HINIKER

8150

OPERATOR'S MANUAL

DO NOT USE OR OPERATE THIS EQUIPMENT UNTIL THIS MANUAL
HAS BEEN READ AND THOROUGHLY UNDERSTOOD

PART NUMBER 393-000-015 Rev. C

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393-000-015 Rev. C **12/10** **Manual/393000015RevC**

SAFETY

THIS IS THE SAFETY ALERT SYMBOL. IT ALERTS AN OPERATOR TO INFORMATION CONCERNING PERSONAL SAFETY. ALWAYS OBSERVE, AND HEED THESE SYMBOLS AND INSTRUCTIONS, OTHERWISE DEATH, OR SERIOUS INJURY CAN RESULT!

Operator safety is a principle concern in equipment design and distribution. However, many accidents occur because a few seconds of thought, and a more careful approach to handling, were ignored.

Throughout this manual, and on all safety related decals, a safety alert symbol, along with the signal word CAUTION, WARNING, or DANGER will be found. These are defined as follows:

CAUTION: A reminder for proper safety practices and directs attention to following them. Decals of this class are yellow and black.

WARNING: A reminder for proper safety practices and what can happen if they are ignored. This has a more serious consequence than CAUTION. Decals of this class are yellow and black.

DANGER: Denotes the most serious safety hazard. It is a reminder for observing the stated precautions and what can happen if they are ignored. Decals of this class are red and white.

CAUTION: For your own protection we very strongly recommend that you read, understand, and heed the following information.

CAUTION: If you and your operator(s) are not intimately familiar with proper handling procedures for Anhydrous Ammonia, contact your supplier for information, and read all safety precautions found in the "HINIKER ANHYDROUS AMMONIA MONITORING AND CONTROL SYSTEM MANUAL", Refer to manual part number 360-000-246 Revision E or later for heat exchanger manufactured prior to 2007. These are painted gray. Or, refer to manual part number 39300035 for heat exchanger manufactured in 2007 or after. These are painted white. Additional manuals may be obtained from your local dealer.

ACCIDENTS CAN BE AVOIDED BY KNOWING, AND FOLLOWING, THE PRECAUTIONS CITED IN THIS MANUAL.

GENERAL

1. If the Operator's Manual is missing from this equipment, obtain a replacement from your HINIKER dealer. If you sell this equipment, ensure the new owner acknowledges receipt of this manual.

2. Read this manual thoroughly. Make sure the operator understands it and knows how to operate this equipment safely. Farm equipment can kill or injure an untrained, or careless operator.

3. Do not attempt to handle and service this equipment, or direct others to do the same, unless you know how to do it safely.

4. Don't be in a hurry.

Hiniker Company reserves the right to change prices, standard features, specifications or designs, and options at any time without notice and without incurring the obligation to install such changes on machines previously manufactured.

TO THE PURCHASER

Congratulations for joining the ranks of agribusinessmen who acknowledge the importance of accurate and controllable application of chemicals.

This product will insure that the proper recommended application rate is maintained. This will not only save you money lost by overapplication, but safeguard that your yields are not being adversely affected by underapplication.

As an added bonus your operation will become more environmentally responsible, by you being able to know that only the proper amounts of chemicals required for your application are being used.

This product is designed and manufactured to give years of dependable service, when used for the purpose for which it was intended.

Never allow anyone to operate this equipment until they fully understand the complete contents of the manual. It is the responsibility of the owner's who do not operate this equipment, to insure that the operator is fully instructed, and is fully aware, and understands, the contents of this manual.

Important information is contained in this manual to help insure safe and efficient operations.

If you have any questions about this manual, or equipment discussed therein, contact your HINIKER dealer.

THIS IS THE SAFETY ALERT SYMBOL. IT ALERTS AN OPERATOR TO INFORMATION CONCERNING PERSONAL SAFETY. ALWAYS OBSERVE, AND HEED THESE INSTRUCTIONS, OTHERWISE DEATH, OR SERIOUS INJURY CAN RESULT.

NOTE: All references to "LEFT" and "RIGHT" are meant to mean viewing the equipment from the rear and facing the tractor.

ALWAYS OBTAIN ORIGINAL HINIKER SERVICE PARTS BECAUSE SUBSTITUTE PARTS COULD ADVERSELY AFFECT EQUIPMENT PERFORMANCE AND WARRANTY.

Record the following information for later reference when obtaining service parts.

Purchase Date_____

Name_____

Dealer's Name_____

Console Serial No._____

Flowmeter Serial No._____

Servo Valve Serial No._____

OPERATION

SYSTEM OVERVIEW

The Hiniker 8150 control is a computerized system that will enable you to apply liquid chemicals, including Anhydrous Ammonia at any given rate.

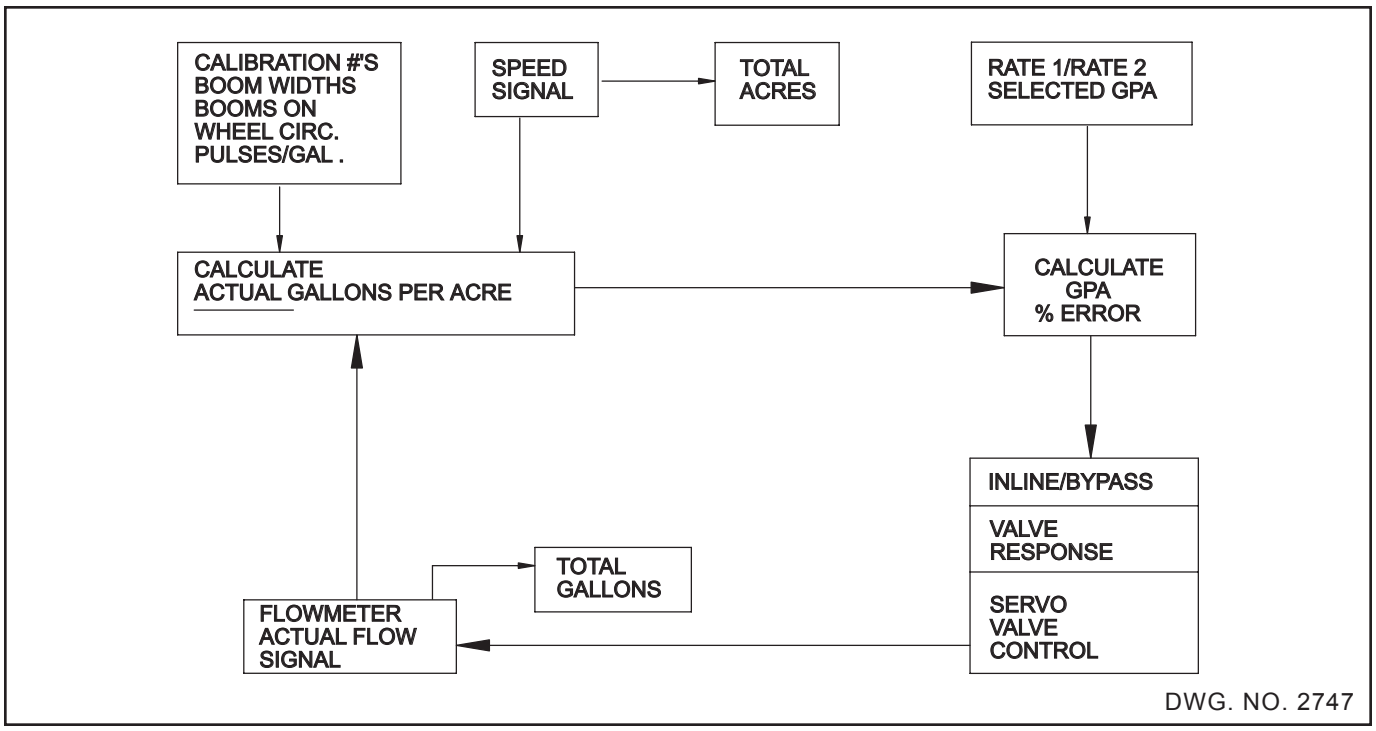
The 8150 console allows you to set up a system individually calibrated to your specific needs.

The 8150 console in conjunction with a speed sensor, flowmeter, and servo valve perform the necessary calculations and adjustments to perform “on-the-go” adjustments to the rate of application of chemicals.

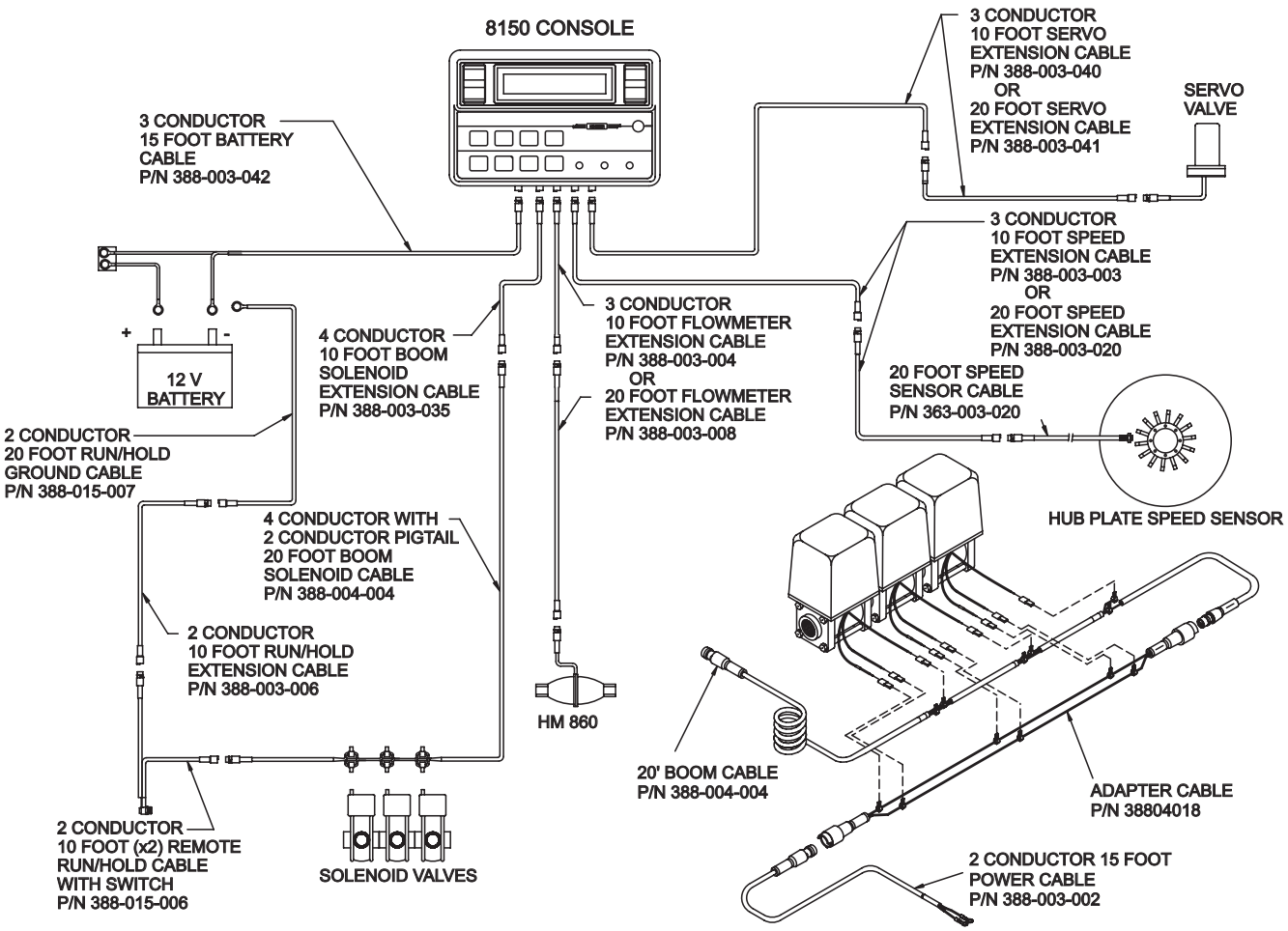
The console uses the inputs of actual flow, speed, and user selected functions to calculate the actual Gallons Per Acre (GPA). This is then compared to the rate selected by the operator to generate a percent-error signal. This signal then causes the servo valve to make corrections to the flow. This continues until the GPA error is 0. See figure below.

The following is a list of features available with this system.

- Inline System Configuration.
- Bypass System Configuration.
- Adjustable Valve Response Rate.
- One, two, or three section control of electric solenoids for individual boom control.
- Boom Section Widths Individually Set.
- Selection of Rate 1, Rate 2, or Manual Control.
- Warning Lamp when the application error is greater than 10%.
- Run/Hold Feature.
- Remote Run/Hold Option.
- Dual Function Display - any two selections displayed at once.
- Five Display Selections available - Rate, Percent Error, Speed, Volume, and Area.
- Individual System Speed Calibration.
- Adjustable Flow Meter Pulses/Gallon Calibration Number.
- Automatically checks the maximum gallons per minute your system will allow.

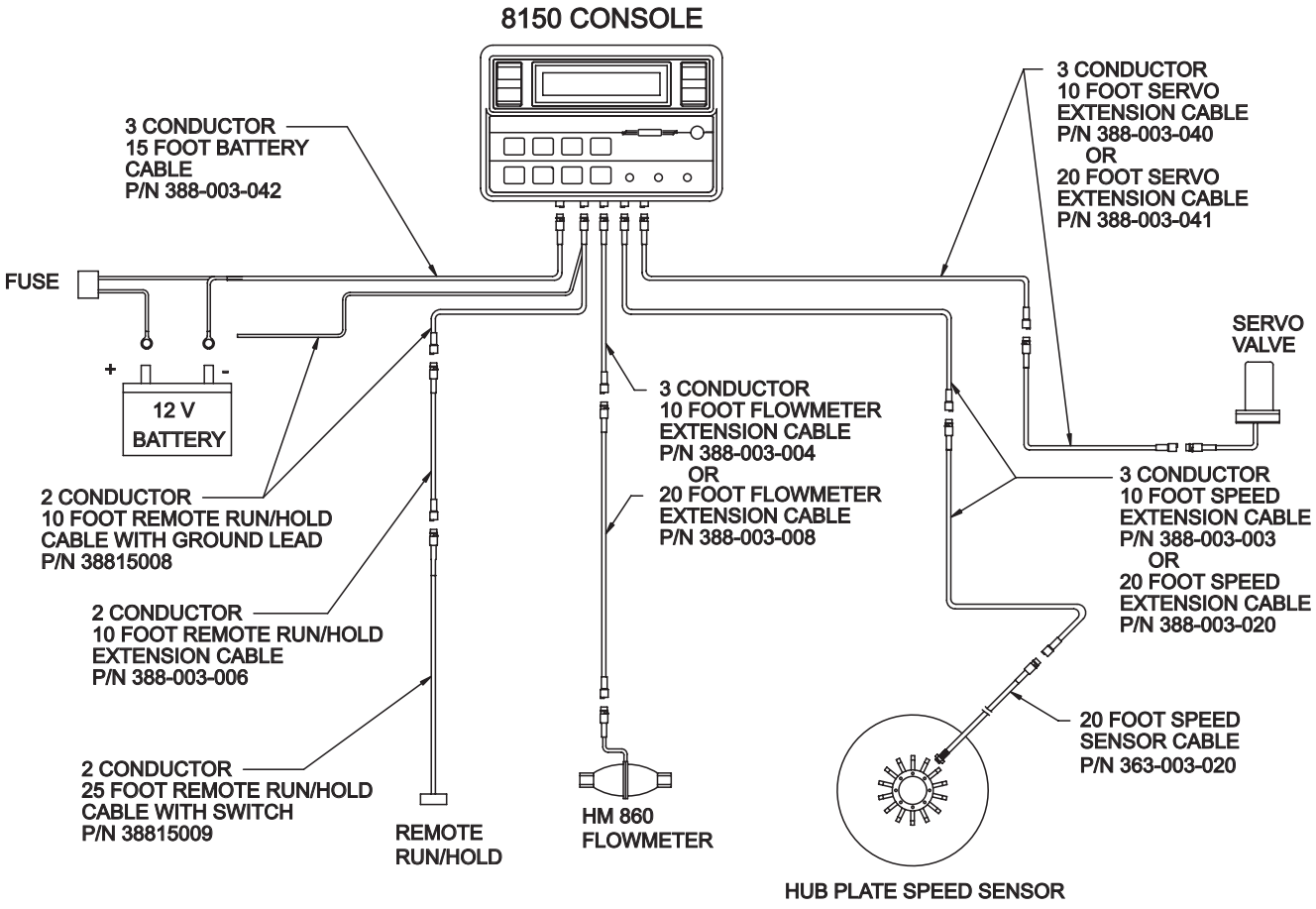


8150 TYPICAL SYSTEM WIRING - SPRAY APPLICATION



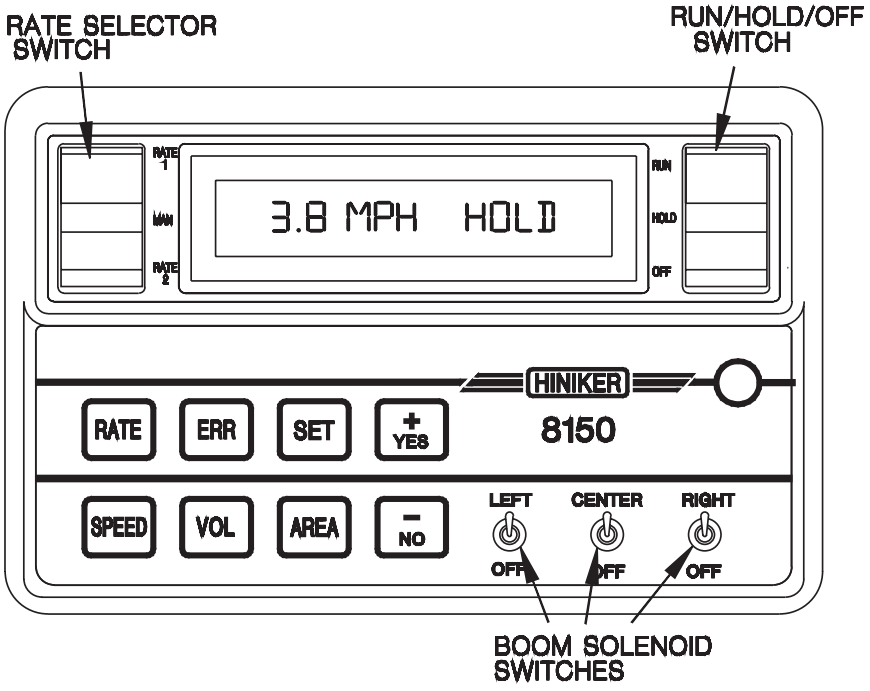
DWG. NO. 5111

8150 TYPICAL SYSTEM WIRING - NH_3 APPLICATION



NOTE: REMOTE RUN/HOLD HAS BEEN MODIFIED AND IS USED ONLY WITH APPLICATIONS WHERE NO ELECTRIC SOLENOID OR BALL VALVES ARE USED.

DWG. NO. 5110



DWG. NO. 2746

The control console will enable you to set up and control a system tailored to your needs.

RUN/HOLD/OFF SWITCH

The Run/Hold/Off switch is the master control switch. When “Run” is selected, power is applied to the boom switches and the console. This is the operating mode.

When “Hold” is selected, power is removed from the boom switches. This is the Hold (standby) mode. In this mode there is no automatic control and the volume and area totals stop accumulating. Speed is still calculated in the Hold mode.

When “Off” is selected, all power is removed from the console, as well as the rest of the system.

RATE SELECTOR SWITCH

The Rate switch is used to select one of two application rates or manual operation.

The Application rate for Rate 1 and Rate 2 is programmed in during the calibration mode.

When the Selector switch is in the center position, the automatic control is off and the servo valve can then be adjusted manually. To make this adjustment, press and hold the “+” or “-” keys.

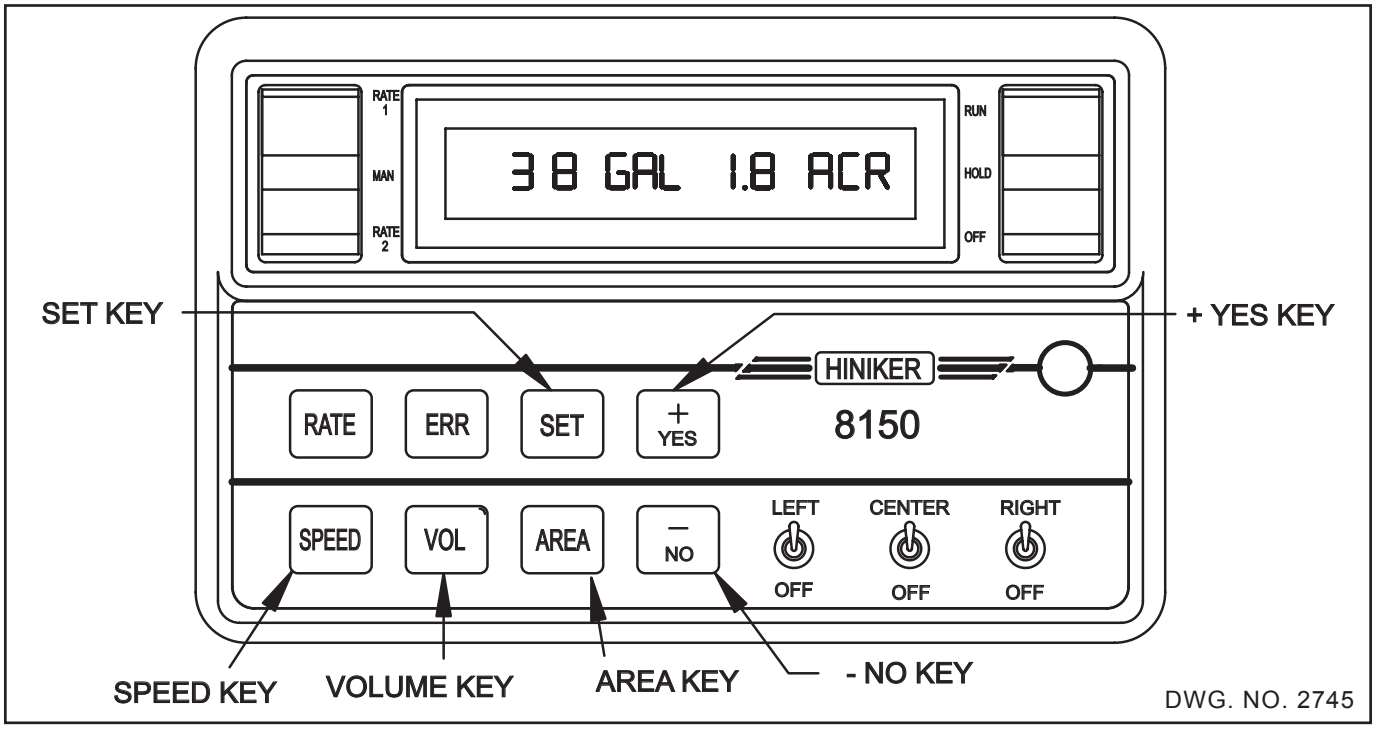
BOOM SWITCHES

Three separate Boom switches are available to control three electric solenoid valves.

The width of each boom is set in the calibration mode. If any boom is not needed, set its width to 0 and leave the boom switch off.

In the Automatic mode, the rate is automatically adjusted as the Boom switches are turned on and off. When all three Boom switches are turned off, the console will automatically stop the automatic control and be in the Hold mode.

Acres are only counted for Booms that are on.



TOTAL GALLONS

Press VOL key to view the total gallons or pounds of actual Nitrogen. The 8150 will always keep track of total volume pumped. Whenever the VOL key is selected, the total will be displayed.

Total gallons may be cleared to 0 in the calibration mode.

VOL has an additional feature which enables it to recalculate the total gallons whenever the flowmeter “PULSES PER GALLON” number is changed.

To recalibrate your flowmeter, see Flowmeter Calibration Procedure.

For Anhydrous Ammonia applications VOL will display total pounds of Nitrogen instead of total gallons.

TOTAL ACRES

The 8150 will keep track of the total acres. To view total acres press the Area key.

Acres are accumulated only when the console is in the Run mode. Acres will not accumulate when in hold.

The 8150 will automatically correct for the change in implement width when one or two of the Boom switches are turned off.

Clearing acres to 0 may be done in the calibration mode.

