



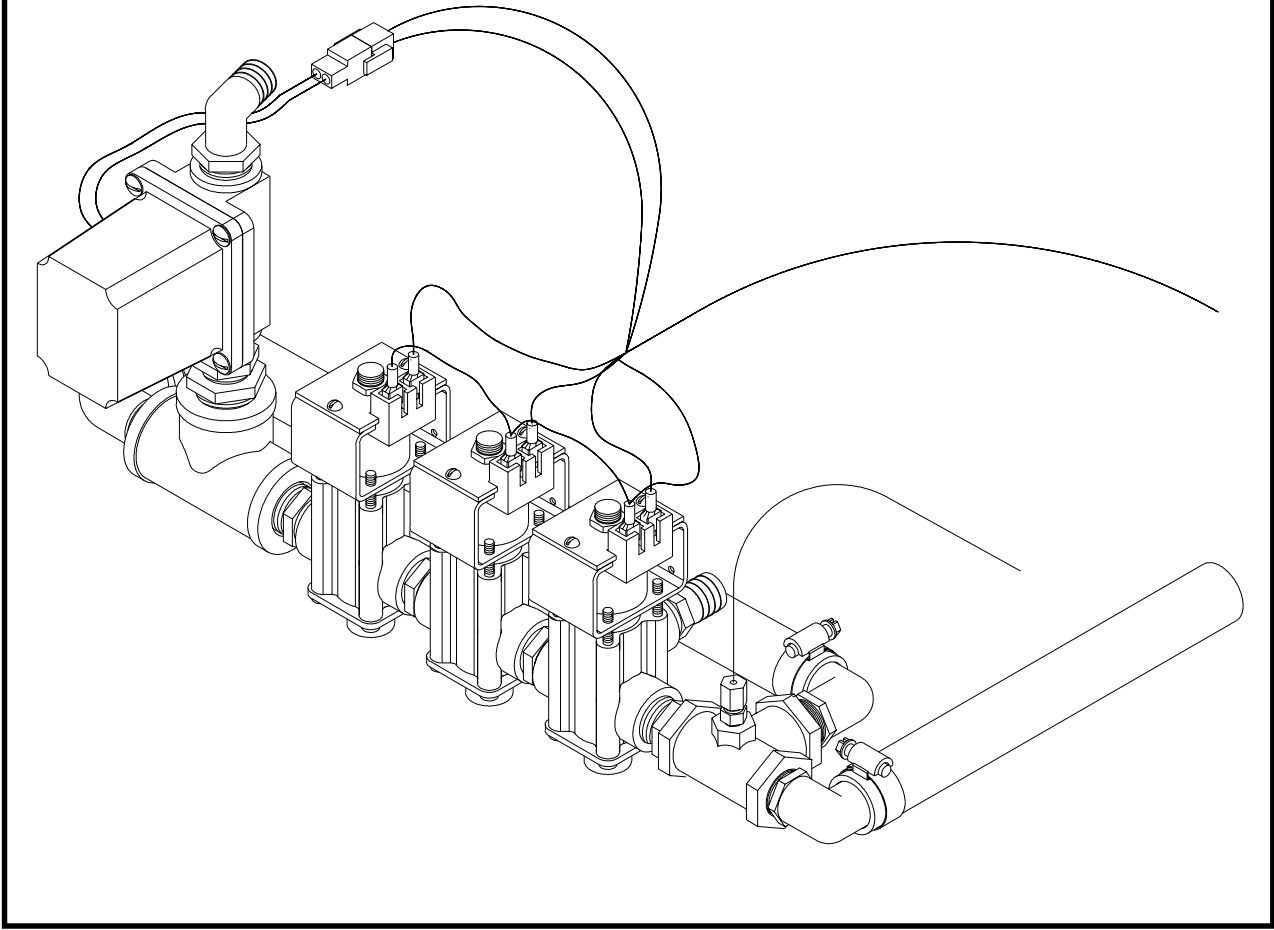
CS414HVR

PLUMBING CONTROL SYSTEM

INSTRUCTION MANUAL

ASSEMBLY
OPERATION
REPLACEMENT PARTS

READ complete manual CAREFULLY
BEFORE attempting operation.



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The CS414HVR Sprayer Control has been designed to give the operator complete boom control from the convenience of the tractor cab. The spraying pressure and boom selection control can be constantly monitored and adjusted to help ensure the accurate application of today's expensive agricultural chemicals. Many unique features add to the value of this sprayer control.

- Control housing constructed with durable, non-corrosive Noryl material.
- Wiring protected with an easily replaceable fuse.
- Units furnished with quick connect terminals and easily mounted components.
- High quality sealed switches.
- Black gauge face to reduce glare.
- Lighted pressure gauge and boom section indicators.

The 144A 1 X electric valve has been designed for remote on/off control of the spray boom. The encapsulated solenoid coil can be changed without disconnecting the valve from the spray line. Metal parts in contact with the liquid are stainless steel to provide added corrosion resistance. The large internal flow chambers with no pilot hole reduces the chance of plugging.

- Operating pressure ranges of 0-100 PSI.
- Flow capacities of 10 GPM for the electric valve.
- Nylon encapsulated 12 VDC coil with 1/4" quick connect terminals.
- Glass filled polypropylene valve body.
- 2.0 amp power requirement.
- Internal metal parts are stainless steel, other metal parts are epoxy coated or electroless nickel plated.
- Chemical resistant EPDM rubber seat washer and diaphragms.

