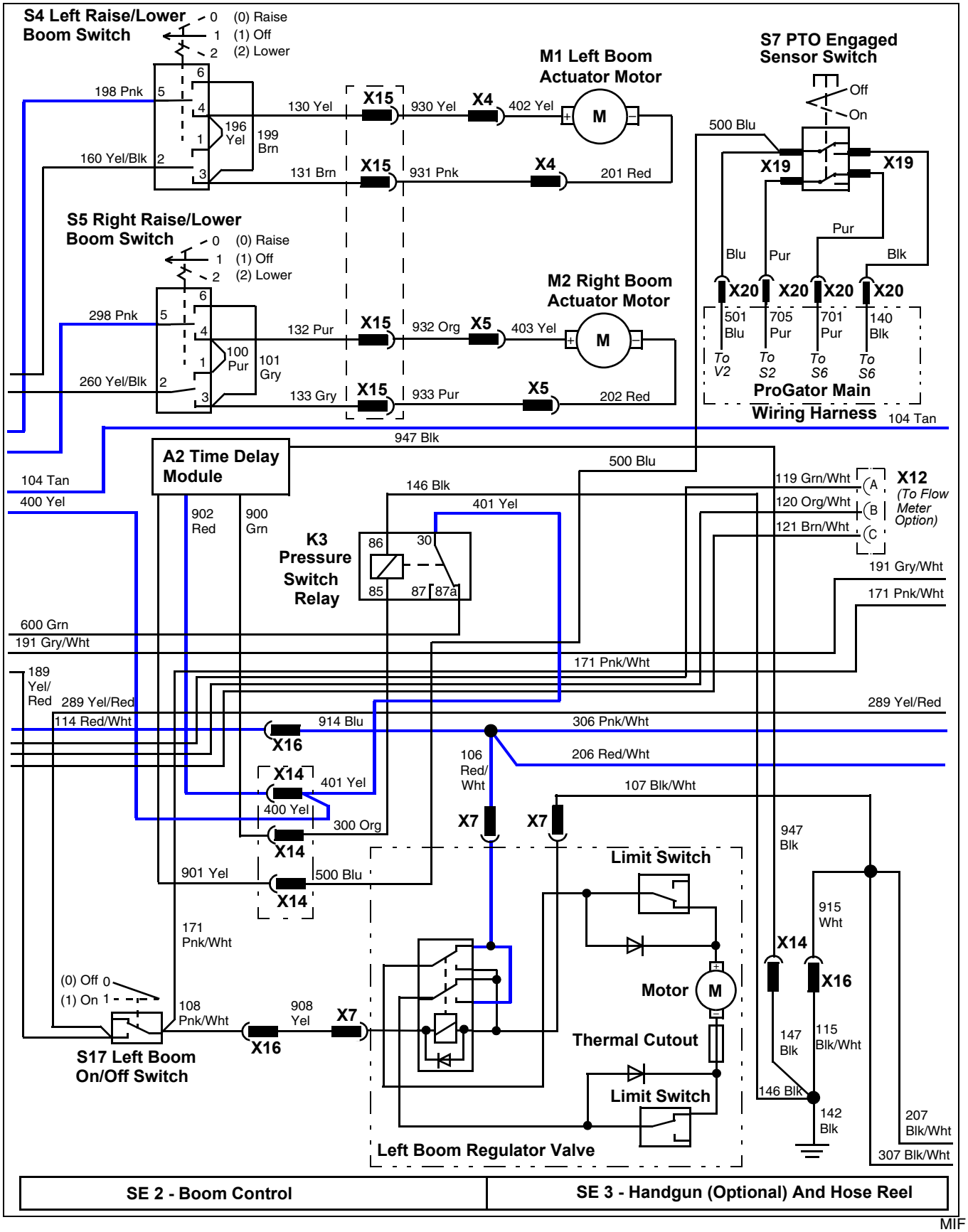
Size/No./Color	Wire Connection Points
2.0 100 Pur	S5, S5 Jumper
2.0 101 Gry	S5, S5 Jumper
2.0 102 Tan	S10, S10 Jumper
2.0 103 Wht	S10, S10 Jumper
2.0 104 Tan	F4, S10
0.8 106 Red/Wht	X7, Solder 114
0.8 107 Blk/Wht	X7, Solder 115
0.8 108 Pnk/Wht	S7, X7
0.8 109 Tan/Wht	S8, X8
0.8 110 Pur/Wht	S9, X9
0.8 111 Yel/Wht	S3, X2
0.8 112 Blu/Wht	S3, X2
0.8 114 Red/Wht	F5, [106, 206, 306]
2.0 115 Blk/Wht	[107, 207, 307], 142
0.8 119 Grn/Wht	X11, X12
0.8 120 Org/Wht	X11, X12
0.8 121 Brn/Wht	X11, X12
2.0 130 Yel	S4, X4
2.0 131 Brn	S4, X4
2.0 132 Pur	S5, X5
2.0 133 Gry	S5, X5
5.0 140 Red	F1, K1(30)
5.0 141 Red	Battery, F1
5.0 142 Blk	[115, 148, 248], Ground
5.0 143 Blk	[159, 160, 161, 195, 200], Ground
2.0 148 Blk	X6, 142 to Ground
2.0 149 Wht	S10, X6
2.0 150 Grn	S10, X6
0.8 159 Blk	K1, 143 to Ground
2.0 160 Yel/Blk	S4, 143 to Ground
0.8 161 Blk/Blu	X3, 143 to Ground
0.8 165 Red/Wht	S6, X3
0.8 166 Blk/Wht	S2, X3
0.8 167 Grn/Wht	S3, X3
0.8 168 Org/Wht	S3, X3
0.8 169 Red/Grn	F3, X3
0.8 171 Pnk/Wht	S7, X10
0.8 172 Tan/Wht	S8, X10
0.8 173 Pur/Wht	S9, X10
0.8 174 Gry/Wht	S11, X10
0.8 186 Yel/Red	X1, K1(86)
2.0 189 Yel/Red	S6, S7
2.0 190 Red	S6, S2
0.8 191 Gry/Wht	S6, S11
2.0 192 Red	F5, S2
0.8 193 Pnk/Wht	S2, S2 Jumper
0.8 194 Tan/Wht	S2, S2 Jumper
2.0 195 Blk	S2, 143 to Ground
2.0 196 Yel	S4, S4 Jumper
2.0 198 Pnk	F2, S4
2.0 199 Brn	S4, S4 Jumper
0.8 206 Red/Wht	X8, Solder 114
0.8 207 Blk/Wht	X8, Solder 115
2.0 210 Blu	S3, S3 Jumper
2.0 248 Blk	X6, 142 to Ground
2.0 260 Yel/Blk	S5, 143 to Ground
2.0 289 Yel/Red	S7, S8
0.8 293 Pnk/Wht	S2, S3
0.8 294 Tan/Wht	S2, S3
2.0 298 Pnk	F2, S5
0.8 306 Pnk/Wht	X9, Solder 114
0.8 307 Blk/Wht	X9, Solder 115
2.0 310 Blu	S3, S3 Jumper

Size/No./Color	Wire Connection Points
2.0 389 Yel/Red	S8, S9
5.0 511 Red	K1, Fuse Block

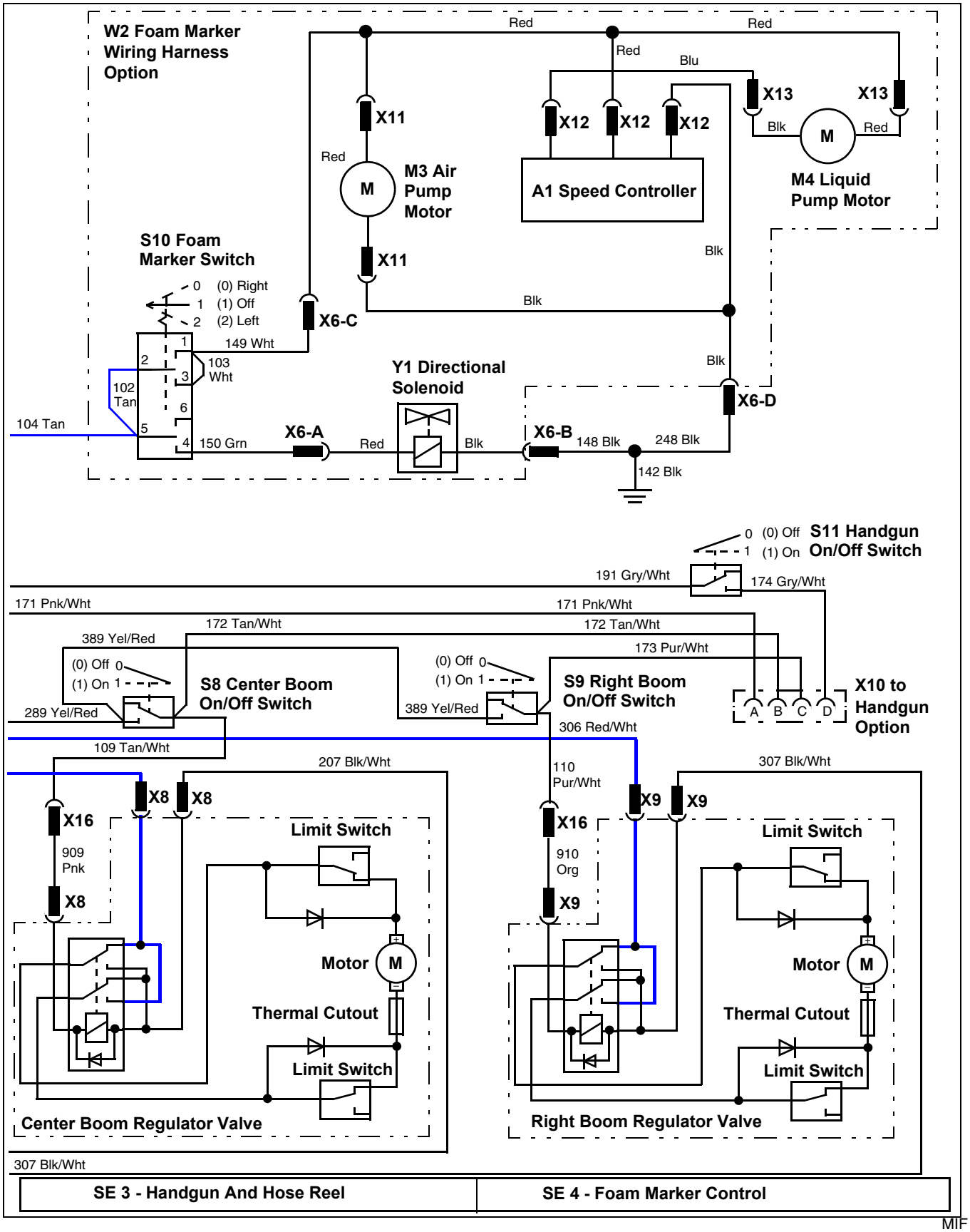
Electrical Schematic HD200 (SN 035001-) and HD300



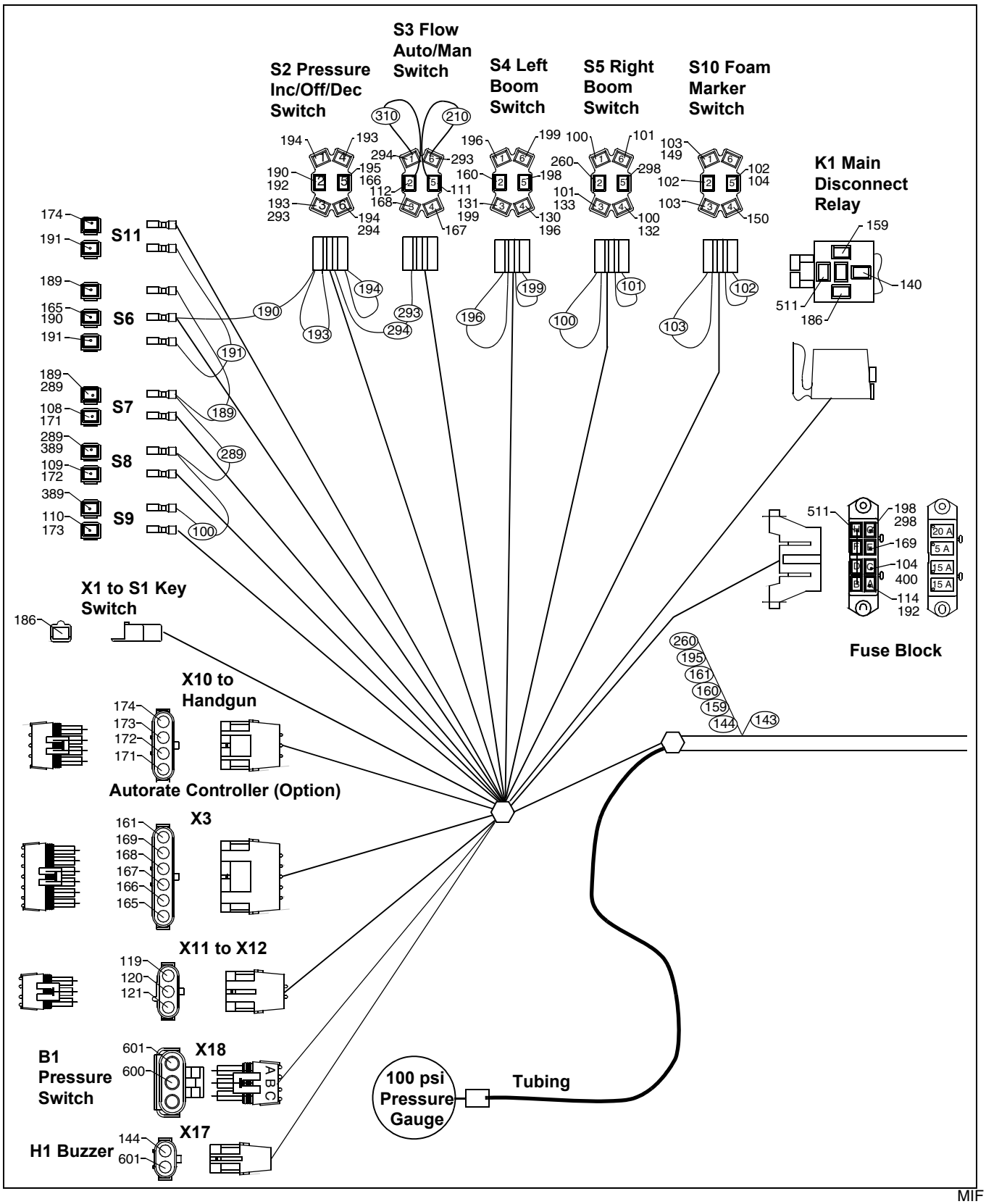
Electrical Schematic HD200 (SN 035001-) and HD300



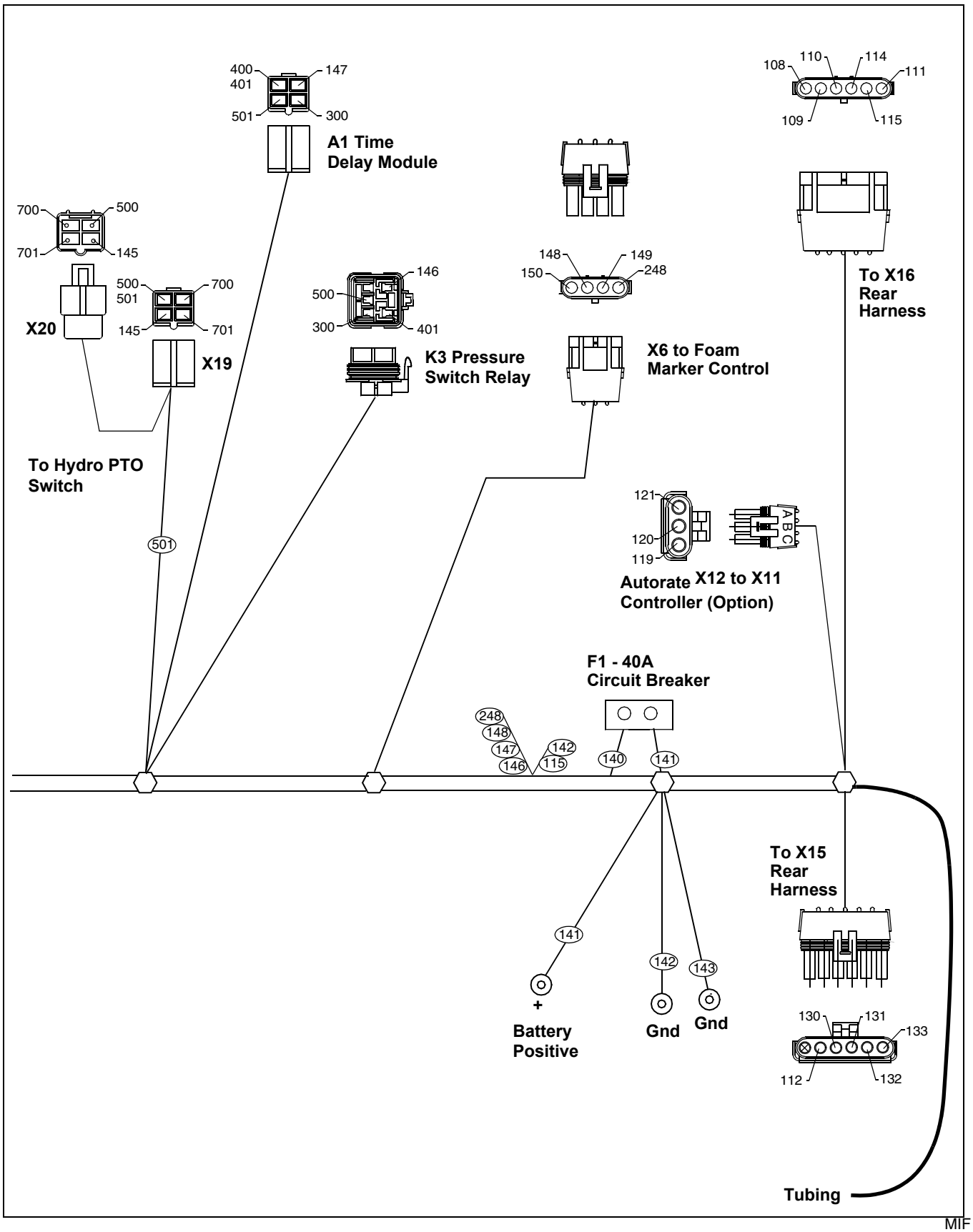
Electrical Schematic HD200 (SN 035001-) and HD300



Electrical Front Wiring Harness HD200 (SN 035001-) and HD300



Electrical Front Wiring Harness HD200 (SN 035001-) and HD300



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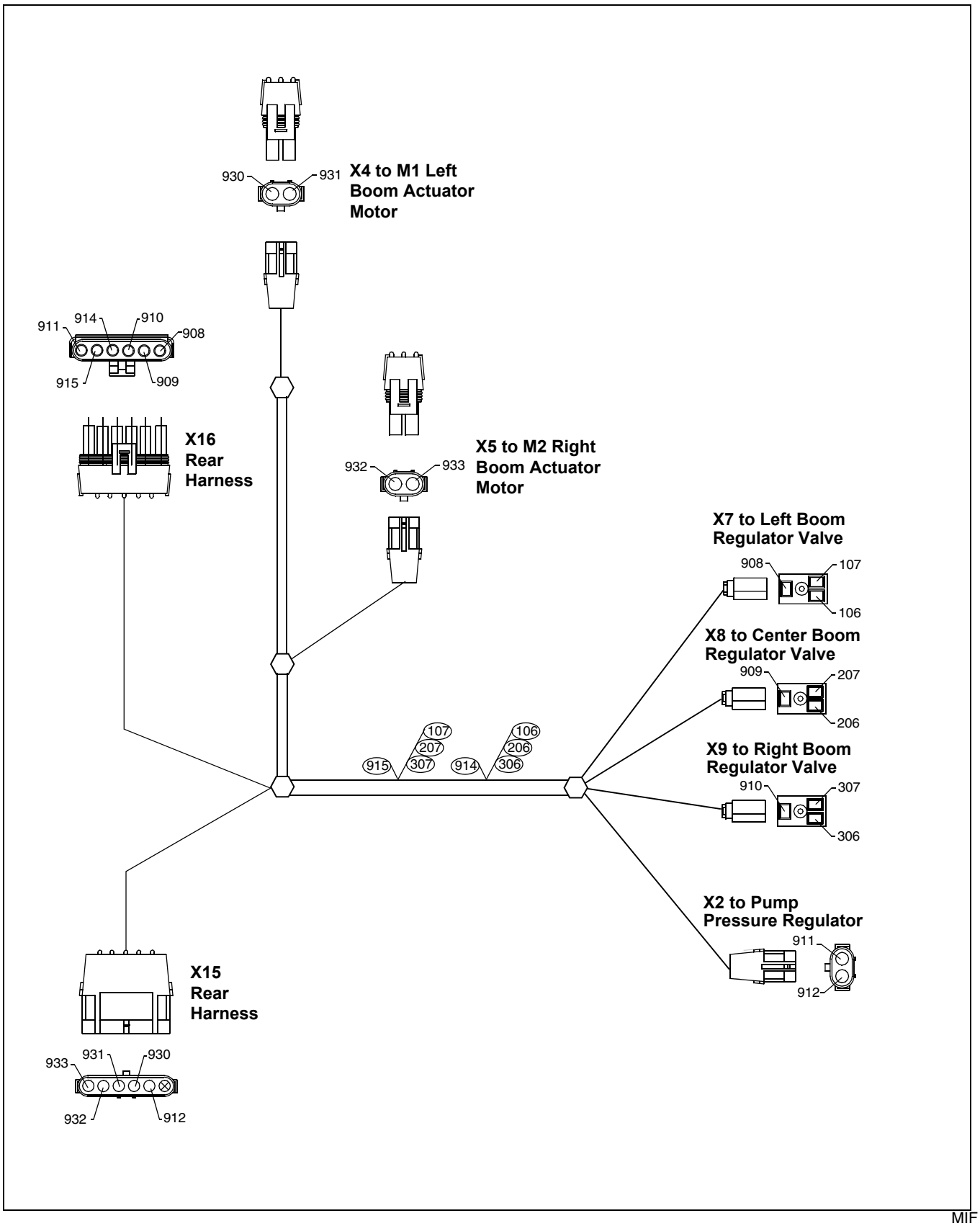
Electrical Rear Wiring Harness HD200 (SN 035001-) and HD300



MIF

Wire Color Codes HD200 (SN 035001-) and HD300

Size/No./Color	Wire Connection Points
2.0 100 Pur	S5 (4), S5 (1) Jumper
2.0 101 Gry	S5 (6), S5 (6) Jumper
2.0 102 Tan	S10 (2), S10 (5) Jumper
2.0 103 Wht	S10 (1), S10 (3) Jumper
2.0 104 Tan	F4, S10 (5)
0.8 106 Red/Wht	X7, Solder 914
0.8 107 Blk/Wht	X7, Solder 915
0.8 108 Pnk/Wht	S7, X16
0.8 109 Tan/Wht	S8, X16
0.8 110 Pur/Wht	S9, X16
0.8 111 Yel/Wht	S3 (5), X16
0.8 112 Blu/Wht	S3 (2), X15
0.8 114 Red/Wht	F5, X16
0.8 115 Blk/Wht	Splice [142], X16
0.8 119 Grn/Wht	X11 (A), X12 (A)
0.8 120 Org/Wht	X11 (B), X12 (B)
0.8 121 Brn/Wht	X11 (C), X12 (C)
2.0 130 Yel	S4, X15
2.0 131 Brn	S4, X15
2.0 132 Pur	S5 (4), X15
2.0 133 Gry	S5 (3), X15
5.0 140 Red	F1, K1(30)
5.0 141 Red	Battery, F1
5.0 142 Blk	Splice [115, 146, 147, 148, 248], Ground
5.0 143 Blk	[159, 160, 161, 195, 200], W1 Ground
0.8 144 Blk	X17, 143 to Ground
0.8 145 Blk	S6 (Main Harness), X20
0.8 146 Blk	K3 (86), 142 to Ground
0.8 147 Blk	X16, 142 to Ground
0.8 148 Blk	X6, Splice [142 to Ground]
2.0 149 Wht	S10 (1), X6
2.0 150 Grn	S10 (4), X6
0.8 156 Blk	M5, Ground
0.8 157 Blk	K2, M5
0.8 158 Blk	K2, Splice
0.8 159 Blk	K1 (85), 143 to Ground
2.0 160 Yel/Blk	S4 (2), 143 to Ground
0.8 161 Blk/Blu	X3, 143 to Ground
0.8 165 Red/Wht	S6, X3 (B)
0.8 166 Blk/Wht	S2 (5), X3 (B)
0.8 167 Grn/Wht	S3 (4), X3 (C)
0.8 168 Org/Wht	S3 (3), X3 (D)
0.8 169 Red/Grn	F3, X3 (E)
0.8 171 Pnk/Wht	S7, S11
0.8 172 Tan/Wht	S8, X10 (A)
0.8 173 Pur/Wht	S9, X10 (B)
0.8 174 Gry/Wht	S11, X10 (D)
0.8 186 Yel/Red	X1, K1(86)
2.0 189 Yel/Red	S6, S7
2.0 190 Red	S6, S2 (2)
0.8 191 Gry/Wht	S6, S11
2.0 192 Red	F5, S2 (2)
0.8 193 Pnk/Wht	S2 (3), S2 (4) Jumper
0.8 194 Tan/Wht	S2 (1), S2 (6) Jumper
2.0 195 Blk	S2 (5), 143 to Ground
2.0 196 Yel	S4 (4), S4 (1) Jumper
2.0 197 Yel	B1, X18
2.0 198 Pnk	F2, S4 (5)
2.0 199 Brn	S4 (6), S4 (3) Jumper
2.0 201 Red	X4 (6), M1 (-)
2.0 202 Red	X5 (6), M2 (-)

Size/No./Color	Wire Connection Points
0.8 206 Red/Wht	X8, Solder 914
0.8 207 Blk/Wht	X8, Splice [107, 307, 915]
2.0 210 Blu	S3 (6), S3 (4) Jumper
0.8 240 Red	F1, Electric Hose Reel Kit
0.8 241 Red	Electric Hose Reel Kit
0.8 242 Red	Splice, S12
2.0 248 Blk	X6, Splice [142 to Ground]
2.0 260 Yel/Blk	S5 (2), 143 to Ground
2.0 289 Yel/Red	S7, S8
0.8 293 Pnk/Wht	S2 (3), S3 (6)
0.8 294 Tan/Wht	S2 (6), S3 (1)
2.0 298 Pnk	F2, S5 (5)
0.8 300 Org	K3 (85), X14
0.8 306 Pnk/Wht	X9, Solder 914
0.8 307 Blk/Wht	X9, Splice [107, 207, 915]
2.0 310 Blu	S3 (1), S3 (3) Jumper
2.0 389 Yel/Red	S8, S9
0.8 400 Yel	F4, X14
0.8 401 Yel	X14, K3 (30)
0.8 402 Yel	X4, M1 (+)
0.8 500 Blu	X14, S7
0.8 501 Blu	V2 to X20
5.0 511 Red	K1 (87), Fuse Block
0.8 600 Grn	X18, K3 (87a)
0.8 601 Gry	X17, X18
0.8 700 Pur	X19, X20
0.8 701 Pur	X20, S6 (Main Harness)
0.8 705 Pur	X20, S2 (Main Harness)
0.8 744 Blk	X17, H1
2.0 745 Blk	X18, B1
0.8 801 Red	X17, H1
0.8 900 Grn	A2, X14

Size/No./Color	Wire Connection Points
0.8 901 Yel	A2, X14
0.8 902 Yel	A2, X14
0.8 908 Yel	X16, X7
0.8 909 Pnk	X8, X16
0.8 910 Org	X9, X16
0.8 911 Pur	X2 (A), X16
0.8 912 Grn	X2 (B), X15
0.8 914 Blu	X16, Splice
0.8 915 Wht	X16, Splice (107, 207,307)
2.0 930 Yel	X15, X4
2.0 931 Pnk	X15, X4
2.0 932 Org	X15, X5
2.0 933 Pur	X15, X5
2.0 947 Blk	X16, X5

Diagnostics and Operation

Power Circuit Operation (All Models)

Unless specified, the Diagnosis and Operation, and the Tests and Adjustment sections apply to all models.

Function:

To provide unswitched power to the primary components whenever the harness is connected to the vehicle battery.

Operating Conditions, Unswitched Circuits:

Sprayer unit mounted on utility vehicle.

Sprayer harness connected to vehicle battery.

Optional electric hose reel harness connected to vehicle battery (if equipped).

Optional foam harness connected to sprayer harness (if equipped).

Utility vehicle key switch in OFF position.

Theory of Operation, Unswitched Circuits:

Voltage must be present at the following components with the utility vehicle key switch in the OFF position:

- Battery positive (+) terminal.
- Utility vehicle key switch, BAT terminal.
- 40-amp circuit breaker (F1).
- Optional Hose Reel Relay (K2).
- Optional Hose Reel Switch (S12).

The main sprayer harness is connected to the 40-amp circuit breaker (F1), which in turn is connected to the positive (+) terminal of the utility vehicle battery.

The sprayer harness connection must be in good condition for the HD200 and HD300 Sprayer Attachment to function properly.

The ground connection is equally important as the power (positive) cable connection.

Operating Conditions, Switched Circuits:

- Sprayer unit mounted on utility vehicle.
- Sprayer harness connected to vehicle battery.
- Utility vehicle key switch in RUN position.

Theory of Operation, Switched Circuits (Standard Equipment):

Voltage must be present at the following components with the Utility vehicle key switch in the RUN position:

- All unswitched circuit locations.
- Main disconnect relay (K1) - Terminal 86.
- Left Raise/Lower Boom Switch (S4).
- Right Raise/Lower Boom Switch (S5).
- Pressure Inc/Off/Dec Switch (S2).
- Left Boom Regulator Valve - Connector X7, Pin 1.
- Center Boom Regulator Valve - Connector X8, Pin 1.
- Right Boom Regulator Valve - Connector X9, Pin 1.

These circuits are controlled by the utility vehicle key switch (S1). The key switch supplies power to the K1 main disconnect relay which energizes to supply power to the fuse block and the remaining circuits.

Optional Foam Marker System Circuit:

Voltage must be present at the following components with the Utility vehicle key switch in the RUN position:

- Foam Marker Switch (S10)

This circuit is controlled by the utility vehicle key switch (S1) and is protected by a 15-amp fuse (F4).

For further information, see “Foam Marker Circuit Operation” on page 68.

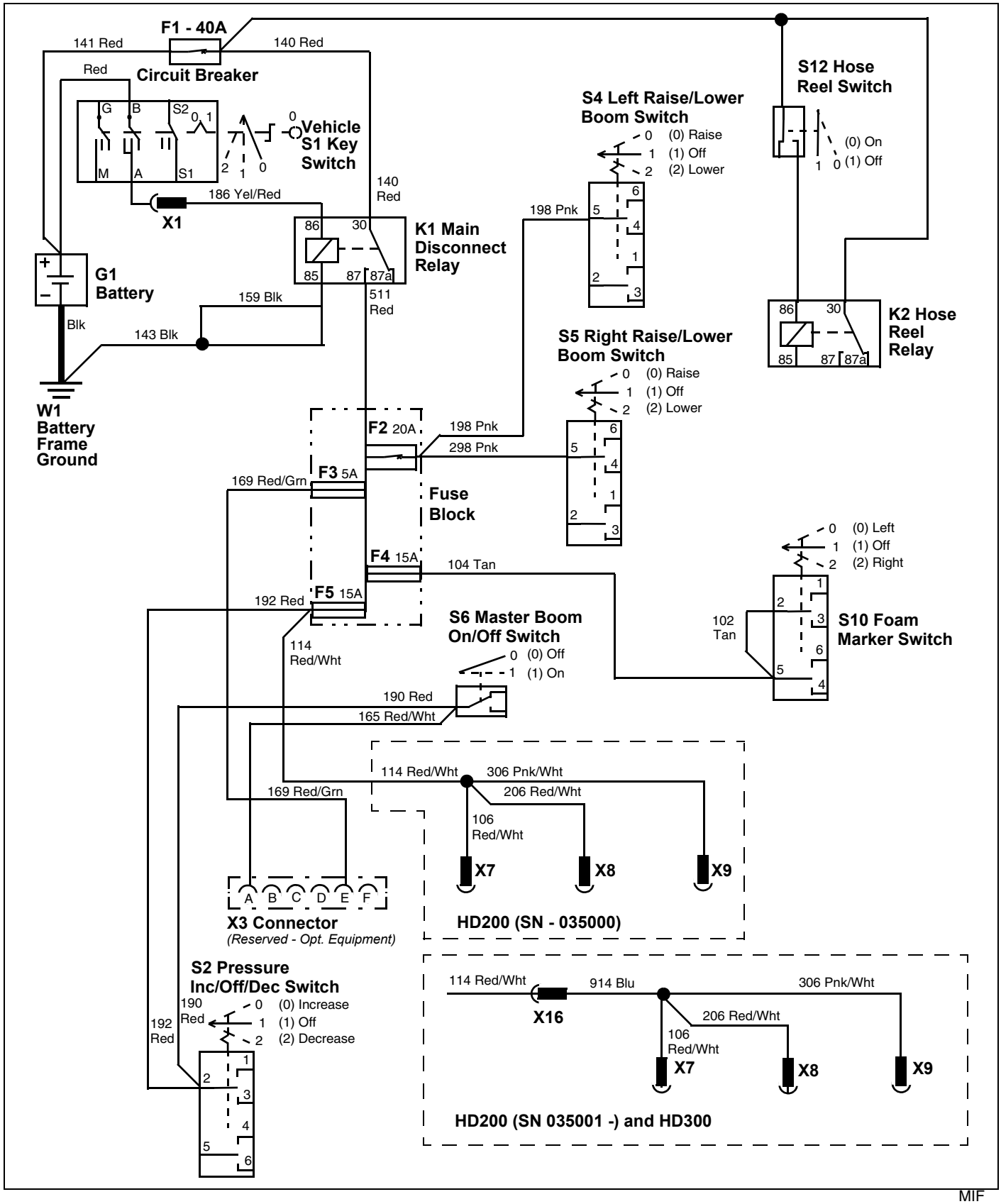
This circuit is controlled by the utility vehicle key switch (S1) and is protected by a 5-amp fuse (F3).

Optional GPS/ACR Circuit:

Voltage must be present at the following components with the Utility vehicle key switch in the RUN position:

- Connector X3, Pin A.
- Connector X3, Pin E.

Power Circuit Schematic



MIF

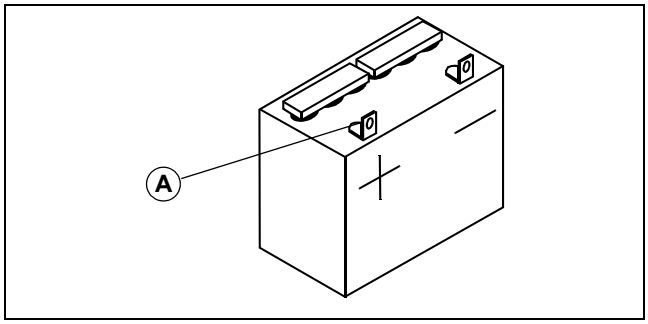
Power Circuit Diagnosis

CAUTION: Avoid injury! Disconnect power before connecting or disconnecting wiring harness connections. Failure to disconnect power may result in damage to electrical components.

Test Conditions:

- Machine parked on level surface.
- Sprayer mounted on utility vehicle.
- Sprayer harness connected to vehicle key switch.
- Key switch S1 in OFF position.
- Connections firmly seated and non-corroded.
- Meter negative lead on battery negative (-) terminal or chassis ground.

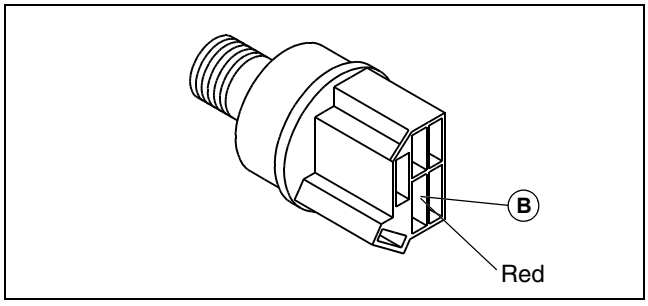
System: Power Circuit



(1) Battery positive post (A) has 11.8 - 13.2 volts?

Yes - Go to next step.

No - Test battery, charge or replace if necessary.

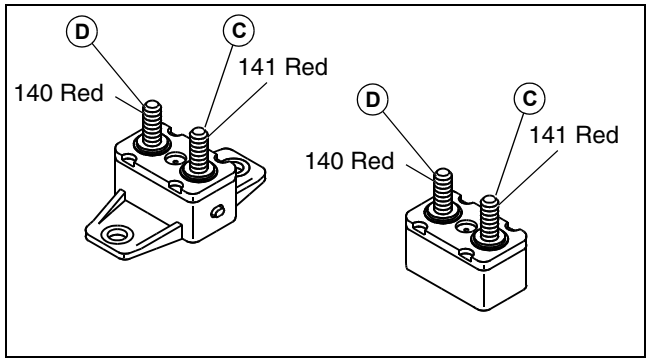


(2) S1 Key switch (B) has battery voltage?

Yes - Go to next step.

No - Check Red wire and connections to battery.

System: Power Circuit



Picture Note: Manual Reset shown at left side and auto-reset shown at right side.

(3) F1 Circuit breaker (battery terminal C) has battery voltage?

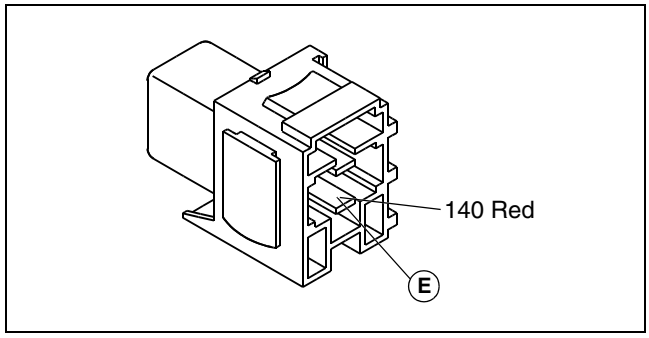
Yes - Go to next step.

No - Check 141 Red wire and connections.

(4) F1 Circuit breaker (D) has battery voltage?

Yes - Go to next step.

No - Test circuit breaker. See “Circuit Breaker Test” on page 76. Reset or replace as necessary.

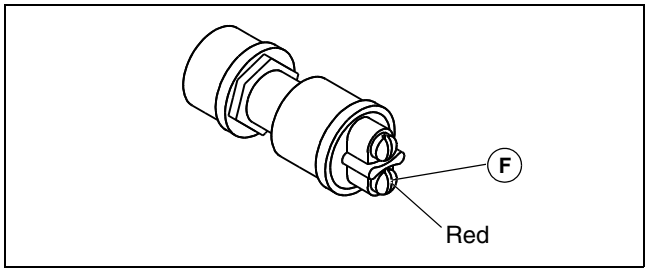


(5) K1 Main disconnect relay (terminal 30) (E) has battery voltage?

Yes - Go to next step.

No - Check 140 Red wire and connections.

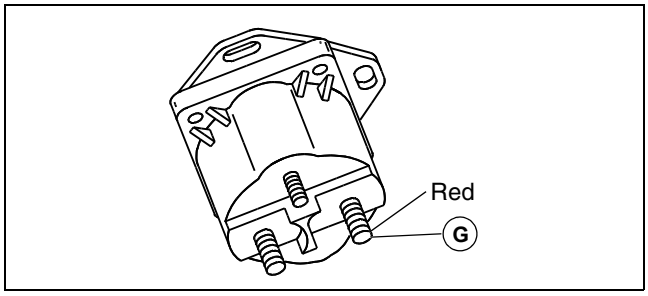
System: Power Circuit



(6) S12 Hose reel switch (F) has battery voltage?

Yes - Go to next step.

No - Check red wire and connections to 40 amp circuit breaker (F1).



(7) K2 Hose reel relay (G) has battery voltage?

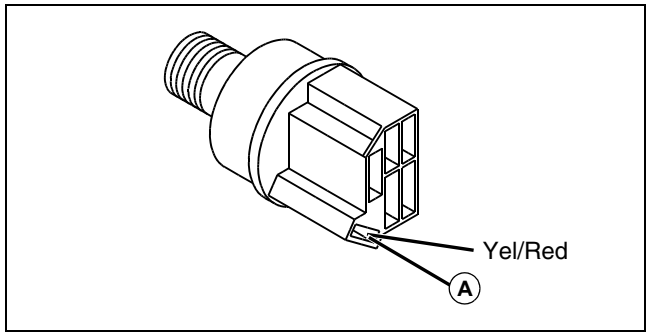
Yes - Set test conditions and go to next step.

No - Check wire and connections to hose reel switch. Test switch. See “Hose Reel Switch Test” on page 77.

Test Conditions:

- Key switch in RUN position, engine not running.
- Connector X3 disconnected.
- Boom valve connectors X11, X12 and X13 disconnected.

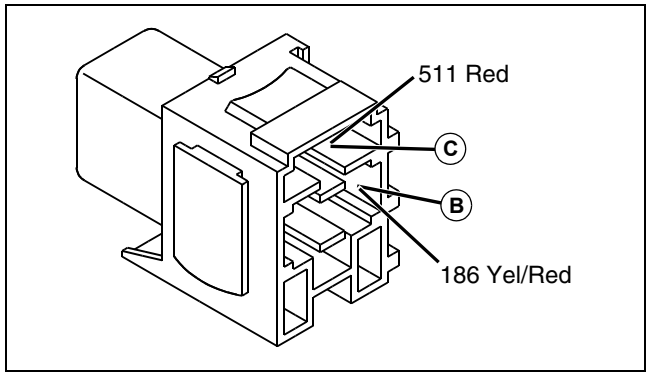
System: Power Circuit (continued)



(1) S1 Key switch (terminal A) (A) has battery power?

Yes - Go to next step.

No - Test key switch, replace if necessary.



(2) K1 Main disconnect relay (B) has battery voltage?

Yes - Go to next step.

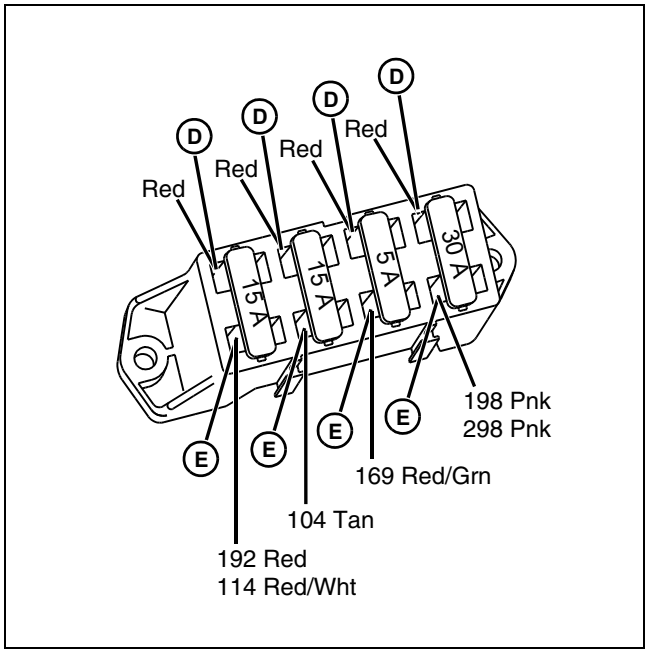
No - Check 186 Yel/Red wire and connections.

(3) K1 Main disconnect relay (C) has battery voltage?

No - Check 159 and 143 Blk wires and connections to ground. Test relay and replace as necessary.

Yes - Go to next step.

System: Power Circuit (continued)



(4) 511 Red wire (D) at fuse block has battery voltage?

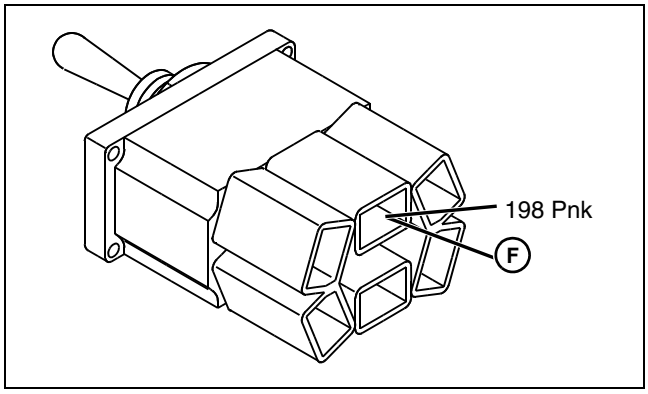
No - Check 511 Red wire (D) and connections.

Yes - Go to next step.

(5) Fuse block (E) has battery voltage?

Yes - Go to next step.

No - Test each fuse and replace as necessary.

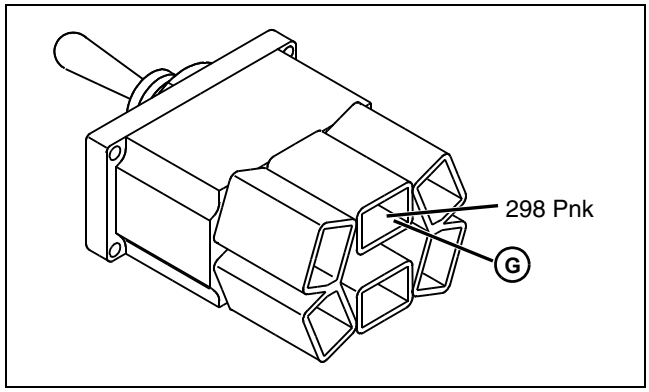


(6) S4 Left Raise/Lower Boom Switch 198 Pnk wire (F) has battery voltage?

Yes - Go to next step.

No - Check 198 Pnk wire and connections.

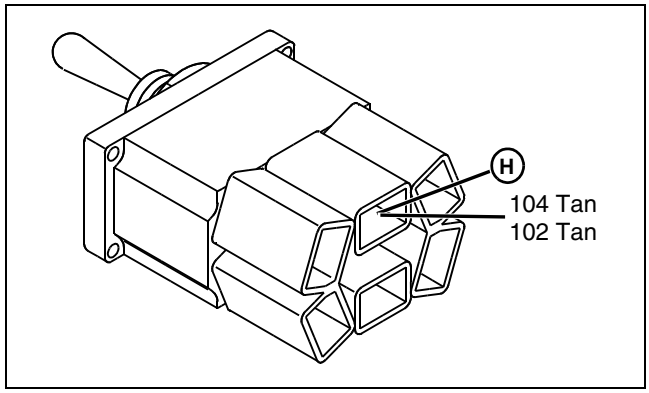
System: Power Circuit (continued)



(7) S5 Right Raise/Lower Boom Switch 298 Pnk wire (G) has battery voltage?

Yes - Go to next step.

No - Check 298 Pnk wire and connections.

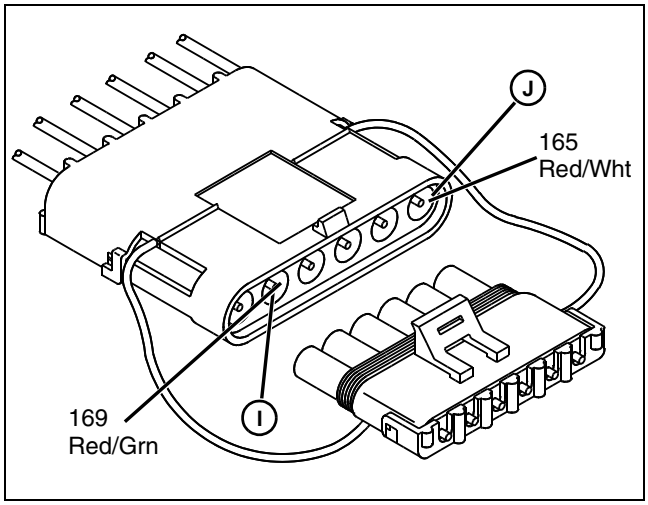


(8) S10 Foam Marker Switch 104 Tan wire (H) has battery voltage?

Yes - Go to next step.

No - Check 104 Tan wire and connections

System: Power Circuit (continued)



(9) X3 connector "E" terminal 169 Red/Grn wire has battery voltage?

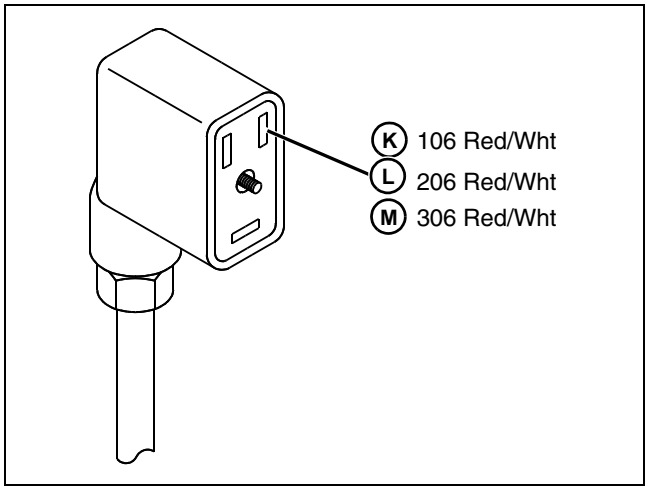
Yes - Go to next step.

No - Check 169 Red/Grn wire (I) and connections.

(10) X3 connector "A" terminal 165 Red/Wht and 190 and 192 Red wires (J) have battery voltage?

Yes - Go to next step.

No - Check 165 Red/Wht and 190 and 192 Red wires and connections.



(11) X7 Left Boom Valve connector X7, pin 1, (K) has battery voltage?

Yes - Go to next step.

No - Check 106 and 114 Red/Wht wires and connections.

System: Power Circuit (continued)

(12) X8 Center Boom Valve connector, pin 1, (L) has battery voltage?

Yes - Go to next step.

No - Check 206 and 114 Red/Wht wires and connections.

(13) X9 Right Boom Valve connector, pin 1, (M) has battery voltage?

Yes - Go to next step.

No - Check 306 and 114 Red/Wht wires and connections.

Pressure Regulator Valve Operation

Function:

To allow the operator to adjust the pressure of the chemical solution, to match the desired application requirements.

Operating Conditions, Unswitched Circuits:

Sprayer unit mounted on utility vehicle.

Sprayer harness connected to vehicle battery.