SPEED

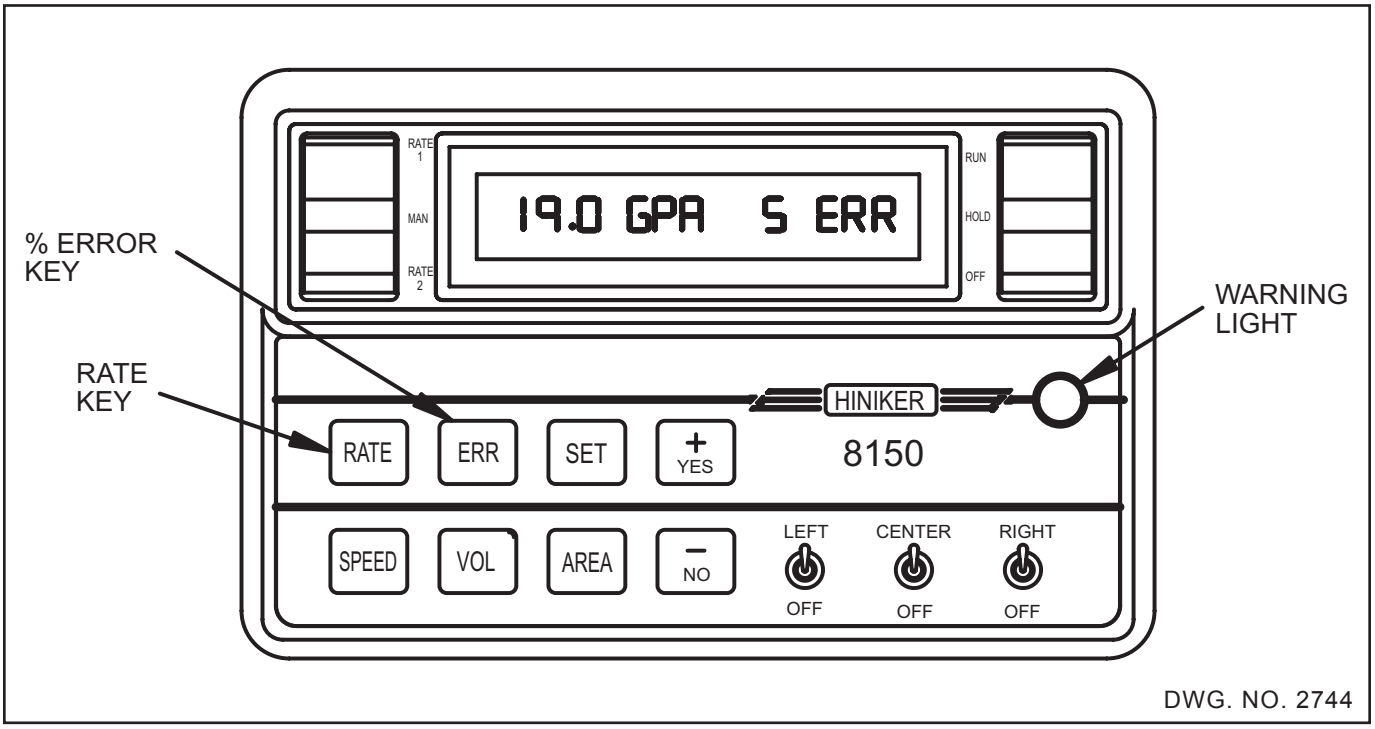
The 8150 will calculate and display speed in MPH anytime the Speed key is pressed.

The speed must be calibrated before attempting to use the console. An incorrect speed calibration will affect MPH, Rate, Percent Error, and Area computations.

SET, +, -, KEYS

The Set key is used to enter the calibration mode. To do so, press and hold the Set key while switching the console off then back on.

The “+” and “-” keys are used to answer questions or adjust values. The “+” or “-” keys are also used during manual operation to control the servo valve.



GALLONS PER ACRE AND PERCENT ERROR

When Rate is selected, actual gallons per acre (actual pounds of Nitrogen per acre) are displayed.

The purpose of “ERR” (RATE % ERROR) is to make it very easy for the operator to see how close his actual application rate is to his desired or target application rate.

The display will read “MAN ERR” if you don’t select Rate 1 or Rate 2.

This function computes and displays the percent error. Therefore, if the actual rate is exactly equal to the desired rate, it will display 0 % error. If, for example, the actual rate was high by 5% then it would display 5. If the actual rate was low by 7% then it would display -7 (note the negative sign).

A quick glance at the display using this mode will let you know that it is working. Under normal conditions the error will stay less than 10% (positive or negative) which should be considered acceptable. Quick speed changes such as shifting gears on a hillside will obviously cause a significant error. However, the 8150 will immediately start correcting and the “RATE % ERROR” display will show this.

The 8150 will start making flow adjustments as soon as the error reaches plus or minus 1%. If the error exceeds 10% the alarm indicator will flash.

The 8150 will then start driving the servo valve at a much faster rate and will soon have the error less than 10% again. The alarm light will stop flashing when the error is less than ±10%. This is a handy feature since the operator can “see” when the error exceeds ±10% and “see” when the 8150 automatically corrects it.

The 8150 performs the ERR (RATE % ERR) calculation very quickly. Therefore, it is normal to see this mode fluctuate, especially in rough ground conditions where the speed naturally makes many small changes. For example, a change of 1/4 MPH above or below 5 MPH would be detected and correctly computed as a 5% error. When the speed makes these small changes, the % error display will usually show 1 or 2 positive error readings followed by 1 or 2 negative readings. It is easy to see that the average error is 0% and the intermediate fluctuating readings should not be considered alarming. Both the sprayer and the 8150 are operating properly.

DISPLAY

When power is first applied or when memory is lost, the message “COMPUTER MEMORY ERASED ?? CHECK POWER CONNECTION PRESS SET KEY TO RECALIBRATE” is displayed. Whenever this message appears you must recalibrate your console.

During calibration the display allows you to see and adjust the calibration numbers.

During normal operation any two of the five function keys may be displayed. Pressing one of the five keys, Rate, Percent Error, Speed, Volume, or Area will display that selected function on the left half of the display. The previous function will now be shifted to the right half of the display.

The following is a list of display messages and their meanings.

HOLD

Reminds the operator that the 8150 is not automatically controlling the sprayer setup and the acre and gallon counters have stopped accumulating. This message is only displayed when the GPA or ERR functions are selected. The speed function will continue to work.

ERR

This stands for percent of error. The percent difference between the rate selected (RATE 1 or 2) and the rate being measured by the combination of wheel and flow signals.

MAN ERR

This is displayed when the “ERR” key is selected and the Rate 1 or 2 switch is in the center or “manual” position.

WIDTH?

This indicates that the total width of “on” Boom switches is equal to 0. It indicates that 0 inches was entered into one or more of the boom widths and these boom switches are the only ones turned on. This message is only displayed when RATE or ERR is selected.

LOW MPH

This is a warning that the speed is too slow for the 8150 to operate in the Rate 1 or Rate 2 mode. Either increase your speed or switch to manual operation. This message is only displayed when RATE or ERR is selected.

LOW FLO

This is a warning that the flow is too low for the 8150 to operate in the Rate 1 or Rate 2 mode. Either increase flow (speed) or switch to manual mode. This message is only displayed when RATE or ERR is selected.

OVER

This is short for overflow. This indicates the 8150 has calculated a number greater than 9999 and it will not fit in the allocated four digits. Clear acres or gallons back to 0 or ignore this message.

VOL

Displayed as “GAL”. This is your accumulated volume. This is measured as gallons or pounds of actual Nitrogen.

AREA

Displayed as “ACR”. This is your area counter and is measured in acres.

SPEED

Displayed as “MPH” (Miles per hour).

RATE

Displayed as “GPA”. This is your application rate measured in gallons per acre or total pounds actual Nitrogen per acre.

REMOTE RUN/HOLD

Before using the Remote Run/Hold it first must be enabled. This is done during calibration. To enable, answer YES to the question “ENABLE REM R/H ?.”

If answered NO, the console will ignore the Remote Run/Hold switch.

If enabled, the Remote Run/Hold switch when pressed will put the console into hold.

DANGER: USE EXTREME CAUTION WHEN USING THE REMOTE RUN/HOLD FEATURE. ALWAYS SWITCH CONSOLE OFF BEFORE LEAVING TRACTOR OR ALLOWING ANYONE NEAR IMPLEMENT. FAILURE TO DO SO COULD CAUSE INJURY OR DEATH.

The Remote Run/Hold switch is a normally closed switch. It completes the ground circuit for the electric Boom solenoids. When the switch is opened (pressed) the Boom solenoids will shut off and the console will go into hold.

This option will reduce the number of controls the operator must use on end rows or turns.

To use the Remote Run/Hold switch, first enable the Remote Run/Hold during Calibration. The Remote Run/Hold switch will now control whether or not the console is in hold.

GUIDELINES

The purpose of this section is to provide some general guidelines and recommendations for operating the 8150 in the field.

The 8150 has 5 keys labeled with 5 modes. All of the modes are working at all times. However, any two can be displayed at a time. Pressing one of the five keys will display that mode. The operator is free to select whichever mode he desires, however, the following is a list of recommendations.

When first installed, it is important to insure that the 8150 is indeed controlling your sprayer properly.

The RATE and ERR keys will show this. Pressing the RATE key will display the actual gallons per acre (pounds per acre). Pressing the ERR key will display the actual error between the actual and target rates. This is displayed as a percentage.

When the console is in hold then “Hold” will be displayed. The console must be in Run and actively working to show RATE and ERR.

It is important to remember that any calculated errors less than 10% are considered good. You will note, however, that the 8150 will continue controlling the servo valve until the error falls below ±1 %. The warning light will flash when the error exceeds ±10%.

The 8150 will automatically adjust the sprayer flow whenever Rate 1 or Rate 2 is selected. Putting the Rate switch in the center position will turn the automatic control off and pressure can then be adjusted manually.

Switching between Rate 1 and Rate 2 can be done at any time and as often as desired. The 8150 will change to the new application rate very quickly and maintain that rate very accurately.

Driving too fast or too slow will cause the servo valve to end stop (either full open or full close). When this happens, the pressure gauge will show minimum or maximum PSI. This indicates that you are exceeding the limits of your sprayer and the 8150 can no longer maintain constant rate per acre. To change the minimum and maximum speed limits, see the AUTO MAX GPM procedure.

NOTE: If the console does not control the servo valve and displays “LOW FLO”, change the rate switch to manual and press “+” key until you achieve operating flow. Start driving and then select rate 1 or rate 2.

If problems still exists see Troubleshooting section.

Sometimes it is necessary to slow down to a very slow speed in the field or on an end row. (Small area or rough spot, etc.) The 8150 will try to maintain a constant rate lowering the pressure even though it is far below the minimum acceptable pressure for the nozzles. This will probably result in a trickle of spray out of the nozzles causing very poor weed control. Whenever the ground speed must be reduced below the minimum found in “AUTO MAX GPM” procedure the following procedure is recommended.

1. Just before reaching the bad spot in the field or very tight end rows, slow down to the MINIMUM pressure found in the initial set-up procedure.

2. Allow enough time for the 8150 to automatically adjust the sprayer MINIMUM pressure. (Usually 10 PSI.)

3. Just before you have to slow way down, flip the console into MANUAL mode. (Rate 1 and Rate 2 switch in center position.) This will freeze the servo valve at that position and maintain the pressure at that MINIMUM amount instead of dropping it to 0.

4. After passing through the bad spot or making the turn, simply switch back to Rate 1 or Rate 2 as you again increase your speed.

Keep in mind when you perform Steps 1 through 4 that you are OVERAPPLYING to maintain a spray pattern at very low speeds.

It is highly recommended that the operator take advantage of the dual rate control. Significant chemical savings can be made if Rate 2 is programmed to a higher rate for weedy spots, and ONLY used when field conditions require it. All the rest of the time the operator can stay in the lower Rate 1 mode and save chemicals.

CALIBRATION

GENERAL

The calibration procedure is used to set up the console to your particular system configuration.

The calibration mode can be entered at any time by holding the SET key and switching the console off and back on.

The calibration mode can be exited at any time by answering questions YES or NO then pressing any of the operating keys (RATE, ERR, SPEED, AREA, VOL).

Before starting the calibration procedure please familiarize yourself with the questions and any number values required.

Step 11 may require an additional "Speed Calibration" procedure to find the true wheel circumference number. This requires "8712" to be entered into all three booms (Steps 8, 9, 10). Enter your actual boom widths in after the Speed Calibration is complete.

DO NOT SWITCH CONSOLE OFF BEFORE EXITING THE CALIBRATION MODE OR ALL MEMORY WILL BE ERASED!

For Anhydrous Ammonia applications see Calibration Procedure for Anhydrous Ammonia.

CALIBRATION PROCEDURE - SPRAYERS		
STEP	**DISPLAYED**	**ACTION YOU TAKE**
1	CLEAR GALLONS ?	
	CLEAR GALLONS Y	Press **YES** key to clear gallons and start counting from 0.
	CLEAR GALLONS N	Press **NO** key if you want to continue counting gallons from the previous total.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
2	CLEAR ACRES ?	
	CLEAR ACRES Y	Press **YES** key if you want the acres to start counting from 0,
	CLEAR ACRES N	Press **NO** key if you want to accumulate acres from the previous acres count.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
3	INLINE SYSTEM ?	
	INLINE SYSTEM Y	Press **YES** key if the servo valve is installed inline with the flow to the booms.
	INLINE SYSTEM N	Press **NO** key if the servo valve is installed in a return or agitation line back to the tank or pump inlet.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.

CALIBRATION PROCEDURE - SPRAYERS		
STEP	**DISPLAYED**	**ACTION YOU TAKE**
4	ENABLE REM R/H ?	
	ENABLE REM R/H Y	Press **YES** key if you are using the remote run/hold.
	ENABLE REM R/H N	Press **NO** key if you are NOT going to use the remote Run/Hold feature.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
5	VALVE RATE 6	
	VALVE RATE 7	Press **"+"** key to increse this number. The higher the number (up to 16) the faster the valve reponds to your flow and speed changes. IMPORTANT - If this number is too high for your application, you will experience a wide fluctuation on the GPA and % error readout.
	VALVE RATE 5	Press **"-"** key to decrease this number.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
6	GPA RATE 1 20.0	
	GPA RATE 1 20.1	Press **"+"** key to increase the gallon per acre for Rate 1.
	GPA RATE 1 19.9	Press **"-"** key to decrease the gallon per acre for Rate 1.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
7	GPA RATE 2 10.0	
	GPA RATE 2 10.1	Press **"+"** key to increase the gallon per acre for Rate 2.
	GPA RATE 2 9.9	Press **"-"** key to decrease the gallon per acre for Rate 2.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
8	LEFT BOOM 120"	
	LEFT BOOM 121"	Press **"+"** key to increase the total width in inches for the left boom.
	LEFT BOOM 119"	Press **"-"** key to decrease the total width in inches for the left boom.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
9	CENTER BOOM 120"	
	CENTER BOOM 121"	Press **"+"** key to increase the total width in inches for the center boom.
	CENTER BOOM 119"	Press **"-"** key to decrease the total width in inches for the center boom.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
10	RIGHT BOOM 120"	
	RIGHT BOOM 121"	Press **"+"** key to increase the total width in inches for the right boom.
	RIGHT BOOM 119"	Press **"-"** key to decrease the total width in inches for the right boom.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.

CALIBRATION PROCEDURE - SPRAYERS		
STEP	**DISPLAYED**	**ACTION YOU TAKE**
11	WHEEL CIRC 84.0”	See **SPEED CALIBRATION.**
	WHEEL CIRC 84.1”	Press **“+”** key to increase the wheel circumference in inches.
	WHEEL CIRC 83.9”	Press **“-”** key to decrease the wheel circumference in inches.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
12	PULSES/GAL 72.0	This number must match the pulses per gallon number on the decal on the flowmeter.
	PULSES/GAL 72.1	Press **“+”** key to increse this number.
	PULSES/GAL 71.9	Press **“-”** key to decrease this number.
		IMPORTANT: Make sure you enter the pulses per gallon calibration number.
		~~17.0~~ PULSES/LB PULSES/Gal 72.0
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
13	AUTO MAX GPM ?	
	AUTO MAX GPM N	Press **NO** key if you do not wish to use Auto Max GPM. You are now finished with the calibration procedure. Press any of the operating keys (SPEED, RATE, ERR, AREA, VOL) to get out of the calibration mode. **DO NOT SWITCH CONSOLE OFF BEFORE PRESSING ONE OF THESE KEYS OR ALL MEMORY WILL BE ERASED!**
	AUTO MAX GPM Y	Press **YES** key if you wish to see what the maximum gallons per minute is with your current plumbing setup and nozzles. Make sure all nozzles are installed and clean. Start the sprayer and turn the pump on. Run at standard pump speeds. Remain parked. It is not necessary to drive the sprayer. Turn on boom solenoids.
	AUTO MAX GPM	Press **SET** key. The 8150 will now drive the servo valve fully open or fully closed. (Depending on inline or bypass installation.) It will now read out your maximum gallons per minute. **TO ADJUST YOUR SPRAYER FOR OPTIMUM PERFORMANCE SEE SPRAYER SETUP PROCEDURE.** **PRESS ANY OPERATING KEY (SPEED, RATE, ERR, AREA, VOL) TO GET OUT OF THE CALIBRATION MODE.**

SPRAYER SETUP PROCEDURE

Before exiting Auto Max GPM note the pressure on your mechanical PSI gauge. This is the maximum pressure that can be obtained and will determine the maximum ground speed that can be used and still maintain a constant rate.

Put the Rate Selector switch in the center (manual) position and using the "-" key, drive the servo valve to decrease the pressure. It will take approximately 30 seconds to drive the valve fully open or closed depending on inline or bypass installation. Note the pressure on your gauge. This is the minimum pressure that can be obtained and will determine the minimum ground speed that can be used and still maintain a constant rate.

To adjust this maximum and minimum pressure, open or close any series valve, bypass valve, etc., to achieve a desired pressure range.

In general, a 4 to 1 pressure range can be used on most nozzles. For example, 10 PSI to 40 PSI can be used on flood-jet nozzles. Be sure to consult your pressure nozzle charts. Using pressures that are too low will generate a poor spray pattern. Very high pressures will cause "misting" and also increase nozzle wear-out rate.

A 4-to-1 change in pressure will only cause a 2-to-1 change in the flow rate. Therefore, the speed change must be limited to 2-to-1. For example, a pressure range of 10 PSI to 40 PSI (4:1) will double the flow rate. This means the speed can also double (4 MPH to 8 MPH) and still maintain a constant GPA (gallon per acre).

REMEMBER, OPERATING OUTSIDE THE SPEED RANGE FOUND IN THIS PROCEDURE (TOO FAST OR TOO SLOW) MAY RESULT IN EXCEEDING THE MINIMUM OR MAXIMUM RECOMMENDED OPERATING PRESSURES FOR YOUR NOZZLE. THIS COULD RESULT IN POOR WEED CONTROL, ETC.

When a desired pressure cannot be obtained the usual cause is low pump capacity. Other possible problems are long runs of small diameter hose, low capacity solenoid valves and excessive agitation flow.

CALIBRATION PROCEDURES ANHYDROUS AMMONIA

Read General Cailbration Page 13.

This calibration procedure is used to set up the console to be used with an applicator for applying Anhydrous Ammonia.

NOTE: FOR ANHYDROUS AMMONIA APPLICATIONS GALLONS IS UNDERSTOOD TO MEAN ACTUAL POUNDS OF NITROGEN.

DO NOT SWITCH CONSOLE OFF BEFORE EXITING THE CALIBRATION MODE OR ALL MEMORY WILL BE LOST!

CAUTION: If you and your operator(s) are not intimately familiar with proper handling procedures for Anhydrous Ammonia, contact your supplier for information, and read all safety precautions found in the "HINIKER ANHYDROUS AMMONIA MONITORING AND CONTROL SYSTEM MANUAL." Refer to manual part number 360-000-246 Revision E or later for heat exchanger manufactured prior to 2007. These are painted gray. Or, refer to manual part number 39300035 for heat exchanger manufactured in 2007 or after. These are painted white. Additional manuals may be obtained from your local dealer.

CALIBRATION PROCEDURE - NH3 APPLICATIONS		
STEP	**DISPLAYED**	**ACTION YOU TAKE**
1	CLEAR GALLONS ?	**GALLONS = POUNDS OF ACTUAL NITROGEN**
	CLEAR GALLONS Y	Press **YES** key to clear POUNDS and start counting from 0.
	CLEAR GALLONS N	Press **NO** key if you want to continue counting POUNDS from the previous total.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
2	CLEAR ACRES ?	
	CLEAR ACRES Y	Press **YES** key if you want the acres to start counting from 0,
	CLEAR ACRES N	Press **NO** key if you want to accumulate acres from the previous acres count.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
3	INLINE SYSTEM ?	
	INLINE SYSTEM Y	Press **YES** key. The servo valve is installed inline with the flow to the applicator on ALL NH_3 applications.
	INLINE SYSTEM N	**DO NOT ANSWER NO.**
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
4	ENABLE REM R/H ?	
	ENABLE REM R/H Y	Press **YES** key if you are using the remote Run/hold.
	ENABLE REM R/H N	Press **NO** key if you are NOT going to use the remote Run/Hold feature.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
5	VALVE RATE 6	
	VALVE RATE 7	Press **"+"** key to increse this number. The higher the number (up to 16) the faster the valve reponds to your flow and speed changes. **IMPORTANT** - If this number is too high for your application, you will experience a wide fluctuation on the GPA (Pounds Per Acre) and % error.
	VALVE RATE 5	Press **"-"** key to decrease this number.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.

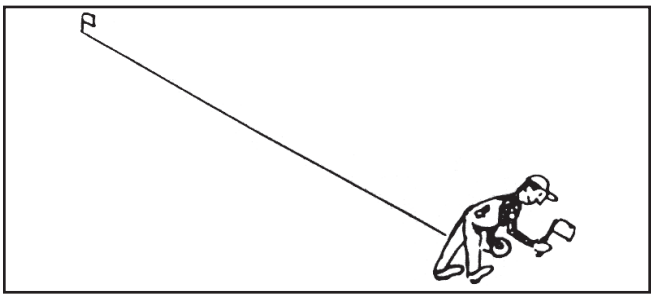
CALIBRATION PROCEDURE - NH3 APPLICATIONS		
STEP	**DISPLAYED**	**ACTION YOU TAKE**
6	GPA RATE 1 20.0	**GPA = Pounds Per Acre**
	GPA RATE 1 20.1	Press **"+"** key to increase the POUNDS per acre for Rate 1.
	GPA RATE 1 19.9	Press **"-"** key to decrease the POUNDS per acre for Rate 1.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
7	GPA RATE 2 10.0	**GPA = Pounds Per Acre**
	GPA RATE 2 10.1	Press **"+"** key to increase the POUNDS per acre for Rate 2.
	GPA RATE 2 9.9	Press **"-"** key to decrease the POUNDS per acre for Rate 2.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
8	LEFT BOOM 120"	Total machine width entered in left boom.
	LEFT BOOM 121"	Press **"+"** key to increase the total width of applicator in inches for the left boom.
	LEFT BOOM 119"	Press **"-"** key to decrease the total width of applicator in inches for the left boom.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
9	CENTER BOOM 120"	Center boom = 0 inches.
	CENTER BOOM 0"	
	CENTER BOOM 0"	Press **"-"** key to decrease to 0 inches for center boom.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
10	RIGHT BOOM 120"	Right boom = 0 inches.
	RIGHT BOOM 0"	
	RIGHT BOOM 0"	Press **"-"** key to decrease to 0 inches for right boom.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
11	WHEEL CIRC 84.0"	See **SPEED CALIBRATION.**
	WHEEL CIRC 84.1"	Press **"+"** key to increase the wheel circumference in inches.
	WHEEL CIRC 83.9"	Press **"-"** key to decrease the wheel circumference in inches.
		PRESS SET KEY TO ADVANCE TO NEXT STEP.
12	PULSES/GAL 72.0	This number must match the Pulses Per Pound number on the decal on the flow meter (Pounds of Actual N).
	PULSES/GAL 72.1	Press **"+"** key to increase this number.
	PULSES/GAL 71.9	Press **"-"** key to decrease this number.
		IMPORTANT: Make sure you enter the pulses per pound calibration number.
		~~72.0~~ PULSES/GAL PULSES/LB 17.0
		PRESS SET KEY TO ADVANCE TO NEXT STEP.

CALIBRATION PROCEDURE - NH3 APPLICATIONS		
STEP	**DISPLAYED**	**ACTION YOU TAKE**
13	AUTO MAX GPM ?	**WARNING: DO NOT USE AUTO MAX GPM**
	AUTO MAX GPM N	Press **NO** key. You are now finished with the calibration procedure. Press any of the operating keys (SPEED, RATE; ERR, AREA, VOL) to get out of the calibration mode. **DO NOT SWITCH CONSOLE OFF BEFORE PRESSING ONE OF THESE KEYS OR ALL MEMORY WILL BE ERASED!**

SPEED CALIBRATION:

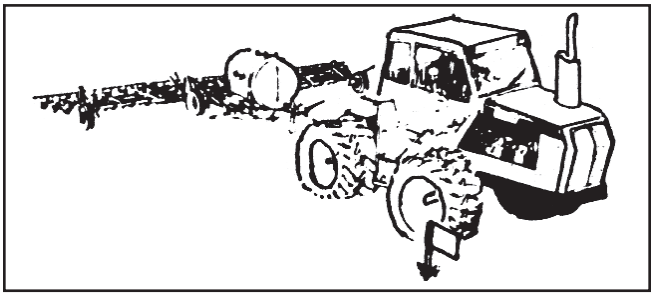
The purpose of this step is to match the console wheel circumference calibration number to the distance measuring device you are using including RADAR. This calibration process is extremely simple and fast, involving nothing more than driving a premeasured distance while the Console is in the AREA mode.

