OPERATOR'S MANUAL

BLUMHARDT 300, 325 & 500 GALLON PICKUP SPRAYERS

HUTCHINSON WIL-RICH
MANUFACTURING COMPANY
P.O. BOX 1030 WAHPETON, ND 58074
(701) 642-2621

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WARRANTY

The only warranty Hutchinson Wil-Rich Manufacturing Company gives and the only warranty the dealer is authorized to give is as follows:

We warrant products sold by us to be in accordance with our published specifications or those specifications agreed to by us in writing at time of sale. Our obligation and liability under this warranty is expressly limited to repairing, or replacing, at our option, within 12 months after date of retail delivery, any product not meeting the specifications. WE MAKE NO OTHER WARRANTY, EXPRESS OR IMPLIED AND MAKE NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. Our obligation under this warranty shall not include any transportation charges or costs or installation or any liability for direct, indirect or consequential damage or delay. If requested by us, products or parts for which a warranty claim is made are to be returned transportation prepaid to our factory. Any improper use, operation beyond rated capacity, substitution of parts not approved by us, or any alteration or repair by others in such manner as in our judgement affects the product materially and adversely shall void this warranty. NO EMPLOYEE OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY.

Hutchinson Wil-Rich Manufacturing Company reserves the right to make improvement changes on any of our products without notice.

WHEN WARRANTY LIMITED OR NOT APPLICABLE: Warranty on hoses, cylinders, hubs, spindles, engines, valves, pumps or other trade accessories are limited to the warranties made by the respective manufacturers of these components. Rubber tires and tubes are warranted directly by the respective tire manufacturer only, and not by Hutchinson Wil-Rich Manufacturing Company.

Warranty does not apply to any machine or part which has been repaired or altered in any way so as in our judgement to affect its reliability, or which has been subject to misuse, negligence or accident.

A DELIVERY REPORT FORM MUST BE FILLED OUT AND RECEIVED BY HUTCHINSON WIL-RICH MANUFACUTING COMPANY TO INITIATE THE WARRANTY COVERAGE.

WARRANTY CLAIMS PROCEDURE

1. The warranty form must be returned to Hutchinson Wil-Rich Manufacturing Companywithin fifteen (15) working days from the repair date.

2. Parts returned to Hutchinson Wil-Rich Manufacuturing Company without authorization will be refused. The parts must be retained at the dealership for ninety (90) days after the claim has been filed. If the Service Department would like to inspect the parts, a packing slip will be mailed to the dealer. The packing slip must be returned with the parts. The parts must be returned prepaid within thirty (30) days of receiving authorization. After the parts are inspected and warranty is verified, credit for the return freight will be issued to the dealer.

3. Parts that will be scrapped at the dealership will be inspected by Hutchinson Wil-Rich Manufacturing Company Sales Representatives, District Sales Managers or Service Representatives within the ninety (90) day retaining period.

TO THE OWNER

It is the responsiblity of the user to read the Operator's Manual and comply with the safe and correct operating procedures as pertains to the operation of the product and to lubricate and maintain the product according to the information outlined in the Operator's Manual.

The user is responsible for inspecting his machine, and for having parts repaired or replaced when continued use of the product would cause damage or excessive wear to the other parts.

The word NOTE is used to convey information that is out of context with the manual; special information such as specifications, techniques, reference information, safety practices, and other information of supplementary nature.

BLUMHARDT EQUIPMENT

Model No. _____

Serial No. _____

ASHLEY, ND 58413

49396

When in need of parts, always specify the model and the serial number. Write this number in the space provided. The serial number plate is located on the engine mount frame. (See page 12.)

MODIFICATIONS

It is the policy of Blumhardt Equipment to improve its product whenever possible and practical to do so. We reserve the right to make changes, improvements, and modifications at any time without incurring the obligation to make such changes, improvements, and modifications on any equipment sold previously.

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PERSONAL SAFETY IS IMPORTANT!

ALL PERSONNEL INVOLVED WITH THE ASSEMBLY AND/OR OPERATION OF THIS EQUIPMENT MUST BE INFORMED OF PROPER SAFETY PROCEDURES. OPERATOR'S AND ASSEMBLY MANUALS PROVIDE THE NECESSARY INFORMATION. IF A MANUAL IS LOST FOR A PARTICULAR IMPLEMENT, ORDER A REPLACEMENT AT ONCE. OPERATOR'S AND ASSEMBLY MANUALS ARE AVAILABLE AT NO CHARGE UPON REQUEST.

ADDRESS INQUIRIES TO:

HUTCHINSON WIL-RICH MANUFACTURING COMPANY

P.O. BOX 1030

WAHPETON, ND 58074

PH(701) 642-2621 FAX(701) 642-3372

SAFETY

Safety decals appear at various locations on your machine. These decals are provided for your safety and must be kept clean. Replace any decal that becomes worn, damaged, painted over or otherwise difficult to read. Replacement decals are available through your Blumhardt dealer.

BEFORE OPERATING

Use extreme care when making adjustments.

After servicing, be sure all tools, parts or servicing equipment is removed from the machine.

Make sure that there is no one near the machine before and during operation.

Reduce speed when cornering on field ends and when operating on or across dead furrows.

Do not attempt to remove any obstruction while the machine is in motion.

Use extreme care when operating close to ditches, fences or on hillsides.

No one other than the operator should ride in the pickup.

Before and during operation be sure no one is on or around the implement. Serious injury can result from improper use.

Before operating each day, fill the clean water tank with fresh water.

ON-HIGHWAY OPERATION

Always place the machine in the transport position.

Comply with your state and local laws governing highway safety when moving machinery on a highway.

Reduce road speed on corners.

Drive at a reasonable speed to maintain complete control of the machine at all times.

TRANSPORTING

The implement must always be placed in the transport position and the booms locked when traveling on public roads.

NOTE: Use extreme caution when working around overhead power transmission lines.

Reduce speed when cornering and when traveling over rough and/or uneven ground.

This symbol is used to call your attention to instructions concerning your personal safety. Be sure to observe and follow these instructions.

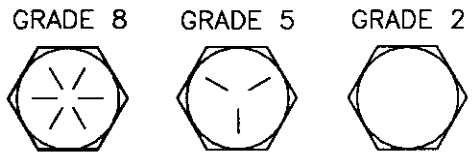
PREPARATION

Before using the Blumhardt sprayer, a careful inspection must become routine. A check must be made to insure that all hardware is securely tightened and moving parts are properly lubricated.

Tighten all loose nuts and bolts and replace any bent or broken parts.

When tightening bolts, they must be torqued to the proper number of foot-pounds as indicated in the table unless otherwise specified. It is important that all bolts be kept tight.

On new machines, all nuts and bolts must be rechecked after a few hours of operation.



TORQUE IN FOOT POUNDS

BOLT DIA		3/8	1/2	5/8	3/4	7/8	1
HEX HEAD		9/16	3/4	15/16	1-1/8	1-5/16	1-1/2
UNC	GRADE 2	18	45	89	160	252	320
	GRADE 5	30	68	140	240	360	544
	GRADE 8	40	100	196	340	528	792
UNF	GRADE 2	21	51	102	178	272	368
	GRADE 5	32	70	168	264	392	572
	GRADE 8	48	112	216	368	792	840

CI-75623

When replacing a bolt use only a bolt of the same grade or higher.

Bolts with no markings are grade 2.

Grade 5 bolts furnished with the machine are identified by three radial lines on the head.

Grade 8 bolts furnished with the machine are identified by six radial lines on the head.

All U-bolts are grade 5.

LUBRICATION

Make sure the sprayer is properly lubricated. (See maintenance, page 26.)

LOADING

With tail gate removed, back under the sprayer until the front of the sprayer is against the front of the pickup box.

Loosen leg set screws and jack sprayer down into pickup box.

WARNING: Jack legs down equally. *DO NOT* completely raise or lower legs one at a time. Doing so will make the implement unstable and result in equipment damage and/or personal injury.

Raise rear support legs from ground and retighten leg set screws.

The front support legs need to be unpinned and rotated 90°. The leg is then slid towards the implements center and the leg set screw re-tightened. (See Fig. 1.)

Lock the sprayer in the pickup box with the retainer, (See Fig. 2). Slide the retainer up the boom support until it fits tightly against the pickup box corner, then bolt securely.

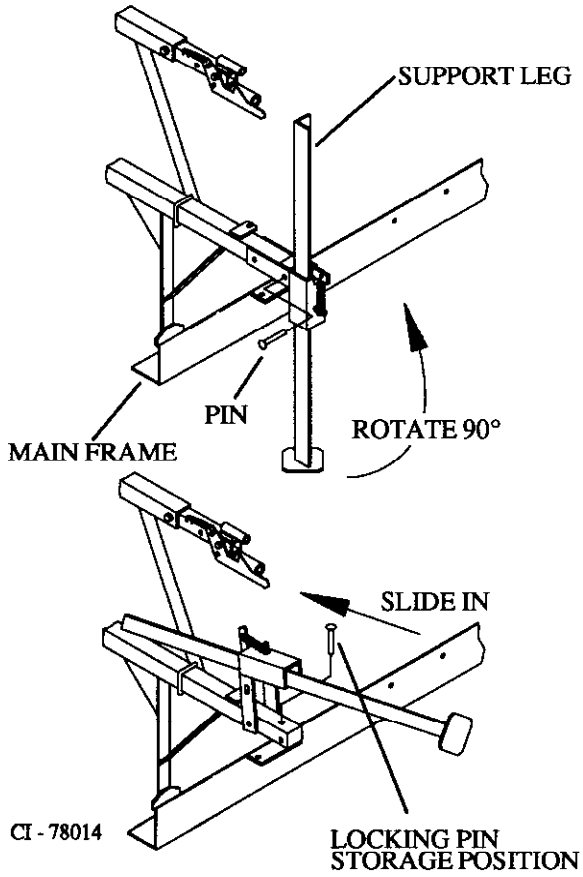


FIG. 1

UNLOADING

Unload on level ground.

The pickup sprayer tank should contain less than 20 gallons, because the support legs will not hold the extra weight and to prevent the bottom of the tank from sagging.

Before unloading, it is best to back rear tires of pickup onto 4 to 6 inch blocks. This will keep the sprayer raised high enough for the pickup to slide under it again for loading in case of settling.

Swing remote control arm away from pickup.

Disconnect the electrical supply from pickup.

Loosen retainer set screws and slide retainers in away from pickup box. (See Fig. 2.) Make sure they will not hit pickup box sides when driving away.

Loosen leg set screws (See Fig. 2.) with wrench end of jack handle and lift locking tab to release leg to the ground. Do this to all 4 legs before jacking.

Jack sprayer off of pickup box slowly and evenly to prevent binding and damage to pickup box.

After sprayer is at a sufficient height for unloading, make sure locking tabs are locked and tighten leg set screws securely.

Now the sprayer should be supported on all four legs. Check again to make sure all parts have been disconnected and are clear from pickup.

NOTE: The sprayer should not be left in a storage (unloaded) position with more than 20 gallons of liquid in the tank. The support legs will not hold the extra weight.

NOTE: Do not work around or under the sprayer when in the storage (unloaded) position.

UNLOADING

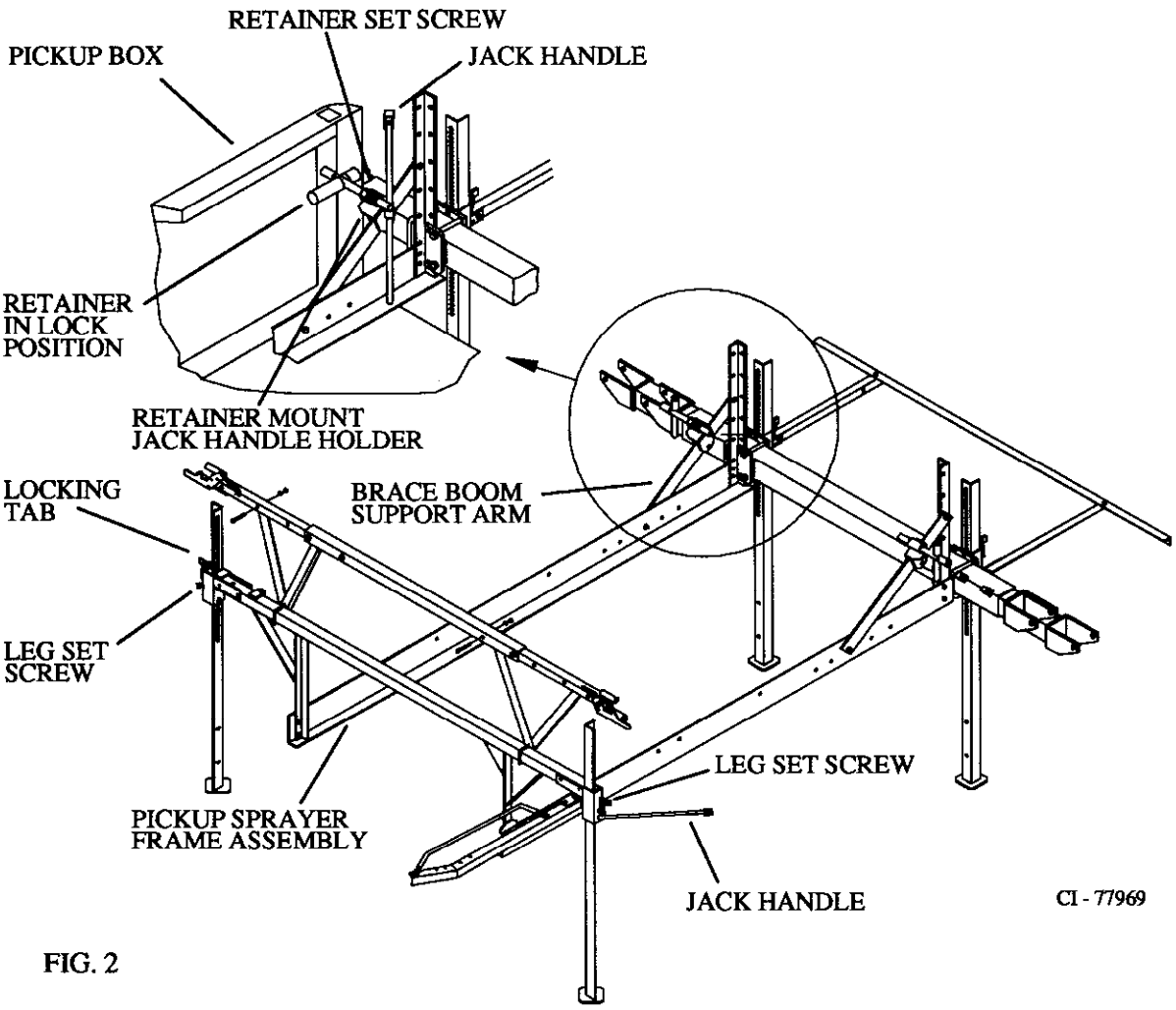
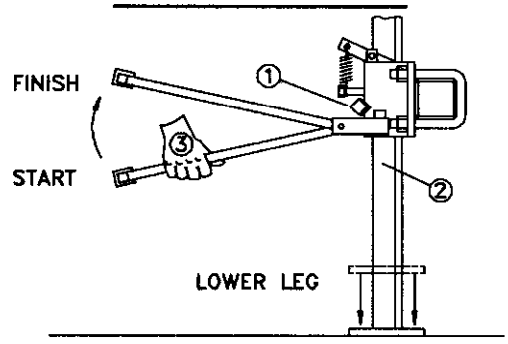


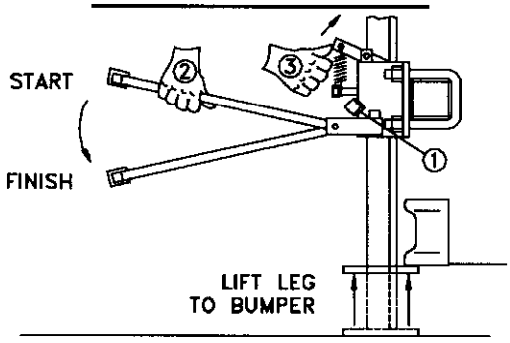
FIG. 2

LIFTING SPRAYER



1st. Loosen set screw ref. ①
2nd. Lower leg ref. ② to ground.
3rd. Start jacking ref. ③ ; alternating from left leg to right leg.
4th. When desired height is reached tighten set screw ref. ① .

LOWERING SPRAYER



1st. Loosen set screw. ① .
2nd. Lift up on jack handle ref. ② to release catch ref. ③ . And jack; alternating from left leg to right leg.
3rd. When leg is loose, lift leg up and tighten set screw ref. ① .

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BOOMS

UNFOLDING

Move anti-swing clutch handle to the unlock position. (See Fig. 4.)

Release transport lock latch and lift the boom from the transport lock. Walk the main boom back to where the boom is perpendicular with the pickup and lock the anti-swing clutch handle. (See Fig. 3.)

After the main boom has been locked in place, lift the outrigger away from the main boom and walk outrigger around until the outrigger locks in place. (See Fig.4.)

NOTE: Additional rear chain length is required to prevent the 16' boom from rising too high, as it is folded. A chain binder is installed on the rear chain to be "opened" when folding and "closed" when the boom is in operation.

FOLDING

Reverse unfolding procedure.

NOTE: When folding, make sure feed lines do not kink and sprayer nozzles don't hit the boom or other nozzles being folded into them.

NOTE: The tube protector must be mounted in the boom latch area to protect the lower boom tube in transport position.

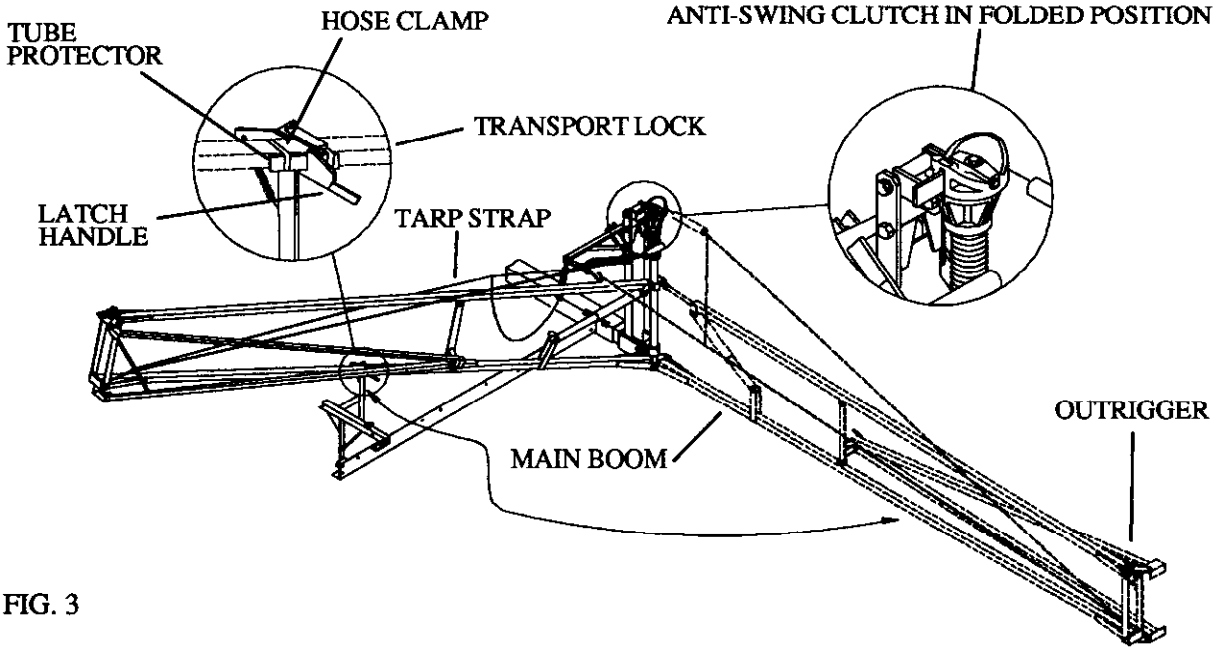

FIG. 3

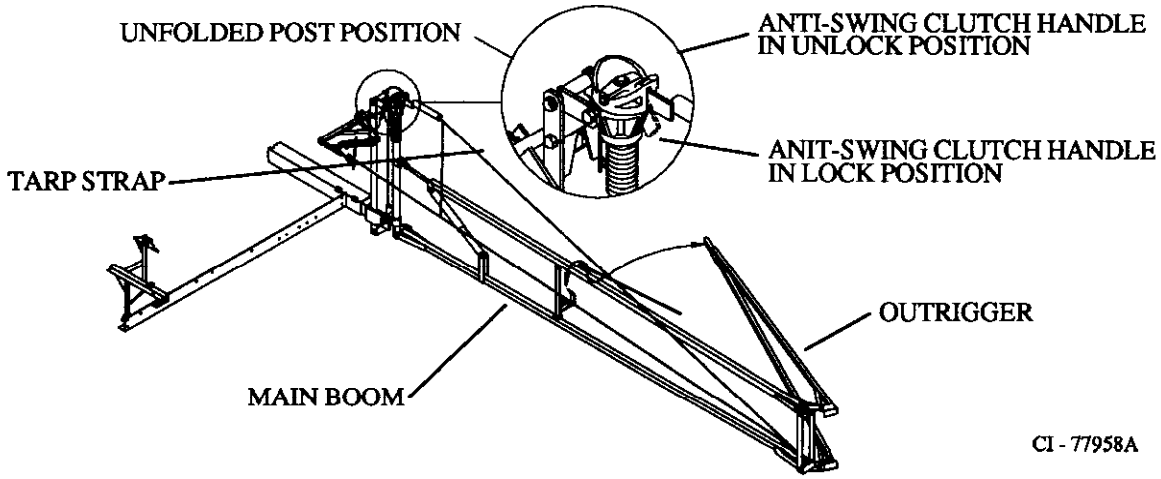

FIG. 4

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BOOM INSTALLATION

BOOM ARMS

Blumhardt has 3 sizes of boom arms available for pickup sprayers. They are 16', 21' and 33' parallel floatation booms. The sizes stated are for the main boom and outrigger assembled and do not included the boom extensions.

The center section is measured from the center of the left boom swivel post to the center of the right boom swivel post. (See Fig. 5.)

The booms are measured from the center of the boom swivel post to the end of the outrigger. (See Fig. 5.)

NOTE: All boom lengths are given in approximate lengths.

NOTE: Pickup sprayer standard center section is 93". No other sizes are available for pickup sprayers.

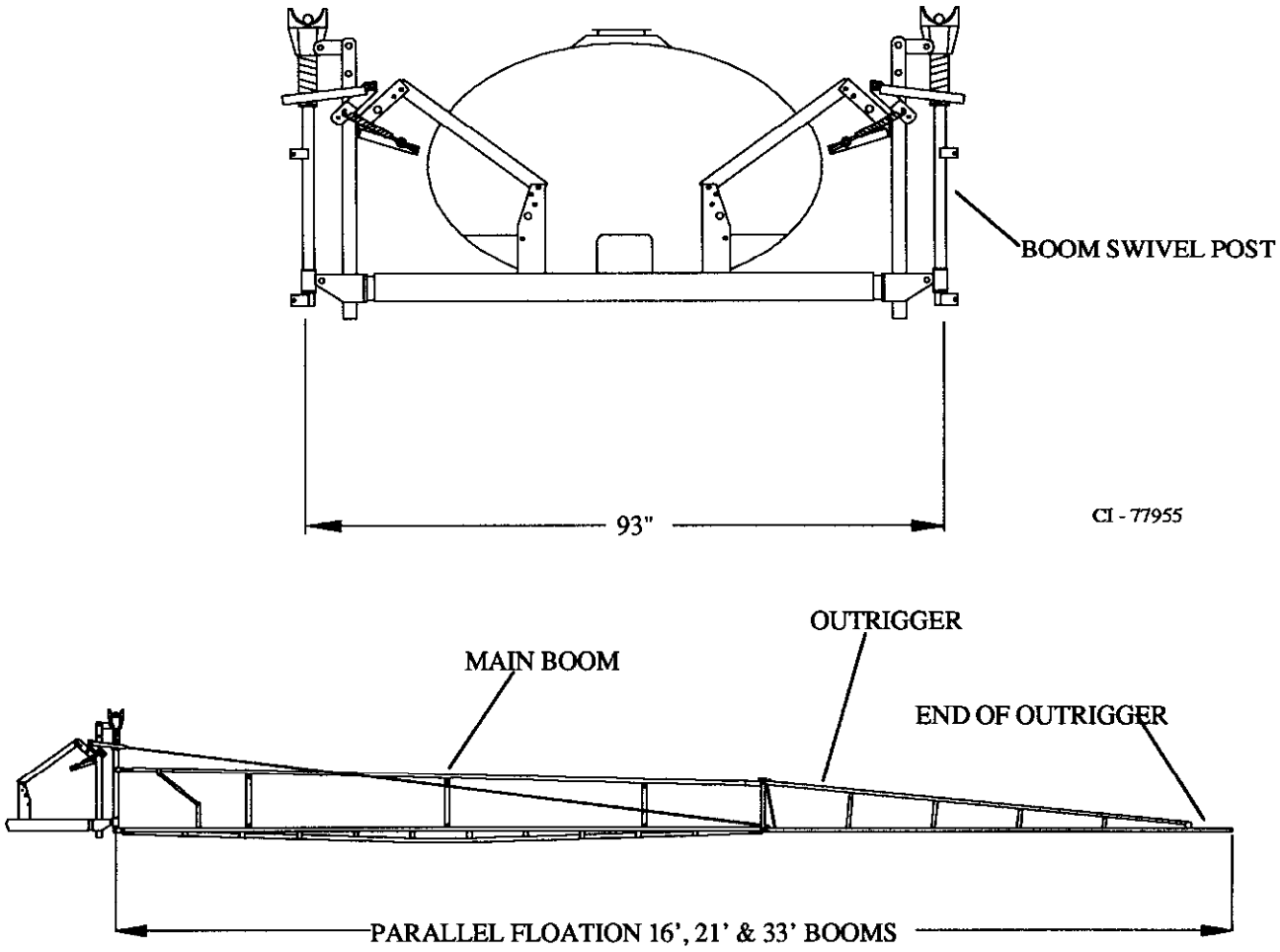

FIG. 5

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PRE-INSTALLATION SET-UP

Insert 3-1/2" square tube stub of the boom post assembly into the 4" square tube of the center frame until it stops at the tab of the inserted tube. Tighten set screw bolt on center tube to hold boom assembly in place.

Install straight brace and lower lift bracket (or optional electric actuator) as seen on page 8.

LATCH ADJUSTMENT

NOTE: The 16' boom must have a 3/16x3-1/4" spring lock pin installed in the hole indicated to prevent it from floating too high. This boom is too light to permit extreme floatation.