GENERAL INFORMATION

1. Unless otherwise specified, high-strength (grade 5) (3 radial-line head markings) hex head bolts are used throughout assembly of this piece of equipment.
2. Whenever the terms "**LEFT**" and "**RIGHT**" are used in this manual it means from a position behind the sprayer and facing forward.
3. When placing a parts order, refer to this manual for proper part numbers and place order by **PART NO. and DESCRIPTION.**

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TROUBLESHOOTING THE ELECTRIC VALVE (144A 1)

CONDITION	POSSIBLE CAUSES	HOW TO CHECK
1. Valve won't open.	A. No electrical power to valve.	Manually activate valve. If stem movement is free, check and clean electrical connections. Inspect electrical system.
	B. Stroke too long.	Energize coil. Check length of stroke - should be 1/8" (.125"). If not, see page 8 for stroke adjustment.
	C. Stem movement restricted.	Manually activate stem by pushing on lower diaphragm piston. If more than 5 lbs. of force is required to move stem, disassemble valve, inspect and clean all parts. Replace any damaged or worn parts with new ones.
2. Valve won't shut off.	A. Spring malfunction.	Manually activate stem. Stem should offer about 2 - 6 lbs. resistance, but movement should be quick and smooth. If there is very little resistance, disassemble and check spring.
	B. Stem movement restricted.	Manually activate stem by pushing on lower diaphragm piston. If more than 5 lbs. force is required to move stem, disassemble valve, inspect and clean all parts. Replace any damaged or worn parts with new ones.
	C. Seat washer blown out of retainer due to excessive pressure.	Remove stem from valve body and inspect condition of seat washer.
	D. Seat washer worn or damaged.	Pull down on lower diaphragm piston. If this tends to induce shut-off, disassemble and replace seat washer.
3. Leakage around coil or around lower diaphragm piston.	A. Ruptured diaphragms.	Disassemble valve and replace diaphragms with new ones.
4. Blowing fuses.	A. Short circuit in power line leading to coil.	Inspect wires for worn insulation and check connections.
	B. Short within the coil.	Remove connections from coil and activate switch, making sure connections don't touch. If fuse doesn't blow, replace coil with new one.
5. Valve operating properly but pressure drop too high.	A. Not getting full stroke.	Energize coil. Check length of stroke should be 1/8" (.125"). If not, see page 8 for stroke adjustment.
	B. Obstruction in valve body.	Remove inlet and outlet connections and inspect body.

MAINTENANCE AND OPERATION OF THE ELECTRIC VALVES

IMPORTANT: Before performing any maintenance, make sure electrical power to the coil is shut off and line pressure is relieved.

I. TO REPLACE COIL ONLY:

1. Shut off power to coil.
2. Disconnect wires from terminals.
3. Remove two screws (no.1 on page 7) from top of coil cover (no.3).
4. Lift off coil (no.5) and replace with new coil.
5. Replace coil cover (no.3) and attach securely with the two screws (no.1).

II. TO REPLACE DIAPHRAGMS AND SEAT WASHER:

1. Remove four screws (no.21 page 7) that secure the body (no.16) and separate coil subassembly. Remove upper and lower diaphragm housings (no. 8 and no.20)
2. Remove spring (no.10) from armature (no.9).
3. Secure flats of armature (no.9) with 7/16" open end wrench. Unscrew entire assembly with screwdriver secured in slot of lower diaphragm piston (no.19).

NOTE: Stem/Seat/Diaphragm assembly may unscrew at lower diaphragm piston (no. 19) (see step 4) or armature (no.9) (see step 5).

4. If lower diaphragm piston (no.19) unscrews, remove diaphragm (no.12) and washer (no.18) and inspect or replace as necessary. Remaining seat/upper diaphragm assembly may be removed from top of valve body (no.16) and disassembled by securing flats on stem (no.17) and unscrewing armature (no.9). Flats on stem (no.17) and seat washer retainer (no.13) can be secured with wrenches to disassemble remaining parts.
5. If armature (no.9) unscrews, remove along with diaphragm (no.12) and washer (no.18) . Secure flats of seat washer retainer (no.13) and slot of lower diaphragm piston (no.19). Lower diaphragm piston (no.19) should now unscrew; however, seat washer retainer (no.13) may unscrew also. Removal of stem (no.17) from seat washer retainers (no.13) is necessary to free spacer (no.15) for removal of seat washer (no.14).

III. TO REASSEMBLE:

6. Reassemble seat washer retainer (no.13), seat washer (no.14) and spacer (no.15) onto stem (no.17) and tighten securely.
7. Reassemble upper diaphragm (no.12) with "Fluid Side" marked facing valve body, washer (no.18) and armature (no.9) onto stem (no.17) end and tighten securely.
8. Insert entire stem/armature/seat subassembly into polypropylene body (no.16) from top. Screw lower diaphragm piston (no.19), with diaphragm (no.12) and washer (no.18) in proper sequence into bottom end of stem assembly. Snug tight with screwdriver.
9. Reinstall spring (no.10) over armature (no.9). Place upper diaphragm housing (no.8) over armature and spring. Place coil assembly (no.5) on top of upper diaphragm housing (no.8).
10. Position polypropylene body sub assembly and coil subassembly together. Mounting position is not important; the relationship of the inlets and outlets may be placed at any position relative to the electrical connections on the coil assembly.
11. Replace lower diaphragm housing (no.20) . Secure coil subassembly, body subassembly and bottom housing using four screws (no.21). Care must be exercised to uniformly tighten the retaining screws (no.21).

IV. IF STROKE ADJUSTMENT IS NEEDED:

1. Unscrew the jam nut.
2. Push up on the lower diaphragm piston until the seat washer contacts the body seating surface.
3. While holding the diaphragm piston up, turn the screw in until it just makes contact with the armature.
4. Turn the armature stop out 1/4 turn and lock it with the jam nut.