Normally you will only have to do this procedure once for each implement used, unless the same implement is used in considerably different ground conditions. (Spring, summer and fall operations).



DWG. NO. 124

1. Measure 500 feet in your field and mark start and finish with flags.



DWG. NO. 125

2. Stop at the first flag. Line up some convenient part of the tractor with the first flag.

3. Clear Acres to “0” by entering the Calibration mode and answering “yes” to the Clear Acres question.

Enter 8712 inches for all 3 booms.

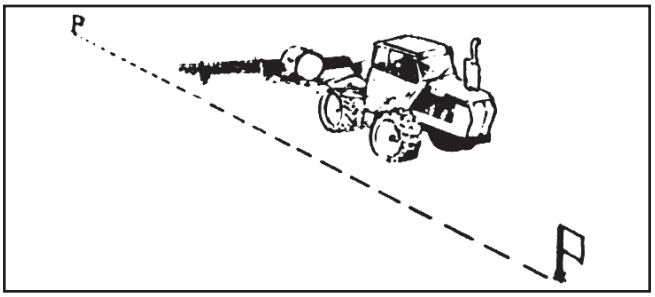
Enter 84.0” in Wheel CIRC (1 acre = 43560 square feet).

Place left, center, and right boom switches in the on position.

4. Make sure Console is in RUN position.

5. Select the AREA key and drive to the second flag.

Drive at normal speeds with the tank 1/2 full and in a straight line.



DWG. NO. 127

6. Slow down and stop when the second flag lines up. DO NOT BACK UP!

7. Divide 2100 by the area reading from the 8150 Console. The result will be the true wheel circumference you enter into the console.

Example:

Calculated wheel circumference to be entered into console.

$$\frac{2100}{25.2} = 83.3$$

Area Reading From Cosole.

To check your calculated wheel circumference repeat Steps 2 through 5. In step 3 enter your calculated wheel circumference instead of 84.0.

When Steps 2 through 5 are completed your console should have accumulated 25.0 acres over the 500 ft. course. 24.8 to 25.2 is 99% accurate.

Enter your actual boom width. Steps 8, 9, and 10 in calibration. Your console should now be accurate for speed and area.

For future reference write all your calibration numbers in the back of this manual.

If you wish to use a longer distance for wheel circumference calibration, complete Steps 2 through 5 and use the following formula.

Example:

$$\frac{\text{Num Of Ft Traveled x 4.2}}{\text{Accumulated Area Reading}} = \text{Cal'd Wheel Circ.}$$

Example:

$$\frac{\text{1320 Ft. (Qtr. Mile) X 4.2}}{\text{67.8 Accumulated Acres}} = \text{81.8 Cal'd Circ}$$

INSTALLATION - BASIC UNIT

CONSOLE MOUNTING

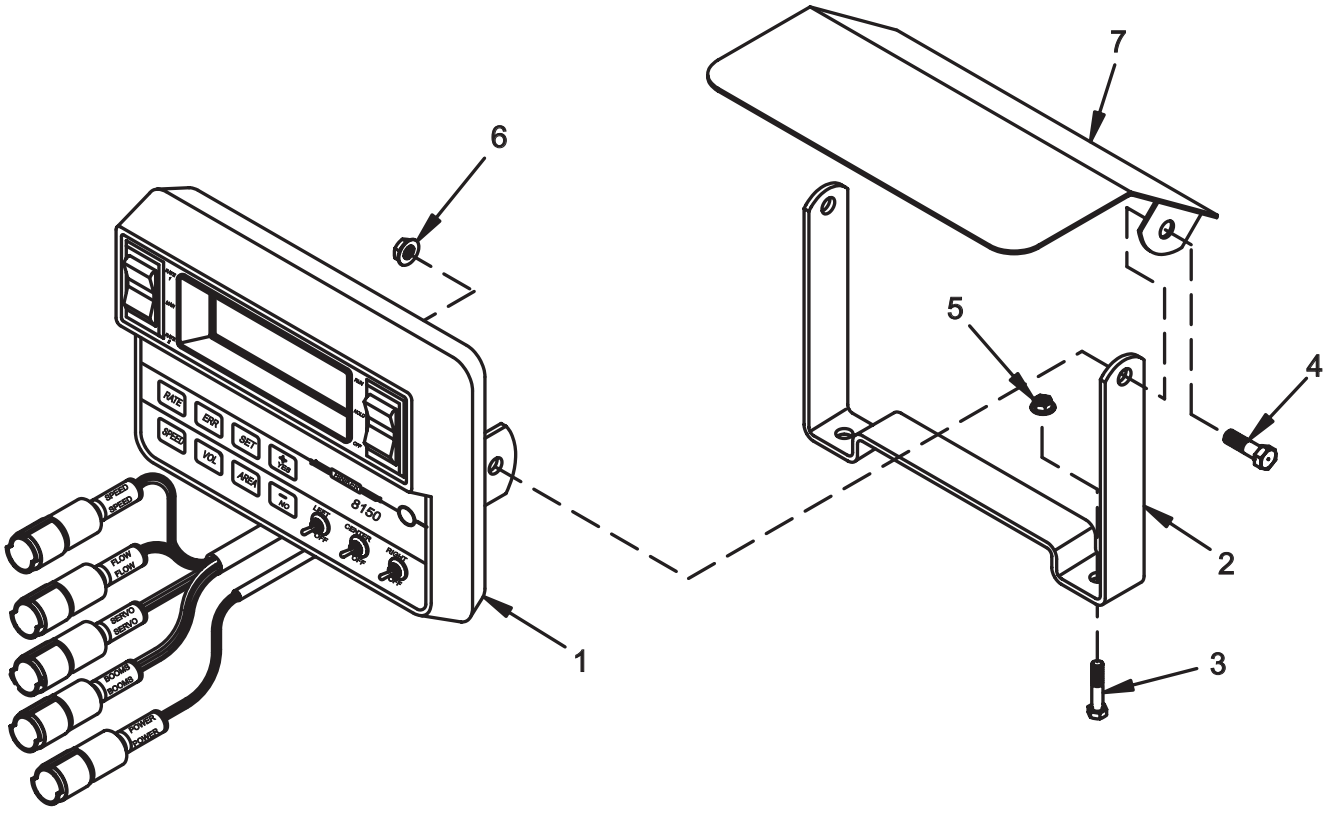
Select a convenient location to mount the control console.

This location should provide the operator with a good view of the console display and easy access to all switches.

There will be 5 cables connecting the console to the other parts of the system. They are listed in the table. The console location should allow easy routing of these cables.

CABLE	CONNECTED TO
POWER	BATTERY
SERVO	SERVO VALVE
SPEED	SPEED SENSOR
FLOW	FLOWMETER
BOOM	SOLENOID VALVES

Install the “U” shaped mounting bracket as shown in Figure 1, using the hardware supplied.



DWG. NO. 2730

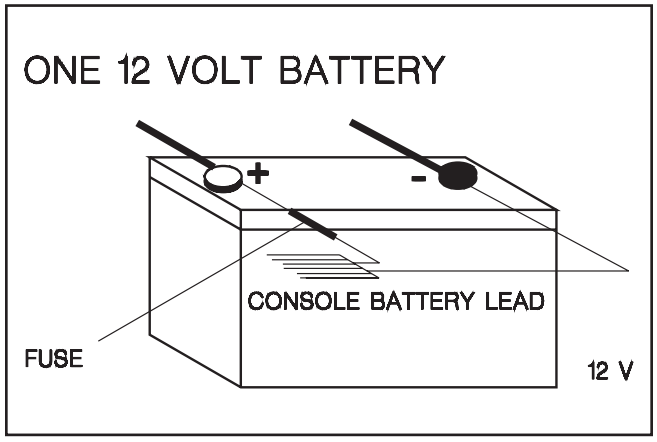
POWER CABLE CONNECTION

The 15-foot battery cable should be routed to the battery and secured with cable ties. Care must be taken to route this cable away from moving or hot parts. The battery cable must be connected directly to the battery post. Be sure the battery is in good condition and the connecting posts are clean. Connect the red and white leads with the circuit breaker to the positive terminal and the black lead to the negative terminal. Be sure it is connected to 12 volts. Plug the other end of the cable into the console connector labeled power.

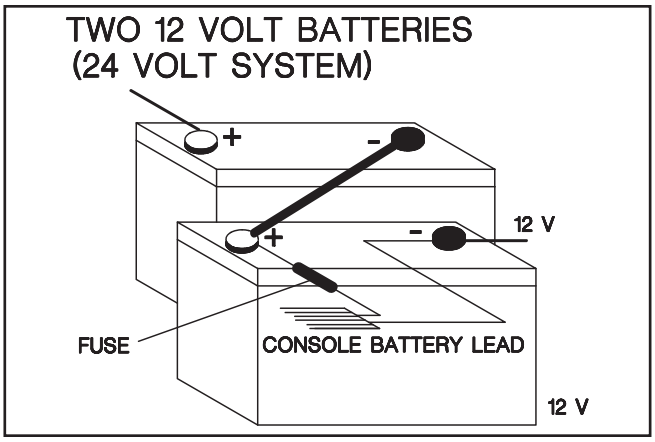
If there is any doubt as to whether or not you have a 12 volt system use a volt meter to check it.

DO NOT connect the battery cable to the tractor starter motor, alternator or other location.

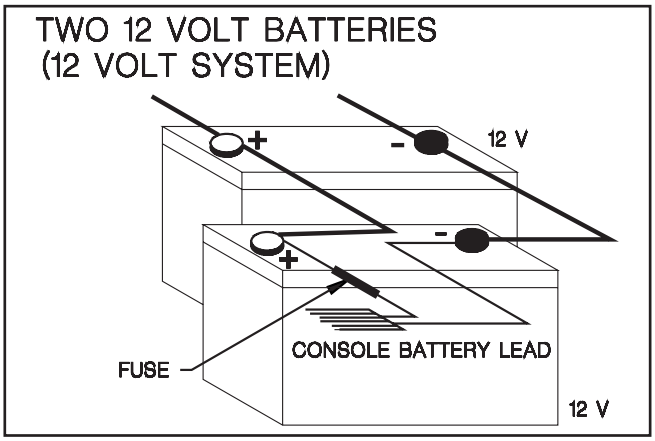
IMPORTANT: Disconnect power cable from console when jump starting or charging battery. Failure to do this may cause damage to the console.



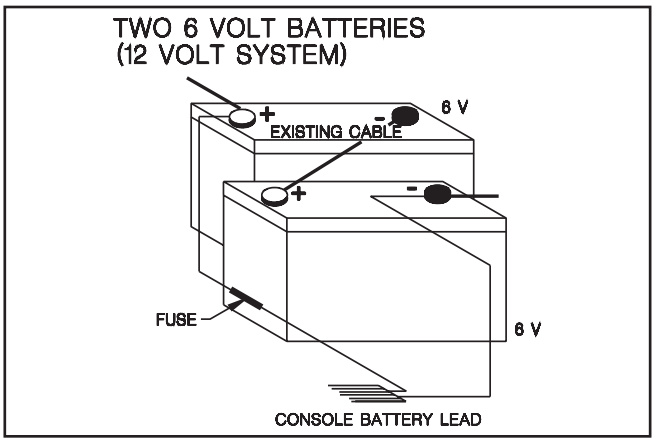
DWG. NO. 3446



DWG. NO. 3445



DWG. NO. 3443



DWG. NO. 3444

INSTALLATION - SPEED SENSOR

HUB PLATE SPEED SENSOR

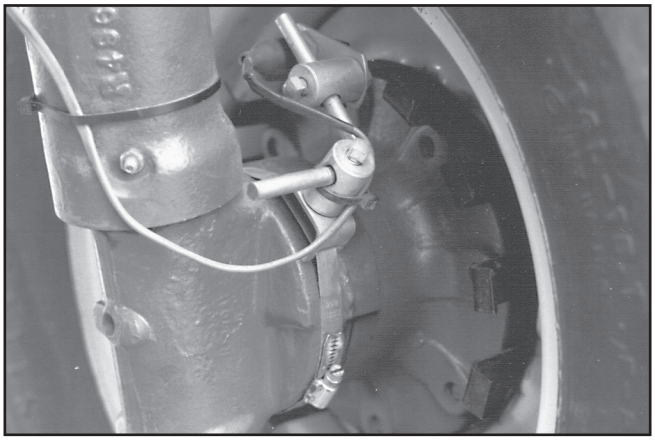


PHOTO NO. 2439

The hub plate speed sensor may be installed either on the tractor or the implement. Do not install the sensor on a driven wheel. This will cause readings to be incorrect due to wheel slippage.

To install the hub plate jack the implement up and block. Remove the wheel from the hub. NOTE: In some special cases it may be easier to split the hub plate (saw in half) and install one-half at a time without removing the wheel from the hub.

Place the hub disk onto the hub with the fingers facing as shown in Figure A.

Assemble the hardware as shown in Figure B. DO NOT tighten the set screws at this time.

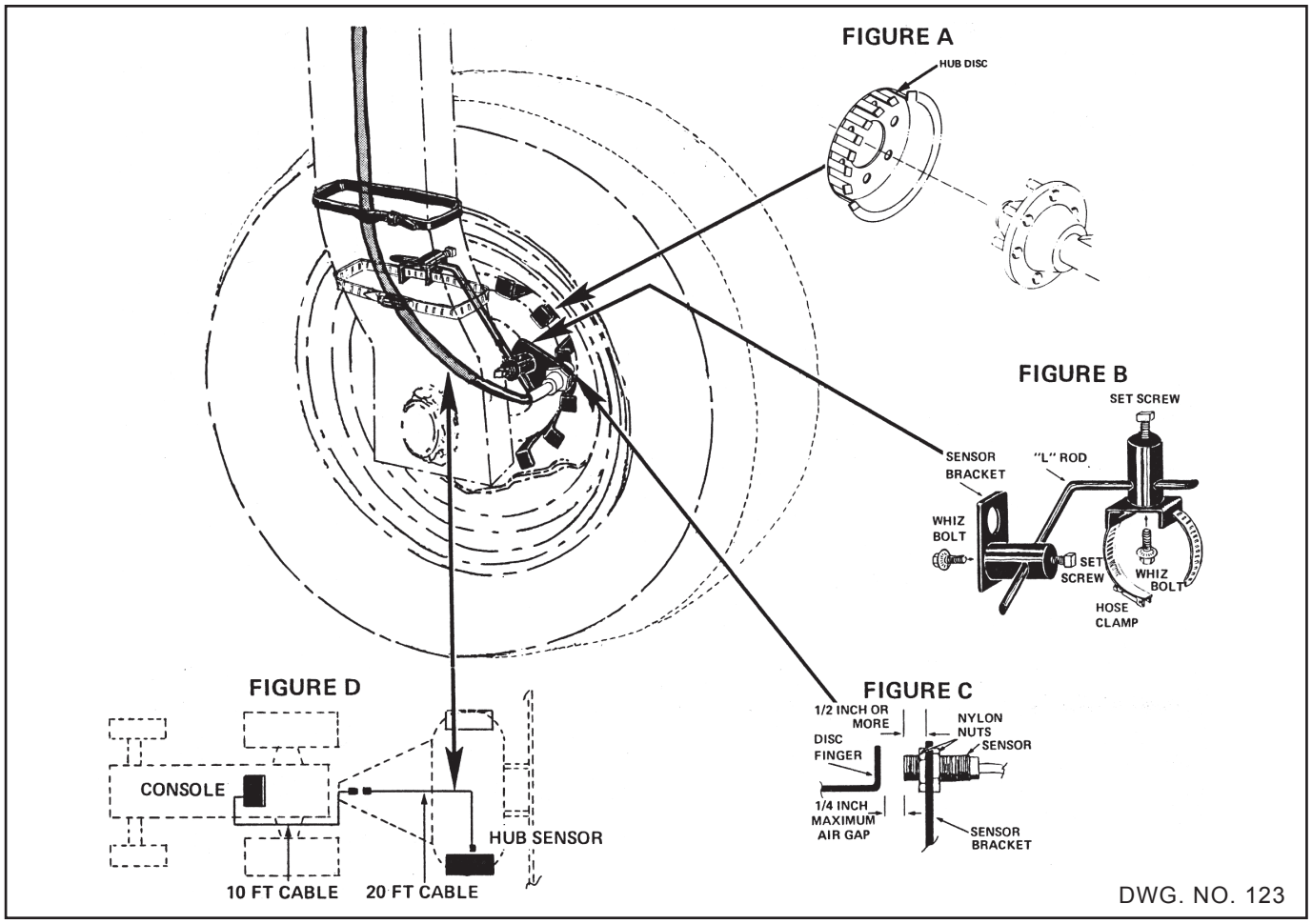
Mount the speed sensor in the sensor bracket using the two nylon nuts. **Be sure the sensor protrudes at least 1/2 inch through the bracket hole. See Figure C.**

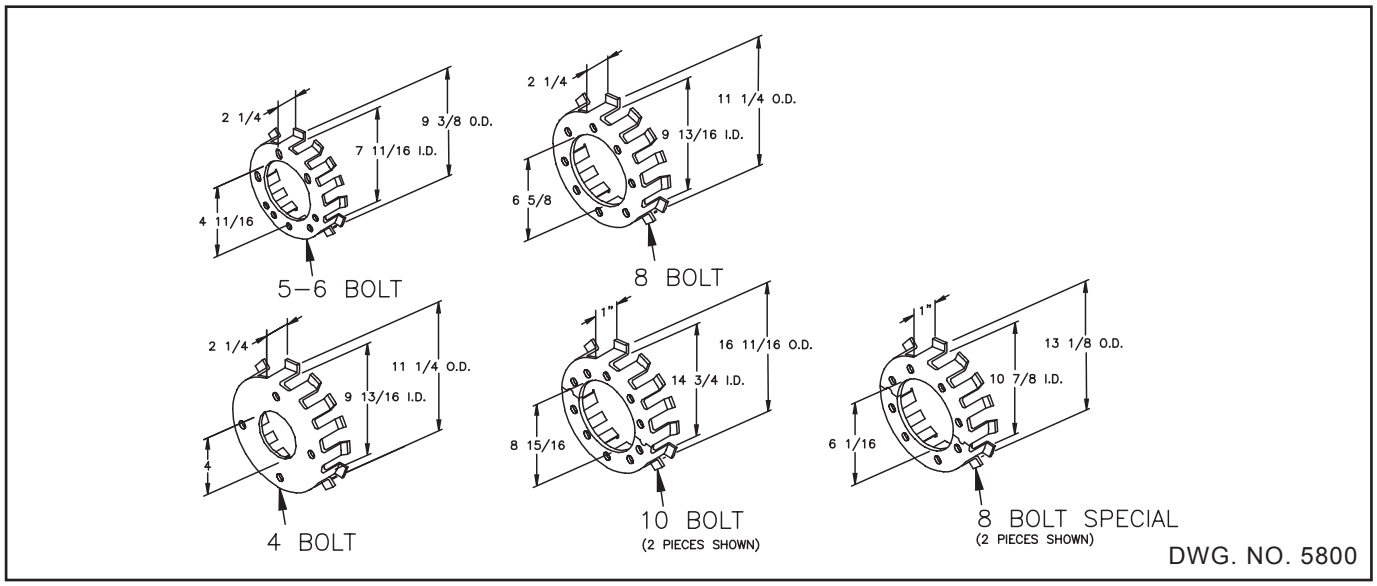
Use the 4-1/2 inch hose clamp to fasten the entire assembly to the axle or some framework.

Position the entire assembly on the implement. Adjust the L rod and sensor bracket as required so the sensor is 1/4 inch or less from the hub disc fingers. See Figure C. Make the installation as strong and rigid as possible. Cut off any excess length from the L rod.

Tighten all whiz bolts and set screws once it is adjusted.

Connect the 20 and 10 foot cables labled speed as shown in Figure D, using the cable ties provided. Secure all cables to prevent dragging and chafing.





The 4 bolt hub plate is for (4) 9/16 inch bolts on a 5-inch bolt circle.

The 5 bolt hub plate is for (5) 9/16 inch bolts on a 5 1/2 inch bolt circle.

The 6 bolt hub plate is for (6) 9/16 inch bolts on a 6-inch bolt circle.

The 8 bolt hub plate is for (8) 5/8 inch bolts on a 8-inch bolt circle.

The 10-bolt hub plate is for (10) 3/4 inch bolts on an 11 1/4 inch bolt circle.

The 8 bolt hub plate (for adjustable axial) is for (8) 5/8 inch bolts on an 8 inch bolt circle.

RADAR:

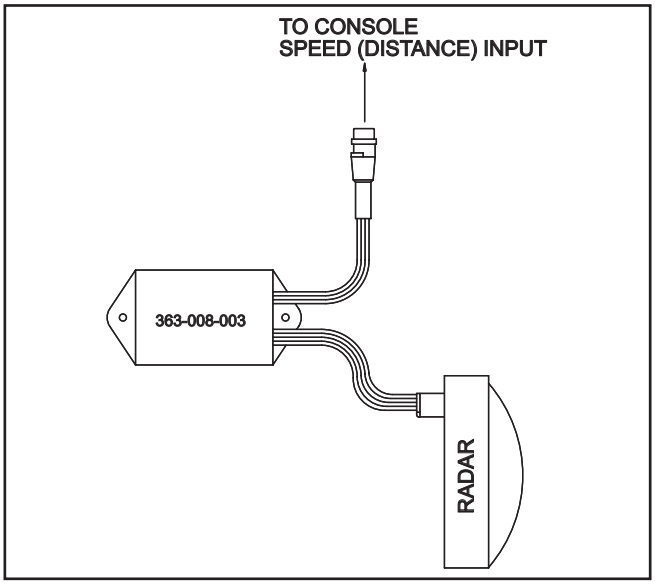
Most commercially available radar units may be used with the Hiniker system. This will require installing a Radar Interface between the radar and the Hiniker system.

Listed below are the Radar Interfaces and their proper hook up.

PART #363-008-003

This standard interface is used to connect a Magnavox radar to the 8150 console in a stand-alone mode. In the stand-alone mode the radar is not connected to any other system.

To install, connect interface to radar and mount in a convenient location. Connect the speed cable to console using speed extension cable (not included).

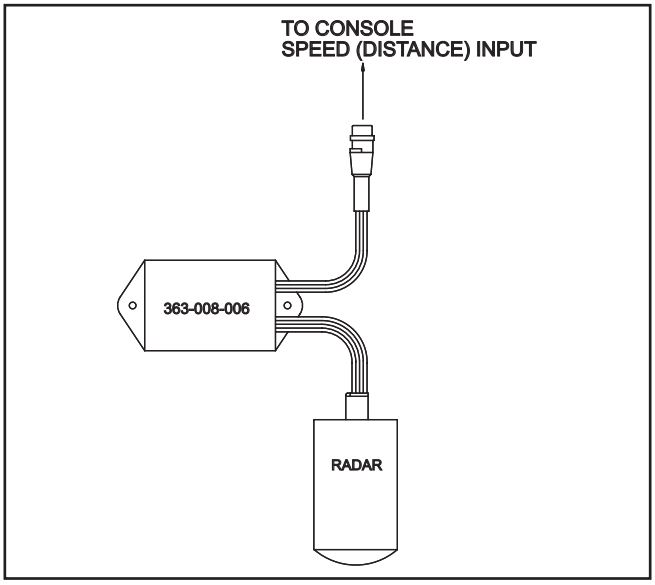


DWG. NO. 2750

PART #363-008-006

This standard interface is used to connect a Dickey John Radar with AMP connector to the 8150 console in a stand-alone mode. In the stand-alone mode the radar is not connected to any other system.

To install, connect interface to radar and mount in a convenient location. Connect the speed cable to console using speed extension cable (not included).



DWG. NO. 3062

ADAPTIVE INTERFACE

The Adaptive Radar Interface is a universal radar interface intended to connect existing radar systems to the Hiniker system.

The Adaptive Radar Interface when used with the proper adapter cable will work with any radar system. The interface will not effect the performance of the radar system and totally isolates the two systems electronically.