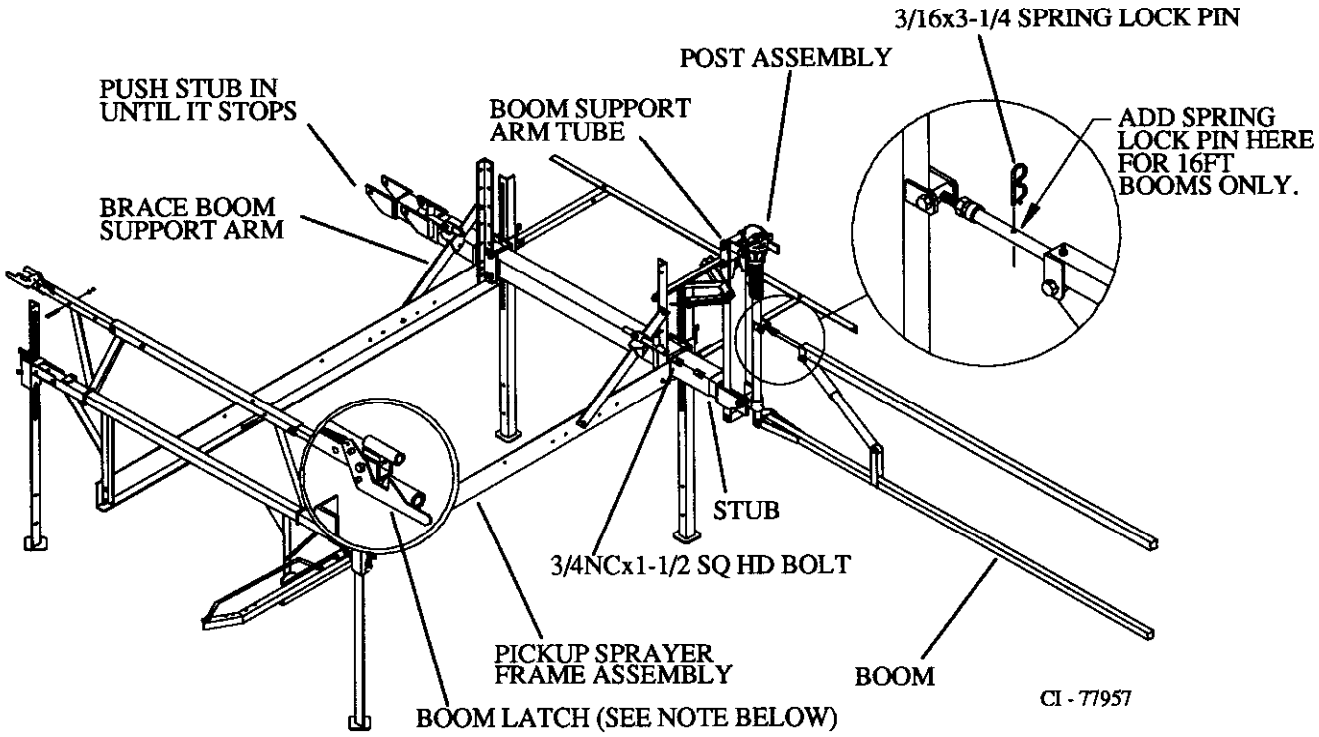
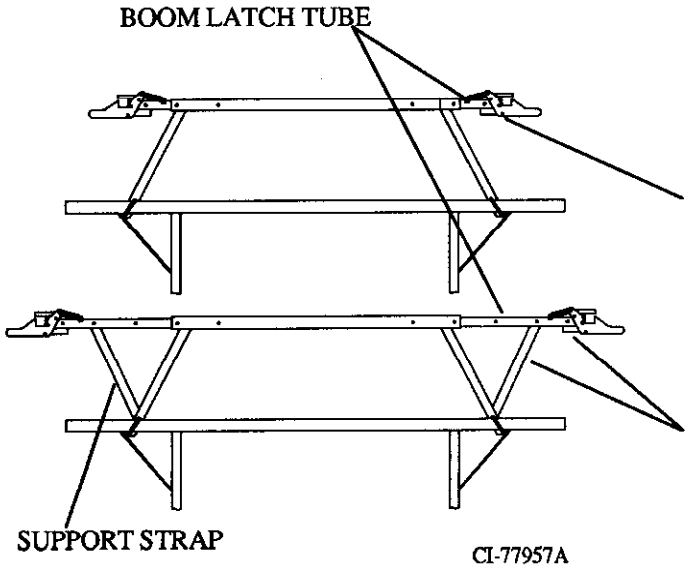


FIG. 6



NOTE: Boom latch handle must be mounted on the forward side of boom latch tube for a positive lock of the boom during transport.

Mounting the boom latch tube to the narrow position will put the booms over the cab of the pick-up.

Mounting the boom latch tube to the wide position will put the booms parallel with the pick-up and will require the use of the support strap.

BOOM LIFT OPTIONS

Reference dimensions are being supplied for the different variations of lift brackets and size of sprayers. An angle finder is also supplied for an exact measurement. Always set the angle with the electric actuator fully extended.

Lower lift bracket should be positioned so the boom upright is angled slightly inward at the top. An angle finder template (provided) is used as a guide between the center tube and the boom upright. The boom upright should then be tilted inward until it matches the angle finder template. (See Fig. 7.)

When correct angle is found, tighten the U-bolt on the lower lift bracket.

21' & 33' BOOM POST ASSEMBLY

BRACE BOOM SUPPORT ARM

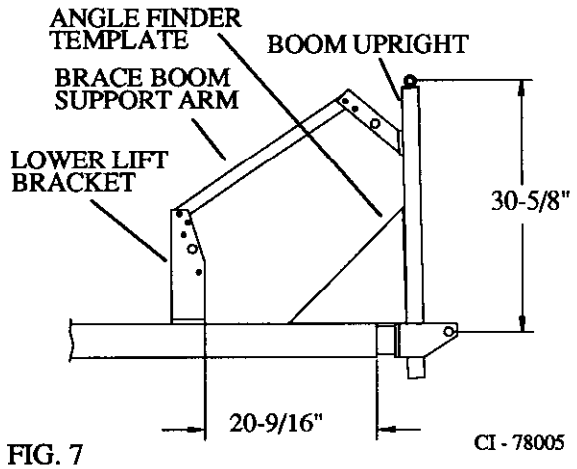


FIG. 7

21' BOOM POST ASSEMBLY

ELECTRIC ACTUATOR

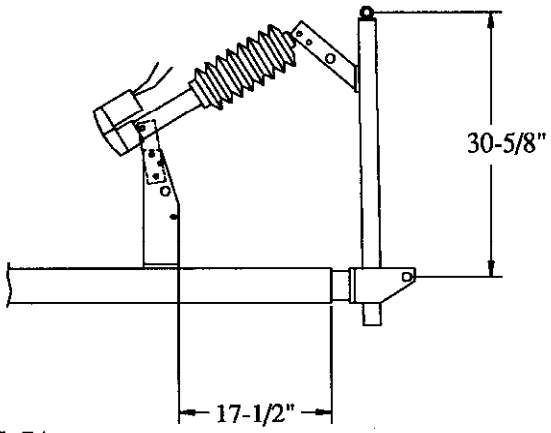


FIG. 7A

33' BOOM POST ASSEMBLY

ELECTRIC ACTUATOR

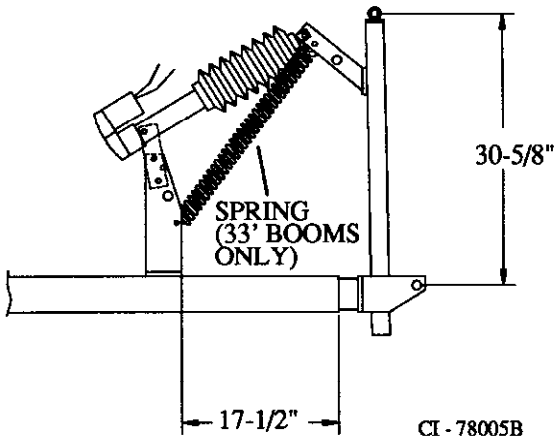


FIG. 8

16' BOOM POST ASSEMBLY

BRACE BOOM SUPPORT ARM

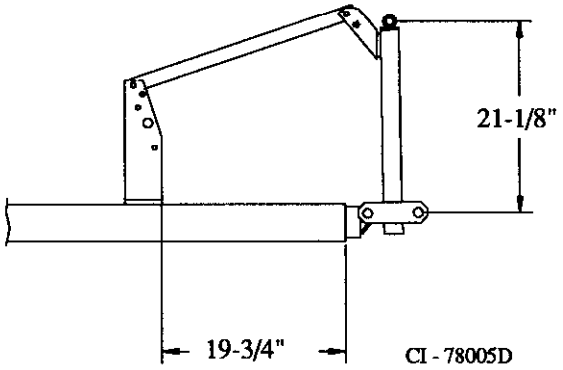


FIG. 9

16' BOOM POST ASSEMBLY

ELECTRIC ACTUATOR

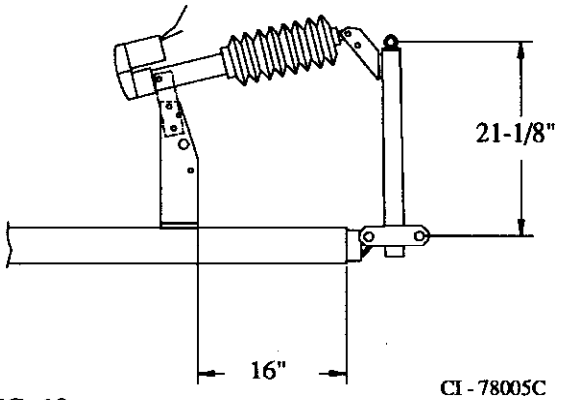


FIG. 10

BOOM EXTENSION

NOTE: Extension tubes may be added on all booms. This extension tube is adjustable out to 5 feet beyond the outrigger.

Mount nozzle assemblies onto extension tube 2" in from end of tube with hose barb facing toward center as shown.

Install extension tube into boom far enough to obtain proper spacing of nozzles. Tighten the boom extension locking bolt securely.

NOTE: Boom extension tube must be inserted a minimum of 12 inches.

The manifold on the end of the outrigger has unused hose barbs for nozzles on the extension.

Remove 1"FSPT cap from tee on the manifold assembly and replace with hose barb adapter. Also, if necessary, remove 1/4" hose barb cap from the manifold head.

Install 1/4" tubing, from the manifold assembly to the nozzle assembly. Cut the tubing to lengths, so that there is no slack. Secure the tubing to the booms with nylon ties.

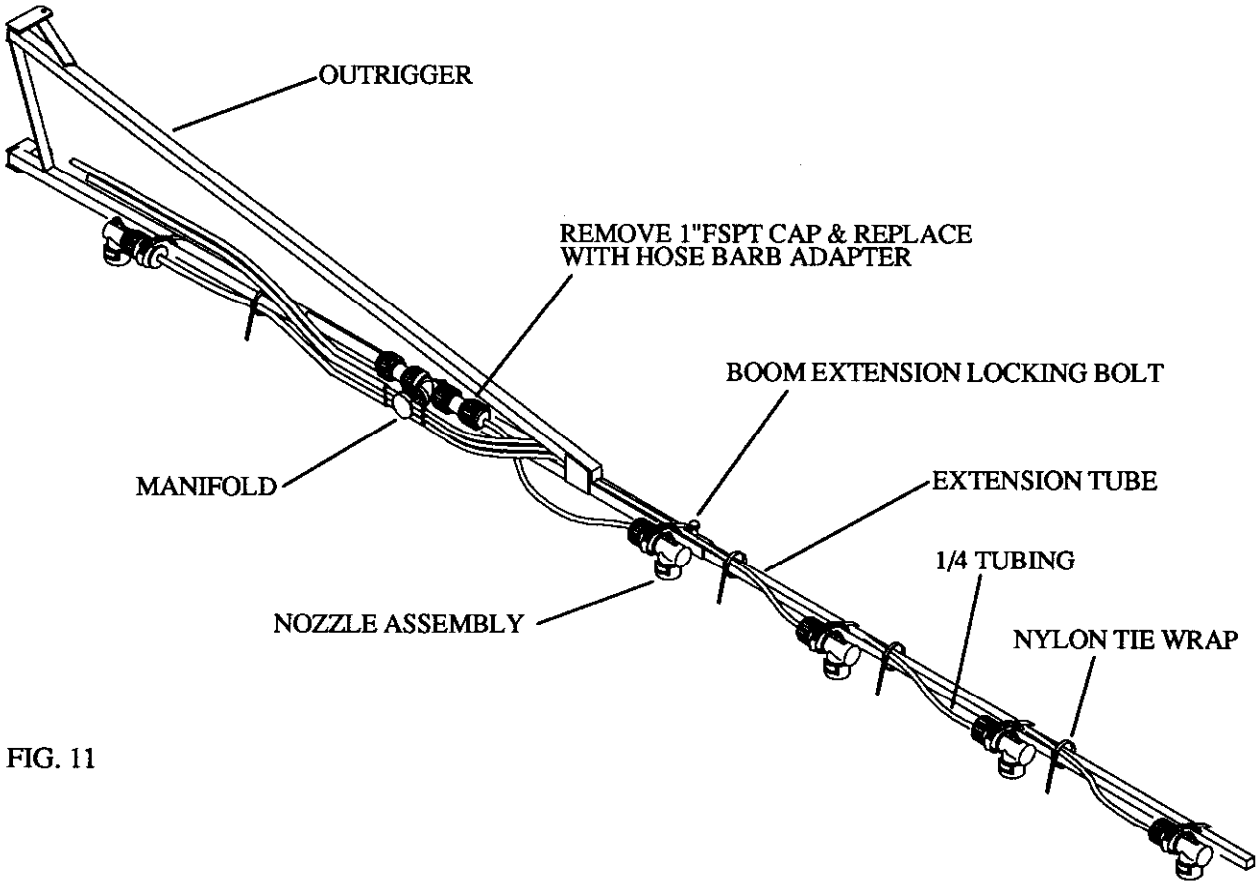


FIG. 11

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NOTE: When using extensions, care must be taken when booms are in a folded position. The extension will stick out behind the sprayer, which can be dangerous when backing up.

RIGGING THE BOOMS

Before starting adjustments, be sure all joints are well lubricated and are moving freely.

With boom completely assembled and sprayer setting on level ground, adjust boom by first checking to see if the boom post is set properly. See page 8 for Lift Bracket Installation.

Install chain assemblies from the rocking chair mechanism to the boom outrigger. To get the intital chain length, rest the main boom on a stand, level or slightly down. Loosen chain turnbuckles so that no threads are showing in the turnbuckle body. Mount chain so it holds the boom in it's resting postion. (See Fig. 12A.)

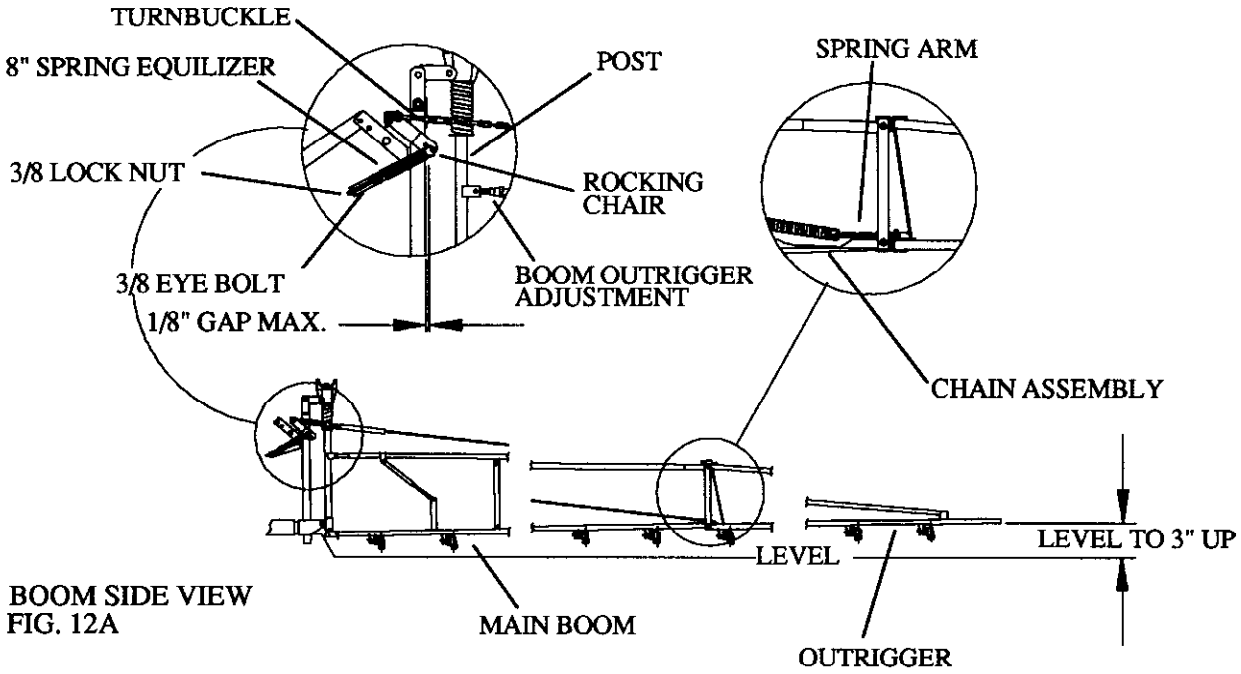
Adjust the boom outrigger so it is parallel with the first section of the main boom by adjusting the nut on the boom outrigger adjustment. (See Fig. 12A.)

Next adjust the equilizer springs so there is approximaitely 1/8" gap between the rocking chair and the post. (There will be no gap for 33' booms.) (See Fig. 12A.)

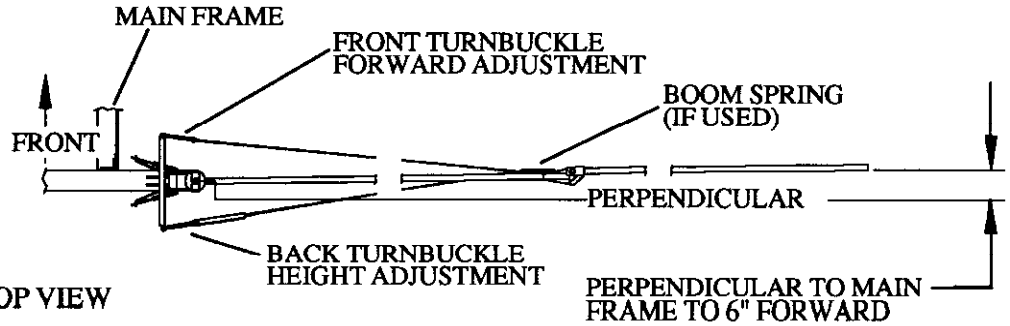
NOTE: Check the boom flotation by pushing down where the outrigger and the main boom arms join. the boom should float back up to the level position. If the boom does not float back up, the eye bolt on the rocking chair equalizer spring must be tightened until the boom floats up.

Adjust the front turnbuckle so that the main boom and outrigger are perpendicular to the main frame to 6" forward. (See Fig. 12B.)

Use the back turnbuckle for adjusting levelness. The main boom and outrigger should be level to 3" above level of the main frame. (See Fig. 12B.)



BOOM SIDE VIEW
FIG. 12A



BOOM TOP VIEW
FIG. 12B

FEEDLINE HOOK UP

2 SOLENOIDS

Each solenoid feeds a boom and splits the center section feed. (See Fig. 13A.)

NOTE: The optimum setting would be to have each solenoid feed an equal amount of nozzles.

3 SOLENOID

Each solenoid feeds a specific area of the boom. The left solenoid feeds the outer section of the left boom. The center solenoid feeds the center section and inside section of the left and right booms. The right solenoid feeds the outer section of the right boom. (See Fig. 13B.)

NOTE: There are many different layouts of manifolds, feedlines and nozzle lines, all depending on the number of solenoids, nozzle spacing, and the size of the total boom assembly.

2 SOLENOIDS

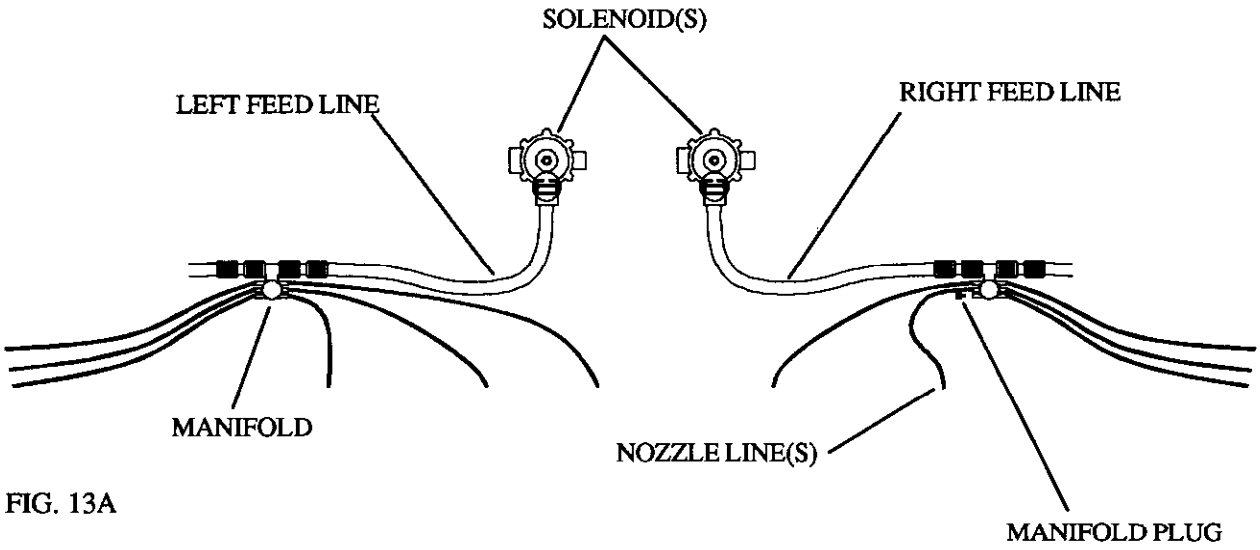


FIG. 13A

3 SOLENOIDS

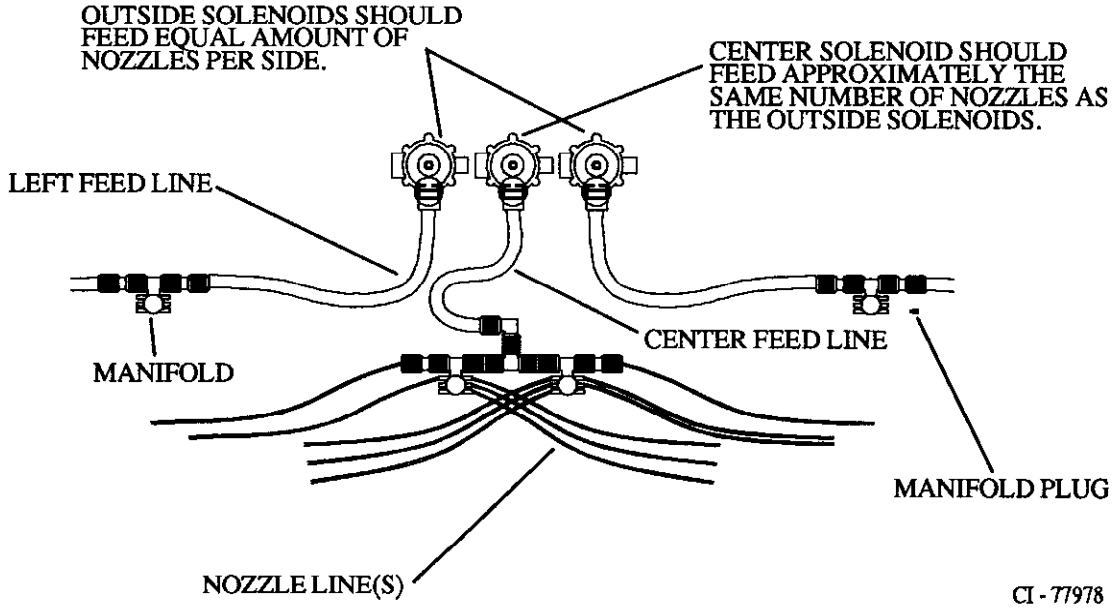


FIG. 13B

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ENGINE MOUNT

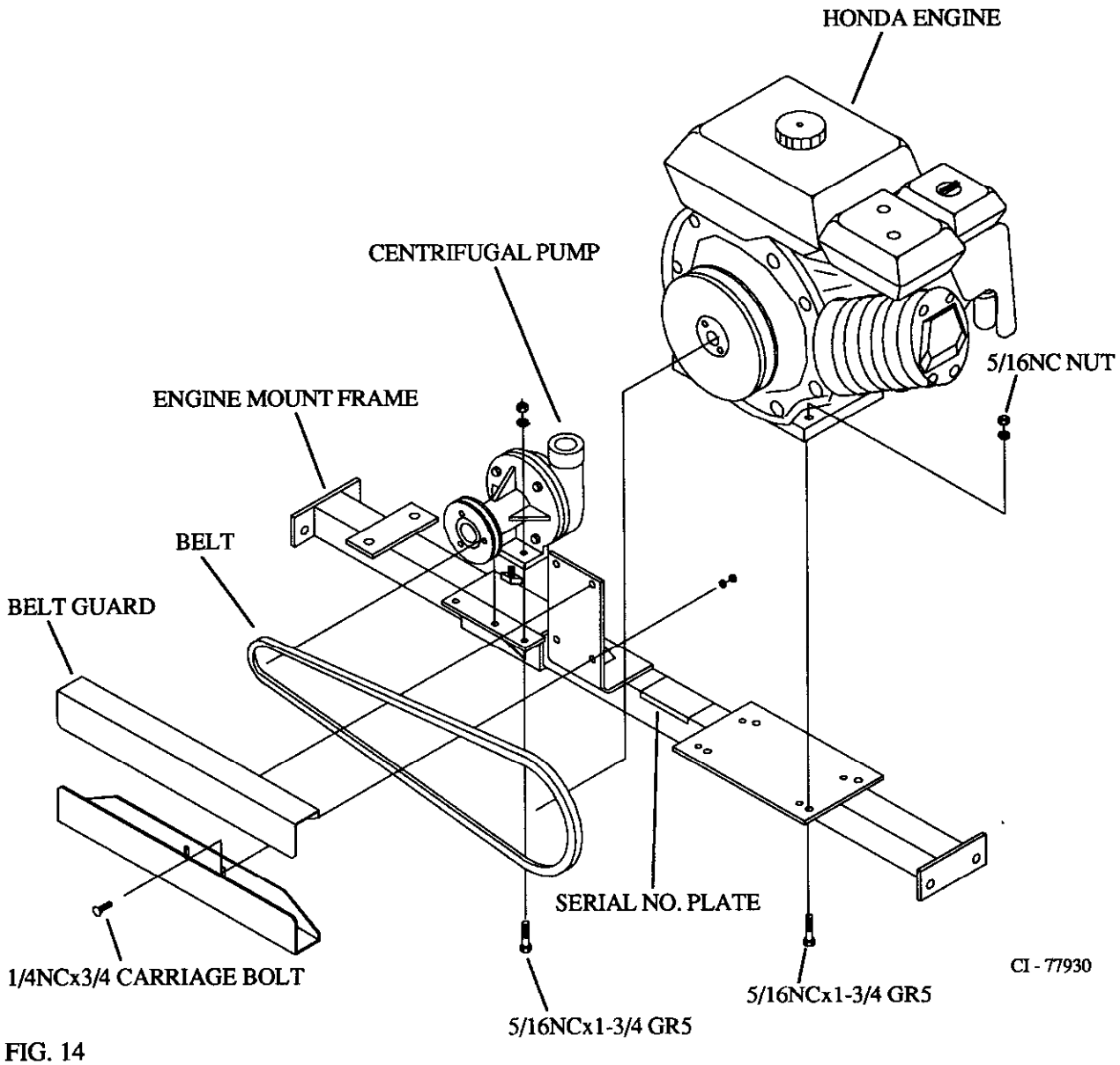


FIG. 14

NOTE: Always keep belt guards in place when working around engines and pumps. SErious bodily injury can result if care is not taken.

APPLICATION RATES

The Application Rate Chart on pages 15 & 16 are based on water at 8.3lbs per gallon and 20 and 30 inch nozzle spacings. When spraying solutions that are heavier or lighter than water, multiply the tabulated gallonage figure from the chart by the appropriate factor shown below.

Weight of Solution	Conversion Factors
7.0lbs. per gallon	1.09
8.0lbs per gallon	1.02
8.34lbs per gallon - water	1.00
9.0lbs per gallon	.96
10.0lbs per gallon	.91
11.0lbs per gallon	.87
12.0lbs per gallon	.83

NOTE: This table is based on theoretical solution densities only and may vary in actual practice because of differing solution characteristics.