Key switch in RUN position.

Pressure Inc/Off/Dec switch in either the INC or DEC position.

Flow Auto/Off/Man switch in either the AUTO or MAN position.

Theory of Operation:

NOTE: Schematic is shown in the pressure decrease position.

The power circuit provides current to the utility vehicle key switch and to terminal 87 of the main disconnect relay (K1). The pressure regulator valve circuit is protected by a re-settable 50-amp circuit breaker (F1) (SN -035000), and an auto-resetting 40-amp circuit breaker (F1) (SN 035001-) and HD300.

With the utility vehicle key switch in the RUN position, current flows to terminal 86 of the main disconnect relay (K1). A path to ground completes the circuit, energizing the relay. As the relay energizes, current flows through 15-amp fuse (F5) to supply current to the pressure Inc/Off/Dec switch (S2).

NOTE: If the sprayer is equipped with optional GPS/ ACR injection system, the Auto/Man switch will need to be placed in MAN position to allow the pressure to be adjusted by the Inc/Off/Dec switch.

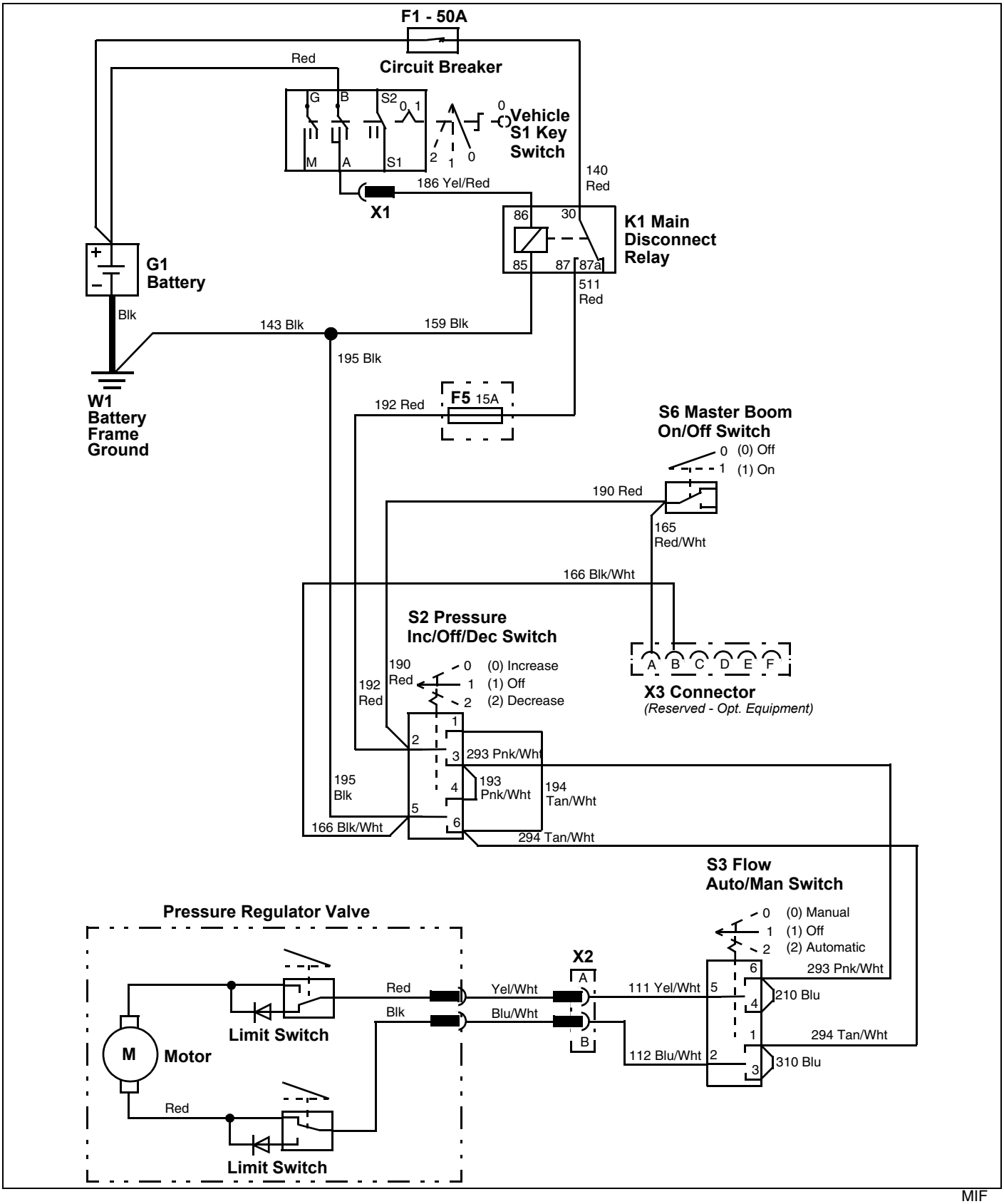
If the sprayer is not equipped with optional GPS/ACR system, a set of blue jumper wires (210 and 310 Blu) are used to bypass the Auto/Man switch connections.

The pressure regulator valve consists of a motor connected to a ball valve and an OPEN and CLOSE limit switch.

When the pressure Inc/Off/Dec switch is moved to either the INC or DEC position, current flows to the flow AUTO/ MAN switch. When the flow Auto/Man switch is moved to either the AUTO or MAN position current flows to the pressure regulator valve through the OPEN limit switch to the drive motor. The path to ground passes through the remaining limit switch (in this case the CLOSE limit switch), energizing the motor.

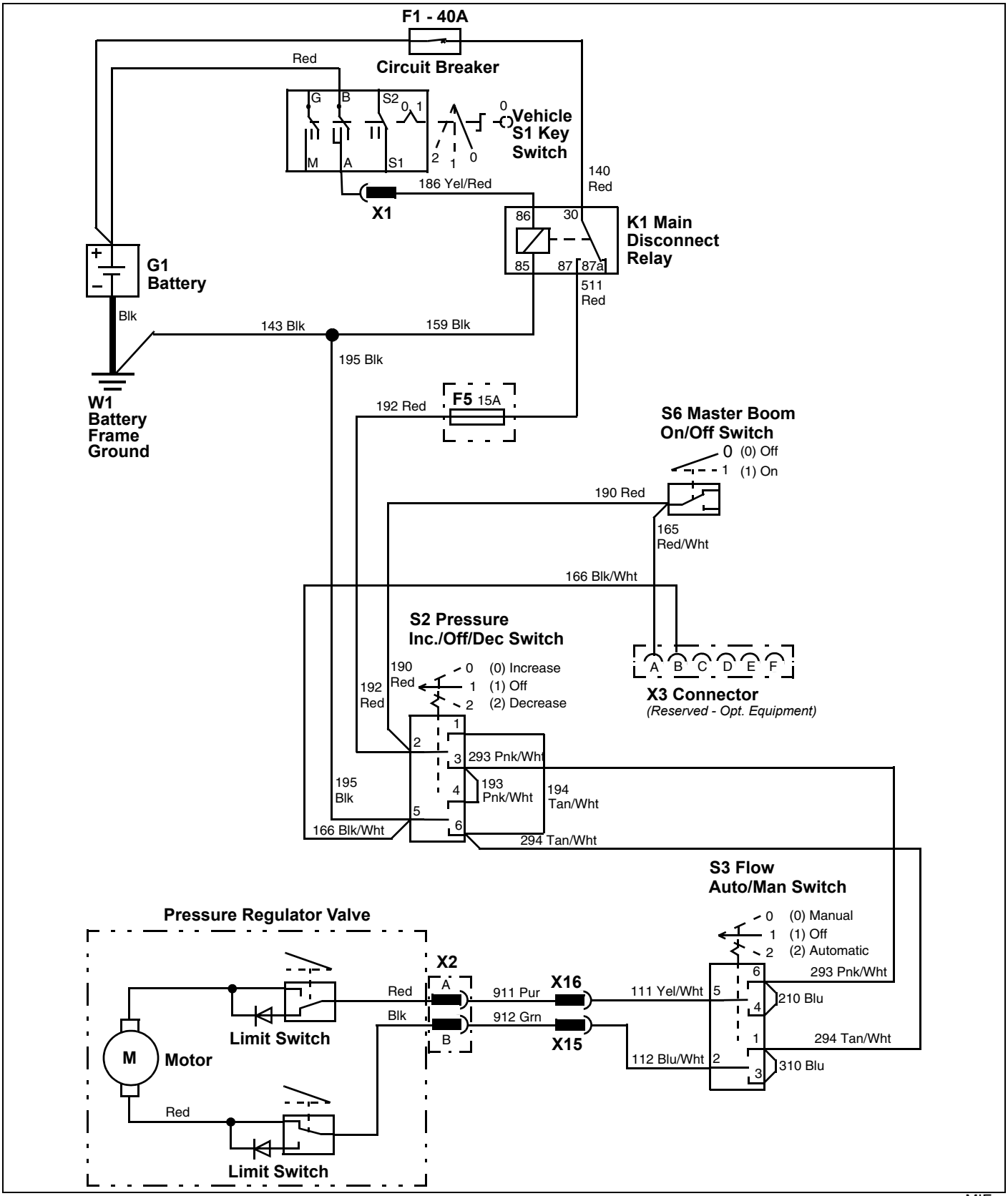
If the switch is held in position, as the motor reaches the maximum limit of travel, the CLOSE limit switch is tripped breaking the path to ground, which stops the motor.

Pressure Regulator Valve Circuit Schematic HD200 (SN -035000)



MIF

Pressure Regulator Valve Circuit Schematic HD200 (SN 035001-) and HD300



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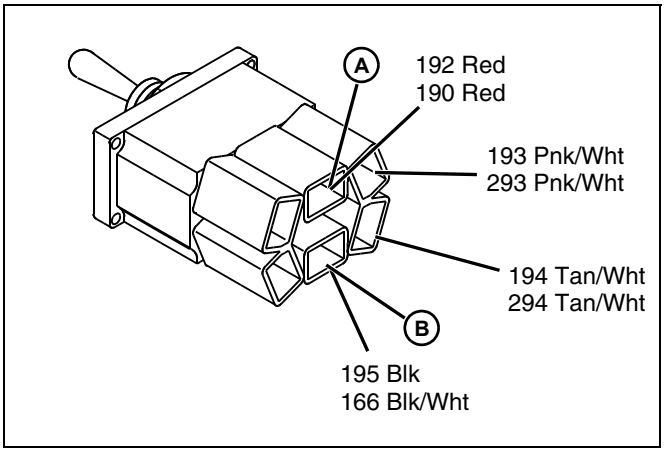
Pressure Regulator Valve Circuit Diagnosis

CAUTION: Avoid injury! Disconnect power before connecting or disconnecting wiring harness connections. Failure to disconnect power may result in damage to electrical components.

Test Conditions:

- Machine parked on level surface.
- Sprayer mounted on utility vehicle.
- Sprayer harness connected to vehicle battery.
- Key switch S1 in RUN position.
- Connections firmly seated and non-corroded.
- Meter negative lead on battery negative (-) terminal or chassis ground.
- Pressure Inc/Off/Dec switch in the DEC position.
- Flow Auto/Man switch in the MAN position.
- X2 connector disconnected.

Symptom: Pressure Regulator Valve Circuit



(1) S2 Pressure Inc/Off/Dec Switch 192 Red wire (A) and F5 fuse have battery voltage?

Yes - Go to next step.

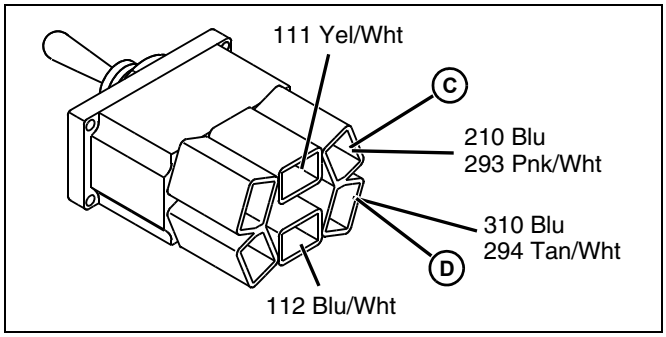
No - Check 192 Red wire and F5 fuse?

(2) S2 pressure Inc/Off/Dec switch 195 and 143 Blk wires (B) have continuity to ground?

Yes - Go to next step.

No - Check 195 and 143 Blk wires and connections.

Symptom: Pressure Regulator Valve Circuit



(3) S3 Flow Auto/Man Switch 293 Pnk/Wht wire (C) has battery voltage?

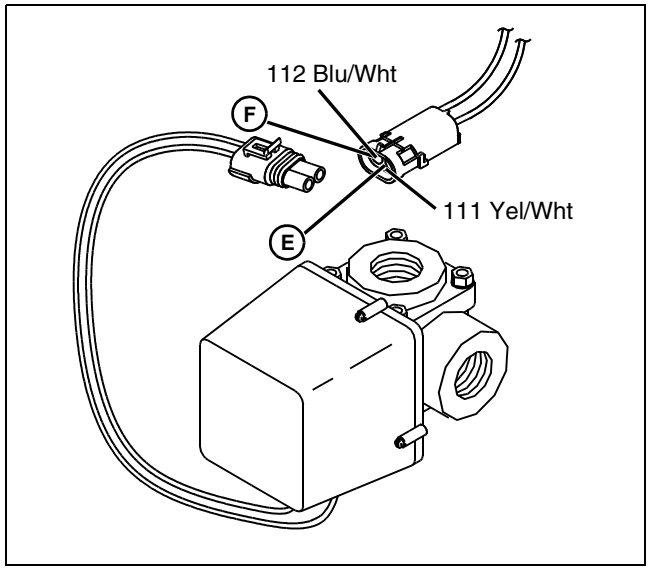
Yes - Go to next step.

Yes - Check 293 Pnk/Wht wire and connections. If OK, test pressure Inc/Off/Dec switch. See “D.P.D.T. Switch Test” on page 79.

(4) S3 Flow Auto/Man Switch has 294 Tan/Wht wire (D) has continuity to ground?

Yes - Go to next step.

No - Check 294 Tan/Wht wire and connections. If OK, test pressure Inc/Off/Dec switch. See “D.P.D.T. Switch Test” on page 79.



(5) [SN -035000] X2 connector 111 Yel/Wht wire (E) has battery voltage?

Yes - Go to next step.

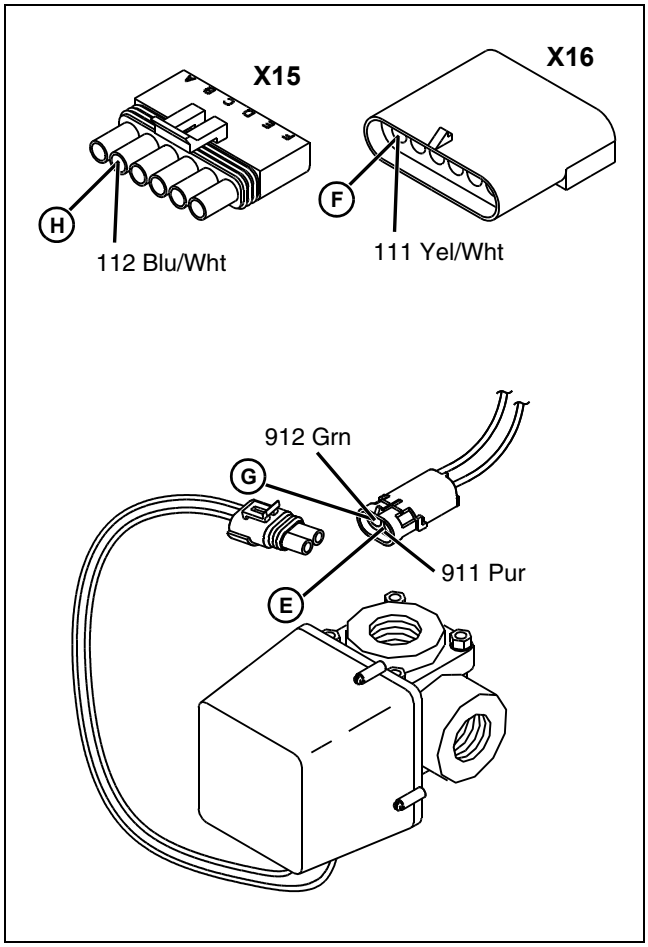
No - Test 111 Yel/Wht wire and connections. If OK, go to next step.

Symptom: Pressure Regulator Valve Circuit

(6) [SN -035000] X2 connector 112 Blu/Wht wire (F) has continuity to ground?

Yes - Go to next step.

No - Check 112 Blu/Wht wire and connections. If OK, test Auto/Man switch. See “D.P.D.T. Switch Test” on page 79.



(7) [SN 035001-and HD300] X2 connector 911 Pur wire (E) has battery voltage?

Yes - Go to next step.

No - Check X16 (Main Wiring Harness) 111 Yel/Wht wire (F) and connections. If OK, go to next step.

(8) [SN 035001-and HD300] X2 connector 912 Grn wire (G) has continuity to ground?

Yes - Go to next step.

No - Check X15 (Main Wiring Harness) 112 Blu/Wht wire (H) and connections. If OK, test Auto/Man switch. See “D.P.D.T. Switch Test” on page 79.

Boom Regulator Valve Circuit Operation HD200 (SN -35000)

Function:

To allow the operator to control the flow of chemical solution to each boom section individually.

Operating Conditions, Unswitched Circuits:

Sprayer unit mounted on utility vehicle.

Sprayer harness connected to vehicle battery.

Boom master switch in ON position.

One (or more) boom valve switches in ON position.

Theory of Operation:

The power circuit provides current to the utility vehicle key switch and to terminal 87 of the main disconnect relay (K1). The boom valve circuit is protected by a resettable 50-amp circuit breaker (F1).

With the utility vehicle key switch in the RUN position, current flows to terminal 86 of the main disconnect relay (K1). A path to ground completes the circuit, energizing the relay. As the relay energizes, current flows through 15-amp fuse (F5) to supply current to both the master boom On/Off switch (S6) and all three boom regulator valves (left, center and right).

When the boom master switch is moved to the ON position, current is supplied to each boom valve switch. When a boom valve switch is moved to the ON position, current flows to the relay coil in the boom regulator valve. A path to ground completes the circuit, energizing the relay.

Current then flows through the boom valve relay to the upper limit switch to the motor. A path to ground passing through the thermal cutout and lower limit switch back to the relay completes the circuit, energizing the motor. As the motor rotates it turns a threaded shaft that is connected to the plunger shaft, opening the valve.

As the motor reaches the maximum limit of travel, the lower limit switch is tripped breaking the path to ground, stopping the motor.

If for some reason (faulty motor, valve obstruction, etc.) the motor draws excessive current, a thermal breaker within the boom valve will trip, protecting the valve.

When the boom valve is moved to the OFF position, the current flow to the motor is reversed, closing the valve.

Boom Regulator Valve Circuit Operation HD200 (SN 35001-) and HD300

Function:

To allow the operator to control the flow of chemical solution to each boom section individually.

Operating Conditions, Unswitched Circuits:

Sprayer unit mounted on utility vehicle.

Sprayer harness connected to vehicle battery.

Boom master switch in ON position.

One (or more) boom valve switches in ON position.

Theory of Operation:

The power circuit provides current to the utility vehicle key switch and to terminal 87 of the main disconnect relay (K1). The boom valve circuit is protected by a auto-resetting 40-amp circuit breaker (F1).

With the utility vehicle key switch in the RUN position, current flows (186 Yel/Red) to terminal 86 of the main disconnect relay (K1). A path to ground (159/143 Blk) completes the circuit, energizing the relay. As the relay energizes, current flows through 15-amp fuse (F5) to supply current (192/190 Red) to both the master boom On/Off switch (S6) and all three boom regulator valves (left, center and right).

When the boom master switch is moved to the ON position, current is supplied to each boom valve switch (189/289/389 Yel/Red). When a boom valve switch is moved to the ON position, current flows to the relay coil in the boom regulator valve. A path to ground completes the circuit, energizing the relay.

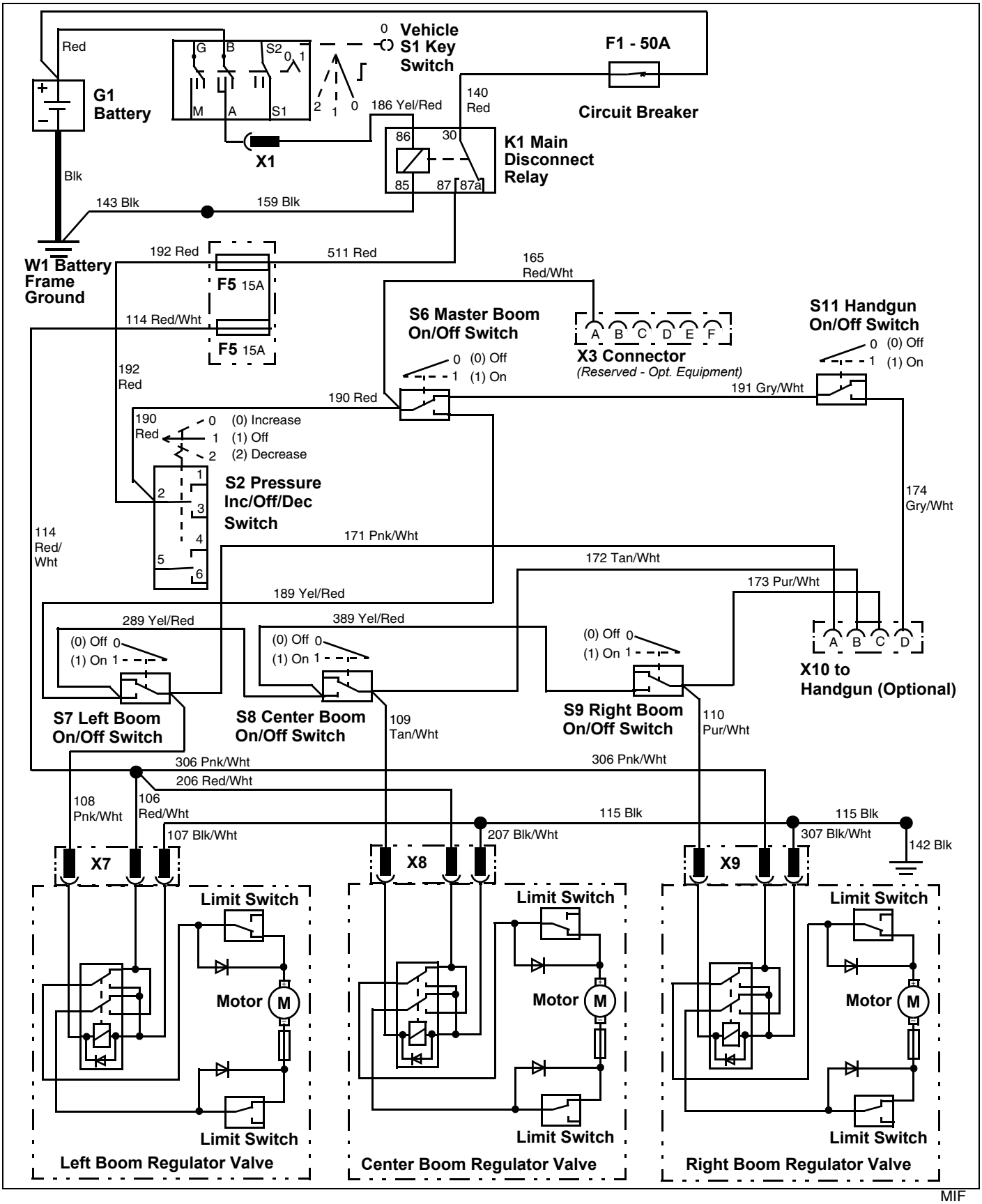
Current then flows through the boom valve relay to the upper limit switch to the motor. A path to ground passing through the thermal cutout and lower limit switch back to the relay completes the circuit, energizing the motor. As the motor rotates it turns a threaded shaft that is connected to the plunger shaft, opening the valve.

As the motor reaches the maximum limit of travel, the lower limit switch is tripped breaking the path to ground, stopping the motor.

If for some reason (faulty motor, valve obstruction, etc.) the motor draws excessive current, a thermal breaker within the boom valve will trip, protecting the valve.

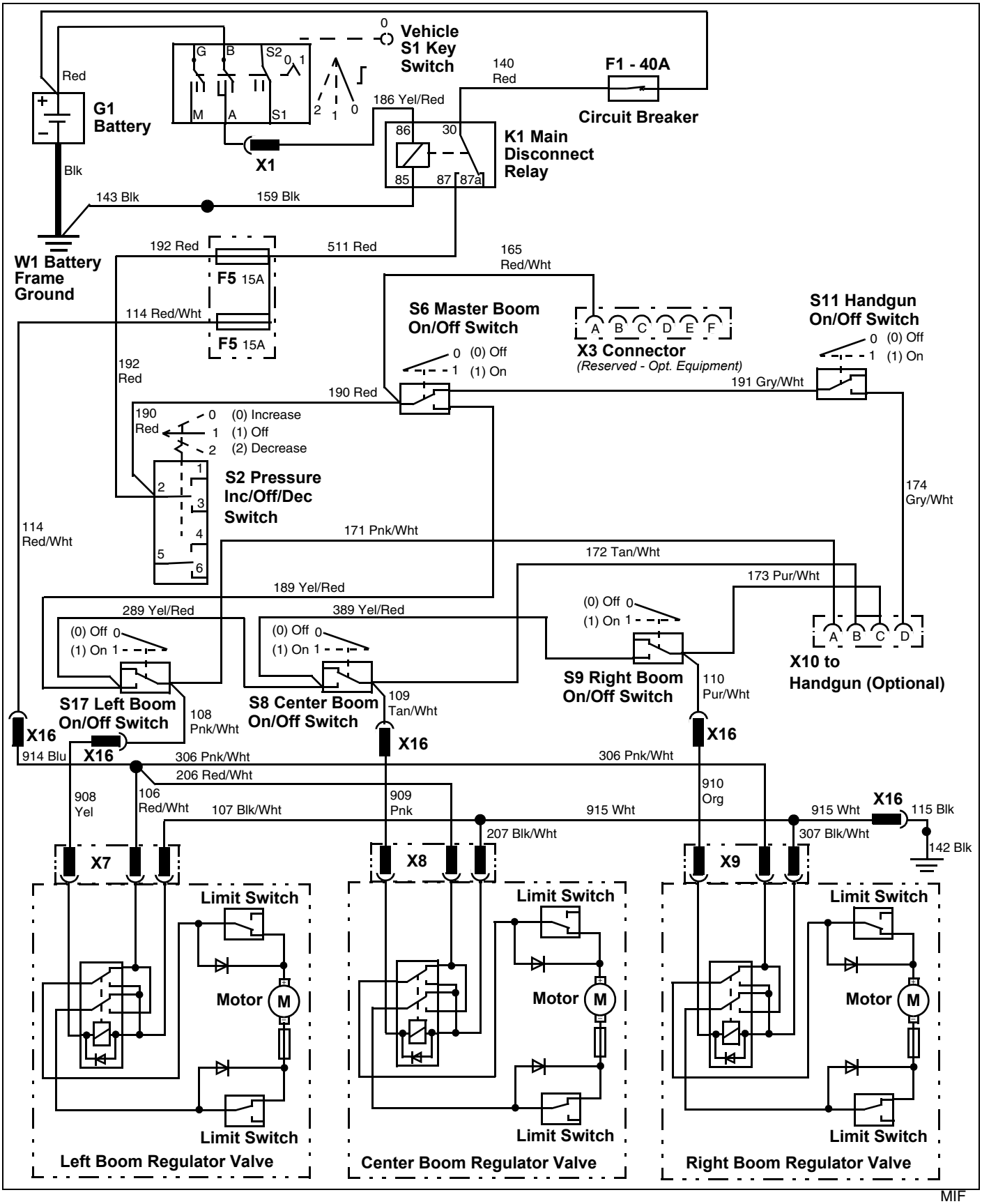
When the boom valve is moved to the OFF position, the current flow to the motor is reversed, closing the valve.

Boom Regulator Valve Circuit Schematic HD200 (SN -035000)



MIF

Boom Regulator Valve Circuit Schematic HD200 (SN 035001-) and HD300



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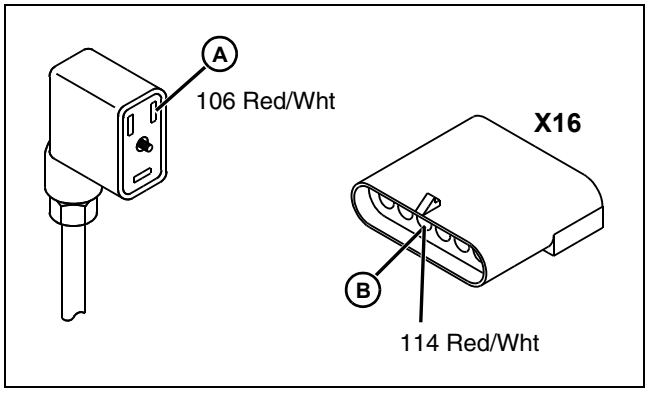
Boom Regulator Valve Circuit Diagnosis

CAUTION: Avoid injury! Disconnect power before connecting or disconnecting wiring harness connections. Failure to disconnect power may result in damage to electrical components.

Test Conditions:

- Machine parked on level surface.
- Sprayer mounted on utility vehicle
- Sprayer harness connected to vehicle battery.
- Key switch S1 in RUN position.
- Connections firmly seated and non-corroded.
- Meter negative lead on battery negative (-) terminal or chassis ground.
- Master boom On/Off switch in the ON position.
- Boom On/Off switch of section to be tested in the ON position.

System: Boom Regulator Valve Circuit



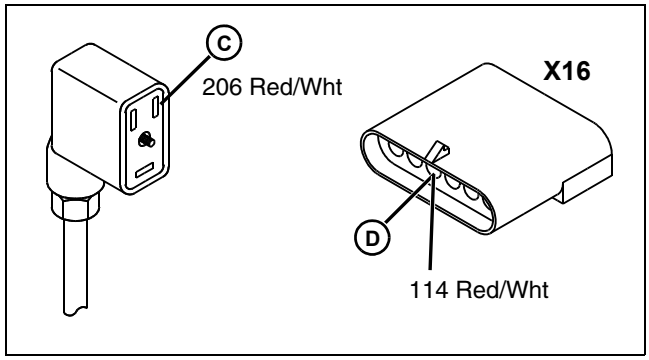
(1) X7 Left Boom Valve connector, pin 1 (A), has battery voltage

Yes - Go to next step.

No - HD200 (SN -035000): Check 106 and 114 Red/Wht wires and connections and F5 fuse. If OK, see “Power Circuit Schematic” on page 45.

No - HD200 (SN 035001-) and HD300: Check 106 and 114 Red/Wht wires, X16 connector and 114 Red/Wht wire (B), connections and F5 fuse. If OK, see “Power Circuit Schematic” on page 45.

System: Boom Regulator Valve Circuit

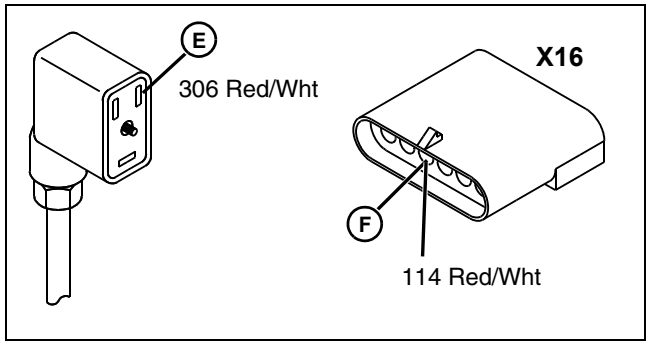


(2) X8 Center Boom Valve, pin 1 (C), has battery voltage?

Yes - Go to next step.

No - HD200 (SN -035000): Check 206 and 114 Red/Wht wires and connections and F5 fuse.

No - HD200 (SN 035001-) and HD300: Check 206 and 114 Red/Wht wires, X16 connector and 114 Red/Wht wire (D), connections and F5 fuse. If OK, see “Power Circuit Schematic” on page 45.



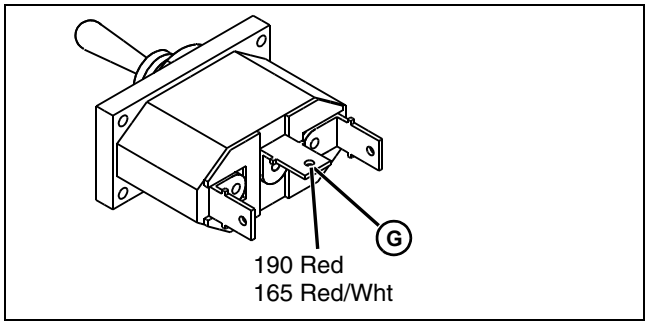
(3) X9 Right Boom Valve connector, pin 1 (E), has battery voltage?

Yes - Go to next step.

No - HD200 (SN -035000): Check 306 and 114 Red/Wht wires and connections and F5 fuse.

No - HD200 (SN 035001-) and HD300: Check 306 and 114 Red/Wht wires, X16 connector and 114 Red/Wht wire (F), connections and F5 fuse. If OK, see “Power Circuit Schematic” on page 45.

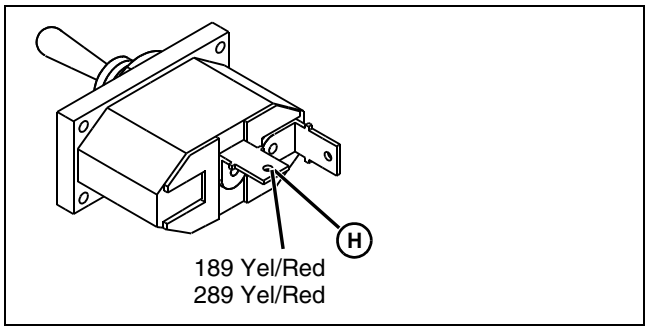
System: Boom Regulator Valve Circuit



(4) Master Boom On/Off Switch (G) has battery voltage?

No - Check 190 and 192 Red wires (G) and connections and F5 fuse. If OK, see "S.P.D.T. Switch Test" on page 79.

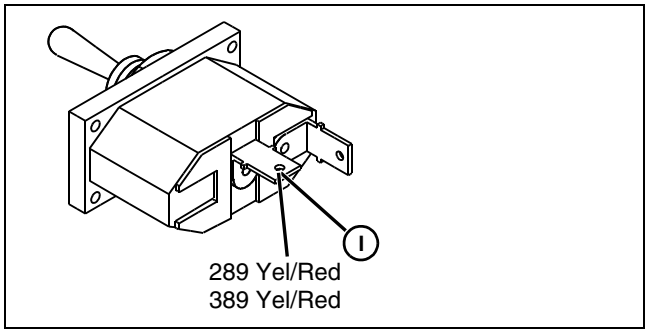
Yes - Go to next step.



(5) Left Boom On/Off Switch (H) has battery voltage?

Yes - Go to next step.

No - Check 189 Yel/Red wire (H) and connections. If OK, test master boom On/Off switch. See "S.P.D.T. Switch Test" on page 79.

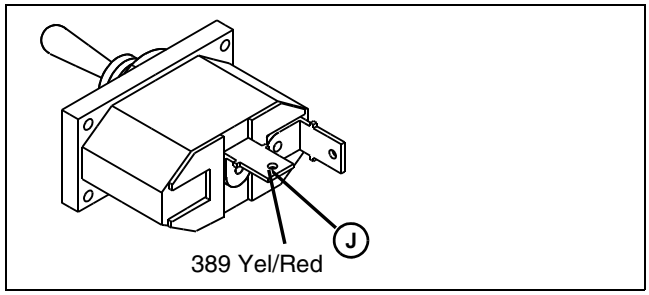


(6) Center Boom On/Off Switch (I) has battery voltage?

Yes - Go to next step.

System: Boom Regulator Valve Circuit

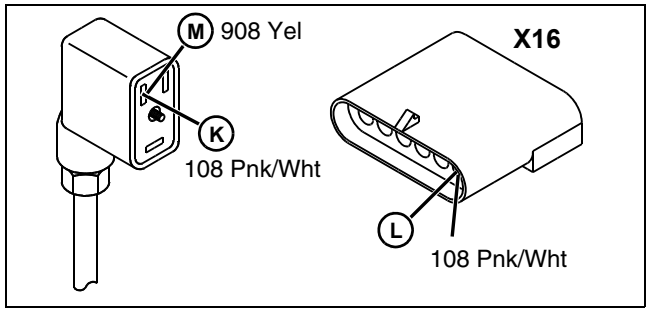
No - Check 289 Yel/Red wire (I) and connections.



(7) Right Boom On/Off Switch (J) has battery voltage?

Yes - Go to next step.

No - Check 389 Yel/Red wire (J) and connections.

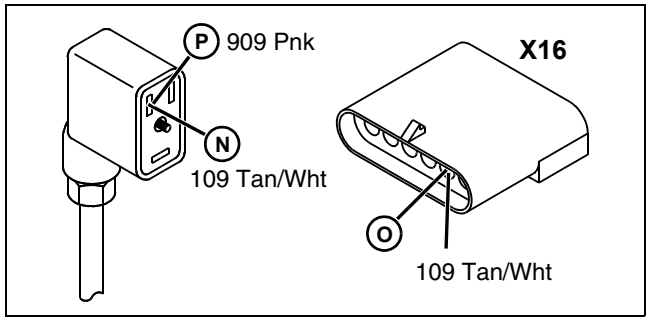


(8) X7 Left Boom Valve connector, pin 2, wire (H) has battery voltage?

Yes - Go to next step.

No - HD200 (SN -035000): Check X7 108 Pnk/Wht wire (K) and connections. If OK, test left boom On/Off switch. See "S.P.S.T. Switch Test" on page 78.

No - HD200 (SN 035001-) and HD300: Check X16 108 Pnk/Wht wire (L), X16 connector and X7 908 Yel wire (M), and connections. If OK, test left boom On/Off switch. See "S.P.S.T. Switch Test" on page 78.

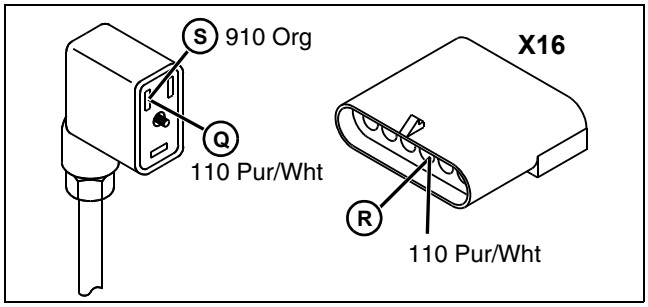


(9) X8 Center Boom Valve, pin 2, has battery voltage?

Yes - Go to next step.

No - HD200 (SN -035000): Check X8 109 Tan/Wht wire (N) and connections. If OK, test left boom On/Off switch. See “S.P.S.T. Switch Test” on page 78.

No - HD200 (SN 035001-) and HD300: Check X16 109 Tan/Wht wire (O), X16 connector and X8 909 Pnk wire (P), and connections. If OK, test left boom On/Off switch. See “S.P.S.T. Switch Test” on page 78.

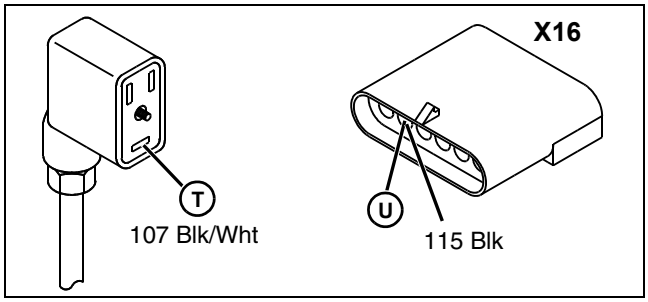


(10) X9 Right Boom Valve, pin 2, has battery voltage?

Yes - Go to next step.

No - HD200 (SN -035000): Check X9 110 Pur/Wht wire (Q) and connections. If OK, test left boom On/Off switch. See “S.P.S.T. Switch Test” on page 78.

No - HD200 (SN 035001-) and HD300: Check X16 110 Pur/Wht wire (R), X16 connector and X9 910 Org wire (S), and connections. If OK, test left boom On/Off switch. See “S.P.S.T. Switch Test” on page 78.



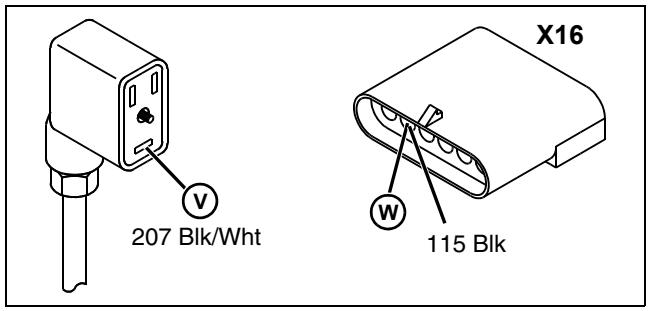
(11) X7 Left Boom Valve connectors, pin 3, has continuity to ground?

Yes - Go to next step.

No - HD200 (SN -035000): Check 107 Blk/Wht wire (T), 115 Blk/Wht wire, and 142 Blk wires and connections to ground.

System: Boom Regulator Valve Circuit

No - HD200 (SN 035001-) and HD300: Check 107 Blk/Wht (T) and 915 Wht wire, X16 connector, and 115 (U) and 142 Blk wires and connections to ground.

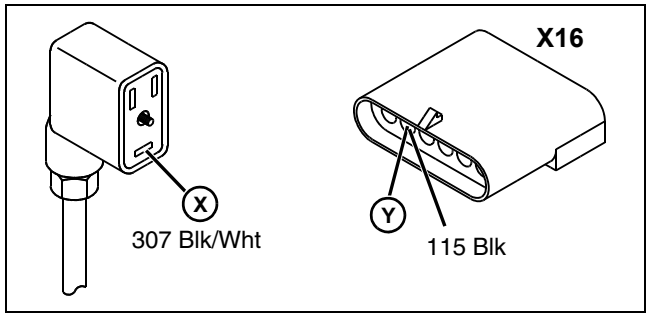


(12) X8 Center Boom Valve connector, pin 3 has continuity to ground?

Yes - Go to next step

No - HD200 (SN -035000): Check 207 (V), 115 Blk/Wht wire, and 142 Blk wire and connections to ground.

No - HD200 (SN 035001-) and HD300: Check 207 Blk/Wht (V) and 915 Wht wire, X16 connector, and 115 (W) and 142 Blk wires and connections to ground.



(13) X9 Right Boom Valve connector, pin 3, has continuity to ground?

No - HD200 (SN -035000): Check 307 (X), 115 Blk/Wht wire, and 142 Blk wire and connections to ground.

No - HD200 (SN 035001-) and HD300: Check 307 Blk/Wht (U) and 915 Wht wire, X16 connector, and 115 (Y) and 142 Blk wires and connections to ground.

Boom Actuator Circuit Operation

Function:

To allow the operator to raise or lower the boom wings without leaving the utility vehicle seat.

Operating Conditions, Unswitched Circuits:

Sprayer unit mounted on utility vehicle.

Sprayer harness connected to vehicle battery.

Boom locking pins removed and in storage position.

Right and/or left Raise/Off/Lower switches in Raise or Lower position.

NOTE: The boom valves should be in the OFF position prior to raising the boom wings, to prevent unnecessary exposure to chemical solution.

Theory of Operation:

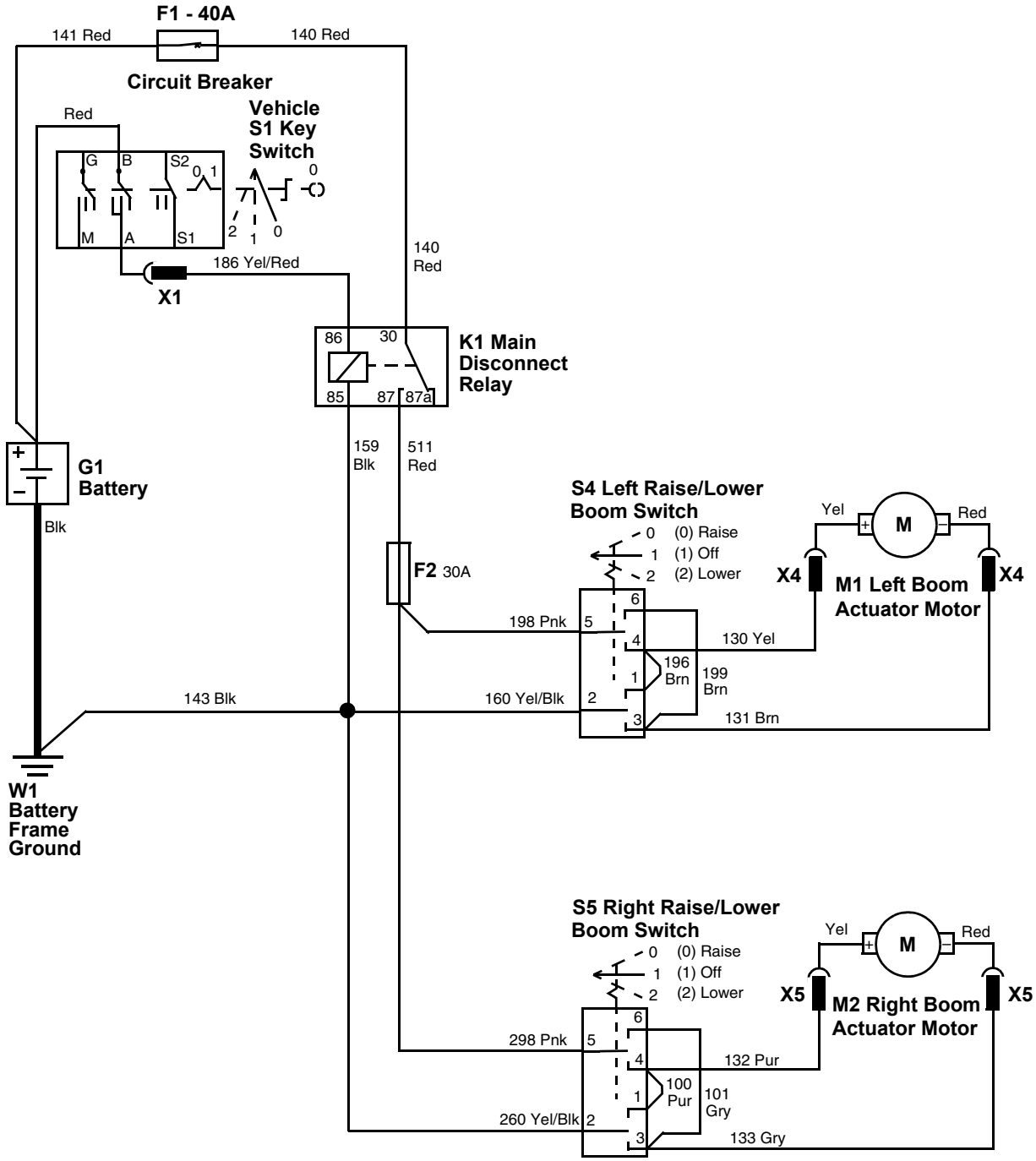
The power circuit provides current to the utility vehicle key switch and to terminal 87 of the main disconnect relay (K1). The boom valve circuit is protected by a auto-resetting 40-amp circuit breaker (F1).

With the utility vehicle key switch in the RUN position, current flows (186 Yel/Red) to terminal 86 of the main disconnect relay (K1). A path to ground (159/143 Blk) completes the circuit, energizing the relay. As the relay energizes, current flows through circuit breaker (F2) to supply current (198/298) to the left and right Raise/Off/Lower switches (S4 and S5).

When the Raise/Off/Lower switches are held in the Raise position, current flows to the boom actuator motor(s), raising the boom wings.

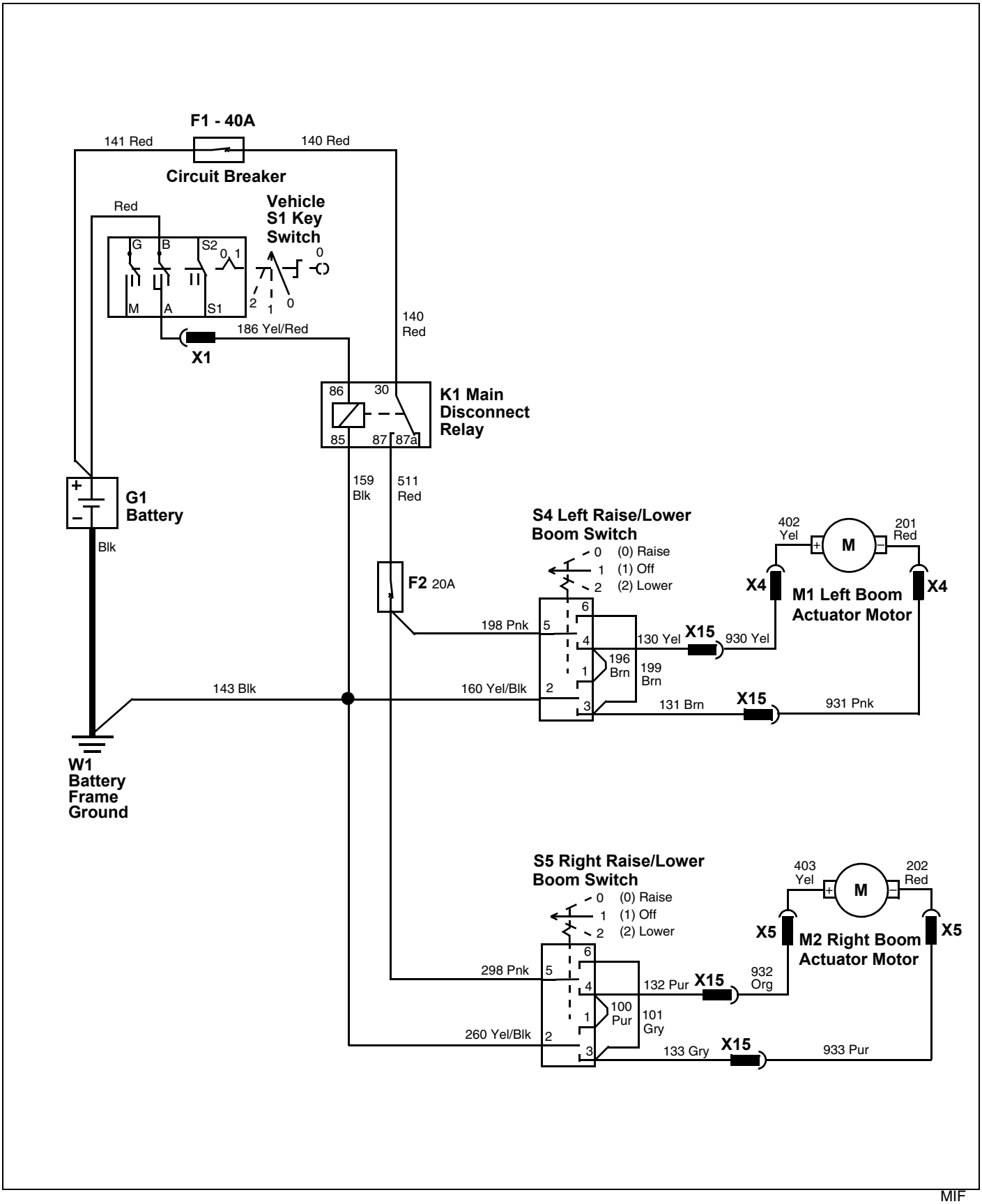
When the Raise/Off/Lower switches are held in the Lower position, the current flow to the motor is reversed, causing the motors to rotate in the opposite direction, lowering the boom wings.