How it works

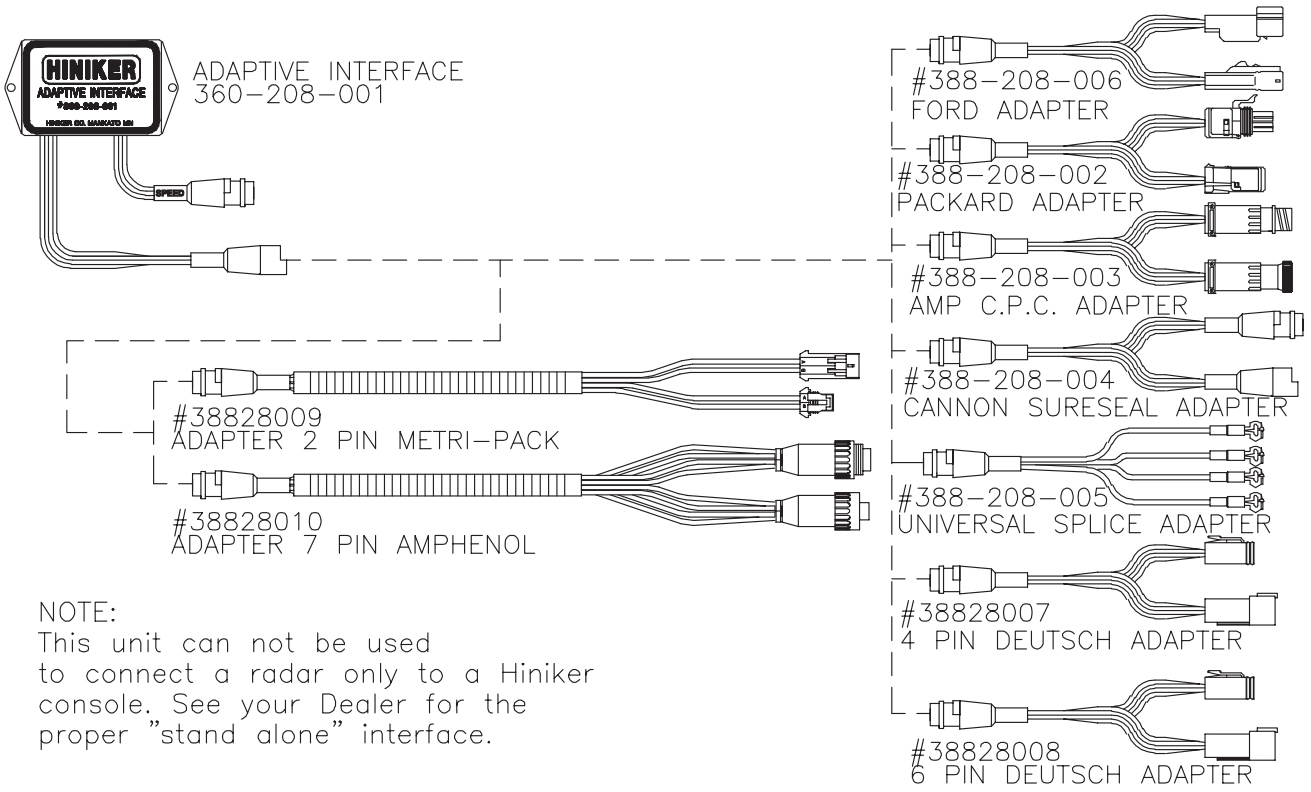
The Adaptive Interface consists of the interface module and the proper adapter cable. The adapter cable is a “T” type feed thru cable with the proper connector to interface to your system. **As long as the connector mates with the connector at the radar, the interface will work.** No more wiring errors! The Adaptive Interface will **find** the proper wires for power, signal, and ground, and provide high isolation between the dash and the Hiniker system. The interface divides the signal, enhances it and routes it to the Hiniker system. Adapter cables are available for all radars.

To install

Disconnect the radar cable from the radar and connect it to the Adaptive Interface adapter cable. Next plug the adapter cable into the radar. Connect the Adaptive Interface to the adapter cable and mount in a convenient location with wires facing down. Connect the cable marked speed to the SPEED input of the Hiniker console using the proper length speed extension cable. Route all cables away from hot or moving parts, and secure with wire ties.

To install the universal splice adapter cable, first apply the blue wire taps to the wires at the radar using a pair of pliers, one tap to each wire. Next connect the adapter to the interface and mount as described above.

If you are using the Ford adapter and your Radar is equipped with the same connector only black instead of gray, then perform the following: On the male shells only, clip off the small indexing tab that prevents the mating of a black and gray shell together. This must be done on both male shells, one black and one gray.



DWG. NO. 5222B

INSTALLATION – SPRAY CONTROL

INTRODUCTION

This section describes how to plumb a sprayer for use with the Hiniker 8150 controller.

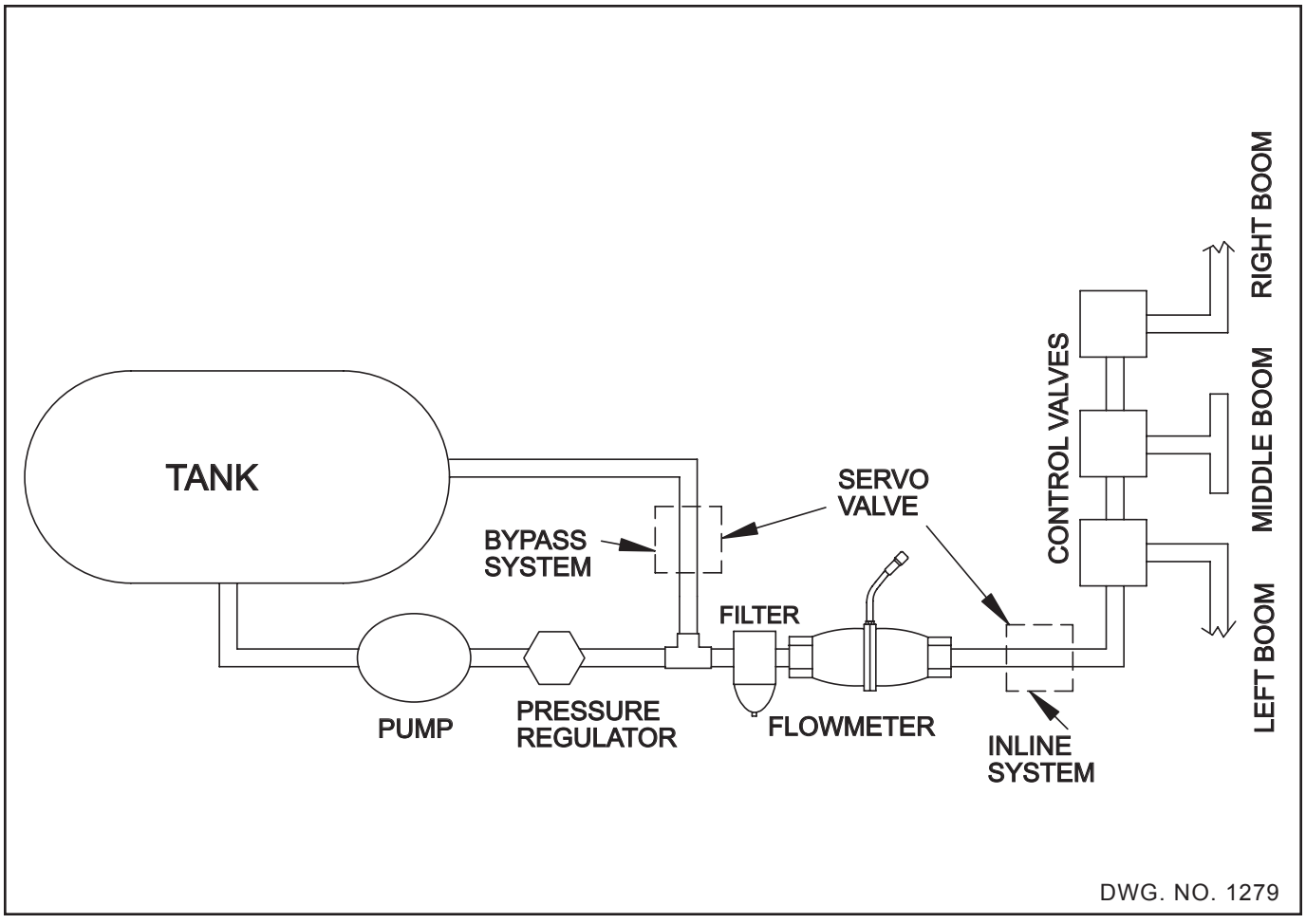
There are two basic configurations. The Inline system and the Bypass system. The Inline system is when the Servo Valve controls the flow to the nozzles. The Bypass system configuration has the Servo Valve controlling the return flow to the tank or pump.

The Bypass system is better suited for flow rates under 5 gallons per minute, where the Inline system is better suited for higher flow rates. The vast majority of flow rates are between 5 and 30 gallons per minute. For these rates it is recommended to use the Inline system.

To determine required gallons per minute with your sprayer, use this formula.

$$GPM = \frac{GPA \times MPH \times Width\ (ft.)}{495}$$

If your sprayer has the boom control valves built into the pressure regulator (one enclosed unit), see options section for special instructions.



INLINE SYSTEMS

In an Inline System the Flowmeter and Servo Control Valve MUST be after all agitation and Bypass lines and inline with all the flow to the booms.

THE FLOWMETER MUST ONLY MEASURE THE FLOW TO THE BOOMS. THEREFORE, IT MUST BE AFTER ANY RETURN LINES.

THE FLOWMETER MUST MEASURE THE FLOW TO THE ENTIRE BOOM. THEREFORE, IT MUST BE BEFORE THE BOOM CONTROL VALVES.

The Bypass or agitation line should be a minimum of 1-inch and contain a manual control valve. This valve is required to make overall sprayer adjustments.

An optional Bypass line may be installed to increase Bypass for high capacity pumps. This line MUST have a manual control valve.

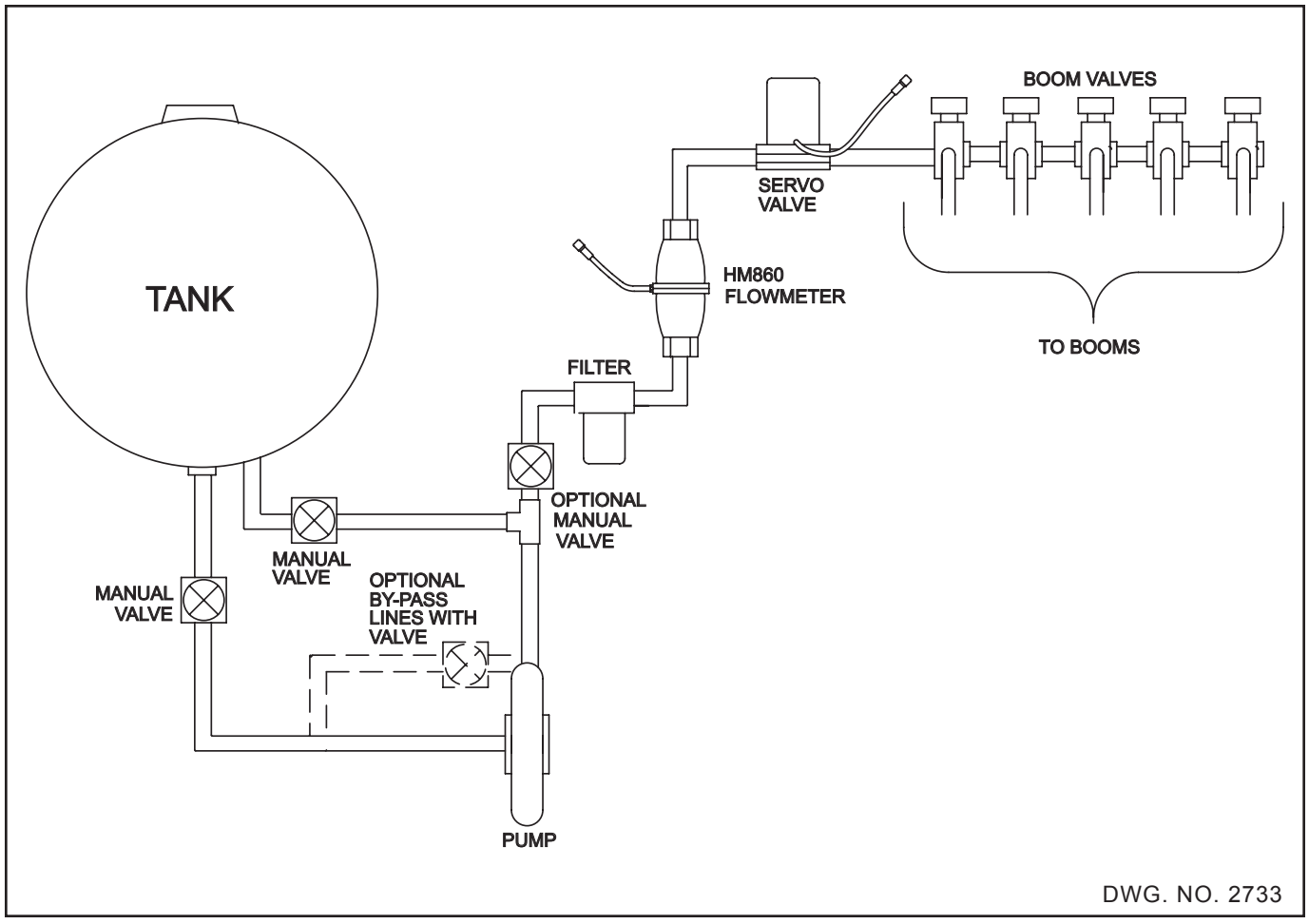
A filter is recommended before the flowmeter.

Recommended mounting for the HM860 Flowmeter is vertical with the arrow pointing up.

The Servo Valve should be mounted horizontally with the cover up to prevent dirt and water from accumulating inside the cover.

All lines up to the Boom Control Valves should be a minimum of 1-inch diameter. Smaller than 1-inch diameter lines may restrict the flow and limit the speed in which you may be able to spray.

NOTE: AT 55 PSI INPUT PRESSURE, THE SERVO VALVE MAY LEAK UP TO 2.5 GALLONS PER MINUTE. THERE IS NO CONTROLLING BELOW THIS RATE. FOR VERY LOW FLOW RATES A "BYPASS INSTALLATION" IS RECOMMENDED.



BYPASS SYSTEMS

In a Bypass System the Flowmeter measures all the flow to the booms, but the Servo Valve controls the flow bypassed back to the Tank (or pump inlet).

This type of system is only used for low flow rates.

This configuration is shown below.

THE FLOWMETER MUST ONLY MEASURE THE FLOW TO THE BOOMS. THEREFORE, IT MUST BE AFTER ANY RETURN LINES.

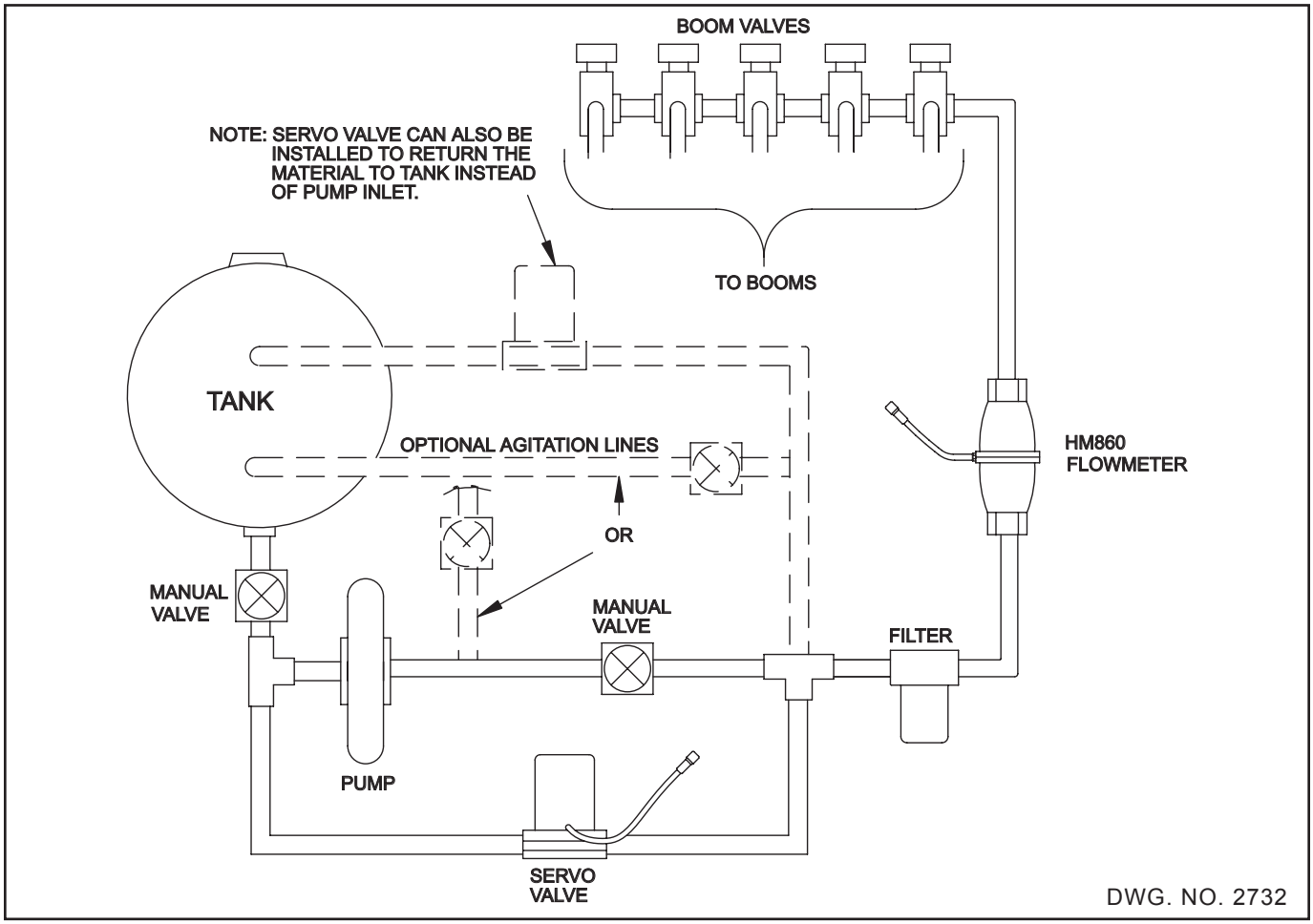
THE FLOWMETER MUST MEASURE THE FLOW TO THE ENTIRE BOOM. THEREFORE, IT MUST BE BEFORE THE BOOM CONTROL VALVES.

It is highly recommended to install the flowmeter after the filter, as shown below.

If the Servo Valve is mounted in an existing bypass line or agitation line, be sure to remove any parts that may restrict the flow. For example, some agitation lines have nozzles inside the tank; this would severely limit the range of the Servo Valve and must not be used. If a new bypass line is going to be installed, keep it as big as possible. A minimum of 1-inch diameter hose should be used. Try to mount it so the total length is as short as possible.

A manual valve MUST be located after the pump and before the bypass line as shown. This valve is required to make overall sprayer pressure adjustments.

Additional bypass lines for agitation are optional. If used, they must include a manual valve for initial pressure adjustments. Low capacity pumps may require closing these valves.



HM860 FLOWMETER

The HM860 FLOWMETER has an output signal proportional to the flow through it. There are decals on the meter with the calibration numbers needed to calibrate the controller. These calibration numbers are in “PULSES PER GALLON” and “PULSES PER POUND OF ACTUAL NITROGEN.”

Although the HM860 FLOWMETER was designed to be operated while mounted in any direction, when used in applications with flow of 5 gallons per minute or less, it is recommended to install the HM860 FLOWMETER in the vertical position with the flow direction up (arrow on meter pointing up).

Do not install the HM860 FLOWMETER near strong magnetic fields such as those created by solenoids or motors. Keep all electrical wiring at least 1-foot away from meter.

INSTALLATION

Refer to the figure for the proper installation of the HM860 FLOWMETER.

STEP 1 Find a convenient location (vertical for low flow rates) on your sprayer to mount the flowmeter.

NOTE: Use Teflon pipe sealant on all pipe connections.

IMPORTANT: The pipe adapter (item 4) must be installed on the inlet side of the flowmeter. It’s purpose is to reduce turbulence caused by hoses, elbows, and reducers. Failure to use at least 4 inches of straight 1 1/4 inch pipe may cause the flowmeter to be inaccurate.

STEP 2 Install pipe adapters (items 4, 5, 6, 7) on the flowmeter.

STEP 3 Install mounting bracket (item 1) to flowmeter assembly using the three 1/4 inch nuts supplied (item 9).

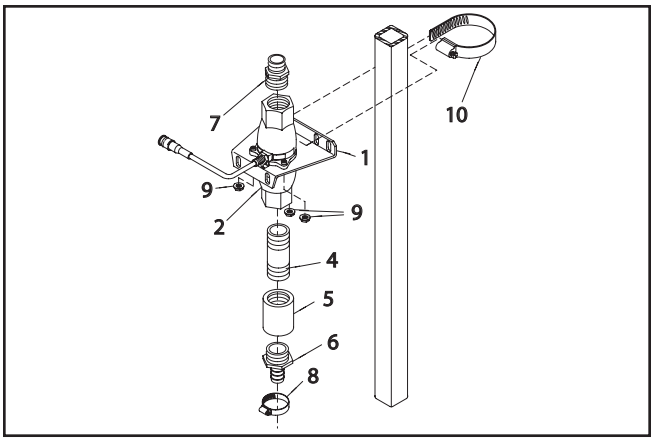
NOTE: Make sure arrow on the flowmeter is pointing in the direction of the flow.

STEP 4 Connect the input hose to the flowmeter by pressing hose firmly on to the hose barb and securing with hose clamp (item 8).

STEP 5 Connect the output to the Servo Valve or use a 1 1/4 inch by 1-inch hose barb and attach to the output hose. Secure with a 1 1/16 hose clamp.

STEP 6 Install the mounting bracket assembly to the sprayer using the 4 inch hose clamp, (item 10) or drill two 1/4 inch diameter holes, and use the 5/16 self-tapping screws.

STEP 7 Connect your flowmeter to the controller using the 10 foot and 20 foot cables. Route them away from moving or hot parts, using the cable ties provided. Both cables are labeled for easy identification. Connect the cable into the console receptacle labeled “Flow.”



DWG. NO. 2729

SERVO VALVE:

The Servo Valve is a motorized Butterfly control valve that is used to control the flow in the system as directed by the console.

Determine Valve placement for either an Inline system or Bypass system.

IMPORTANT - If you have a very low application rate the Servo Valve must be mounted in bypass.

In general, any mechanical pressure regulator already on the sprayer does NOT have to be removed. However, specific adjustments to this regulator are usually required and are described under sprayer set-up.

The servo valve has 1 inch female NPT on each end. If required, reducing bushings may be used; however, keep the bypass line as big in diameter as possible. Using 1/2 inch line may severly limit the effective range of the servo valve.

If the Servo Valve is mounted in an existing bypass line or agitation line, be sure to remove any parts that may restrict the flow. For example, some agitation lines have nozzles inside the tank; this would severly limit the range of the servo valve and must not be used.

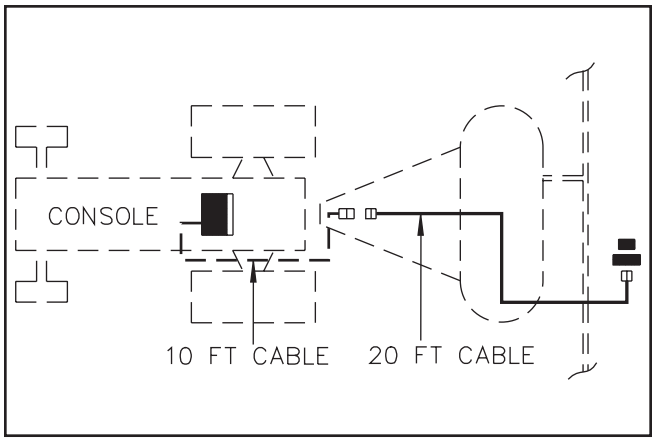
Flow direction through the servo valve is not critical, there is no “in” and “out” installation requirement.

The servo valve can be mounted at any angle. If possible, mount it with the cover towards the top so it will limit the accumulation of rain and dirt.

The servo valve is stainless steel. Maximum operating pressure is 400 PSI.

Be sure to use Teflon tape or pipe thread sealer on all connections to prevent leaks.

The servo valve comes with a 20 foot cable which should be long enough to reach the tractor hitch. A 10 foot cable is provided to go from the hitch to the 8150 console. Be sure to connect the 10 foot cable to the receptacle labeled “Servo.” Both cables are labeled “Servo” for easy identification. Extension cables are available, if required. Be sure to route all cables away from moving or hot parts. Use the cable ties provided.



DWG. NO.111

REMOTE RUN/HOLD:

The 8150 allows the user to disable the remote run/hold. To disable the remote run/hold just answer “no” to the question “ENABLE REM. R/H ?” during calibration.