Recommended Spray Heights	
20" Spacing	30" Spacing
20" to 40"	30" to 40"

CALIBRATION

Pre Calibration Check: Be sure that all sprayer parts are free of foreign material and are functioning properly. Inspect nozzle tips and internal parts for obvious wear, defects, proper size and type. Check the flow rate of each nozzle using water at the planned operating pressure for uniform output, and uniform appearance of spray pattern. Replace any nozzle tips having flow 5 percent more or less than the average of the other nozzles checked and/or having obviously different patterns. Check the flow rate of new nozzles.

This Engineering Practice provides information on the calibration of boom type field sprayers used for broadcast, band, or row applications.

This Engineering Practice sets forth guidelines for those who prepare field sprayer calibration procedure. The purpose is to encourage practices that will improve uniformity, accuracy and safety of pesticide application with field sprayers.

Never use chemical to calibrate the sprayer. always use clean water.

Use water alone to calibrate the sprayer unless the flow rate of the actual spray mixture varies more than 5 percent from the flow rate of water.

Calibration with actual spray mixture. Wear suitable, approved safety equipment and protective clothing. Avoid contact with the spray.

Avoid contamination of area. Calibrate only when wind speed is below 8km/h (5mph).

General Calibration Information. The volume of spray material applied to a given area depends on nozzle flow rate, ground speed of the sprayer and the sprayed width per nozzle. Each variable must be determined when developing a specific calibration procedure.

Nozzle flow rate. Nozzle flow rate varies with nozzle capacity, nature of the fluid and fluid pressure.

Nozzle capacity. Select the nozzle that will best fit the requirements of application volume, pressure and ground speed.

Nature of the fluid. If the spray mixture will be altered considerably by the addition of adjuvants, compare the flow rate of the spray mixture to the of water. If the rate difference is 5 percent or more, adjust the actual spray mixture in the calibration.

Fluid pressure. A constant pressure must be maintained to achieve uniform application. Flow rate is generally proportional to the square root of the pressure drop across the nozzle.

Ground speed of sprayer. Spray volume has an inverse relationship to the ground speed. Ground speed is the easiest factor to change for minor corrections in application rate. Ground speed must be constant for uniform application.

(Reference: ASAE Standards ASAE EP 367.1 Guide for Preparing Field Sprayer Calibration Procedures.)

NOTE: Calibration is not a one time occurence! Sprayers should periodically be recalibrated during the season, particularly when changing chemicals. You can calibrate during application if field dimensions are accurately known.

CONE TIP CALIBRATION

SPRAYER CALIBRATION

The tip charts should be used to get an approximate application rate for choosing proper tip size. Once you have the desire tip installed in the sprayer, it will be necessary to calibrate the sprayer to get an exact rate. Use the calibration bottle, and spray application calculator, for this purpose. If not available use the method described below.

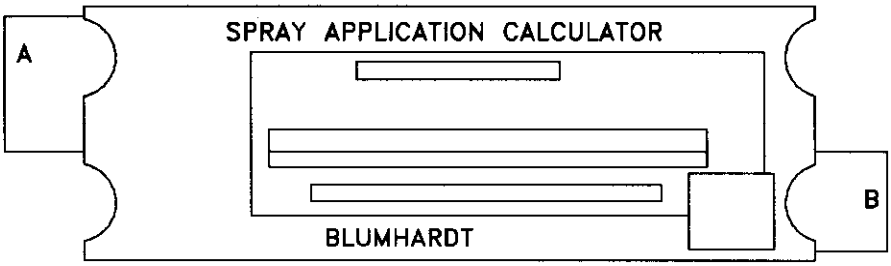
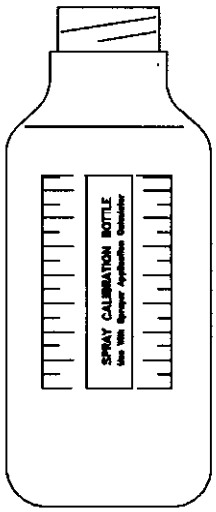


FIG. 15 CI-78013



CI-78013A

Calibration instructions without blumhardt bottle and calculator.

EQUIPMENT: A bottle with 1 ounce graduations on it, a watch with a second hand, pencil and paper or calculator.

PROCEDURE: Determine desired gallons per acre and speed in miles per hour. Choose a level in graduated bottle, any level can be used however greater accuracy exists by using a higher level. Figure from the equation the amount of seconds it should take to fill the bottle to the desired number of ounces. Adjust the sprayer pressure accordingly to fill the bottle to the desired number of ounces. Adjust the sprayer pressure accordingly to fill the bottle to desired level in the proper amount of time.

EQUATION:

$$\text{Seconds} = \frac{2589 \times \text{Level (liquid ounces)}}{\text{MPH} \times \text{Gallons Per Acre} \times \text{Nozzle Spacing}}$$

Example: Determine 10 gallons per acre, 5 miles per hour speed of travel, 30" nozzle spacing and 8 ounces to be collected.

$$\frac{2598 \times 8}{5 \times 10 \times 30} = 13.808 \text{ seconds}$$

It should take 13.8 seconds to fill the bottle to 8 ounces.

CAUTION

Agricultural chemicals can be dangerous. Improper selection or use can seriously injure persons, animals, plants, soil or other property. Be safe: select the right chemical for the job. Handle it with care. Follow the instructions on the container label and instructions from the equipment manufacturer.

FLOOD TIP CALIBRATION

BROADCAST APPLICATION RATE

Although total sprayer capacity is determined by nozzle flow rate and the number of nozzles, the volume of liquid applied per acre is a function of flow rate, nozzle spacing, and sprayer speed as defined in the following formula:

$$\text{Gallons per acre (gpa)} = \frac{(5940) \times (\text{gpm per nozzle})}{(\text{Nozzle Spacing-inches}) \times (\text{mph})}$$

OR

$$\text{GPM} = \frac{\text{GPA} \times \text{MPH}}{5940} \times \text{Nozzle Spacing-inches}$$

NOTE: The performance of any agricultural chemical depends upon the proper application of the correct amount . . . based on chemical manufacturer's recommendation. Be sure that your equipment has been properly calibrated before spraying.

This information on Flood Tips is taken from the Delavan Ag Spray Products 1990 Catalog #1609P.

BROADCAST NOZZLE SPACING CONVERSION FACTORS

To calculate GPA capacities for nozzle spacings other than those shown in capacity charts, note on what nozzle spacing the capacity chart is based and use the corresponding conversion table. Multiply capacities from chart by the proper factor indicated.

FACTORS FOR 20" SPACING CAPACITIES

Nozzle Spacing	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"
Factor	2.0	1.67	1.43	1.25	1.11	1.00	.91	.86	.77	.71	.67

FACTORS FOR 30" SPACING CAPACITIES

Nozzle Spacing	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"
Factor	1.88	1.67	1.50	1.36	1.25	1.15	1.07	1.00	.94	.88

HYPRO 9203C PUMP PERFORMANCE TABLES

SPEED (RPM)	PUMP OPERATING PRESSURE											
	20PSI		40PSI		60PSI		80PSI		100PSI		120PSI	
	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPR	HP
2400	54	1.2										
3600	105	4.2	90	3.9	34	2.5						
4200	122	6.7	115	6.5	93	5.9	46	4.2				
5000			134	10.7	130	10.6	112	10.1	88	9.0	41	6.6
6000			136	15.1	134	15.4	131	15.8	125	16.2	120	16.2

NOTE: All information is taken from the Hypro Series 9000 centrifugal pumps form 197.

See Hypro series pump manuals for more specific operation, maintenance and performance tables.

D-TYPE FLOOD TIP CHART: WATER

Flood Tip	PSI	GPM	20" SPACING					30" SPACING				
			4 MPH	5 MPH	6 MPH	10 MPH	15 MPH	4 MPH	5 MPH	6 MPH	10 MPH	15 MPH
D 2.5	10	.25	18.6	14.85	12.45	7.5	4.95	12.4	9.9	8.3	5.0	3.3
	20	.35	26.3	21.0	17.5	10.5	7.0	17.5	14.0	11.7	7.0	4.7
45767	30	.43	32.1	25.7	21.4	12.8	8.6	21.4	17.1	14.3	8.6	5.7
DARK BLUE	40	.50	37.1	29.7	24.8	14.9	9.9	24.8	19.8	16.5	9.9	6.6
D 3	10	.30	22,35	17.85	14.85	8.85	6.0	14.9	11.9	9.9	5.9	4.0
	20	.42	31.5	25.2	21.0	12.6	8.4	21.0	16.8	14.0	8.4	5.6
45768	30	.52	39.0	31.2	26.0	15.6	10.4	26.0	20.8	17.3	10.4	6.9
DARK GREEN	40	.60	45.0	36.0	30.0	18.0	12.0	30.0	24.0	20.0	12.0	8.0
D 5	10	.50	37.5	29.7	24.75	14.85	9.9	25.0	19.8	16.5	9.9	6.6
	20	.71	52.5	42.0	35.0	21.0	14.0	35.0	28.0	23.3	14.0	9.3
45769	30	.87	64.5	51.6	43.0	25.8	17.2	43.0	34.4	28.7	17.2	11.5
TAN	40	1.00	75.0	60.0	50.0	30.0	20.0	50.0	40.0	33.3	20.0	13.3
D 7	10	.75	55.5	45.0	37.5	22.35	14.85	37.0	30.0	25.0	14.9	9.9
	20	1.10	78.8	63.0	52.5	31.5	21.0	52.5	42.0	35.0	21.0	14.0
45770	30	1.30	96.2	76.9	64.1	38.5	25.6	64.1	51.3	42.7	25.6	17.7
LIGHT BLUE	40	1.50	111.0	88.8	74.0	44.4	29.6	74.0	59.2	49.3	29.6	19.7
D 10	10	1.00	75.0	60.0	49.5	29.7	19.8	50.0	40.0	33.0	19.8	13.2
	20	1.40	105.0	84.0	70.0	42.0	28,0	70.0	56.0	46.7	28.0	18.7
45766	30	1.74	129.3	103.5	86.2	51.7	34.5	86.2	69.0	57.5	34.5	23.0
LIGHT GREEN	40	2.00	148.5	118.8	99.0	59.4	39.6	99.0	79.2	66.0	39.6	26.4

45716

D-TYPE FLOOD TIP CHART: FERTILIZER

Flood Tip	PSI	GPM	20" Spacing						30" Spacing					
			4 MPH	5 MPH	6 MPH	8 MPH	10 MPH	14 MPH	4 MPH	5 MPH	6 MPH	8 MPH	10 MPH	14 MPH
D 2.5	20	.221	16.4	13.1	10.9	8.2	6.6	4.7	10.9	8.8	7.3	5.5	4.4	3.1
	25	.259	19.3	15.4	12.8	9.6	7.7	5.5	12.8	10.3	8.6	6.4	5.1	3.7
45767	30	.302	22.4	17.9	15.0	11.2	9.0	6.4	15.0	12.0	10.0	7.5	6.0	4.3
	35	.344	25.5	20.4	17.0	12.8	10.2	7.3	17.0	13.6	11.3	8.5	6.8	4.9
D 3	20	.281	21.0	16.8	14.0	10.5	8.4	6.0	14.0	11.2	9.3	7.0	5.6	4.0
	25	.341	25.4	20.3	16.9	12.7	10.2	7.3	16.9	13.6	11.3	8.5	6.8	4.8
45768	30	.392	29.2	23.4	19.5	14.6	11.7	8.4	19.5	15.6	13.0	9.7	7.8	5.6
	35	.436	32.5	26.0	21.7	16.3	13.0	9.3	21.7	17.3	14.5	10.8	8.7	6.2
D 5	20	.480	35.8	28.7	23.9	17.9	14.3	10.2	23.9	19.1	15.9	11.9	9.6	6.8
	25	.591	44.1	35.2	29.4	22.0	17.6	12.6	29.4	23.5	19.6	14.7	11.7	8.4
45769	30	.681	50.8	40.7	33.9	25.4	20.3	14.5	33.9	27.1	22.6	16.9	13.6	9.7
	35	.759	56.7	45.3	37.8	28.3	22.7	16.2	37.8	30.2	25.2	18.9	15.1	10.8
D 7	20	.665	49.4	39.5	32.9	24.7	19.7	14.1	32.9	26.3	21.9	16.5	13.2	9.4
	25	.766	56.8	45.5	37.9	28.4	22.7	16.2	37.9	30.3	25.3	18.9	15.2	10.8
45770	30	.896	66.5	53.2	44.3	33.2	26.6	19.0	44.3	35.5	29.6	22.2	17.7	12.7
	35	.969	71.9	57.6	48.0	36.0	28.8	20.6	48.0	38.4	32.0	24.0	19.2	13.7
D 10	20	1.14	84.6	67.7	56.4	42.3	33.9	24.2	56.4	45.1	37.6	28.2	22.6	16.1
	25	1.24	92.1	73.7	61.4	46.0	36.8	26.3	61.4	49.1	40.9	30.7	24.6	17.5
45766	30	1.34	99.8	79.8	66.5	49.9	39.9	28.5	66.5	53.2	44.4	33.3	26.6	19.0
	35	1.47	109.1	87.3	72.8	54.6	43.7	31.2	72.8	58.2	48.5	36.4	29.1	20.8

Cone Spray Tip Metering Chart
(GALLONS PER ACRE)

Cone Tip	PSI	GPM	20" Spacing						30" Spacing					
			4 MPH	5 MPH	6 MPH	8 MPH	10 MPH	14 MPH	4 MPH	5 MPH	6 MPH	8 MPH	10 MPH	14 MPH
45680	40	.044	3.3	2.6	2.2	1.6	1.3	.9	2.2	1.8	1.5	1.1	.9	.6
	60	.052	3.9	3.1	2.6	1.9	1.6	1.1	2.6	2.1	1.7	1.3	1.0	.7
Red	80	.061	4.6	3.7	3.0	2.3	1.8	1.3	3.0	2.4	2.0	1.5	1.2	.9
	100	.073	5.4	4.3	3.6	2.7	2.2	1.5	3.6	2.9	2.4	1.8	1.4	1.0
45681	40	.059	4.4	3.5	2.9	2.2	1.7	1.2	2.9	2.3	1.9	1.5	1.2	.8
	60	.071	5.3	4.2	3.5	2.7	2.1	1.5	3.5	2.8	2.4	1.8	1.4	1.0
White	80	.084	6.3	5.0	4.2	3.1	2.5	1.8	4.2	3.4	2.8	2.1	1.7	1.2
	100	.098	7.3	5.9	4.9	3.7	2.9	2.1	4.9	3.9	3.3	2.4	2.0	1.4
45682	40	.082	6.1	4.9	4.1	3.1	2.5	1.8	4.1	3.3	2.7	2.0	1.6	1.2
	60	.108	8.0	6.4	5.3	4.0	3.2	2.3	5.4	4.3	3.6	2.7	2.1	1.5
Blue	80	.124	9.2	7.4	6.2	4.6	3.7	2.6	6.2	4.9	4.1	3.1	2.5	1.8
	100	.140	10.4	8.3	7.0	5.2	4.2	3.0	7.0	5.6	4.6	3.5	2.8	2.0
45683	40	.120	8.9	7.2	6.0	4.5	3.6	2.6	6.0	4.8	4.0	3.0	2.4	1.7
	60	.154	11.5	9.2	7.7	5.7	4.6	3.3	7.7	6.1	5.1	3.8	3.1	2.2
Green	80	.180	13.5	10.8	9.0	6.7	5.4	3.8	9.0	7.2	6.0	4.5	3.6	2.6
	100	.203	15.2	12.1	10.1	7.6	6.1	4.3	10.1	8.1	6.7	5.1	4.0	2.9
45684	40	.148	11.0	8.8	7.4	5.5	4.4	3.2	7.4	5.9	4.9	3.7	2.9	2.1
	60	.179	13.3	10.7	8.9	6.7	5.3	3.8	8.9	7.1	5.9	4.4	3.6	2.5
Yellow	80	.217	16.2	12.9	10.8	8.1	6.5	4.6	10.8	8.6	7.2	5.4	4.3	3.1
	100	.271	20.2	16.2	13.5	10.1	8.1	5.8	13.5	10.8	9.0	6.7	5.4	3.8
45685	40	.205	15.3	12.2	10.2	7.6	6.1	4.4	10.2	8.2	6.8	5.1	4.1	2.9
	60	.252	18.8	15.0	12.5	9.4	7.5	5.4	12.5	10.0	8.4	6.3	5.0	3.6
Purple	80	.306	22.8	18.3	15.2	11.4	9.1	6.5	15.2	12.2	10.1	7.6	6.1	4.3
	100	.372	27.7	22.2	18.5	13.9	11.1	7.9	18.5	14.8	12.3	9.2	7.4	5.3
45686	40	.286	21.3	17.1	14.2	10.7	8.5	6.1	14.2	11.4	9.5	7.1	5.7	4.1
	60	.372	27.7	22.2	18.5	13.9	11.1	7.9	18.5	14.8	12.3	9.2	7.4	5.3
Black	80	.443	33.0	26.4	22.0	16.5	13.2	9.4	22.0	17.6	14.7	11.0	8.8	6.3
	100	.504	37.6	30.1	25.1	18.8	15.0	10.7	25.1	20.0	16.7	12.5	10.0	7.2
45687	40	.396	29.5	23.6	19.7	14.8	11.8	8.4	19.7	15.8	13.1	9.8	7.9	5.6
	60	.497	37.1	29.6	24.7	18.5	14.8	10.6	24.7	19.8	16.5	12.4	9.9	7.1
Pink	80	.600	44.8	35.8	29.8	22.4	17.9	12.8	29.8	23.9	19.9	14.9	11.9	8.5
	100	.706	52.7	42.1	35.1	26.3	21.1	15.1	35.1	28.1	23.4	17.6	14.0	10.0
45688	40	.488	36.4	29.1	24.3	18.2	14.6	10.4	24.3	19.4	16.2	12.1	9.7	6.9
	60	.630	47.0	37.6	31.3	23.5	18.8	13.4	31.3	25.1	20.9	15.7	12.5	9.0
Brown	80	.763	56.9	45.5	37.9	28.4	22.8	16.3	37.9	30.3	25.3	19.0	15.2	10.8
	100	.844	62.9	50.4	42.0	31.5	25.2	18.0	42.0	33.6	28.0	21.0	16.8	12.0
45689	40	.635	47.4	37.9	31.6	23.7	19.0	13.5	31.6	25.3	21.1	15.8	12.6	9.0
	60	.828	61.8	49.4	41.2	30.9	24.7	17.7	41.2	32.9	27.5	20.6	16.5	11.8
Orange	80	.969	72.3	57.8	48.2	36.1	28.9	20.6	48.2	38.5	32.1	24.1	19.3	13.8
	100	1.18	88.0	70.4	58.7	44.0	35.2	25.1	58.7	46.9	39.1	29.3	23.5	16.8
45690	40	.797	59.4	47.6	39.6	29.7	23.8	17.0	39.6	31.7	26.4	19.8	15.9	11.3
	60	1.02	75.8	60.6	50.5	37.9	30.3	21.6	50.5	40.4	33.7	25.3	20.2	14.4
Olive	80	1.21	90.3	72.3	60.2	45.2	36.1	25.8	60.2	48.2	40.1	30.1	24.1	17.2
	100	1.34	100.2	80.2	66.8	50.1	40.1	28.6	66.8	53.5	44.6	33.4	26.7	19.1

45716

NOTE: The performance of any agricultural chemical depends up on the proper application of the correct amount . . . based on chemical manufacture's recommendation. Be sure that your equipment has been properly calibrated before spraying.

OPERATION

INITIAL START-UP

IMPORTANT! Engine is shipped ***without oil.***

Engine must be serviced before starting. Refer to the manufactures operating and maintenance manual for proper procedures.

The engines are shipped without a positive wire (8GA. minimum) assembly to the battery. This is to be supplied by the customer (See Fig. 16).

A ground wire assembly is included and it should be connected to a solid ground in the pickup box, (not the sprayer frame).

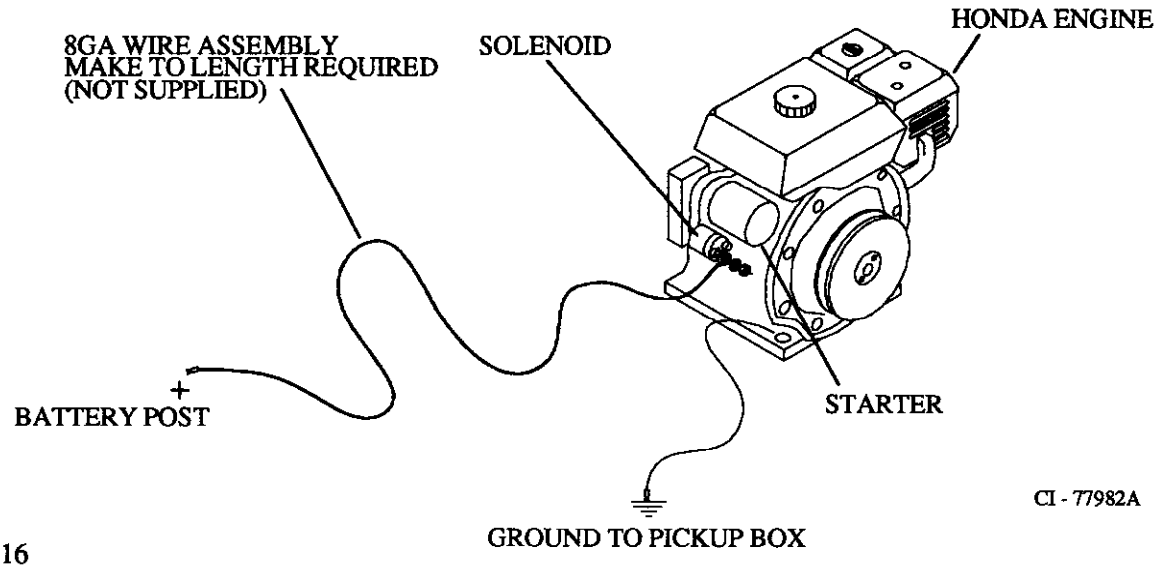


FIG. 16

Before filling the chemical tank, check to be sure the tank straps (300 and 500 gallon tanks) and/or mounting hardware (325 gallon tank)is secure to the tank frame. This should be done again after the first day of field use and weekly after that.

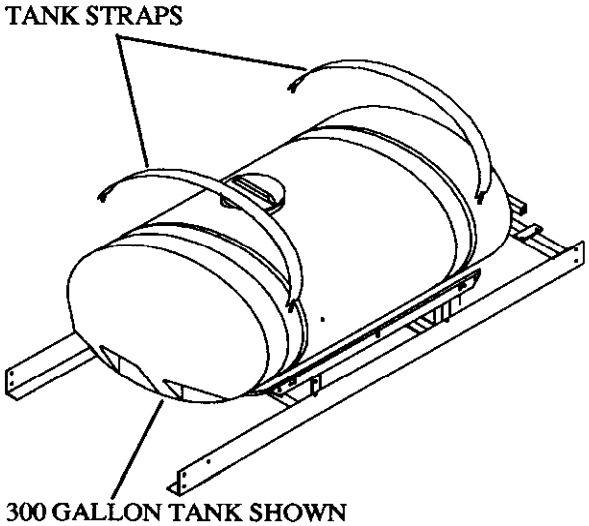


FIG. 17

All pickup sprayers are supplied with an 8 gallon clean water tank that is mounted onto the center frame tube. This tank is to be used for rinsing your hands and face in the event of contact with the chemical. Do not use as drinking water.

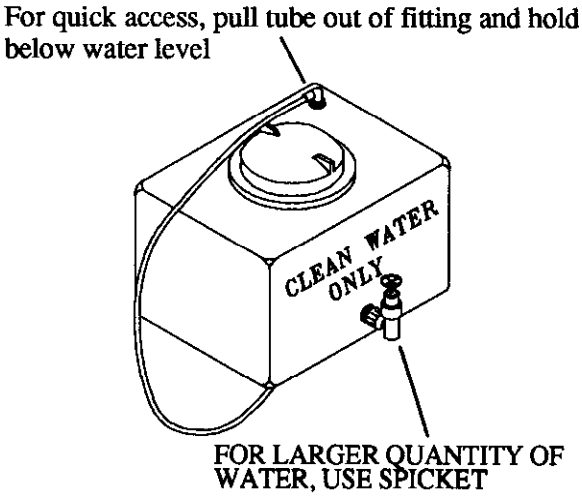


FIG. 18

Check your sprayer equipment to be sure that all components are clean and in good working condition. Even if the sprayer is new or used and has been properly stored, it should be checked and tested.

We suggest before any use new or used to wash out the tank to remove dust or oil. For the initial use of the sprayer, use water only, to check hoses for holes, weathering, and places that are worn. Check the pump to be certain that it turns freely. Check strainer screens. Clean and replace or repair any defective parts. Doing all of these steps with water will prevent loss of chemical and enable you to test the mechanical functions of the sprayer in a safe manner.

Centrifugal pumps need the liquid level to be above the top of the pump to create a prime. The amount to create a prime will vary with each tank size.

All engines supplied with our sprayers have electric start, either located on the engine as standard, or with the remote starter with the electric lift option.

To start engine, refer to the manufactures operating instructions for the proper procedure.

The following instructions refer to the RC-1B control panel. For directions or usage for the optional Target Master Control refer to the MT-3000 Sprayer Control Manual for instructions. See page 30 for correct location of the speed sensor used with the Target Master.

With engine running, check to see that the pump has obtained its prime. This will be indicated when aggitation begins in the tank. Turn master switch on control panel to ON position. Turn each of the boom valves ON (2 or 3 section) and adjust the pressure to approximately 40psi. This pressure setting will allow you to check each of the nozzles on the boom to ensure they are developing a proper spray pattern. At this time, recheck all of the connections on the sprayer for leaks and each of the nozzles for proper pattern. Replace all worn tips and those with streaked, uneven patterns.

WARNING: Do not use a metal probe when cleaning a nozzle orifice. Wash the tips thoroughly with water or a cleaning solution. If the orifice remains clogged or plugged, clean it with a fine bristled brush or toothpick, being careful not to damage the orifice. Rinse with water and dry. do not attempt to clean tips by blowing through them.

Turn each boom OFF and ON to check for proper function of each of the solenoid valves.

Set the pressure to the setting that you will be using for the application rate you chose. (Refer to the rate charts on pages 13-16.)

The nozzles should now be checked for proper application rate. This can be accomplished by the use of the calibration bottle and chart (or the calculation method). (Refer to pages 14-16 for proper procedures.)

If nozzle flow rate (gpm) is higher than specified, replace the tip.

Repeat this test for each nozzle.

SETTING ENGINE SPEED

The speed of the engine needs to be set so that the required pressure can be obtained at the tips and adequate aggitation occurs. If the required pressure setting cannot be reached by adjusting the pressure switch, increase the engine speed until the pressure required is reached. If the required pressure was reached without increasing engine speed, decrease engine speed until the pressure begins to drop below the required amount. Now increase engine speed until required pressure is reached. Check the tank for adequate aggitation. The engine speed may need to be increased if aggitation is not adequate. Running the engine at a faster rate than required will result in increased aggitation and decreased fuel economy.

CLEANING TANK

Tank cleanout is imperative using the 300, 325 and 500 gallon tank units.

NOTE: When using the 325 gallon pickup sprayer, be aware that there is potentional for approximately 5 to 10 gallons of solution to remain in the bottom of the tank. This material will need to be removed before storage or mixing additional materials using incompatible formulas. Extra precaution is needed when spraying crops of differenct species which require different crop protection materials.