INSTALLATION PROCEDURES

1. Turn off all switches on the 3318X sprayer control console.
2. Determine the best location for the control console in the tractor cab according to the following guidelines:
 - Pressure gauge should be readily visible.
 - Switches should be within easy reach.
 - Controller bracket should rest on a flat surface.
 - 12 volt-DC power source accessible (maximum draw of 10 amps).
3. Determine the best routing for cables & pressure tube:
 - Away from operators movement area.
 - Away from moving parts.
 - Away from sharp objects.
4. Install mounting bracket using 1/4" drill, machine screws, nuts, washers, and lockwashers as shown. Attach the control housing assembly to the mounting bracket using the console adjusting knobs and washers.

5. Installation of output control cable: Cut approx. 1" dia. opening which will be used to feed this cable from the interior of the tractor cab out to the control system on the sprayer. Make sure that this hole has no burrs or sharp edges that could damage the wire.

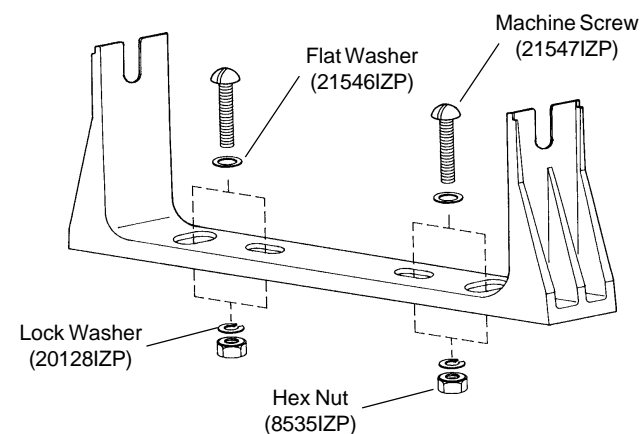
3318X Control Console: 6 wires from the control cable are used to control a three section boom. Orange/Yellow/Green wires - 144A 1 X valve, Black wire-common ground 144A 1 X valve, Red/Brown wires - 244 3/4 X valve.

NOTE: Do not plug the control cable into the control console until it has been fully connected to the control valves. Doing so may allow the unconnected leads to short out.

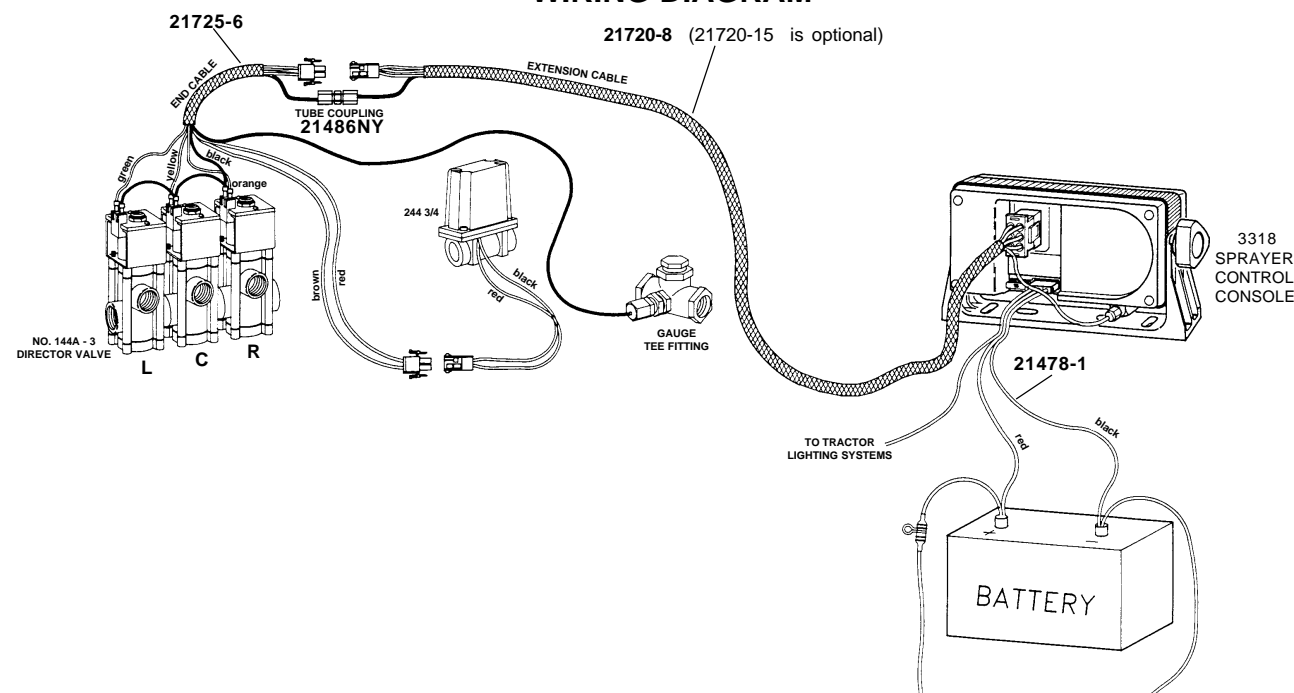
6. Installation of input power cable: the power cable should also use the same 1" dia. hole as did the control cable and pressure tube. This cable consists of three (3) wires. The red wire should be connected to a 12 volt power supply in the tractor cab (e.g. ignition switch). The yellow wire should be connected to the headlight system of the tractor either by directly connecting this wire to the auxiliary terminal of the headlight switch or splicing into the wire going to the headlight. The black wire is the negative and should be connected to a good chassis ground.