This allows the 8150 console to operate in the run mode without the need to connect the remote run/hold switch. The console run/hold/off switch and boom switches will still put the unit into hold.

To use the remote run/hold function answer “yes” to the question during calibration.

This option will reduce the number of controls the operator must use on the end rows or turns.

If the remote run/hold is enabled, then pin 1 of the solenoid valve connector has to be connected to the negative side of the 12-volt power source to bring the console out of hold. This is accomplished using the remote run/hold switch.

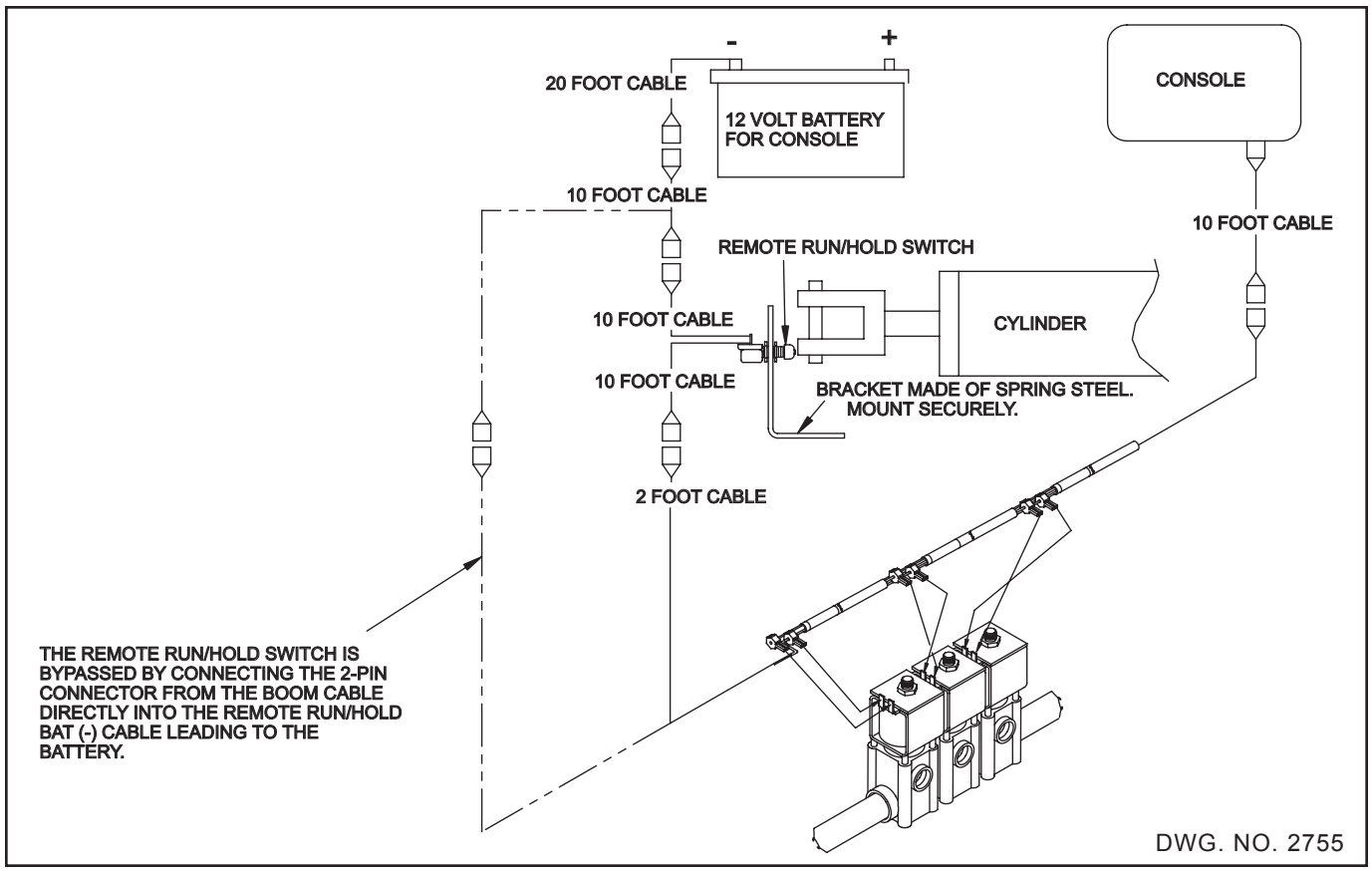
NOTE: BECAUSE PIN 1 OF THE SOLENOID VALVE CONNECTOR IS A “SENSE” LINE AND NOT A RETURN GROUND, THE REMOTE RUN/HOLD CABLE MUST BE ROUTED BACK TO THE NEGATIVE SIDE OF THE BATTERY. DO NOT CONNECT TO THE FRAME.

The remote run/hold switch is closed when the button is not pressed and open when the button is pressed.

The console will go into hold when the button is pressed.

Connect the switch bracket as illustrated below so the cylinder or another moving part will activate the switch and put the console into hold.

If using electric solenoids, but not using the remote run/hold, the 2-pin connector of the boom cable must be connected directly to the negative side of the battery. This allows the electrical solenoids to operate. The remote run/hold switch may be bypassed by connecting the 2-pin connector from the boom cable directly into the remote run/hold battery (-) cable leading to the battery.



INSTALLATION - ANHYDROUS AMMONIA

CAUTION: If you and your operator(s) are not intimately familiar with the proper handling procedures for Anhydrous Ammonia, contact your supplier for information, and read all safety precautions found in the "HINIKER ANHYDROUS AMMONIA MONITORING AND CONTROL SYSTEM MANUAL" Refer to manual part number 360-000-246 Revision E or later for heat exchanger manufactured prior to 2007. These are painted gray. Or, refer to manual part number 39300035 for heat exchanger manufactured in 2007 or after. These are painted white.

Refer to the "HINIKER ANHYDROUS AMMONIA MONITORING AND CONTROL SYSTEM MANUAL" for Installation of Anhydrous Ammonia systems. Refer to this manual for installing the Console, Speed Sensor, Cables, and Remote Run/Hold feature.

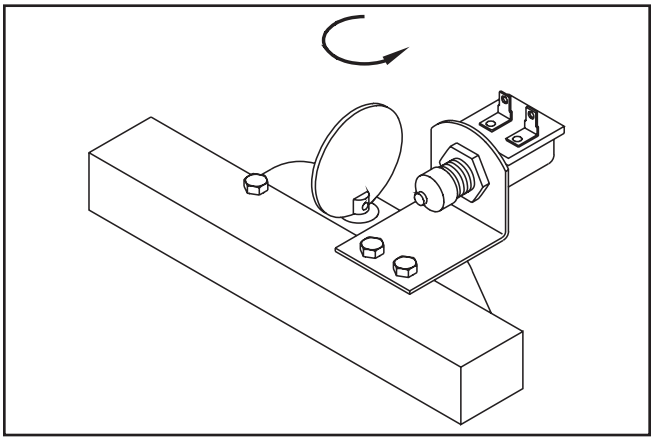
REMOTE RUN/HOLD:

DANGER: DO NOT use the Remote Run/Hold switch when wired to an electric shutoff valve. Unintentional activation of the remote switch could cause a discharge of Ammonia.

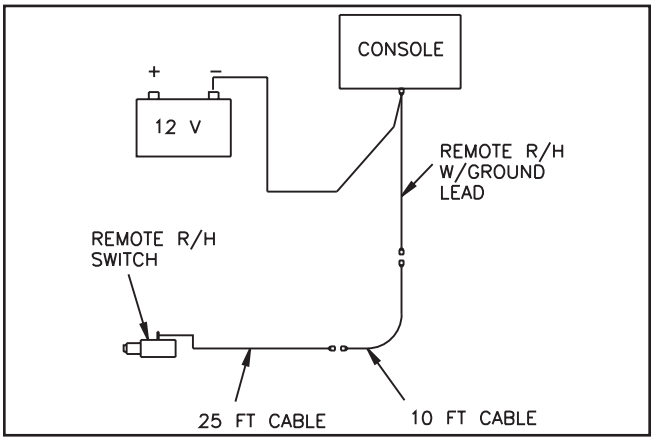
IMPORTANT: The console must be switched to Hold whenever the Anhydrous is turned off.

Before using the Remote Run/Hold, it first must be "enabled" during the Calibration procedure. The NH_3 Remote Run/Hold cable with a ground lead should be connected to the Console Connector marked booms. The ground lead needs to be connected to the negative side of the battery or suitable ground. Route the 25 Ft. and 10 Ft. cables as shown in drawing 5113.

The Remote Run/Hold switch can be used with Hydraulic shutoff valves. Position the switch on the shutoff valve in a manner so that the exposed Shaft or Flag will activate the switch when turned OFF See drawing 2756 below.



DWG. NO. 2756



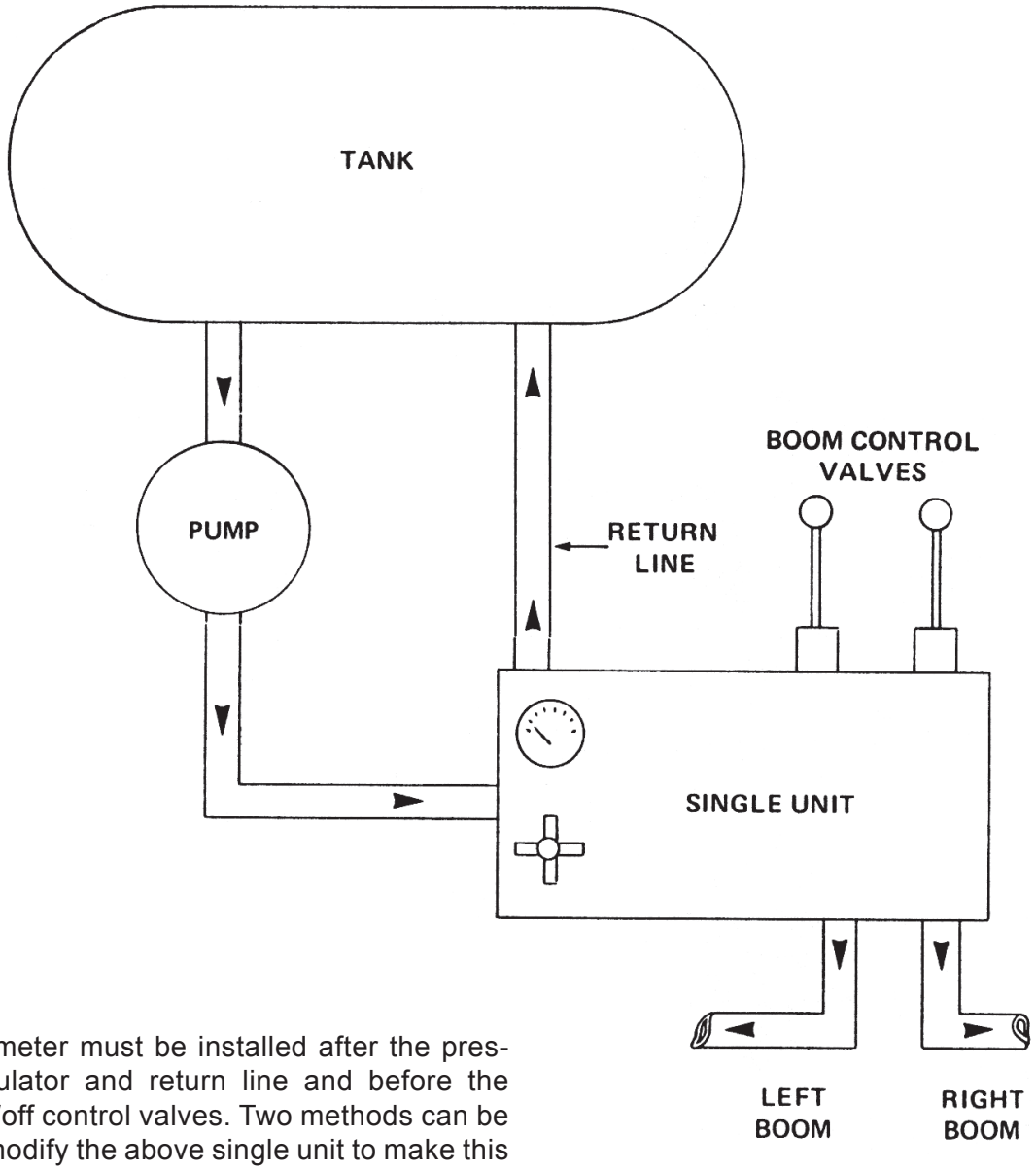
DWG. NO. 5113

OPTIONS

FLOWMETER SPECIAL INSTALLATIONS

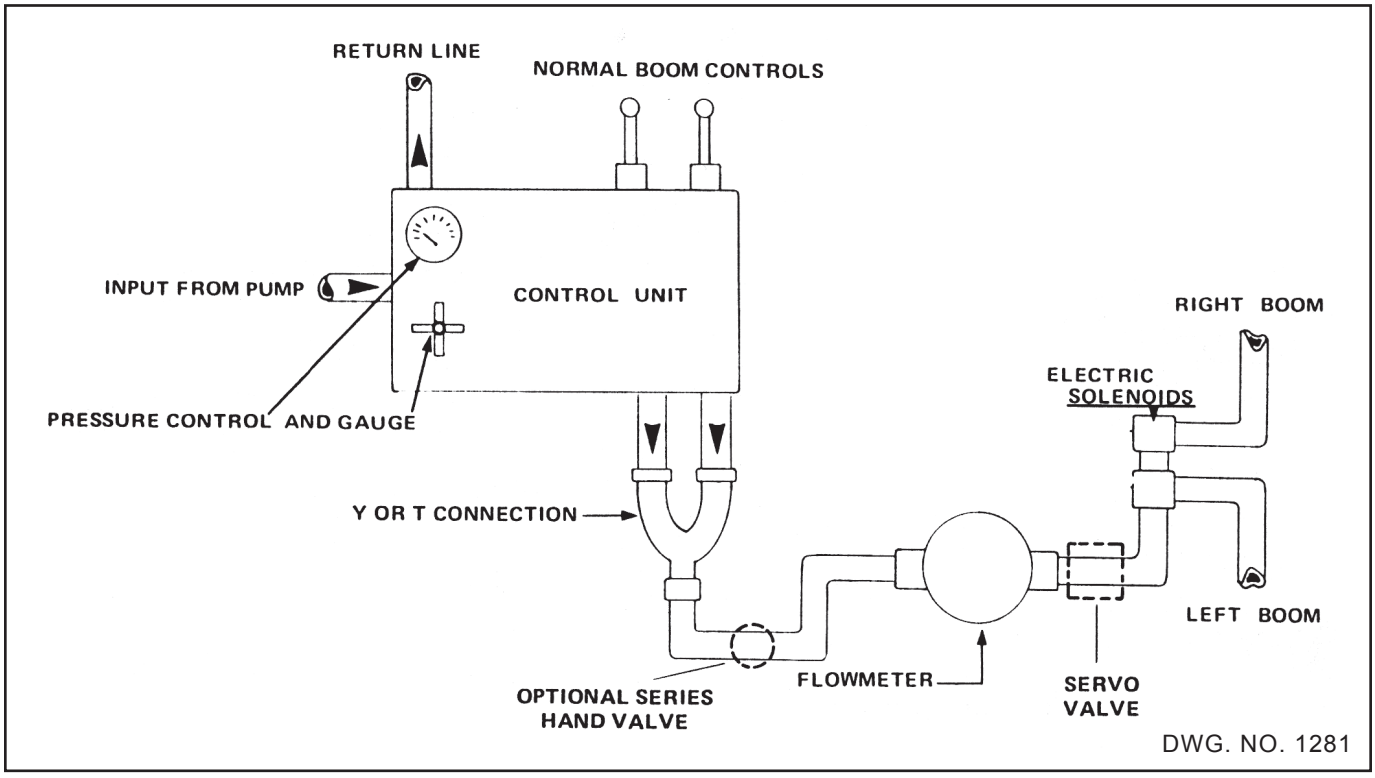
Some sprayers have a pressure regulator valve incorporating boom shut off valves in a single housing as shown below.

READ THIS SECTION ONLY IF YOU HAVE THIS TYPE OF SPRAYER.

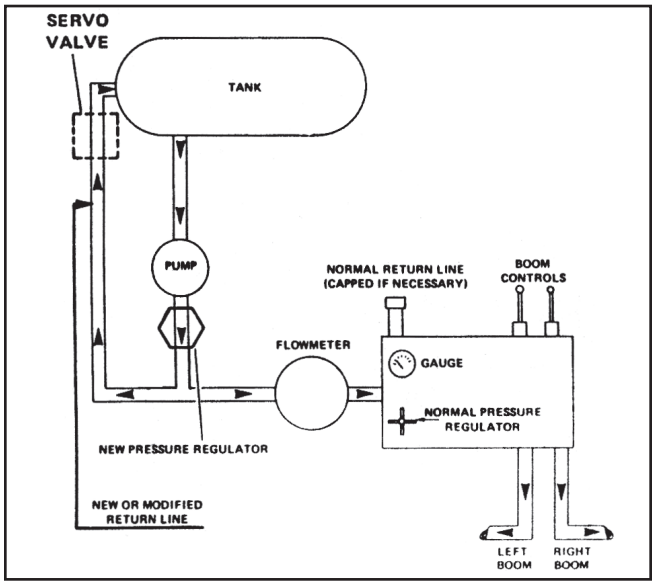


The flowmeter must be installed after the pressure regulator and return line and before the boom on/off control valves. Two methods can be used to modify the above single unit to make this installation possible.

DWG. NO. 109

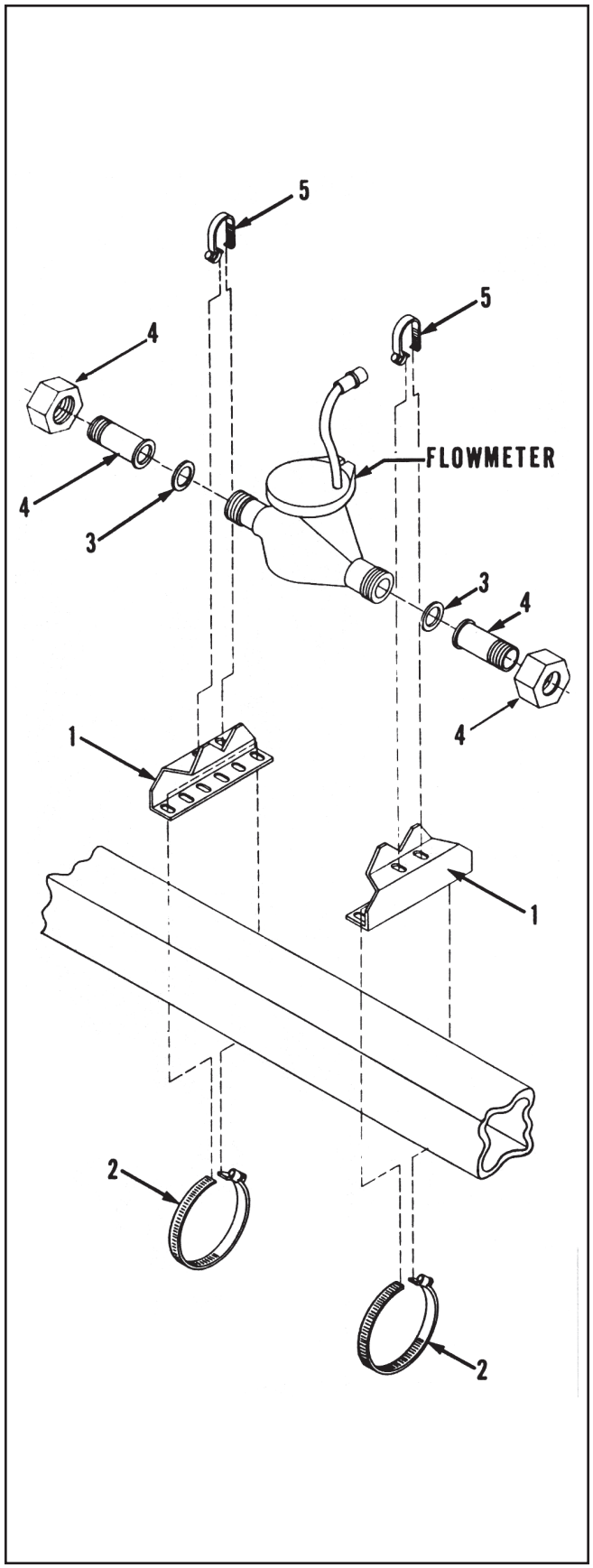


The first method requires the use of two solenoid valves. These valves are used in place of the existing left-right boom controls. The above diagram shows how to use this method. In this method, the existing pressure regulator and gauge still work. The two normal boom controls must be left in the “on” position. The two outputs are combined using the “Y” connections shown. It then flows through the flowmeter and splits back into a left and right boom using the solenoid valves.



DWG. NO. 1283

The second method requires the use of an additional pressure regulator but does not require any extra valves. The diagram at left explains how to use this method. The output of the pump must go to the new pressure regulator. The regulator by-pass must be piped back into the tank with a new or modified return line. The output of the regulator goes to the flowmeter and then to the normal control unit. The normal pressure regulator is adjusted to prevent any flow down the normal return line. If this cannot be done, the line must be cut and capped. The existing pressure gauge will still operate correctly but the operator must use the new pressure control to make overall sprayer adjustments. In this method, the left and right boom control valves will operate normally.



DWG. NO. 110

MVR FLOWMETER MOUNTING

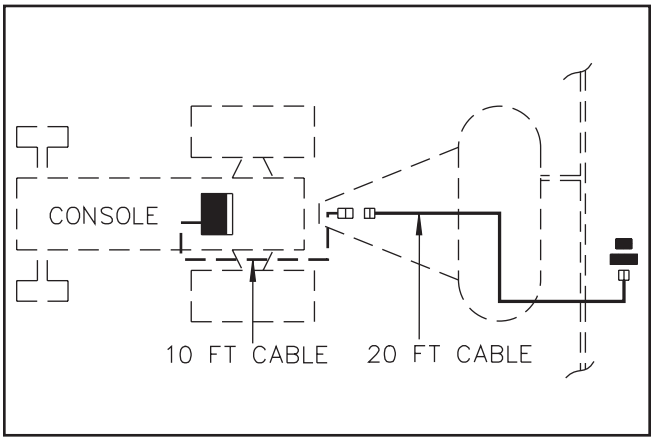
STEP 1 Find a convenient location (must be level) on your sprayer to mount the flowmeter. You will have to remove approximately 12 inches of hose to “splice” in the flowmeter assembly.

STEP 2 Using the 4 1/2 inch hose clamps (Item 2) fasten the flowmeter mount brackets (Item 1) to the sprayer frame. 1 1/2 inch hose clamps are provided as extensions if necessary. The brackets can be spaced so that either the spuds or the flowmeter set in the V notches. **NOTE:** If desired you may bolt the brackets to your frame.

STEP 3 Secure the hose ends to the threaded end of the spuds (Item 4) using the appropriate hardware for your application, (not supplied). Flow must be in the direction as shown by arrow.

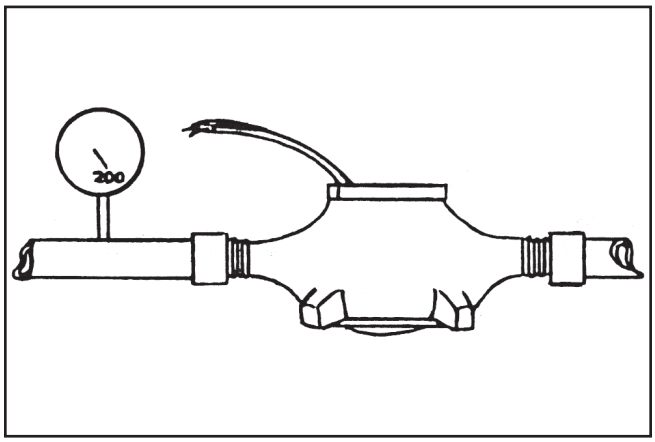
STEP 4 Mount the flowmeter assembly to the mount brackets using the 1 1/2 inch hose clamps (Item 5). When connecting spuds to flowmeter do not forget to install leather washers (Item 3).

Connect your flowmeter to the console using the 20 foot and 10 foot cables as shown below. Route them away from moving or hot parts, using the cable ties provided. Both cables are labeled for easy identification. Connect the 10 foot cable into the console receptacle labeled “Flow.” Extension cables are available if required.