HONDA IGNITION WIRING

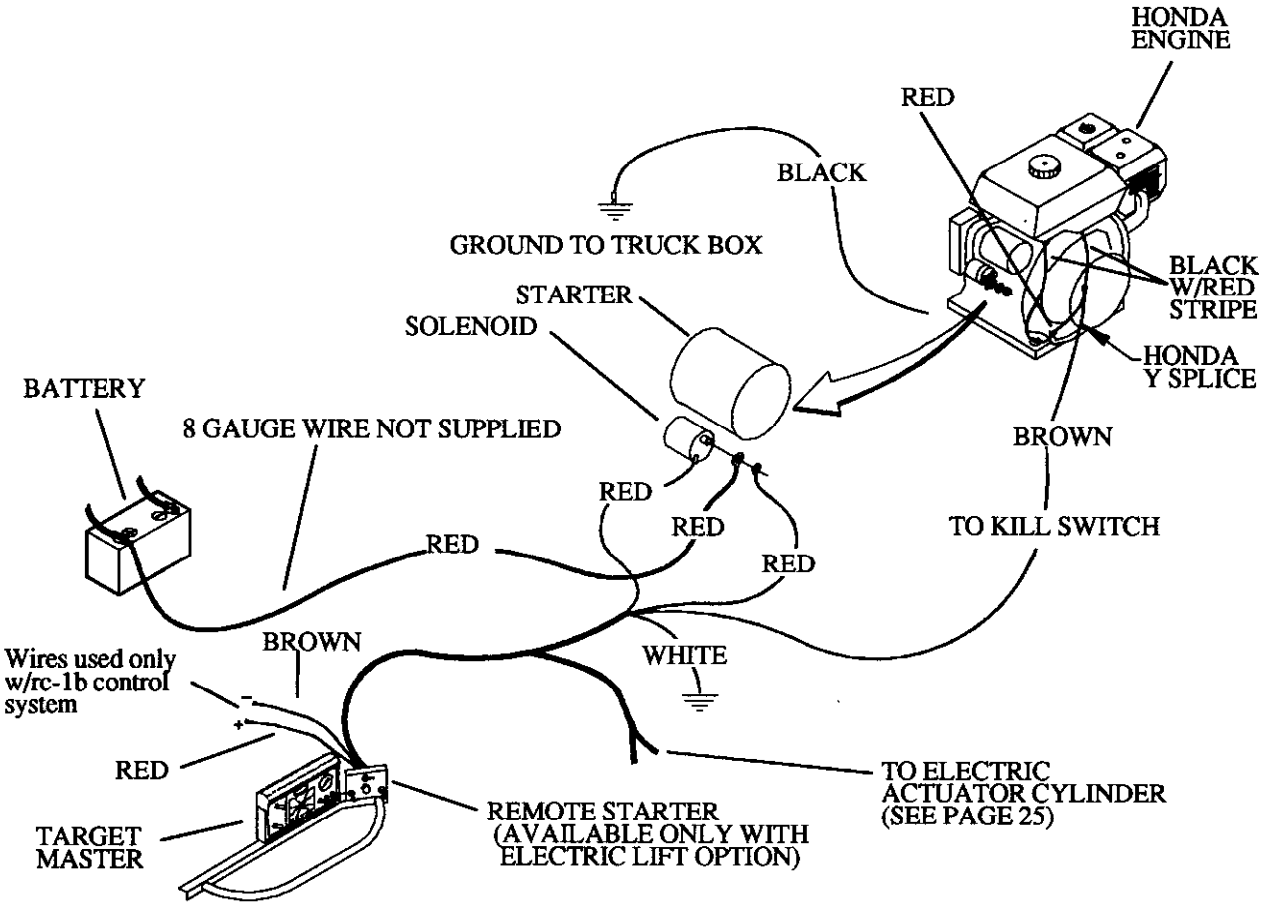


FIG. 18

CI - 77938

TARGET MASTER 2 SOLENOID WIRING

REMCOR SOLENOID

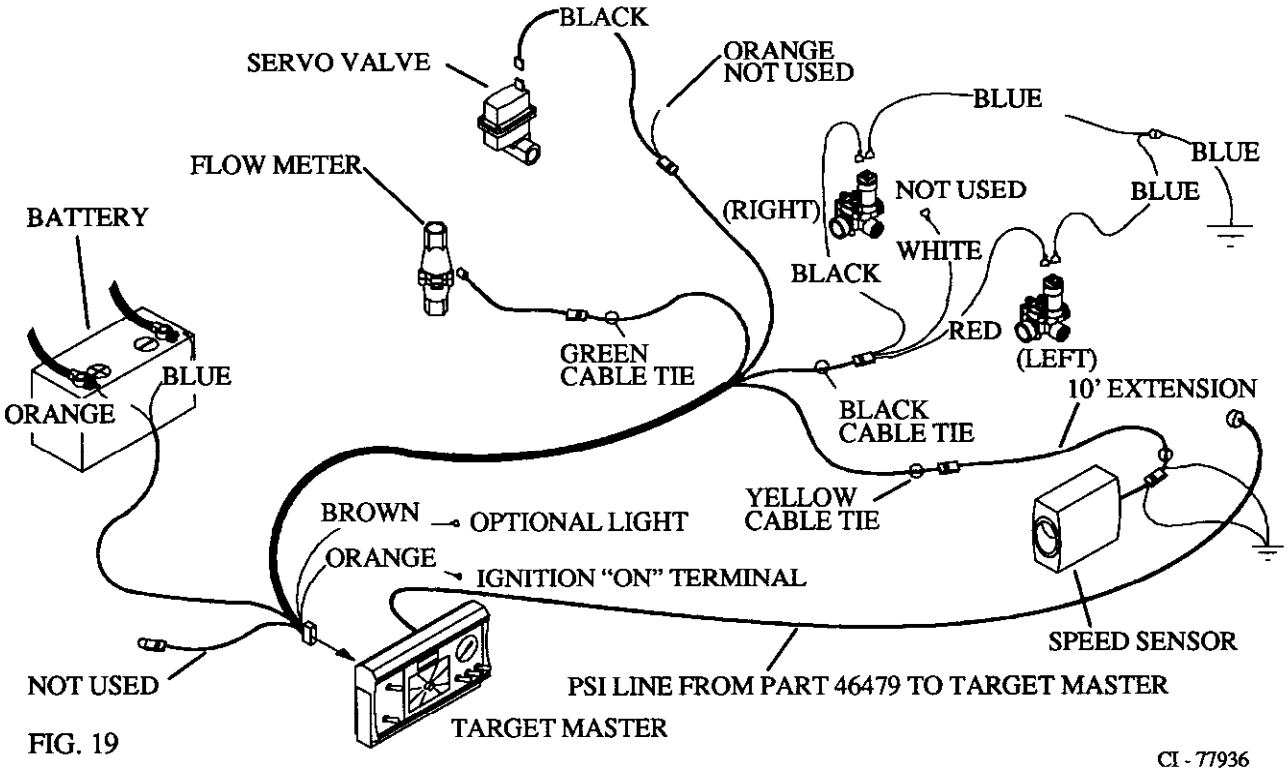


FIG. 19

TARGET MASTER 3 SOLENOID WIRING

REMCOR SOLENOID

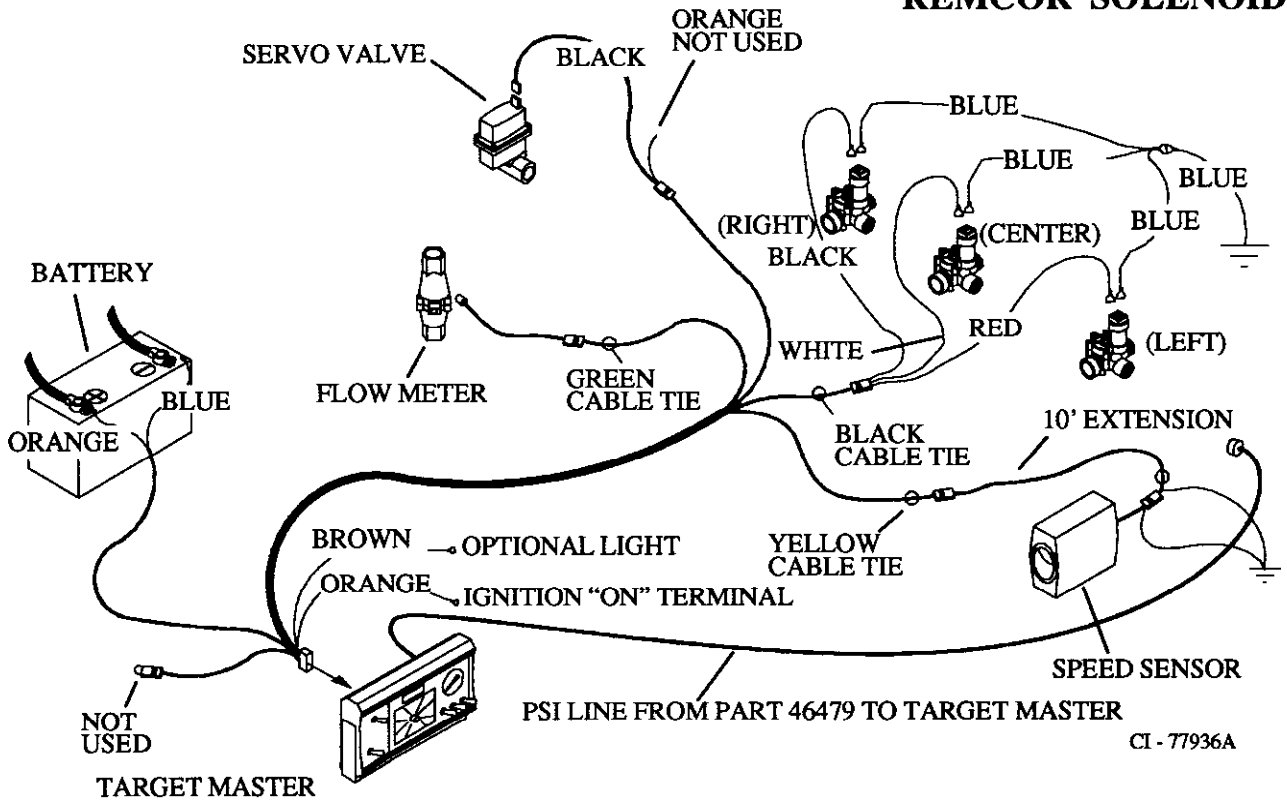


FIG. 20

TARGET MASTER 2 SOLENOID WIRING

PRIOR TO 1993 (GREENLAWN SOLENOID)

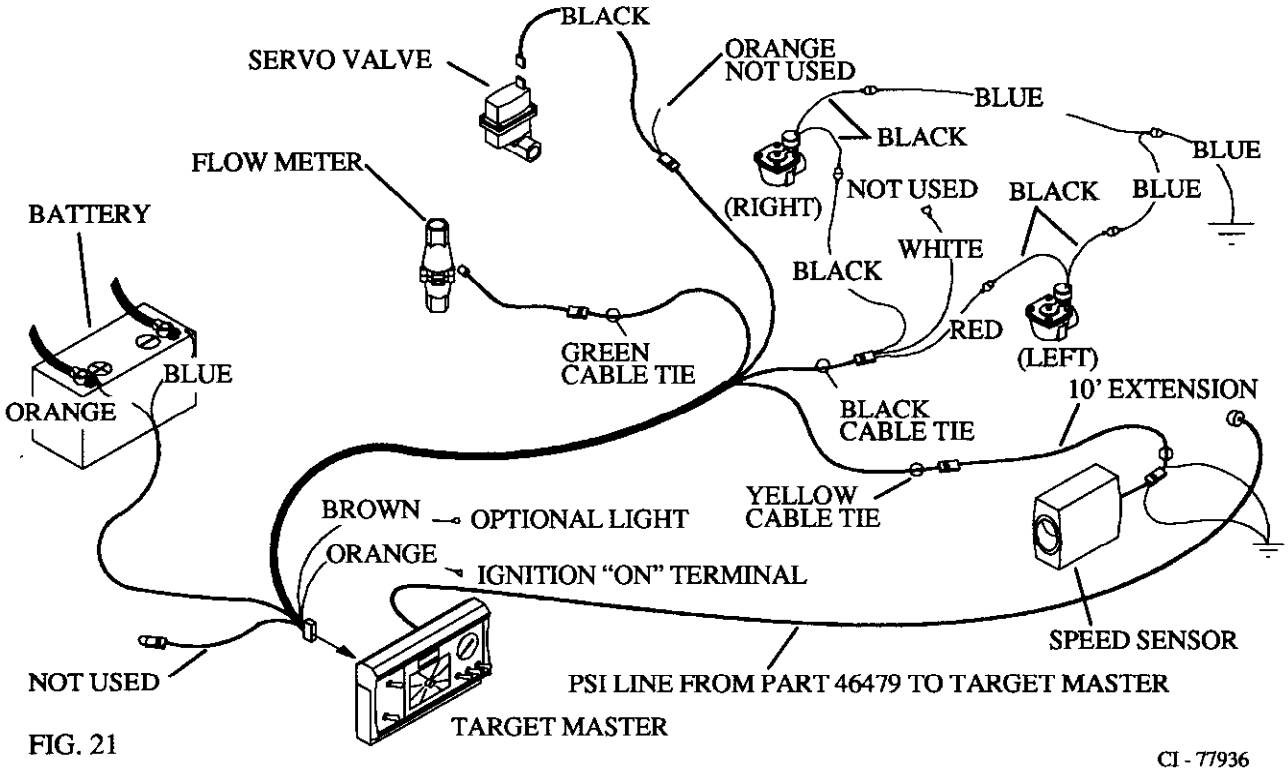
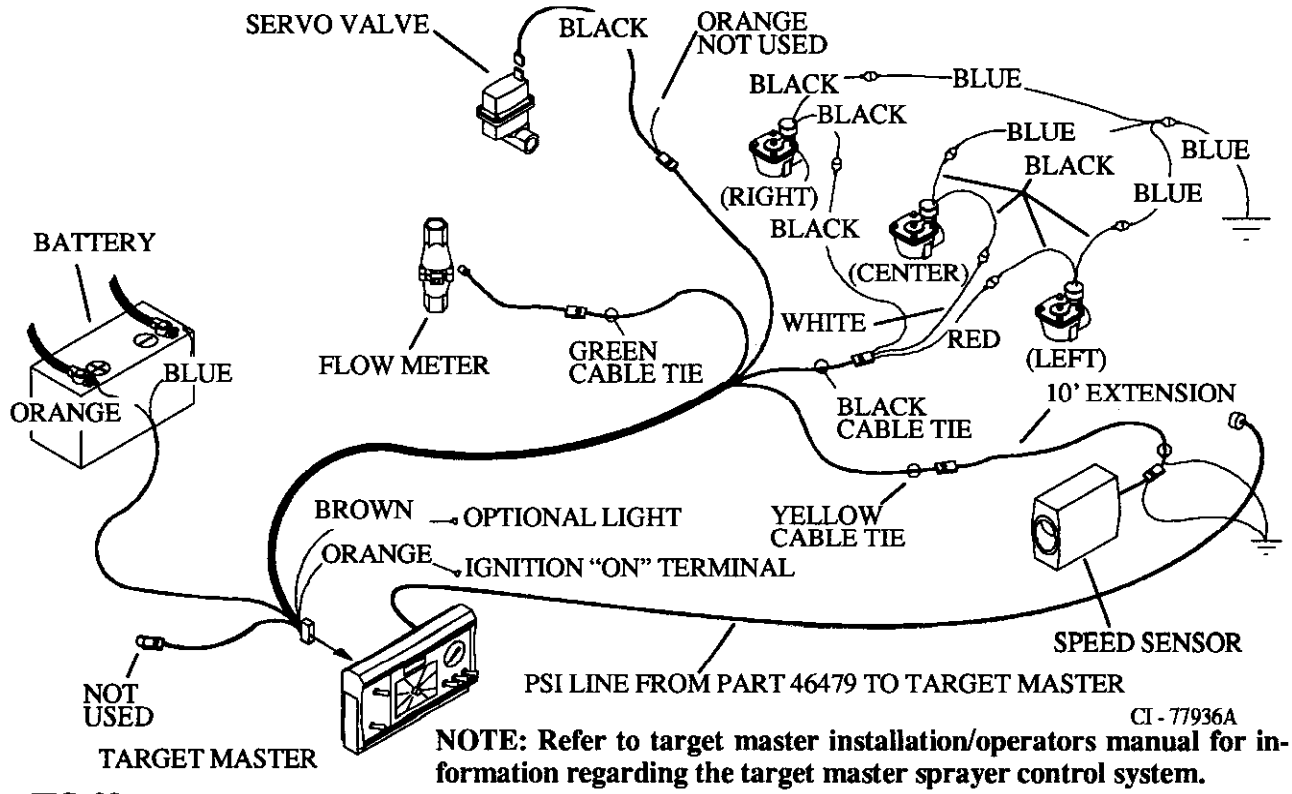


FIG. 21

CI - 77936

TARGET MASTER 3 SOLENOID WIRING

PRIOR TO 1993 (GREENLAWN SOLENOID)



CI - 77936A

NOTE: Refer to target master installation/operators manual for information regarding the target master sprayer control system.

FIG. 22

RC-1B 2 SOLENOID WIRING

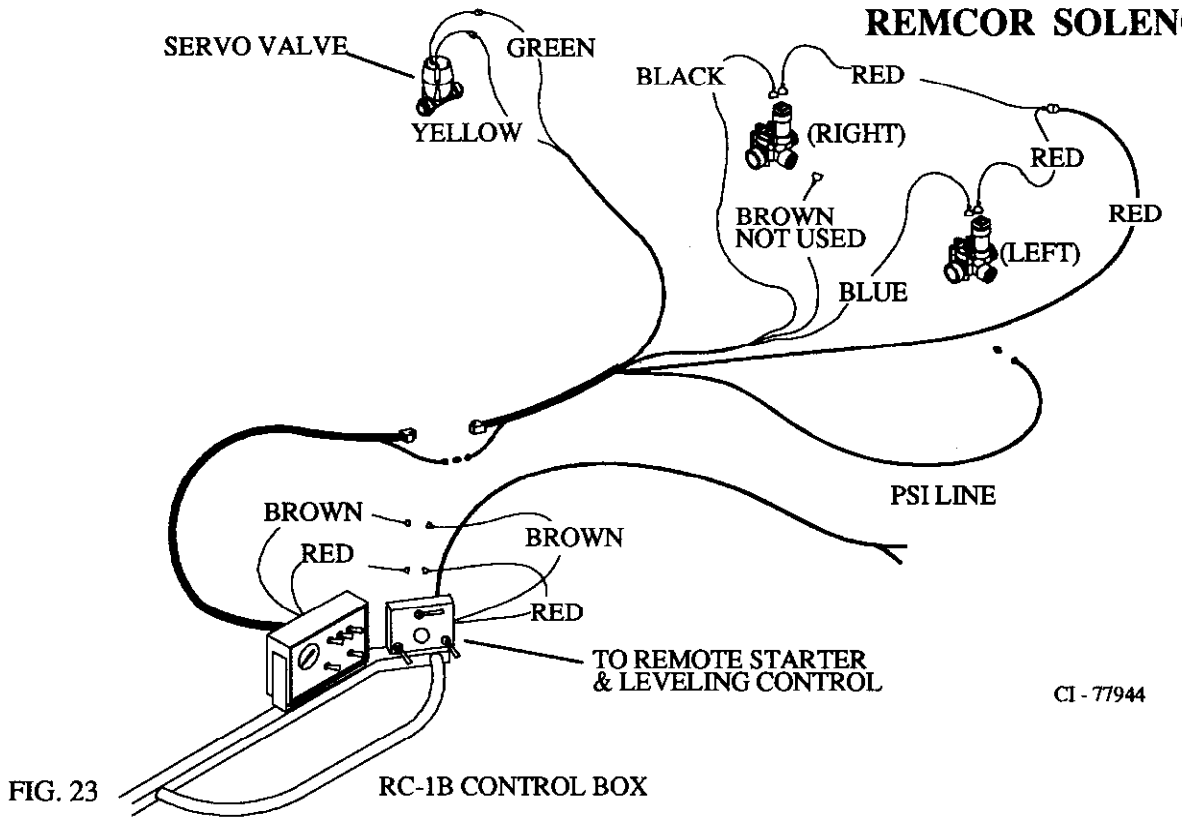


FIG. 23

RC-1B 3 SOLENOID WIRING

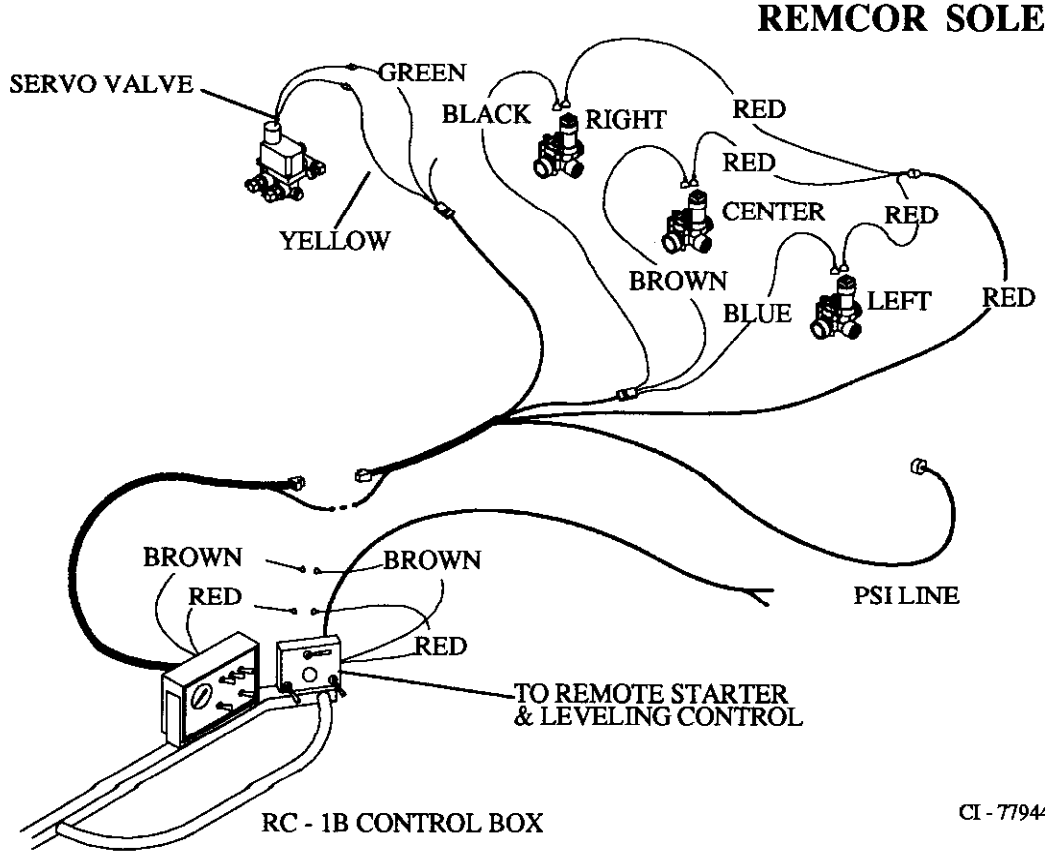


FIG. 24

RC-1B 2 SOLENOID WIRING

PRIOR TO 1993 (GREENLAWN SOLENOID)

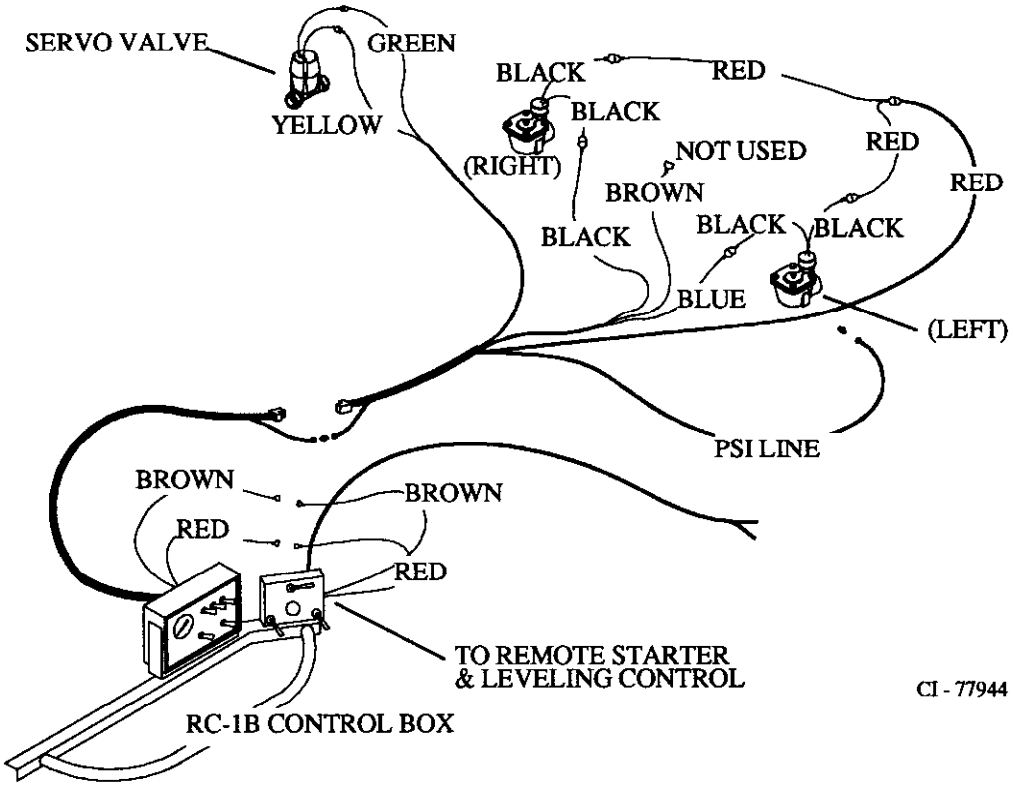


FIG. 25

RC-1B 3 SOLENOID WIRING

PRIOR TO 1993 (GREENLAWN SOLENOID)