To test the installation of the power input cable, plug it into the power input receptacle on the back of the control console. Turn the tractor ignition switch to the ON position. The boom section indicator lights should illuminate when the boom section switches are turned on. The gauge light should illuminate when the tractor headlights are switched on.

BRACKET MOUNTING

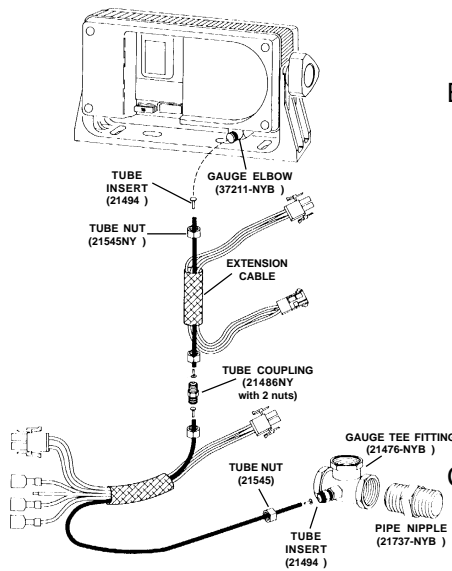


WIRING DIAGRAM



7. The tubing for the pressure gauge is supplied as one continuous 15 ft. piece (25 ft. optional). The tube coupling can be installed by the operator at any location. The tube coupling is normally installed outside the tractor cab in case of leakage. If a gauge isolator is used with the system, it should be installed in place of the tube coupling, outside the tractor cab, to satisfy regional or safety regulations.

PRESSURE GAUGE TUBE ASSEMBLY



NOTE: All cables and the tube should be out of the way of the operators feet and path so that they cannot be snagged or pulled. These lines should be routed away from sharp metal edges and moving parts. DO NOT PINCH THE TUBE.

REMOVAL OF THE CONTROL CONSOLE

1. Depressurize the system.
2. Uncouple the nylon pressure tube from outside the cab and allow the liquid to drain. Then uncouple the tube from the back of the console.
3. Disconnect the input power cable from the back of the control console.
4. Disconnect the output control cable from the back of the control console.
5. Remove the triangular knobs and washers from the bracket and remove the control console box. Replace these items on the control console after it has been removed from the bracket for safe keeping.

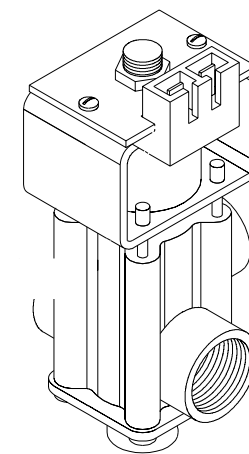
PREVENTIVE MAINTENANCE 3300 X CONTROL CONSOLE

Several routine procedures should be followed to help maintain the control console and the control panel.

1. Check all wires and connections for wear, damage and frayed ends to prevent shorting out the system.
2. Make sure that the mounting bracket for the control console is secure.
3. All connectors and terminals should be free of corrosion.
4. The control unit is designed so that it may be removed, cleaned and stored during periods of non-use, to protect it from exposure to extreme heat or cold.
5. Please note that the control console is not waterproof. Do not immerse the unit when cleaning.
6. Periodic flushing of the sprayer will help prevent clogging due to residue build-up.

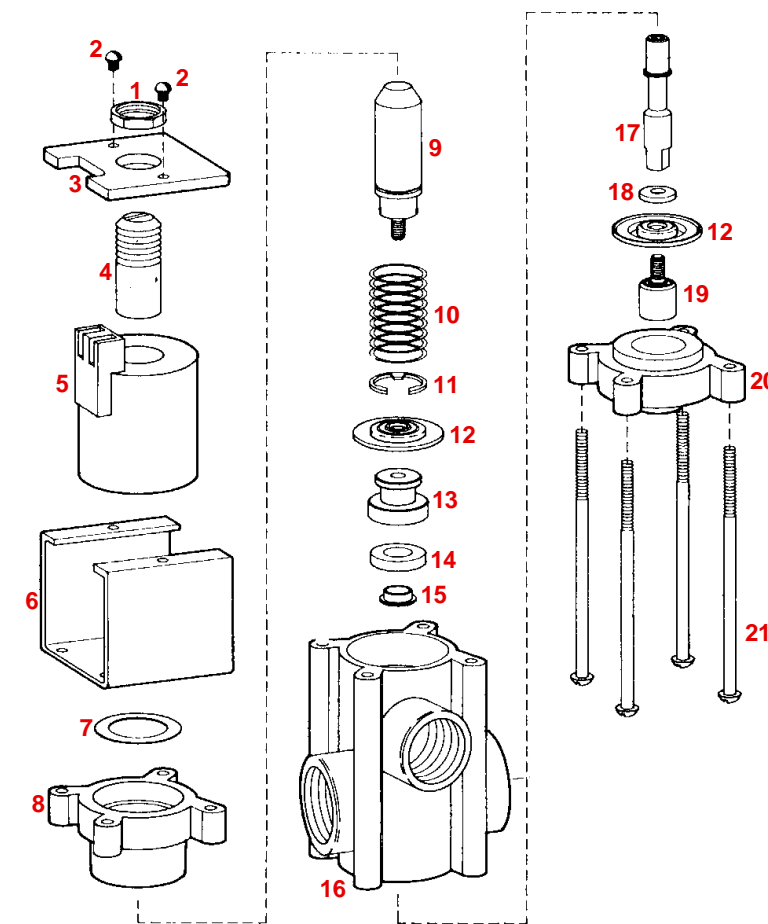
CONTROL SYSTEM & 144A 1 X VALVES

1. Keep all electrical connections, coil, and metal strap clean at all times.
2. A protective coating may be applied to the completed electrical connections, if desired.
3. Flush system with clean water after each days use especially when using wettable powders.
4. For winter storage, flush and drain the system.
5. Do not apply lubricating oils or petroleum products to the valves, as this may cause swelling of the rubber parts. Also, check with the chemical manufacturer to be sure that chemicals used are compatible with the valve parts.
6. If nozzle cannot be seen by operator during spray application, the on-off operation of valves should be checked periodically.