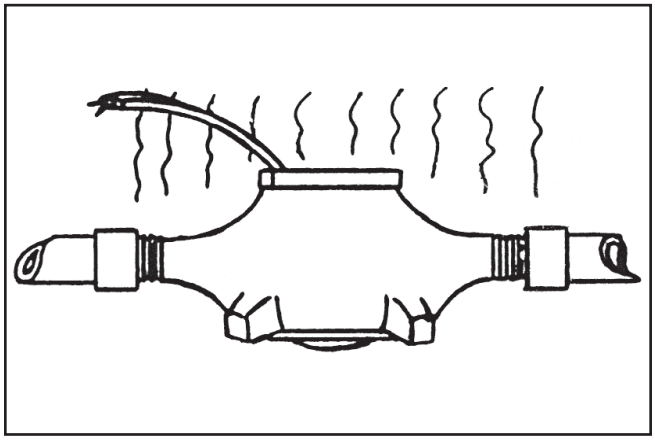


DWG. NO. 111

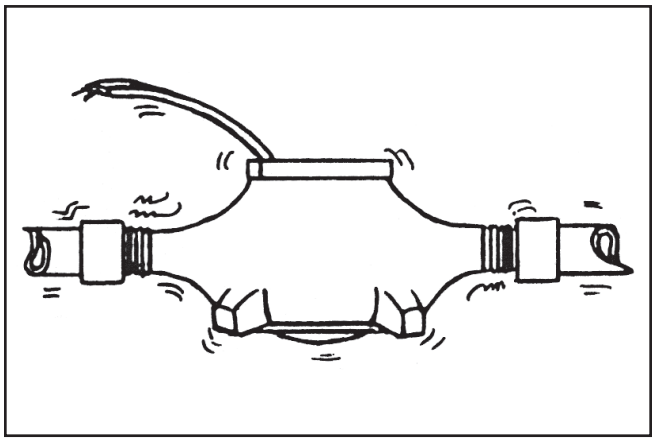
FLOWMETER PRECAUTIONS AND CARE



Do not exceed 200 PSI on flowmeter input as it may leak or rupture.

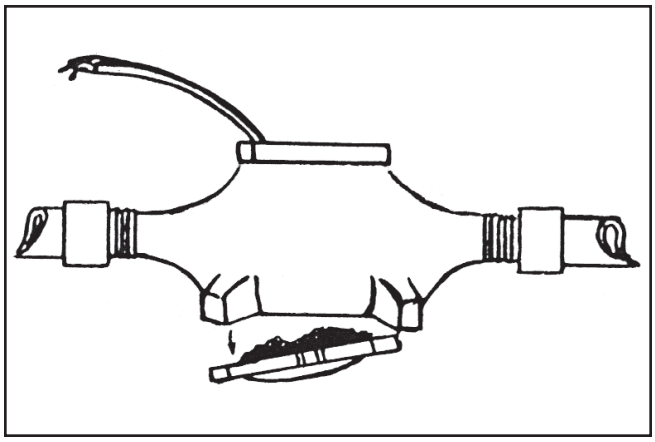


Never expose meter to liquid temperatures higher than 130 degrees Fahrenheit.

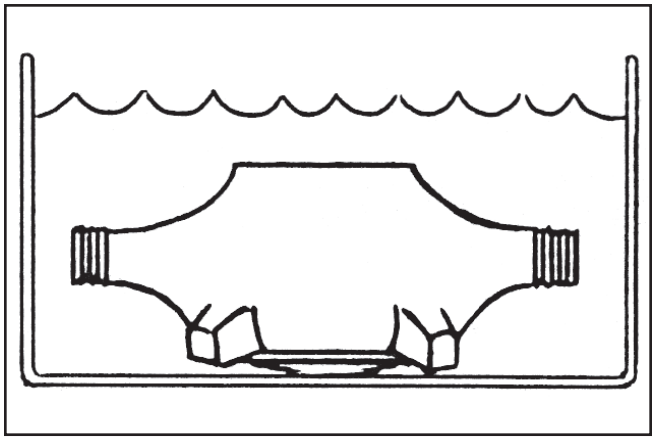


Avoid mounting flowmeter in extremely high vibration locations.

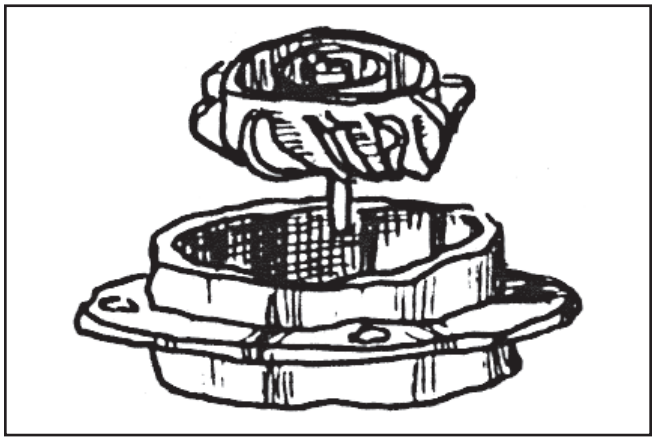
IMPORTANT: Full-strength chemicals may damage flowmeter. Abide by chemical manufacturers instructions for correct mix ratios.



If powdered chemicals are used, it may be necessary to remove bottom plate and clean out sediment occasionally. Some chemicals require thoroughly flushing the sprayer and flowmeter at the end of the day.



Remove the flowmeter from service and let it soak in water if it is not to be used for an extended period of time. Do not put in diesel fuel or gasoline. Remove the detector module before putting it in water and store it where it will not freeze



The Polypropylene turbine and inlet hub may be damaged by some chemicals. Consult chemical manufacturer if in doubt.

FOUR WHEEL DRIVE SPEED SENSOR

Locate the drive shaft that actually drives the tractors wheels (refer to Figure A). In the case of the John Deere 8640, shown in Figure A, the correct shaft is the bottom one. The other two shafts are PTO and engine to transmission shafts. Attempting to sense from them will result in inability to calibrate the Speed Sensor.

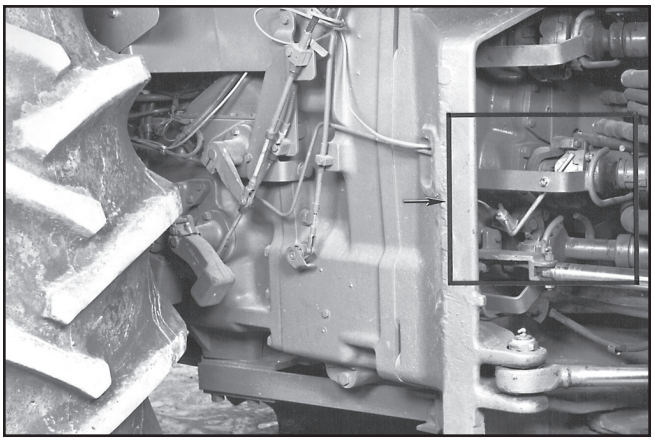


FIGURE A PHOTO NO. 2167

NOTE: It is our recommendation that the hose clamps supplied not be used to clamp the mount kit to the tractor frame. There is a remote possibility that the clamps may loosen under vibration creating the possibility of the Mount Kit becoming entangled with the drive shaft. We DO recommend that the Mount Kit be firmly bolted to the tractor frame in the manner illustrated in Figure B.

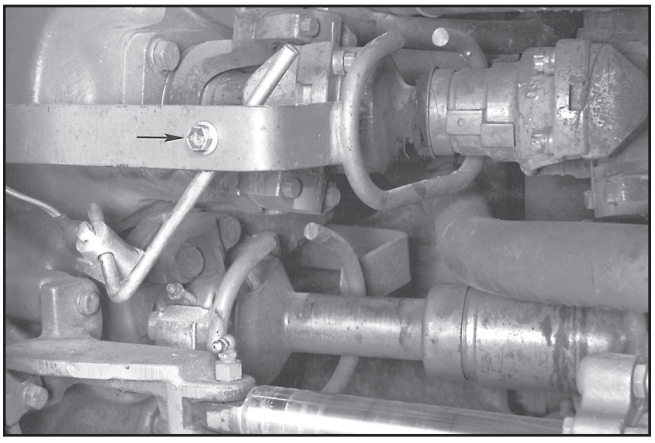


FIGURE B PHOTO NO. 2168

Once you have located the correct drive shaft, locate an area near the universal joint that is free of other moving parts to install the Mount Kit.

If your tractor pivots in the center, be sure to attach the Mount Kit to a portion of the frame that remains stationary with the universal joint knuckles that you will be sensing from. Failure to do so will result in damage to the Speed Sensor or no speed sensing when the tractor pivots.

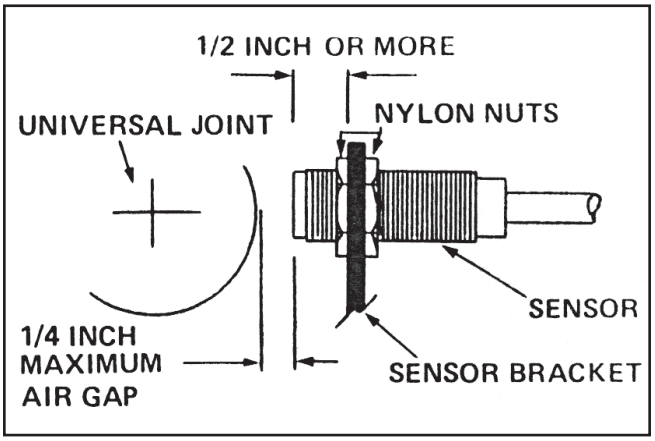


FIGURE C DWG. NO. 119

Attach the Mount Kit to the tractor frame (a hole may need to be drilled in the frame) in the manner illustrated in Figure B. Install the Speed Sensor in the sensor bracket using the two nylon nuts (reference Figure C). Be sure the sensor protrudes at least 1/2 inch through the bracket hole. Adjust the L rod and sensor bracket so the sensor is 1/4 inch or less from the outermost portion of one of the knuckles of the universal joint. Tighten all whiz bolts and set screws once it is adjusted. You may need to cut off unused portions of the L rod. Route the Speed Cable to the console keeping it away from moving parts and leaving enough slack in the cable to allow for turning. Secure the cable with ties.

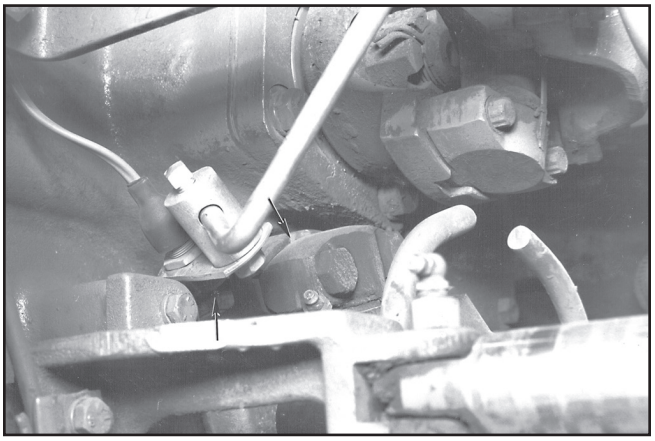
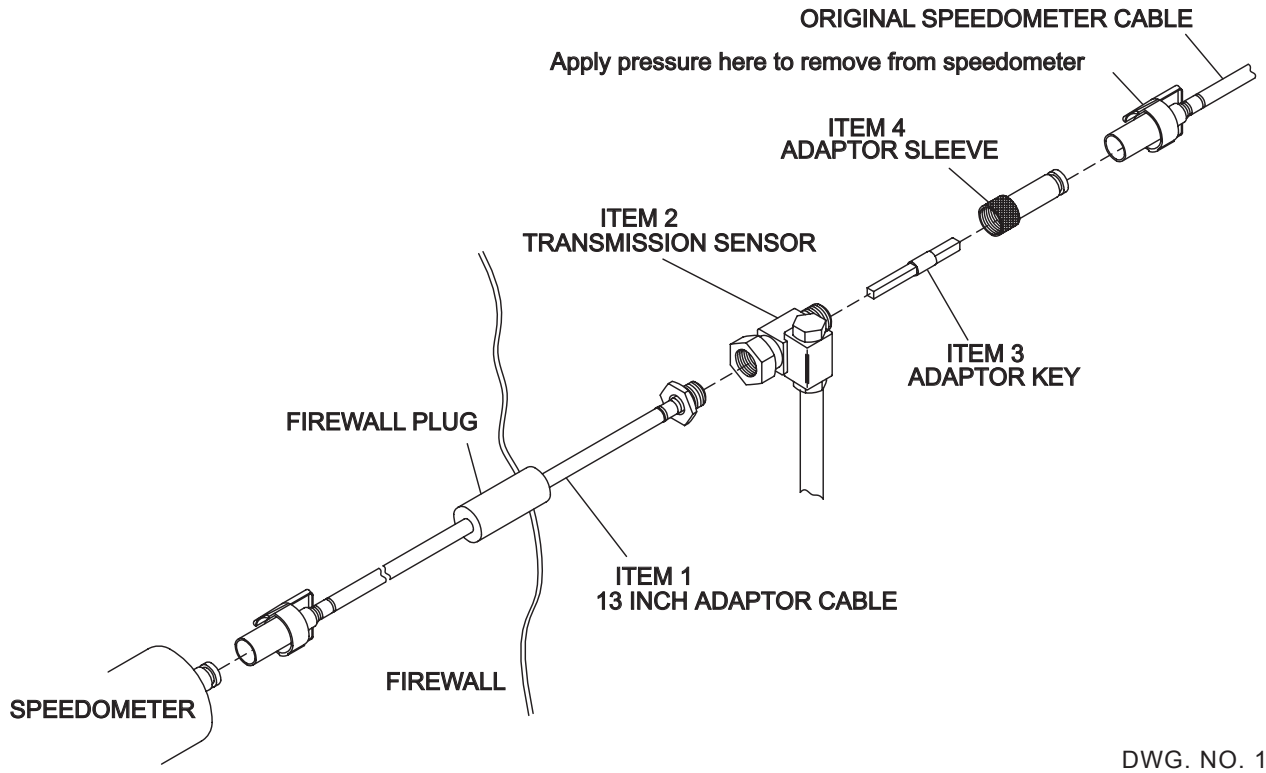


FIGURE D PHOTO NO. 2169

FORD TRANSMISSION SENSOR



DWG. NO. 120

STEP 1 Disconnect original cable from speedometer by reaching up under dash, pressing tab as shown above, and pulling it away from speedometer. Pull cable through firewall into engine compartment.

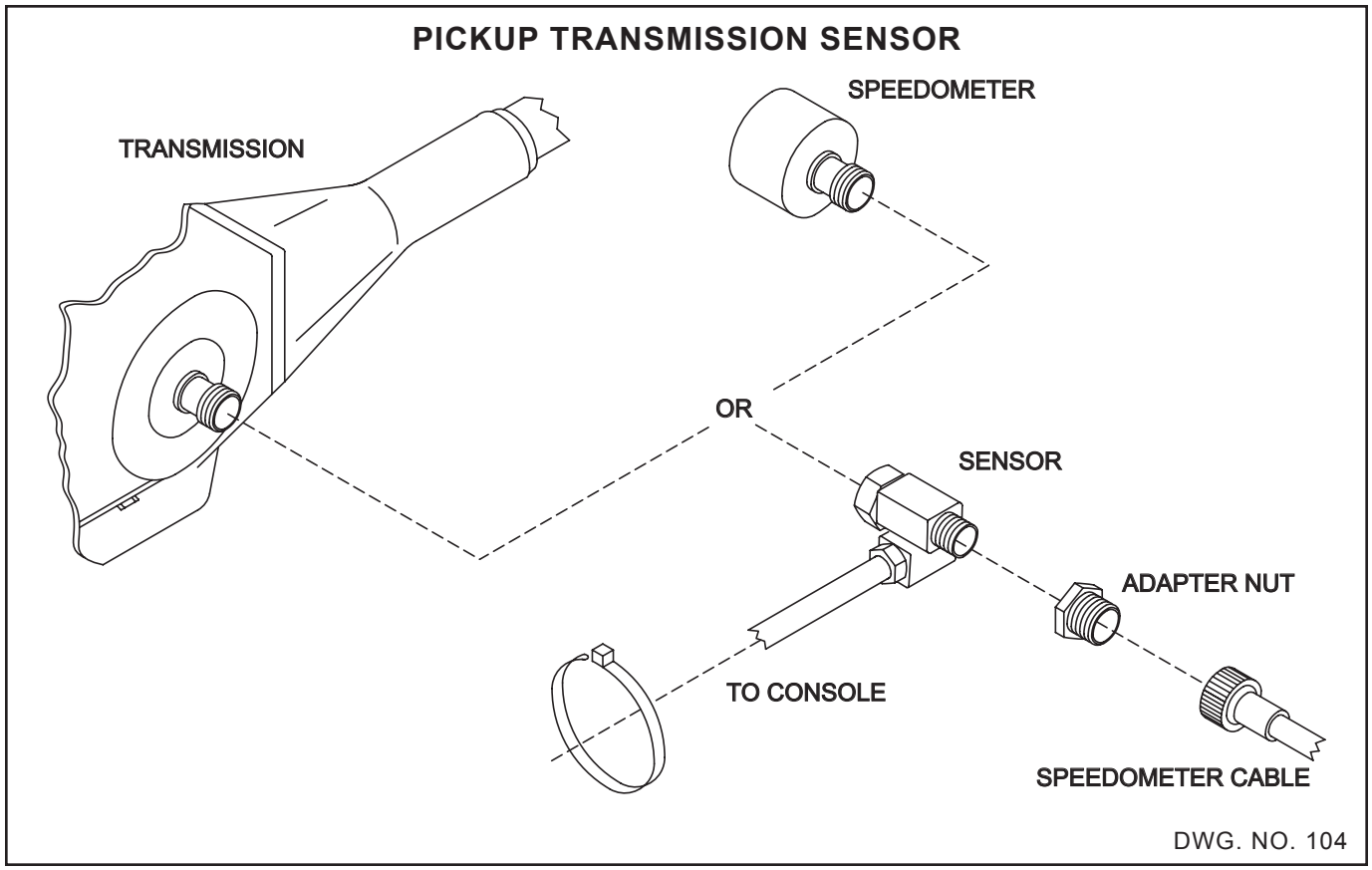
STEP 2 Feed 13 inch adapter cable through firewall and clip to speedometer. Do not insert firewall plug at this time.

STEP 3 Assemble items 2, 3, & 4. Snap speedometer cable onto adapter sleeve (Item 4). Adapter key must be positioned so that it will slide over speedometer cable core.

STEP 4 Connect transmission sensor (Item 2) to adapter cable and tighten. It may be necessary to cut cable ties fastening original speedometer cable to allow for the 13 inch extension.

STEP 5 Route sensor cable through firewall to console and insert foam firewall plug into hole to protect cables. Connect transmission sensor to SPEED input.

STEP 6 Make sure all connections are tight and the cables are secured with the ties provided. Do not route cables near hot or moving parts. Drive the truck a short distance to insure the speedometer is working properly.



This sensor can generally be mounted on either end of the speedometer cable. It can be mounted under the dash directly to the speedometer or to the transmission.

If your vehicle has a two speed rear axle it may also have a two speed speedometer drive. If it does, then the sensor must be mounted somewhere between the speedometer (in the dash) and the two speed speedometer drive.

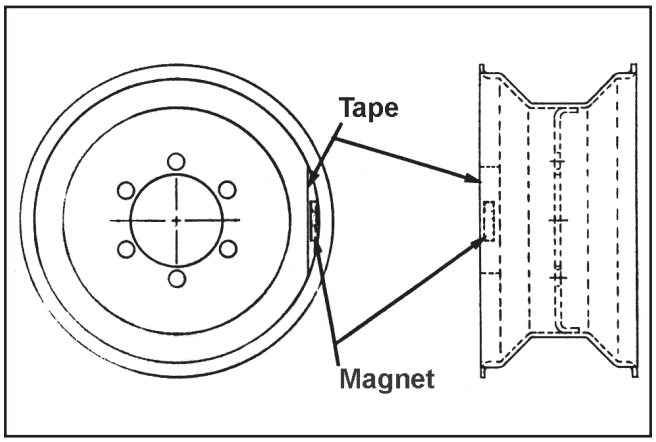
Locate the speedometer cable connection on the transmission. Wipe clean all dirt, grease, etc., from the connection. Unscrew the connection and pull the cable from the transmission. Screw the HINIKER sensor onto the transmission in place of the speedometer cable. The adapter nut can be used on either end of the sensor to make it fit either 7/8 inch threads or 5/8 inch threads. If the provided sensor does not fit your transmission, adapter connections are usually available at your truck dealer or shop or from a local Auto/Truck supply store.

With the sensor in place and tightened, screw the speedometer cable into the sensor and tighten. Plug sensor cable into the 8150 console receptacle labeled SENSOR. Tie the sensor cable to the frame or other convenient location to prevent damage from dragging, chafing or heat. Use the cable ties provided. Drive the pickup a short distance and observe that the speedometer is working properly.

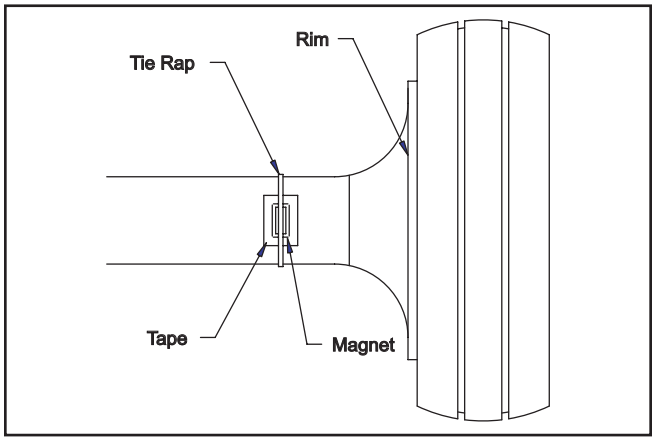
MAGNETIC TYPE SPEED SENSOR

The speed sensor transmits electric pulses to the Console so ground speed and acres covered can be calculated. This sensor should be mounted on a non-powered wheel or on the drive shaft of a 4-wheel drive tractor or pickup truck.

The magnet should be mounted on a non-driven wheel. Mount the long (1”) dimension of the magnet with the rotation of the wheel. The surface area should be cleaned with a solvent and sanded. (Do not use gasoline or diesel fuel.) Apply magnet with double-stick tape, epoxy or silicone rubber (RTV), cover with duct tape, and cable tie where applicable.

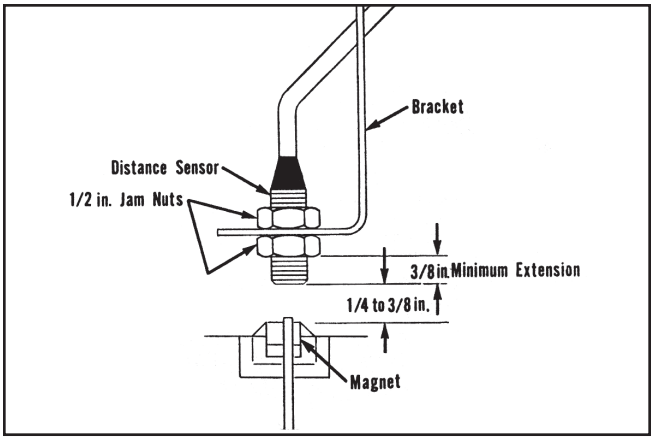


DWG. NO. 1319



DWG. NO. 1324

To achieve optimum response from the console, use more than one magnet, especially on larger wheels. These magnets must be evenly spaced.



DWG. NO. 1323

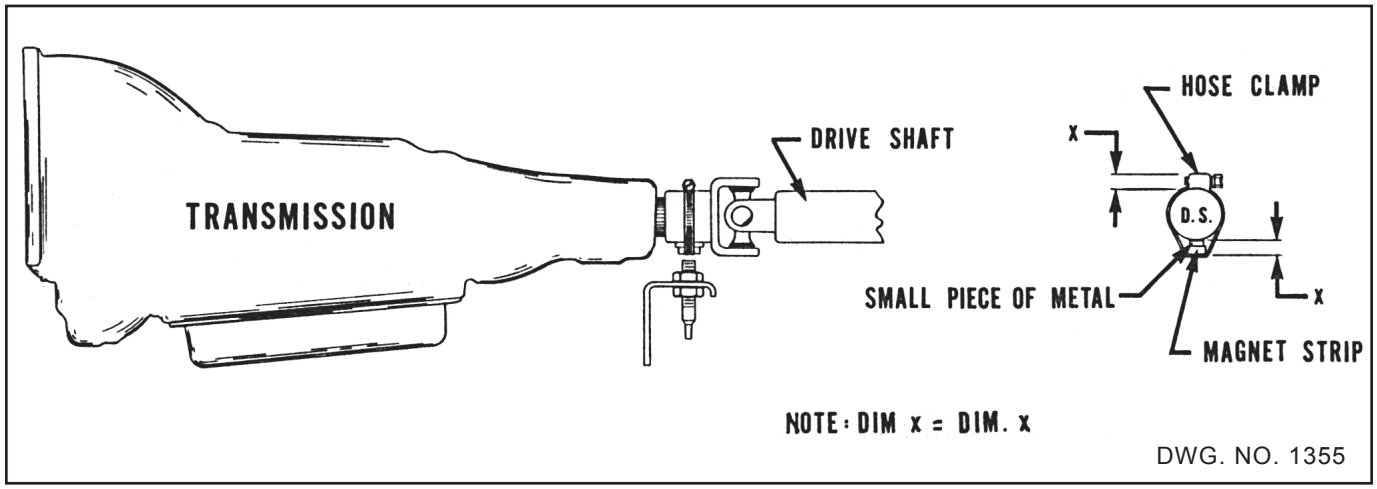
The sensor and sensor mount bracket should be mounted rigid, and positioned in a manner that the rotating magnet will pass within 1/4” to 3/8” of the end of the sensor. The end of the sensor should protrude at least 3/8” from the mounting nut. (See diagram above.) Sensor mount bracket may have to be bent to correctly position the sensor over the magnet.