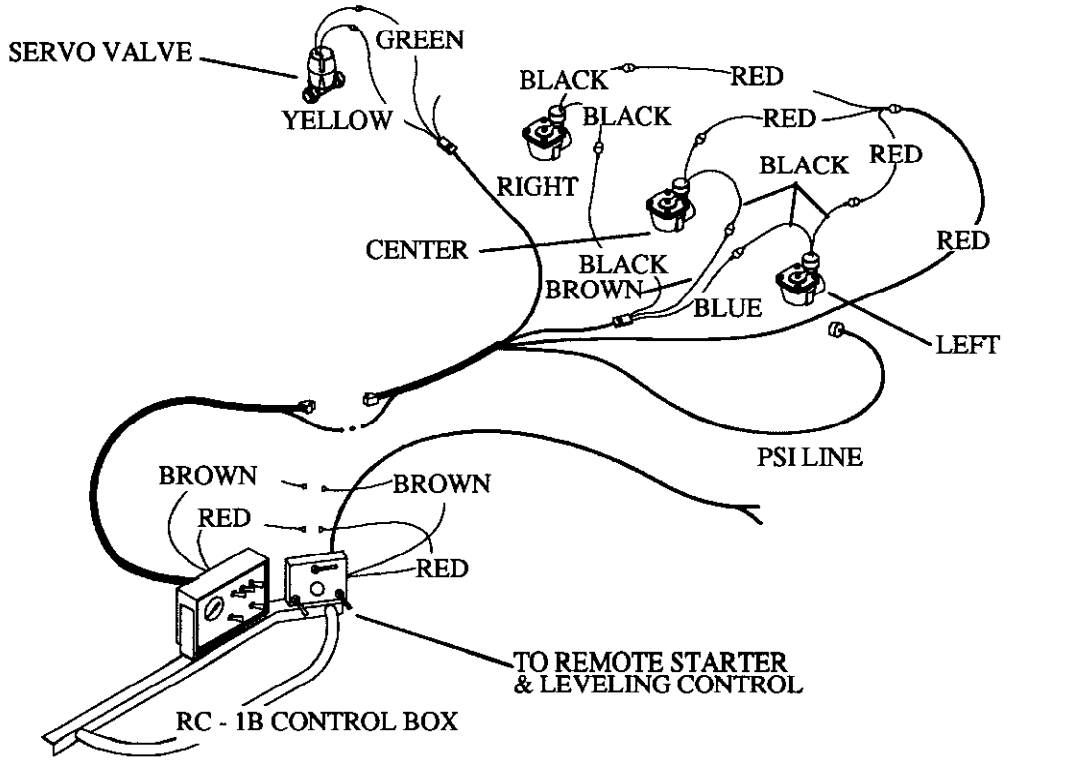


FIG. 26

ELECTRIC LIFT WIRING DIAGRAM

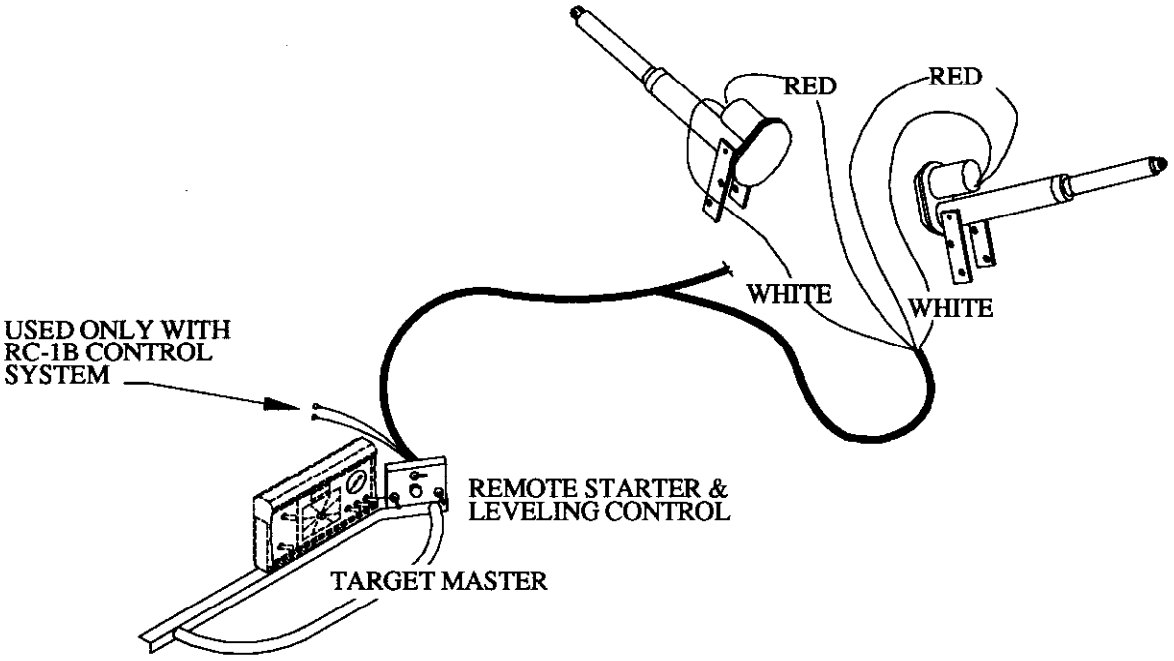


FIG. 27

CI - 77940

FOAMER WIRING

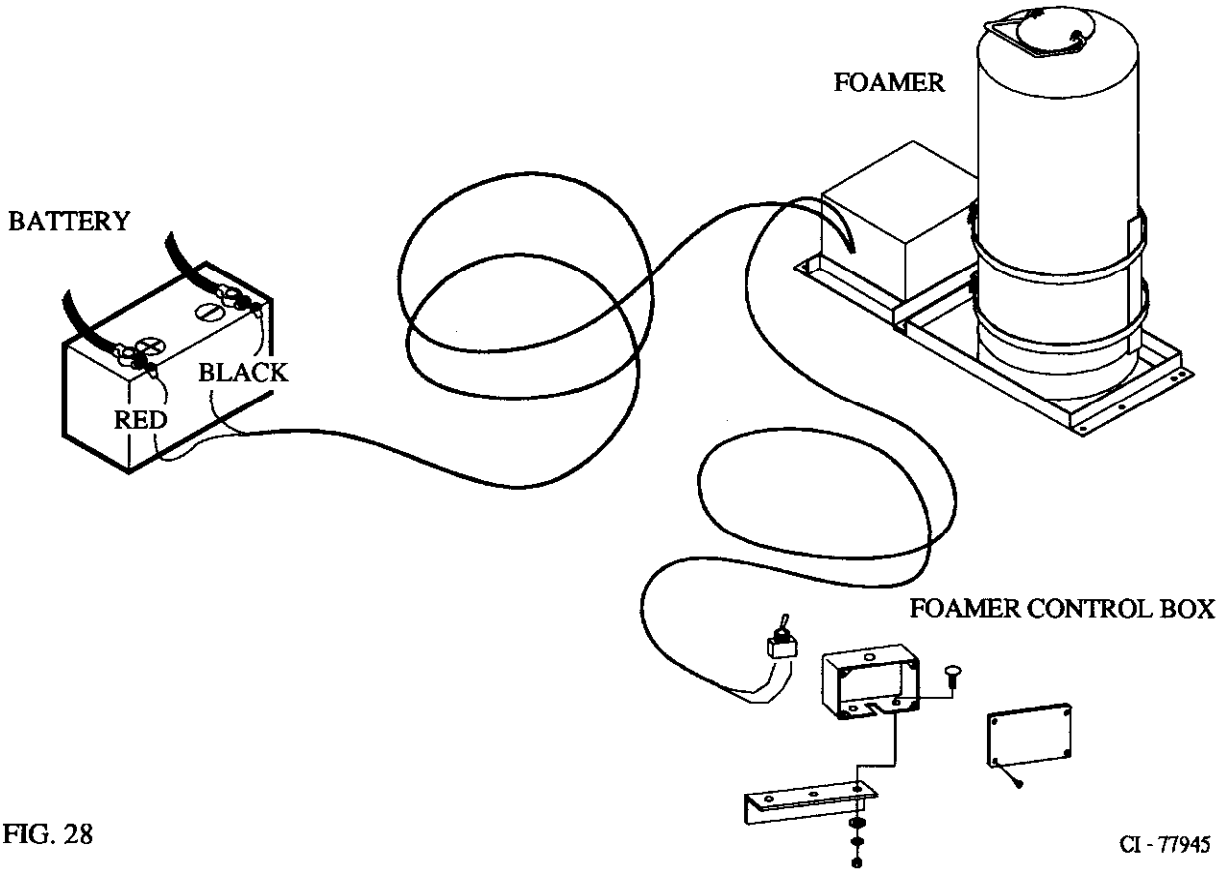


FIG. 28

CI - 77945

MAINTENANCE

CLEANING AND NIGHTLY STORAGE

Wash the entire sprayer as often as possible to help reduce the chemical build up on the sprayer.

Inspect plumbing daily for cracked or pinched hoses and examine each nozzle assembly for proper working order.

At the end of each days spraying, the entire sprayer system should be flushed with clean water.

As an added precaution when changing chemicals and before storing, the sprayer should be cleaned with household ammonia. This is added to the water used for flushing (1 quart per 25 gallons of water) and will neutralize most chemical used in spraying.

If the sprayer system is to be stored overnight during freezing temperatures, the entire system should be thoroughly flushed with permanene-type radiator anti-freeze (using a 50% solution).

During periods of use with freezing temperatures or when the sprayer is to be stored, the swivel nut on all nozzles should be loosened or removed to prevent freezing and damage to the nozzles.

NOTE: The above steps should be performed nightly if the sprayer is to be used during periods with freezing temperatures (early spring or late fall).

LUBRICATION

Grease booms daily or every 10 hours. (See Fig. 29.)

SEASONAL STORAGE

NOTE: If possible store your sprayer inside.

At the end of a season, rinse with ammonia, drain, flush with anti freeze and remove caps and tips. Clean the sprayer thoroughly to remove any trash, soil or dirty grease which could hold moisture and cause premature rusting. Repaint any chipped, bare or rusted areas to prevent any further deterioration. Inspect the machine for any worn or broken parts and adjust or replace as required.

SEE YOUR BLUMHARDT DEALER FOR ANY PARTS AND/OR SERVICE WHICH MAY BE NEEDED.

Thoroughly lubricate all grease fittings at the end of the seasons use and again before the first operation of the next season.

NOTE: Check with your local or county extension office, state chemical association, or chemical dealer for local laws pertaining to washing and flushing the sprayer. Run off can contaminate ground water supplies.

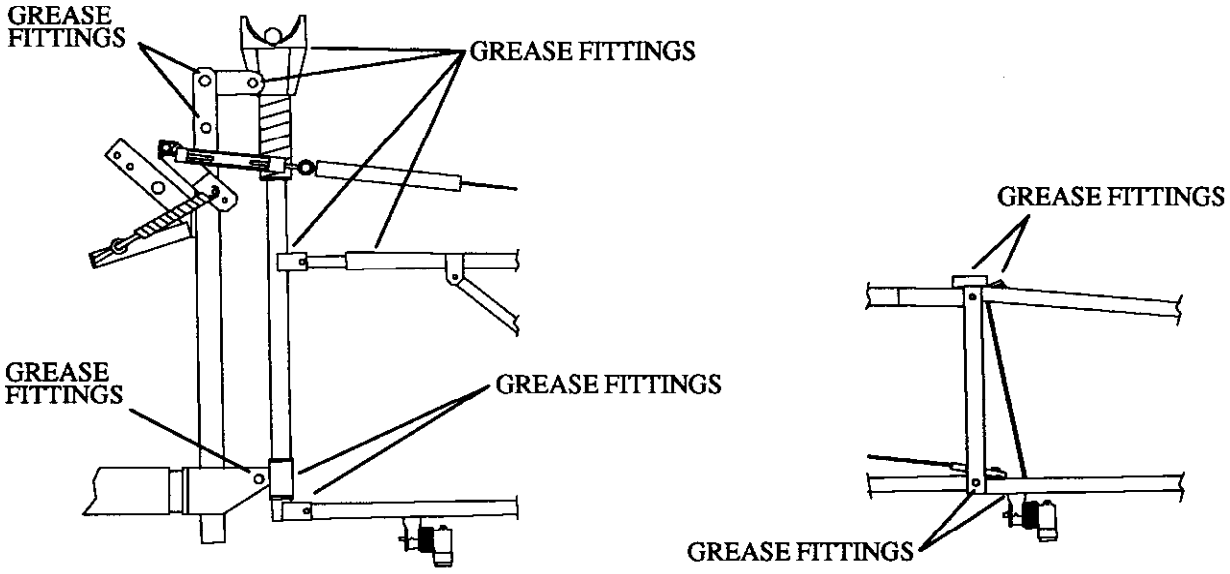
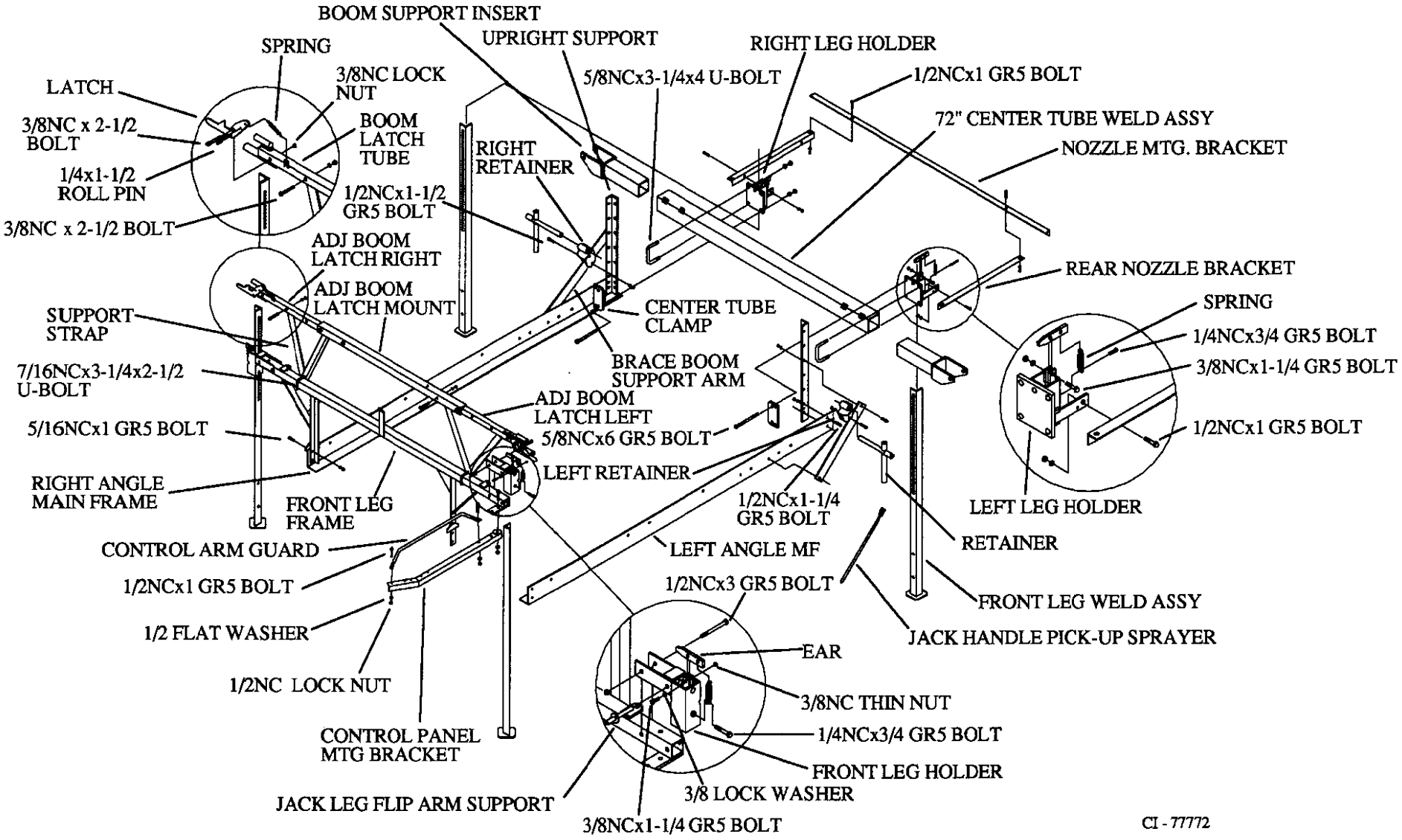


FIG. 29

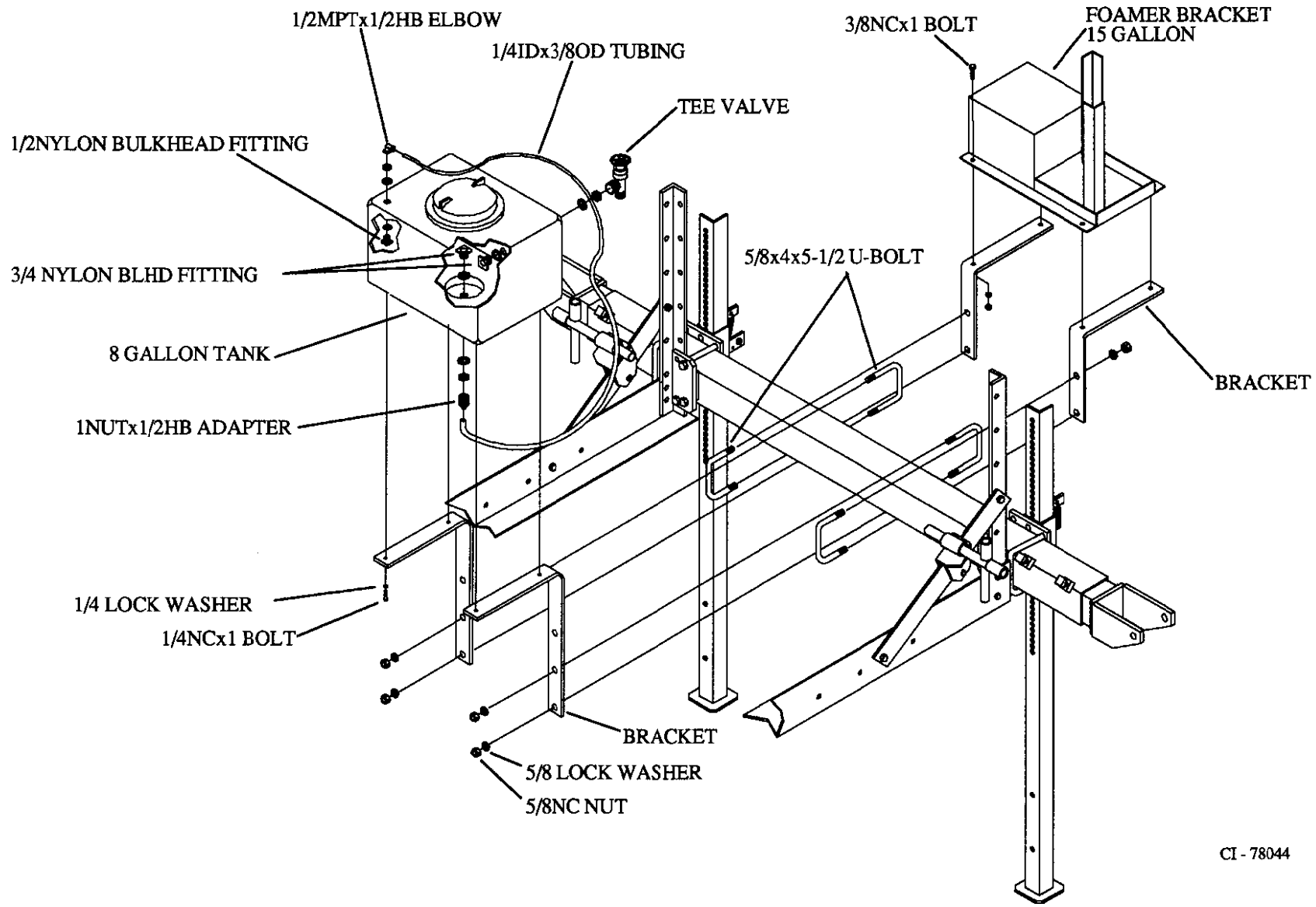
TROUBLESHOOTING

SYMPTOMS	PROBABLE CAUSE	CORRECTIVE ACTION
No Pressure	Pump is not primed.	Open ball valve in suction line. Fill tank to level higher than pump.
	Air vent plugged.	Check that restriction orifice at pump vent fitting at top of tank is properly installed.
	Pressure gauge not functioning.	Check connection of 1/8 pressure tube to gauge. Replace if faulty.
Low Pressure	Air leak in suction line.	Check for tightness and seal on all fittings in suction line. Be sure to check line strainer bowl.
	Restriction in suction line.	Check that ball valve is completely open. Clean line strainer screen.
	Pump is not at full RPM.	Tighten drive belt.
	Too much by-pass from pump.	Check operation of pressure control valve, make sure that it is properly controlling by-pass. Check that restricting orifice at pump vent fitting on top of the tank is properly installed. Check that agitation orifice is installed.
Pressure will not adjust.	Return line is closed.	Open ball valve in return line.
	Pressure control valve is not functioning.	Check electrical connections to vehicle, control panel and valve. Check fuse, master switch and pressure switch on control panel.
One of both booms will not spray.	No pressure from pump.	Follow corrective actions listed above for a sprayer with no pressure.
	No electrical power to solenoids.	Check electrical connections to vehicle, control panel and solenoid valves. Check fuse, master switch and boom switches on control panel.
	Coil assembly on solenoid not functioning.	Clean plunger, spring and inside of coil. Replace faulty coil.
	Solenoid valve not functioning.	Disassemble and clean valve and diaphram. Replace swollen diaphram or replace complete solenoid valve.

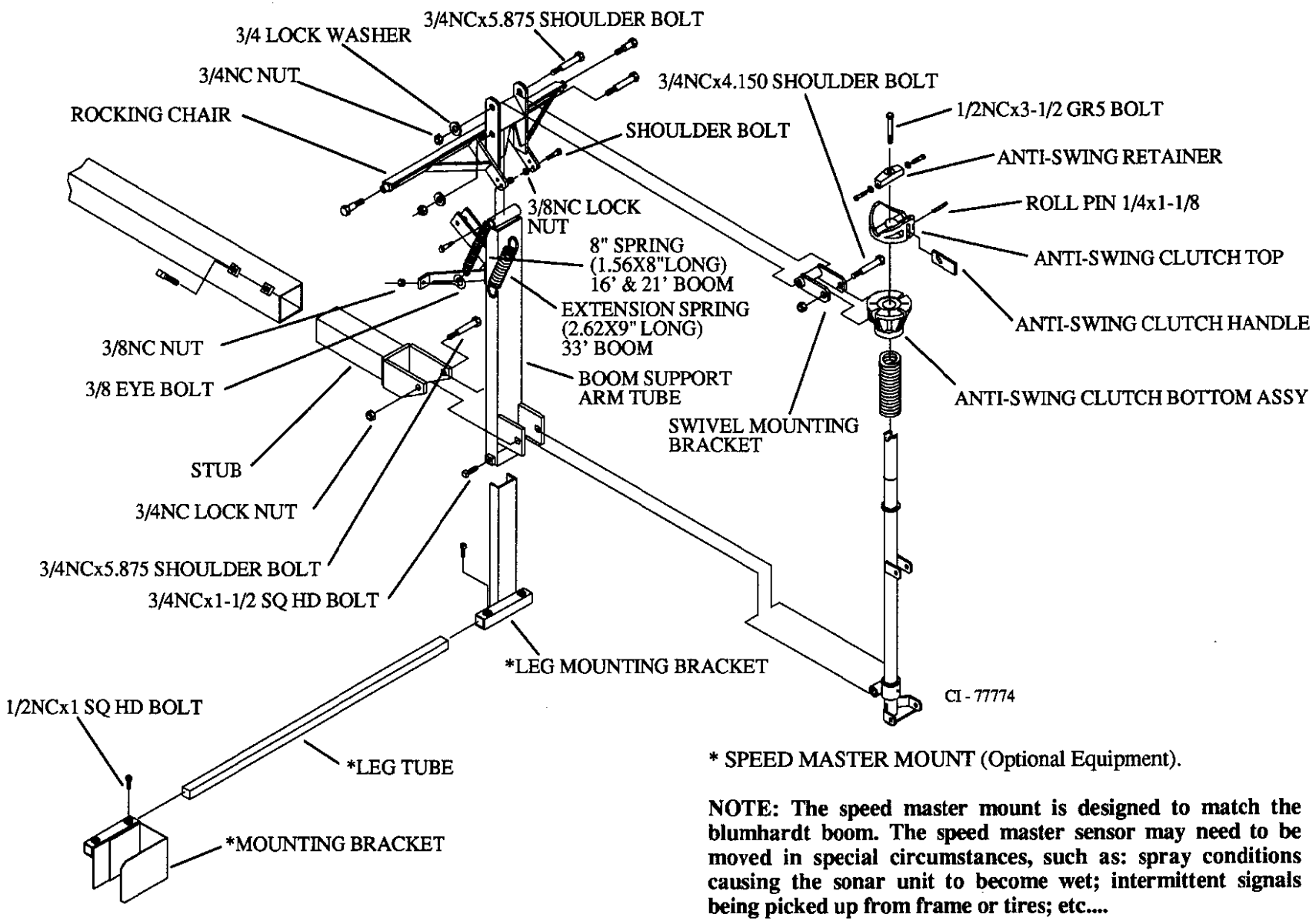
PICKUP SPRAYER FRAME ASSEMBLY



CLEAN WATER TANK ASSEMBLY & FOAM MARKER MOUNTING



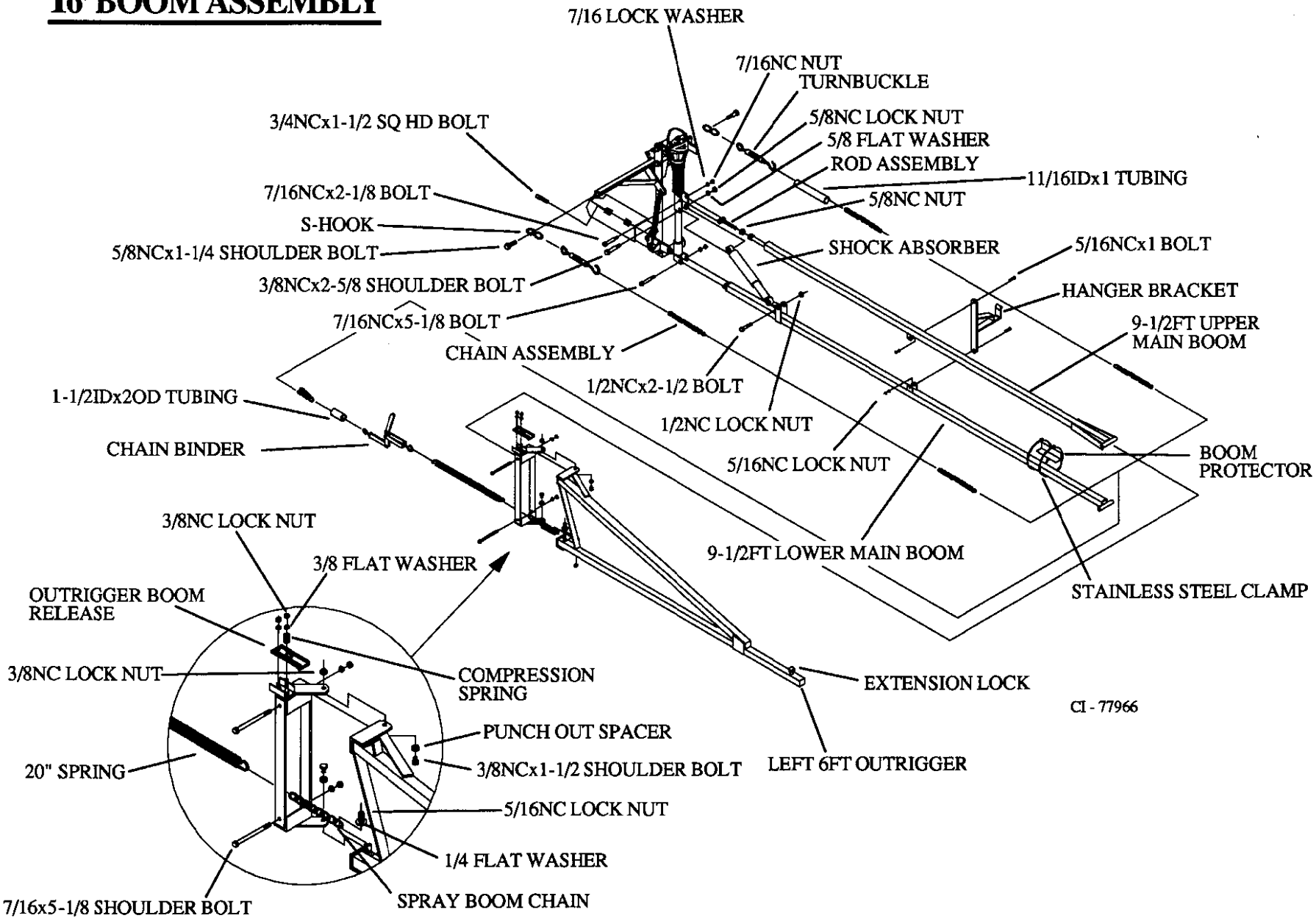
BOOM POST ASSEMBLY



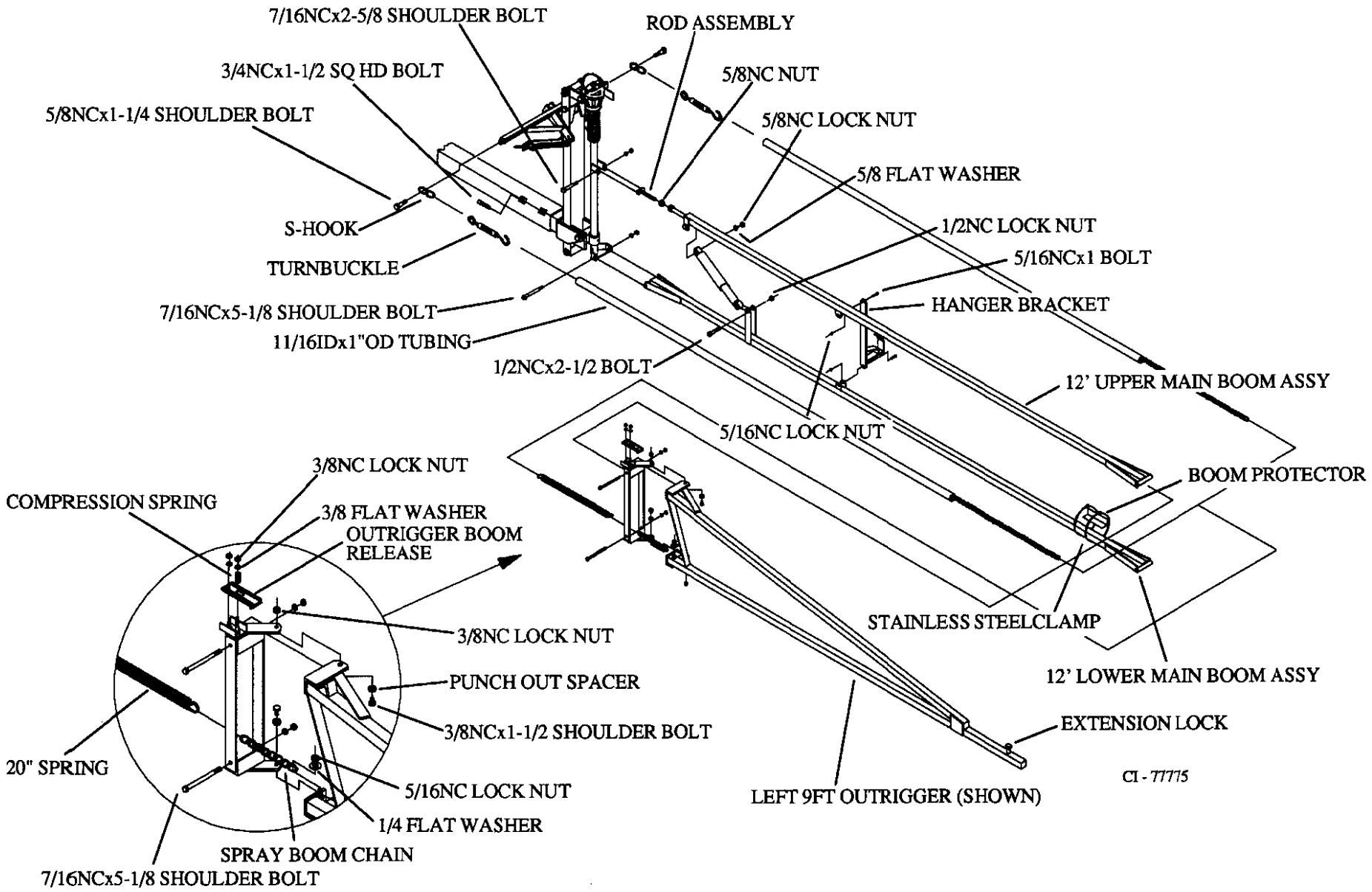
* SPEED MASTER MOUNT (Optional Equipment).