Boom Actuator Circuit Schematic HD200 (SN -035000)



MIF

Boom Actuator Circuit Schematic HD200 (SN 035001-) and HD300



MIF

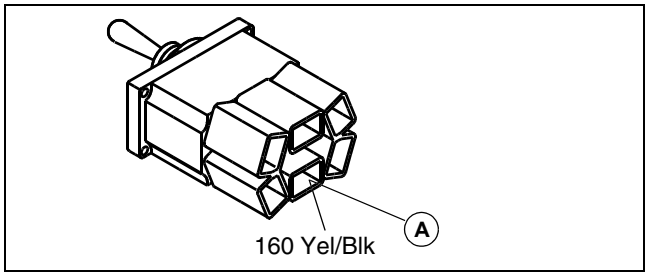
Boom Actuator Circuit Diagnosis

CAUTION: Avoid injury! Disconnect power before connecting or disconnecting wiring harness connections. Failure to disconnect power may result in damage to electrical components.

Test Conditions:

- Machine parked on level surface.
- Sprayer mounted on utility vehicle.
- Sprayer harness connected to vehicle battery.
- Key switch S1 in OFF position.
- Connections firmly seated and non-corroded.
- Meter negative lead on battery negative (-) terminal or chassis ground.

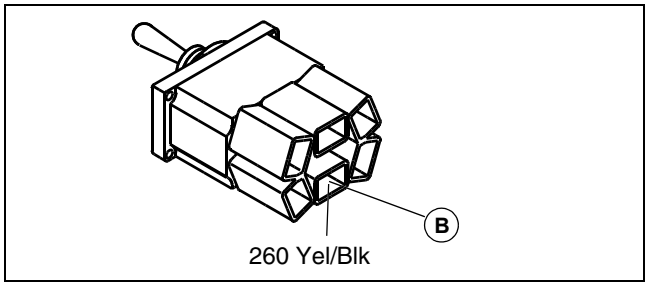
System: Boom Actuator Circuit



(1) S4 Left Raise/Off/Lower Boom Switch (A) has continuity to ground?

Yes - Go to next step.

No - Check 160 Yel/Blk and 143 Blk wires and connections.



(2) S5 Right Raise/Off/Lower Boom Switch (B) has continuity to ground?

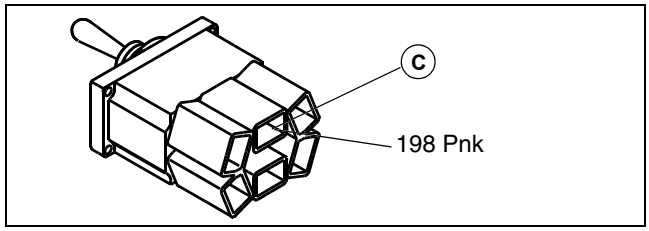
Yes - Go to next step.

No - Check 260 Yel/Blk and 143 Blk wires and connections.

Test Conditions:

- S1 Key Switch in RUN position

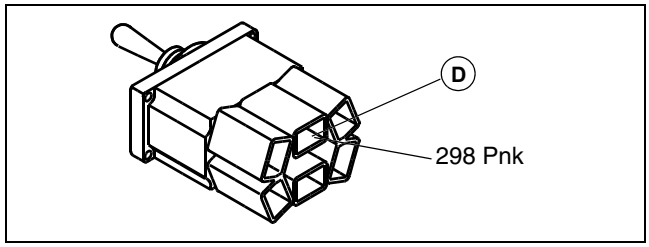
System: Boom Actuator Circuit



(1) S4 Left Raise/Off/Lower Boom Switch has battery voltage?

Yes - Go to next step.

No - Check 198 Pnk wire and connections and F2 fuse or circuit breaker. See “Power Circuit Operation (All Models)” on page 44.



(2) S5 Right Raise/Off/Lower Boom Switch has battery voltage?

No - Check 298 Pnk wire and connections and F2 fuse or circuit breaker. See “Power Circuit Operation (All Models)” on page 44.

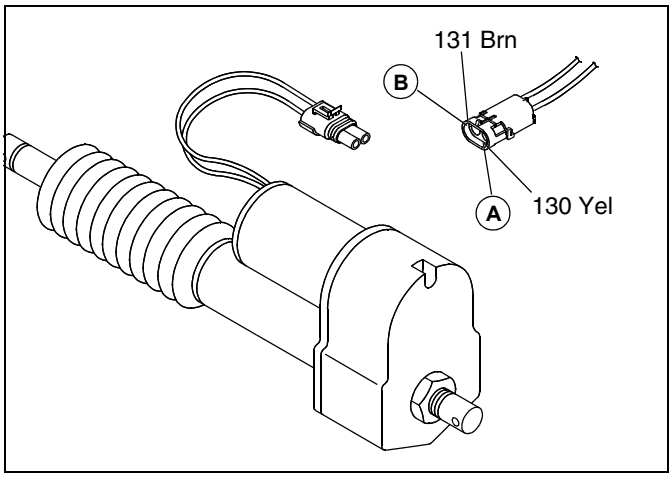
Boom Actuator Circuit Diagnosis Continued HD200 (SN -035000)

CAUTION: Avoid injury! Disconnect power before connecting or disconnecting wiring harness connections. Failure to disconnect power may result in damage to electrical components.

Test Conditions:

- S1 Key switch in RUN position.
- Boom Raise/Off/Lower switch in Lower position.
- Boom actuator motor connectors (X4 - Left and X5 - Right) disconnected.

System: Boom Actuator Circuit Continued HD200 (SN - 035000)



(1) X4 Left Boom Actuator Motor connector (A) has battery voltage?

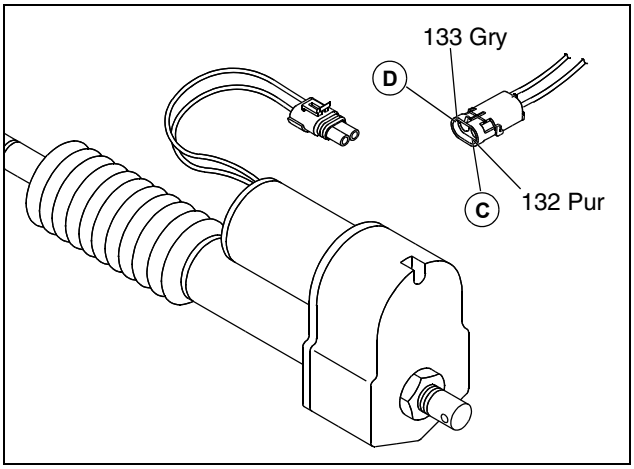
No - Check 130 Yel (A) and 196 Brn wires and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

Yes - Go to next step.

(2) X4 Left Boom Actuator Motor connector (B) has continuity to ground?

Yes - Go to next step.

No - Check 131 (B) and 199 Brn wires and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.



(3) X5 Right Boom Actuator Motor connector (C) has battery voltage?

Yes - Go to next step.

System: Boom Actuator Circuit Continued HD200 (SN - 035000)

No - Check 132 (C) and 100 Pur wires and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

(4) X5 Right Boom Actuator Motor connector (D) has continuity to ground?

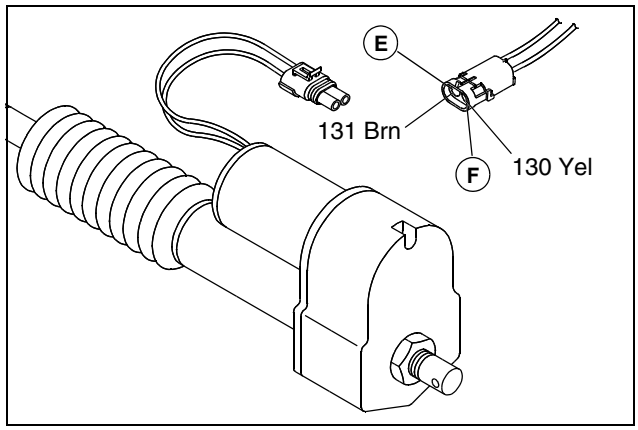
Yes - Go to next step.

No - Check 133 (D) and 101 Gry wires and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

Test Conditions:

- S1 Key Switch in RUN position.
- Boom Raise/Off/Lower switch in Raise position.
- Boom actuator motor connectors (X4 - Left and X5 - Right) disconnected.

System: Boom Actuator Circuit Continued (SN - 035000)



(1) X4 Left Boom Actuator Motor connector (E) has battery voltage?

Yes - Go to next step.

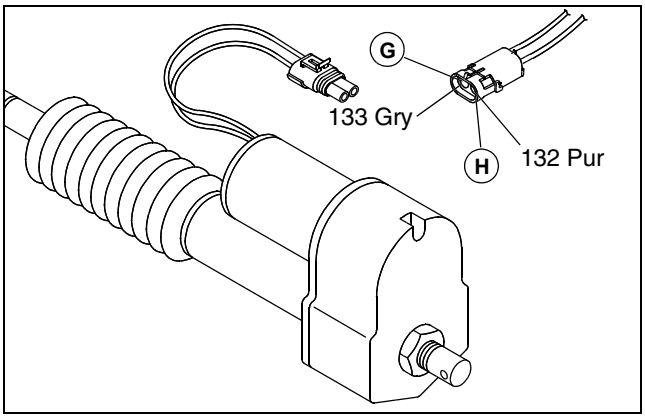
No - Check 131 (E) and 199 Brn wires and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

(2) X4 Left Boom Actuator Motor connector (F) has continuity to ground?

Yes - Go to next step.

No - Check 130 Yel (F) and 196 Brn wires and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

System: Boom Actuator Circuit Continued (SN - 035000)



(3) X5 Right Boom Actuator Motor connector (G) has battery voltage?

Yes - Go to next step.

No - Check 133 (G) and 101 Gry wires and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

(4) X5 Right Boom Actuator Motor connector (H) has continuity to ground?

No - Check 132 (H) and 100 Pur wires and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

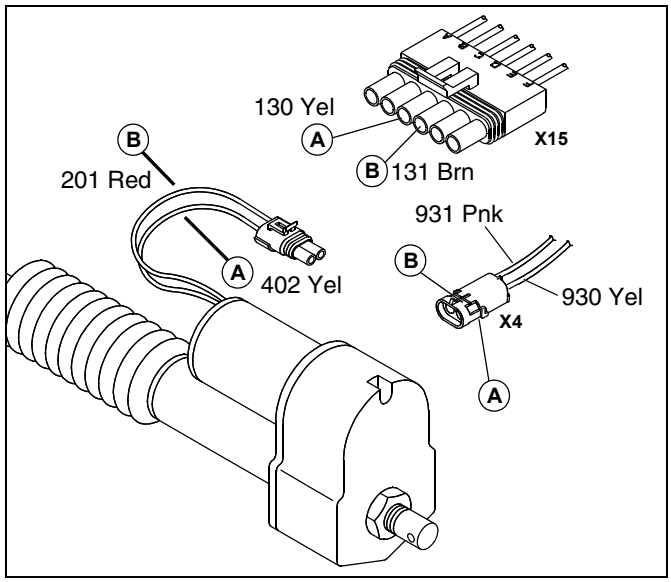
Boom Actuator Circuit Diagnosis Continued HD200 (SN 035001-) and HD300

CAUTION: Avoid injury! Disconnect power before connecting or disconnecting wiring harness connections. Failure to disconnect power may result in damage to electrical components.

Test Conditions:

- S1 Key switch in RUN position.
- Boom Raise/Off/Lower switch in Lower position.
- Boom actuator motor connectors (X4 - Left and X5 - Right) disconnected.

System: Boom Actuator Circuit Continued HD200 (SN 035001 -) and HD300



(1) X4 and X15 connectors have battery voltage?

Yes - Go to next step.

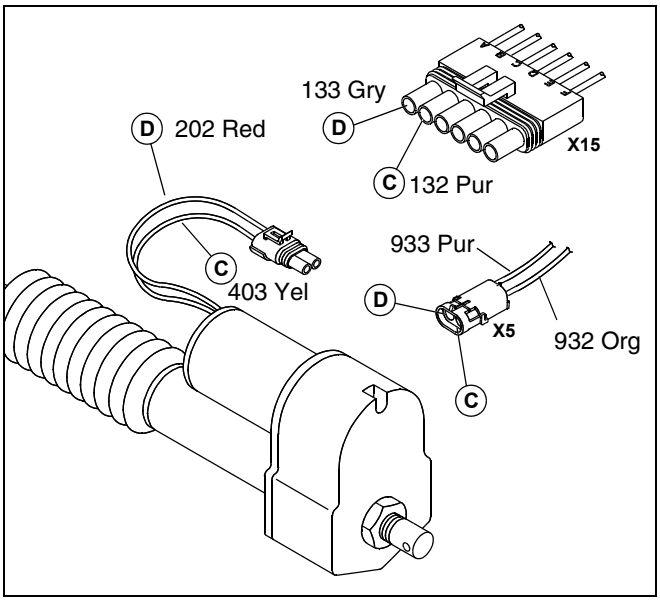
No - Check 130, 930 and 402 Yel wires (A) and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

(2) X4 and X15 connectors have continuity to ground?

Yes - Go to next step.

No - Check 131 Brn, 931 Pnk, and 201 Red wires (B) and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

System: Boom Actuator Circuit Continued HD200 (SN 035001 -) and HD300



(3) X5 and X15 connectors have battery voltage?

Yes - Go to next step.

No - Check 132 Pur, 932 Org and 403 Yel wires (C) and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

(4) X5 and X15 connectors have continuity to ground?

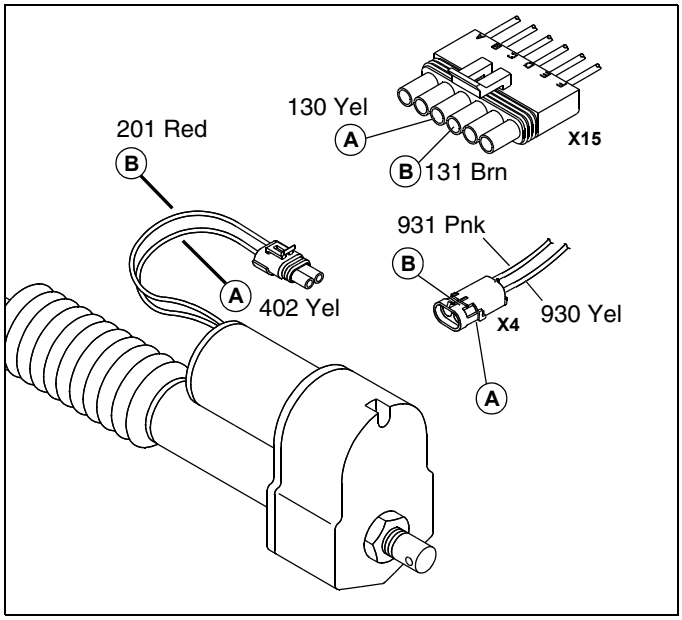
Yes - Go to next step.

No - Check 133 Gry, 933 Pur, 202 Red wires (D) and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

Test Conditions:

- S1 Key Switch in RUN position
- Boom Raise/Off/Lower switch in Raise position
- Boom actuator motor connectors (X4 - Left and X5 - Right) disconnected

System: Boom Actuator Circuit Continued HD200 (SN 035001 -) and HD300



(1) X4 and X15 connectors have battery voltage?

Yes - Go to next step.

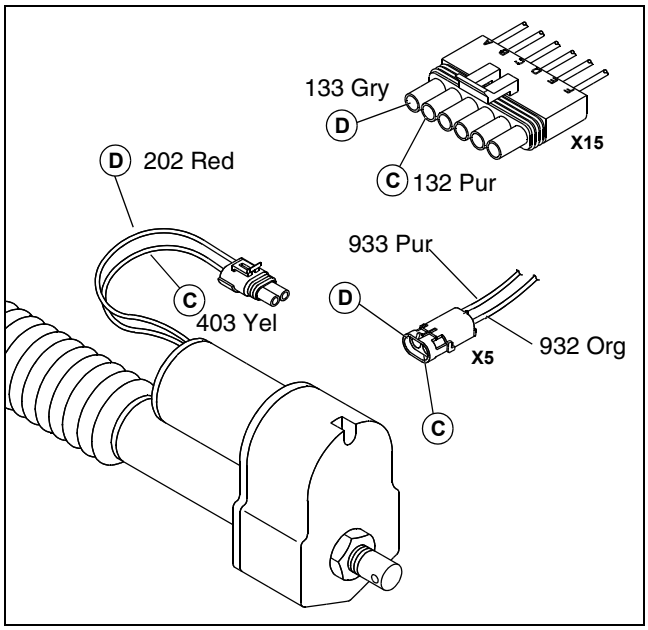
No - Check 131 Brn, 931 Pnk, and 201 Red wires (B) and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

(2) X4 and X15 connectors have continuity to ground?

Yes - Go to next step.

No - Check 130, 930 and 402 Yel wires (A) and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

System: Boom Actuator Circuit Continued HD200 (SN 035001 -) and HD300



(3) X5 and X15 connectors have battery voltage?

Yes - Go to next step.

No - Check 133 Gry, 933 Pur, 202 Red wires (D) and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

(4) X5 and X15 connector have continuity to ground?

No - Check 132 Pur, 932 Org and 403 Yel wires (C) and connections. If OK, test the Raise/Off/Lower switch. See “D.P.D.T. Switch Test” on page 79.

Foam Marker Circuit Operation

Function:

To engage and operate the foam marker system.

Operating Conditions:

Sprayer mounted on utility vehicle.

Sprayer harness connected to vehicle battery.

Foam marker harness connected to sprayer harness.

Foam marker tank filled.

Foam marker liquid pump primed. See “Liquid Pump Priming Procedure - Foam Marker System” on page 146.

Foam marker Right/Off/Left switch in Right or Left position.

Theory of Operation:

The power circuit provides current to the utility vehicle key switch and to terminal 87 of the main disconnect relay (K1). The sprayer circuit is protected by a auto-resetting 40-amp circuit breaker (F1).

With the utility vehicle key switch in the RUN position, current flows (186 Yel/Red) to terminal 86 of the main disconnect relay (K1). A path to ground (159/143 Blk) completes the circuit, energizing the relay. As the relay energizes, current flows through 15-amp fuse (F4) to supply current (104 Tan) to common terminals of the foam marker Left/Off/Right switch (S10).

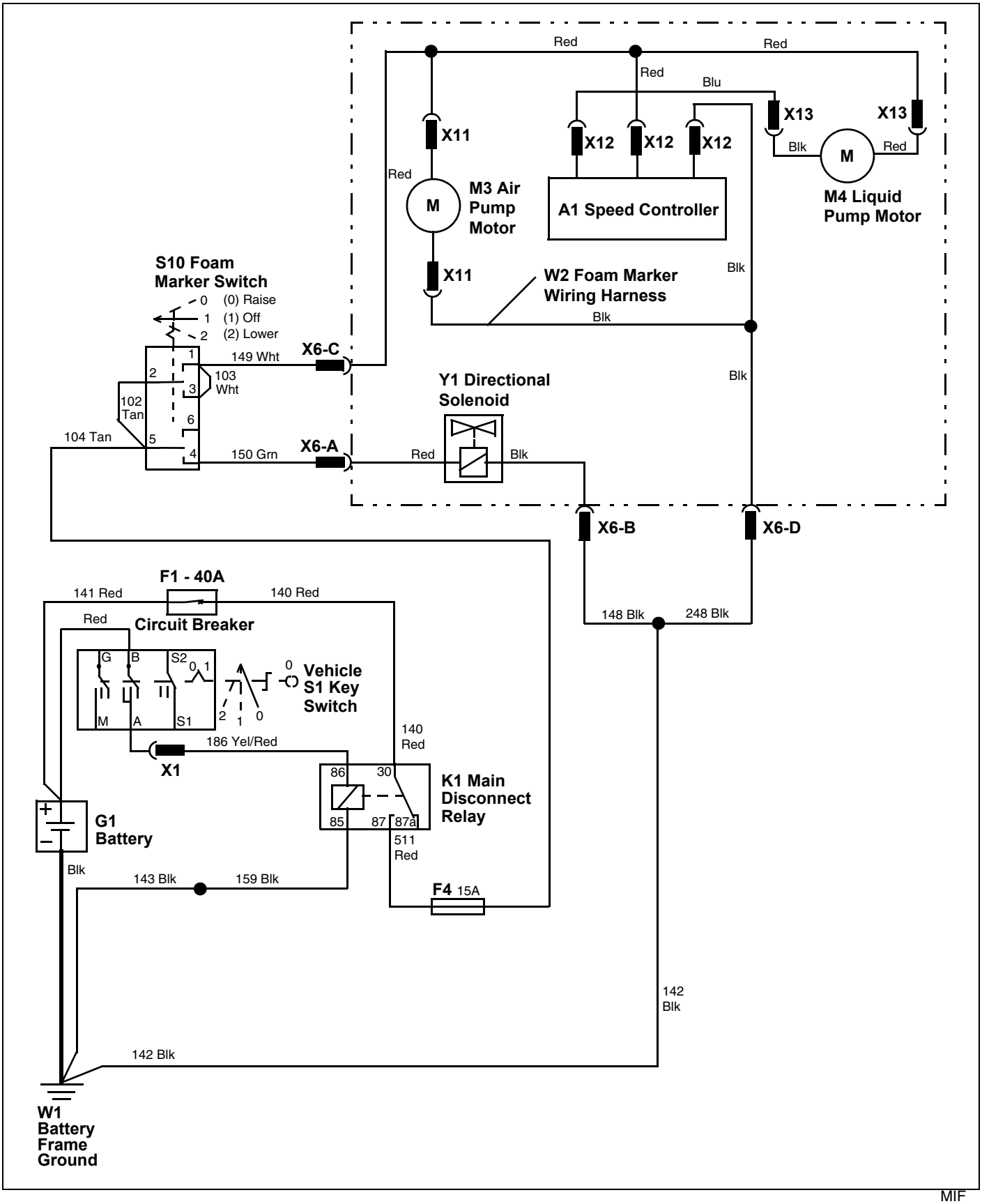
NOTE: When current to the direction valve is interrupted, the valve defaults to the right.

When the S10 Left/Off/Right switch is moved to the Left position, current (150 Grn) flows to the Y1 Direction valve solenoid, directing the flow to the left boom.

Current also flows to the air pump motor (M3), speed controller (A1) and liquid pump motor (M4). A path to ground (248/142 Blk) for the air pump motor completes the circuit, energizing the motor.

The path to ground for the M4 liquid pump motor is controlled through the speed controller. As the A1 Speed Controller is adjusted, the speed of the M4 liquid pump motor is changed.

Foam Marker Circuit Schematic



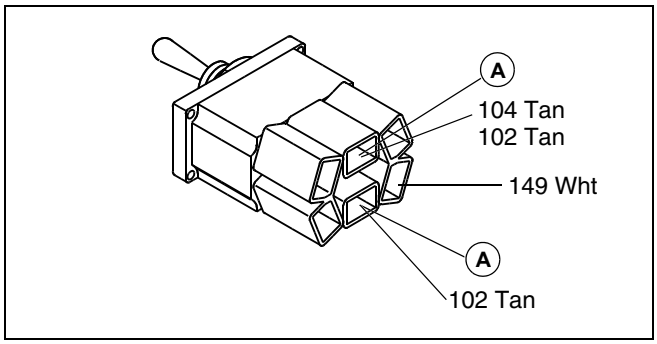
MIF

Foam Marker Circuit Diagnosis

Test Conditions:

- Machine parked on level surface.
- Sprayer mounted on utility vehicle.
- Sprayer harness connected to vehicle battery.
- S1 key switch in Run position.
- S10 Foam marker switch in Off position.
- Connection(s) firmly seated and non-corroded.
- Meter negative (-) lead on battery negative terminal or chassis ground.

System: Foam Marker Circuit



(1) S10 Foam Marker Switch (A) has battery voltage?

Yes - Go to next step.

No - Check 104 and 102 Tan wire (A) and connections and F4 fuse. See “Power Circuit Operation (All Models)” on page 44.

Test Conditions:

- S10 Foam Marker Switch in Left position.

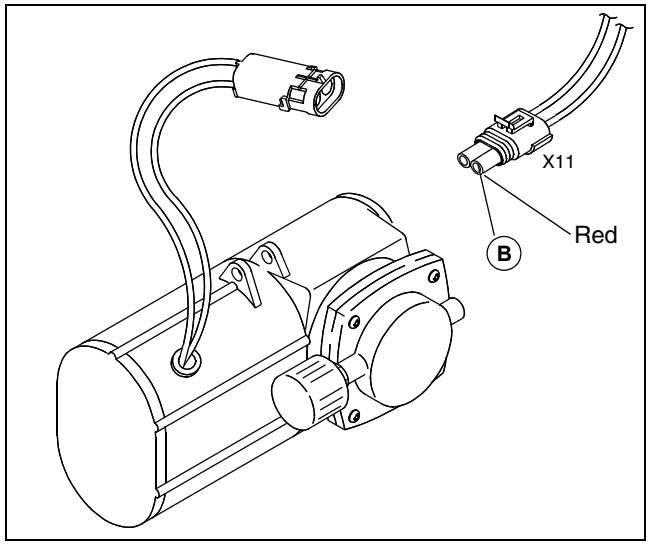
System: Foam Marker Circuit Continued

(1) S10 Foam Marker Switch has battery voltage?

Yes - Go to next step.

No - Test foam marker switch. See “D.P.D.T. Switch Test” on page 79.

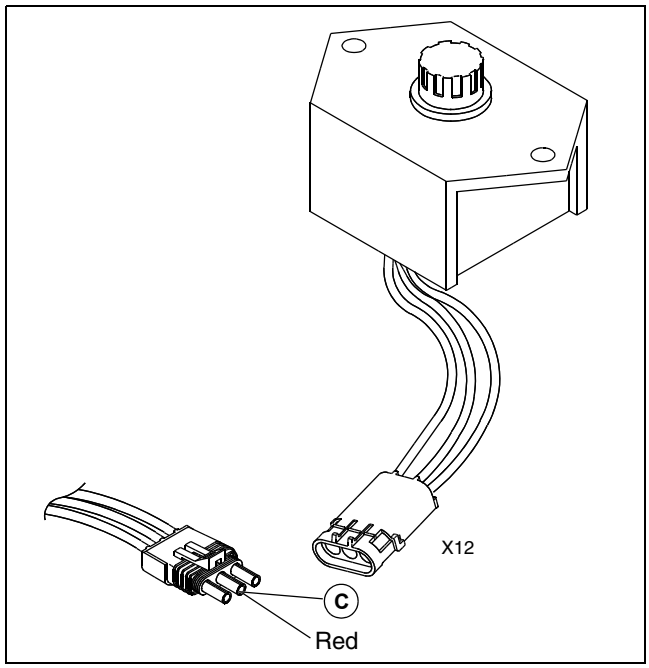
System: Foam Marker Circuit Continued



(2) M3 Air Pump Motor (B) has battery voltage?

Yes - Go to next step.

No - Check red wire (B) to X11 pump motor connector, 149 Wht wire (B) and X6-C wire.

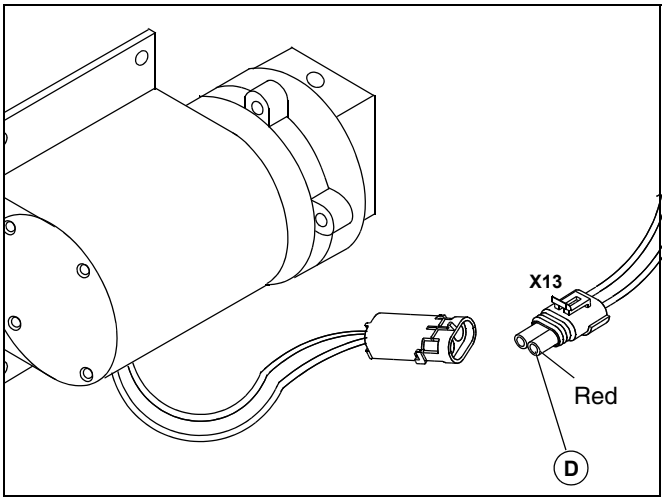


(3) A1 Speed Controller has battery voltage?

Yes - Go to next step.

No - Check Red wire (C) to X12 speed controller connector, 149 Wht wire, and X6-C wire.

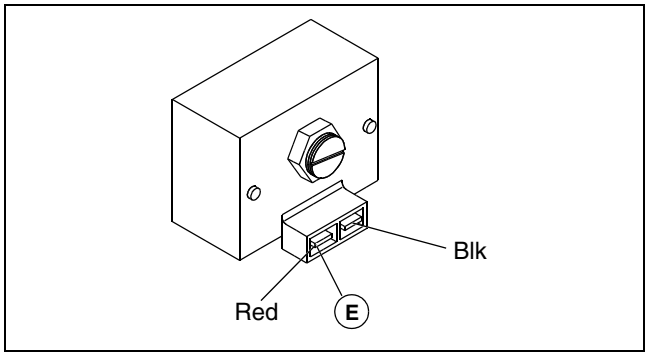
System: Foam Marker Circuit Continued



(4) M4 Liquid Pump Motor has battery voltage?

Yes - Go to next step.

No - Check Red wire (D) to X13 liquid pump motor connector, 149 Wht wire and X6-C wire. See “D.P.D.T. Switch Test” on page 79.

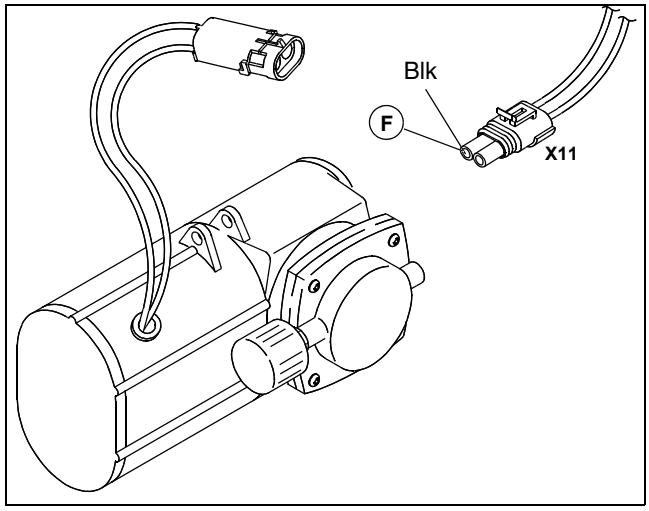


(5) Y1 Directional Solenoid (E) has battery voltage?

Yes - Go to next step.

No - Check 150 Grn wire, X6-A connector and Red wire (E) to Y1 solenoid. Test S10 foam marker switch. See “D.P.D.T. Switch Test” on page 79.

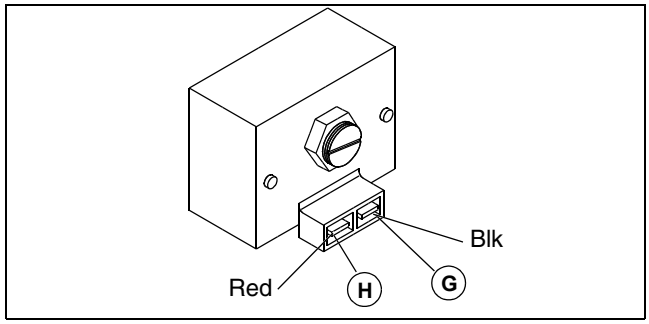
System: Foam Marker Circuit Continued



(6) M3 Air Pump Motor has continuity to ground?

Yes - Go to next step.

No - Check Blk wires (F) to X11 connector, X6-D connector, and 248 and 142 Blk wires and connectors.



(7) Y1 Directional Solenoid (G) has continuity to ground?

Yes - Go to next step.

No - Check Blk wire (G) to X6-B connector and 148 and 142 Blk wires and connections.

Test Conditions:

- S10 Foam Marker Switch in Right position.

System: Foam Marker Circuit

(1) Y1 Direction Valve Solenoid (H) measures less than one volt?

No - Check Red wire (H) to X6-A connector, and 150 Grn wire and connections. Test S10 foam marker switch. See “D.P.D.T. Switch Test” on page 79.

Electric Hose Reel - Rewind Circuit Operation

Function:

To engage the hose reel rewind motor when the hose rewind switch is depressed.

Operating Conditions:

Sprayer mounted on utility vehicle.

Hose reel harness connected to vehicle battery.

Theory of Operation:

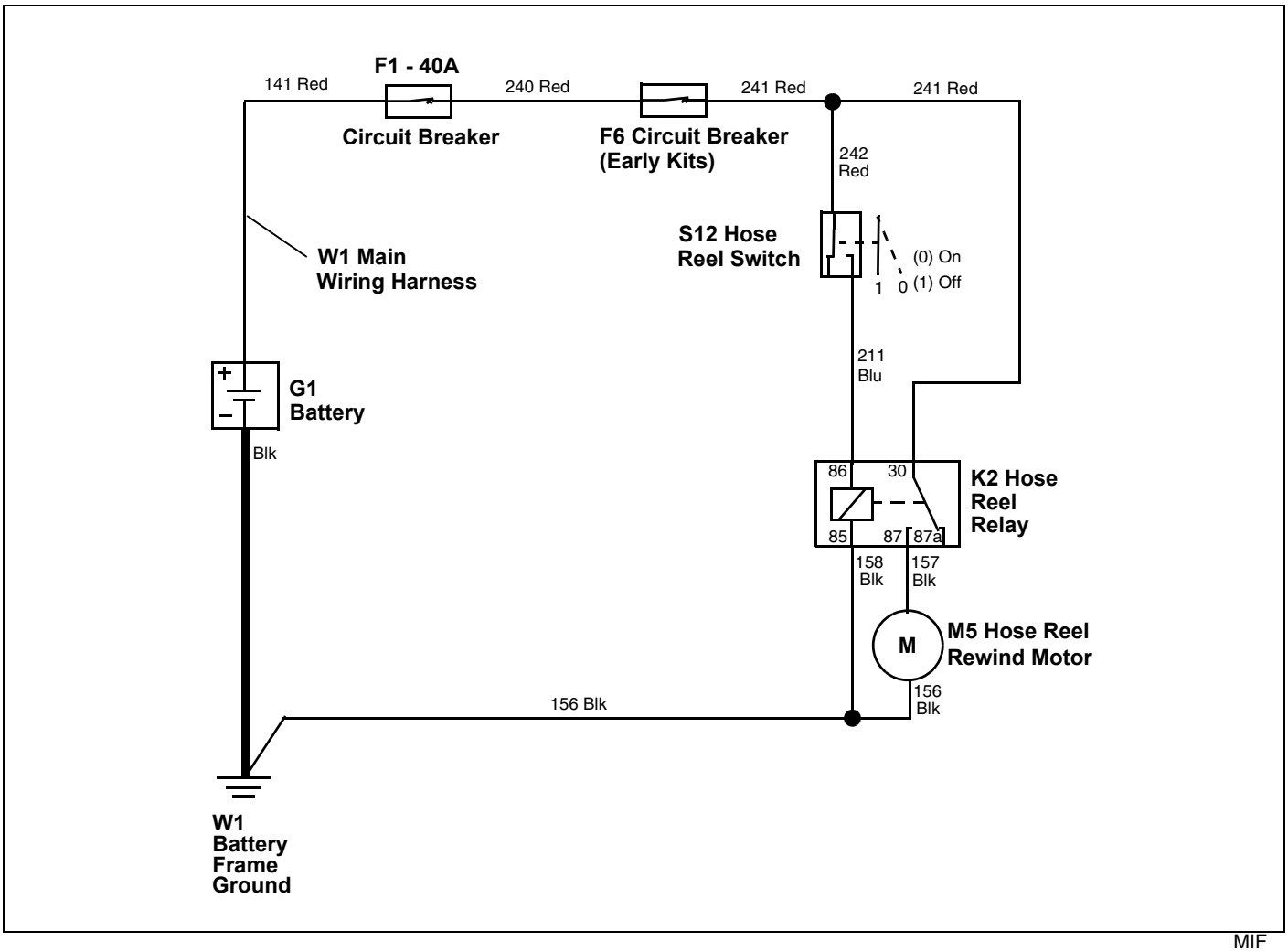
The power circuit provides current to the hose reel rewind relay (K2) and to hose reel rewind switch (S12). The hose reel circuit is protected by an auto-resetting 40-amp circuit breaker (F1), and a manual reset 50-amp circuit breaker on early hose reel kits.

Current flows from the battery positive (+) post to the F1 40-amp circuit breaker (141 Red) [and if installed, the F6 circuit breaker] to the K2 hose reel relay (241 Red) and to the S12 hose relay rewind switch (242 Red).

As the S12 hose reel rewind switch is pressed, current (211 Blu) flows to the coil of the hose reel rewind relay (K2). A path to ground (158 Blk) completes the circuit, energizing the solenoid.

With the solenoid energized, current (157 Blk) flows to the M5 hose reel rewind motor, A path (156 Blk) to ground completes the circuit, energizing the motor and rewinding the hose.

Electric Hose Reel Circuit Schematic



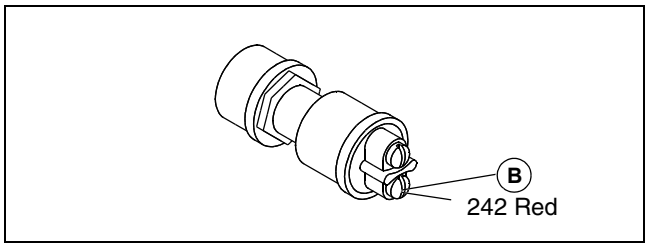
MIF

Electric Hose Reel Circuit Diagnosis

Test Conditions:

- Machine parked on level surface.
- Sprayer mounted on utility vehicle.
- Hose reel harness connected to 40-amp circuit breaker (F1).
- S1 key switch in Off position.
- Connection(s) firmly seated and non-corroded.
- Meter negative (-) lead on battery negative terminal or chassis ground.

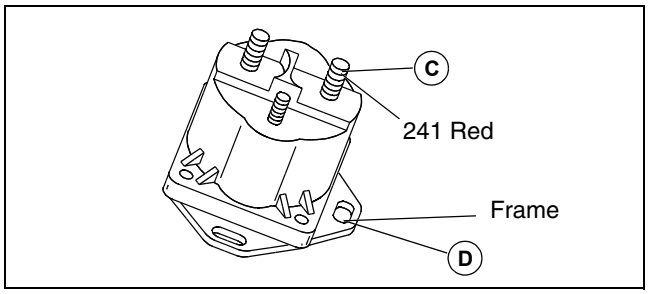
System: Electric Hose Reel Circuit



(1) S12 Hose Reel Switch (B) has battery voltage?

Yes - Go to next step.

No - Check 242 Red wire (B) and connections. See “Power Circuit Operation (All Models)” on page 44. Test circuit breaker. See “Circuit Breaker Test” on page 76.



(2) K2 Hose Reel Solenoid (C) has battery voltage?

Yes - Go to next step.

No - Check 241 Red wire (C) and connections.

(3) K2 Hose Reel Solenoid (D) has continuity to ground?

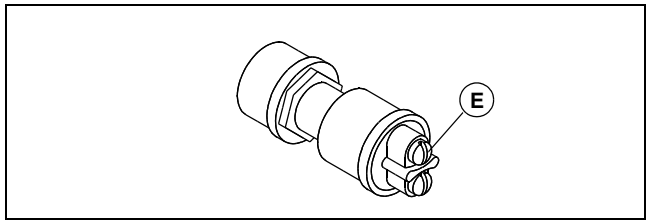
Yes - Go to next step.

No - Check for any rust or corrosion in or around the hose reel solenoid mounting plate and hardware.

Test Conditions:

- S12 Hose rewind switch in REWIND position.

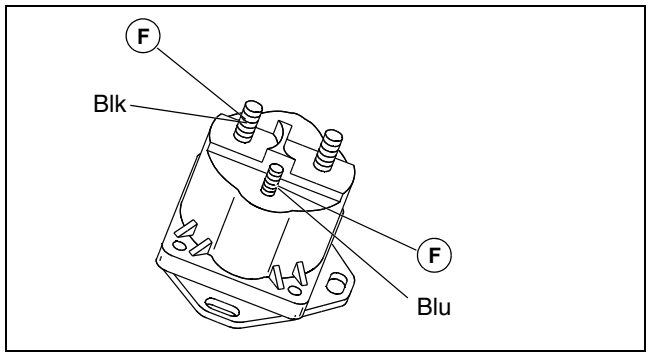
System: Electric Hose Reel Circuit



(1) S12 Hose Reel Switch (E) has battery voltage?

Yes - Go to next step.

No - Test S112 Hose Reel Switch. See “Hose Reel Switch Test” on page 77.



(2) K2 Hose Reel Switch Blu wire (F) has battery voltage?

Yes - Go to next step.

No - Check 211 Blu wire (F) and connections.

(3) K2 hose reel switch Blk wire (G) has battery voltage?

No - Test K2 hose reel solenoid. See “Hose Reel Solenoid Test” on page 77.

Handgun (Option) Circuit Operation

Function:

To allow the operator to activate the optional autorate meter without an error. The handgun sprayer can be operated without this circuit in place.

In normal operation, without the rate controller installed, this is a manual valve operation and is not affected by electrical issues.

Operating Conditions:

Sprayer unit mounted on utility vehicle.

Sprayer harness connected to vehicle battery.

S1 Vehicle Key Switch in Run position.

Handgun Option mounted on Hose Reel.

S6 Master Boom switch in Off position and S11 Handgun On/Off Switch in On position.

or:

S6 Master Boom switch in ON position and S17 Left Boom Switch, S8 Center Boom Switch and S9 Right Boom Switch in On position.

Theory of Operation:

The power circuit provides current to the utility vehicle key switch and to terminal 87 of the main disconnect relay (K1). The handgun circuit is protected by a auto-resetting 40-amp circuit breaker (F1).

With the S1 utility vehicle key switch in the RUN position, current flows (186 Yel/Red) to terminal 86 of the main disconnect relay (K1). A path to ground (159/143 Blk) completes the circuit, energizing the relay. As the relay energizes, current flows through 15-amp fuse (F5) to supply current (192/190) Red to the S6 Master Boom On/Off switch).

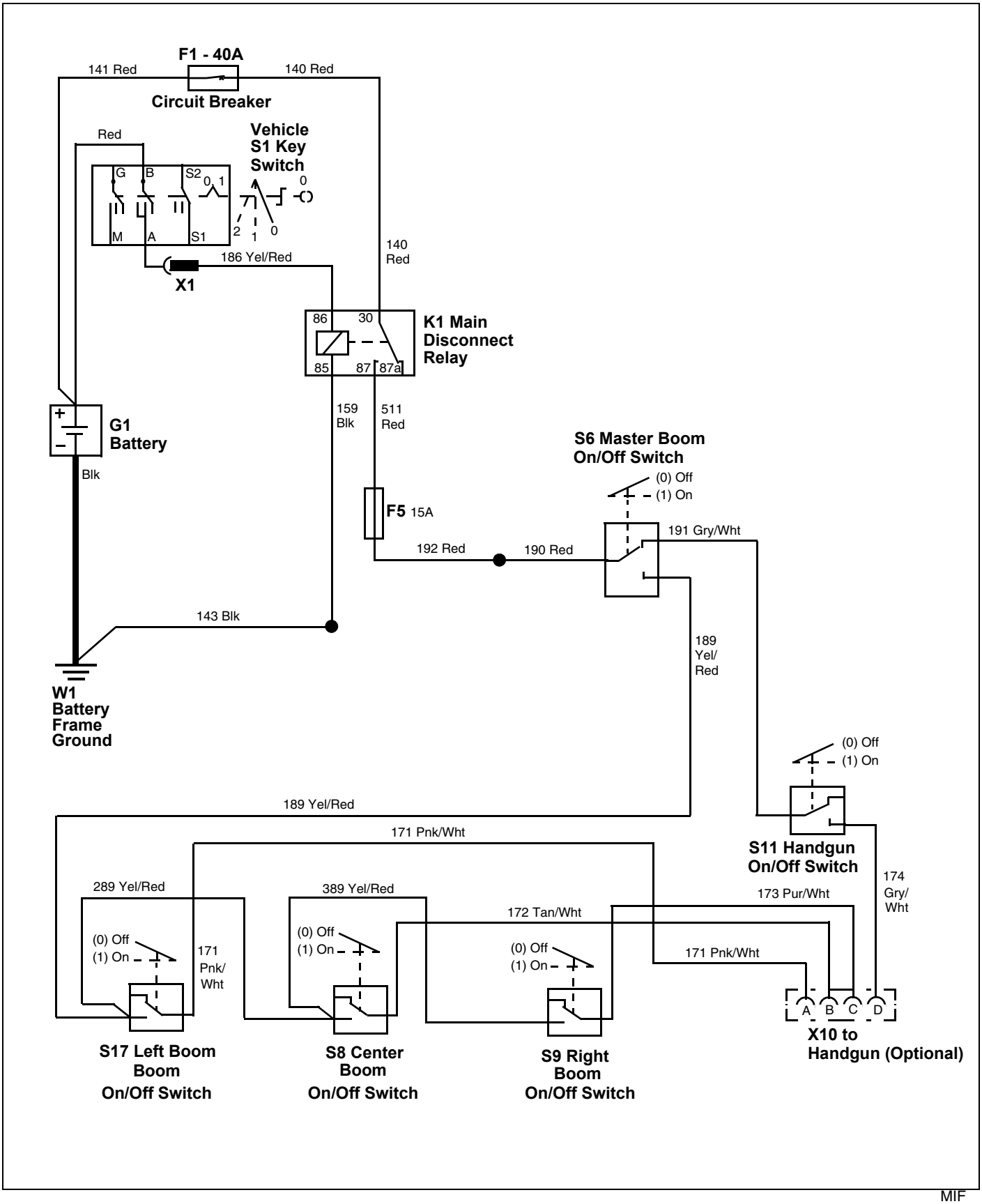
When S6 switch is in the OFF position, current flows (191 Gry/Wht) to the S11 Handgun On/Off Switch.

When the S11 switch is in the On position, current flows to the D pin on the X10 Handgun connector.

When the S6 switch is in the Off position, current flows (189 Yel/Red) to the S17 Left Boom On/Off Switch. From the S17 switch, current flows 289 (Yel/Red) to the S8 Center Boom On/Off Switch. From the S8 switch, current (389 Yel/Red) flows to the S9 Right Boom.

When the S17, S8 and S9 switches are ON, current flows to the X10 Handgun connector. From the S17 switch current (171 Pnk/Wht) flows to the X10 Handgun connector Pin A. From the S8 switch, current flows to the B connector via 172 Tan/Wht. From the S9 Right Boom On/Off Switch current flows via 173 Pur/Wht to the X10 Handgun connector C.

Handgun/Autorate Controller Circuit Schematic



MIF

Tests and Adjustments

Fuse Test

Reason:

To verify that fuse has continuity.

Test Equipment:

Ohmmeter or continuity tester

Procedure:

M48391

1. Remove fuse from fuse block.
2. Check visually for broken filament.
3. Connect tester to each end of fuse.
4. Check for continuity.

Results:

- If continuity is not indicated, replace fuse.

Circuit Breaker Test

Reason:

To verify that the circuit breaker is operating properly.

Test Equipment:

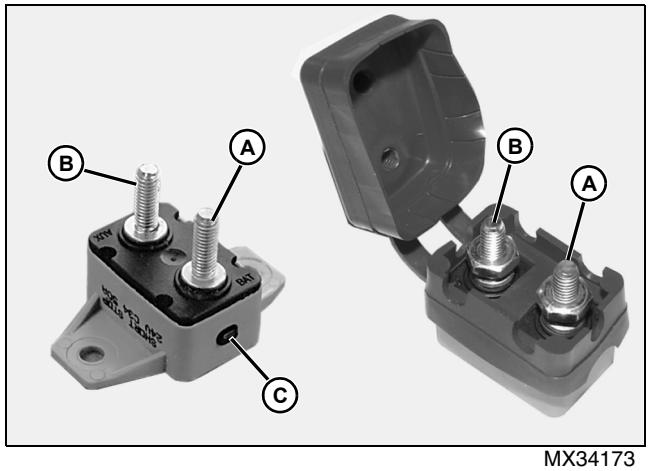
Ohmmeter or continuity tester

Procedure:

1. Park machine on a level surface.
2. Move vehi.cle key switch to OFF position.
3. Engage vehicle park brake.

NOTE: Mark wire locations before removing to ensure correct installation.

4. If necessary, remove circuit breaker from machine.



MX34173

5. Connect ohmmeter or continuity tester leads across BAT (A) and AUX (B) posts.
6. Check for continuity.

Results:

Manual Reset Circuit Breakers: If continuity is not indicated, reset the breaker by pushing in the reset button (C). Repeat test. If the breaker still does not indicate continuity, replace breaker.

Auto-Reset Circuit Breakers: If continuity is not indicated, allow the circuit breaker to cool. Repeat test. If the breaker still does not indicate continuity, replace breaker.

Hose Reel Solenoid Test

Reason:

To verify that the solenoid is operating properly.