NOTE: Even spacing is required when.. more than one magnet is used.

Connect the plug end of the Speed Sensor cable to the connector on the Console marked Speed.

MAGNETIC SPEED SENSOR SHAFT MOUNT

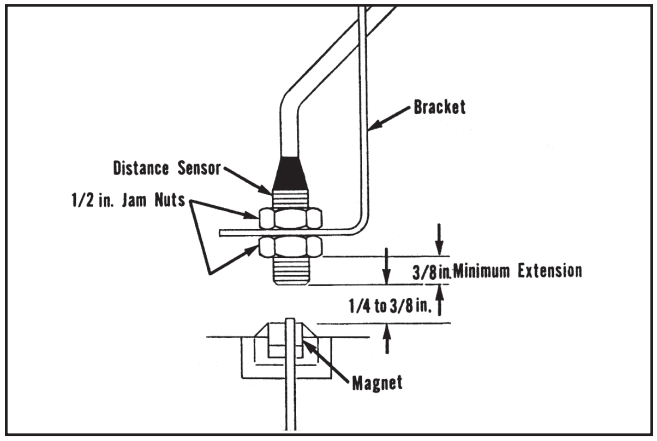
Select a location near the shaft where the sensor bracket can be rigidly mounted. Use a hose clamp and a spacer to mount the long (1 “) dimension of the magnet with the rotation of the magnet, so the magnet is of equal or greater distance from the shaft, as the hose clamp adjusting screw.



DWG. NO. 1355

The sensor and sensor mount bracket should be mounted rigid, and positioned in a manner that the rotating magnet will pass within 1/4” to 3/8” of the sensor. The end of the sensor should protrude at least 3/8” from the mounting nut. (See diagram below.) Sensor mounting bracket may have to be bent to correctly position the sensor over the magnet.

Connect the plug end of the Speed Sensor Cable to the connector on the back of the Console marked “Speed.”



DWG. NO. 1323

TROUBLE SHOOTING

Do not overlook the obvious. Check pump, solenoids, hoses, improper installation, etc.

The 8150 is easy to troubleshoot if you approach it in an organized manner. There are four primary parts. 1) The 8150 Console, 2) Speed Sensor, 3) Flowmeter, and 4) Servo Valve. Your main objective when troubleshooting is to isolate the problem and find out which of the four parts is defective.

The 8150 has been designed with internal protective circuitry. It protects the console from damage due to shorts caused by pinched wires, or connectors being plugged in wrong. Excessive current draw from the servo valve is also protected.

If your console display goes dead, turn Run/Hold switch off for 1 or 2 minutes, then back on. If the display is still dead, then disconnect all cables except power from the console and try again. By trial and error you can find the bad cable or device.

If your Rate or % Error becomes erratic, one possible cause could be the servo valve is starting to require excessive current to operate. The console will begin to protect itself by limiting this current.

Extreme overheating of the console will cause it to shut itself off until the temperature is reduced.

The following table will help you avoid unnecessary testing by isolating the affected sensor(s) and calibration numbers used for each mode.

The next step is to narrow the problem(s) down to one of the two sensors. The top half of the following table indicates which sensors are used for the various modes.

For example, assume Total Gallon is not working properly. From the table we can see that only one calibration number is used, the Pulses Per Gallon.

First double check the calibration number, making sure that it is programmed in correctly, then check the flowmeter.

If the table indicates two sensors are used for a mode, such as ‘RATE 1 or RATE 2, then you can isolate the faulty sensor by testing other modes which depend upon only one of the sensors. Using the AREA or SPEED mode will test the speed sensor accuracy.

TROUBLE SHOOTING CHART

	SELECTED MODE	SPEED MPH	VOLUME TOTAL GALLON	AREA TOTAL ACRE	RATE GAL/ACRE	GPA% ERROR	RATE 1 OR RATE 2
Sensor Used	SPEED SENSOR	X		X	X	X	X
	FLOWMETER		X		X	X	X
Calibration Numbers Used	SPEED (CIRC.)	X		X	X	X	X
	PULSES/GALLON		X		X	X	X
	BOOM WIDTH			X	X	X	X
	VALVE RATE				X	X	X

CONSOLE - SYMPTOMS

A. Is completely dead.

1, 2, 3, 4, and 6.

B. Displays “Memory Erased” each time console is turned on.

1, 2, 3, and 6.

C. Displays HOLD or switches will not operate solenoid valves.

2, 4, 5, 7, and 8.

D. Displays “LOW MPH.”

2, 4, 9, and 10.

E. Displays “LOW FLOW.”

2, 4, 11, and 12.

F. Displays “OVER.”

4, 8, 10, 12 and 19.

G. Gallons per acre inaccurate.

2, 4, 8, 9, 10, 11, and 12.

H. Gallons per acre fluctuates excessively or RATE 1 or RATE 2 will not control normally.

2, 4, 9, 11, 13, 14, 15, 16, 17, and 18.

I. Acres inaccurate or does not count.

2, 4, 5, 7, 8, 9, and 10.

J. Total gallons inaccurate or does not count.

2, 4, 5, 7, 11, and 12.

K. GPA% ERROR reading fluctuates plus or minus by more than 10%, or GPA% ERROR continually reads high or low by large percentage.

2, 4, 9, 11, 13, 14, 15, 16, 17, and 18.

L. Miles per hour inaccurate or reads 0.

2, 4, 9, and 10.

POSSIBLE CAUSE

1. Battery voltage below 10.0 volts.
2. Bad cable.
3. Battery connections reversed or not connected directly to battery.
4. Defective console.
5. Remote RUN/HOLD question answered wrong.
6. Solenoid valve coil drawing too many amps (unplug solenoid).
7. Remote RUN/HOLD switch not functioning or remote RUN/HOLD not grounded to the negative side of the battery.
8. Boom width is not entered correctly, or boom switch is not turned on.
9. Speed sensor problem; see speed sensor troubleshooting.
10. Wheel circumference calibration not correctly entered.
11. Flowmeter problem; see flowmeter troubleshooting.
12. Flowmeter pulses per gallon not correctly entered.
13. Servo valve not function properly; see servo valve troubleshooting.
14. Valve rate adjusted too high or low (question number 5, calibration).
15. Pump or pump hoses surging or sucking air.
16. Incorrect nozzle size, or driving too fast or too slow.
17. Target GPA is set beyond the range of your system; go to step 13 of the calibration procedure.
18. Calibration question number 3 answered incorrectly.
19. Total gallons, or acres over 9999.

CABLE AND CONNECTOR TROUBLESHOOTING

NOTE: Splices in cables are not recommended. If a splice is necessary to eliminate down time, the wires should be individually soldered and taped. (Use rosin core solder only.)

NOTE: All three wire cables are interchangeable. EXAMPLE: A flowmeter cable can interchange with a servo cable.

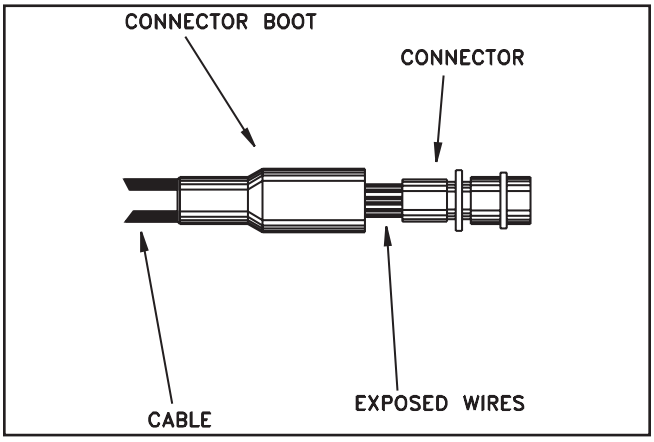
1. Visibly check the routing of all cables to make sure the cables are plugged into the proper components and the correct connector on the console. Look for any cut, pinched, burned, or corroded wires which may be the source for the problem.

2. Check all connectors, including console connectors. Make sure all male pins are not bent, and are mating properly with the female socket. An indentation in the rubber next to the female socket is a good indication that the male pin is not aligned properly. Look for moisture, dirt, corrosion, etc., on the male pins or female sockets. To clean, spray LPS contact cleaner in the connector. Plug and unplug the connector several times and wipe dry.

NOTE: A speed sensor cable only has one female socket.

3. Check crimp connectors; the crimp connection in all connectors is where the wire is joined to the male pin or the female socket. Start by sliding the connector boot back to expose the wires (Figure A). Gently tug on each of the wires. If the wires do not pull out of the connector the connection should be good. Look for moisture or corrosion build-up inside the connector boot area as this could be the source of the problem.

FIGURE A



DWG. NO. 1290

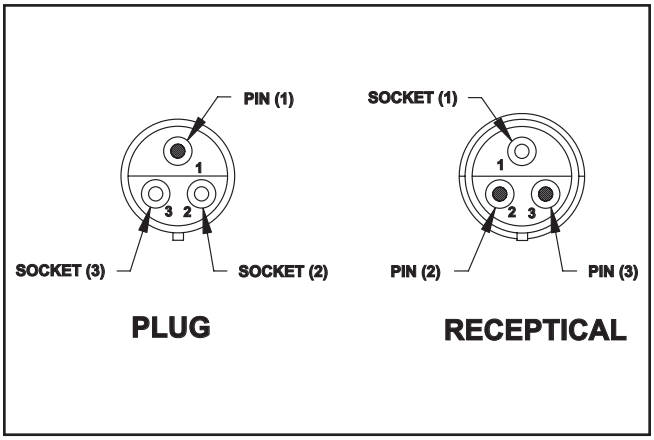
4. In general, a continuity check on the cable is a good check; however, it may not find a intermittent short or open in one of the cables.

CONSOLE/CABLE CONNECTORS

In the connector there are numbers stamped in the rubber next to each female socket and male pins. Each connector is listed on the next page. The list includes pin and socket numbers, color of wire, and purpose or function of wire.

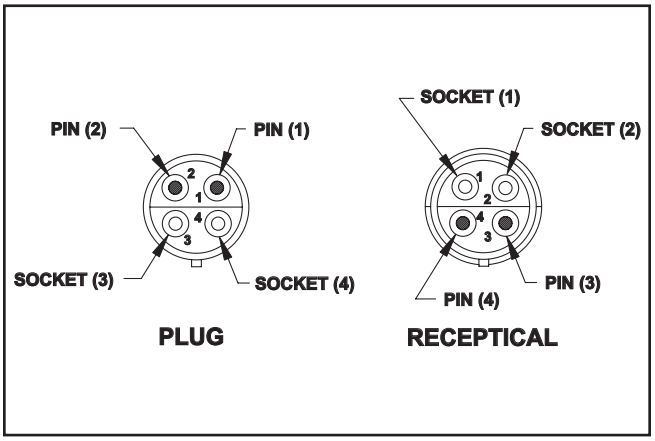
By using a voltmeter you can check to make sure cables are working properly. Always make sure of the pin and socket numbers before you start testing. Make sure pins are not bent or connector is not twisted.

3 PIN CONNECTOR



DWG. NO. 2763

4 PIN CONNECTOR



DWG. NO. 2764

12 VOLT DC BATTERY CONNECTOR OR CABLE			
Pin or Socket Numbers	Console Cable Wire Color	Cable Wire Color	Description
1.	Black	Black	Ground or Negative (-) of 12 Volt Battery.
2.	Red	Red	Positive (+) of 12 Volt Battery
3.	Red	White	Positive (+) of 12 Volt Battery

SERVO VALVE CONNECTOR OR CABLE			
Pin or Socket Numbers	Console Cable Wire Color	Cable Wire Color	Description
1.	Tan	Black	Cam Switch, to sense if valve fully open or fully closed.
2.	Orange	White	Motor Terminal (-)
3.	Brown	Red	Motor Terminal (+)

FLOWMETER CONNECTOR OR CABLE			
Pin or Socket Numbers	Console Cable Wire Color	Cable Wire Color	Description
1.	Black	Black	Ground or Negative of 12 Volt
2.	White	White	Signal Line
3.	Red	Red	+ 12 Volts

SPEED-SENSOR CONNECTOR OR CABLE			
Pin or Socket Numbers	Console Cable Wire Color	Cable Wire Color	Description
1.	Black	Black	Ground or Negative of 12 Volt Battery
2.	White	White	Signal Line
3.	Red	Red	+ 12 Volts

On the 20 foot Speed Sensor, the green wire replaces the white wire.

BOOM SOLENOID VALVE CONNECTOR OR CABLE			
Pin or Socket Numbers	Console Cable Wire Color	Cable Wire Color	Description
1.	Pink	Black	Common ground sense wire for Solenoid Valves. (Measure + 12 Volts if remote Run/Hold disconnected)
2.	Blue	White	Right Solenoid Valve Wire
3.	Yellow	Red	Center Solenoid Valve Wire
4.	Green	Green	Left Solenoid Valve Wire

HUB PLATE TYPE SPEED SENSOR TROUBLESHOOTING

The speed sensor is a very important component in the 8150 system. If the speed sensor is not functioning properly, it will have an adverse effect on the operation of the console. Rate per acre, miles per hour, acres, and percent error will all be inaccurate if the speed sensor is not functioning properly.

1. Make sure console is not in “HOLD”. Check console calibration on wheel circumference and boom width. It is possible that the rolling circumference of the measuring wheel has changed due to a variation of field conditions or tire air pressure from the time it was originally calibrated.

2. Check installation on speed sensor. Sensor and bracket should be mounted very rigid. Sensor should be mounted through holding bracket at least 1/2 inch.

Sensor end should be no further away from sensing plate tabs than 1/4 inch. If one tab is bent so it is more than 1/4 inch away from the face of the sensor, the 8150 SPEED or RATE readout will fluctutuate. On a hard surface road while traveling at a constant speed the 8150's MPH should not vary by more than two tenths of a MPH. A loose wheel bearing could also cause fluctuating readouts.

3. If the speed sensor is working intermittently, and parts one and two did not correct the problem, the sensor and cable should be thoroughly tested. Start by examining the sensor itself. Look for nicks, cuts, or scrapes on the sensor. If the sensor has been nicked hard or visibly worn on the end, it may need replacing.

4. The speed sensor can also be checked by plugging the speed sensor into the flowmeter connector on the console. Program your pulses per gallons (PPG) number to 1.0 (one) and answer "yes" to "clear gallons?" question in the calibration mode. Put console into Run. Now each time metal passes in front of the sensor the gallon count will count up. If you drive one revolution of the distance wheel with a standard hub plate, the gallon count should indicate 14 as a standard hub plate has 14 metal tabs on it.

MVR/STARFLOW SERIES FLOWMETER TROUBLESHOOTING

The flowmeter is a very important component in the 8150 system. If the flowmeter is not functioning properly, it will have an adverse effect on the operation of the console. RATE per acre, total Volume, percent error, and gallons per minute (calibration step 13) will all be inaccurate if the flowmeter is not functioning properly.

1. Make sure console is not in "HOLD".

2. Check console calibration (Step 12) pulses per gallon with number on the flowmeter, remember the decimal point is one digit from the right. NH_3 applications should always use the pulses per pound number.

3. Check flowmeter cables and connectors, reference cable, and connector troubleshooting.

4. Check flowmeter installation. Make sure flowmeter is mounted in the line to the booms after any agitation or return lines. Also make sure direction of flow (Arrow on flowmeter) is correct.

5. Check flowmeter for debris slowing or stopping the turbine. For the flowmeter to measure gallons accurately it must be kept very clean. See flowmeter disassembly. Figure A refers to MVR series flowmeter. The turbine should spin very freely when you blow on it and not come to an abrupt stop. Disassemble and clean all parts. Look for any worn parts. Reassemble the flowmeter. (MVR Series) make sure the inlet hub is properly centered and the turbine will spin freely when blowing on it. (Starflow Series) make sure turbine is installed as shown in Figure B with flow direction hitting cupped side of turbine.

6. To test the Detector module (MVR Series) see Figure A. Loosen clamp band screw and remove clamp band. Lift detector module from case of flowmeter. Program console pulses per gallon to 1.0 (Step 12 in calibration). Touch a magnet (any strength) to the flat surface on the bottom of the cone shaped detector module. Each time the magnet touches the bottom of the detector module the console should register 1 gallon on the (VOL) key.

NOTE: Make sure console is in RUN mode of operation when doing flowmeter test and boom cable is grounded with one or more booms on.

If you do not get VOL to count with this test, unplug all extension cables from detector module. Plug the detector module into the console flowmeter connector and touch the magnet to the flat surface. If the VOL now begins to count one of the extension cables is BAD. If the gallons do not count most likely the detector module is BAD, to verify this, check the flowmeter console connector. If the console connector tests good contact your dealer for a replacement detector module.

To test starflow sensor, remove sensor from body by removing the 4 cap screws. See Figure B. Program the console pulses per gallon to 1.0 (step 12 in Calibration). Gallons will count up as the turbine is spun.

MVR/STARFLOW SERIES FLOWMETER DISASSEMBLY

Periodic disassembly and cleaning is recommended for maximum lifetime and accuracy. Some chemicals, such as BLADEX, may tend to curdle or become gummy and may require frequent flushing, especially at low flow rates. Do not allow the flowmeter to dry out before it is thoroughly flushed.

FIGURE A - MVR SERIES

BEARING - Inspect the two small sapphire (glass) bearings. Loose or cracked bearings must be replaced.

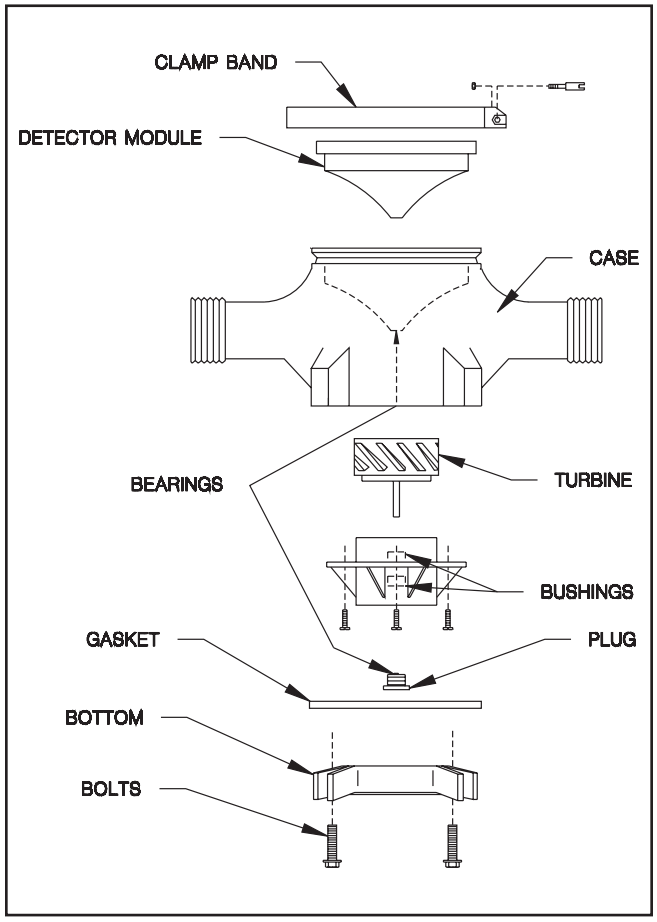
TURBINE - Turbine should spin freely inside inlet hub when bottom plug is adjusted properly. Do not over-tighten!

Remove any chemical or rust residue. Flush thoroughly with water, NOT DIESEL FUEL.

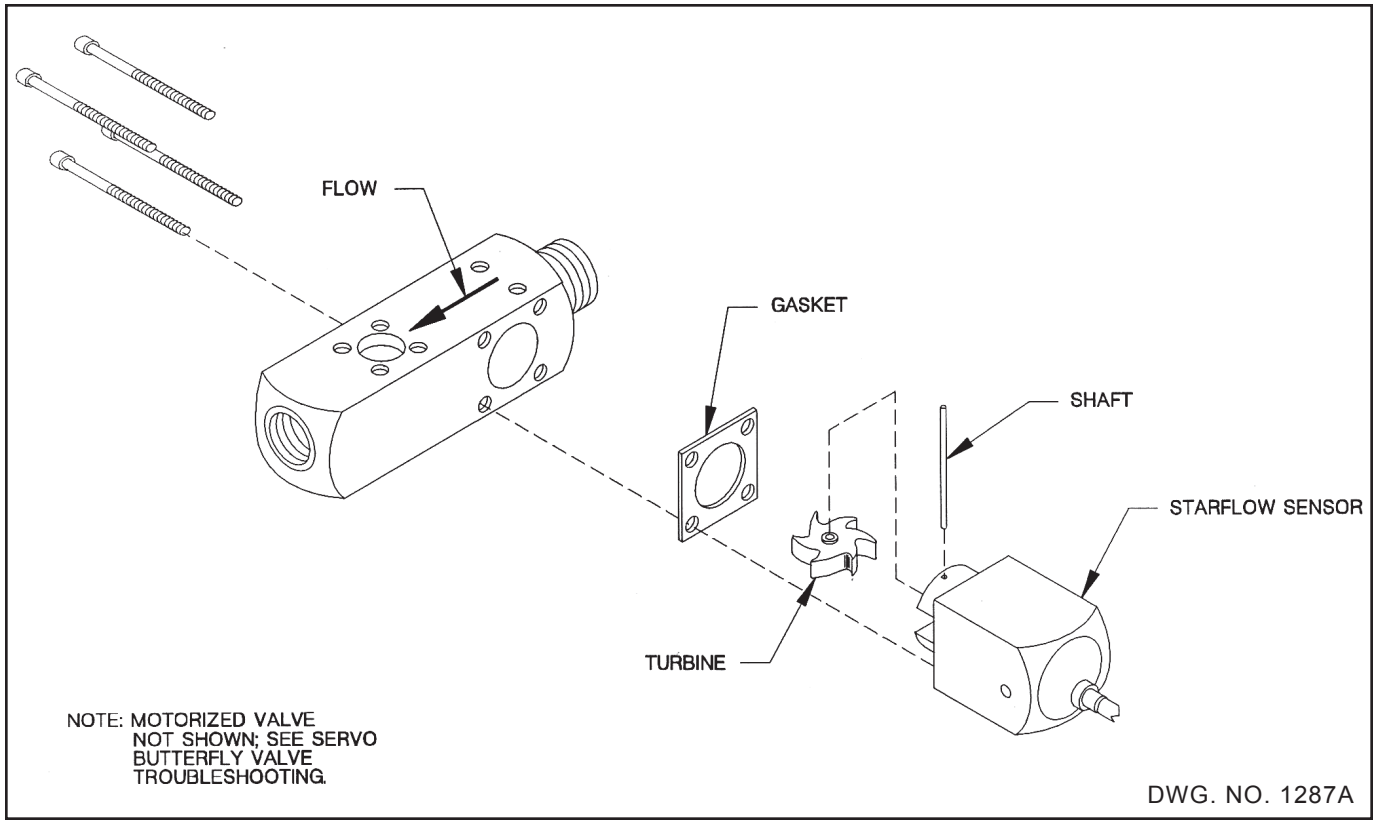
INLET HUB - Inspect the two graphite bushings. Inside diameter should not be oval.

GASKET - Some chemicals may slightly deform the gasket. Replace it, if necessary.

FIGURE A



DWG. NO. 1286



DWG. NO. 1287A

HM860 FLOWMETER TROUBLESHOOTING AND MAINTENANCE

TROUBLESHOOTING

1. The HM860 FLOWMETER SENSOR will output a pulse, as a pole on a magnet is passed over the sensor's end.

   To check the sensor, first set the pulses per gallon calibration number to "1," then make sure the console is not in hold.

   The volume reading should count up by one each time a magnet is passed under the bottom of the sensor (sensor is removed from flowmeter).

2. Make sure direction of flow (arrow on flowmeter) is correct.

3. Check flowmeter for debris slowing or stopping the turbine. For the flowmeter to measure accurately it must be kept very clean.