NOTE: The speed master mount is designed to match the blumhardt boom. The speed master sensor may need to be moved in special circumstances, such as: spray conditions causing the sonar unit to become wet; intermittent signals being picked up from frame or tires; etc....

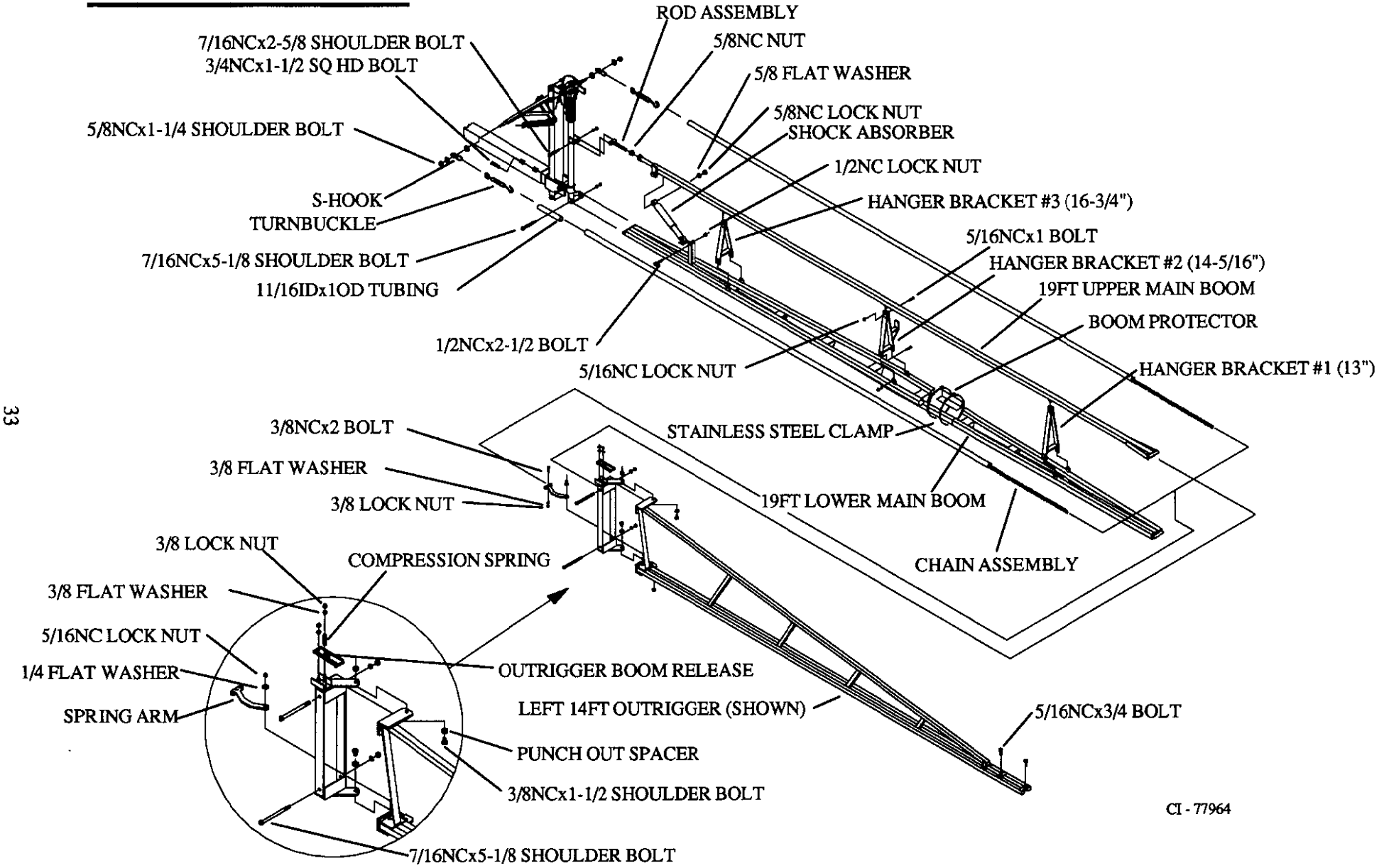
16' BOOM ASSEMBLY



21' BOOM ASSEMBLY



33' BOOM ASSEMBLY



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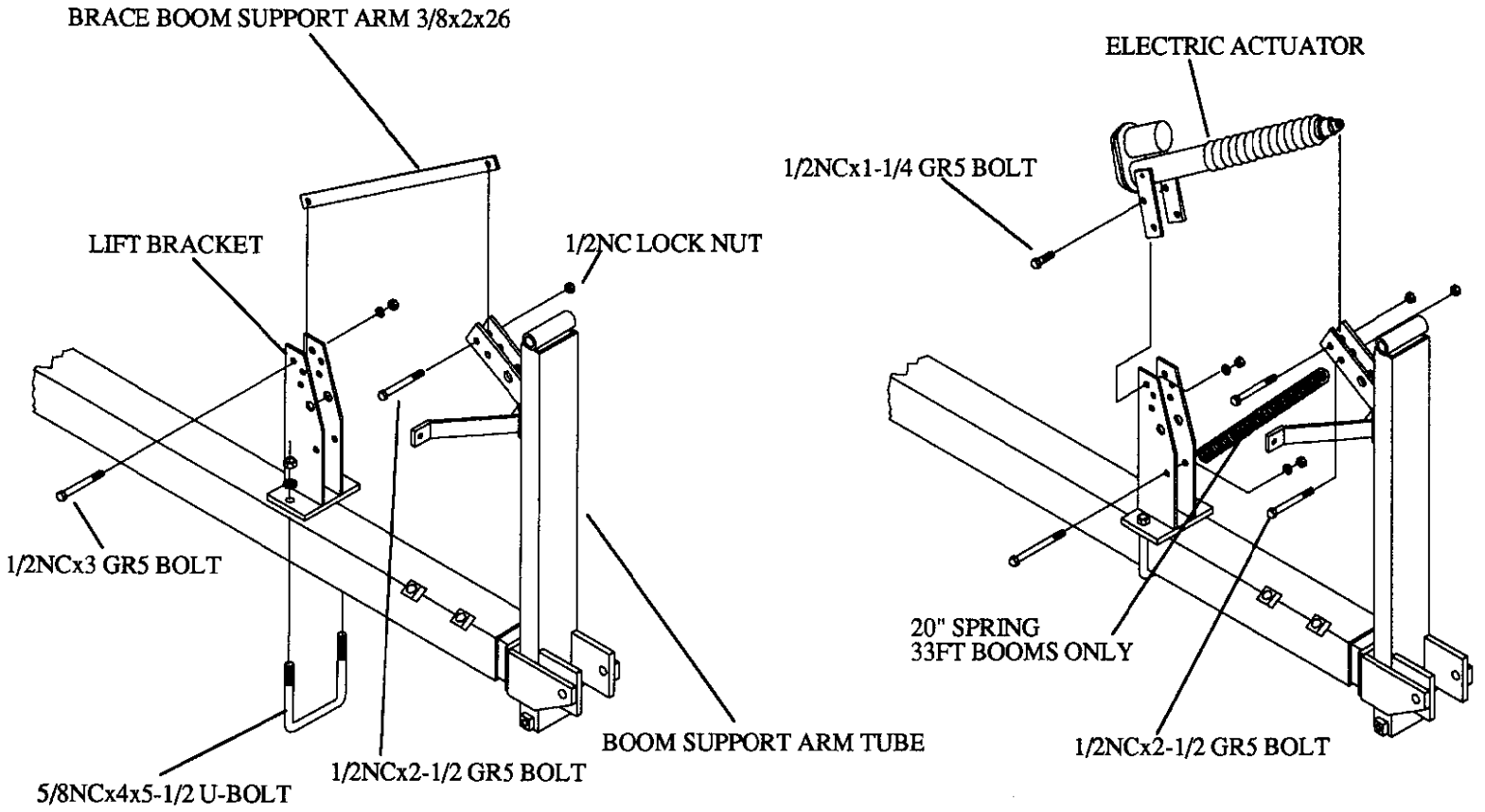
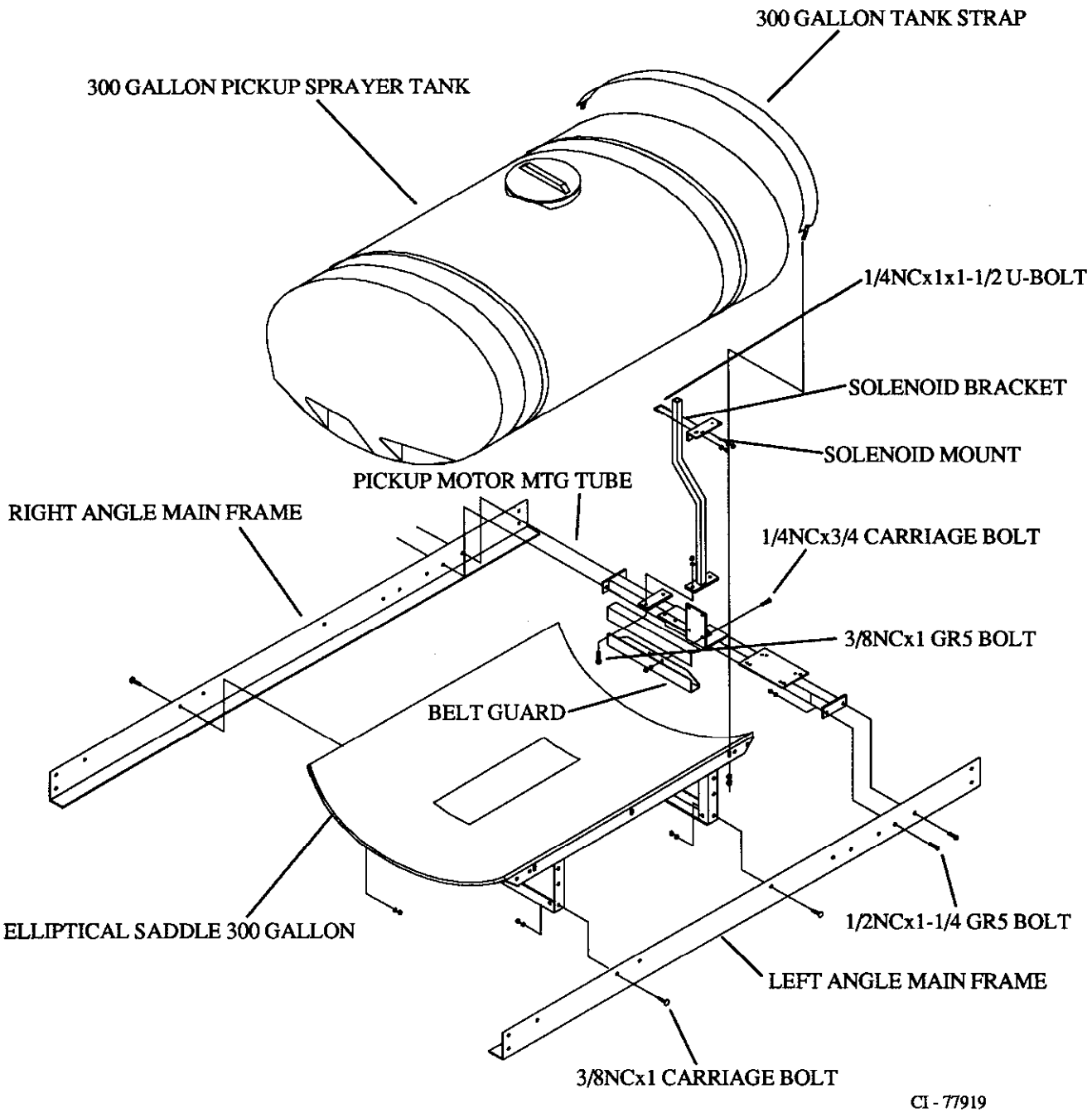
BOOM LIFTS