Test Equipment:

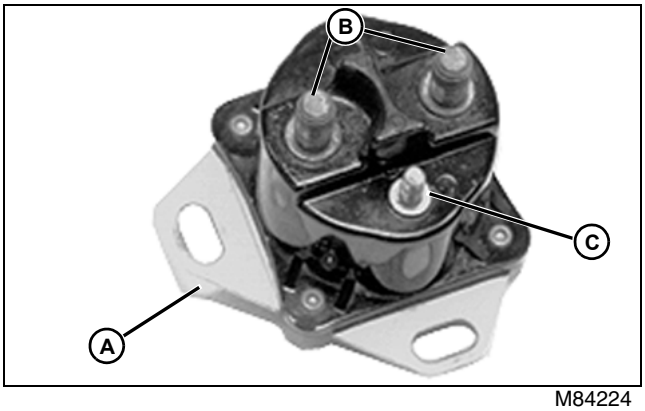
- Ohmmeter or continuity tester
- Jumper wires

Procedure:

1. Park machine on a level surface.
2. Move vehicle key switch to OFF position.
3. Engage vehicle park brake.

NOTE: Mark wire locations before removing to ensure correct installation.

4. Remove solenoid from machine.



M84224

5. Connect a jumper wire to battery negative (-) terminal and solenoid mounting bracket (A).
6. Connect ohmmeter or continuity tester leads across solenoid terminals (B).
7. Check continuity. There should be no continuity (maximum resistance).
8. Connect a jumper wire to battery positive (+) terminal and solenoid “battery” terminal.
9. Check continuity. There should be continuity (no resistance).

NOTE: An audible “click” should be heard when power is applied from the battery positive terminal to the solenoid “battery” terminal (C).

Results:

If continuity is not correct, replace solenoid.

Hose Reel Switch Test

Reason:

To verify that the switch is operating properly.

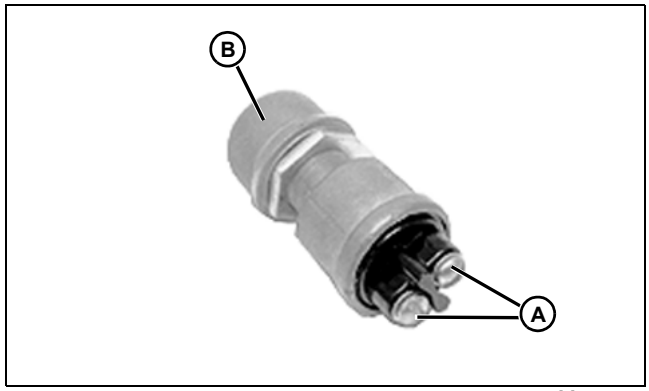
Test Equipment:

- Ohmmeter or continuity tester

Procedure:

NOTE: Mark wire locations before removing to ensure correct installation.

1. Park machine on a level surface.
2. Move vehicle key switch to OFF position.
3. Engage vehicle park brake.
4. Disconnect wires from switch.



M84223

5. Using an ohmmeter or continuity tester, check continuity across terminals (A). There should be NO continuity.
6. Press and hold button (B).
7. Using an ohmmeter or continuity tester, check continuity across the terminals (A). There should be continuity across terminals.

Results:

If continuity is not correct, replace the switch.

Relay Test

Reason:

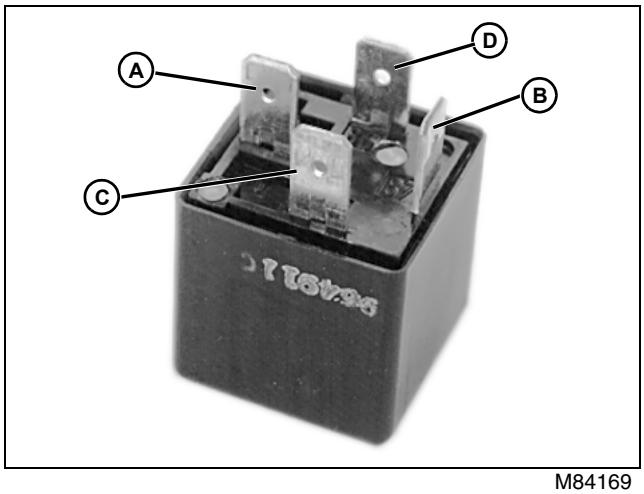
To check relay terminal continuity in the energized and de-energized condition.

Test Equipment:

- Ohmmeter or continuity tester

Procedure:

1. Park machine on a level surface.
2. Move vehicle key switch to OFF position.
3. Engage vehicle park brake.
4. Disconnect relay from harness.



M84169

5. Using an ohmmeter or continuity tester, check continuity between terminals 30 (A) and 87 (B). There should NOT be continuity across terminals 30 (A) and 87 (B) with the relay de-energized.

6. Connect a jumper wire from battery positive (+) to relay terminal 85 (C). Connect a jumper wire from battery negative (-) to relay terminal 86 (D).

7. Using an ohmmeter or continuity tester, check continuity between terminals 30 (A) and 87 (B). There should be continuity across terminals 30 (A) and 87 (B) with the relay energized.

Results:

If continuity is not correct, replace the relay.

S.P.S.T. Switch Test

Reason:

To check switches for proper operation.

NOTE: The following switches are covered by this test:

- **Boom valve switches**
- **Handgun switch**

Test Equipment:

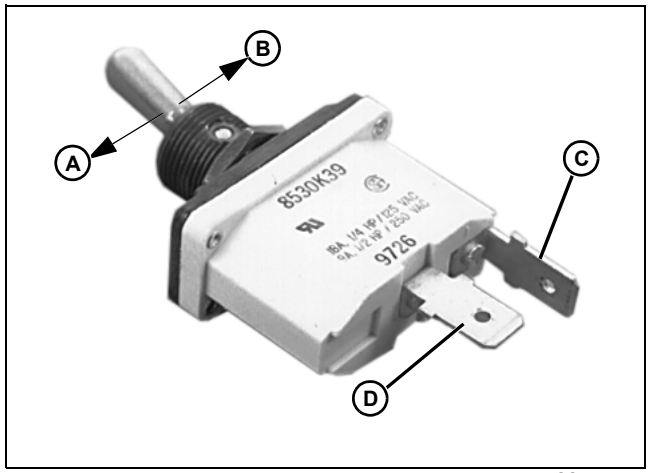
- Ohmmeter or continuity tester

Procedure:

1. Park machine on a level surface.
2. Move vehicle key switch to OFF position.
3. Engage vehicle park brake.

NOTE: Mark wire locations before removing to ensure correct installation.

4. Disconnect wire connectors from switch.



M84173

5. Move switch to ON (A) position.

6. Check continuity across terminals (C) and (D). There should be continuity.

7. Move switch to OFF (B) position.

8. Check continuity across terminals (C) and (D). There should be NO continuity.

Results:

If continuity is not correct, replace the switch.

S.P.D.T. Switch Test

Reason:

To check switches for proper operation.

NOTE: The following switches are covered by this test:

- ***Boom master ON/OFF switch***

Test Equipment:

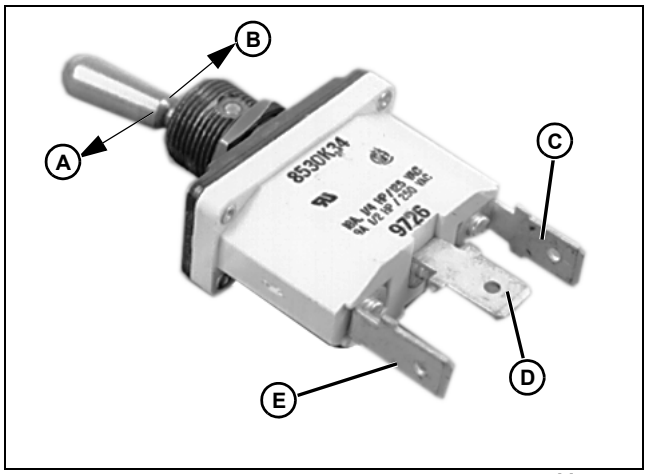
- Ohmmeter or continuity tester

Procedure:

1. Park machine on a level surface.
2. Move vehicle key switch to OFF position.
3. Engage vehicle park brake.

NOTE: Mark wire locations before removing to ensure correct installation.

4. Disconnect wire connectors from switch.



M84171

5. Move switch to ON (A) position.
6. Check continuity across terminals (C) and (D.) There should be continuity.
7. Check continuity across terminals (D) and (E). There should be NO continuity.
8. Move switch to OFF (B) position.
9. Check continuity across terminals (C) and (D). There should be NO continuity.
10. Check continuity across terminals (D) and (E). There should be continuity.

Results:

If continuity is not correct, replace the switch.

D.P.D.T. Switch Test

Reason:

To verify that switch is operating properly.

NOTE: The following switches are covered by this test:

- **Pressure Inc/Off/Dec switch (momentary)**
- **Foam marker Left/Off/Right switch**
- **Boom Raise/Off/Lower switch (momentary)**
- **Flow Auto/Man switch**

Test Equipment:

- Ohmmeter or continuity tester

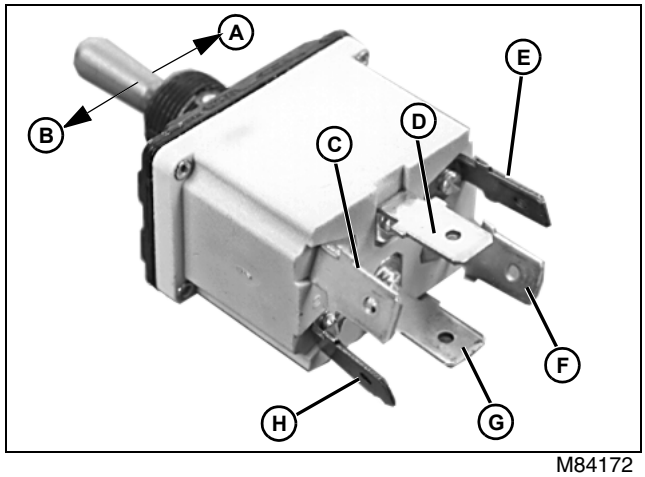
Procedure:

1. Park machine on a level surface.
2. Move vehicle key switch to OFF position.
3. Engage vehicle park brake.

NOTE: Mark connector orientation before removing to ensure correct installation.

4. Disconnect wire connector from switch.
5. There should be NO continuity between any terminals with the switch in the center position.

NOTE: For Momentary type switches, it will be necessary to hold the switch actuator in position while running continuity checks.



M84172

6. Move switch to (A) position.
7. Check continuity across terminals (C) and (D). There should be continuity.
8. Check continuity across terminals (G) and (H). There should be continuity. There should be NO continuity between any other terminals.
9. Move switch to (B) position.

10.Check continuity across terminals (D) and (E). There should be continuity.

11.Check continuity across terminals (F) and (G). There should be continuity.

There should be NO continuity between any other terminals.

Results:

If continuity is not correct, replace the switch.

Boom Actuator Motor Amperage Draw Test

Reason:

To determine the condition of the boom actuator motor.

Test Equipment:

- JT05791 Multimeter
- JT05792 Shunt

Procedure:

1. Battery fully charged and start switch in RUN position.

2. Connect shunt in series between F1 circuit breaker AUX terminal and 141 Red wire using a jumper wire.

3. Connect shunt leads to voltmeter.

4. Set meter to the milli-amp scale.

5. Lower each boom and observe amperage rating.

6. Raise each boom and observe amperage reading.

Specifications:

Maximum Amperage Draw Specifications:

Lower . . . . . 3 - 6 Amps

Raise . . . . . 5 - 10 Amps

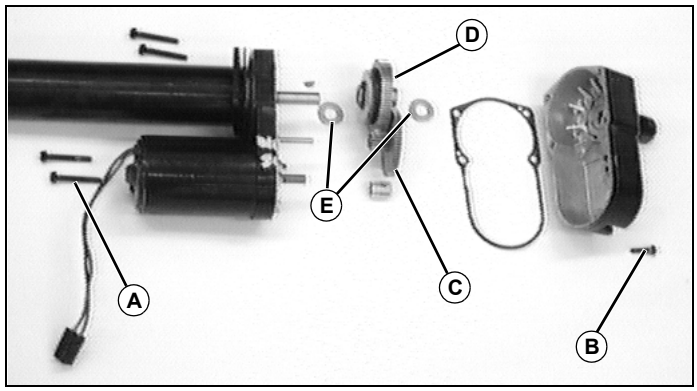
Results:

- If amperage is below specification, actuator motor is OK.
- If unit does not raise, check for stripped gears or worn motor.
- If amperage is zero, check control circuit or fuse.
- If control circuit and fuse are OK, and motor will not run, thermal protector or motor may be defective. Replace motor.
- If amperage is above specification, check boom, gears, worm gear or bearings for binding that may be causing an excessive load.
- Repair or replace boom actuator.

Repair

Replace Actuator Clutch

Procedure:



M566967

1. Separate gear case housing by removing the four gear case housing cap screws (A) and the one gear case housing screw (B).

2. Remove intermediate gear (C), clutch (D) and thrust washers (E).

3. Install new clutch and thrust washers.

4. Install new gear case housing gasket.

5. Install gear case with cap screws and housing screw tightening hardware evenly to specification.

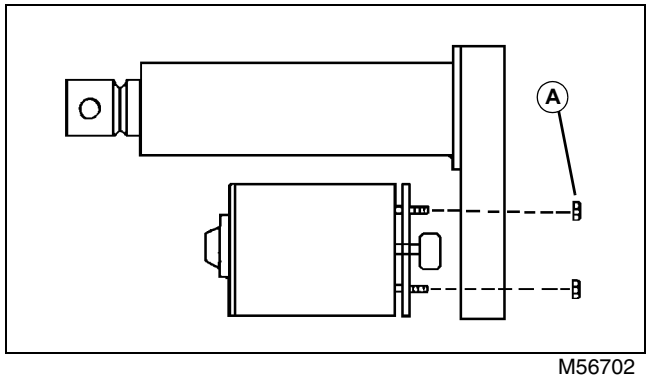
Specifications:

Gear Case Housing Cap Screws. . . . . 8 N•m (70 lb-in.)

Gear Case Housing Screws . . . . . 2.3 N•m (20 lb-in.)

Replace Motor

IMPORTANT: Avoid damage! When replacing motor, note direction that motor gear is installed. Intermediate gear teeth should ride close to the center of motor gear.



M56702

1. Remove gear case housing.
2. Remove nuts from motor (A).
3. Remove spur gear from motor shaft. Note orientation of step in spur gear.
4. Replace motor and seal.
5. Tighten nuts evenly to specification.
6. Install and grease spur gear.
7. Install gear case. Tighten hardware to specification.

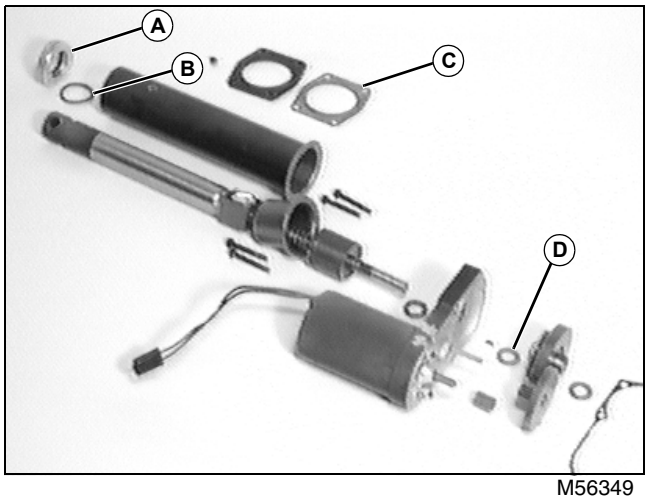
Specifications:

Motor Mounting Nuts . . . . . 8 N•m (70 lb-in.)

Gear Case Housing Screws. . . . . 2.3 N•m (20 lb-in.)

Cover Tube Seal

If tube is removed or leaking, replace the upper O-ring and lip seal. Drive seal and O-ring from end of tube with a disk and driver.



M56349

1. Install new lip seal (A) and O-ring (B) flush with end of tube.
2. Install new tube retaining gasket (C).
3. Install tabbed thrust washer (D) and thicker thrust washer.
4. Tighten hardware evenly.

Specifications:

Gear Case Housing Cap Screws. . . . . 8 N•m (70 lb-in.)

Gear Case Housing Screws. . . . . 2.3 N•m (20 lb-in.)

Table of Contents

PUMP TABLE OF CONTENTS

PUMP SPECIFICATIONS

Specifications

Pump Specifications

Make . . . . . **Hypro®**
Model **9203C**
Type . . . . . **Centrifugal**
Maximum Flow Rate . . . . . **310 L/min (82 gpm)**
Discharge Pressure . . . . . **620 kPa (90 psi)**

Hydraulic Specifications

Type . . . . . **Open System**
Working Pressure . . . . . **17000 kPa (2456 psi)**
Pump Flow (Gas Engines at 3530 rpm) . . . . . **25.9 L/min (6.84 gpm)**
Pump Flow (Diesel Engines at 3450 rpm) . . . . . **25.3 L/min (6.68 gpm)**

Other Materials

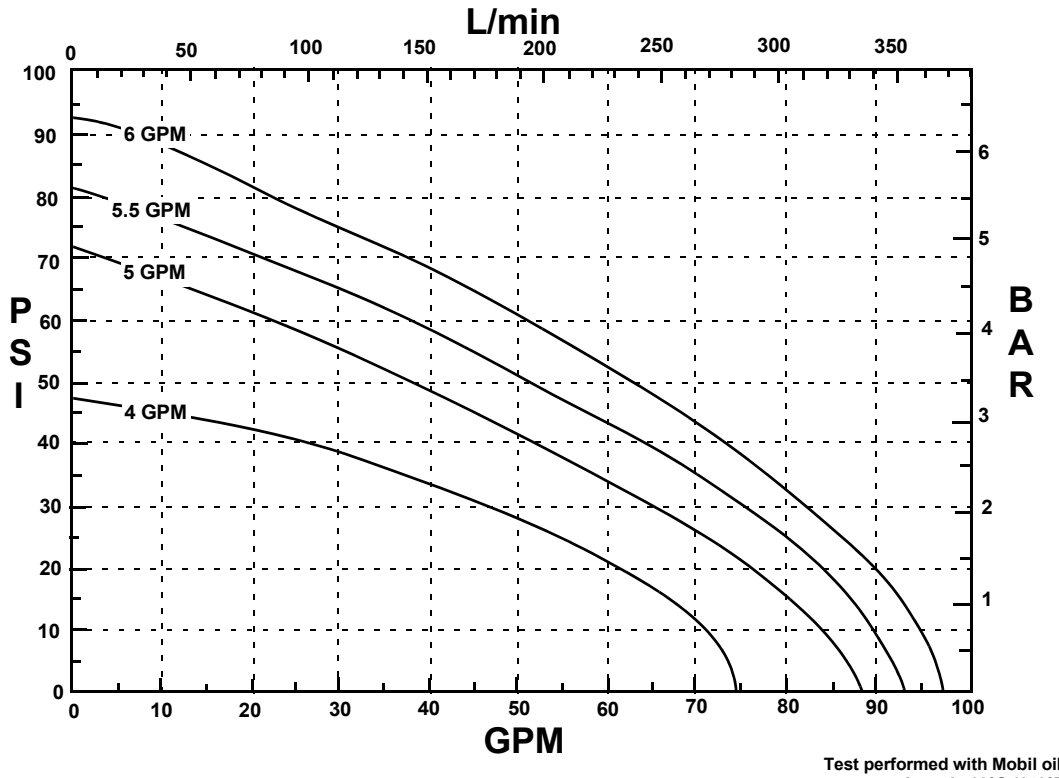
Other Material

Part No.	Part Name	Part Use
	TEFLON tape	Apply to threads of hose fittings.
T43512 / TY9473 / LOCTITE 242	Thread lock and sealer (medium strength)	Apply to threads of impeller nut.

TEFLON, is a registered trademark of the DuPont Co.

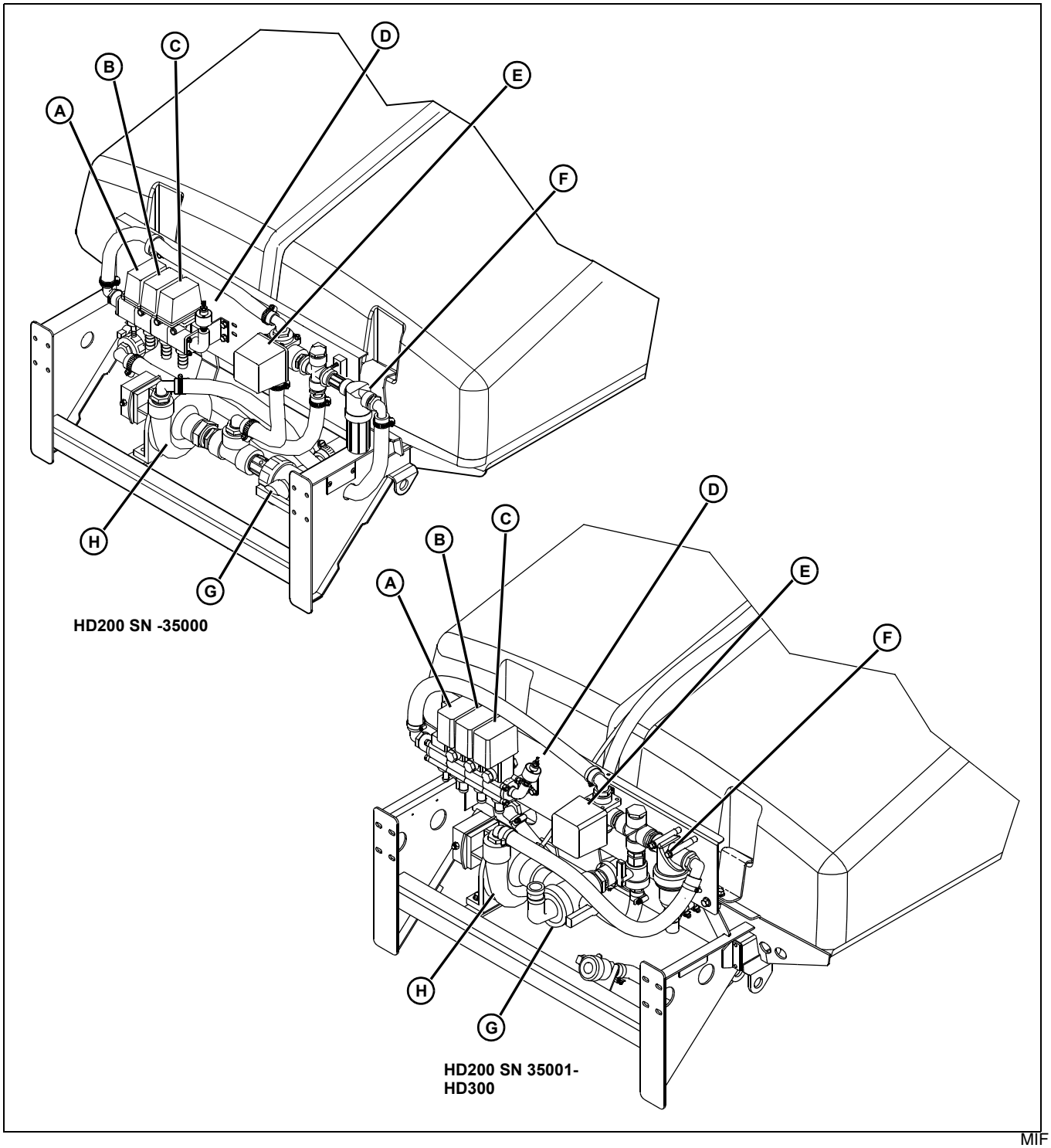
LOCTITE, is a registered trademark of the Loctite Corp.

Performance Curves



Component Location

Pump Component Location

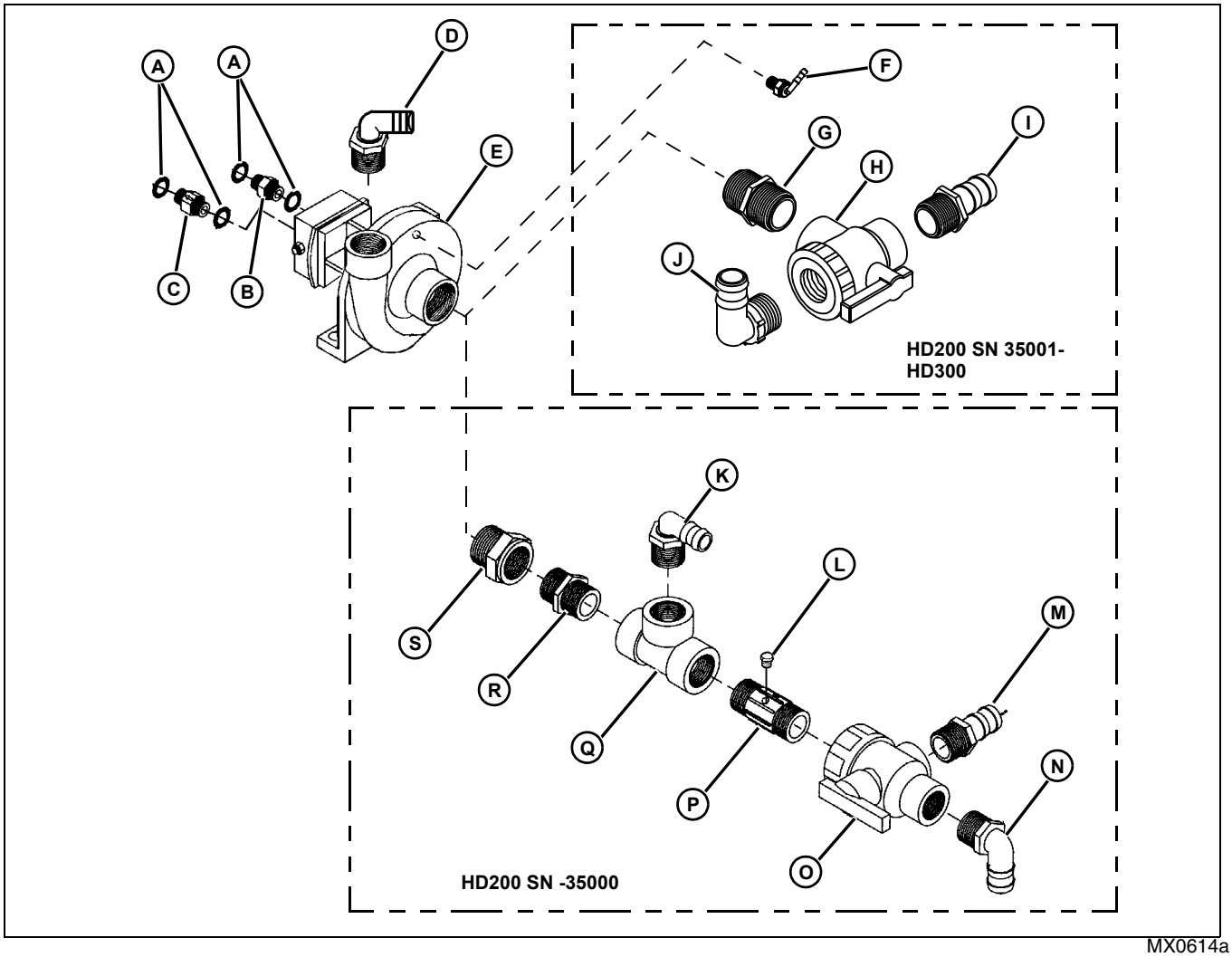


MIF

A - Left Boom Regulator Valve
B - Center Boom Regulator Valve
C - Right Boom Regulator Valve
D - Gauge Isolator
E - Pump Pressure Regulator
F - Strainer
G - Three-Way Ball Valve
H - Pump

PUMP COMPONENT LOCATION

Pump Assembly



MX0614a

A - O-Rings
B - Fitting
C - Check Valve
D - Elbow Fitting
E - Pump Assembly
F - Elbow Fitting (HD200 SN 35001- , HD300)
G - Fitting (HD200 SN 35001- , HD300)
H - Three-Way Ball Valve (HD200 SN 35001- , HD300)
I - Fitting (HD200 SN 35001- , HD300)
J - Elbow Fitting (HD200 SN 35001- , HD300)
K - Elbow Fitting (HD200 SN -35000)
L - Plug (HD200 SN -35000)
M - Fitting (HD200 SN -35000)
N - Elbow Fitting (HD200 SN -35000)
O - Three-Way Ball Valve (HD200 SN -35000)
P - Threaded Nipple (HD200 SN -35000)
Q - Tee Fitting (HD200 SN -35000)
R - Fitting (HD200 SN -35000)
S - Pipe Bushing (HD200 SN -35000)

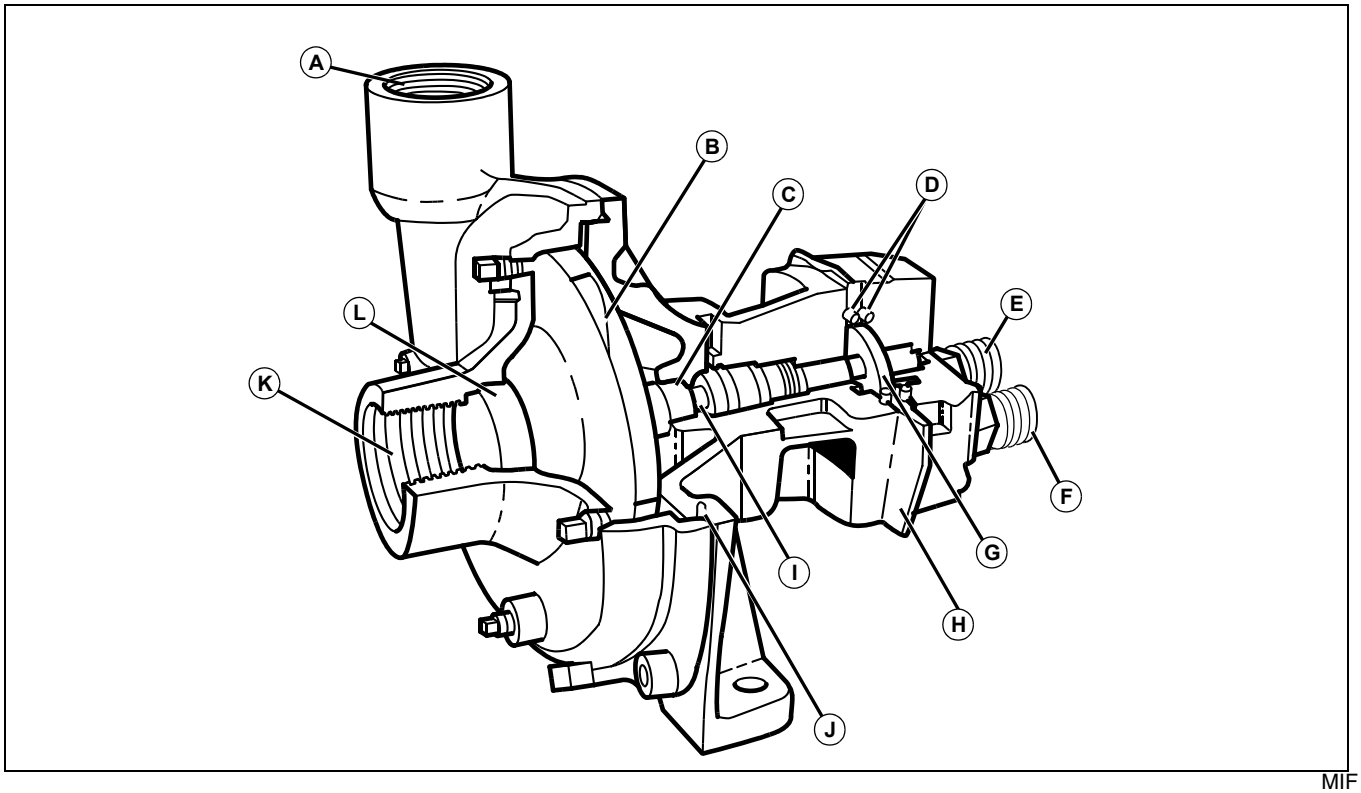
Theory of Operation

Pump Operation

Function:

To pressurize the chemical solution for application.

Theory of Operation:



MIF

A - Output Port
B - Impeller
C - Ball Bearing
D - O-Ring Seals
E - Hydraulic Port (Out, marked TANK)
F - Hydraulic Port (In, marked PRESSURE)
G - Gerotor
H - Gerotor Housing
I - Shaft
J - O-Ring Seal
K - Inlet Port
L - Wear Ring

PUMP THEORY OF OPERATION

The HD200 and HD300 Sprayer Attachments uses a centrifugal pump to pressurize the chemical solution for application. The pump is hydraulic driven, with power supplied by the machine hydraulic pump.

IMPORTANT: Avoid damage! DO NOT run the pump dry. DO NOT leave the three-way ball valve lever in the vertical (OFF) position. Damage to pump seals could result.

Chemical solution is gravity fed through a three-way ball valve to the sprayer pump. When the three-way ball valve lever is in the horizontal OPEN position, pointed toward the pump (HD200 SN -35000) or toward the tank (HD200 SN 35001- , HD300), the chemical solution can flow to the inlet port at the center of the pump. This is the normal spraying position, and is also used when using the optional Tank Rinse Kit (not export version). See “Sprayer System Operation - Tank Rinse Option” on page 113.

When the machine engine is running, and the PTO lever is lifted to the ENGAGED position, machine hydraulic fluid enters the sprayer motor body and flows through a gerotor. The gerotor is directly connected to the pump impeller by a shaft.

As the gerotor and impeller rotate, the tank solution is drawn through the vanes in the impeller, and is forced outward against the pump housing. The internal shape of the housing directs the solution to the outlet port, where it flows through a strainer and then to the pressure regulator valve.

(HD200 SN -35000): Depending on pressure regulator valve setting, excess solution may be directed back to the inlet side of the pump at a T-fitting located between the three-way ball valve and pump inlet port. See “Sprayer System Operation” on page 112.

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Diagnostics

Troubleshooting

Test Conditions:

- Sprayer attachment mounted on machine
- Machine parked on level surface
- Engine running
- PTO lever in ENGAGED position

Symptom: Low or No Output to Pump

(1) Is pump inlet hose restricted?

Yes - Straighten or replace hose.

No - Go to next step.

(2) Are the hydraulic lines connected to the pump?

Yes - Go to next step.

No - Connect hydraulic lines and recheck for spray and agitation.

(3) Is the hydraulic check valve correctly installed?

Yes - Go to next step.

No - Install check valve in return port of pump with arrow pointing toward hose.

(4) Is the pump plugged with sediment or corrosion?

Yes - Clean and/or repair pump.

No - Go to next step.

(5) Is pump worn or damaged.

Yes - Repair or replace pump.

Symptom: Noisy Operation

(1) Is there air in the system?

Yes - Prime pump, purge air (HD200 SN -35000). Repair vent line, fittings or connections (HD200 SN 35001- , HD300). Verify correct orientation of check valve in vent line (arrow toward tank).

No - Go to next step.

(2) Are the pump bearings worn or damaged?

Yes - Repair or replace pump.

Symptom: Excessive Leakage

(1) Are the fittings and hose connections properly tightened?

Yes - Go to next step.

No - Tighten connections.

(2) Are the pump seals worn or damaged?

Yes - Replace seals.

Tests and Adjustments

Cautions

CAUTION: Avoid Injury! Wear proper clothing and safety equipment while handling chemicals or using sprayer unit.It is best to wear full cover clothing and always wear protective goggles and rubber gloves to protect yourself while handling chemicals or using sprayer unit.

Prohibit all smoking, drinking and eating food in chemical-handling area.

Decontaminate all spraying equipment before servicing. Decontamination should be done in a safe area by washing with water, neutralization, or by means recommended by the manufacturer of the chemical last used.

Spray solutions or vapors may be extremely dangerous. Treat all spray chemicals, solutions, or solution residues with great caution. Don't take chances. When in doubt, proceed as though contamination is present.

Keep spray material from contacting your skin. If spray material contacts skin, wash off immediately with clean water and detergent or follow the instructions of manufacturer of chemical last used.

Pump Priming Procedure (HD200 SN -35000)

Reason:

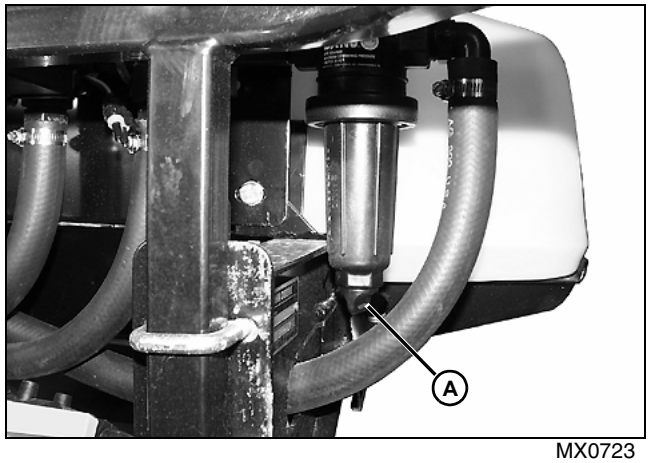
To ensure that all air is purged from the pump after the tank has been drained, or the pump has been serviced.

NOTE: Sprayer pumps (HD200 SN 35001- , HD300) are self-primed through tubing between the pump and top of tank.

Procedure:

NOTE: The sprayer attachment must be mounted on a machine and at least partially filled with clear water or chemical solution to perform the following procedure.

1. Park the machine on a flat, level surface.
2. Engage machine park brake.
3. Move three-way ball valve lever to horizontal position pointed toward the pump.
4. Start machine engine. Run engine at full throttle.
5. Lift PTO lever to ENGAGED position to start pump.



MX0723

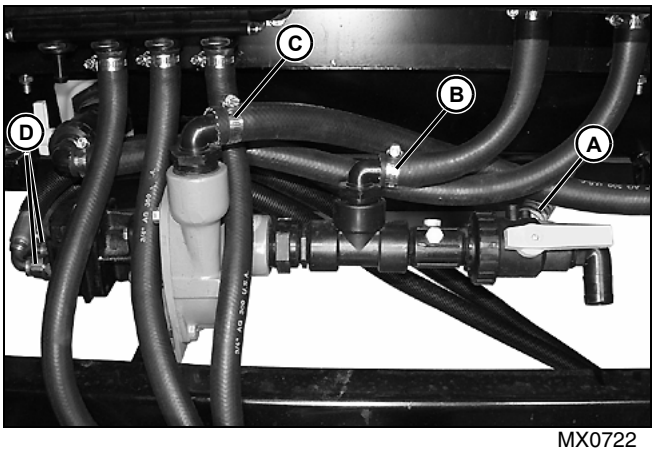
6. Loosen drain plug (A) at line strainer.
7. Run pump until air is purged and water/chemical solution flows from line strainer drain plug.
8. Tighten drain plug.

Repair

Pump And Three-Way Ball Valve Assembly

Removal/Installation HD200 (SN -35000):

1. Drain chemical tank. See “Chemical Tank” on page 151.



MX0722

2. Disconnect inlet hose (located on opposite side of valve from handle) at coupler (A).
3. Loosen hose clamp and disconnect pump bypass hose (B).
4. Loosen hose clamp and disconnect pump outlet hose (C).
5. Disconnect rinse tank inlet hose (if equipped with optional rinse tank).
6. Disconnect hydraulic lines (D) from pump.
7. Remove two pump mounting bolts.
8. Remove pump and three-way ball valve assembly.

Installation:

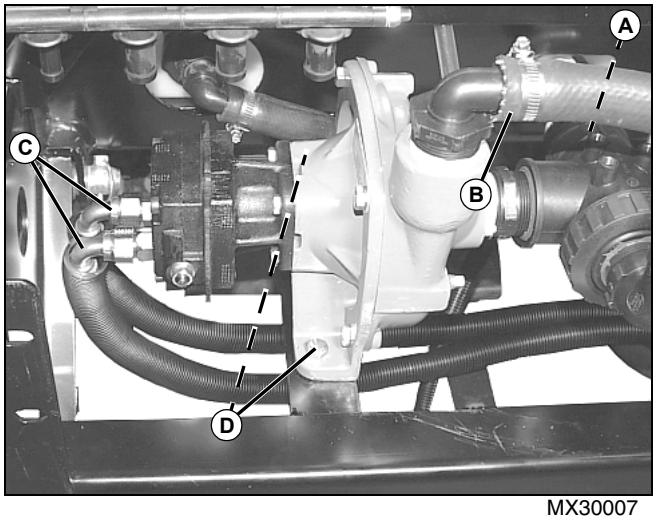
- Installation is done in the reverse order of removal.
- Prime pump. See “Pump Priming Procedure (HD200 SN -35000)” on page 92.
- Run system and check for leaks, repair as necessary.

Disassembly/Assembly:

- Inspect all parts for wear or damage. Replace parts as necessary.
- Tighten hydraulic line fittings to 46 N•m (34 lb-ft).
- Apply Teflon tape to all threaded fittings.
- Repair pump if necessary.

Removal/InstallationHD200 (SN 35001-) and HD300:

1. Drain chemical tank. See “Chemical Tank” on page 151.
2. Disconnect priming tube from top of pump.



MX30007

3. Disconnect inlet hose (located on opposite side of valve from handle) at coupler (A).
4. Loosen hose clamp and disconnect pump outlet hose (B).
5. Disconnect rinse tank inlet hose (if equipped with optional rinse tank).
6. Disconnect hydraulic lines (C) from pump.
7. Remove two pump mounting bolts (D).
8. Remove pump and three-way ball valve assembly.

Installation:

- Installation is done in the reverse order of removal.

NOTE: One of the hydraulic fitting adaptors contains a check valve. There is an arrow on the fitting adaptor indicating direction of flow. This fitting must be installed in the pump outlet port. The outlet port is marked “TANK”.

- Install and tighten hydraulic line fittings to 46 N•m (34 lb-ft).
- Apply Teflon tape to all threaded fittings.
- Run system and check for leaks, repair as necessary.

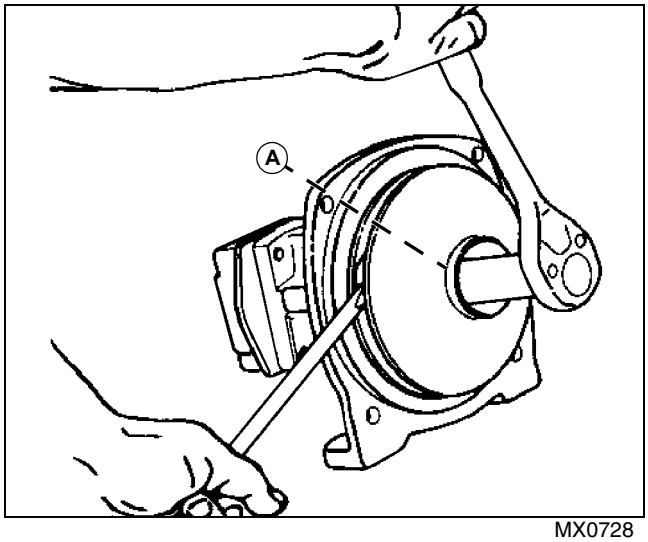
Disassembly/Assembly:

- Inspect all parts for wear or damage. Replace parts as necessary.
- Apply Teflon tape to all threaded fittings.
- Repair pump if necessary.

Pump

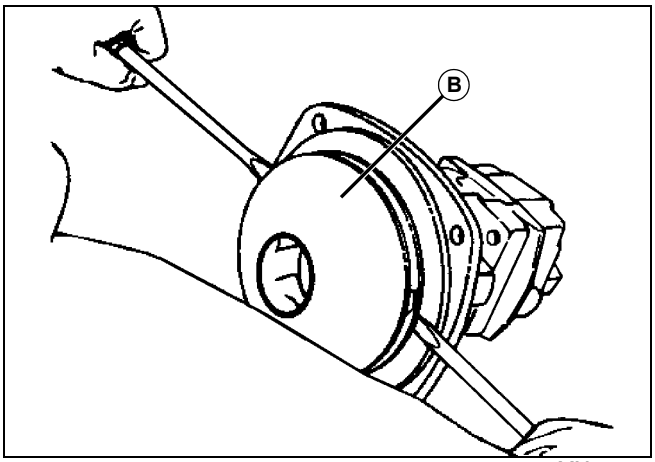
Pump Housing Disassembly:

1. Remove pump from sprayer.
2. Unscrew and remove inlet plumbing from pump.
3. Remove hydraulic pump from input shaft.
4. Remove the four bolts securing the pump casing to the mounting flange.



MX0728

5. Insert a large screwdriver into impeller vanes to prevent impeller from turning. Remove impeller nut (A).

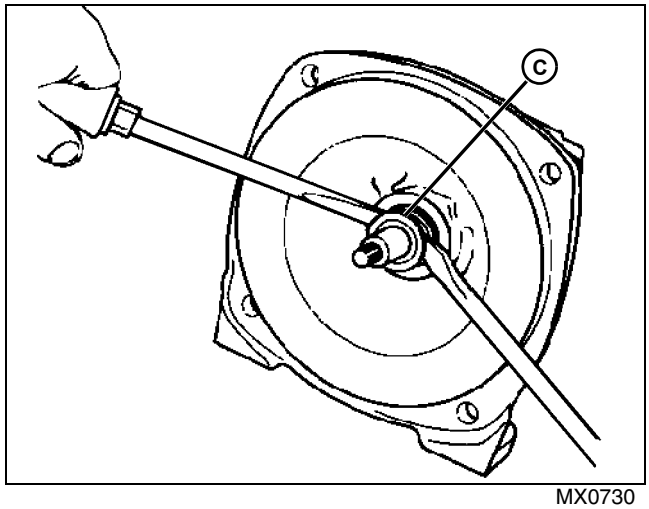


MX0729

6. Place a screwdriver on each side behind the impeller and pry away from mounting flange.
7. Remove woodruff key from the shaft and remove O-ring from the mounting flange.

Pump Seal Removal:

1. Lubricate the shaft for easier removal of the seal.



MX0730

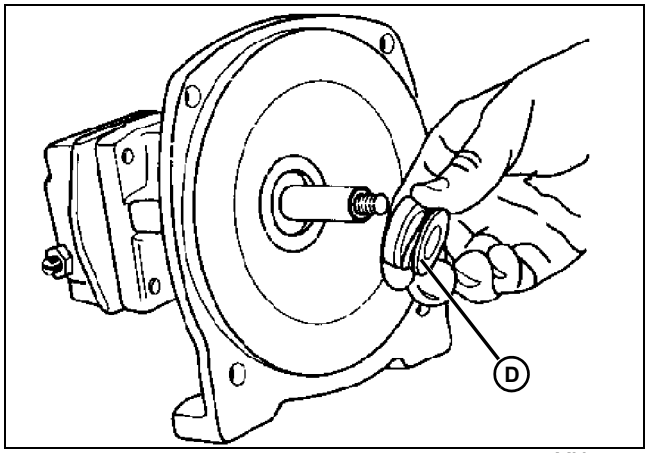
2. Use two screwdrivers to pry the rotary portion of the seal (C) from the shaft.
3. Remove the four bolts securing the hydraulic motor to the mounting flange. Remove motor.

NOTE: If the motor is not removed, the seal can be pried out with a small screwdriver. The seal MUST be replaced if this method is used.

4. Tap out the stationary portion of the mechanical seal from the motor side of the mounting flange.

Seal Replacement/Pump Housing Reassembly:

1. Lightly lubricate the seal cavity in the mounting flange. Do NOT lubricate the shaft.



MX0731

2. Install the stationary portion of the seal (D) with the ceramic side out. Ensure seal is fully seated in the seal cavity.

3. Lubricate the sealing surface on the seal after it is seated. Do NOT lubricate the shaft.

4. Install the rotary portion of the seal with the carbon side facing in. Press seal until it bottoms out against the stationary portion of the seal.

5. Install the woodruff key into the shaft.

6. Place the impeller on the shaft.

7. Install the impeller nut on the shaft. Insert a large screwdriver into impeller vanes to prevent impeller from turning and tighten nut securely.

8. Install new O-ring (as needed) on the mounting flange.

9. Place pump casing on the mounting flange, insert and tighten bolts.

Disassembly and Repair of the Hydraulic Motor:

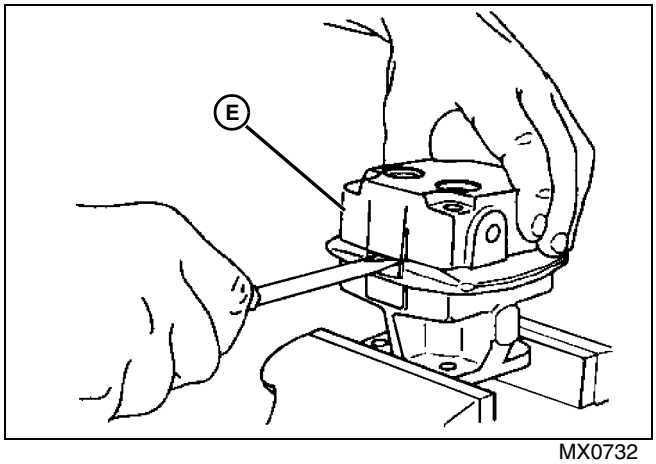
1. Disassemble pump housing and remove pump seal.

2. Place hydraulic motor in a vise.

3. Remove hydraulic hose adaptors.

4. Loosen the nut on bypass adjusting screw and remove adjusting nut from the motor.

5. Remove socket head bolts from the motor end plate.



MX0732

6. If the motor end plate will not lift easily, use a small screwdriver to carefully pry apart the boss portion of the end plate and gerotor housing. If gerotor housing will not lift easily, carefully pry apart the boss area between the gerotor housing and the motor body.

7. Remove both parts of the gerotor.

8. Remove the woodruff key from the shaft.

9. Remove the O-ring from the motor end plate and body.

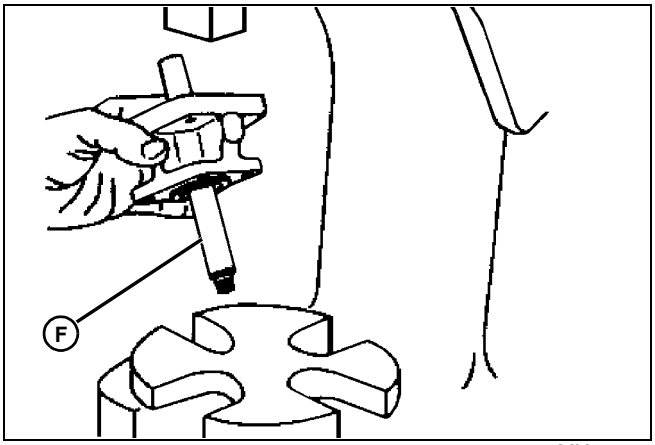
10. Clean all parts in solvent and inspect motor end plate, body and gerotor for wear and/or gouging. If gouging has occurred in both the motor end plate and housing, the motor is not repairable. If gouging has occurred in the motor end plate, body or gerotor housing, the part that is worn must be replaced. If gerotor housing is damaged, gerotor parts must also be replaced.