144A 1 - 100 PSI.

ELECTRIC SOLENOID VALVE PARTS BREAKDOWN

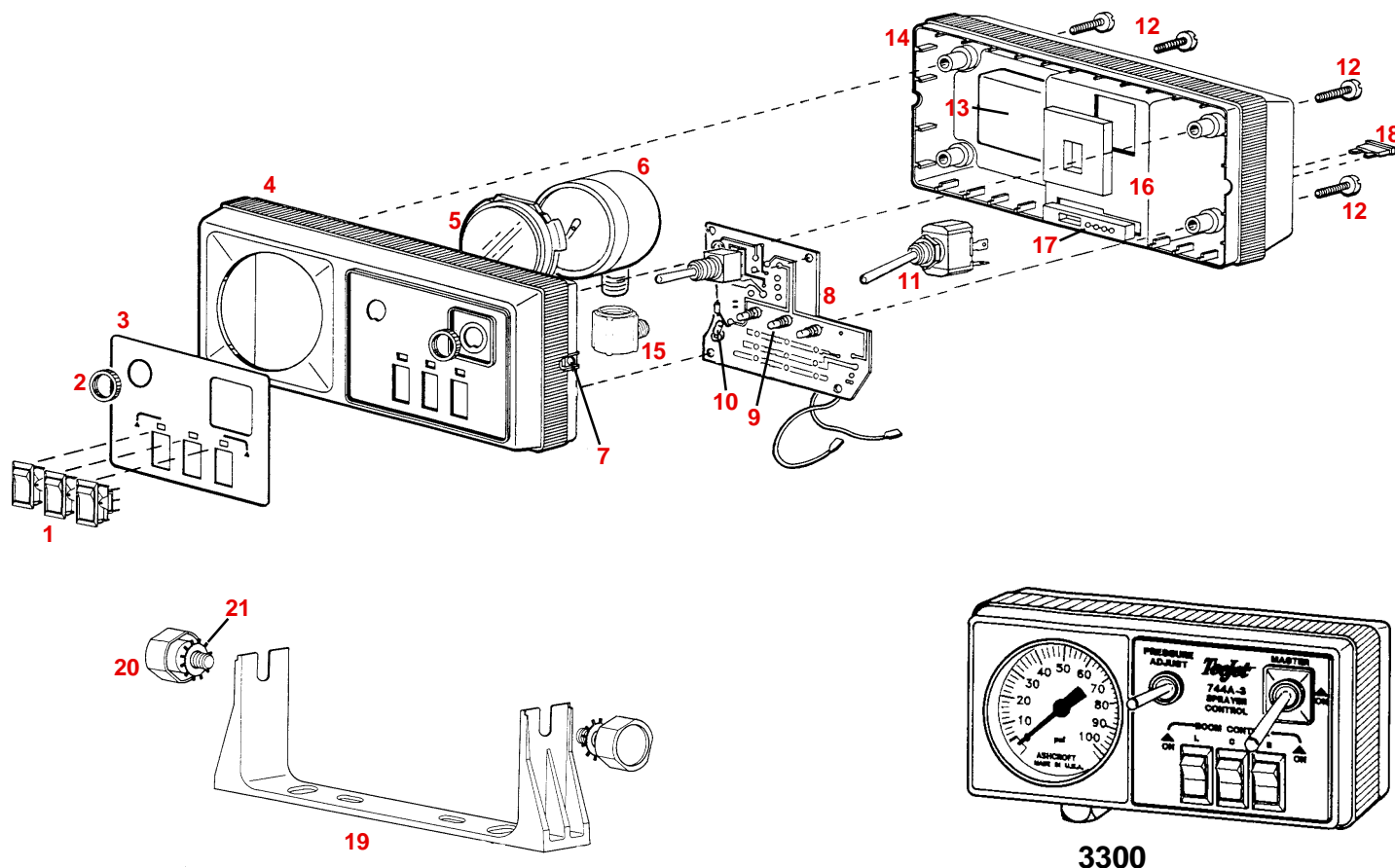


ELECTRIC SOLENOID VALVE PARTS LIST

REF. NO.	PART NO.	QTY.	DESCRIPTION
1.	15168-IENP	1	Jam Nut Steel-Electroless Nickle Plated
2.	14933SS	2	Stainless Steel Screw
3.	15166 I	1	Coil Cover
4.	15161 I	1	Armature Stop
5.	15163 I	1	12 VDC Coil
6.	14927I	1	Steel Epoxy Strap
7.	15169-302SS	1	Washer, Type 302 Stainless Steel
8.	15164-NYB	1	Upper Diaphragm Housing
9.	15170-IENP	1	Armature
*10.	15167-302SS	1	Type 302 Spring-100 PSI.
11.	14813 1-IENP	1	Retainer Ring
*12.	36101-EPR	2	EPDM Rubber Diaphragm (Standard)
**12.	36101VI	2	Viton Diaphragm
13.	14807SS	2	Seat Washer Retainer
*14.	14802R	2	EPDM Rubber Seat Washer (Standard)
**14.	14802-VI	2	Viton Seat Washer
15.	14811-SS	2	Stainless Steel Spacer
16.	14801PP	1	Black Polypropylene Body
17.	14812-SS	1	Stainless Steel Stem
18.	14806-SS	1	Stainless Steel Washer
19.	15162-SS	1	Lower Diaphragm Piston
20.	15165-NYB	1	Lower Diaphragm Housing
21.	14819-SS	4	Stainless Steel Screw
	AB144A 1	-	Valve Repair Kit (EPDM) - Standard includes ref. no. marked with an (*)
	AB144A 1 VI	-	Valve Repair Kit (VITON) - Optional includes ref. no. marked with an (**)

Please order replacement parts by PART NO. and DESCRIPTION.