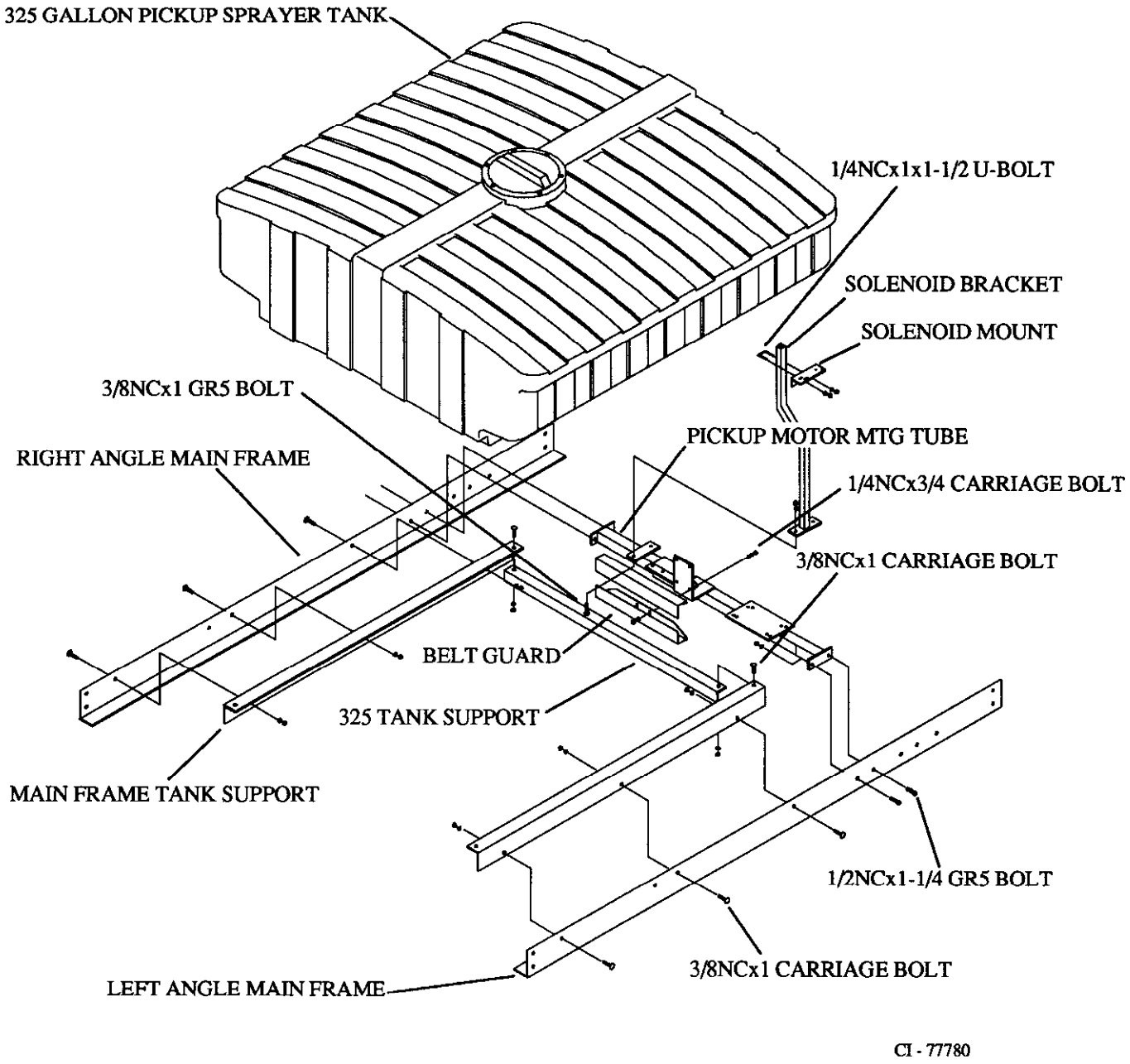


CI - 77786

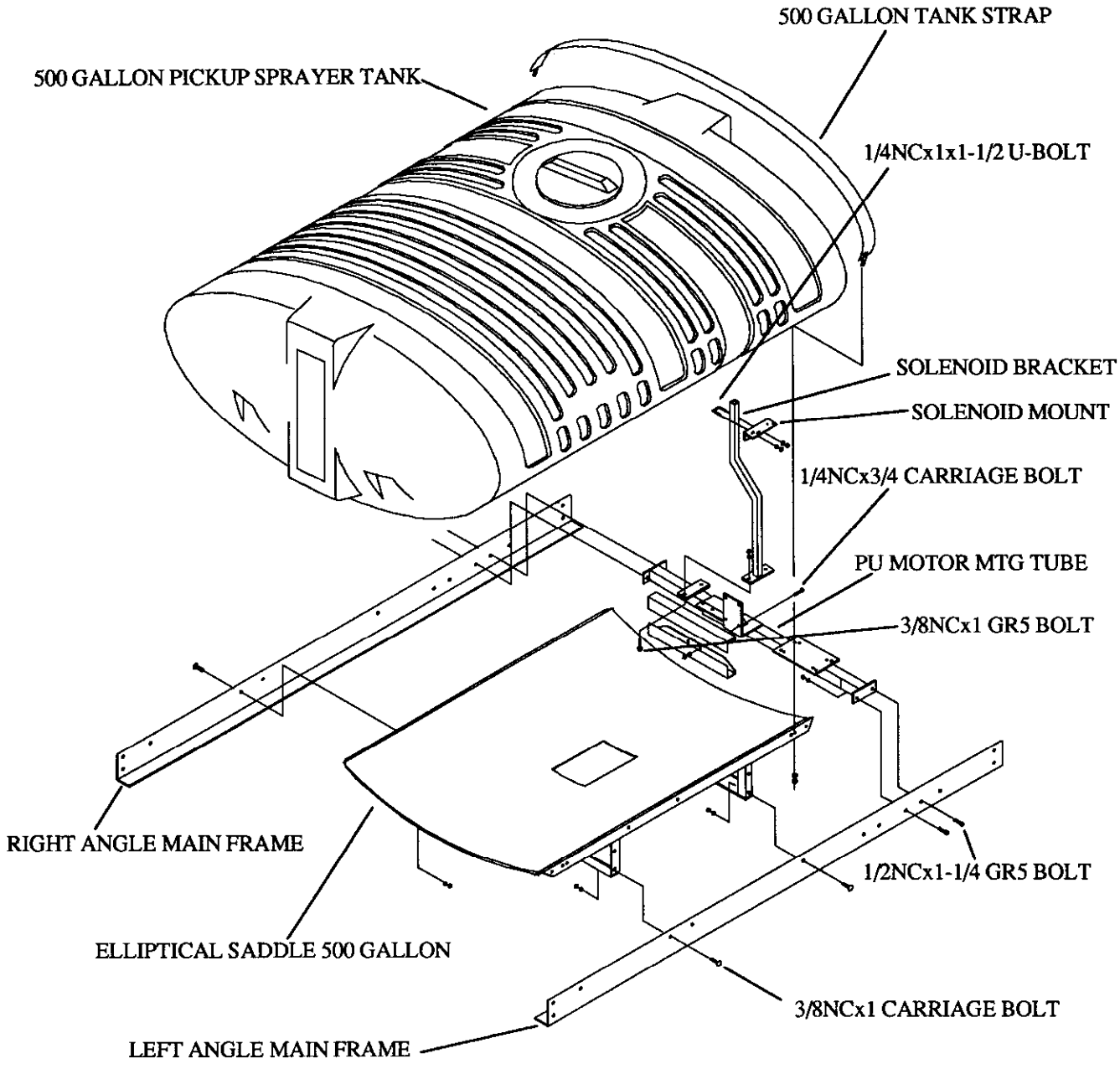
300 GALLON TANK MOUNT



325 GALLON TANK MOUNT

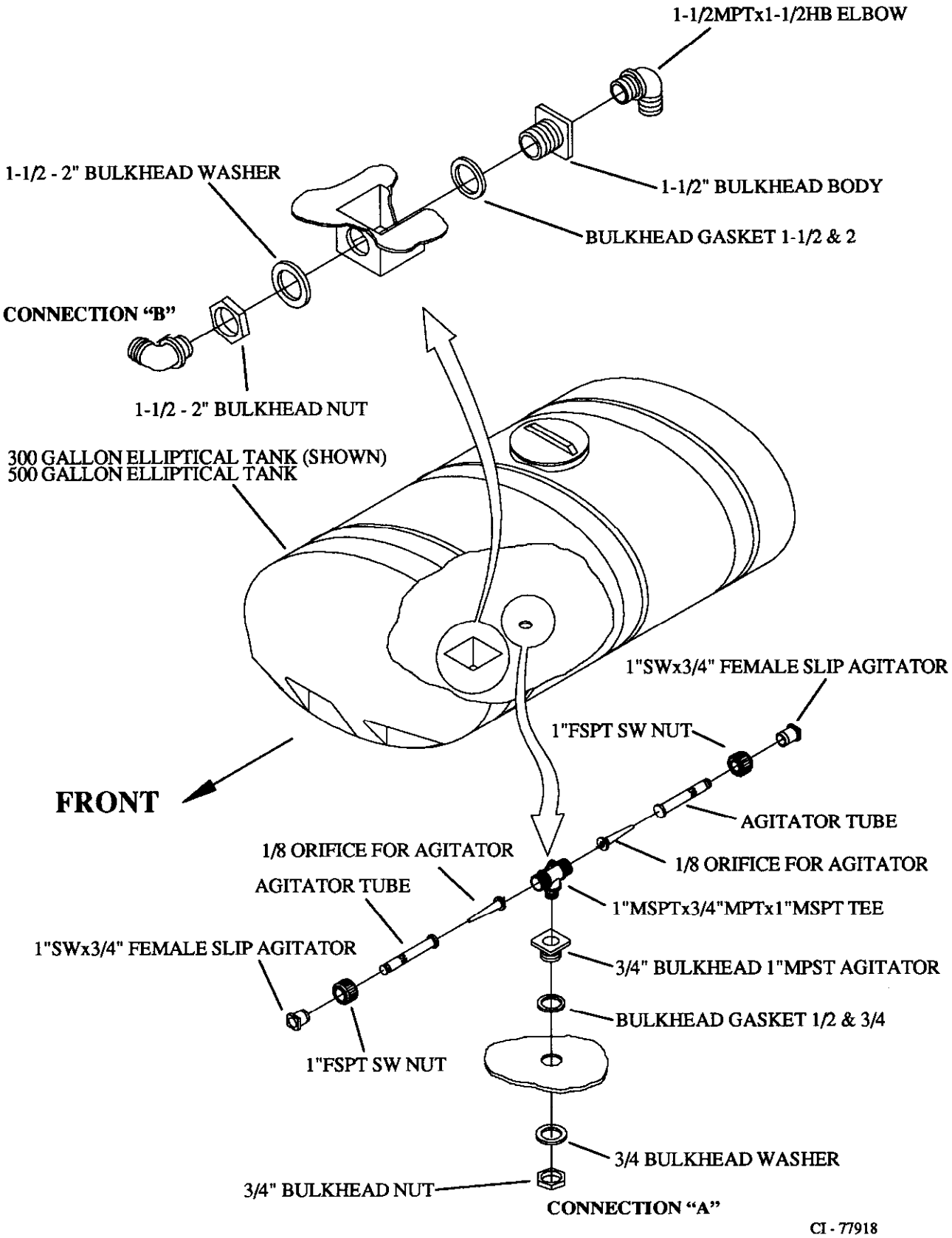


500 GALLON TANK MOUNT

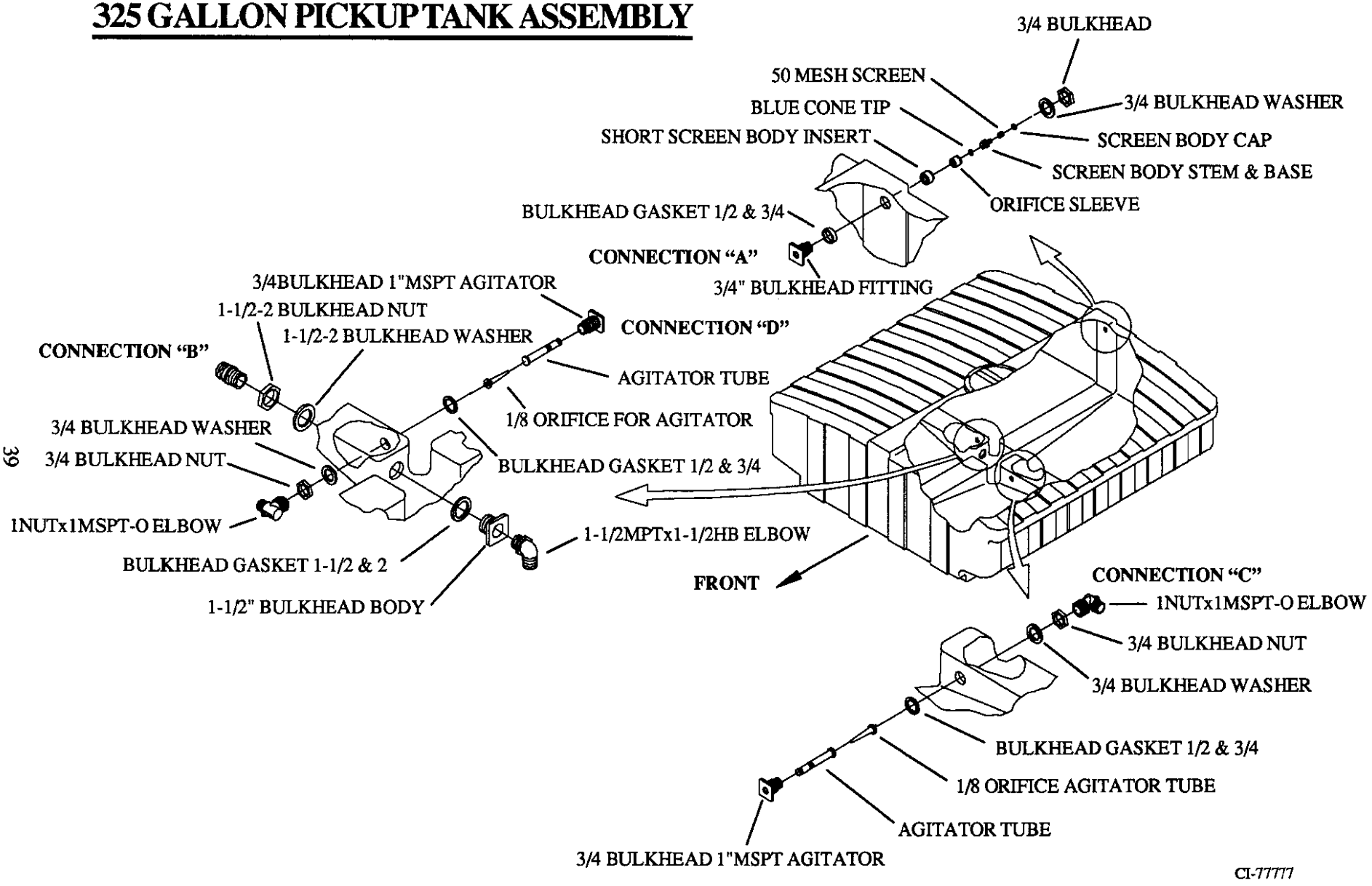


CI - 77781

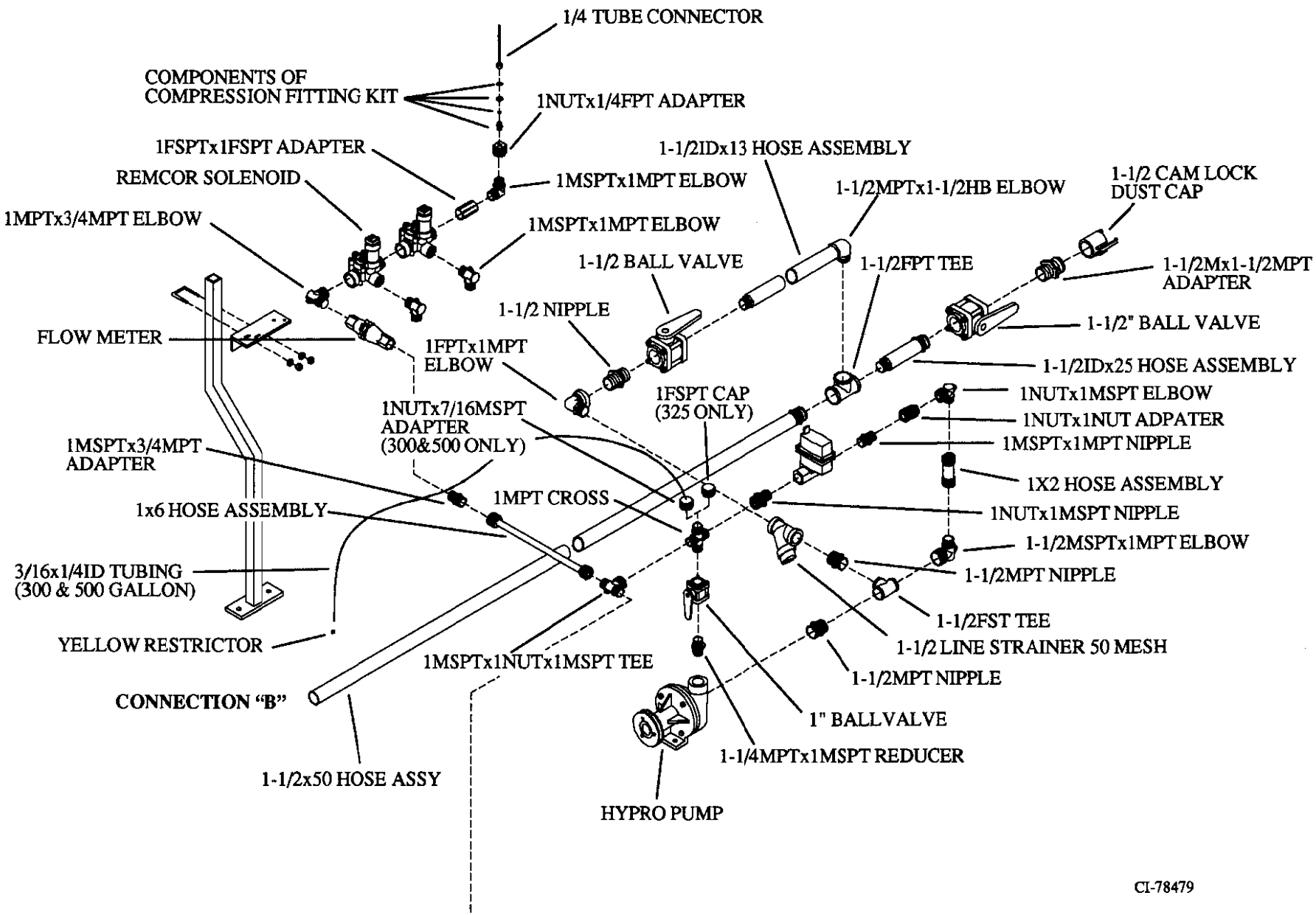
300 & 500 GALLON PICKUP TANK ASSEMBLY



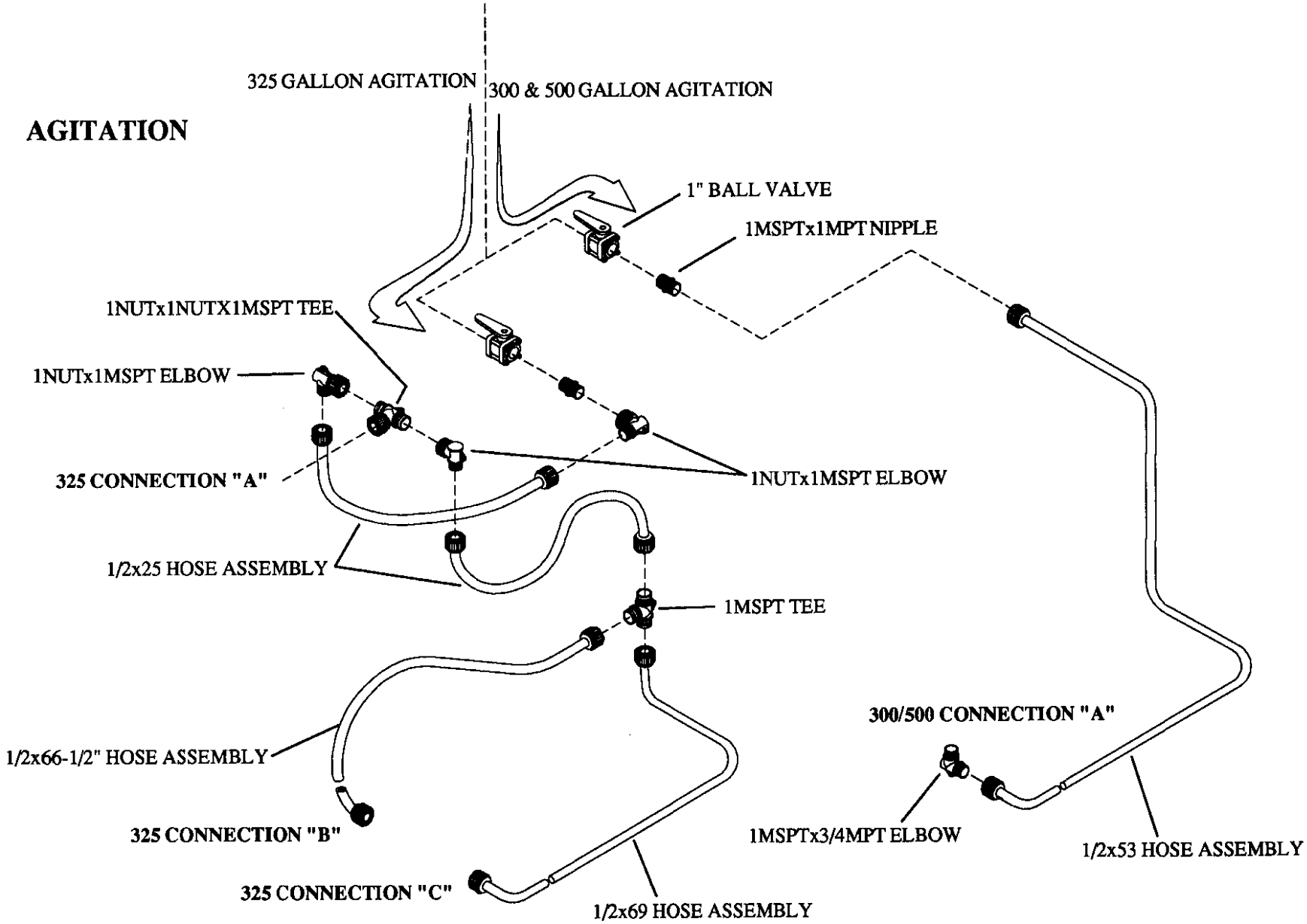
325 GALLON PICKUP TANK ASSEMBLY



300, 325 & 500 GALLON W/TARGET MASTER



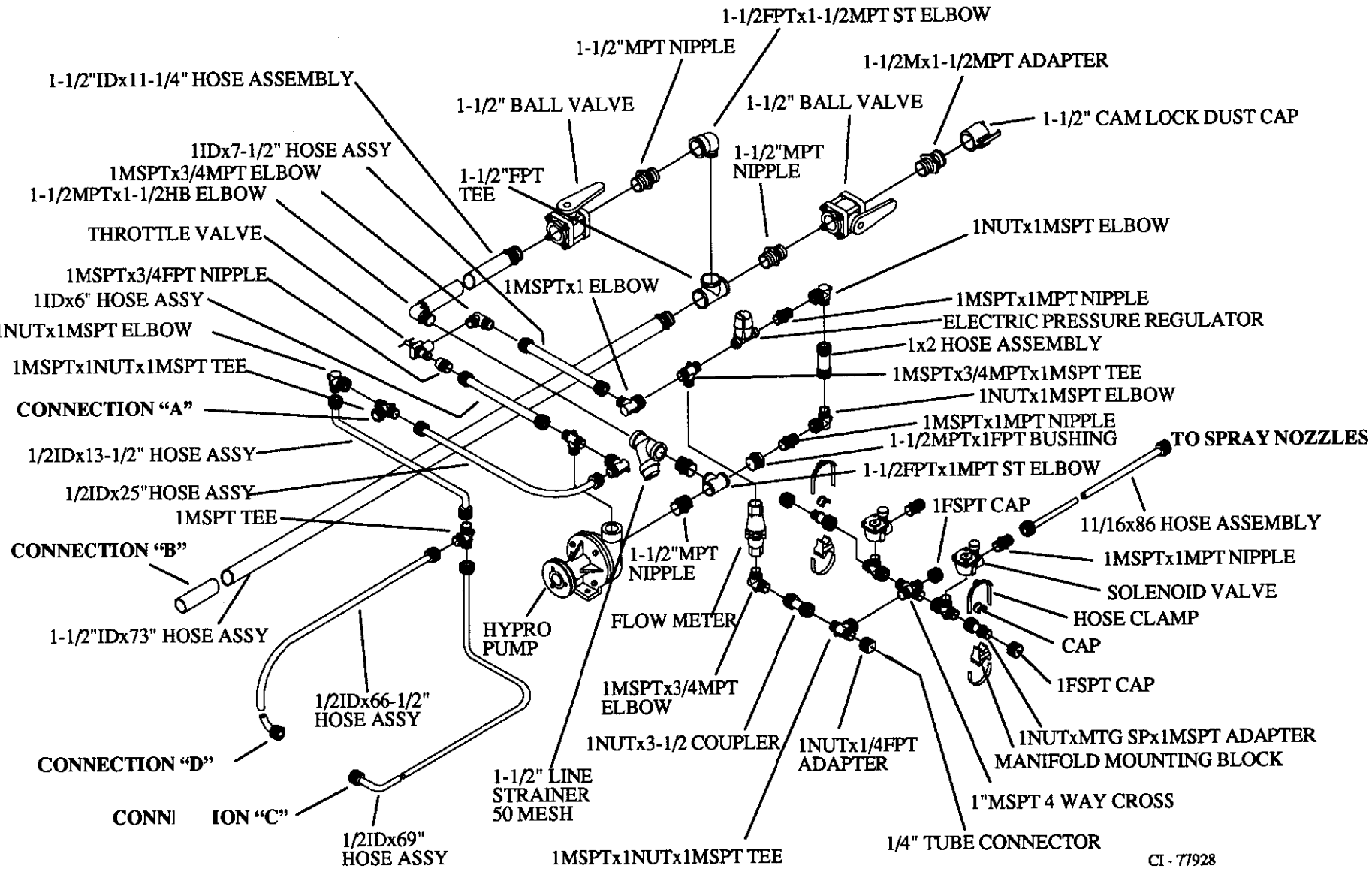
AGITATION



CI-78479A

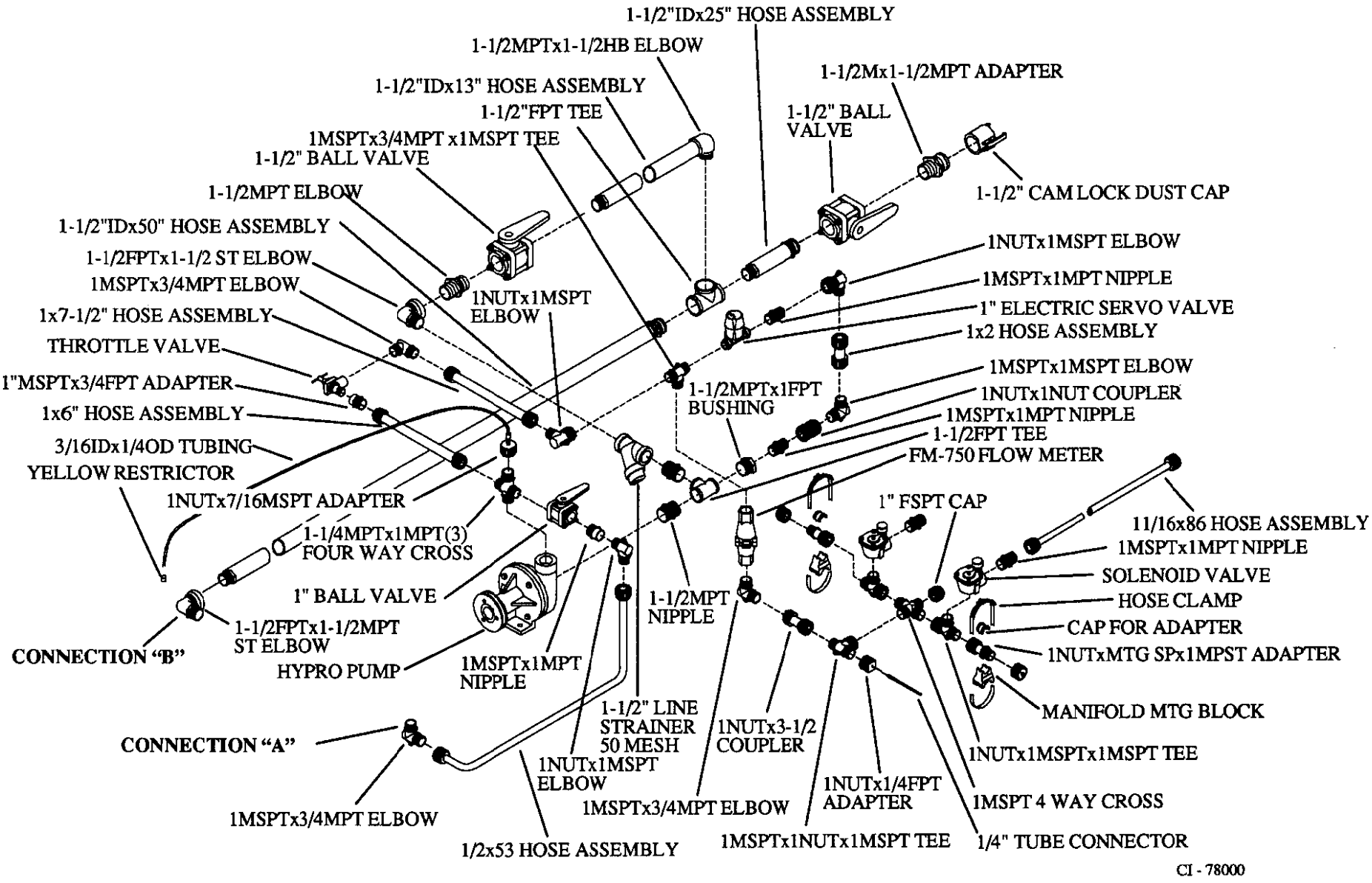
325 GALLON W/TARGET MASTER

PRIOR TO 1993 (GREENLAWN SOLENOID)



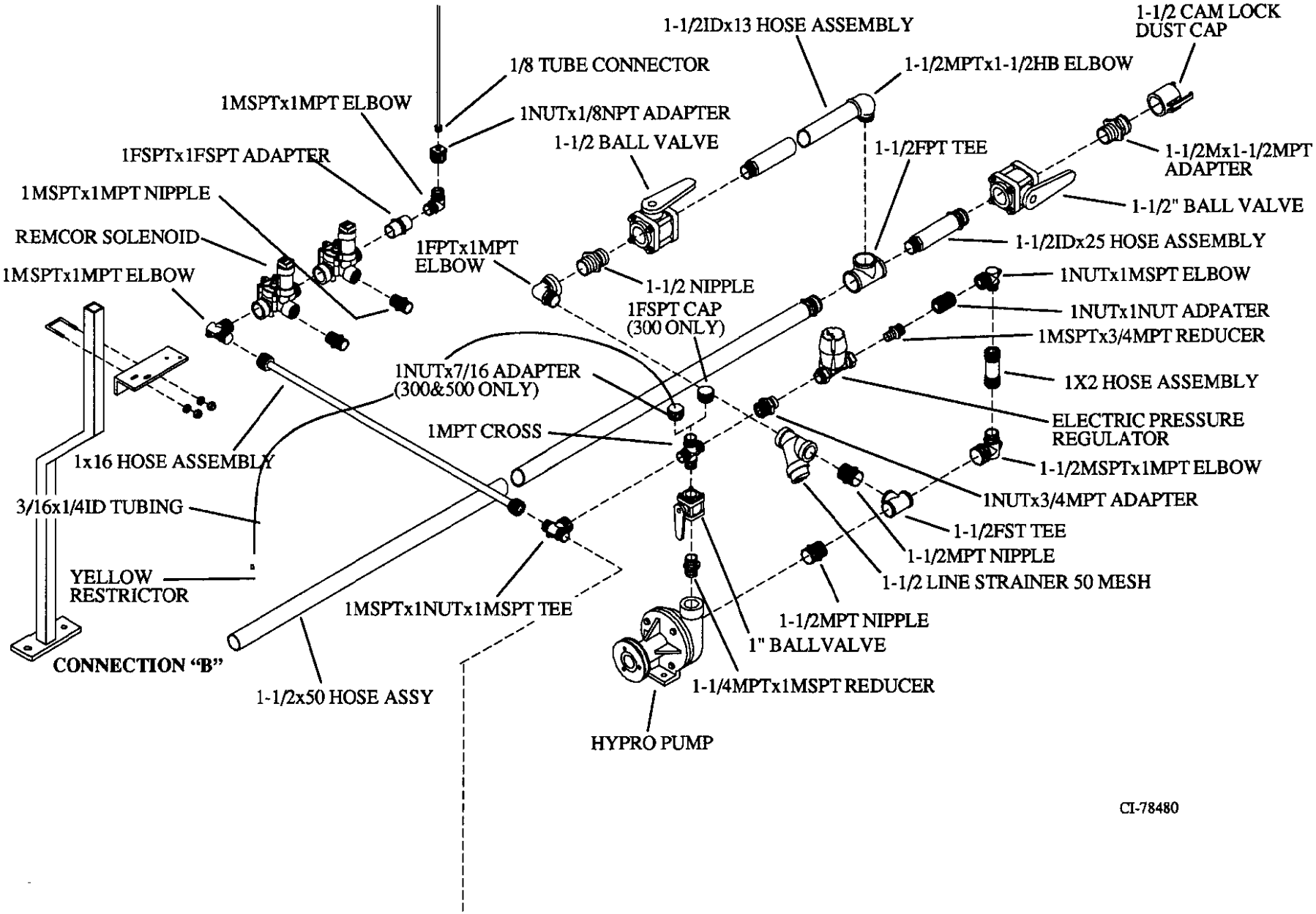
300 & 500 GALLON W/TARGET MASTER

PRIOR TO 1993 (GREENLAWN SOLENOID)