To Remove the Shaft Assembly from the Motor Body:

1. Remove the slinger ring from the motor shaft.

2. Remove the retaining ring next to the ball bearing in the motor body.

NOTE: If bearing is binding against the retaining ring so that it cannot be easily removed, place the motor body (threaded portion of the shaft up) on arbor press. Use a piece of unthreaded metal pipe slid over the shaft to gently press down to just remove the pressure on the retaining ring.



MX0733

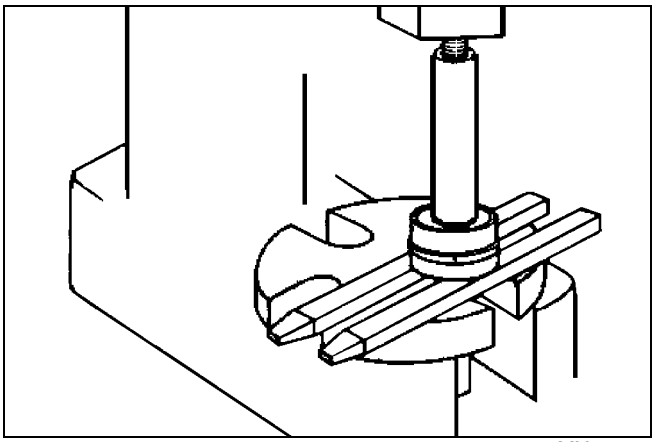
3. Place body in position on arbor press. Press out shaft assembly (F).

Hydraulic Motor Shaft Disassembly and Repair:

1. Remove large snap ring from the shaft.

2. Remove thrust bearing assembly from the shaft (includes the thrust bearing and two thrust bearing races) and the seal spacer.

3. Remove the small snap ring next to the shaft ball bearing.


MX0734

4. To remove the bearing from the shaft, place the shaft with the threaded side up in arbor press. Support the seal on the shaft and press the shaft through the bearing, seal spacer and seal.

5. Inspect the sealing area of the shaft for wear. Inspect other shaft assembly components for wear and replace as needed.

To Install New Shaft Seal:

1. Press new seal onto larger end of shaft (with seal lip facing out) to expand seal. Do not push past keyway.

2. Once seal has expanded, remove seal from shaft.

3. With the seal lip facing the larger end of shaft, slide the seal over the threaded end of shaft and gently push onto raised area of the shaft, stopping approximately 6.3 mm (0.25 in.) from the large retaining ring groove.

4. Over the large end of the shaft, install the seal spacer, thrust bearing race, thrust bearing, second thrust bearing race and the large retaining ring.

To Install the Shaft Bearing:

1. Install the spacer ring and ball bearing over the threaded end of the shaft.

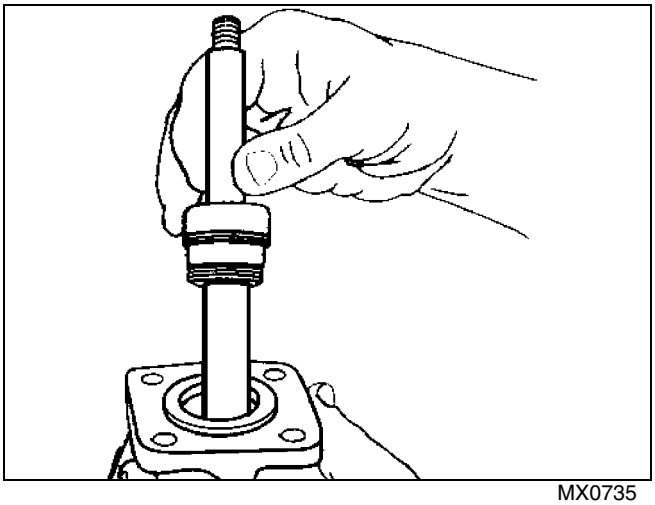
IMPORTANT: Avoid damage! Make sure the spacer ring between the seal and the ball bearing is not binding.

2. Insert the shaft (threaded end down) into arbor press. Place a support between the bearing. Carefully press the shaft down until there is just enough room for the snap ring next to the bearing to be installed.

NOTE: Should the main needle bearings in the hydraulic motor need replacement, a new body and/or end plate, with the main bering already installed, must be used. If this occurs, check other internal parts of the motor for damage or wear.

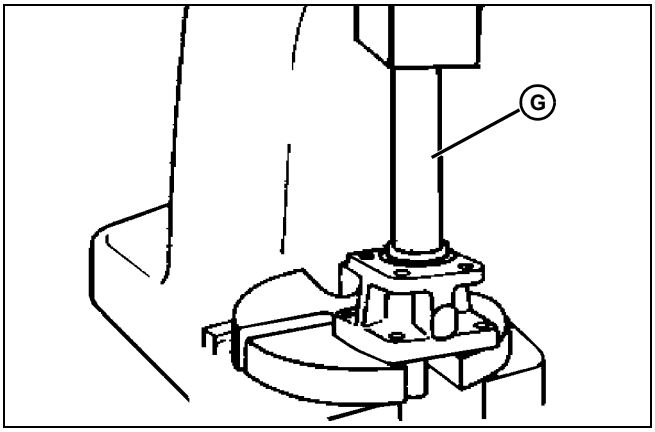
To Install the Shaft Assembly in the Motor Body:

1. Place the shaft assembly into the motor body bearing bore with the threaded end up.



MX0735

2. Place body on clean and smooth arbor press fixture.



MX0736

3. An unthreaded piece of pipe (G) is needed to support the outer bearing race on the shaft ball bearing. Place pipe over the shaft and press shaft assembly down until the retaining ring can be installed in its groove in the bearing core of the motor body.

Reassembly of Remaining Hydraulic Motor Parts:

1. Place the motor in a vice with the large end of the shaft facing up.

2. Install the O-ring in the body.

3. Install the woodruff key in the shaft. Place the inner gear of the gerotor onto the shaft making sure gerotor slot lines up with the key.

NOTE: The woodruff key can slide up behind the inner gear of the gerotor when the gear is installed. Make sure the key is visible in the slot after the gear is in place.

4. Install the outer portion of the gerotor, making sure the gerotor is centered within the O-ring groove on the body.

5. Install the gerotor housing, making sure the pins in the gerotor housing line up with their holes in the body.

6. Lightly lubricate the area between the inner and outer gerotor and gerotor housing with hydraulic oil.

7. For units with a motor end plate plug, remove retaining ring. Tap plug out from the inside of the end plate. Remove the O-ring, inspect and replace as needed.

8. Install O-ring on the motor end plate.

9. Place end plate on gerotor housing, making sure holes in end plate line up with pins in the gerotor housing.

10. Install four socket head bolts in motor end plate and tighten bolts in a criss-cross pattern to approximately 20 N•m (15 lb-ft).

11. Install the thread seal gasket on from the slotted end and turn until four threads on the screw are showing. Install the washer and nut. Install bypass adjusting screw in the motor end plate.

12. Turn the bypass adjusting screw in until it bottoms out in the end plate; then turn it back out 1-1/2 turns. Hold the bypass screw with a screwdriver and tighten nut.

13. Replace O-ring in both port adaptors.

14. Install hydraulic line adaptors.

IMPORTANT: Avoid damage! The OUT port adaptor has a built in check valve to protect against reverse hydraulic oil flow. The adaptor with the check valve must be installed in the correct (closest to bypass adjusting screw) pump port.

15. Remove hydraulic motor from vise. Turn shaft by hand to check for binding.

16. Install slinger ring over motor shaft.

17. Install motor into pump mounting flange. Insert four bolts and tighten securely.

18. Install plumbing assembly onto pump.

19. Install pump on sprayer. See “Pump And Three-Way Ball Valve Assembly” on page 93.

SPRAYER TABLE OF CONTENTS

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SPRAYER TABLE OF CONTENTS

Specifications

Other Materials

Other Material

Part No.	Part Name	Part Use
	TEFLON tape	Apply to threads of hose fittings.
	RV anti-freeze	Used to fill the pressure gauge tube.

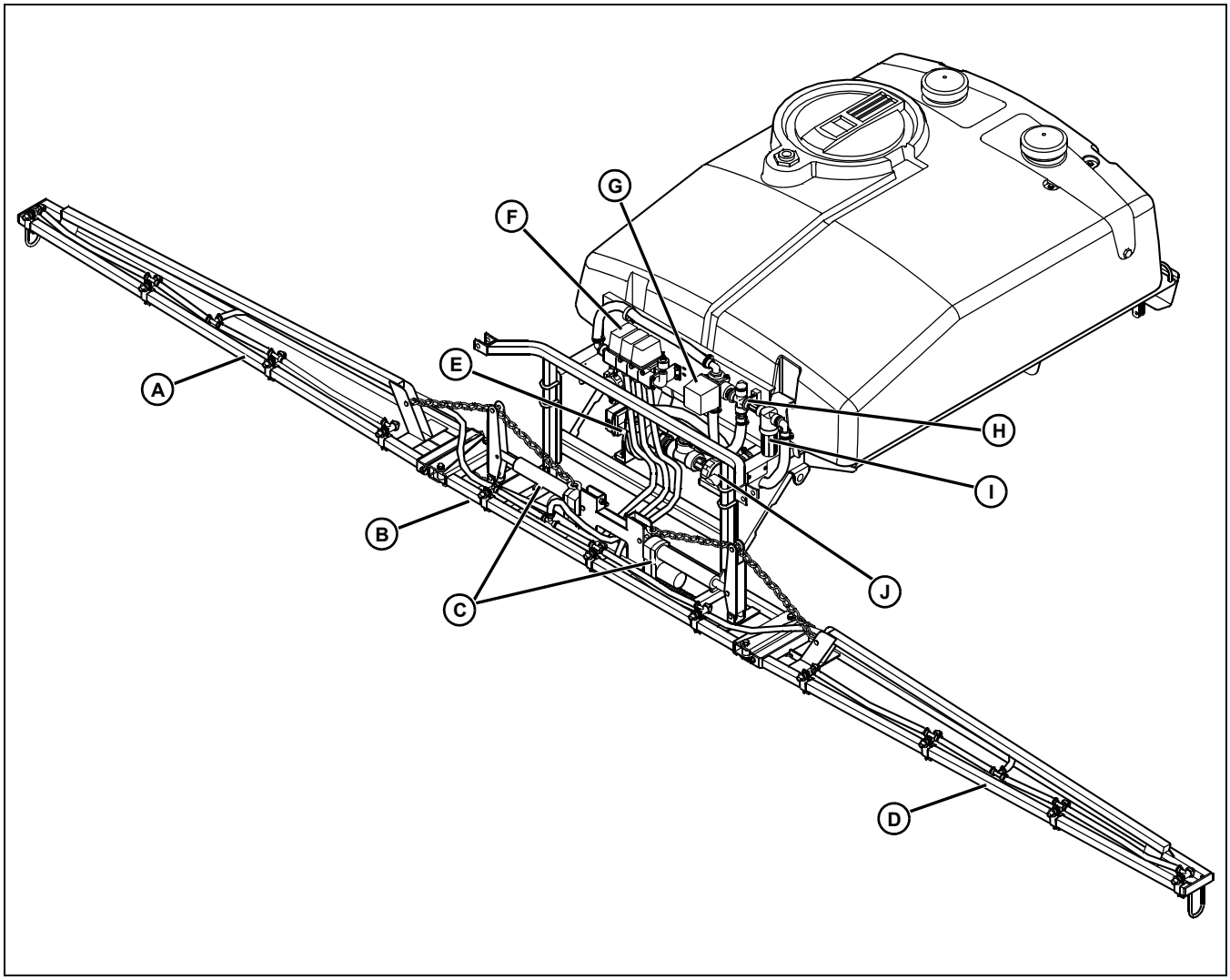
TEFLON, is a registered trademark of the DuPont Co.

Service Parts Kits

- Boom/Manual Valve Plunger Kit
- Boom/Manual Valve Seal Kit
- Pressure Regulator Valve Seal Kit
- Flooding Nozzle Kit (Turbo Floodjet) (Set of 13)
- Flat Fan Nozzle Kit (Set of 13)
- Ultra Low Drift Nozzle Kit (Set of 13)

Component Location

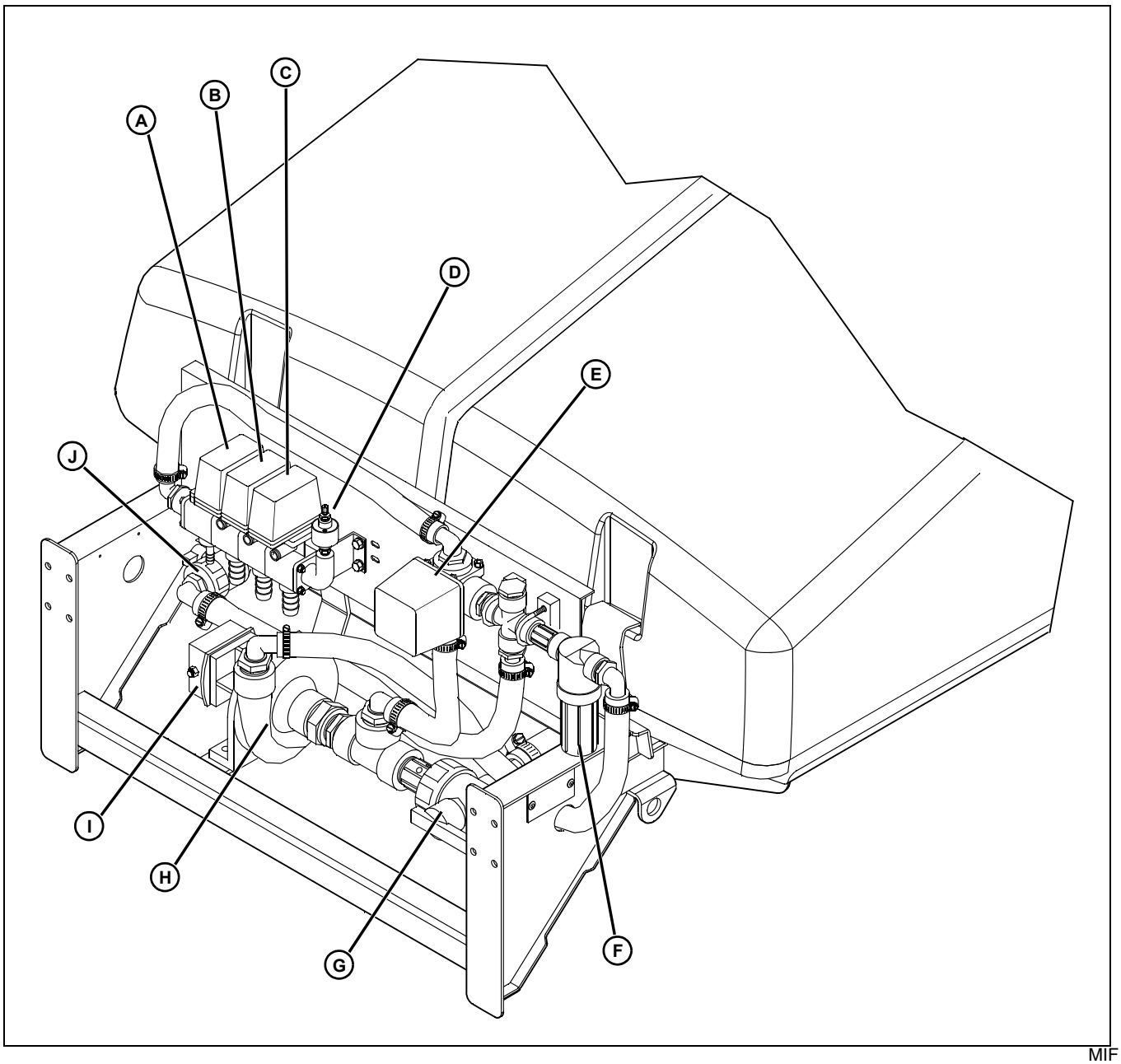
Sprayer System Components - All Models



MIF

A - Left Boom
B - Center Boom
C - Boom Lift Actuators (Option)
D - Right Boom
E - Pump
F - Boom Valves
G - Pressure Regulator Valve
H - “Cross” Fitting
I - Strainer
J - Three-Way Ball Valve

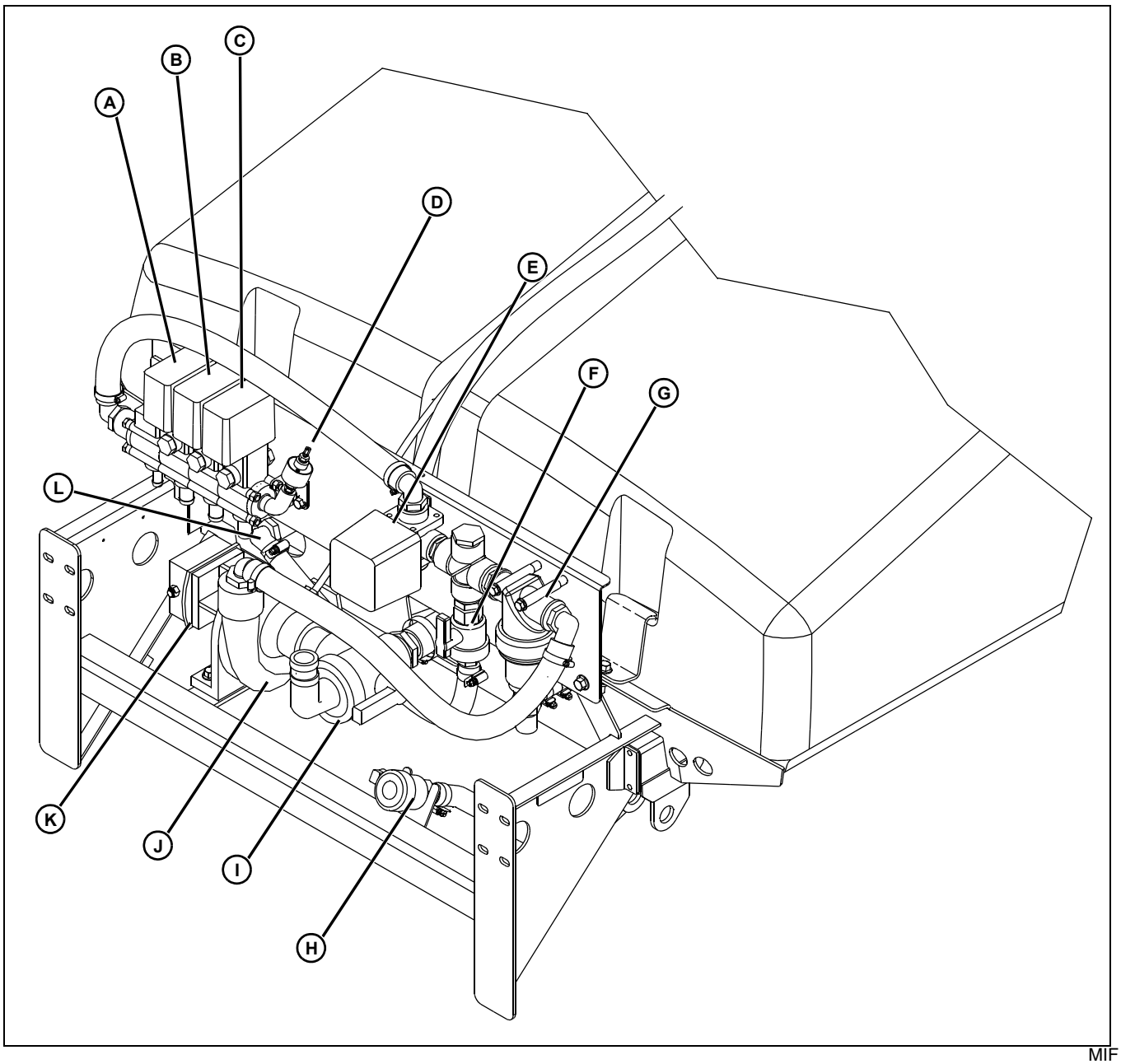
HD200 (SN -035000) Sprayer System Components



MIF

A - Left Boom Valve
B - Center Boom Valve
C - Right Boom Valve
D - Guage Isolator
E - Pressure Regulator
F - Strainer Housing
G - Three-Way Ball Valve
H - Pump
I - Pump Hydraulic Motor
J - Agitator Valve

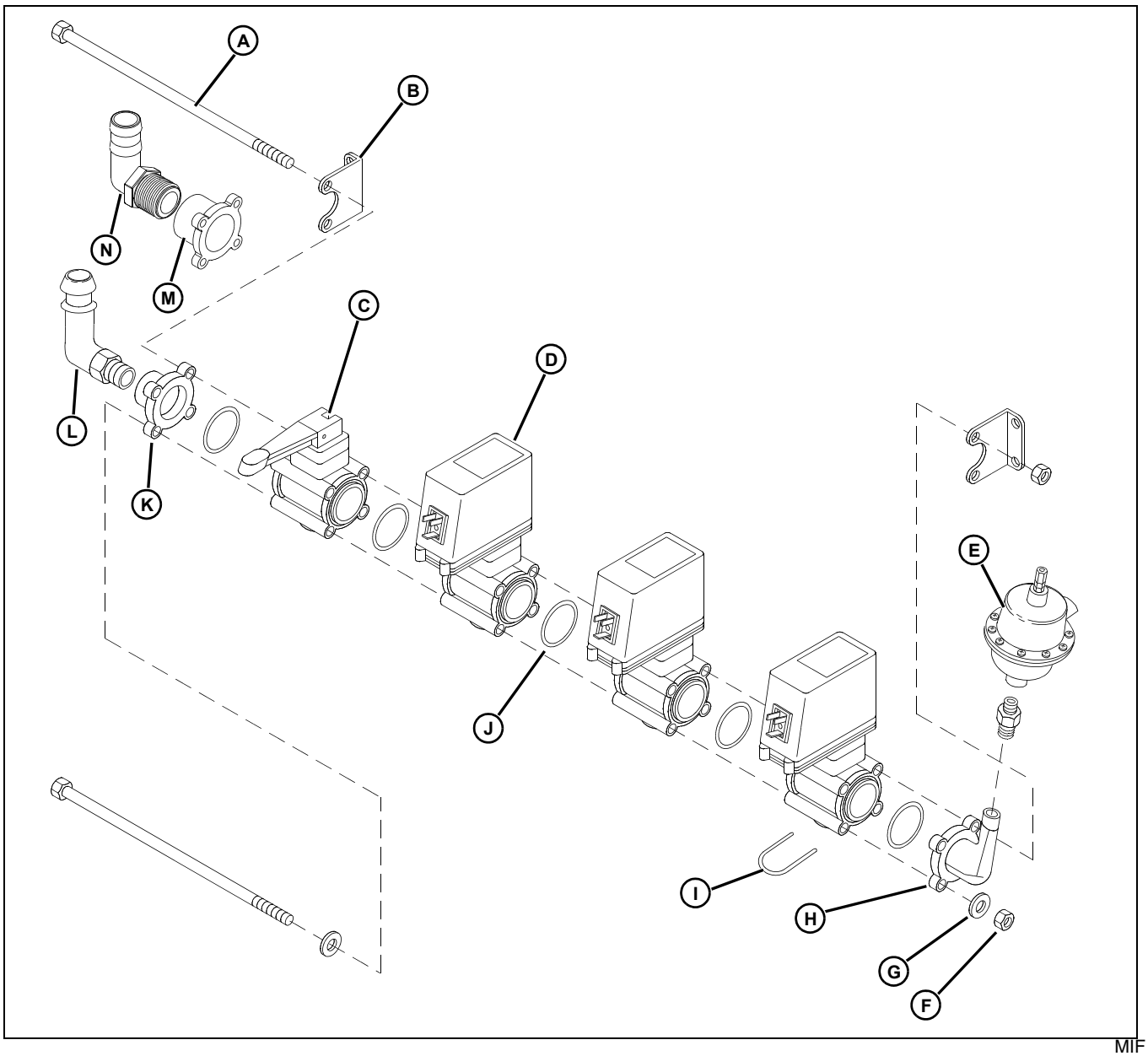
HD200 (SN 035001-) and HD300 Sprayer System Components



MIF

A - Left Boom Valve
B - Center Boom Valve
C - Right Boom Valve
D - Guage Isolator
E - Pressure Regulator
F - Agitator Valve
G - Strainer
H - Tank Drain Hose
I - Three-Way Ball Valve
J - Pump
K - Pump Hydraulic Motor
L - Hose to Agitator

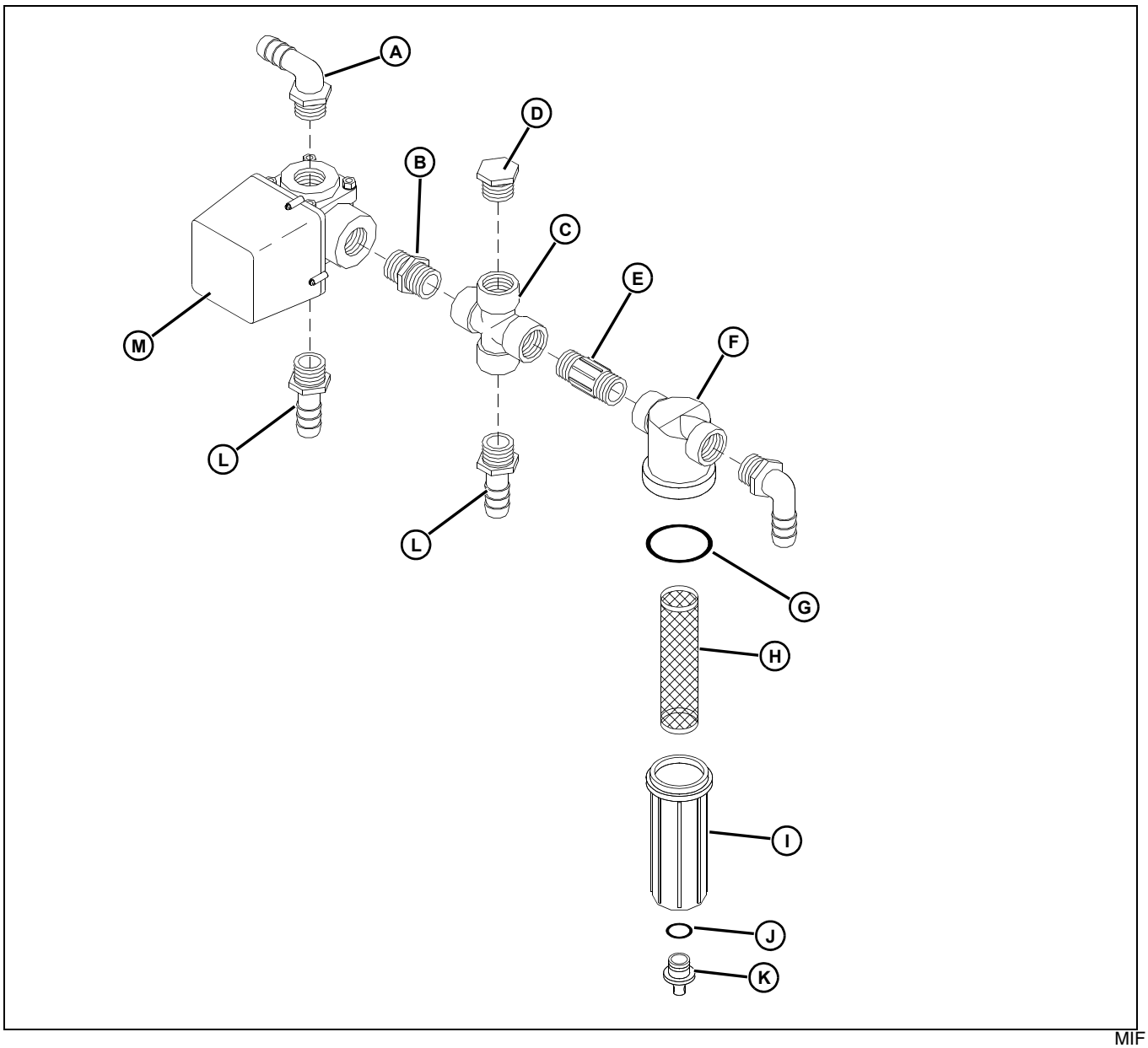
Valve Assembly Components



MIF

A - Cap Screws (4 used)
B - Mounting Bracket (2 used)
C - Manual Valve
D - Boom Valve (3 used)
E - Gauge Isolator
F - Nut (4 used)
G - Washer (4 used)
H - Gauge Isolator Adaptor
I - Retaining Clip (4 used)
J - O-Ring (5 used)
K - End Cap (HD200 SN -035000)
L - Elbow Fitting (HD200 SN -035000)
M - End Cap (HD200 SN 035001- , HD300)
N - Elbow Fitting (HD200 SN 035001- , HD300)

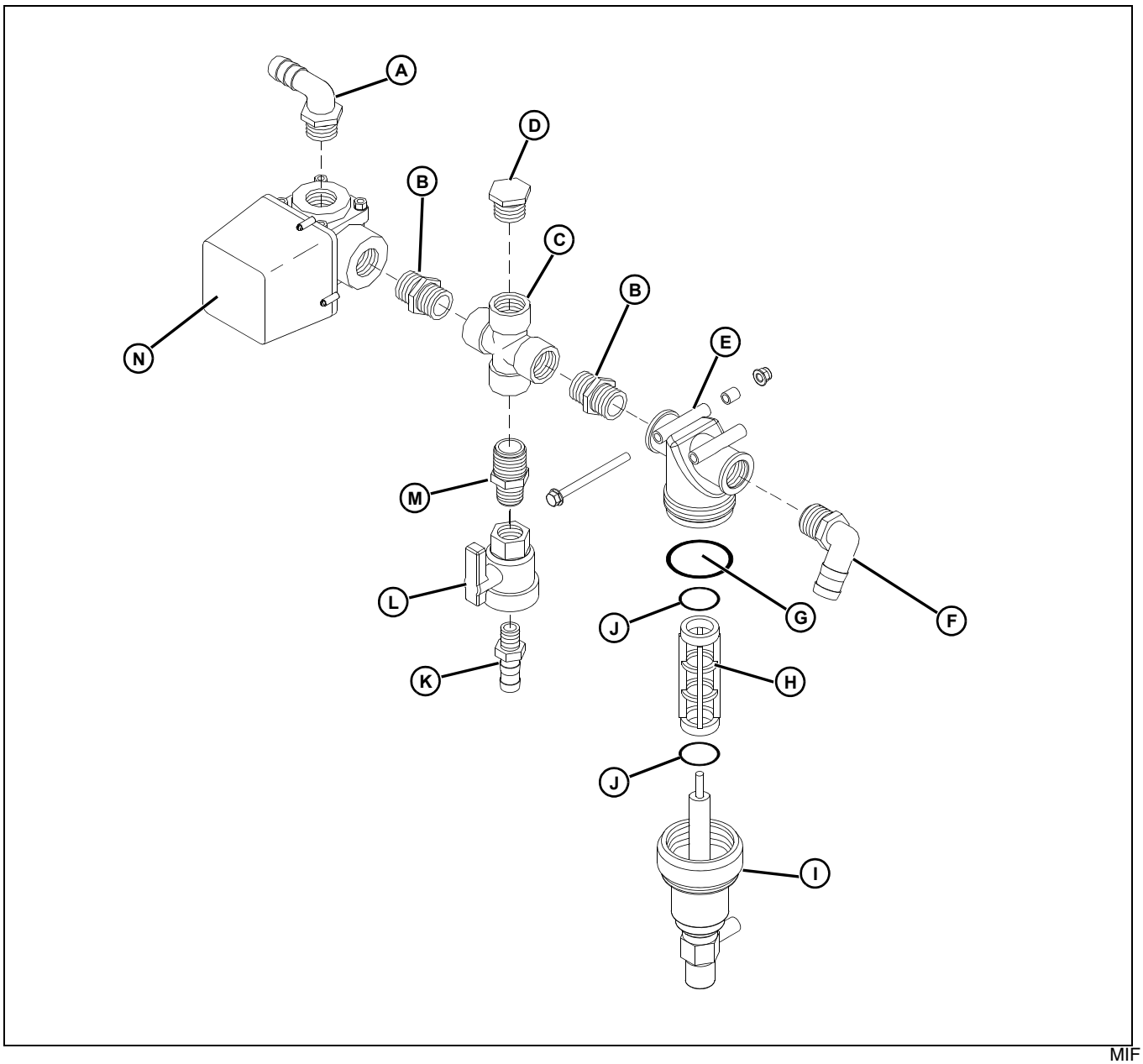
Strainer Assembly Components HD200 (SN -035000)



MIF

A - Elbow Fitting (2 used)
B - Threaded Nipple
C - “Cross” Fitting
D - Plug
E - Threaded Nipple
F - Strainer Housing
G - O-Ring
H - Strainer
I - Strainer Bowl
J - O-Ring
K - Drain Screw
L - Hose Fitting
M - Pressure Regulator Valve

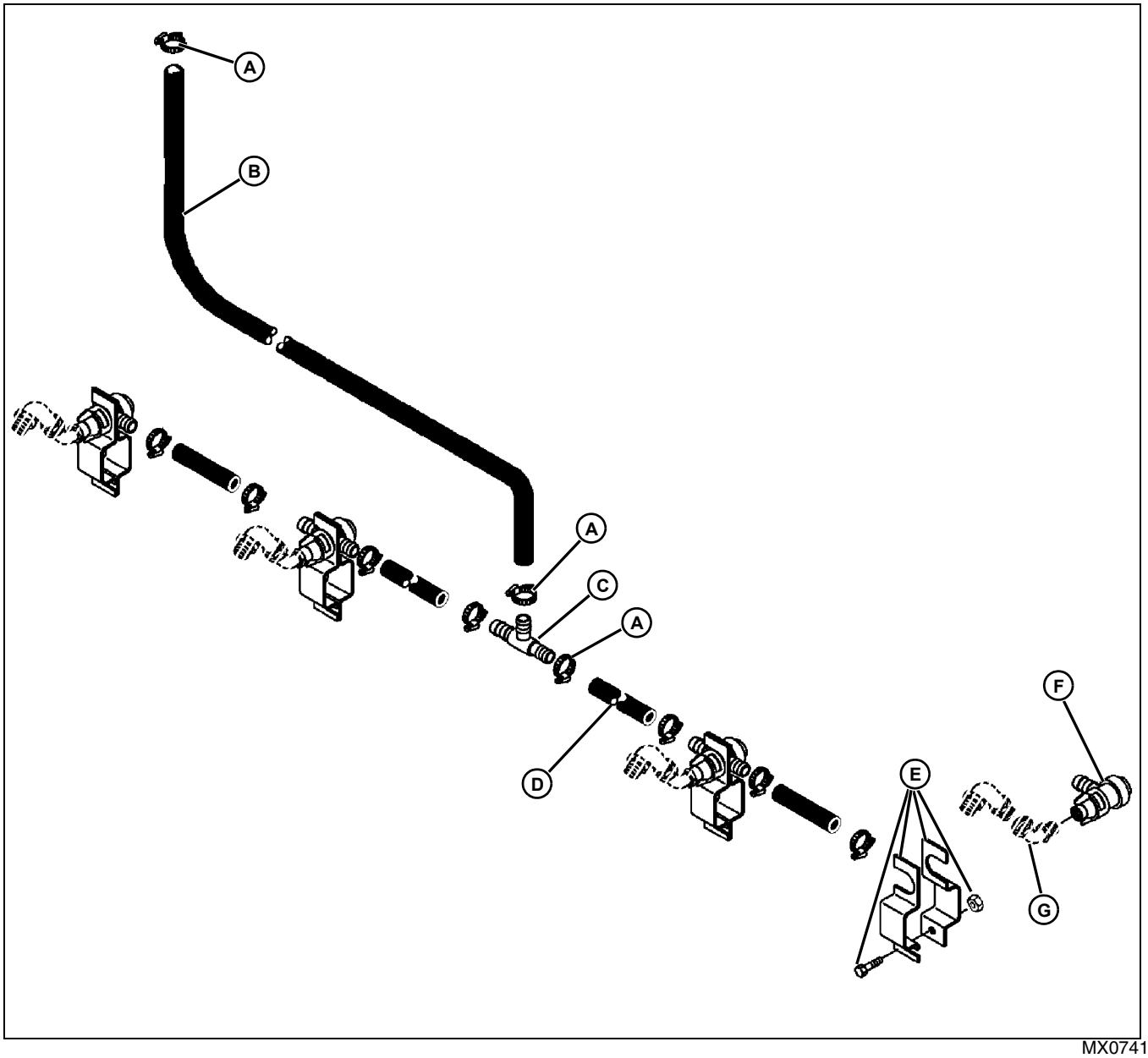
Strainer Components HD200 (SN 035001-) and HD300



MIF

A - Elbow Fitting
B - Threaded Nipple
C - "Cross" Fitting
D - Plug
E - Strainer Housing
F - Elbow Fitting
G - O-Ring
H - Strainer
I - Strainer Housing
J - O-Ring
K - Hose Fitting
L - Agitator Valve
M - Threaded Nipple
N - Pressure Regulator Valve

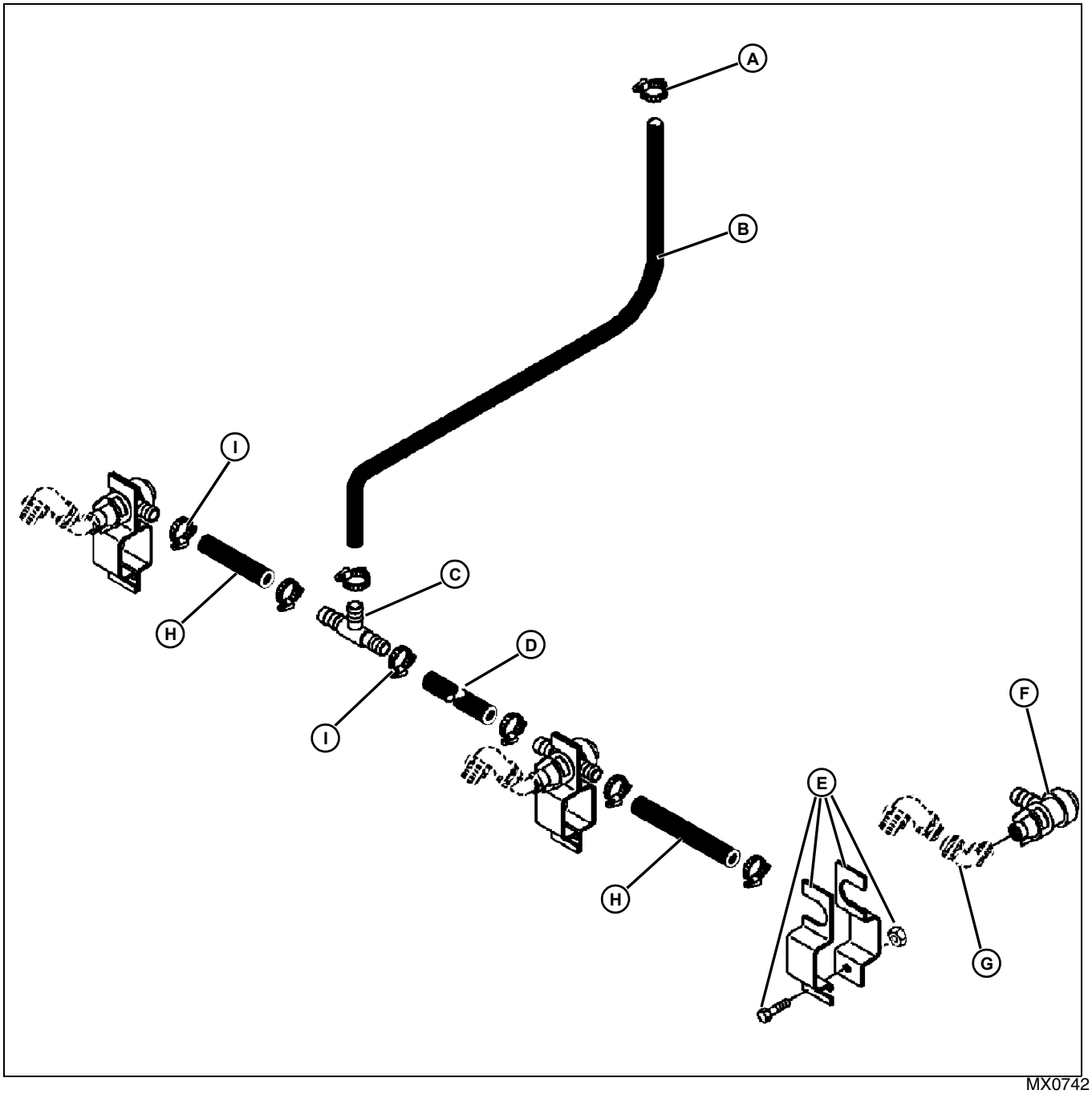
End Boom Plumbing - 18 Foot



MX0741

A - Hose Clamp
B - Hose, 3/4 in.
C - Tee Fitting
D - Hose, 1/2 in.
E - Bracket (4 used)
F - Nozzle Body (4 used)
G - Sprayer Tip (4 used)

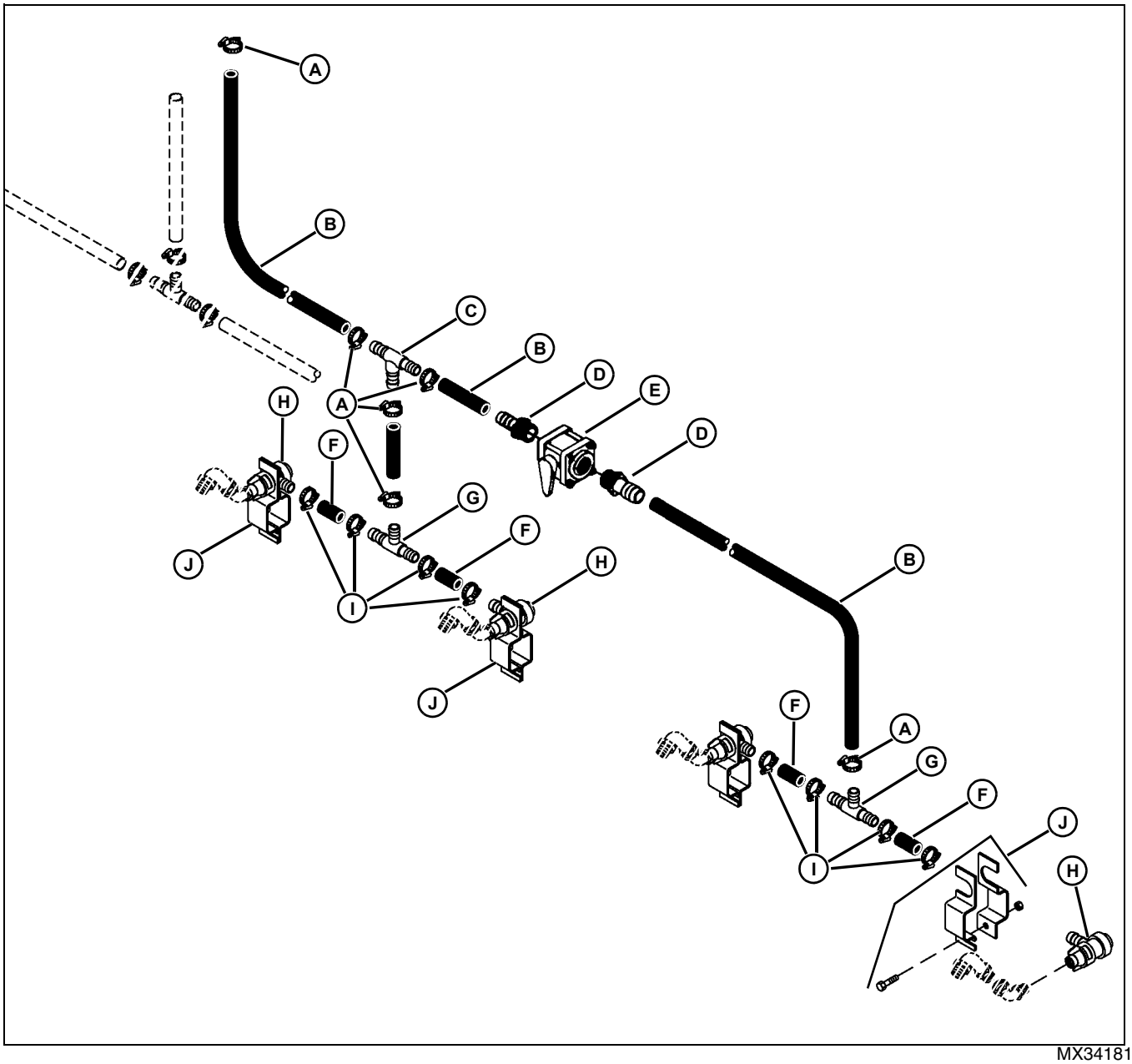
Center Boom Plumbing - 18 Foot



MX0742

A - Hose Clamp (6 used)
B - Hose
C - Tee Fitting
D - Hose
E - Bracket (3 used)
F - Valve (3 used)
G - Nozzle Assembly (3 used)
H - Hose (2 used)
I - Hose Clamp (6 used)

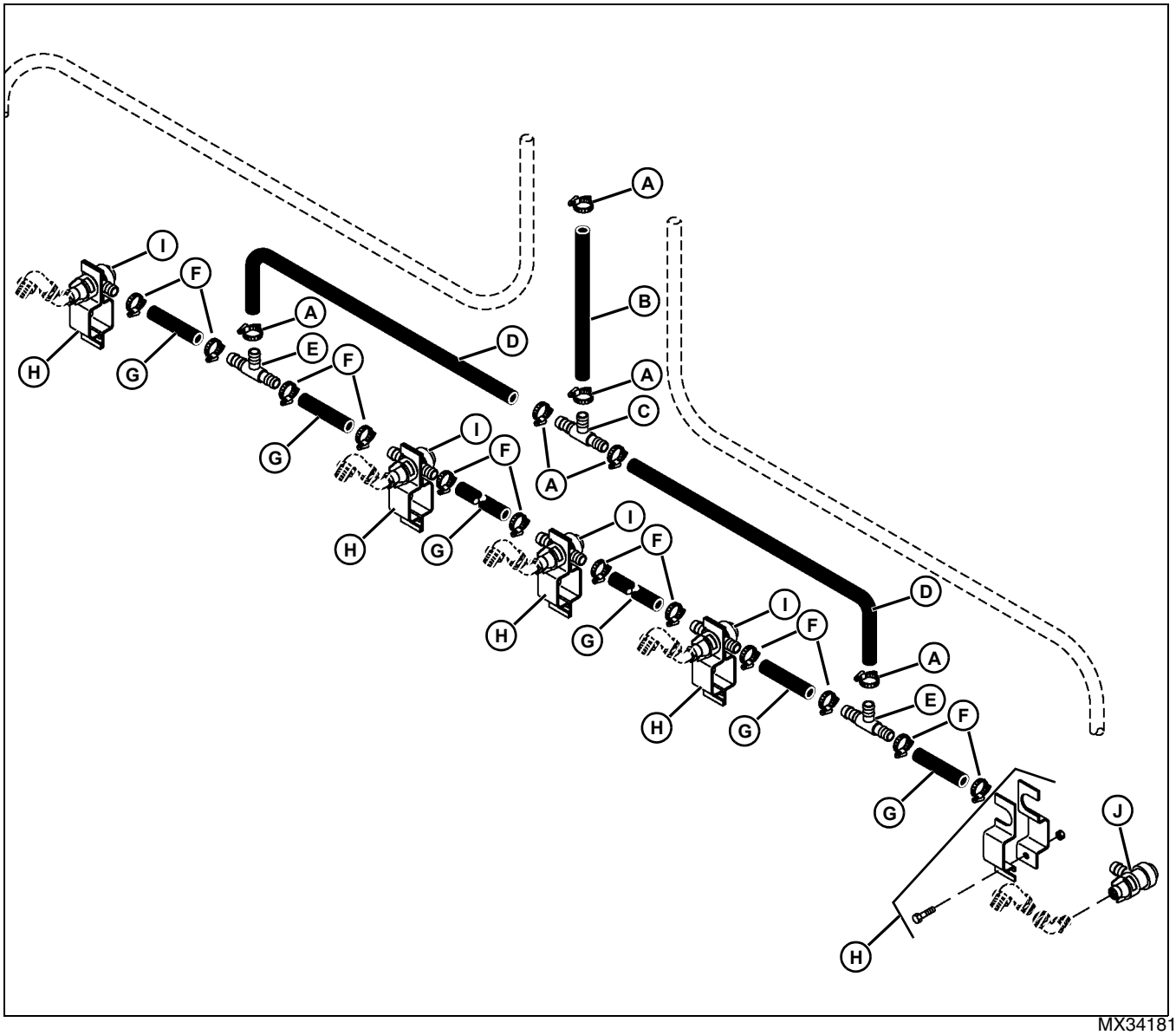
End Boom Plumbing - 15/21 Foot



MX34181

A - Hose Clamp
B - Hose, 3/4 in.
C - Tee Fitting
D - Fitting
E - Hand Operated Valve
F - Hose, 1/2 in.
G - Tee Fitting
H - Nozzle Body
I - Hose Clamp
J - Bracket
K - Sprayer Tip

Center Boom Plumbing - 15/21 Foot



MX34181

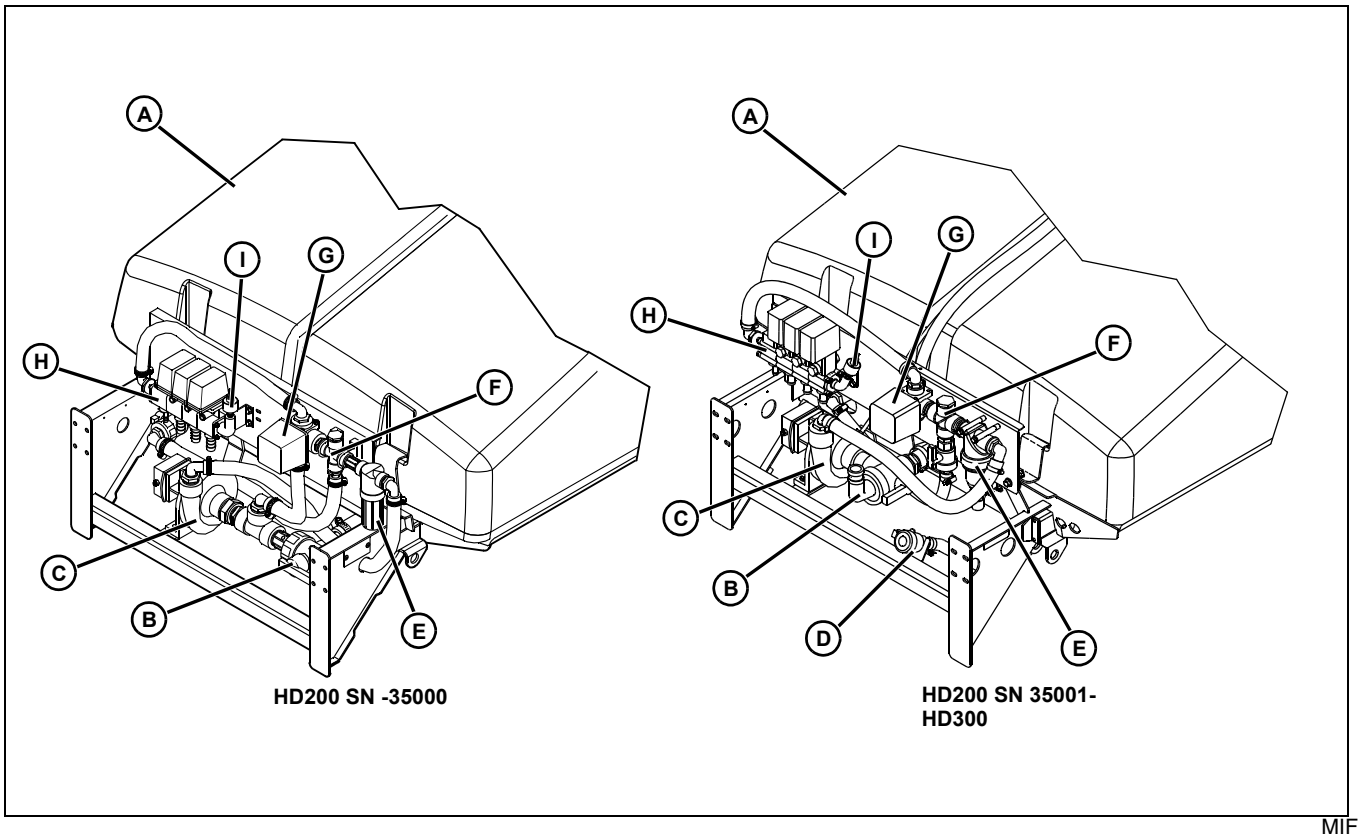
A - Hose Clamp
B - Hose, 3/4 in.
C - Tee Fitting
D - Hose
E - Tee Fitting
F - Hose Clamp
G - Hose, 1/2 in.
H - Bracket
I - Nozzle Assembly
J - Nozzle Assembly

Theory of Operation

Sprayer System Operation

Function:

To regulate and apply the pressurized chemical solution.