(3318 X) CONTROL CONSOLE PARTS BREAKDOWN



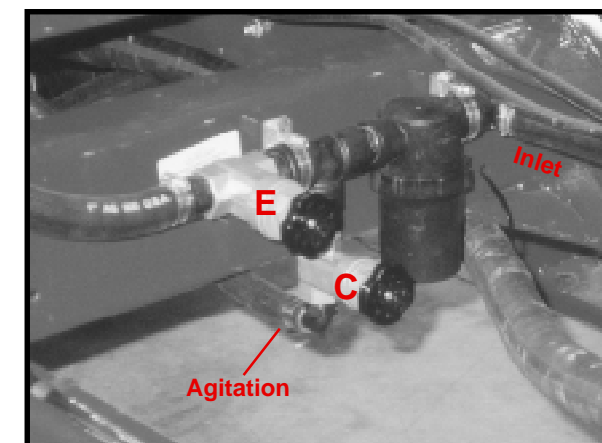
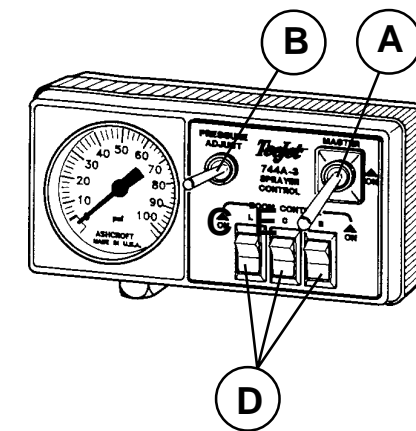
(3318) CONTROL CONSOLE PARTS LIST

REF. NO.	PART NO.	QTY.	DESCRIPTION
1.	26211	3	Boom Switch
2.	21966NP	1	Knurled Nut
3.	37213PC	1	Graphic Panel
4.	21969	1	Front Housing
5.	21972	1	Lens Gauge (Dry)
-	37210	-	Lens Gauge (Liquid) optional
6.	26387	1	2-1/2" Dry Gauge
-	26388	-	2-1/2" Liquid Gauge optional
7.	21469IZP	2	Square Nut
8.	37206	1	Circuit Board Module (incl. items 9 & 10)
9.	37222	4	Boom L.E.D.
10.	37221	1	Gauge Lamp
11.	22573	1	Toggle Switch w/Knurled Nut
12.	21495	4	#6 Plastic Screw, Type 410 SS
13.	37216	1	Foam Spacer (for Dry Gauge)
14.	21462	1	Back Housing
15.	37211NYB	1	Elbow, Nylon (Black)
16.	21488	1	Output Cable Shield
17.	21487NEO	1	Receptacle-Fuse Shield
18.	21470	1	Fuse, 15 Amp
19.	36990NYB	1	Mounting Bracket
20.	20644	2	Lock Knob
21.	7695IZP	2	1/4" External Tooth Lockwasher Type A

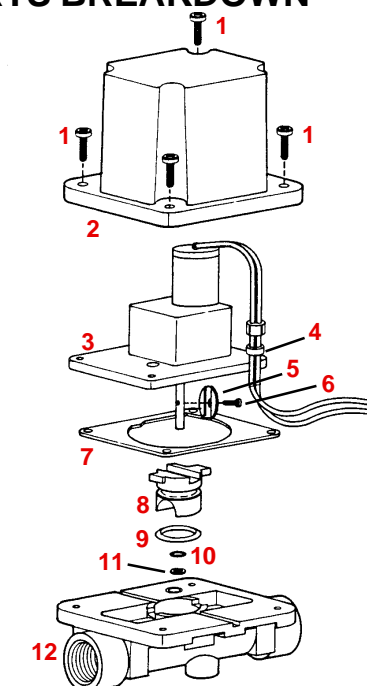
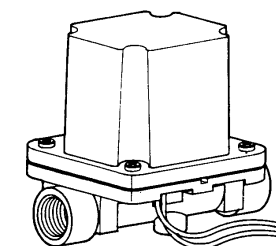
Please order replacement parts by PART NO. and DESCRIPTION.