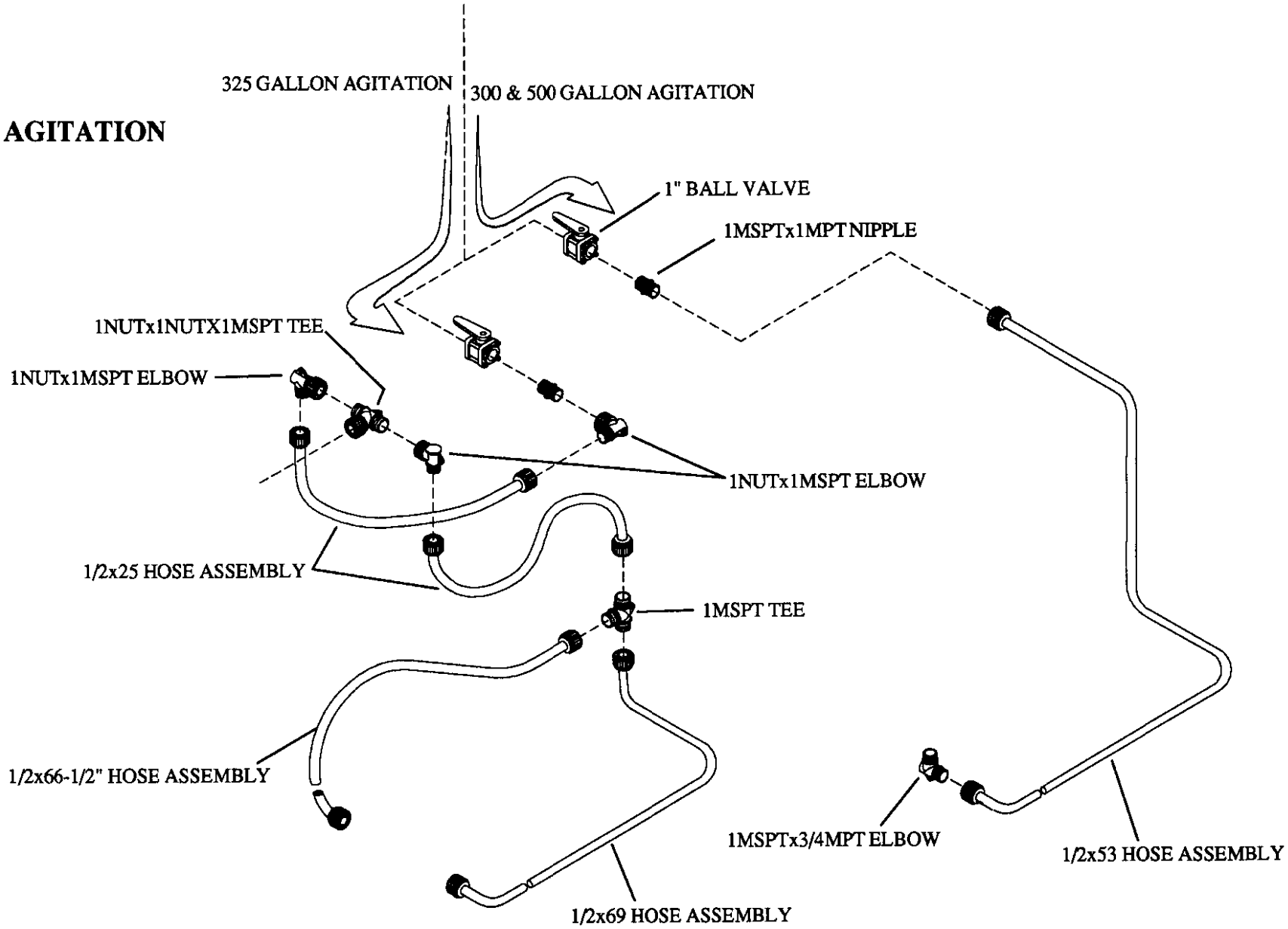


300, 325 & 500 GALLON W/RC-1B

REMCOR SOLENOIDS



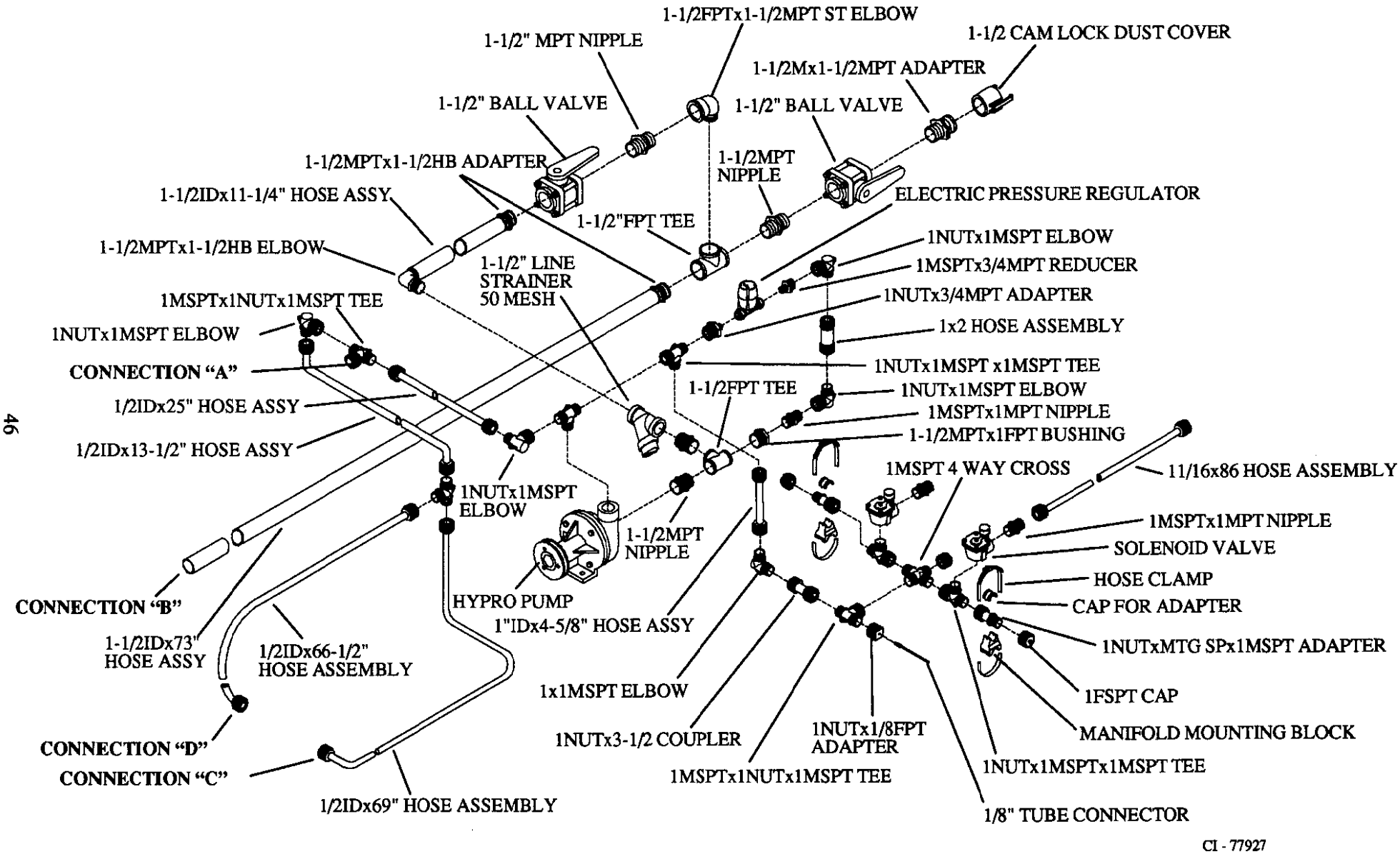
AGITATION



CI-78479A

325 GALLON W/ RC-1B

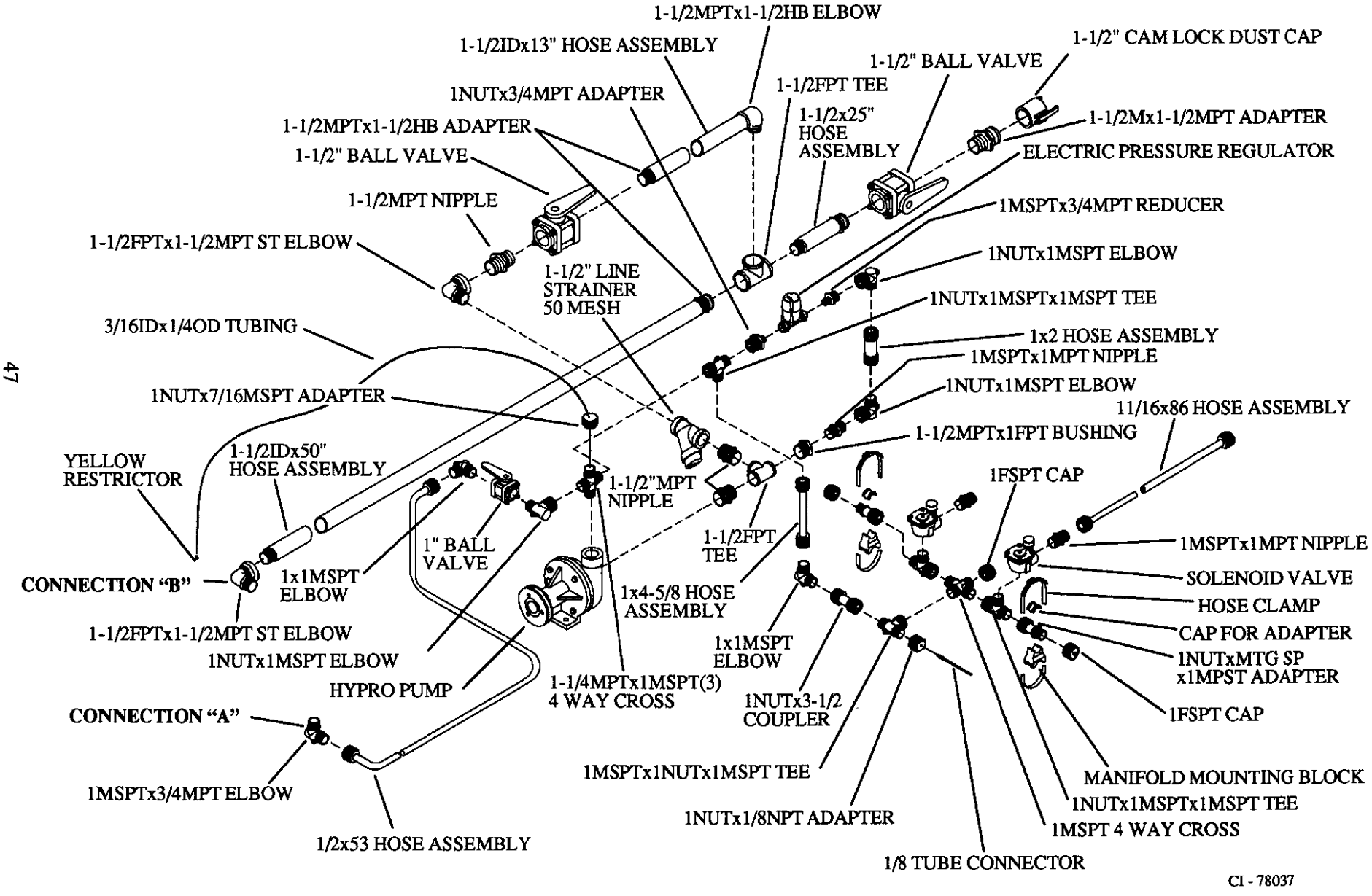
PRIOR TO 1993 (GREENLAWN SOLENOID)



CI - 77927

300 & 500 GALLON W/RC-1B

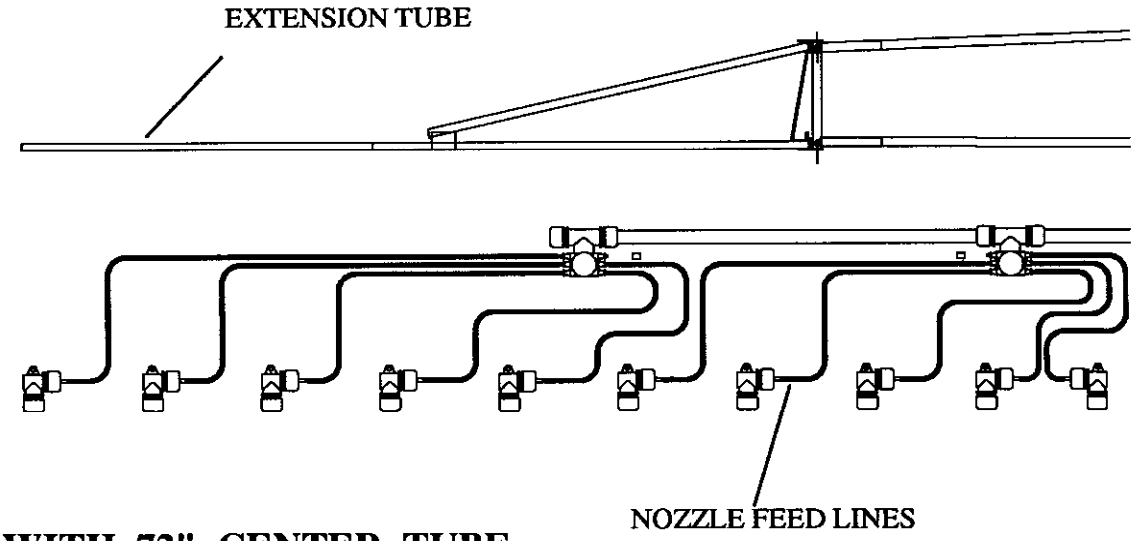
PRIOR TO 1993 (GREENLAWN SOLENOID)



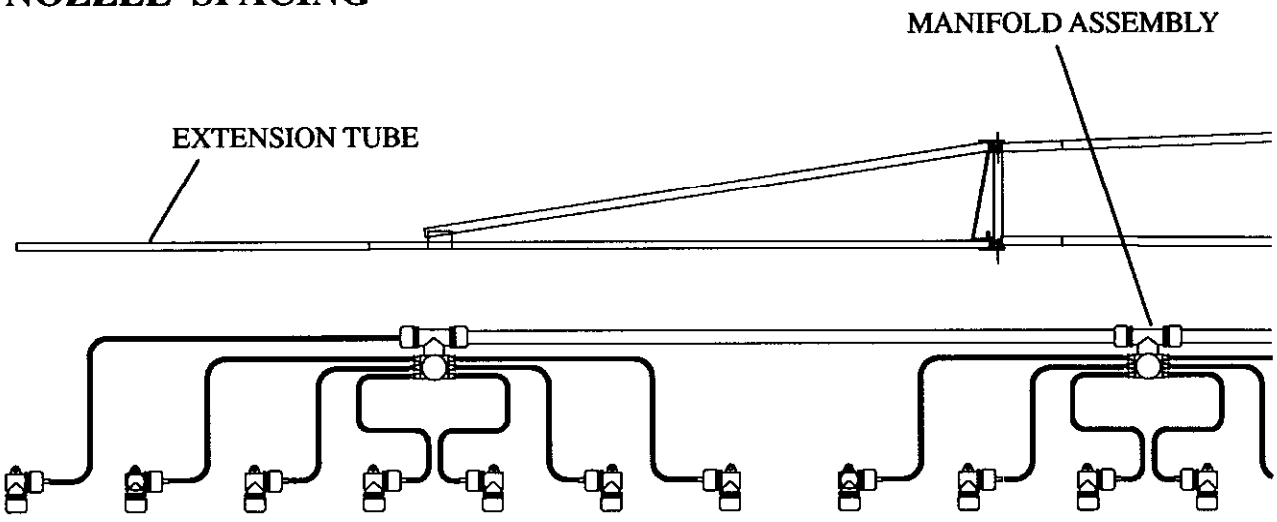
NOZZLE & MANIFOLD PLACEMENT

2 SECTION CONTROL STANDARD WITH PICKUP SPRAYERS

16' BOOM WITH 72" CENTER TUBE
20" NOZZLE SPACING



21' BOOM WITH 72" CENTER TUBE
20" NOZZLE SPACING



NOTE: 20" nozzle spacing on the 16' & 21' pickup sprayer booms start with the center nozzle on the center of the rear bar. The pickup sprayer with 16' or 21' booms comes with a 93" center tube assembly. the actual tube length is 72".

Some nozzles and feed lines may have been to turned around or moved slightly to clear obstructions.

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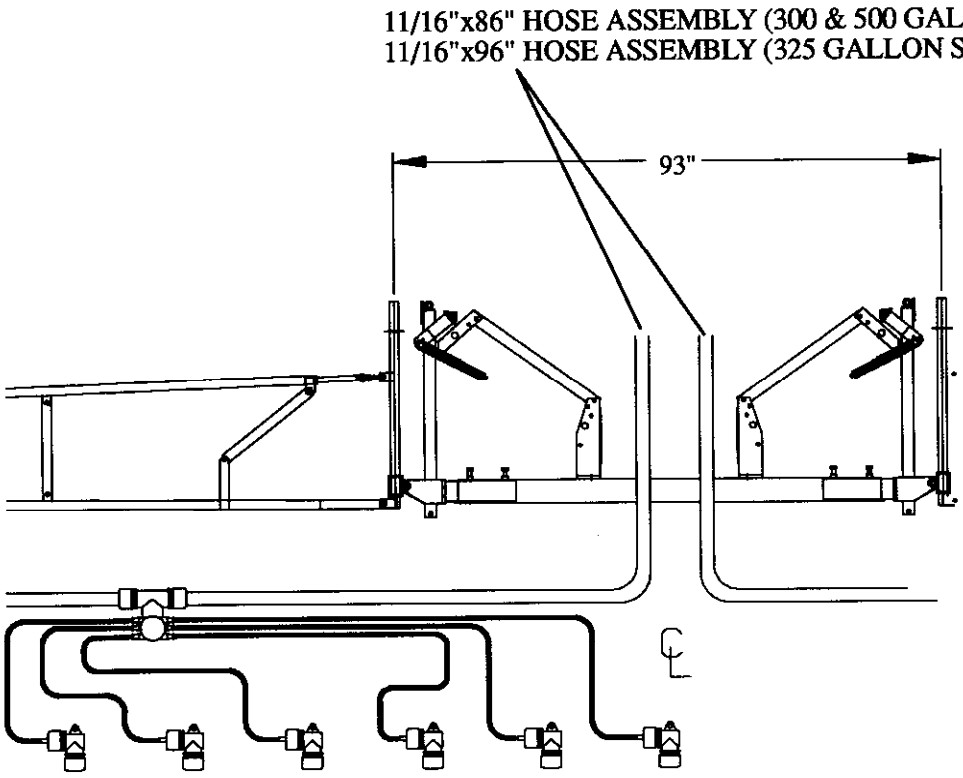
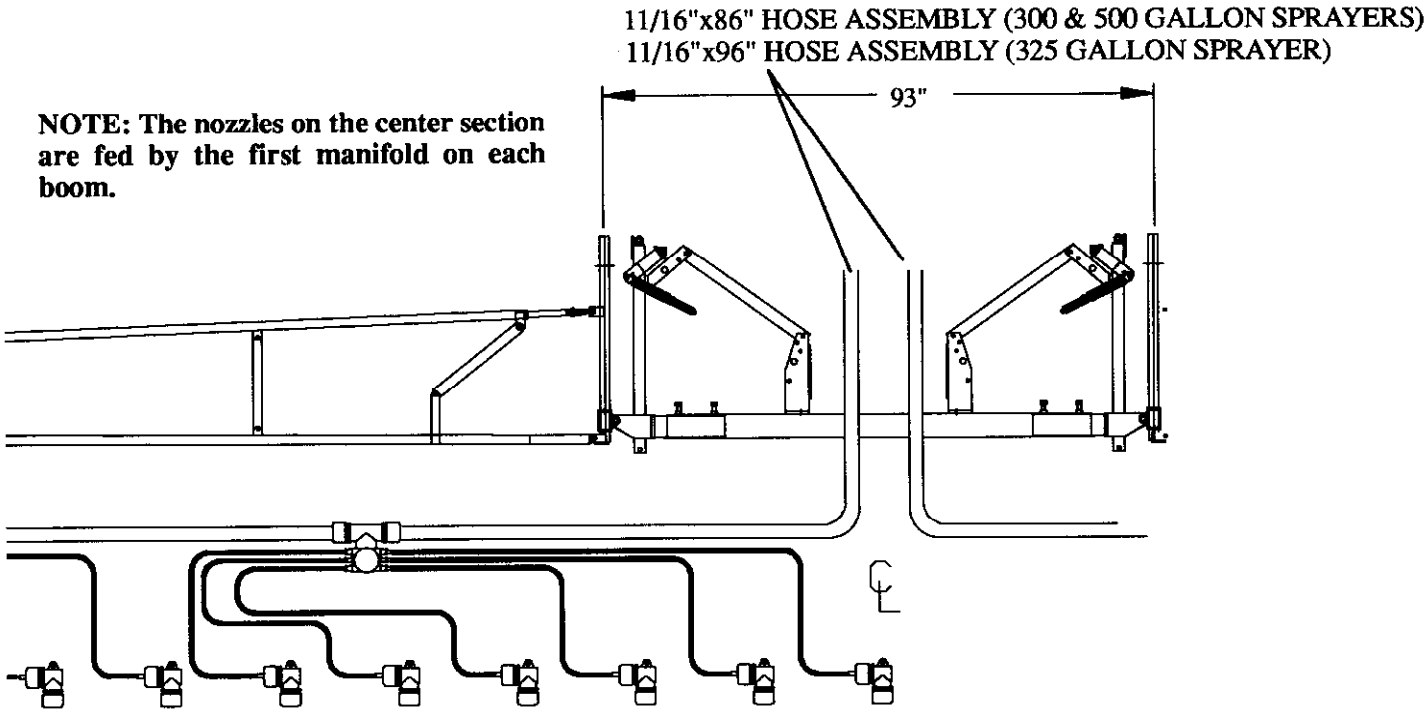




NOTE: The nozzles on the center section are fed by the first manifold on each boom.

NOTE: Both booms are shown from back.

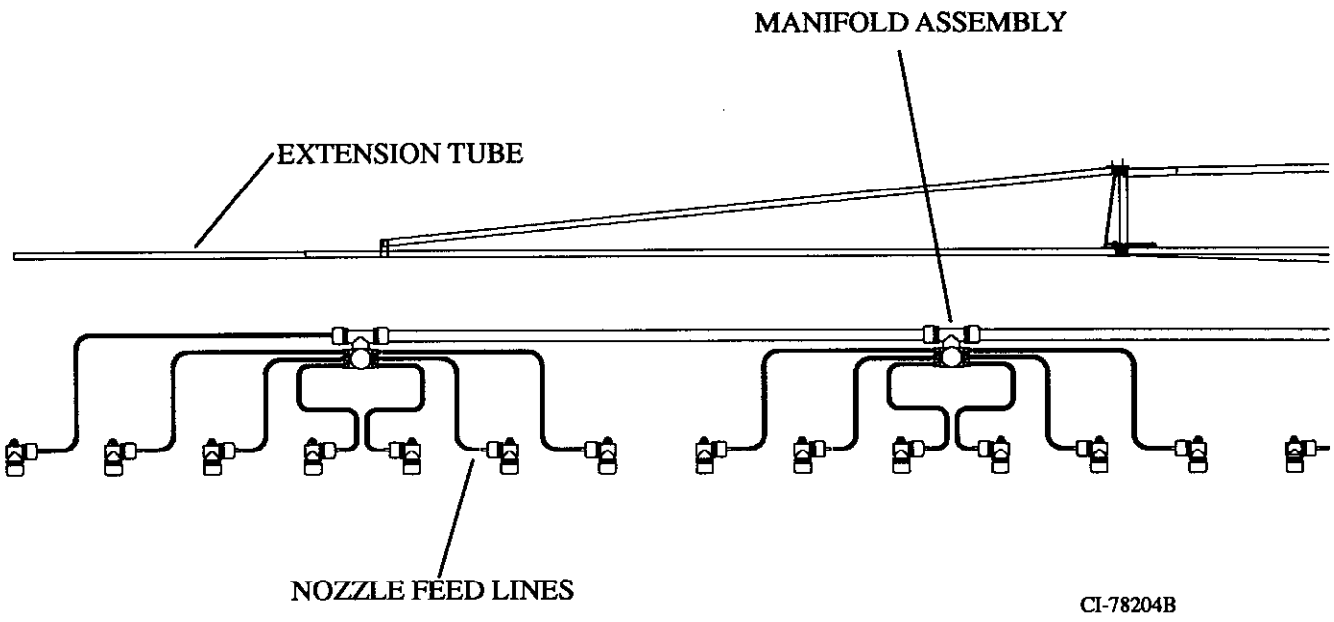
The nozzles and manifolds have been **enlarged** for ease of viewing.

CI-78204A

NOZZLE & MANIFOLD PLACEMENT

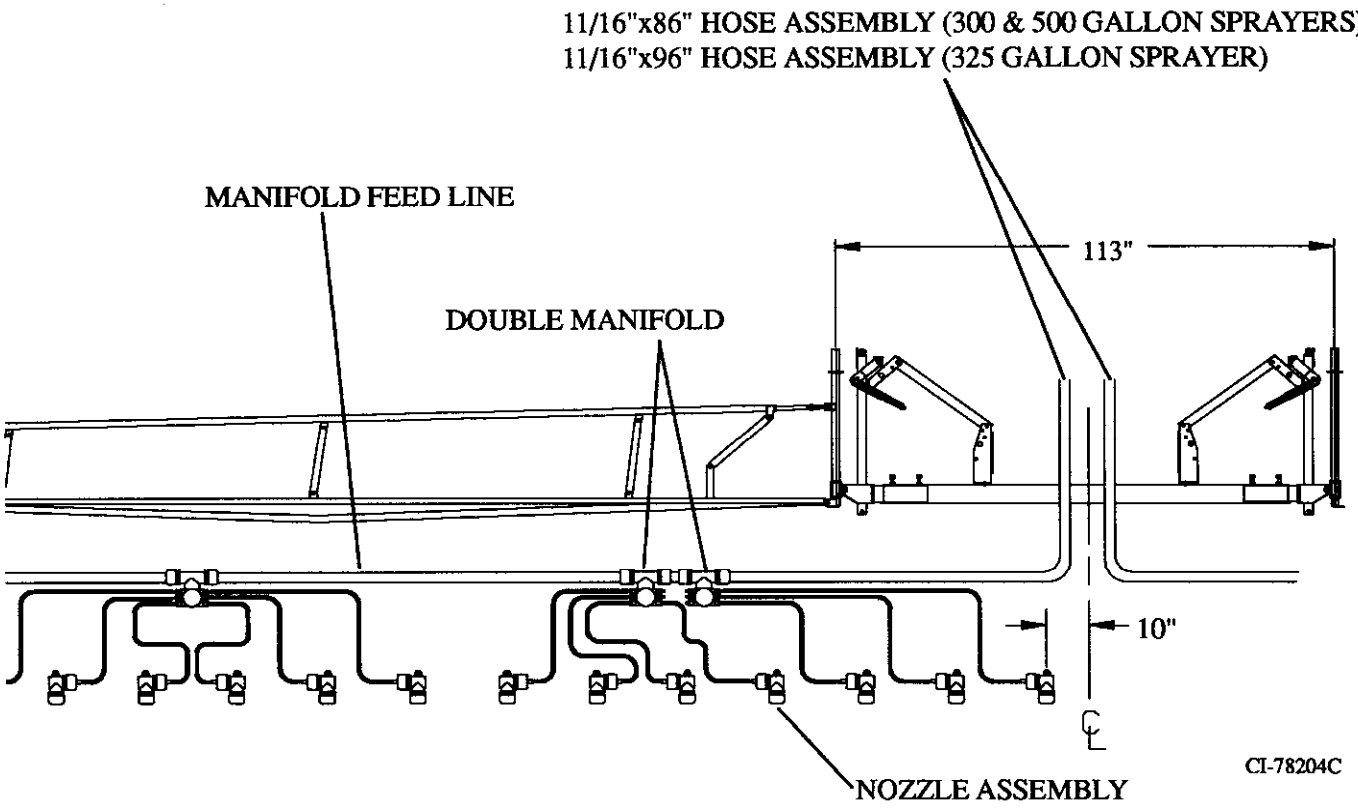
PICKUP SPRAYERS - 2 SECTION CONTROL STANDARD

33' BOOM WITH 92" CENTER TUBE
20" NOZZLE SPACING



NOTE: 20" nozzle spacing on the 33' pickup sprayer booms start with the nozzle 10" off the center of the rear bar. The pickup sprayer with a 33' boom comes with a 113" center tube assembly. the actual tube length is 92".

Some nozzles and feed lines may need to turned around or moved slightly to clear obstructions.

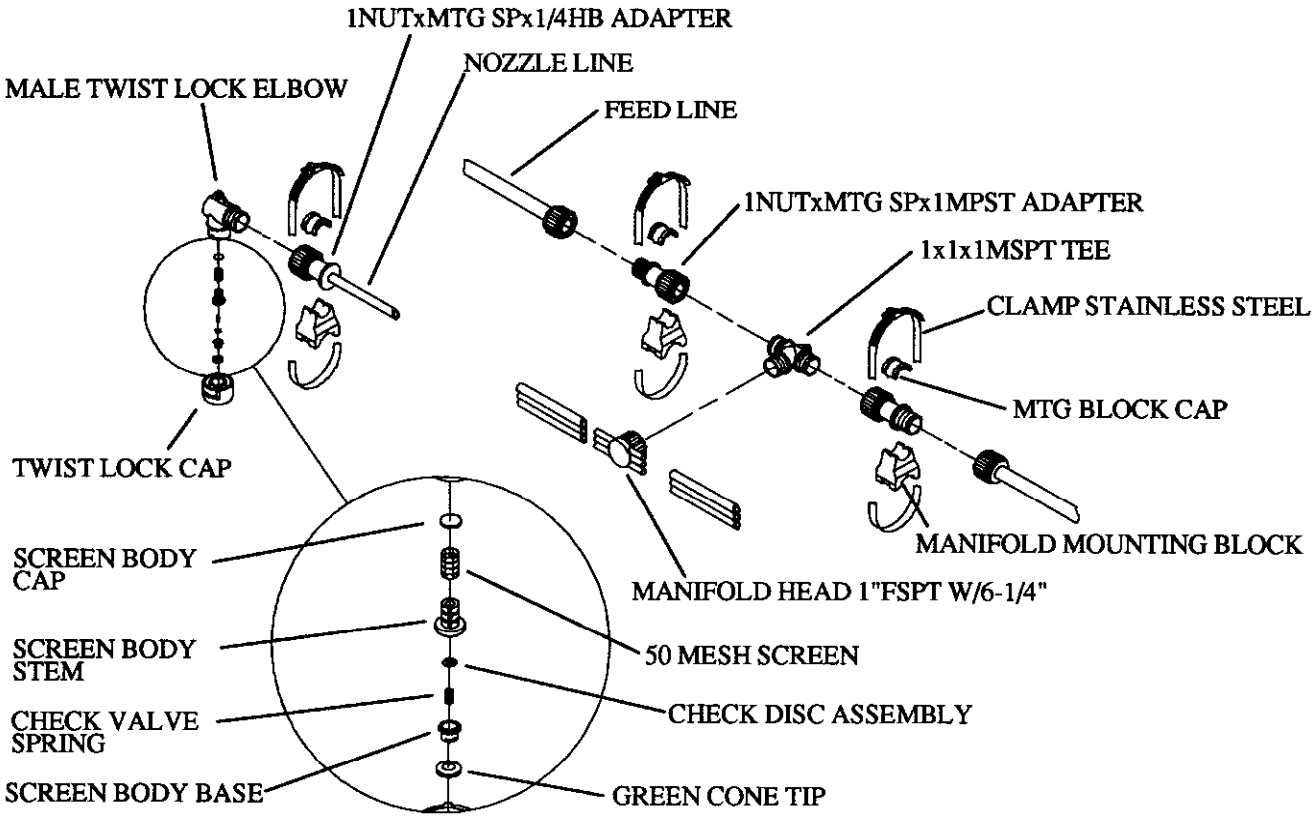


NOTE: The nozzles on the center section are fed by a double manifold on each boom.

NOTE: The boom is shown from the back.

The nozzles and manifolds have been **enlarged** for ease of viewing.

BOOM MANIFOLDS



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METRIC CONVERSION FACTORS

	Multiply	By	To Obtain
LENGTH	inches	25.40	millimeters (mm)
	inches	2.540	centimeters (cm)
	feet	.03048	meters (m)
	miles	1.609	kilometers (km)
AREA	acres	4046.7	square meters (m^2)
	acres	0.4047	hectares (ha)
VOLUME	gallons	3.785	cubic decimeters (dm^3)
	gallons	3.785	liters (L)
	Imperial gallons	4.546	liters (L)
FLOW RATE	gallons/hour (gph)	3.785	liters/hour (L/h)
	gallons/minute (gpm)	3.785	liters/minute (L/min)
APPL. RATE	gallons/acre (gpa)	9.353	liters/hectare (L/ha)
PRESSURE	pounds/square inch (psi)	6.895	kilopascals (kPa)
SPEED	miles/hour (mph)	1.609	kilometers/hour (km/h)
IMPERIAL GALLON CONVERSION FACTORS			
	Multiply	**By**	**To Obtain**
Volume	Imperial gallons	1.201	U.S. gallons
	U.S. gallons	.833	Imperial gallons

43,560 Square Feet = 1 Acre

VOLUME and LIQUID MEASURES

8 fluid ounces = 16 tablespoons = 1 cup = 236.6 mL

2 cups = 32 tablespoons = 1 pint = 473.1 mL

2 pints = 64 tablespoons = 1 quart = 964.2 mL

4 quarts = 256 tablespoons = 1 gallon = 3785 mL

128 fluid ounces = 1 gallon = 3785 mL