MIF

Theory of Operation:

Spraying solution is gravity fed from the chemical (main) tank (A) through a three-way ball valve (B) to the sprayer pump (C). Ball valves for sprayers (HD200 SN -35000) have OPEN (lever horizontal, toward pump), CLOSED (lever vertical), or DRAIN (lever horizontal, toward drain elbow) positions. Ball valves for sprayers (HD200 SN 35001- , HD300) have OPEN (lever horizontal, toward tank), CLOSED (lever vertical) and RINSE (lever horizontal, away from tank) positions. The RINSE position is used with an optional export Tank Rinse Kit, which has a separate rinse tank. Older sprayers may also use an export Tank Rinse Kit, but will need an additional tank drain to be installed, and other modifications (See your John Deere Dealer for information). Newer sprayers have a tank drain hose (D) in addition to the ball valve.

The pump increases the solution pressure to a maximum of 620 kPa (90 psi). See “Pump Operation” on page 89. From the pump, the solution is routed to the plumbing plate assembly which includes the strainer (E), “cross” fitting (F), pressure regulator valve (G) and boom valve stack assembly (H).

The strainer screen removes any foreign material from the solution before reaching the valve assemblies, preventing damage to the sprayer system components.

The “cross” fitting allows solution to be directed to the pressure regulator valve and agitator, as well as an optional Tank Rinse Kit, if installed.

The chemical solution is agitated by the use of a “sparge tube” assembly (HD200 SN -35000) or a “jet nozzle” assembly (HD200 SN 35001- , HD300) to maintain consistent mixtures. Pressurized solution is tapped at the “cross” fitting on the plumbing plate assembly and routed to the agitator mounted inside the chemical tank. The flow to the agitator can be shut off, if desired, at the shutoff valve on the left side of the tank (HD200 SN -35000) or below the “cross” fitting (HD200 SN 35001- , HD300).

The pressure regulator valve will open at a pre-set pressure to allow excess solution to flow back to the intake side of

the pump to maintain a consistent solution application pressure. The valve can be adjusted to vary the application pressure by the pressure INC/OFF/DEC switch on the control panel.

The boom valve stack controls the flow of the chemical solution to the booms/nozzles. The boom valve stack assembly consists of three motor-operated valves (one for each boom section). This allows the solution flow to each boom section to be turned on or off individually, by the switches located on the control panel.

From the boom valve stack assembly, the pressurized solution flows through the hoses to the booms/nozzles for application. For additional control, flow to the boom wing extensions can be shut off individually by manual shutoff valves (only on longest boom).

An additional outlet port is provided for an optional hose reel attachment. This allows pinpoint application of chemical solution with a hand-held sprayer. Flow to this accessory port is controlled by a manual poppet valve on the boom valve assembly.

Pressure can be monitored by a gauge mounted on the dash. The gauge is isolated from the chemical solution by a diaphragm type isolator (I) mounted on the boom valve stack assembly.

The sprayer pump can be damaged if it is operated dry, and a low pressure reading on the gauge is an indicator of a potential problem. For HD200 sprayers (SN 35001 and newer) and HD300 sprayers, a low pressure warning system has been added. This consists of a pressure sensitive switch, located in the cross fitting behind the pressure gauge, and an electric buzzer. Pressure lower than 69 kPa (10 psi) will cause the buzzer to sound. A time delay is designed into the circuit to allow pressure to build after starting the machine before sounding the low pressure alarm.

Sprayer System Operation - Tank Rinse Option

NOTE: For optional export Tank Rinse Kit operation, see instructions provided with that kit.

Function:

To rinse chemical solution from sprayer system components. This will minimize any cross-contamination of chemicals, build-up of sediments in sprayer system components and exposure to chemicals prior to performing service.

Theory of Operation:

NOTE: The chemical tank should be drained and the unused solution be properly disposed before the system can be rinsed. See “Chemical Tank” on page 151.

The tank rinse attachment consists of a spray head, hose and rinse valve. The spray head is installed in the top of the chemical tank. The rinse valve is installed in the normally unused top port of the “cross” fitting in the pressure regulator valve/strainer assembly. The hose connects the spray head and rinse valve.

NOTE: The system should be triple-rinsed, use 1/3 of the available rinse water volume for each rinse operation.

The rinsing operation is a two-stage process - tank rinse and boom/system rinse.

Operating Conditions - Tank Rinse

- Sprayer unit mounted on machine.
- Chemical tank drained, then filled with approximately 76 L (20 gal.) clean water.
- Three-way ball valve in OPEN position.
- Rinse valve in OPEN position.
- Agitator shutoff valve in OPEN position.
- Boom master switch in OFF position.
- Boom valve switches in OFF position.
- Engine running at a minimum of 2500 rpm.
- PTO lever in ENGAGED position.

In this stage, rinse water from the chemical tank flows into the inlet port of the pump. The pump increases the water pressure to a maximum of 620 kPa (90 psi).

From the pump, the pressurized rinse water is routed to the pressure regulator valve/strainer assembly.The “cross” fitting allows solution to be directed to pressure regulator valve and agitator.

With the rinse valve in the OPEN position, rinse water is directed to a spray head mounted at the top of the chemical tank, rinsing the tank from the top down.

Operating Conditions - Boom/System Rinse

- Sprayer unit mounted on machine.
- Chemical tank drained, then filled with approximately 76 L (20 gal.) clean water.
- Three-way ball valve in OPEN position.
- Rinse valve in CLOSED position.
- Boom master switch in ON position.
- Boom valve switches in ON position.
- Engine running at a minimum of 2500 rpm.
- PTO lever in ENGAGED position.

IMPORTANT: Avoid damage! DO NOT run the pump dry. Disengage the pump before the all the rinse water is emptied from the tank.

NOTE: Spray rinse water on a previously treated area.

With the three-way ball valve in the OPEN position and the boom valve engaged, the rinse water from the chemical tank is flushed through the boom valves, hoses and nozzles, flushing the system. For best results, the rinse procedures should be repeated, using 1/3 of the rinse water volume for each operation. If a hose reel option is installed, rinse water should also be sprayed through handgun and hose to flush those components.

Diagnostics

System Fails To Build Pressure

Test Conditions:

- Sprayer attachment mounted on machine.
- Machine parked on a level surface.
- Adequate volume of solution or clean water in tank.
- Engine running at a minimum of 2500 rpm.
- PTO lever in ENGAGED position.

Symptom: System Fails to Build Pressure

(1) Is the three-way ball valve in OPEN position?

Yes - Go to next step.

No - Place valve in correct position.

(2) Is the pump primed?

Yes - Go to next step.

No - Prime pump. See “Pump Priming Procedure (HD200 SN -35000)” on page 92. Repair vent line or fittings (HD200 SN 35001- , HD300).

(3) Is the pump inlet hose restricted or damaged?

Yes - Repair or replace hose.

No - Go to next step.

(4) Is the pump worn, damaged or obstructed?

Yes - Repair pump.

No - Go to next step.

(5) Is the strainer assembly screen plugged?

Yes - For sprayers HD200 (SN -35000): Clean or replace strainer screen. See “Pressure Regulator Valve/Strainer Assembly” on page 125.

Yes - For sprayers HD200 (SN 35001-) and HD300: Flush the inline strainer. Clean or replace strainer as necessary.

No - Go to next step.

(6) Are all nozzles installed?

Yes - Go to next step.

No - Replace missing or damaged nozzles.

(7) Is the pressure regulator valve properly adjusted?

No - Adjust system pressure. See “Pressure Regulator Valve” on page 126. Refer to Operator’s Manual. Repair valve as necessary.

Rough Operation and Delivery Pressure and/or Volume Drops

Test Conditions:

- Sprayer attachment mounted on machine.
- Machine parked on a level surface.
- Adequate volume of solution or clean water in tank.
- Three-way ball valve in OPEN position
- Engine running at a minimum of 2500 rpm.
- PTO lever in ENGAGED position.

Symptom: Rough Operation and Delivery Pressure and/or Volume Drops

(1) Is the pump inlet hose restricted or damaged?

Yes - Repair hose.

No - Go to next step.

(2) Is the strainer assembly screen plugged?

Yes - For sprayers HD200 (SN -35000): Clean or replace strainer screen. See “Pressure Regulator Valve/Strainer Assembly” on page 125.

Yes - For sprayers HD200 (SN 35001-) and HD300: Flush the inline strainer. Clean or replace strainer as necessary.

Large Pressure Fluctuations

Test Conditions:

- Sprayer attachment mounted on machine.
- Machine parked on a level surface.
- Adequate volume of solution or clean water in tank.
- Three-way ball valve in OPEN position
- Engine running at a minimum of 2500 rpm.
- PTO lever in ENGAGED position.

Symptom: Large Pressure Fluctuations

(1) Is the pump inlet hose restricted or damaged?

Yes - Repair hose.

No - Go to next step.

(2) Is the pump primed?

Yes - Go to next step.

Symptom: Large Pressure Fluctuations

No - Prime pump. See “Pump Priming Procedure (HD200 SN -35000)” on page 92. Repair vent line or fittings (HD200 SN 35001- , HD300).

(3) Is the pump worn, damaged or obstructed?

Yes - Repair pump.

Boom Valves Do Not Engage/No Flow To Boom Sections

Test Conditions:

- Sprayer attachment mounted on machine.
- Machine parked on a level surface.
- Engine running at a minimum of 2500 rpm.
- PTO lever in ENGAGED position.
- Tank must have at least 190L (50 gal) of clean fresh water.
- Three-way ball valve in OPEN position.
- Boom master switch in ON position.
- Boom valve switches in ON position.

Symptom: Boom Valves Do Not Engage/No Flow To Boom Sections

(1) Are boom wing extension valves open?

Yes - Go to next step.

No - Move valves to OPEN position.

(2) Do the boom valves engage when switches are moved to ON position?

Yes - Go to next step.

No - Check boom valve circuit. See “Boom Actuator Circuit Operation” on page 61 in the Electrical section.

(3) Are the boom valves worn or damaged?

Yes - Replace boom valve(s). See “Boom Valve” on page 121.

Wrong Booms Operate When Boom Switches Are Engaged

Test Conditions:

- Sprayer attachment mounted on machine.
- Machine parked on a level surface.
- Engine running at a minimum of 2500 rpm.
- PTO lever in ENGAGED position.
- Tank must have at least 190L (50 gal) of clean fresh water.
- Three-way ball valve in OPEN position.
- Boom master switch in ON position.
- Boom valve switches in ON position.

Symptom: Wrong Booms Engage When Switches Are Engaged.

(1) Are the boom valve electrical connectors connected to correct booms?

Yes - Go to next step.

No - Move connectors to correct valve assembly.

(2) Are the boom hoses connected to correct valve?

No - Disconnect hoses from bottom of valves and move to correct valve assembly.

Poor/Uneven Spray Pattern

Test Conditions:

- Sprayer attachment mounted on machine.
- Machine parked on a level surface.
- Adequate volume of solution or clean water in tank.
- Three-way ball valve in OPEN position
- Engine running at a minimum of 2500 rpm.
- PTO lever in ENGAGED position.

Symptom: Poor/Uneven Spray Pattern

(1) Are nozzles missing, damaged or plugged?

Yes - Go to next step.

No - Replace missing or damaged nozzles. Clean plugged nozzles. See “Nozzles” on page 129.

(2) Nozzle seals in place and undamaged?

Yes - Go to next step.

Symptom: Poor/Uneven Spray Pattern

No - Replace nozzle seals. See “Nozzles” on page 129.

(3) Are all nozzles the same type?

Yes - Go to next step.

No - Replace nozzles as necessary so they are all the same.

(4) Are nozzles the correct type for application?

Yes - Go to next step.

No - Install correct nozzles for application. See Operator’s Manual to determine correct nozzle for application.

(5) Are booms set at correct height for nozzles/ application?

Yes - Go to next step.

No - Adjust boom height. See Operator’s Manual.

(6) Are boom wings level?

Yes - Go to next step.

No - Level boom wings. See Operator’s Manual.

(7) Are nozzle screens plugged?

Yes - Clean screens.

Pressure Gauge Reading Inaccurate (Pump Off)

Test Conditions:

- Sprayer attachment mounted on machine.
- Machine parked on a level surface.
- Engine not running.
- PTO lever in DISENGAGED position.

Symptom: Pressure Gauge Reading Inaccurate

(1) Does the pressure gauge reading return to 0 kPa (0 psi) with pump off?

No - Loosen fitting at isolator, allow a small amount of fluid to drain as pressure is released, then tighten fitting.

Pressure Gauge Reading Inaccurate (Pump On)

Test Conditions:

- Sprayer attachment mounted on machine.
- Machine parked on a level surface.
- Engine running at a minimum of 2500 rpm.
- Tank must have at least 190L (50 gal) of clean fresh water.
- Three-way ball valve in OPEN position.
- PTO lever in ENGAGED position.
- Boom master switch in ON position.
- Increase/Decrease Switch held to increase to maximum work pressure.

Symptom: Pressure Gauge Reading Inaccurate

(1) Does pressure gauge read approximately 415 kPa (60 psi) with pump on?

No - Bleed pressure tube. See “Pressure Gauge Tube Bleeding Procedure” on page 118. If the pressure reading is still low after priming the gauge tube, check the condition of pump and sprayer system. See “System Fails To Build Pressure” on page 115.

Tests and Adjustments

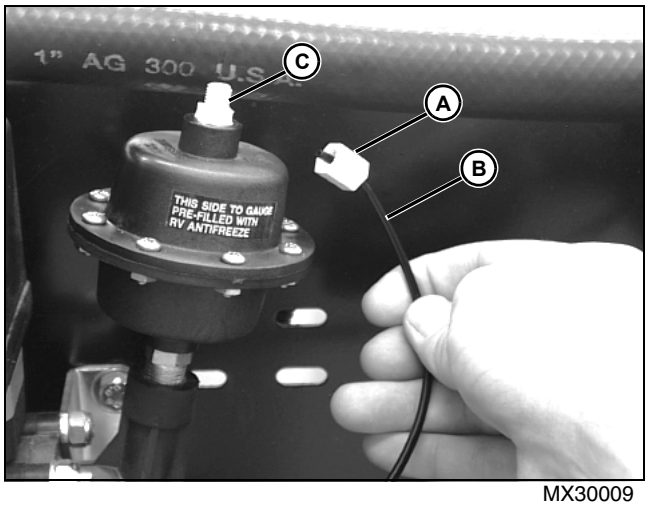
Isolator Bleeding Procedure

Reason:

If pressure is inaccurate on the gauge when the pump is running, the isolator must be bled to remove excess air to ensure accurate pressure readings.

Procedure:

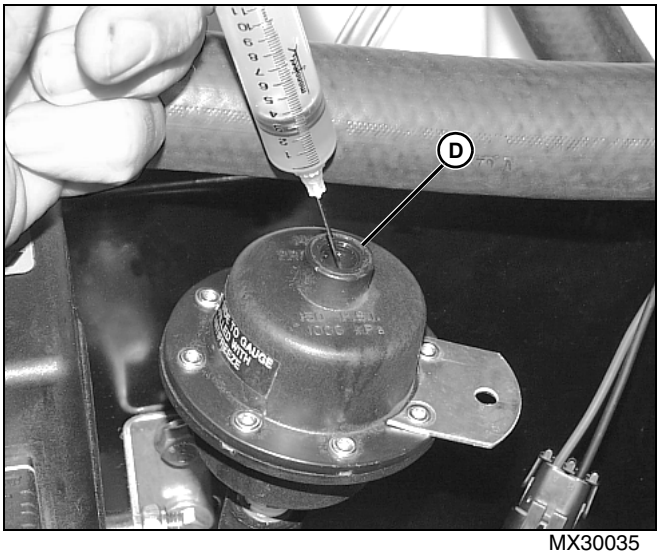
NOTE: The sprayer must be installed before and performing this procedure.



MX30009

1. Disconnect the female compression fitting (A) and remove the pressure tube (B) from the isolator.

2. Remove the male compression fitting (C) from the isolator.



MX30035

3. Add RV anti-freeze to isolator port (D) with syringe or other method, allowing fluid to displace any air in isolator. Fill to top of port.

4. Install compression fittings and pressure tube, operate sprayer to confirm proper gauge function or continue with procedure to bleed the pressure tube.

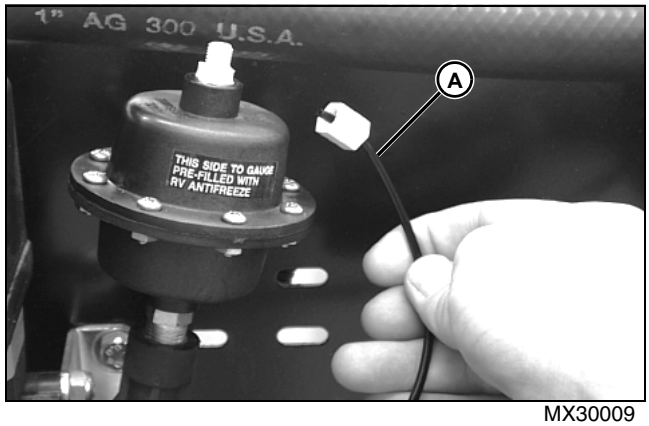
Pressure Gauge Tube Bleeding Procedure

Reason:

To ensure that all air is removed from the gauge tube, after the tube has been disconnected for service, or after the sprayer has been installed. Failure to bleed the tube could result in inaccurate gauge readings.

Procedure (HD200 SN -35000):

NOTE: The sprayer must be installed before and performing this procedure.



MX30009

1. Locate the pressure gauge isolator and remove the tubing (A).

MX2980

2. Remove pressure gauge from the control panel.

3. Loosen and remove pressure tube connector (A) from threaded fitting on back side of pressure gauge. Set gauge aside.

4. Using a siphon pump or syringe, fill the pressure tube completely with RV anti-freeze until it squirts from tube end at pressure gauge. Leave pump or syringe attached to tube

end at isolator to prevent air from entering the system.

5. Insert pressure tube into threaded fitting at back side of gauge. Tighten the pressure tube connector to secure.

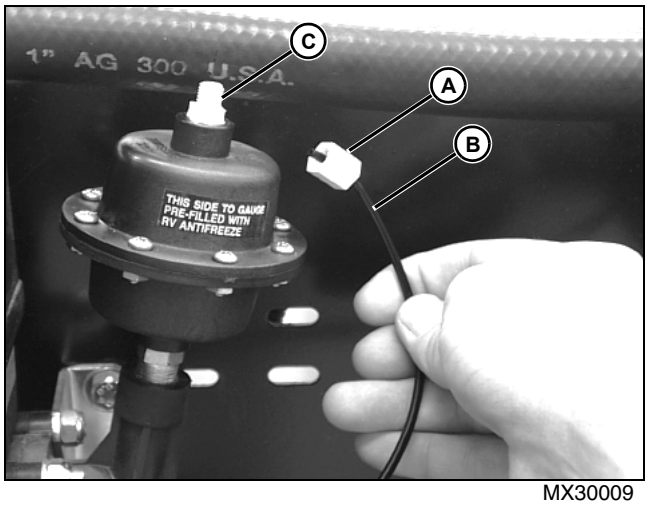
6. Remove pump or syringe from tube at isolator. Insert tube into threaded fitting on isolator. Tighten the pressure tube connector to secure.

7. Install pressure gauge in dash panel.

8. Operate sprayer and confirm proper gauge function. If readings still appear inaccurate, bleed the isolator.

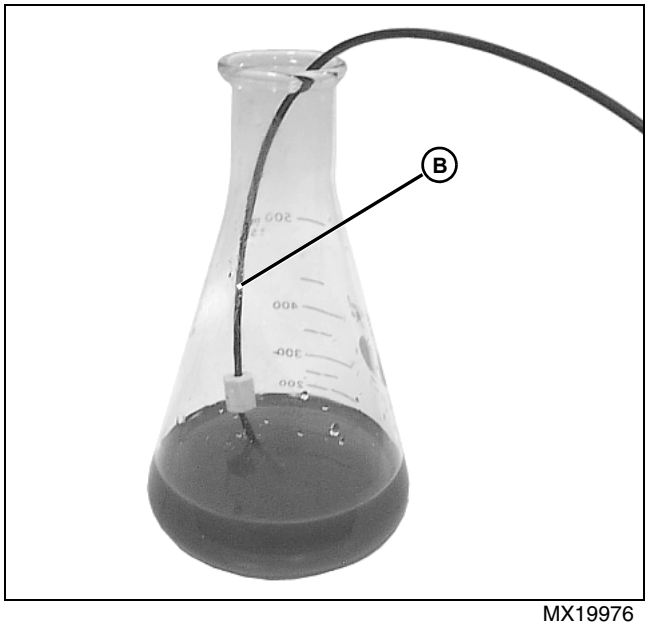
Procedure (HD200 (all models) and HD300), Suction Method:

1. Remove the machine front grille to allow access to dash panel hardware for later removal.



MX30009

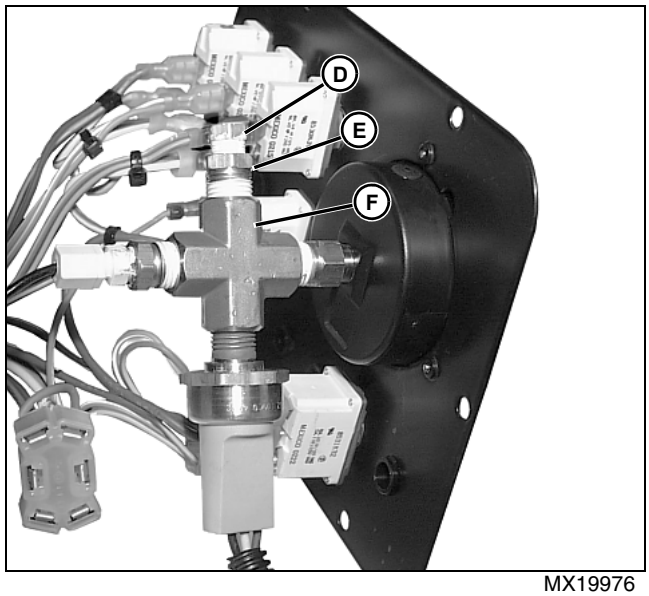
2. Disconnect female compression fitting (A) from isolator and remove pressure tube (B). Male compression fitting (C) can remain in isolator.



MX19976

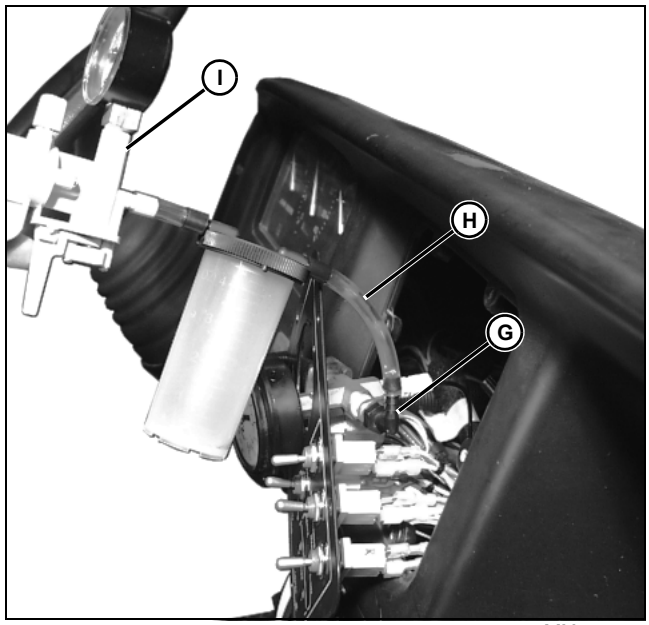
3. Place the sprayer end of the pressure tube (B) into a container filled with an adequate amount of RV anti-freeze. The container should be at or above the level of the pressure gauge.

4. Remove the hardware retaining the dash panel and carefully pull panel out to enable access to cross fitting behind pressure gauge. Retain hardware.



MX19976

5. Remove plug (D) from adapter (E) in cross fitting (F) at rear of pressure gauge. Retain plug.



MX19975

6. Install a fitting (G) and tubing (H) compatible with available equipment to connect suction pump (I) or equivalent to adapter on cross fitting.

7. HD200 (SN -35000): Connect vacuum pump directly to pressure tube.

8. Operate pump until fluid appears in tube and allow pressure to equalize.

9. Remove the tube from the fluid container, quickly connect the tube to the isolator and tighten the compression fitting.

10.Remove the pump and hardware from the cross fitting, keeping the opening on top. Top off cross fitting with RV anti-freeze and install plug (D) removed earlier, using thread sealant tape to prevent leakage.

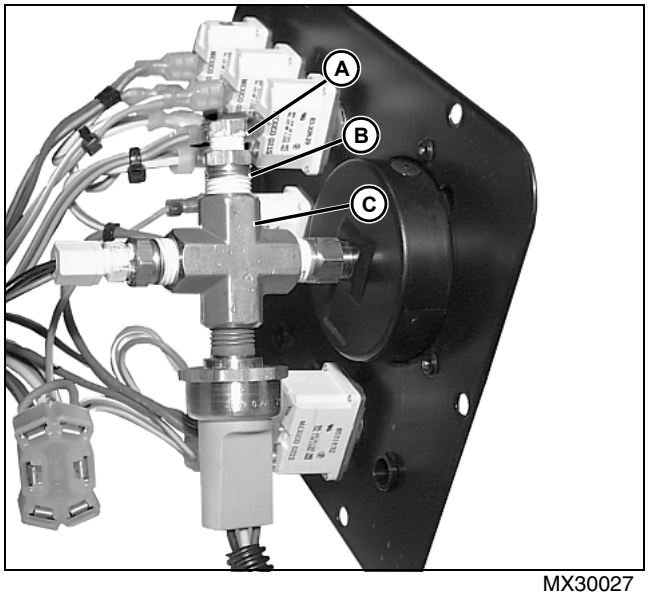
11.Operate sprayer and confirm proper gauge function. If readings appear inaccurate, or low pressure warning buzzer sounds intermittently, there may be air in system. Repeat bleed procedure if necessary.

12.Install dash panel and machine front grill.

Procedure (HD200 (all models) and HD300), Injection Method:

1. Remove the machine front grille to allow access to dash panel hardware.

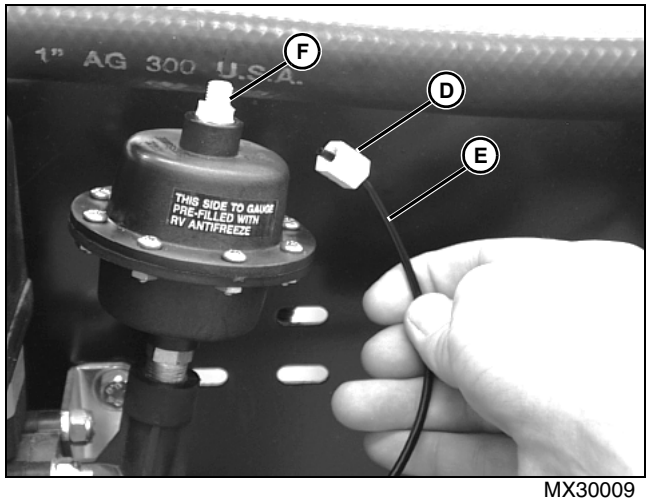
2. Remove the hardware retaining the dash panel and carefully pull panel out to enable access to cross fitting behind pressure gauge. Retain hardware.



MX30027

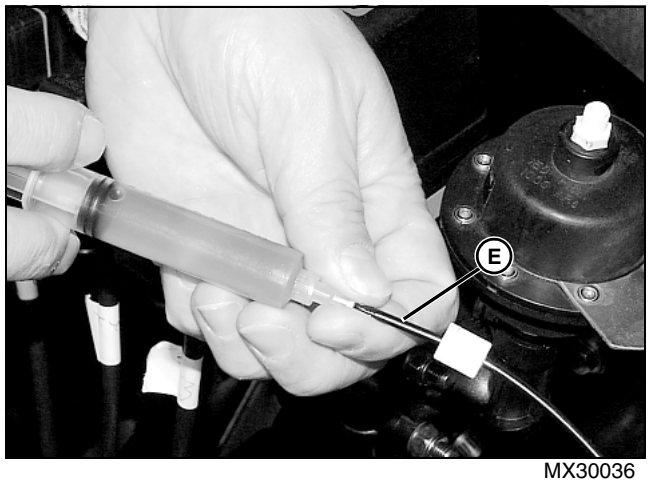
3. Remove plug (A) from adapter (B) in cross fitting (C) at rear of pressure gauge. Retain plug.

- HD200 (SN -35000): Remove pressure tube from pressure guage.



MX30009

4. Disconnect female compression fitting (D) from isolator and remove pressure tube (E). Male compression fitting (F) can remain in isolator.



MX30036

5. Inject RV anti-freeze into the sprayer end of the pressure tube (E) with a syringe until it fills the plug port on cross fitting at pressure gauge.

6. Remove syringe, quickly connect the tube to the isolator and tighten the compression fitting.

- HD200 (SN -35000): Connect pressure tube from pressure guage.
- HD200 (SN 35001- ,HD300): Top off cross fitting with RV anti-freeze and install plug removed earlier, using thread sealant tape to prevent leakage.

7. Operate sprayer and confirm proper gauge function. If readings appear inaccurate, or low pressure warning buzzer sounds intermittently, there may be air in system Repeat bleed procedure if necessary.

8. Install dash panel and machine front grill.

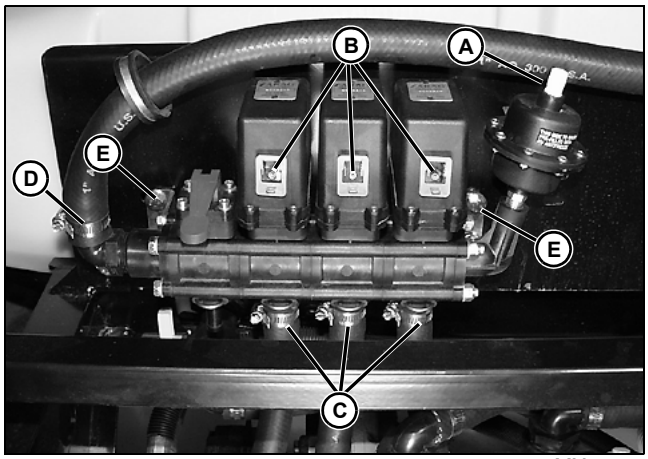
Repair

Boom Valve Stack Assembly

Removal/Installation:

1. Disconnect circuit breaker main power lead at the battery.

NOTE: The gauge tube is filled with RV anti-freeze. Drain excess oil into a properly marked container and dispose of properly.



MX0721

HD200 SN -35000 Shown, Others Similar

2. Disconnect gauge tube from connector (A).

NOTE: Mark valve electrical connectors before removing from valve solenoids (B) to ensure correct installation.

3. Loosen screws and disconnect solenoid wiring connectors.

NOTE: Mark hoses (C) before removing to ensure correct installation.
Some chemical solution may remain in hoses and valve assembly. Drain excess chemical solution into a properly marked container and dispose of properly.

4. Disconnect inlet hose (D).

5. Disconnect hose from manual valve (if equipped with optional hose reel or walking boom).

6. Remove U-pins and disconnect boom valve output hose connectors and hoses.

7. Remove cap screws, washers and nuts (E).

8. Remove boom valve stack assembly.

Installation is done in the reverse order of removal.

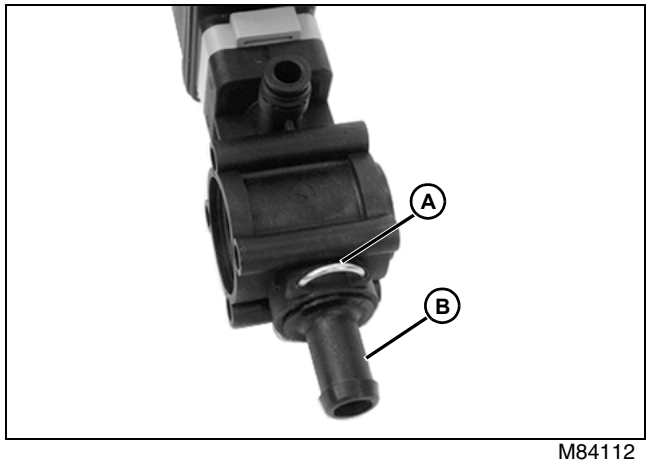
- Make sure the electrical connector gaskets are in place.
- Prime gauge tube. See “Pressure Gauge Tube Bleeding Procedure” on page 118.
- Prime pump. See “Pump Priming Procedure (HD200 SN -35000)” on page 92.
- Run system and check for leaks, repair as necessary.

Disassembly and Assembly:

- Apply Teflon tape to threads of all fittings and adaptors.
- Replace O-rings.
- Inspect all parts for wear or damage. Replace parts as necessary.
- Repair boom valves if necessary. See “Boom Valve” below.
- Repair manual valve if necessary. See “Manual Valve” on page 124.

Boom Valve

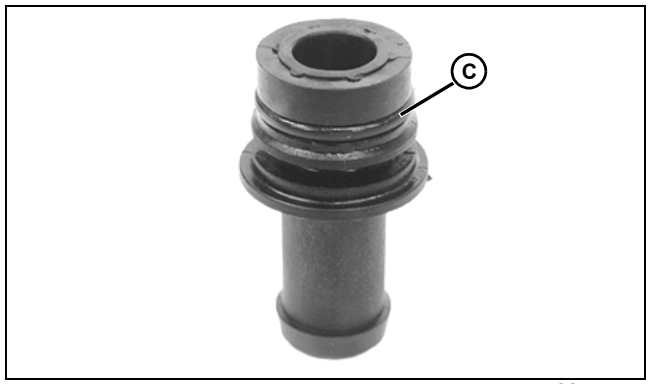
Disassembly/Assembly:



M84112

Outlet Fitting

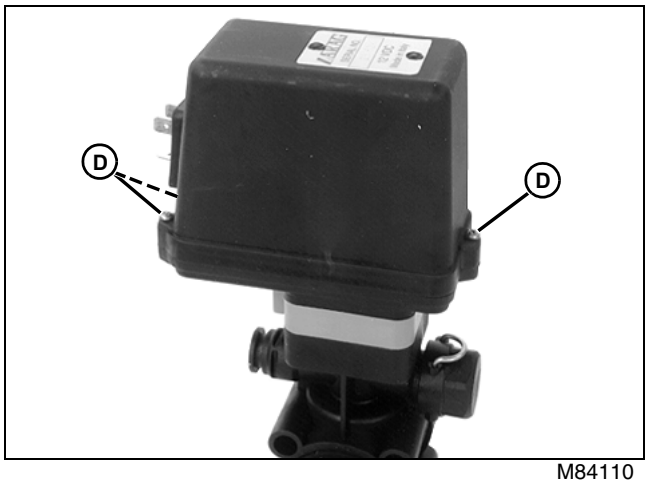
1. Remove retainer clip (A).
2. Remove outlet fitting (B).



M84126

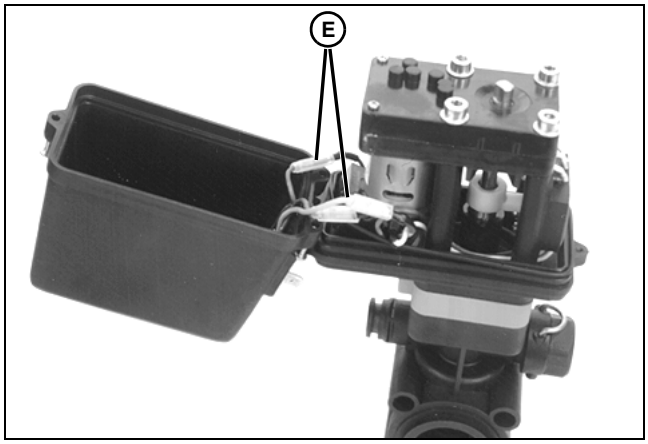
3. Inspect O-ring (C). Replace if damaged.

CAUTION: Avoid Injury! Lift cover carefully to prevent damaging wires.



M84110

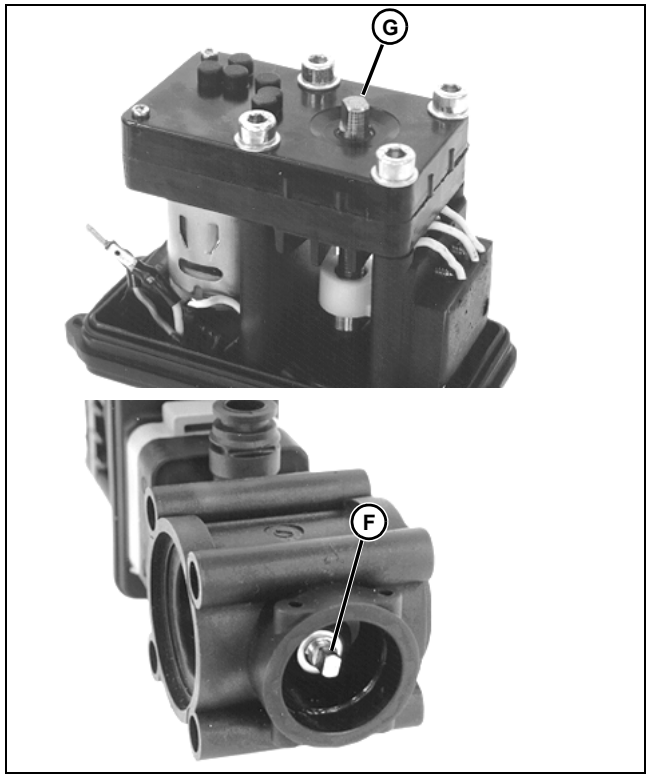
4. Remove three screws (D) and carefully lift cover.



M84120

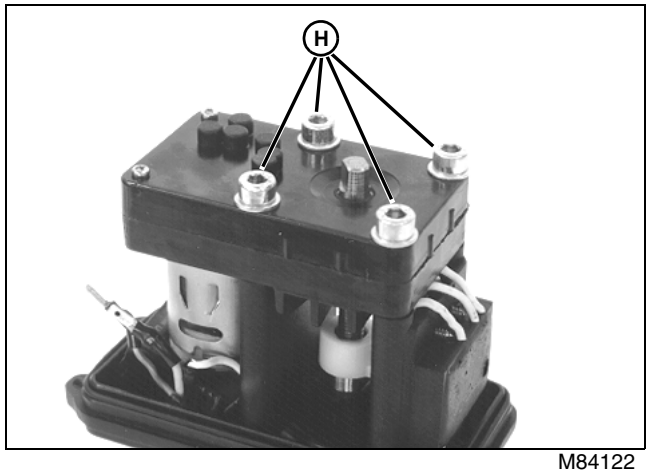
5. Disconnect wires (E) and remove cover.

NOTE: If the motor shaft (G) turns with the plunger shaft, hold the motor shaft.



M84121 and M84122

6. Remove plunger shaft (F) assembly from the valve body by turning it counterclockwise, until it unscrews from the motor shaft (G).

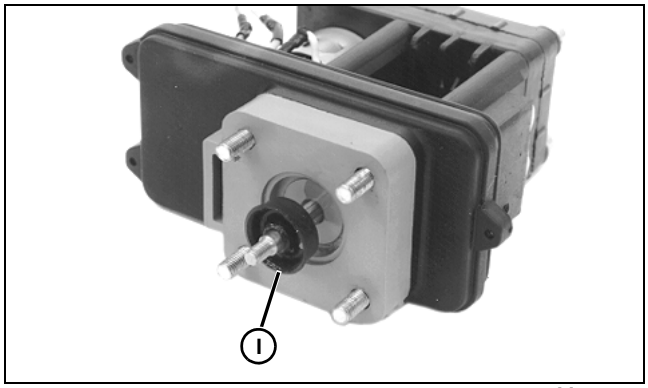


M84122

7. Loosen the four screws (H) completely, but do not remove the screws from the motor assembly.

NOTE: Remove the motor assembly as a unit to maintain alignment and prevent loss of small parts.

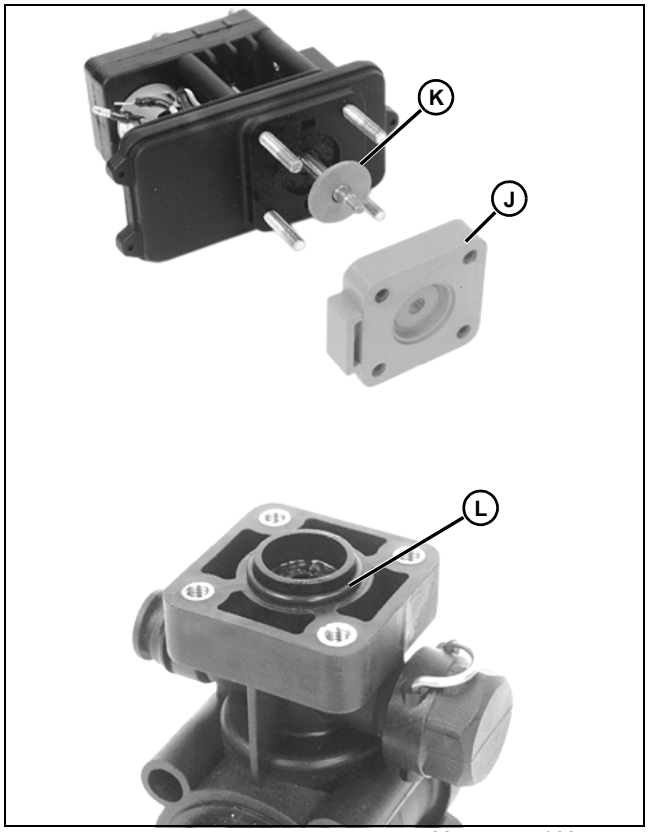
8. Remove the motor assembly from the valve body.



M84123

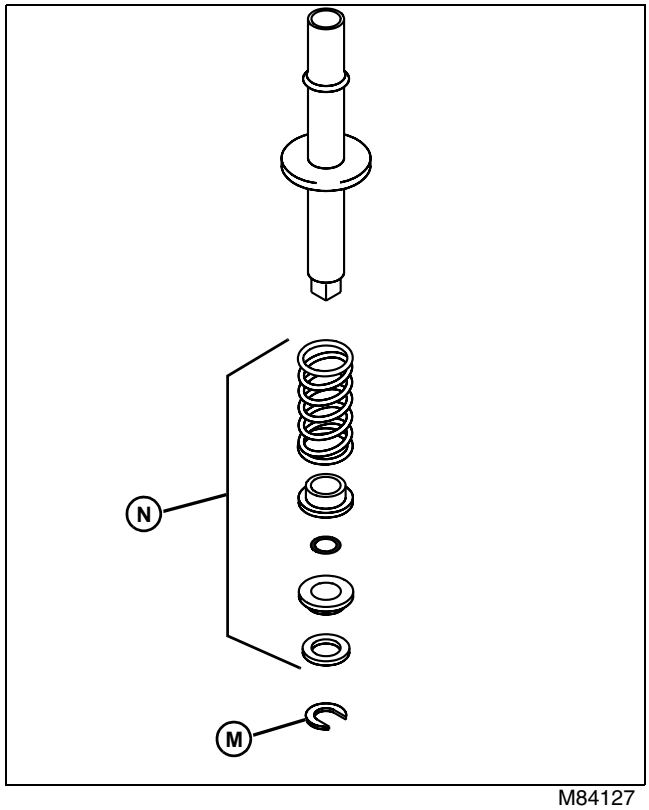
9. Remove seal (I).

10. Remove spacer block (J) and washer (K).



M84124 and M84125

11. Remove O-ring (L) from valve body.



M84127

12. Remove retaining clip (M).

13. Remove washer, plunger, O-ring, plate and spring (N) from the plunger shaft.

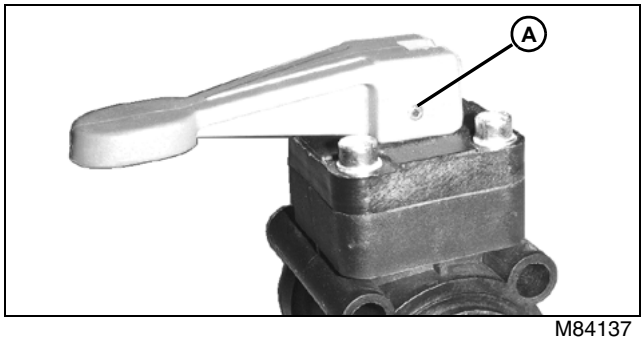
14. Inspect all parts for wear or damage. Replace as necessary.

Assembly is done in the reverse order of disassembly.

- Apply a light coat of petroleum jelly to O-rings (except cover O-ring).

Manual Valve

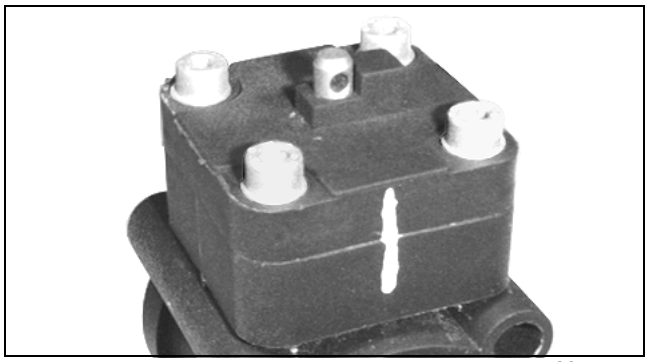
Disassembly/Assembly:



M84137

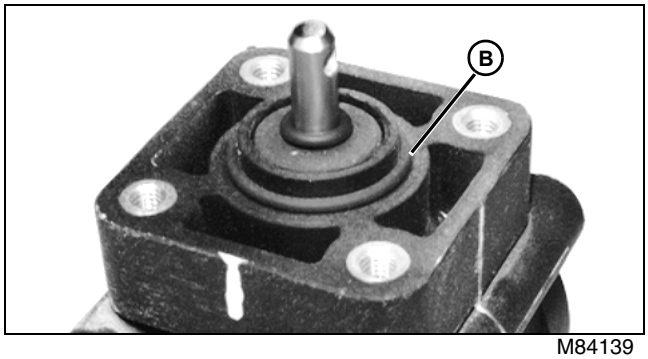
1. Drive out handle retaining pin (A).
2. Remove handle.

NOTE: Mark a line across the cover and valve body to aid in assembly.