CONTROL SYSTEM OPERATION

1. Mount the CS414HVR on the sprayer main frame as shown on page 4 & 5, and the Control Console in the tractor cab.
2. Flip master switch **A** on the control console in the tractor cab up to the **ON** position. Toggle the pressure adjust switch **B** up until the pressure on the gauge is as high as it will go. This means the pressure regulating valve (#28 on page 4) is closed all the way. Close the agitation wedge valve **C**.
3. Run the sprayer at desired RPM with the boom spraying (boom control switches **D** on the console should be **ON**). Begin by closing valve **E** until the pressure reads approx. 7-10 PSI over desired spraying pressure then open or close the regulating valve with switch **B** until the gauge reads approx. 3 PSI over your desired spraying pressure with all three booms spraying. (The spraying pressure may vary depending on the tip size and type of chemical solution being sprayed.)
4. Open the agitation wedge valve **C** until the gauge drops to your desired spraying pressure.
Example: If desired spraying pressure is 30 PSI adjust valve **E** until gauge reads 37-40 PSI. After this, open or close the regulating valve with switch **B** until the gauge reads approx. 3 PSI over your desired spraying pressure with all three booms spraying. After this, open the wedge agitation valve **C** until the gauge drops down to 30 PSI. This is to ensure the recommended pressure to the tank jet agitators.
NOTE: The master switch **A** activates all solenoid valves at once. Individual booms are on/off controlled with separate switches.
5. Sprayer is now ready to use. **Check pressure and tip wear periodically.**



ELECTRIC REGULATING VALVE PARTS BREAKDOWN

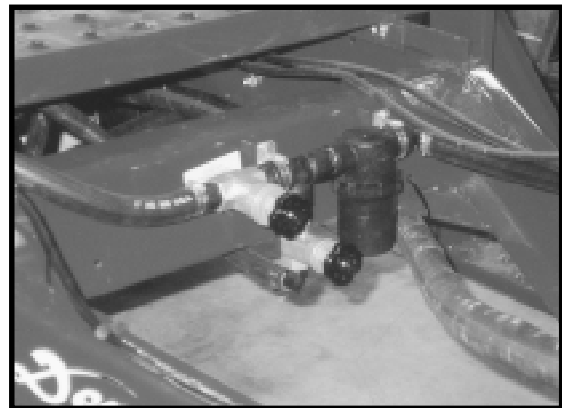
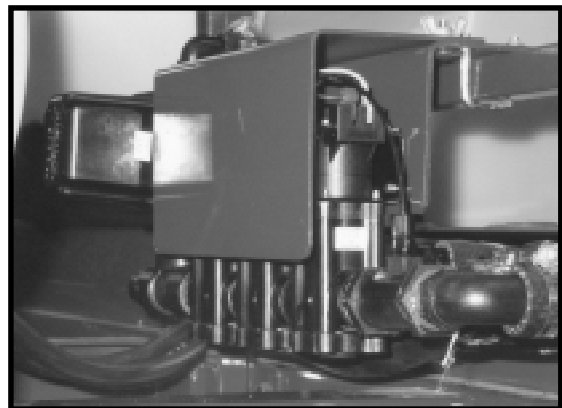
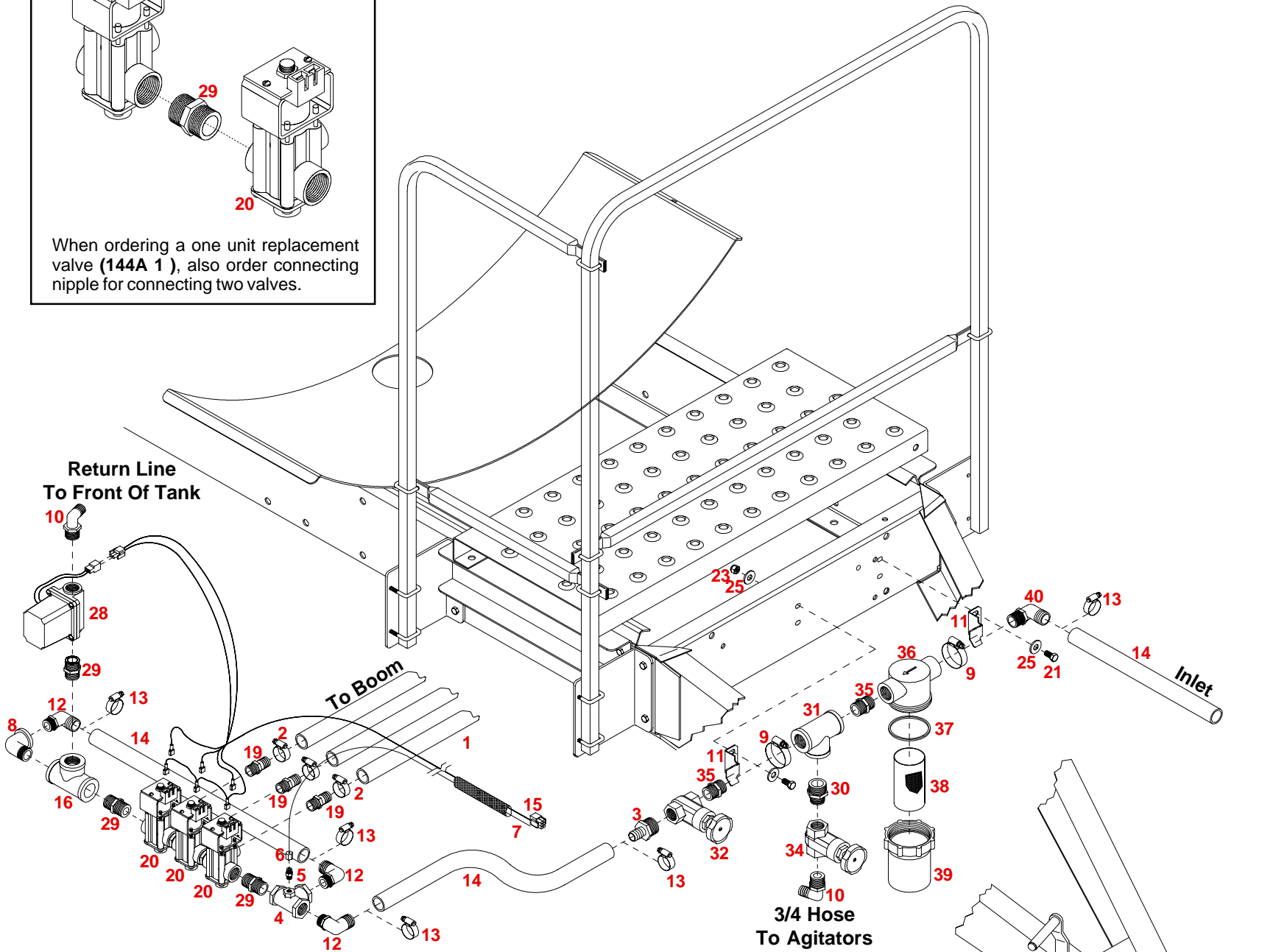
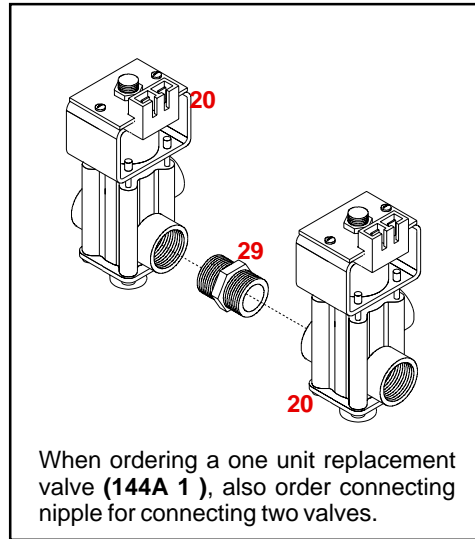