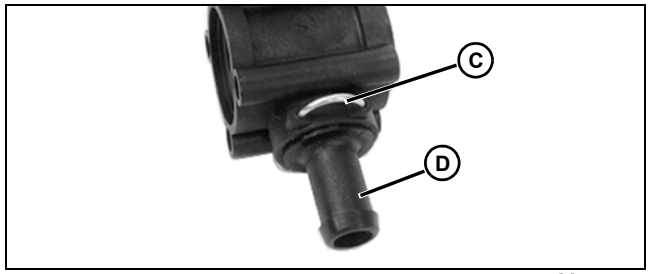
M84138

3. Remove four socket-head cap screws and washers.
4. Remove cover.



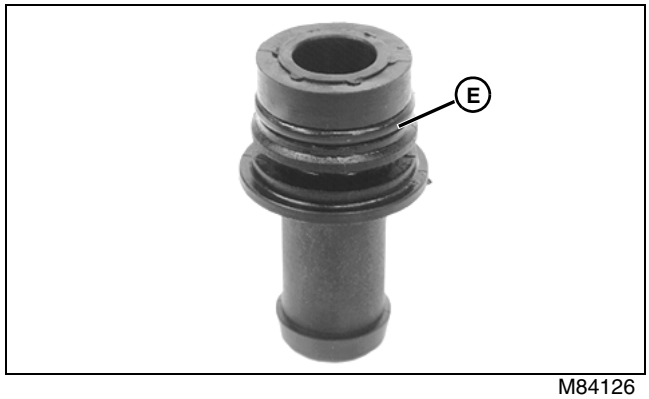
M84139

5. Remove O-ring (B).



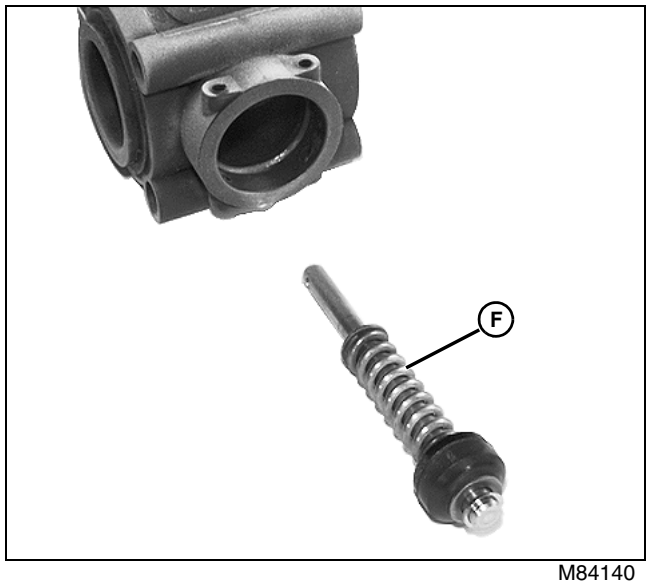
M84112

6. Remove retainer clip (C). Remove outlet fitting (D).



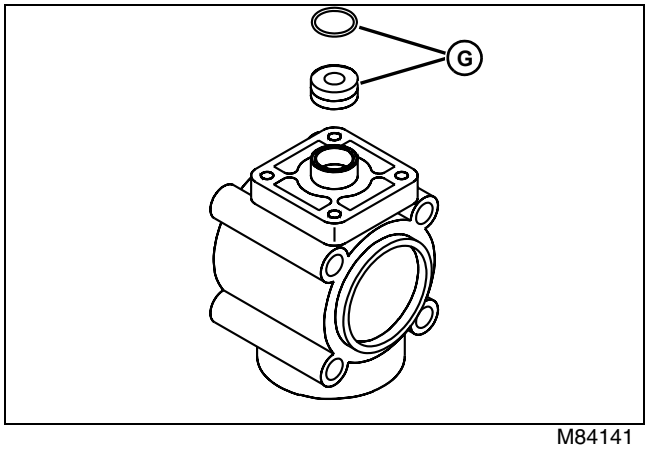
M84126

7. Inspect O-ring (E). Replace if damaged.



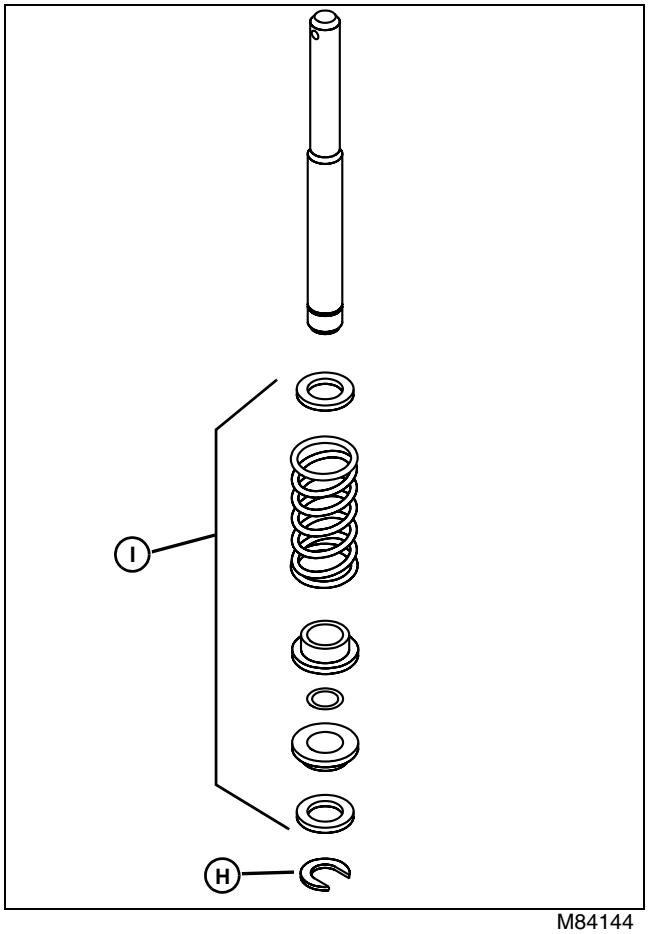
M84140

8. Remove plunger shaft assembly (F).



M84141

9. Remove seal and O-ring (G).



M84144

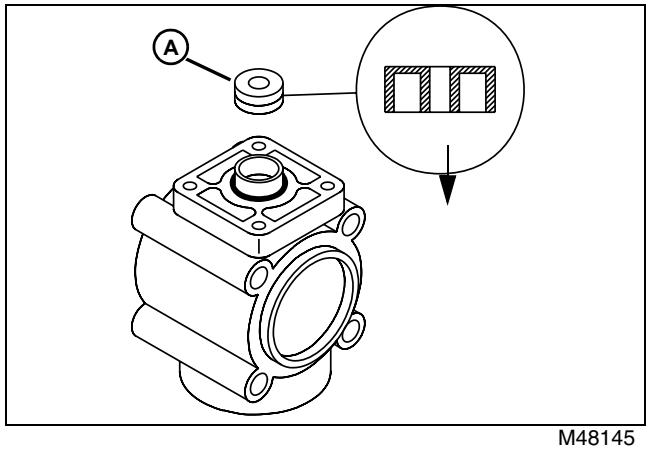
10.Remove retaining clip (H).

11.Remove washer, plunger, O-ring plate and spring (I).

12.Inspect all parts for wear or damage. Replace as necessary.

Assembly is done in the reverse order of disassembly.

- Apply a light coat of petroleum jelly to O-rings.



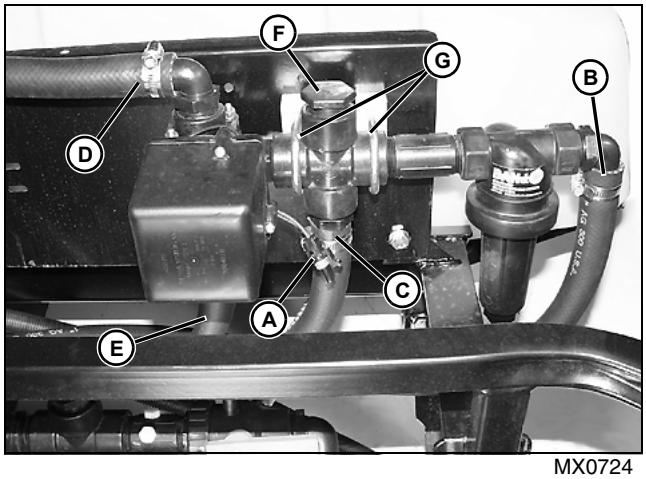
M48145

IMPORTANT: Avoid damage! Install seal with open face of the seal toward the valve body.

Pressure Regulator Valve/Strainer Assembly

Removal/Installation (HD200 SN -035000):

1. Drain chemical tank. See “Chemical Tank” on page 151; or, Close chemical tank shutoff valve.



MX0724

2. Disconnect solenoid wiring connector (A) from wiring harness.

NOTE: Some chemical solution may remain in hoses and valve assembly. Drain excess chemical solution into a properly marked container and dispose of properly.

3. Disconnect strainer inlet hose (B).

4. Disconnect sparge tube hose (C) from cross fitting.

5. Disconnect outlet hose (D) from pressure regulator valve.

6. Disconnect bypass hose (E) from pressure regulator valve.

7. Disconnect rinse tank hose (F) from cross fitting if

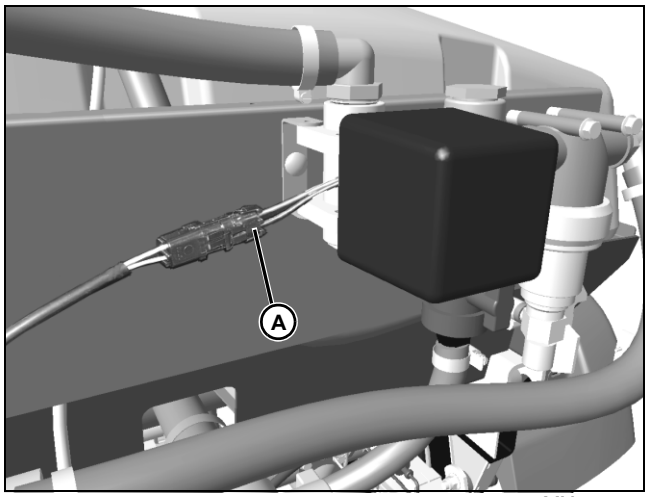
installed, plug does not need to be removed.

8. Remove nuts, washers and U-bolts and spacers (G).

9. Remove pressure regulator valve/strainer assembly.

Removal/Installation (HD200 (SN 035001-), HD300):

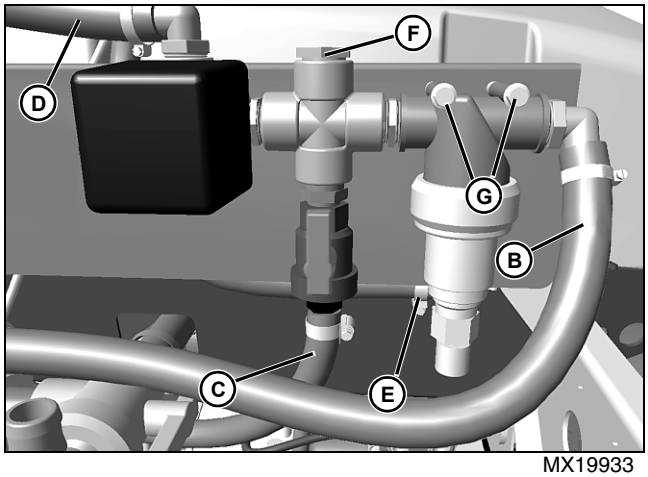
1. Drain chemical tank. See “Chemical Tank” on page 151; or, Close chemical tank shutoff valve.



MX19926

2. Disconnect solenoid wiring connector (A) from wiring harness.

NOTE: Some chemical solution may remain in hoses and valve assembly. Drain excess chemical solution into a properly marked container and dispose of properly.



MX19933

3. Disconnect strainer inlet hose (B).

4. Disconnect agitator hose (C) from valve.

5. Disconnect outlet hose (D) from pressure regulator valve.

6. Disconnect strainer return hose (E) from bottom of strainer.

NOTE: Plug (F) shown where rinse tank hose would be if installed

7. If installed, disconnect rinse tank hose from cross fitting.

8. Remove nuts, spacers, and bolts (G).

9. Remove pressure regulator valve/strainer assembly.

Installation is done in the reverse order of removal.

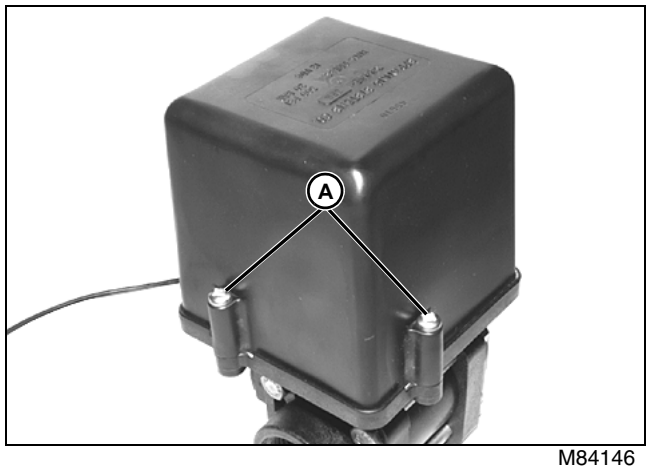
- Run system and check for leaks, repair as necessary.

Disassembly/Assembly:

- Apply Teflon tape to threads of all fittings and adaptors.
- Inspect all parts for wear or damage. Replace parts as needed.
- Clean strainer screen.
- Install a new strainer cover O-ring.
- Repair pressure regulator valve if necessary.

Pressure Regulator Valve

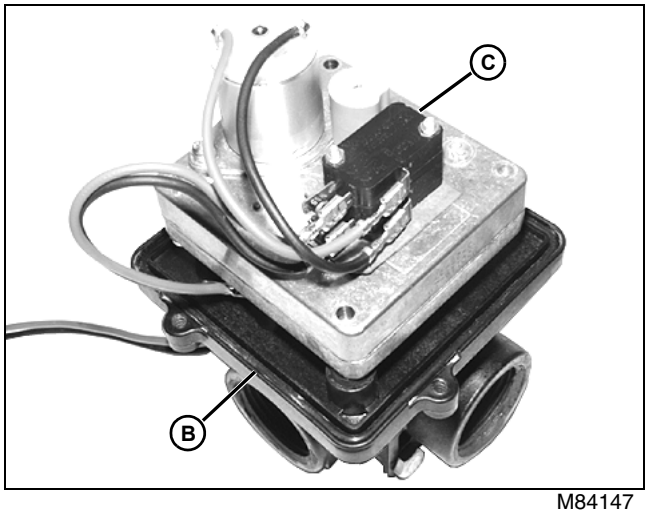
Disassembly/Assembly:



M84146

1. Remove four cover screws (A).

2. Remove cover.

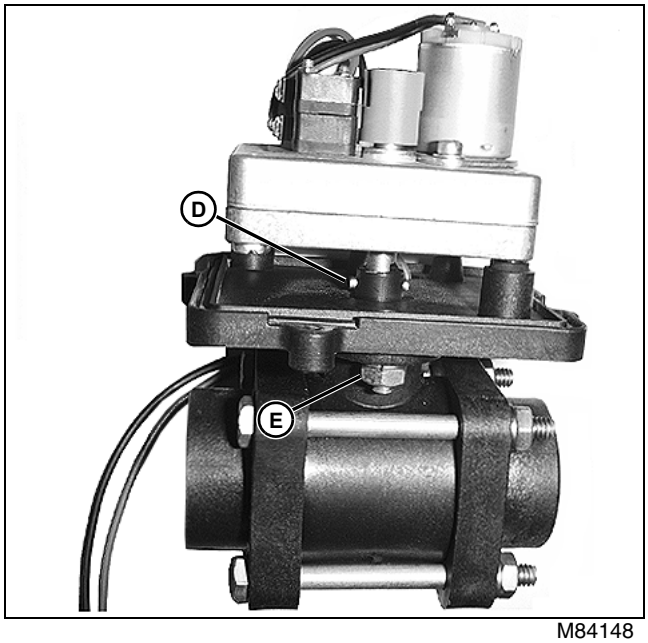


M84147

3. Remove O-ring (B).

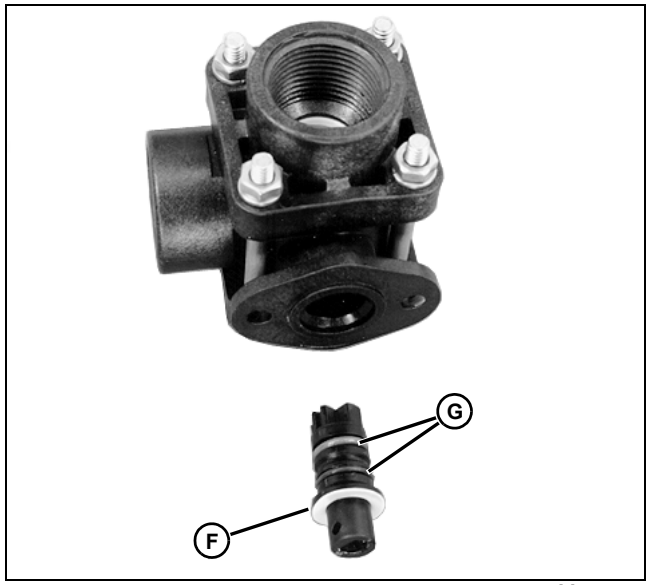
NOTE: Remove limit switches only if switches are to be replaced. Note location of wires to ensure correct installation.

4. Disconnect limit switch wires.
5. Remove screws, washers and limit switches (C).



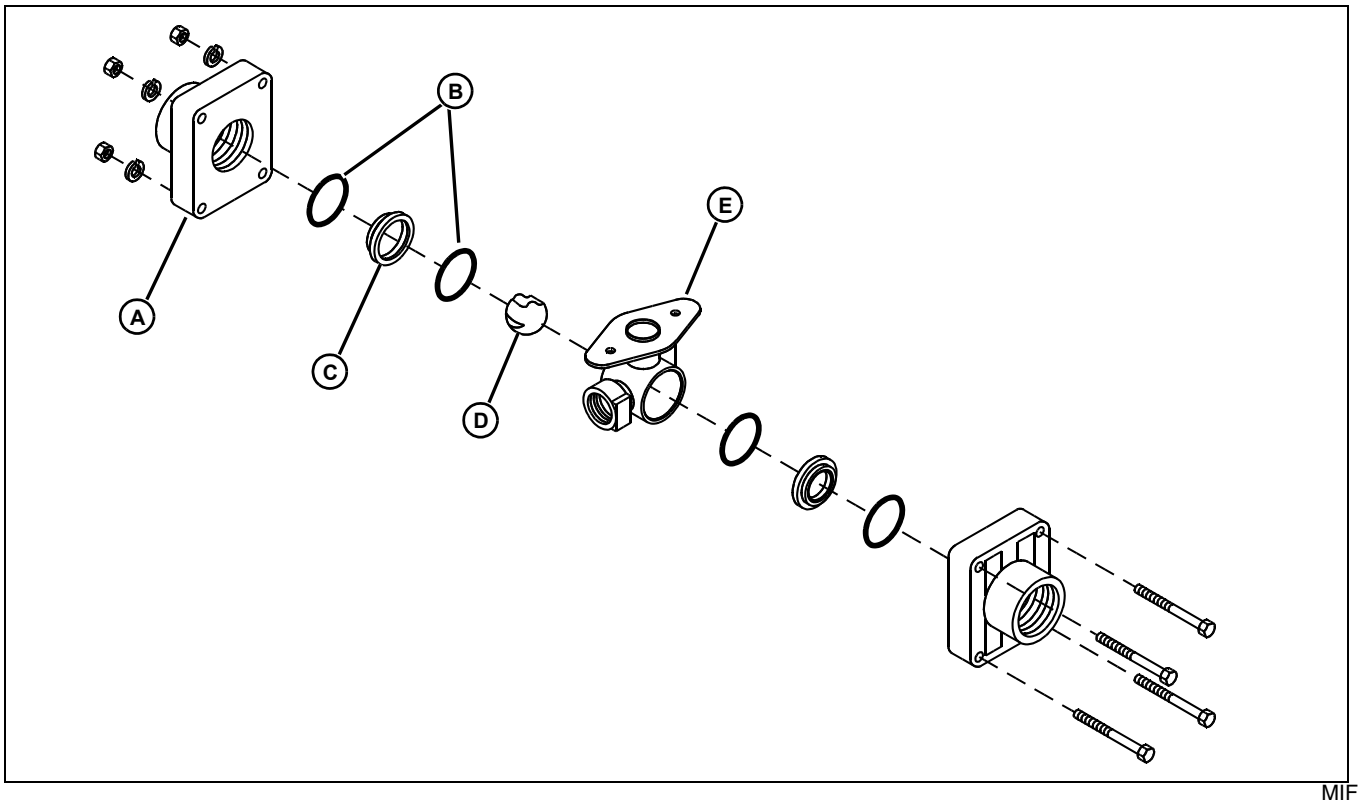
M84148

6. Drive out motor shaft pin (D) using a punch.
7. Remove nuts (E) from motor mounting plate.
8. Remove motor assembly.



M84211

9. Remove stem assembly (F) from valve body.
10. Inspect O-rings (G).



MIF

11.Remove four nuts, washers and cap screws securing end housing (A). Remove end housings

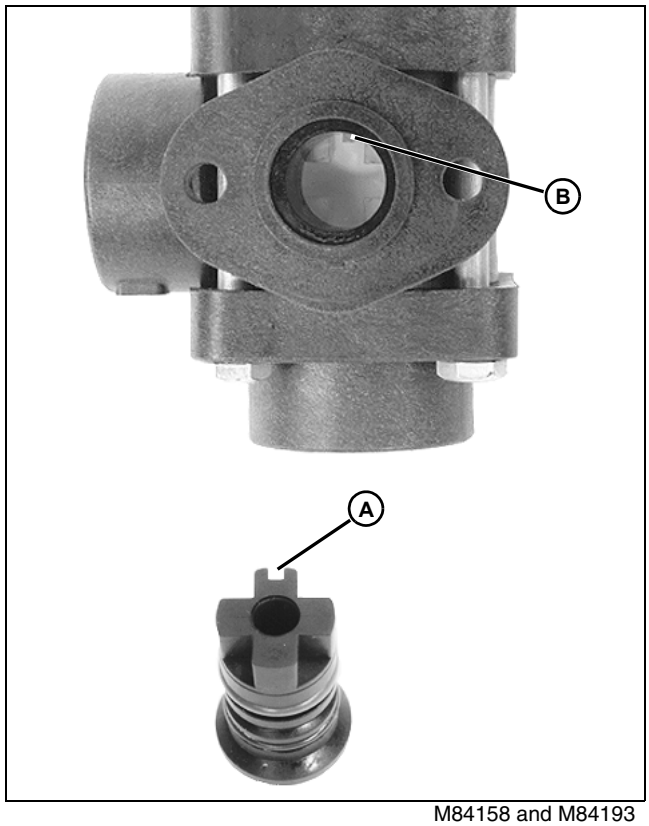
12.Remove O-rings (B) and seals (C).

13.Remove ball (D) from housing (E).

14.Inspect all parts for wear or damage. Replace parts as needed.

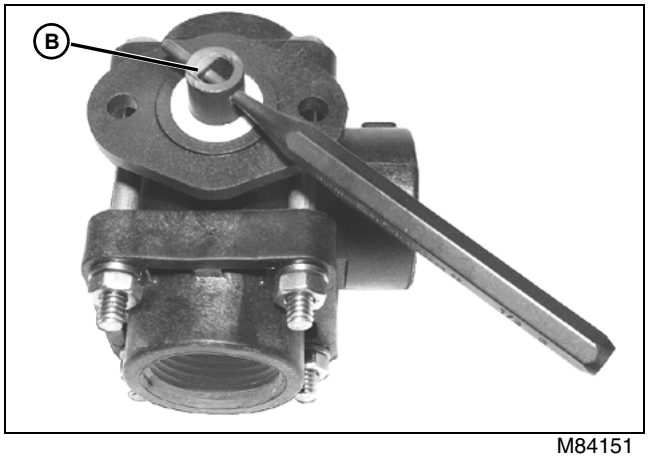
Assembly is done in the reverse order of disassembly.

IMPORTANT: Avoid damage! Always use new O-rings and seals. Damaged or used parts will leak.



M84158 and M84193

- Align notch (A) in stem with tab (B) on ball check.



M84151

• Insert a punch into the stem crosshole and rotate the stem to align the flat (B) with the flat on the motor shaft.

Boom Plumbing

Repair - Center and End Booms:

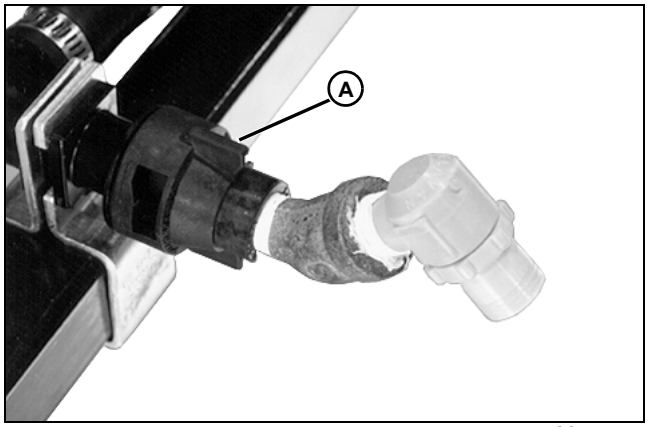
• Inspect all parts for wear or damage. Replace parts as needed.

• Remove, inspect and/or replace nozzles. See “Nozzles” below.

• Inspect hoses for signs of cracking. Replace hoses and needed.

Nozzles

Removal:



M84186

Raindrop® nozzle shown.

1. Press in on the nozzle connector (A) slightly, twist the connector 90° counterclockwise and remove the nozzle assembly.

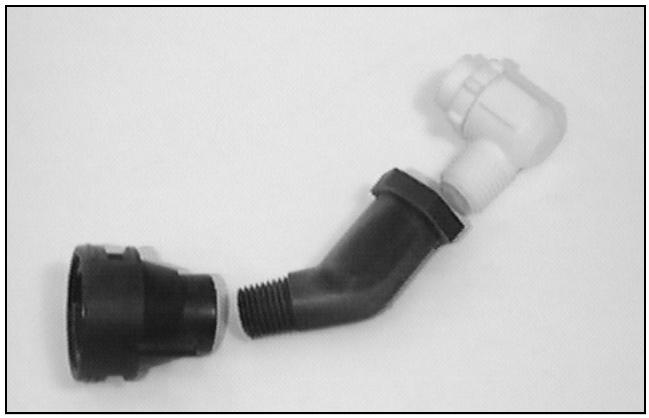
Repair (All Nozzles):

CAUTION: Avoid Injury! Reduce compressed air to less than 210 kPa (2 bar) (30 psi) when using for cleaning purposes. Clear area of bystanders, guard against flying chips, and wear personal protection equipment including eye protection.

IMPORTANT: Avoid damage! Never use a metal probe or tool to clean the nozzle orifice.

• Clean nozzle tips and strainers with a strong detergent solution and a soft brush. Dry with compressed air.

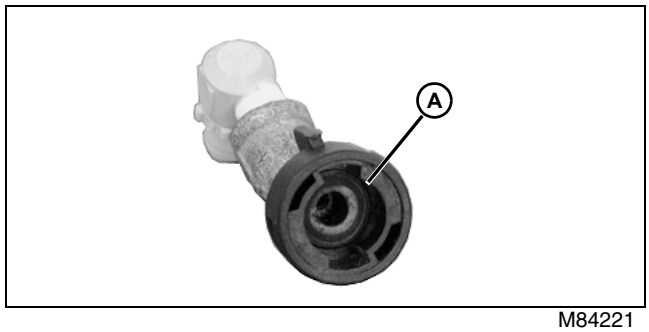
Raindrop Nozzles:



M88232

• Inspect all parts for wear or damage. Replace if necessary.

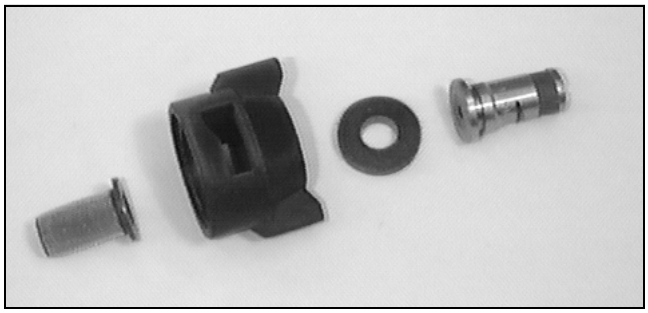
• Apply thread sealant tape to threads of nozzle and elbow fitting where applicable.



M84221

• Inspect seals (A). Replace if necessary.

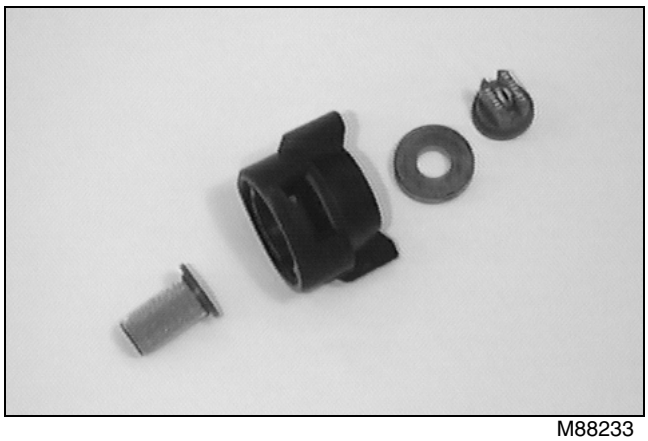
Turbo Floodjet Nozzles:



M88231

- Inspect all parts for wear or damage. Replace if necessary.
- Inspect seals (A). Replace if necessary.
- Clean or replace strainer.

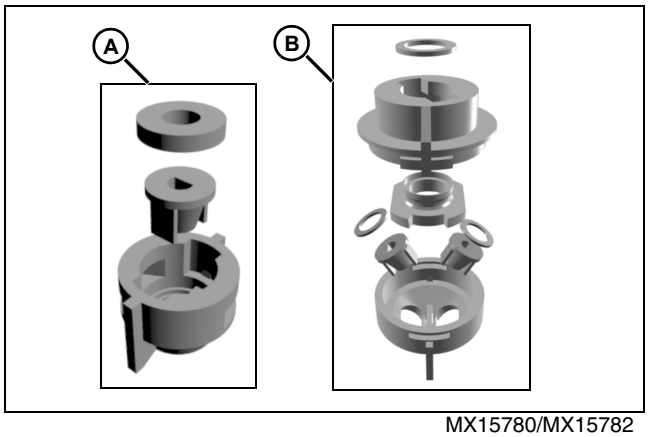
Flat Fan Nozzles:



M88233

- Inspect all parts for wear or damage. Replace if necessary.
- Inspect seals (A). Replace if necessary.
- Clean or replace strainer.

Ultra Low Drift Nozzles



MX15780/MX15782

A - Single nozzle detail

B - Dual nozzle detail

- Inspect all parts for wear or damage. Replace if necessary.

Installation:

Installation is done in the reverse order of removal.

Table of Contents

MISCELLANEOUS TABLE OF CONTENTS

Specifications

Adjustment Specifications

Foam Marker Air Operating Pressure . . . . . 414 kPa (60 psi)
Pressure Switch . . . . . 69 kPa (10 psi)

Repair Specifications

Chemical Tank Capacity . . . . . 757 L (200 gal)
Boom Wing Weight . . . . . 27 kg (60 lb)
Boom Center Section Weight . . . . . 38 kg (85 lb)
Personal Wash Tank Capacity . . . . . 15 L (4 gal)
Foam Marker Tank Capacity . . . . . 15 L (4 gal)

Other Materials

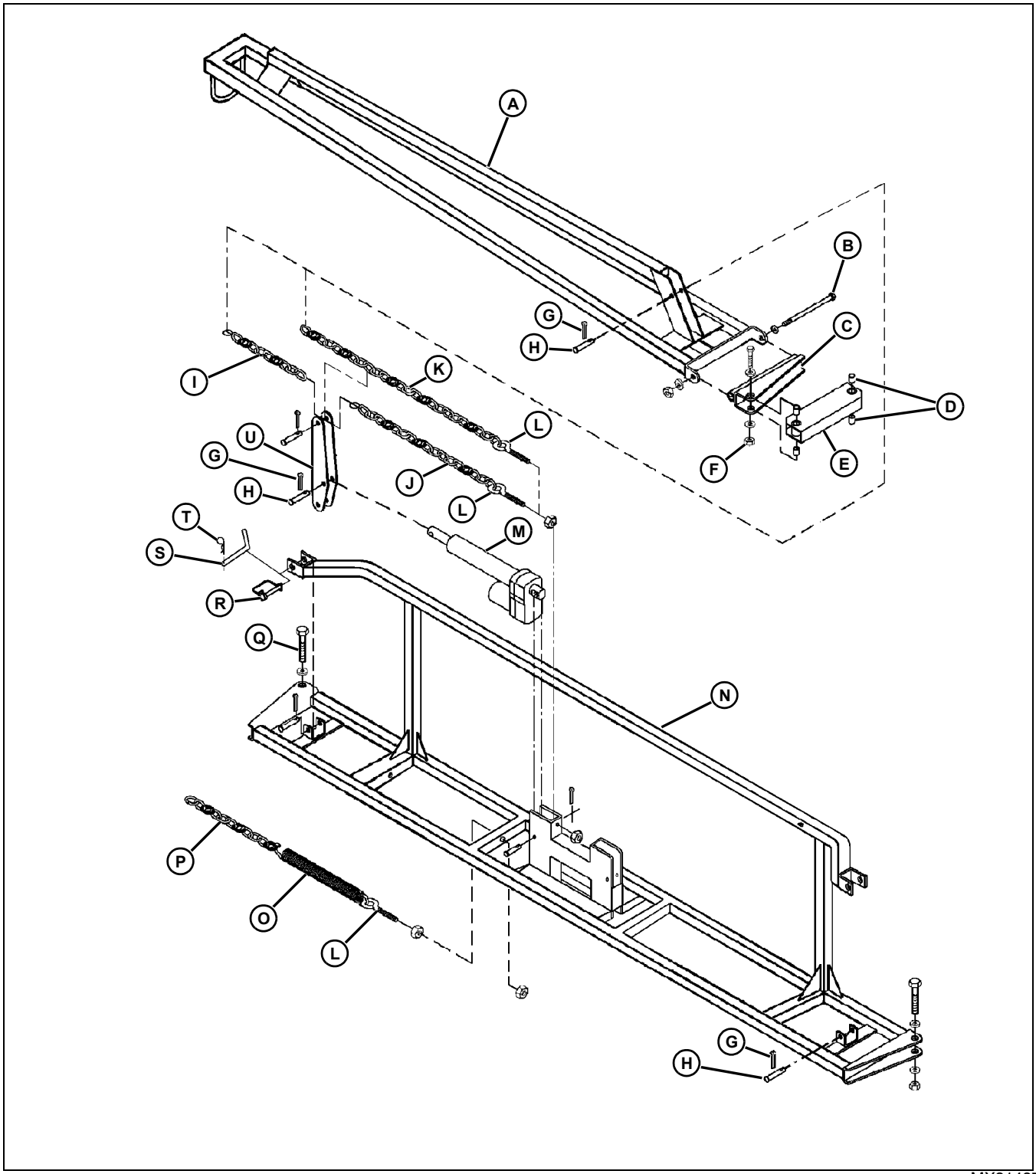
Other Material

Part No.	Part Name	Part Use
	TEFLON Tape	Apply to threads of hose fittings.

TEFLON® is a registered trademark of the DuPont Co.

Component Location

Boom Components - 18 Foot Boom



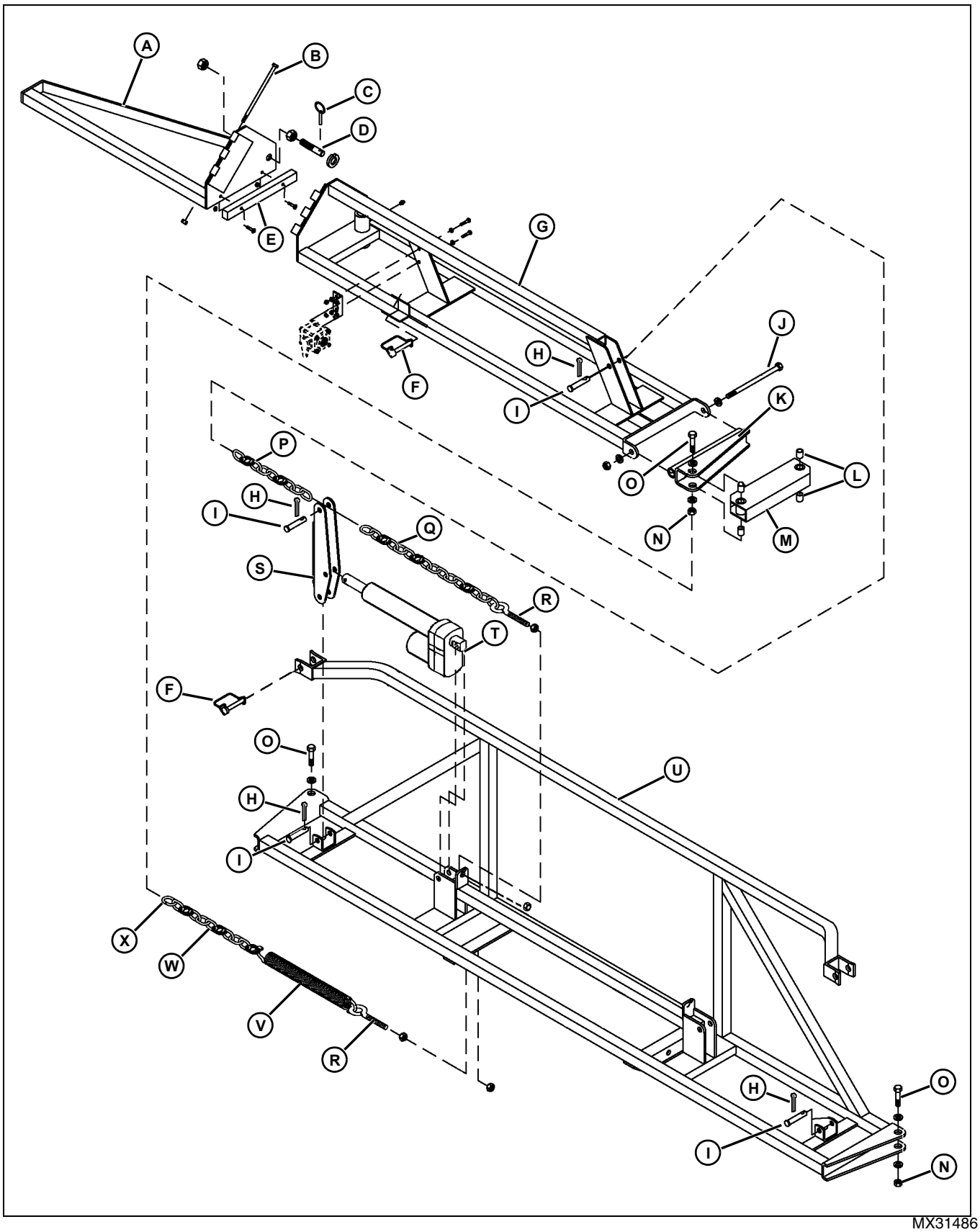
MX31487

Picture Note: Left boom extension shown.

MISCELLANEOUS COMPONENT LOCATION

A - Boom Wing
B - Cap Screw
C - Hinge
D - Sleeve
E - Hinge
F - Lock Nut
G - Cotter Pin
H - Pin
I - Chain, 9 link (-2002 models)
J - Chain, 19 Link (-2002 models)
K - Chain, 28 Link (2003- models)
L - Eye Bolt
M - Electric Actuator
N - Center Section
O - Spring
P - Chain, 9 Link
Q - Cap Screw
R - Spring Locking Pin (SN -35000)
S - Drilled Pin (SN 35001-)
T - Spring Locking Pin (SN 35001-)
U - Fold Yoke

Boom Components - 15/21 Foot Boom

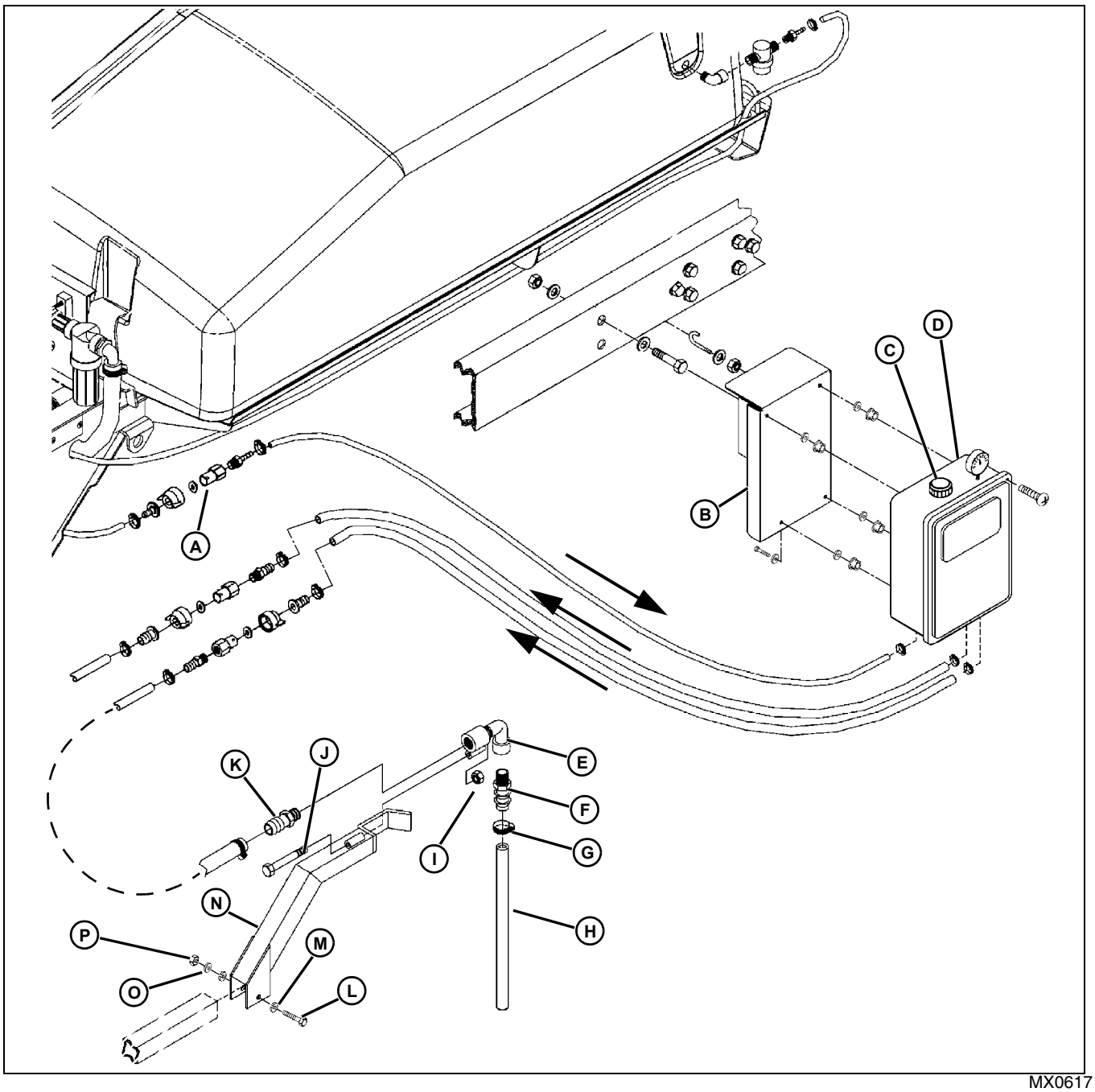


MX31486

MISCELLANEOUS COMPONENT LOCATION

A - Outer Wing Section (Left)
B - Bolt
C - Quick Lock Pin
D - Pin Fastener
E - Strap
F - Pin Fastener
G - Inner Wing Section (Left)
H - Cotter Pin
I - Drilled Pin
J - Bolt
K - Hinge
L - Sleeve
M - Hinge
N - Lock Nut
O - Cap Screw
P - Chain, 9 Link
Q - Chain, 16 Link
R - Eye Bolt
S - Fold Yoke
T - Electric Actuator
U - Center Section
V - Spring
W - Chain, 10 Link
X - Chain Link

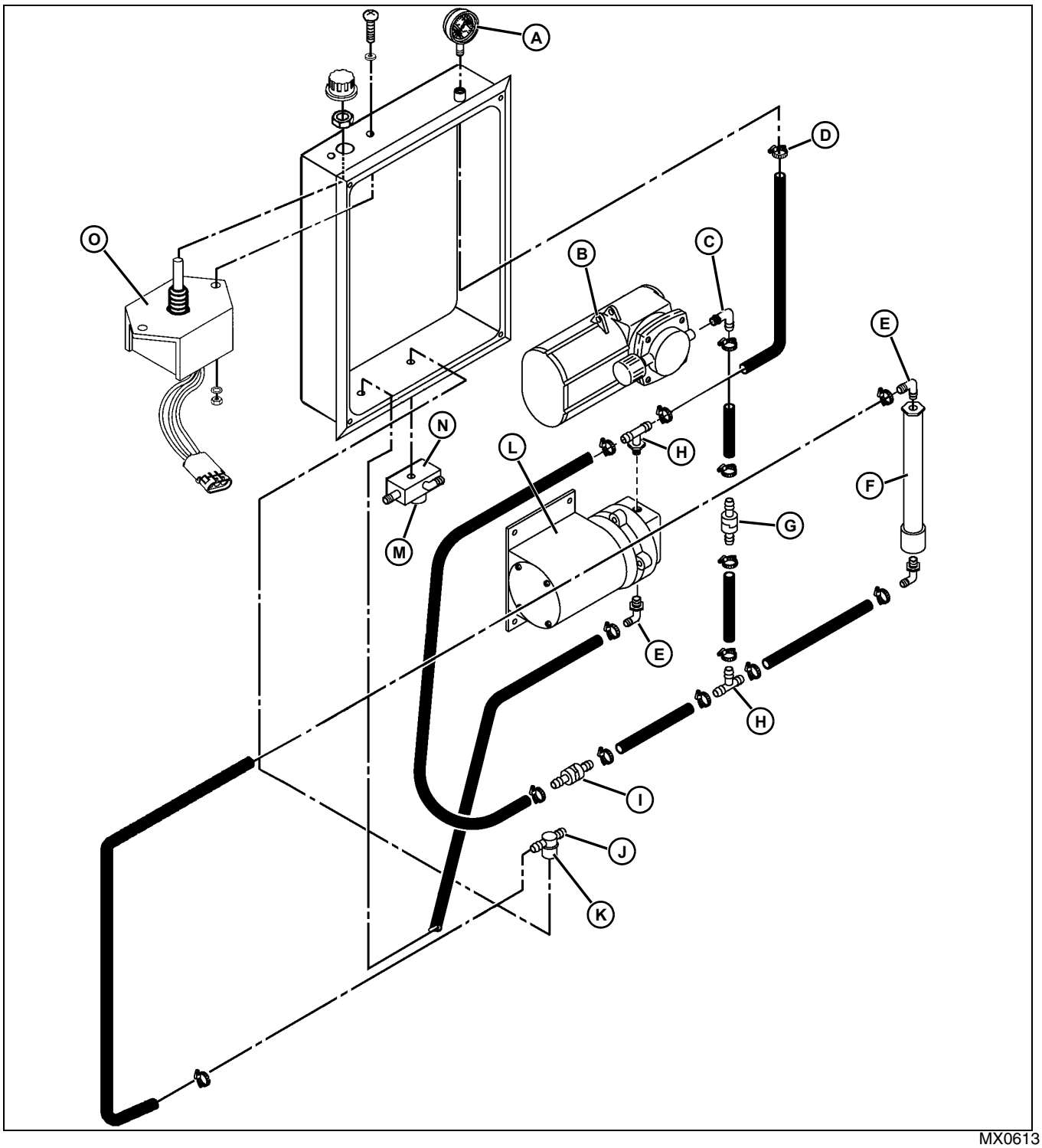
Hand Sprayer Components



MX0617

A - Strainer
B - Mounting Bracket
C - Adjustment Knob
D - Pump Assembly
E - Fitting (2 used)
F - Hose Fitting (2 used)
G - Clamp (2 used)
H - Hose (2 used)
I - Lock Nut (2 used)
J - Cap Screw (2 used)
K - Fitting (2 used)
L - Cap Screw (2 used)
M - Washer (4 used)
N - Support
O - Lock Washer (2 used)
P - Nut (2 used)

Foam Marker Components

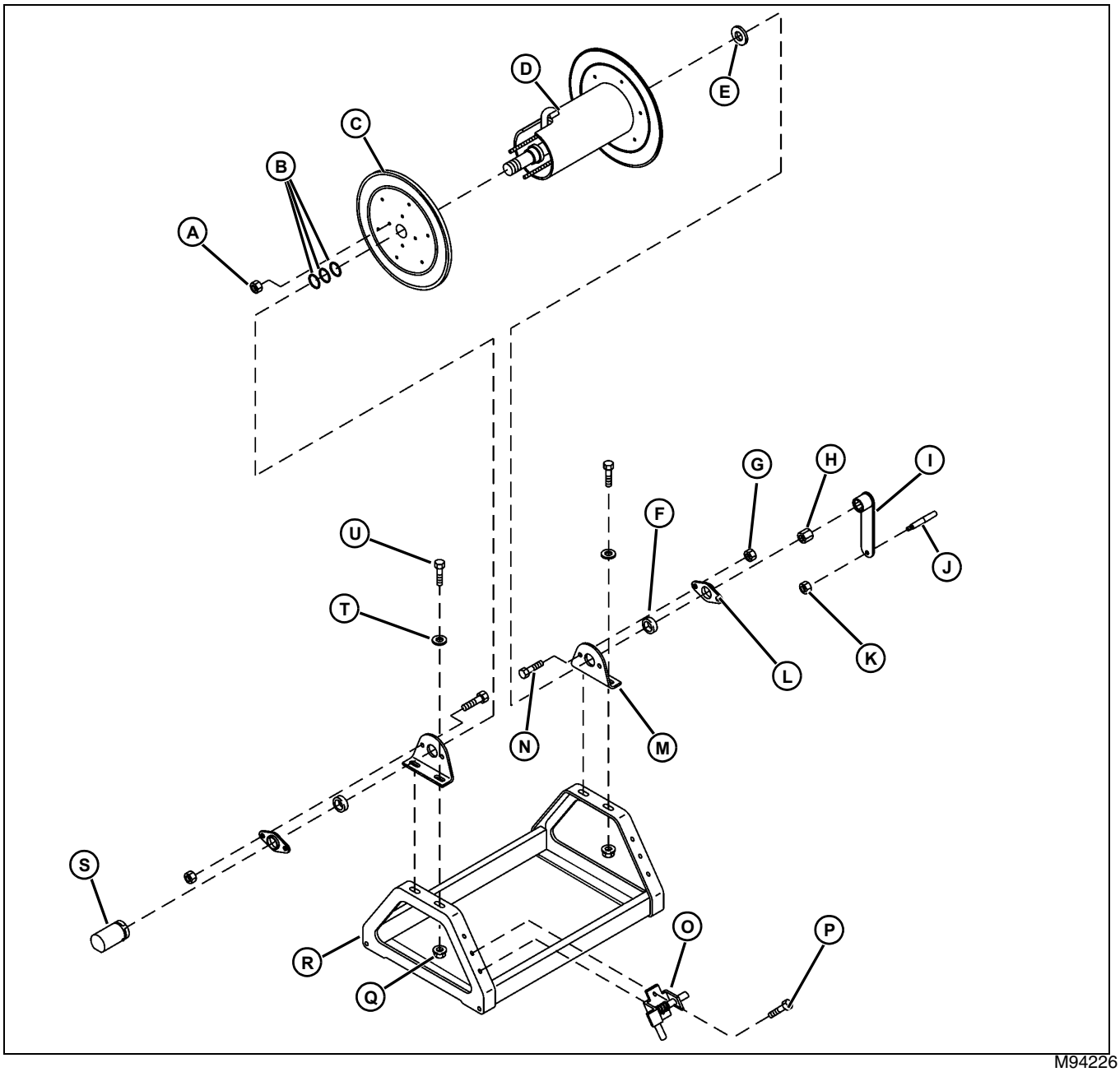


MX0613

A - Pressure Gauge
B - Air Pump
C - Elbow Fitting
D - Hose Clamp
E - Elbow Fitting
F - Foam Line
G - Check Valve
H - Tee Fitting
I - Check Valve
J - Hose Fitting
K - Strainer
L - Liquid Pump

M - Plug
N - Direction Valve
O - Speed Control

Manual Hose Reel Components

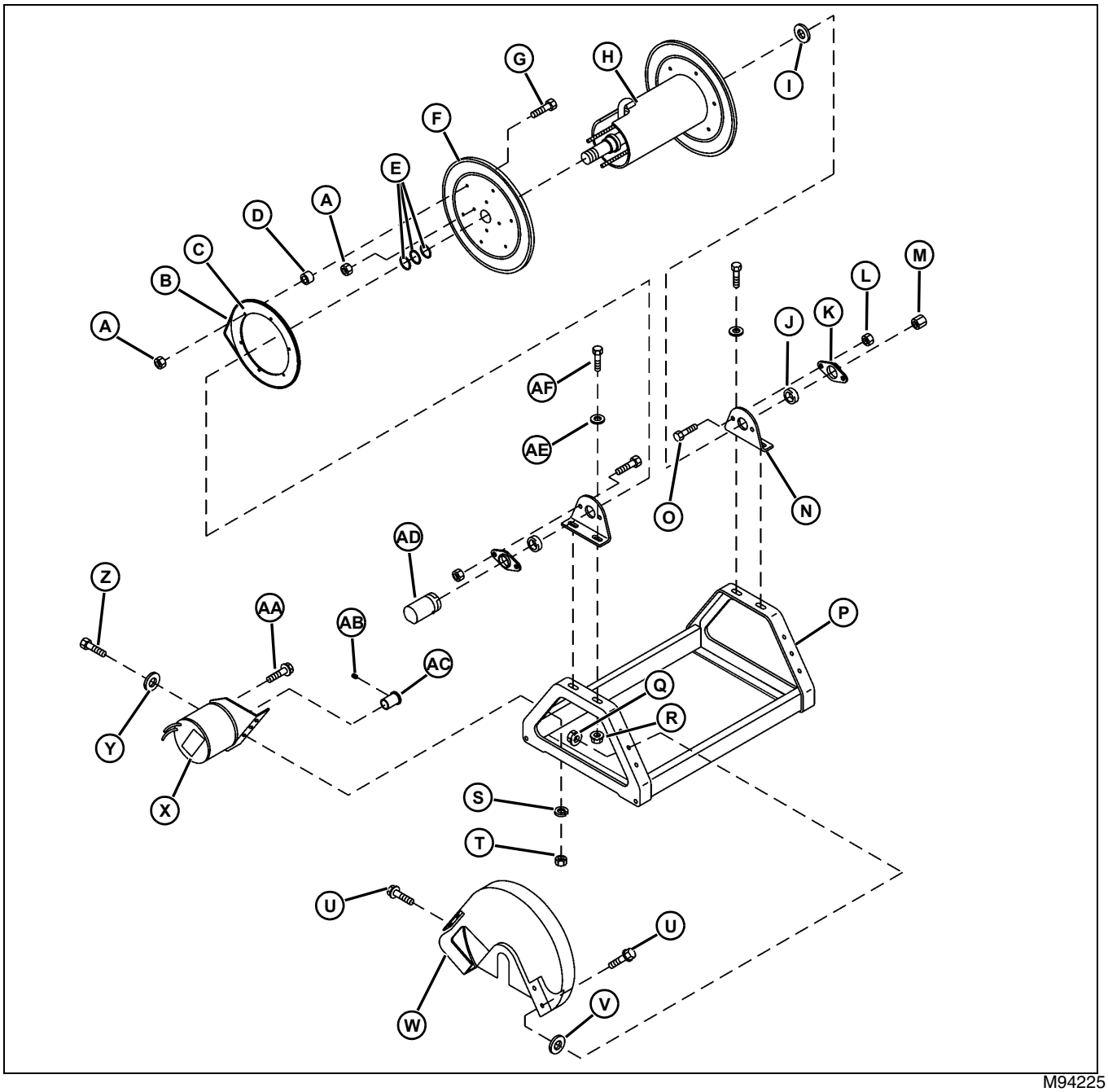


M94226

A - Nut (3 used)
B - Seals (3 used)
C - Reel End Plate
D - Reel
E - Washer
F - Bearing (2 used)
G - Nut (4 used)
H - Nut
I - Crank
J - Handle
K - Nut
L - Bearing Retainer (2 used)
M - Bearing Bracket (2 used)
N - Cap Screw (4 used)
O - Latch
P - Cap Screw (2 used)

Q - Nut (4 used)
R - Frame
S - Swivel Joint
T - Washer (4 used)
U - Cap Screw (4 used)

Electric Hose Reel Components



M94225

A - Flange Nut (6 used)
B - Drive Chain
C - Sprocket
D - Flange Nut (2 used)
E - Seals
F - Reel End Plate
G - Cap Screw (6 used)
H - Reel
I - Washer
J - Bearing (2 used)
K - Bearing Retainer (2 used)
L - Nut (4 used)

M - Nut
N - Bearing Bracket (2 used)
O - Cap Screw (4 used)
P - Frame
Q - Nut
R - Nut (4 used)
S - Lock Washer
T - Nut
U - Cap Screw
V - Washer
W - Cover
X - Motor
Y - Washer
Z - Cap Screw
AA- Cap Screw
AB- Set Screw
AC- Sprocket
AD- Swivel Joint
AE- Washer (used)
AF- Cap Screw (4 used)

Diagnostics

Foam Marker System

Test Conditions:

- Machine parked on level surface.
- Sprayer mounted on machine.
- Foam marker harness connected to machine battery.
- Ignition key in RUN position.
- Foam marker switch in RIGHT or LEFT position.