244 3/4 ELECTRIC REGULATING VALVE PARTS LIST

REF. NO.	PART NO.	QTY.	DESCRIPTION
1.	38036IZP	4	Screw, Stainless Steel
2.	38028PPB	1	Cover, Polypropylene
3.	38033	1	12VDC Verticle Motor & Strain Relief
4.	380292EPR	1	Grommet, EPDM Rubber
5.	38030SS	1	Butterfly, Stainless Steel
6.	38034SS	1	Machine Screw, Stainless Steel
*7.	38031EPR	1	Gasket, EPDM Rubber
8.	38027NYB	1	Core, Nylon
*9.	7717 2 211VI	1	O-ring, Viton
*10.	7717 2	1	O-ring, Viton
11.	38035SS	1	Retainer Washer, Stainless Steel
12.	38026NYB	1	Body, Nylon
	AB244A	-	Spare Parts Kit (incl. all items marked with *)

Please order replacement parts by PART NO. and DESCRIPTION.

CS414HVR PLUMBING CONTROL PARTS BREAKDOWN



CS414HVR PLUMBING CONTROL PARTS LIST

REF. NO.	PART NO.	QTY.	DESCRIPTION
1.	340RB	-	3/4" Rubber Hose
2.	B12H	3	3/4" Hose Clamp
3.	BA1010	1	1" MPT x 1" Hose Barb (GFP)
4.	21476NY	1	3/4" FPT Tee with gauge fitting
5.	21736NY	1	Male Coupling
6.	21486NY	1	Male Coupling w/ 2 - Tube Nuts
7.	21634	1	Pressure Gauge Tubing (standard)*
8.	BSE34	1	3/4" FPT x 3/4" MPT Street Elbow (GFP)
9.	B24H	2	1-1/4" Hose Clamp
10.	BEL3434	2	3/4" MPT x 3/4" Hose Barb Elbow (GFP)
11.	05286	2	Plumbing Bracket
12.	BEL3410	3	3/4" MPT x 1" Hose Barb Elbow (GFP)
13.	B16H	6	3/4" Hose Clamp SS
14.	1010RB	-	1" Rubber Hose
15.	21725 6	1	6' Wire Harness
16.	BTT34	1	3/4" FPT Tee (GFP)
17.	07471	1	Mounting Tube
18.	07473	1	Mounting Plate
19.	BA1234	3	1/2" MPT x 3/4" Hose Barb (GFP)
20.	144A 1	3	Replacement one unit Electric Solenoid Valve
21.	00003	4	5/16"-18 UNC x 1" Hex Head Bolt (Gr.5)
22.	07472	1	Cover Plate
23.	02802	4	5/16"-18 UNC Nylon Insert Locknut
24.	04822	4	1/4"-20 UNC x 1" Sq. U-bolt
25.	00004	8	5/16" Flatwasher
26.	02772	8	1/4"-20 UNC Nylon Insert Locknut
27.	01907	2	1/4"-20 UNC Wing Nylon Locknut
28.	244 3/4	1	3/4" Electric Regulation Valve w/ connectors
29.	BM3400	5	3/4" MPT Short Nipple (GFP)
30.	BM1034	1	1" MPT x 3/4" MPT Short Nipple Reducer (GFP)
31.	BTT100	1	1" FPT Tee (GFP)
32.	G2003	1	1" FPT Gate Valve
33.	01906	6	3/16" x 1/2" Slotted Truss Hd. Bolt
34.	G2002	1	3/4" FPT Gate Valve
35.	BM1000	2	1" MPT Short Nipple (GFP)
-	RVF100 40	1	1" Line Strainer with 40 mesh screen
36.	RVF100C	-	1" Strainer Cap
37.	RVF114GV	-	Viton Gasket
38.	RVF140	-	40 Mesh Screen for 1" strainer
39.	RVF114B	-	Strainer Bowl
40.	BEL1010	1	1" MPT x 1" Hose Barb Elbow (GFP)
41.	00214	6	1/4" Flatwasher

Please order replacement parts by PART NO. and DESCRIPTION.
* Specify quantity (Footage) to be ordered.