Symptom: Foam Marker System Does Not Operate

(1) Does foam marker control box have correct operating voltage at all test points? See "Foam Marker Circuit Schematic" on page 69 in the Electrical section.

No - Repair as necessary.

Symptom: Air Pump Runs, No Foam Output, Gauge Indicates No Pressure

(1) Is tank strainer plugged?

Yes - Clean tank strainer.

No - Go to next step.

(2) Is liquid pump running and functioning correctly?

No - Prime pump. See "Liquid Pump Priming Procedure - Foam Marker System" on page 146.

No - Check electrical connections. See "Foam Marker Circuit Schematic" on page 69 in the Electrical section.

No - Check for ruptured diaphragm, or worn or damaged valves. See "Foam Marker Attachment" on page 154. Replace pump as necessary.

Symptom: Air Pump Runs, No Foam Output, Gauge Indicates Pressure

(1) Is liquid metering orifice and/or strainer plugged?

Yes - Clean orifice and/or strainer. See "Foam Marker Attachment" on page 154.

No - Go to next step.

(2) Is tank cover vent plugged or not operating freely?

Yes - Clean cover vent. See "Foam Marker Attachment" on page 154.

Symptom: Air Pump Runs, No Foam Output, Gauge Indicates Pressure

No - Go to next step.

(3) Is tank outlet strainer dirty or plugged.

Yes - Clean or replace outlet strainer. See "Foam Marker Attachment" on page 154.

Symptom: Foam Discharge Almost All Water

(1) Is air pump running?

Yes - Go to next step.

No - Check electrical connections. See "Foam Marker Circuit Diagnosis" on page 70 in the Electrical section.

(2) Is air pump discharge outlet plugged?

Yes - Check air pump. See "Air Pump Check - Foam Marker System" on page 146.

No - Go to next step.

(3) Is air check valve installed and operating correctly? See "Foam Marker Attachment" on page 154.

Yes - Go to next step.

No - Repair or replace check valve.

(4) Is air pump diaphragm damaged?

Yes - Replace pump.

Symptom: Discharge Foamy But Very Watery

(1) Is air pump malfunctioning, with air check valve properly installed?

Yes - Check electrical connections. See "Foam Marker Circuit Diagnosis" on page 70 in the Electrical section.

No - Check air pump. See "Air Pump Check - Foam Marker System" on page 146.

(2) Is the liquid metering orifice installed? See "Foam Marker Attachment" on page 154.

No - Install metering orifice.

Symptom: Low Foam Discharge Volume

(1) Is solution mixture concentration correct?

No - Change mixture to proper concentration. Refer to Operator's Manual.

Symptom: Foam Discharge Goes To Wrong Side

(1) Are hoses connected to correct outlets?

Symptom: Foam Discharge Goes To Wrong Side

Yes - Go to next step.

No - Disconnect hoses from directional valves and connect to correct outlets.

(2) Is voltage correct at directional valve, and is valve operating correctly?

No - Check electrical connections. See “Foam Marker Circuit Diagnosis” on page 70 in the Electrical section. Repair as necessary.

Symptom: Foam Discharge Goes To Both Sides

(1) Is direction valve adjusted properly? See “Direction Valve Adjustment - Foam Marker System” on page 147.

No - Adjust valve.

Manual Hose Reel

Test Conditions:

- Machine parked on level surface.
- Sprayer mounted on machine.
- Manual hose reel mounted on sprayer.

Symptom: Reel Turns Too Easy

(1) Is hose reel tension brake properly adjusted?

No - See “Hose Reel Tension Brake Adjustment - Manual Hose Reel” on page 149. Adjust brake tension.

Symptom: Reel Turns Too Hard

(1) Is reel tension brake properly adjusted?

Yes - Go to next step.

No - See “Hose Reel Tension Brake Adjustment - Manual Hose Reel” on page 149. Adjust brake tension.

(2) Is reel swivel joint properly lubricated and not binding?

Yes - Go to next step.

No - Lubricate swivel joint. Refer to Operator’s Manual.

(3) Are reel bearings worn, damaged or binding?

Yes - Replace bearings.

Symptom: Reel Will Not Turn

(1) Is reel brake unlocked?

Yes - Go to next step.

No - Move latch to UNLOCKED position.

(2) Are reel bearings worn, damaged or binding?

Yes - Replace bearings.

Electric Hose Reel

Test Conditions:

- Machine parked on level surface.
- Sprayer mounted on machine.
- Hose reel attachment mounted on sprayer.

Symptom: Reel Will Not Rewind Hose

(1) Is there proper voltage at hose reel switch? See “Electric Hose Reel Circuit Diagnosis” on page 73 in the Electrical section.

Yes - Go to next step.

No - Repair as necessary.

(2) Are reel bearings worn, damaged or binding?

Yes - Replace bearings.

No - Go to next step.

(3) Is drive chain damaged or broken?

Yes - Repair or replace chain.

No - Go to next step.

(4) Is drive motor working properly, circuit working properly? See “Electric Hose Reel - Rewind Circuit Operation” on page 72 in Electrical section.

No - If circuit is good, test motor. If defective, replace motor.

Symptom: Reel Turns Too Hard or Noisy

(1) Is reel swivel joint properly lubricated and not binding?

Yes - Go to next step.

No - Lubricate swivel joint. Refer to Operator’s Manual.

(2) Are reel bearings worn, damaged or binding?

Yes - Replace bearings.

No - Go to next step.

(3) Is drive chain adjusted properly? See “Drive Chain Adjustment - Electric Hose Reel” on page 150.

Symptom: Reel Turns Too Hard or Noisy

Yes - Go to next step.

No - Adjust drive chain tension.

(4) Is drive chain damaged or broken?

Yes - Repair or replace chain.

Symptom: Frequently Trips Circuit Breaker(s)

(1) Is reel swivel joint properly lubricated and not binding?

Yes - Go to next step.

No - Lubricate swivel joint. Refer to Operator's Manual.

(2) Are reel bearings worn, damaged or binding?

Yes - Replace bearings.

No - Go to next step.

(3) Is drive chain adjusted properly? See "Drive Chain Adjustment - Electric Hose Reel" on page 150.

Yes - Go to next step.

No - Adjust drive chain tension.

(4) Is drive chain damaged or broken?

Yes - Repair or replace chain.

(5) Is hose reel harness shorted to chassis? Check hose reel circuit. See "Electric Hose Reel - Rewind Circuit Operation" on page 72 in Electrical section.

Yes - Repair as necessary.

Tests and Adjustments

Air Pump Check - Foam Marker System

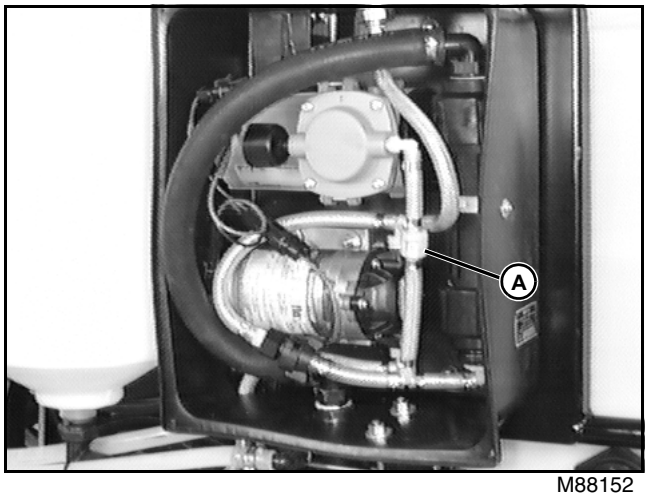
Reason:

To check the air pump for internal damage and/or worn components.

Procedure:

NOTE: The sprayer attachment must be mounted on machine to perform the following procedure.

1. Park the machine on a flat, level surface.
2. Remove the four screws and pump housing cover.



M88152

3. Disconnect the air check valve (A) connector.
4. Place finger over pump outlet.
5. Move machine ignition switch to the RUN position.
6. Move foam marker switch to RIGHT or LEFT position.
7. With the pump running, pressure should be felt, and the pump should labor.

Results:

- If the pump labors, but no or very little pressure is noted, check the pump outlet for obstructions and/or check valve for correct installation.
- If the pump runs normally, but no or very little pressure is noted, replace the pump.

Liquid Pump Priming Procedure - Foam Marker System

Reason:

To assure that air is purged from the liquid pump.

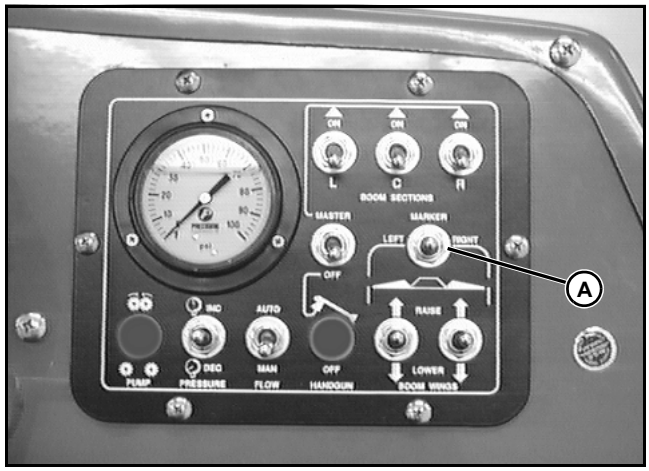
Procedure:

NOTE: The sprayer attachment must be mounted on machine to perform the following adjustment.

1. Park the machine on a flat, level surface.
2. Move machine ignition switch to the RUN position.

IMPORTANT: Avoid damage! DO NOT operate the liquid pump at full speed for extended periods of time. Damage to pump could result.

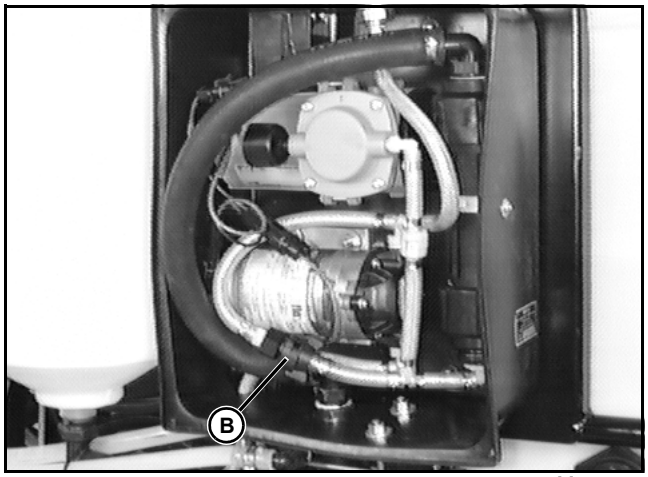
3. Turn liquid speed control knob fully clockwise (full speed).



M88144b

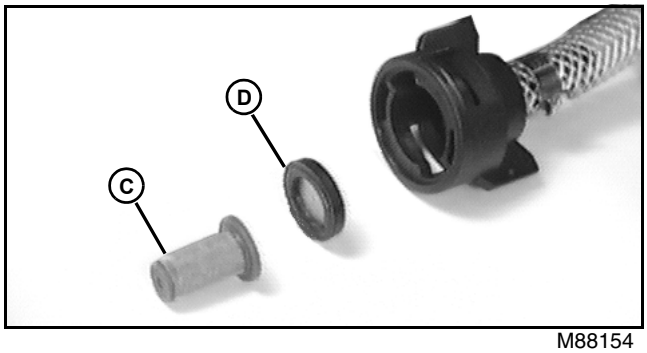
Gauge shown from sprayer SN -35000

4. Move foam marker switch (A) to RIGHT or LEFT position.
5. Allow the pump to run for 1—2 minutes. Observe the pressure gauge on the foam marker, the pressure should rise to approximately 414 kPa (60 psi).
6. If the pump fails to prime, remove the four screws and pump housing cover.



M88152

7. Briefly disconnect the check valve to relieve pressure.
8. Open connector housing (B) to access strainer.



M88154

9. If the pump still fails to prime, remove and clean or replace the strainer (C) and orifice plate (D) as necessary.

10.Install the orifice plate with numbers facing away from coupler.

11.If the pump still fails to prime, replace the pump.

12.Adjust liquid pressure to meet desired foam characteristics. (Refer to Owner's Manual.)

Direction Valve Adjustment - Foam Marker System

Reason:

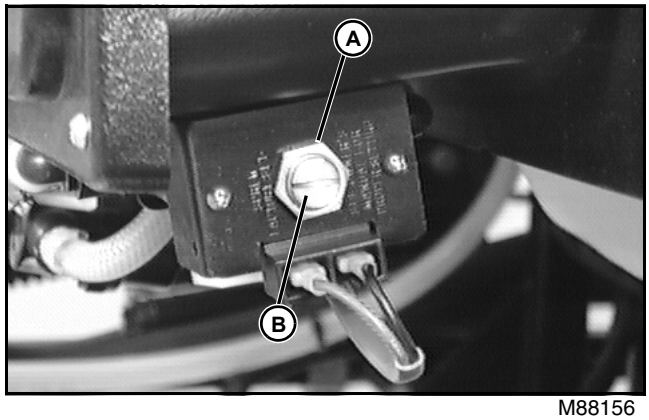
To ensure that the foam marker discharges to the correct side.

Procedure:

NOTE: The sprayer attachment must be mounted on a machine to perform the following adjustment.

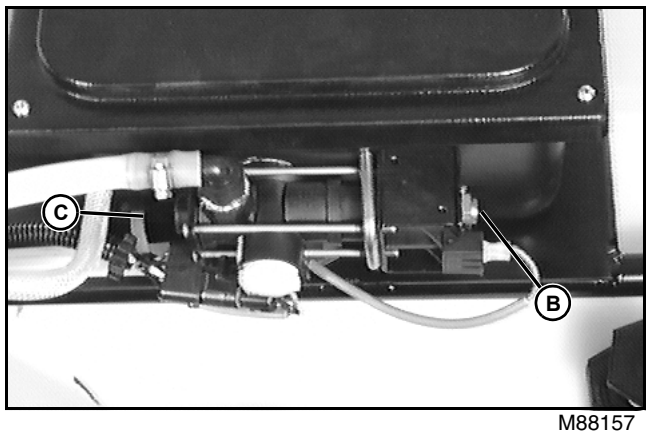
1. Park the machine on a flat, level surface.

NOTE: The direction valve is located at the bottom of the foam marker pump housing.



M88156

2. Loosen jam nut (A).
3. Unscrew armature stop (B).



M88157

4. Using a small screwdriver, push in on the spring-loaded piston (C) located at the rear of the armature.
5. While holding the piston in, turn the armature stop (B) in just until it makes contact.
6. Back the armature stop out 1-1/8 turns.
7. Hold the armature stop while tightening the jam nut.

Boom Height Adjustment

Reason:

To ensure that the nozzles are positioned at the correct working height and the center boom section is level.

Procedure:

NOTE: The sprayer attachment must be mounted on machine to perform the following adjustment.

1. Park the machine on a flat, level surface.
2. Check and adjust the machine tire pressure. (Refer to machine Owner's Manual.)
3. Raise boom wings and fold wing extensions.
4. Measure the distance between the bottom of each end

of the boom center section and the ground, the distance should be equal.

NOTE: The approximate weight of the boom assembly is 111 kg (245 lbs.). Use an appropriately rated lifting device to lift and support the boom while adjusting the boom height.

5. If adjustment is required, support the boom assembly evenly using either a hoist/sling arrangement or floor jacks on each side of the boom.

6. Loosen four U-bolts.

7. Adjust the boom height until both side of the boom are level.

8. Tighten clamps.

9. Level boom wings. See “Boom Wing Level Adjustment” on page 148.

Boom Wing Level Adjustment

Reason:

To ensure that the boom wing sections are level.

Procedure:

NOTE: The center boom section must be adjusted to the proper working height and level before performing this adjustment. See “Boom Height Adjustment” above.

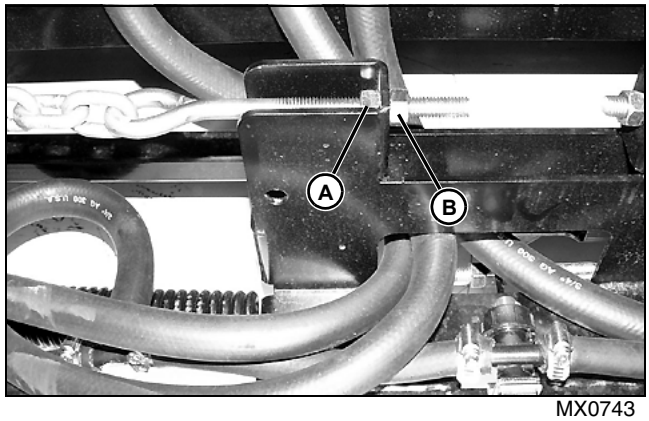
1. Park the machine on a flat, level surface.

2. Lower boom wings.

3. Measure the distance between the bottom of each outer end of the boom wings sections and the ground, the distance should be equal.

4. Adjust boom wing level, using the method appropriate to the style of support the sprayer is equipped with.

Boom Wings with Standard Chain Supports:



MX0743

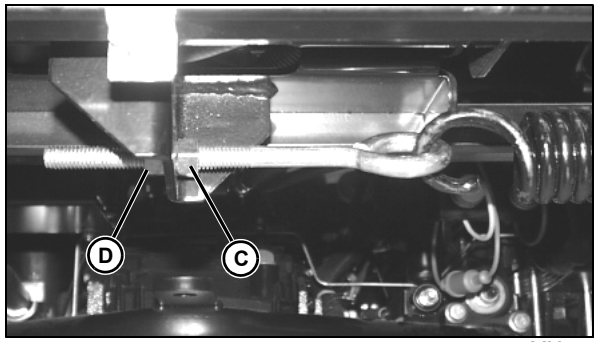
1. Loosen jam nut (A).

2. Tighten or loosen the adjustment nut (B) to raise or lower the end of the boom wings:

   - Hold bolt while adjusting nut.

3. Tighten jam nut.

4. Check for the proper amount of spring tension on the boom wing flexible joint. Adjust spring tension as needed.



MX2971

5. Loosen jam nut (C).

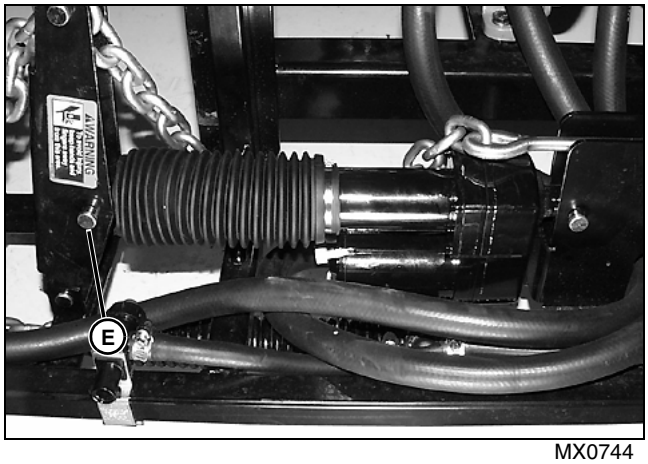
6. Tighten or loosen the adjustment nut (D) to adjust spring tension.

   - Hold bolt while adjusting nut.

7. Tighten jam nut.

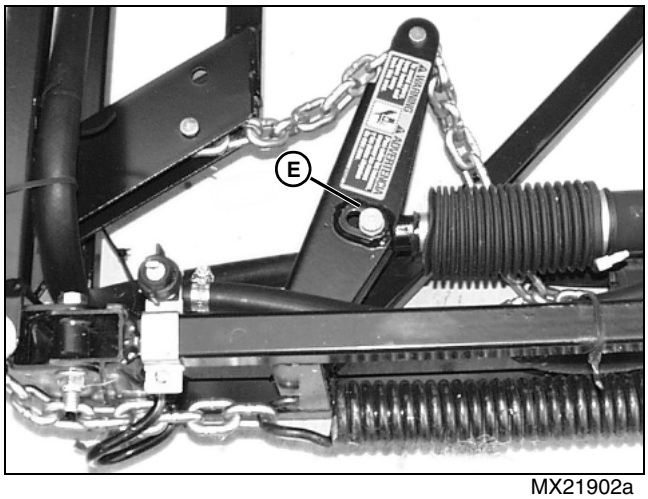
Boom Wings with Electric Actuators:

1. Raise and secure boom wing.
2. Disconnect actuator cylinder end.



MX0744

a. Early models: Remove cotter pin and pivot pin (E).



MX21902a

b. Late models: Remove bolt (E).

3. Disconnect actuator at pivot.
4. Loosen jam nut. See “Boom Wings with Standard Chain Supports:” on page 148.
5. Tighten or loosen the adjustment nut to raise or lower the end of the boom wings.
6. Tighten jam nut.
7. Raise boom wing and align the actuator anchor hole with the hole in the pivot bracket.
8. Install the pivot pin and cotter pin.
9. Check for the proper amount of spring tension on the boom wing flexible joint. Adjust spring tension as needed.

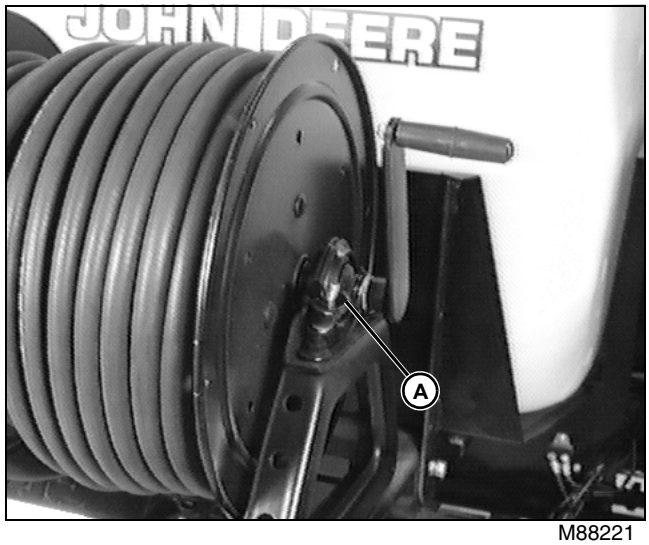
Hose Reel Tension Brake Adjustment - Manual Hose Reel

Reason:

To ensure that proper tension is applied to the reel to prevent the hose from unwinding during transport.

Procedure:

1. Park the machine on a flat, level surface.
2. Move reel brake latch to UNLOCKED position.



M88221

3. Pull out approximately 10—15 feet of hose.

NOTE: Reel should be properly lubricated prior to checking tension.

4. Using the hand crank, rewind the hose onto the reel, checking the amount of drag. The reel should not offer excessive drag when turning the hand crank.
5. If adjustment is required, turn wing nut (A):
   - Clockwise (tighten) to increase tension.
   - Counterclockwise (loosen) to decrease tension.

Drive Chain Adjustment - Electric Hose Reel

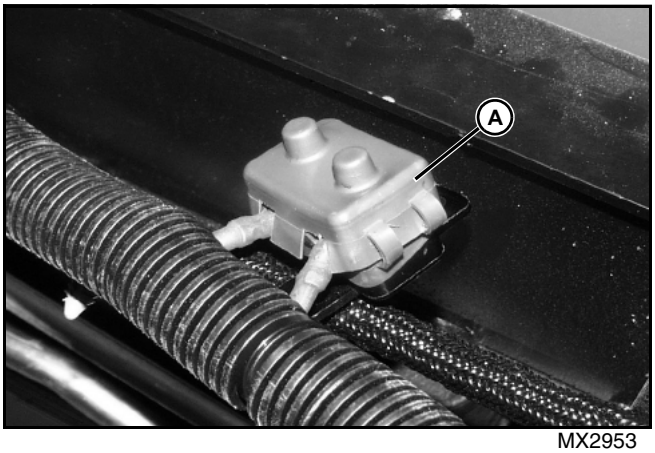
Reason:

To ensure proper chain tension.

Procedure:

CAUTION: Avoid Injury! Disconnect power to hose reel attachment before adjusting, to prevent accidental motor activation.

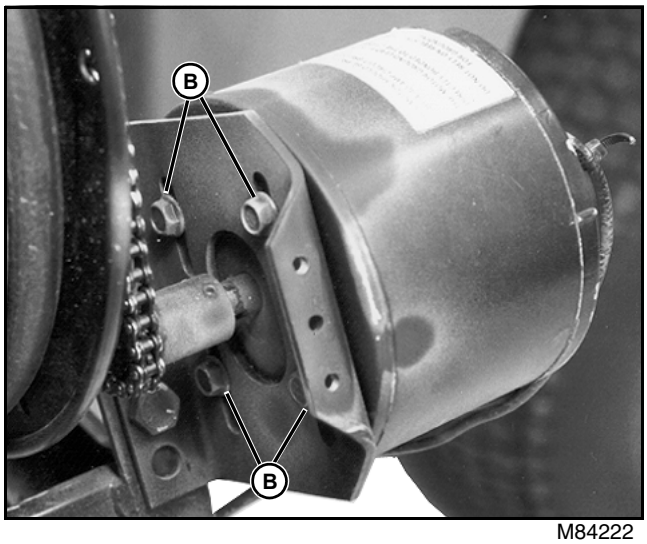
1. Park the machine on a flat, level surface.



MX2953

2. Lift cap (A) and disconnect red wire from circuit breaker.

3. Remove flange screws, cap screws, washers and flange nuts securing cover. Remove cover.



M84222

Shown with cover removed

4. To adjust chain tension, loosen motor mounting cap screws (B) and move motor down to increase tension, up to decrease tension.

5. Tighten loosen motor mounting cap screws.

6. Install cover.

7. Connect red wire to circuit breaker and secure cap over circuit breaker.

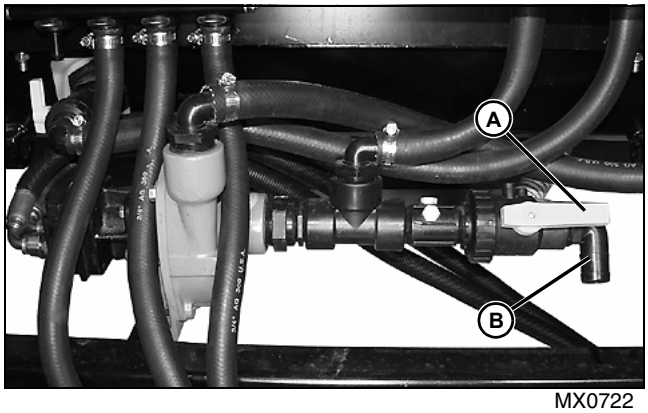
Repair

Chemical Tank

Drain (HD200 SN -35000):

CAUTION: Avoid Injury! Dispose of Chemicals Safely. Proper disposal of excess chemical solution is very important. If you have excess solution, it is best to dilute it with water and apply it to the area that has been previously treated. NEVER dump solution in a drain or near a lake or stream.

1. Park the sprayer unit on a surface that cannot be damaged by chemicals. DO NOT park in an area with a drain or near a stream or other body of water.



MX0722

2. Turn three-way ball valve (A) to CLOSED (vertical) position.

NOTE: Chemical tank capacity is approximately 757 L (200 gallons) for HD200.

3. Place a properly marked container below drain elbow (B) at end of three-way ball valve.

4. Turn three-way ball valve to horizontal position, with arrow pointing toward drain elbow, as shown, and drain chemical into container.

5. Triple-flush system with clear water.

6. Turn three-way ball valve 180° so that arrow points toward pump.

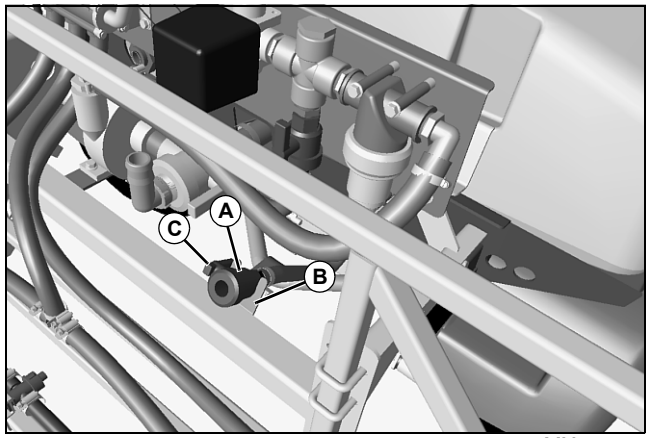
Drain (HD200 SN 35001- , HD300):

CAUTION: Avoid Injury! Dispose of Chemicals Safely. Proper disposal of excess chemical solution is very important. If you have excess solution, it is best to dilute it with water and apply it to the area that has been previously treated. NEVER dump solution in a drain or near a lake or stream.

1. Park the sprayer unit on a surface that cannot be damaged by chemicals. DO NOT park in an area with a drain or near a stream or other body of water.

2. Rinse interior of tank as needed.

NOTE: Chemical tank capacity is approximately 757 L (200 gallons) for HD200; 1135 L (300 gallons) for HD300.



MX19961

3. Place container under drain hose (A) at the rear of the sprayer.

4. Remove hose from retaining cradle (B).

5. Turn valve handle (C) to align with hose to open valve.

6. Lower valve to ground to allow gravity to drain tank.

7. Allow tank to drain completely.

IMPORTANT: Avoid damage! Avoid potential spills. Turn valve handle so that is faces perpendicular to hose after draining tank.

8. Turn valve handle 90° so handle points perpendicular to hose to close valve.

9. Secure hose in retaining cradle.

10. Properly dispose of rinse water.

Repair:

- Inspect all parts for wear or damage. Replace parts as

necessary.

- Apply Teflon tape or thread sealant to threads of all fittings and adaptors.

Booms

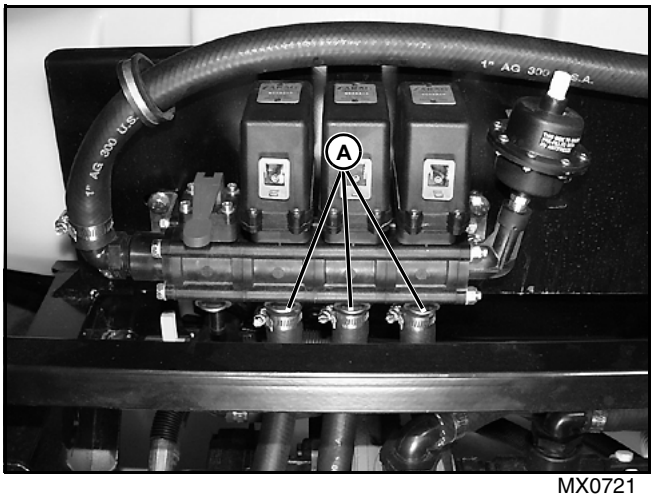
Removal/Installation—End Sections:

NOTE: Mark hoses before removing to ensure correct installation.

1. Lower booms to horizontal position.

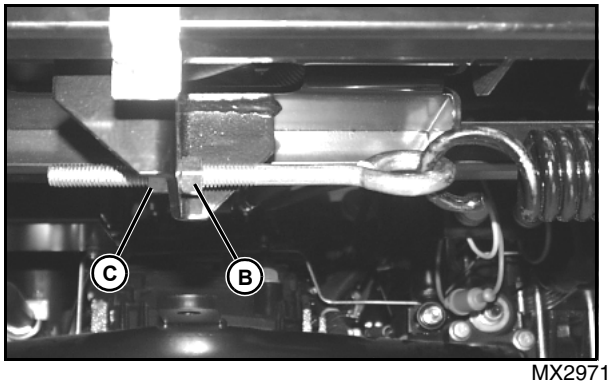
2. Disconnect foam marker hoses (If the sprayer is equipped with foam marker system).

NOTE: Some chemical solution may remain in hoses. Drain excess chemical solution into a properly marked container and dispose of properly.



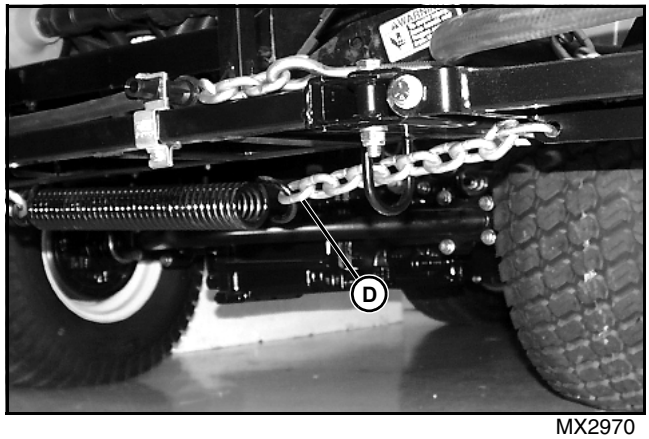
MX0721

3. Pull disconnect clips (A) and remove boom valve hoses. Remove any tie straps securing hoses to center section and reroute hoses if necessary to avoid snagging during boom end removal.



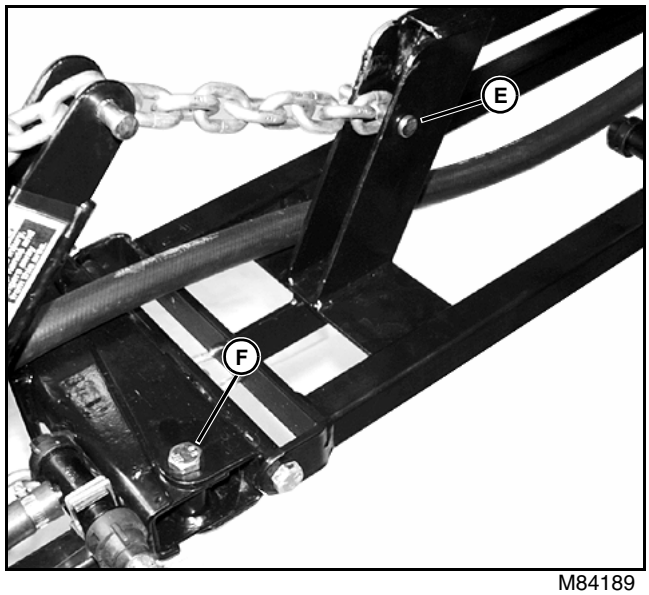
MX2971

4. Loosen jam nut (B) and then adjustment nut (C) to reduce spring tension.



MX2970

5. Disconnect chain (D) from spring.



M84189

6. Support the boom wing using a hoist/sling arrangement.

7. Remove cotter pin, anchor pin (E) and disconnect support chain.

8. Remove nut and cap screw (F).

9. Remove boom wing from hinge.

Installation is done in the reverse order of removal.

- Adjust boom wing level. See “Boom Wing Level Adjustment” on page 148.

Repair—End Sections:

- Inspect all parts for wear or damage. Replace parts as necessary.

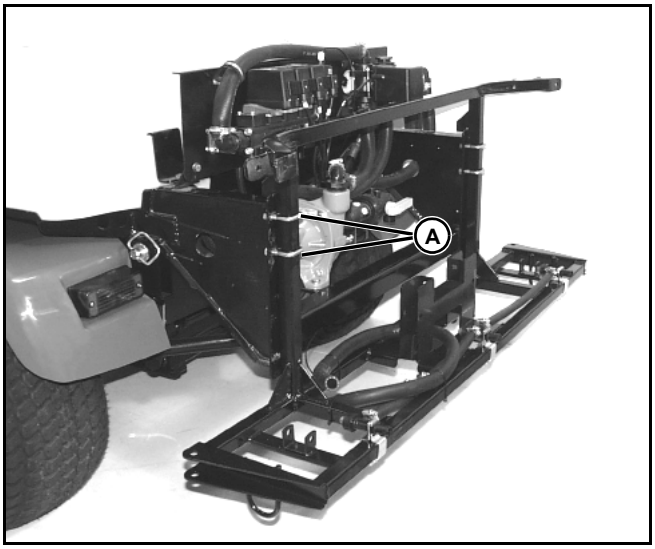
- Apply a light coat of grease to pivot bolts. See Specifications section.

- Inspect hoses and nozzles. See “Boom Plumbing” on page 129.

Removal/Installation—Center Section:

NOTE: Some chemical solution may remain in hoses. Drain excess chemical solution into a properly marked container and dispose of properly.

1. If not already done, remove boom end sections. See “Removal/Installation—End Sections”.
2. Support the boom assembly using a hoist/sling arrangement.
3. Disconnect electric actuator connection if equipped.



MX2964

4. Remove four U-bolts (A) and nuts.
5. Remove center boom.

Installation is done in the reverse order of removal.

- Adjust boom wing level. See “Boom Wing Level Adjustment” on page 148.

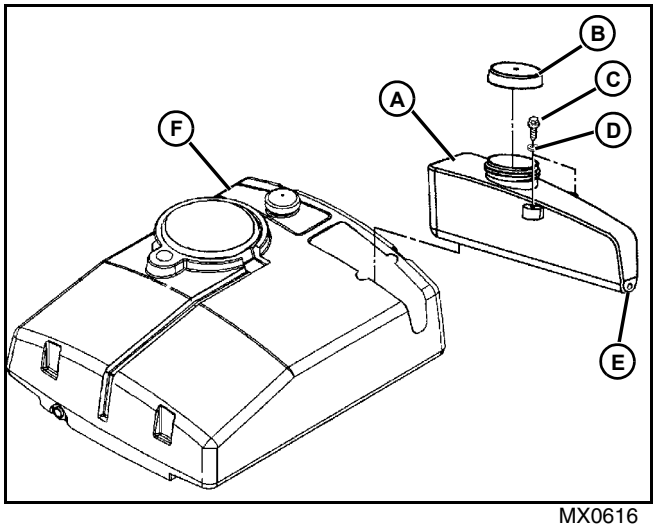
Repair—Center Section:

- Inspect all parts for wear or damage. Replace parts as necessary.
- Apply a light coat of grease to pivot sleeves. See Specifications section.
- Inspect hoses and nozzles. See “Boom Plumbing” on page 129.

Personal WashTank / Foam Marker Tank Assemblies

NOTE: The personal wash tank is identical to the foam marker tank with the addition of a small spigot and wash hose in place of the drain.

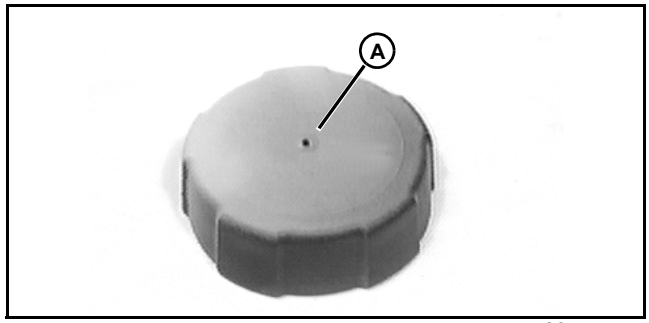
Repair:



MX0616

A - Foam Marker Tank
B - Vented Cover
C - Cap Screw (2 used)
D - Washer (2 used)
E - Drain (Foam Marker Tank)
F - Personal Wash Tank

- Inspect all parts for wear or damage. Replace parts as necessary.



M88216a

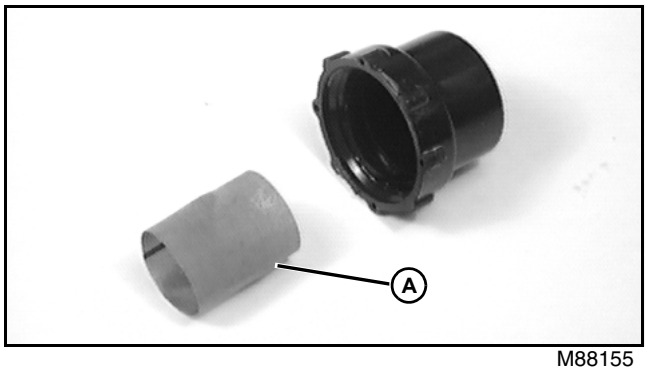
- Inspect tank cover vent hole (A). Clean vent hole as needed.
- Inspect cover gasket. Replace if necessary.

Foam Marker Attachment

Refer to “Foam Marker Components” on page 139 for component locations.

Repair:

- Inspect all parts for wear or damage. Replace parts as needed.

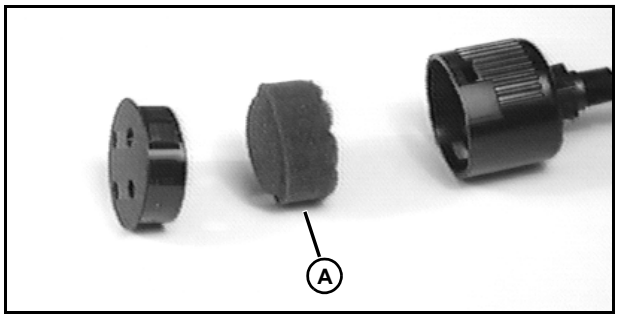


M88155

- Clean or replace tank outlet strainer (A).

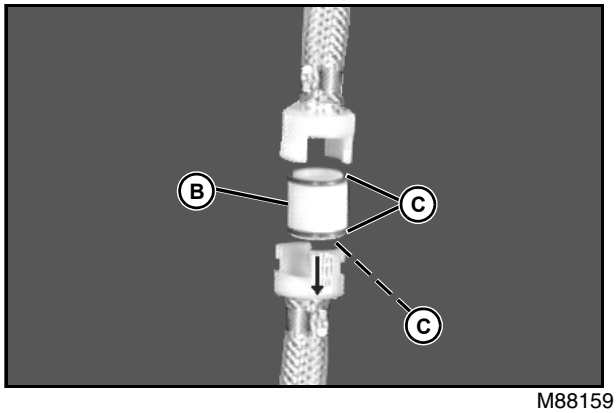
Pump Housing Assembly:

- Inspect all parts for wear or damage. Replace parts as needed.



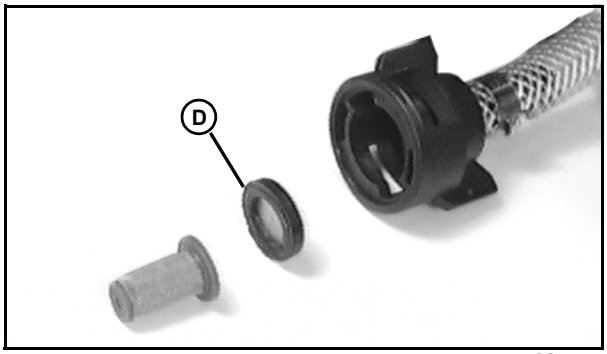
M88153

- Inspect and clean or replace air pump inlet filter (A).



M88159

- Inspect air pump check valve cartridge (B) and inner and outer O-rings (C). Replace if needed.
- Install air pump check valve cartridge with spring side toward liquid pump.



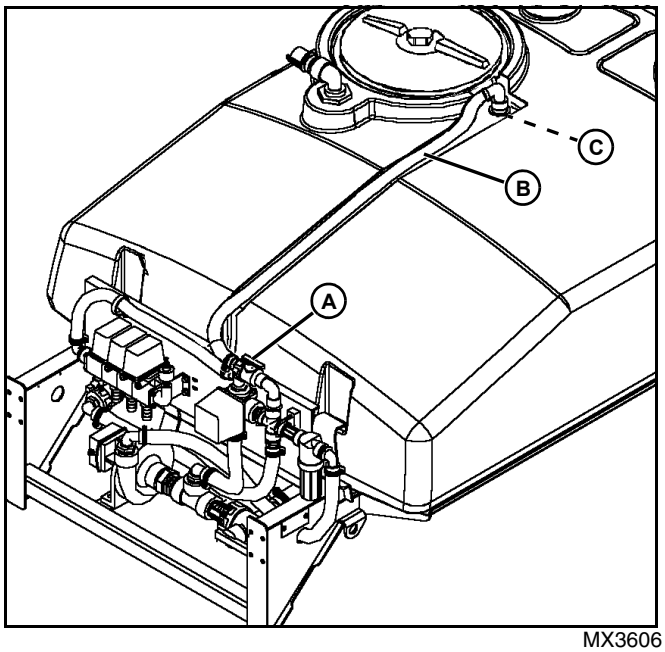
M88154

- Install the orifice plate (D) in liquid check valve assembly with numbers facing away from coupler.
- Adjust liquid pressure to meet desired foam characteristics. (Refer to Owner’s Manual.)

Tank Rinse Kit

Repair:

NOTE: Export models may have a separate rinse water tank not shown here.



MX3606

A - Tank Rinse Valve
B - Tank Rinse Hose
C - Tank Rinse Head (Inside Tank)

- Inspect all parts for wear or damage. Replace parts as necessary.
- Apply Teflon tape to threads of all fittings and adaptors.

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