4. For application rates under 5 gallons per minute, the flowmeter should be mounted vertically with the flow going up.

5. Make sure magnet on turbine is positioned under sensor.

6. Make sure sensor is inserted fully into meter.

7. Flowmeter operation may be affected by strong magnetic fields such as those created by motors and solenoid valves.

MAINTENANCE

For all applications, except anhydrous ammonia, the HM860 FLOWMETER should be thoroughly flushed with clean water immediately after each use.

Periodic disassembly and cleaning of the HM860 FLOWMETER is recommended for maximum lifetime and accuracy. Some chemicals may tend to curdle or become gummy and may require frequent flushing, especially at low flow rates. Do not allow the flowmeter to dry out before it has been thoroughly flushed.

CAUTION: ALWAYS FOLLOW MANUFACTURER'S RECOMMENDATIONS WHEN WORKING WITH CHEMICALS.

DISASSEMBLY

Refer to figure 4 for proper parts placement.

Remove the three nuts holding the two flowmeter halves together.

Carefully pull the two halves straight apart, if flowmeter is not pulled apart straight, damage to bushings and shaft may result.

Remove any chemical or rust residue. Flush thoroughly with water. NOT WITH DIESEL FUEL.

TURBINE - Inspect the turbine and shaft for damage or excessive wear.

BUSHINGS - Inspect the two graphite bushings. The inside diameter should not be oval.

BEARINGS - Inspect the two sapphire end bearings. Cracked bearings should be replaced. These “glass” bearings are held in place by the “pressed in” graphite bushings.

To replace a bushing or bearing, gently insert by hand a #6 sheet metal screw into the graphite bushing and pull.

NOTE: Damage may result to the sapphire bearing if the screw is inserted too far.

Do not reuse graphite bushings after removal. Use new bushings.

O-RING - Some chemicals may slightly deform the o-ring. Replace if necessary.

ASSEMBLY

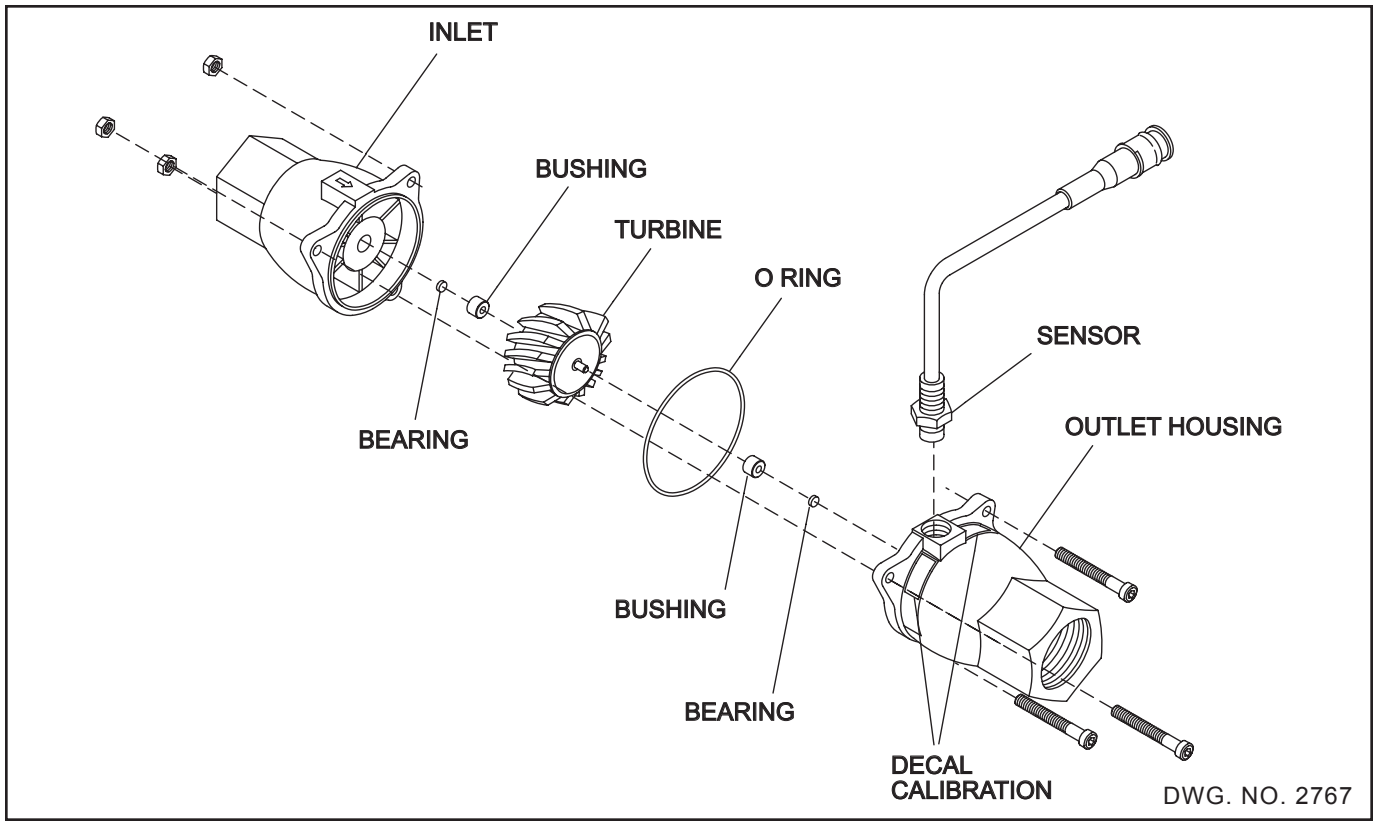
Place the turbine and o-ring into the housing half without the sensor, with magnet end of the turbine showing.

Carefully mate the flowmeter halves together. Install the three 1/4 inch stainless steel screws.

IMPORTANT: Torque the three 1/4 inch nylock nuts equally to 8.3 foot pounds (100 inch pounds).

The turbine should spin freely when a very small amount of air is directed into the flowmeter.

FIGURE 4



FLOWMETER CALIBRATION TEST

All flowmeters are factory calibrated and should measure GALLONS with at least 98% accuracy. If you feel the flowmeter is inaccurate and would like to test it, you may do so using the following procedure.

A. Clear Gallons counter to 0.

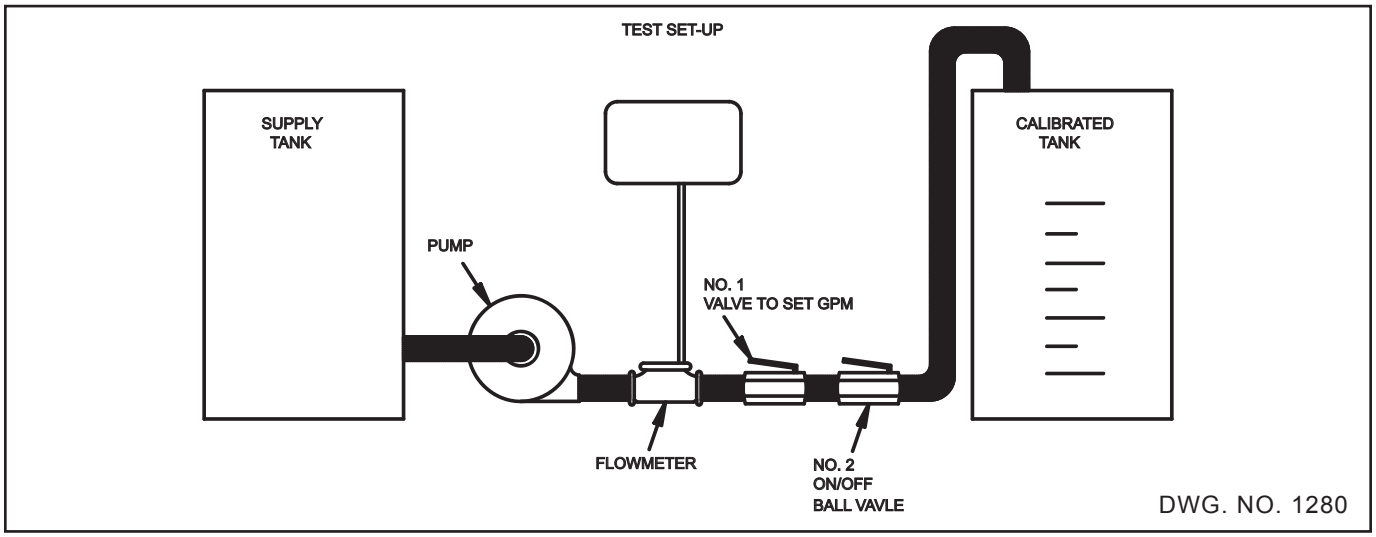
B. Program PPG to “1.0.”

C. Proceed to pump water into a calibrated container. It is very important that this calibrated container have markings that are at least 99% accurate or this test will not be valid.

D. **NOTE: Each time the flowmeter generates a pulse, GALLONS will count up by 1. Therefore, the console is counting the total number of pulses generated for a known amount of water flowing through the flowmeter.**

E. To determine the PULSES/GALLON, simply take the count displayed in GALLONS and divide it by the amount of water pumped through the flowmeter into the calibrated tank. The result is the new PULSES/GALLON calibrate number.

F. Compare the new PULSES/GALLON with the factory calibration number. If the new number deviates more than 10% from the factory number, the flowmeter is in need of repair and should be returned to your dealer.



TEST SETUP

1. Set valve No. 1 for the GPM of the test.

2. Stop flow with valve No. 2.

3. Clear GALLON counter to 0, console to “RUN.”

4. Open valve No. 2 (use a ball valve, it will give you fast ON/OFF times).

5. Shut valve No. 2 when tank reaches selected volume.

6. Refer to Step E above to determine the Pulse/Gallon.

SERVO BUTTERFLY VALVE TROUBLESHOOTING

The servo valve does the actual controlling or adjusting of the flow rate. If the servo valve is not functioning properly the gallons-per-acre readout will fluctuate by more than +/-10% or the RATE per acre will remain extremely low or high. If the servo valve is not functioning correctly, the 8150 can still be used as a monitor by putting the RATE 1, RATE 2 switch in the MANUAL (center) position.

1. See cable and connector troubleshooting.

2. Check calibration question number 3, “Inline system?” If the question was answered yes, then the + key should OPEN the valve to increase flow to the boom. If the question was answered no, then the valve is mounted in a return line to the tank or the input of the pump. In this case, the + key should CLOSE the valve to increase flow to the boom.

3. Check calibration question number 5. If the 8150 does not adjust the flow fast enough for speed changes, increase this number. If the 8150 GPA readout fluctuates excessively, decrease this number.

4. Answer yes to calibration question number 13 (Auto MAX GPM). Turn sprayer on, and press the set key. The console will now send voltage to the valve. The valve will drive fully open inline or fully closed in a bypass installation. The console will now readout the maximum gallons per minute that your sprayer will pump (note this figure). Press and hold the minus (-) key until the gallons per minute reaches the lowest readout (approximately 20 seconds). This is the minimum gallons per minute your sprayer will pump (Note this figure). Now calculate your gallons per minute.

$$\frac{\text{MPH x Impl. Width (In Feet) x Gallons Per Acre}}{\text{Divide By 495}} = \text{GPM}$$

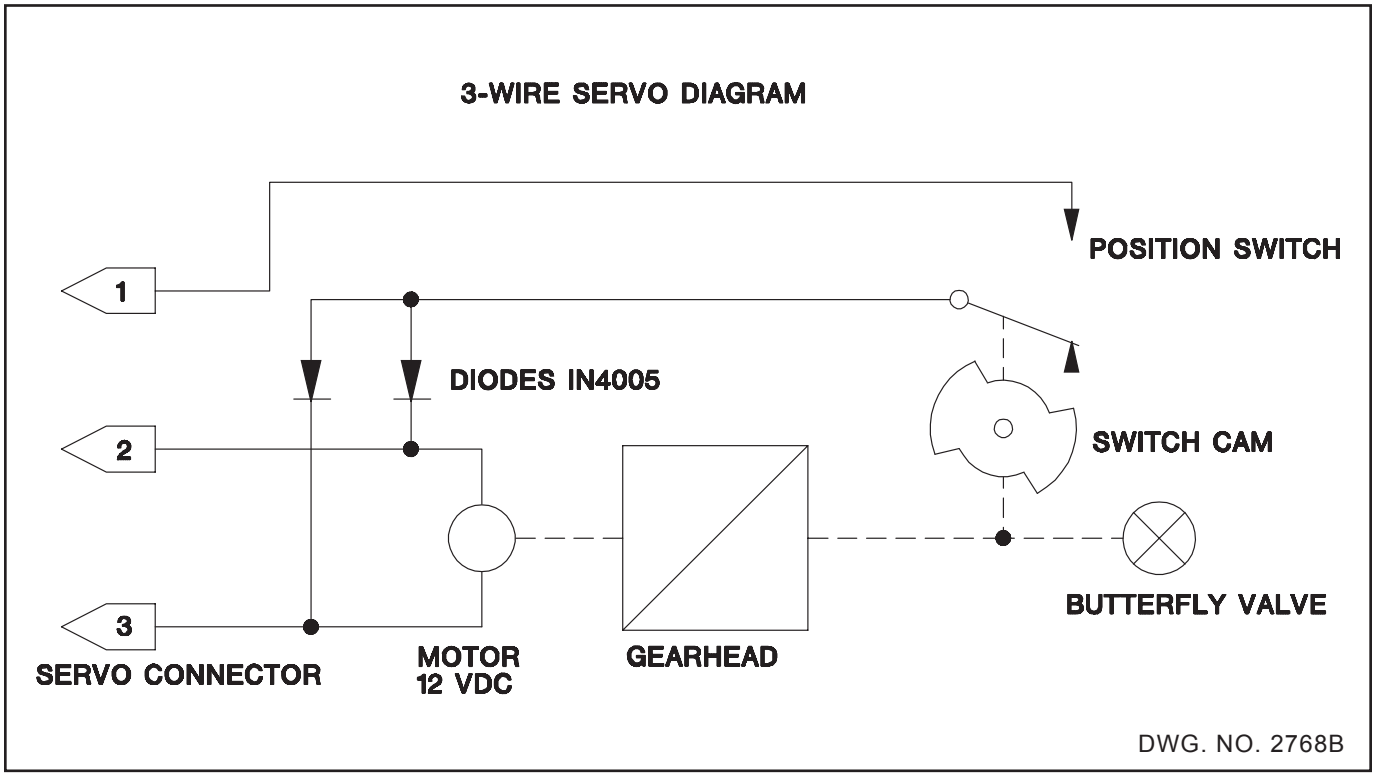
Your calculated gallons per minute should be in a mid-range between your maximum gallons per minute and your minimum gallons per minute.

Example: If your maximum GPM was 7 and your minimum GPM was 1 you would be running at 4 GPM (Calculated GPM). This would mean your servo valve would be operating at the halfway point. So, if you increased your speed it could increase your flow, or if you decrease your speed it can decrease the flow. If the calculated GPM is close or exceeds the minimum or maximum GPM readouts, then the problem is not with the servo valve. The sprayer, pump, hand valves, nozzles or speed require adjustments.

5. The 8150 console applies a discontinous positive voltage level (short pulses of voltage) to the gear motor. This causes the servo gear motor to run “jerky.” With a voltmeter, check between cable connector pins 2 and 3 on the servo cable or the two motor terminals. You should get a readout of 1 to 8 volts when the RATE 1/MAN/RATE 2 switch is in the center (manual) position and the “+” or “-” key is depressed. If there is no voltage during this test, refer to Cable and Connector troubleshooting or the console could be defective. If there is voltage, and the motor does not turn the butterfly, the motor may be burned out. There may be something binding the butterfly or the set screws on the switch cam may be loose.

6. To check a gear motor apply 10 to 12 volts to the terminals on top of the motor (any polarity). The motor should drive as long as you apply voltage to it. Reverse polarity, and the motor should drive the opposite direction.

7. To see if the gear motor and position switch are functioning properly put the RATE 1/ MAN/RATE 2 switch in the center (manual) position and press and hold the “+” or “-” key. This should drive the valve in one direction. When the switch cam turns far enough to activate the position switch the servo gear motor should stop its positive direction of travel and oscillate back and forth. If the valve does not stop its direction of travel when the switch is activated, the valve should be replaced. The valve should respond to both the “+” and “-” key. If the valve only responds to one of the keys perform step number 6 to see if the motor will turn in both directions. If the motor turns both directions in step number 6 and only one direction with the console, the console should be repaired.



ELECTRICAL

The schematic indicates how the valve operates. At least one motor drive input (connector pins 2 or 3) is always negative. The diodes steer this negative level to the position switch. The output voltage level of the position switch is determined by which quadrant the butterfly disc is in.

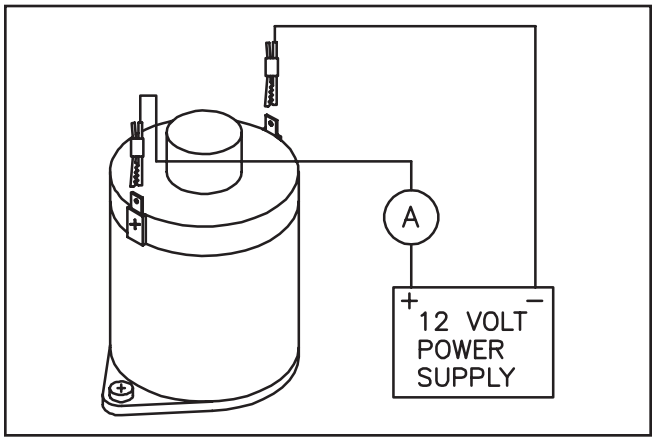


FIGURE 1 DWG. NO. 2030

A = Ampmeter

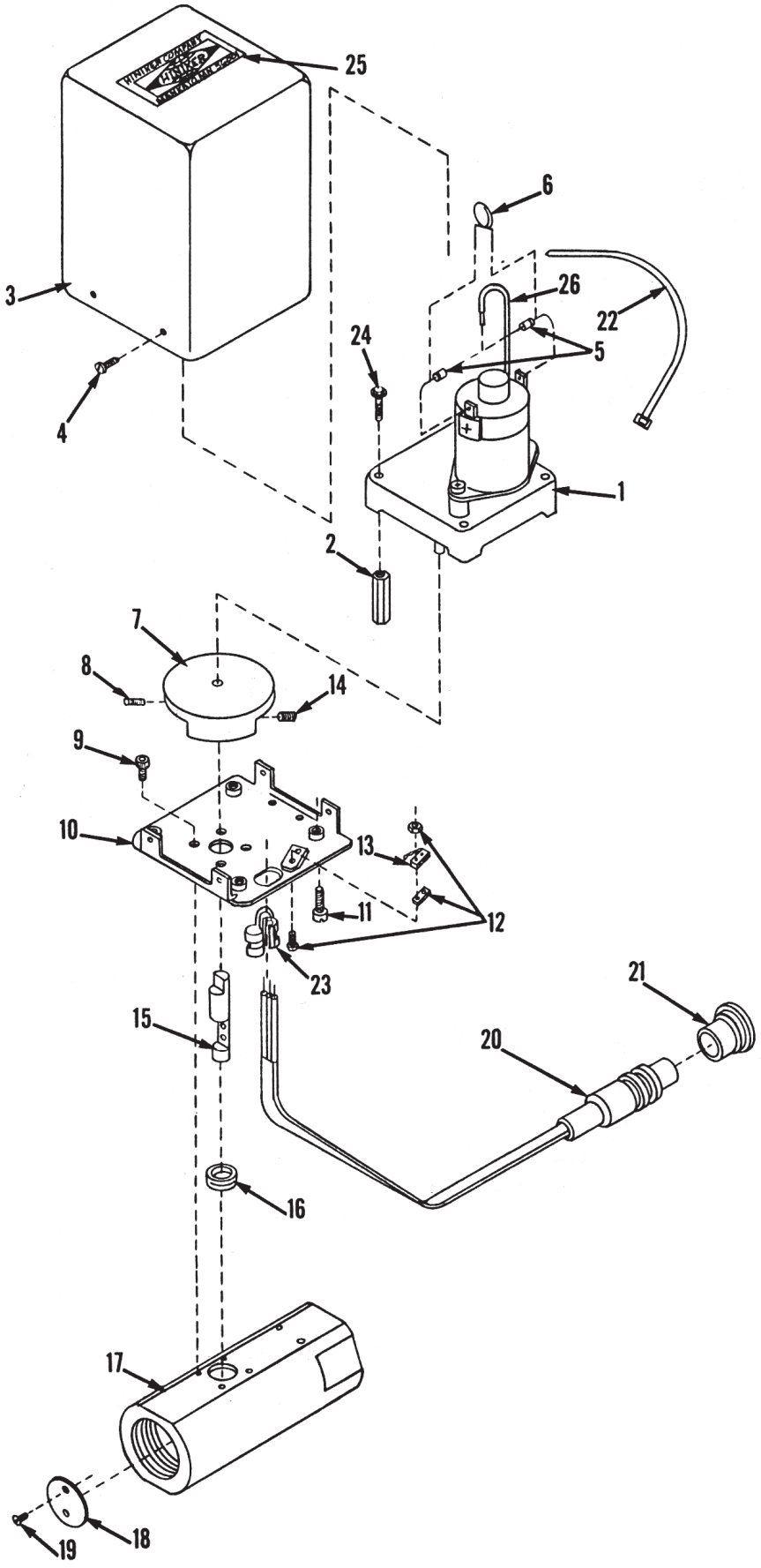
This quadrant information enables the servo controller to determine the required motor drive polarity. The 8150 applies a discontinuous positive voltage level to either pin 2 or 3 to operate the valve. The 8150 can vary the discontinuity times to vary the valve response.

To test motor, unplug the servo cable and apply 12 volts as indicated in Figure 1.

Normal current is less than 1/2 amp. Anything drawing up to 1 amp may need replacing. Replace any motor drawing more than 1 amp current.

NOTE: To test in both directions, reverse leads to motor.

GENRAL PURPOSE VALVE



DWG. NO. 2032

GENERAL INFORMATION

HOW TO MAKE CHEMICAL APPLICATION PRECISE AND COST EFFECTIVE

Proper chemical application is crucial. Applied uniformly and at the correct rate, you can count on excellent weed control without damage to the crop. Applied incorrectly and at an uncontrolled rate, you can count on $2.00 to $12.00 added chemical expense, potential crop damage and greater weed competition.

OVER APPLICATION

In a typical situation, over application can be as much as 30%. In this situation if the farmer's average weed control cost (corn, soybeans and grain sorghum) is $15.00 per acre, then he is increasing production costs by MORE THAN $4.00 PER ACRE. With the cost of chemicals increasing constantly each year, it's getting even more expensive to over apply.

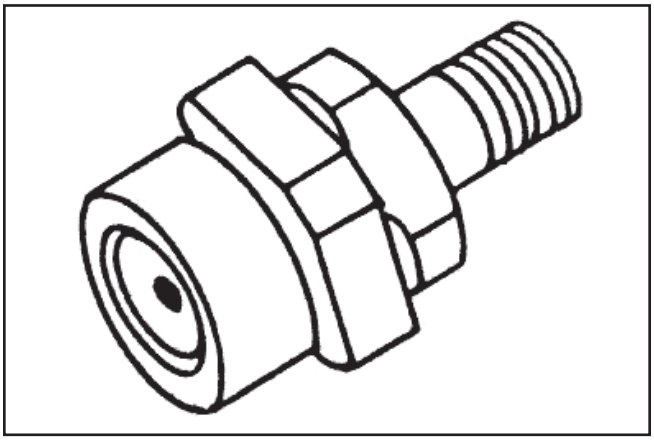
UNDER APPLICATION

Here too, the application rate can be off as much as 30%. Poor weed control results and yields are cut substantially. Tests have proven that a single extra weed every 128 feet in a row of grain sorghum, for instance, can reduce yields by 5%.

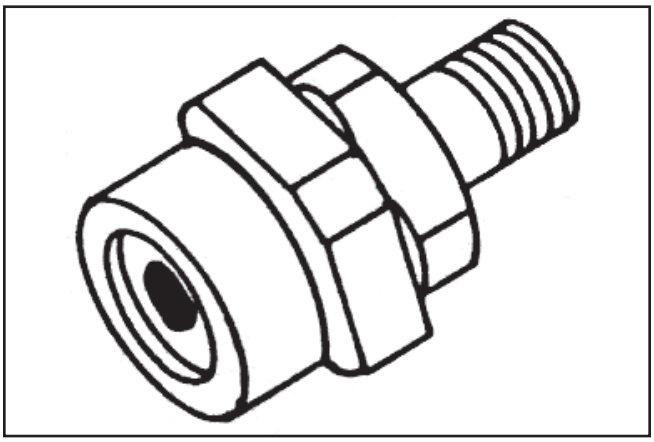
To help increase your application efficiency and assure maximum results, the Hiniker Company has published the following guidelines and special instructions.

WHAT DETERMINES GALLONS PER ACRE?

SIZE OF NOZZLE TIPS AFFECT G.P.A.

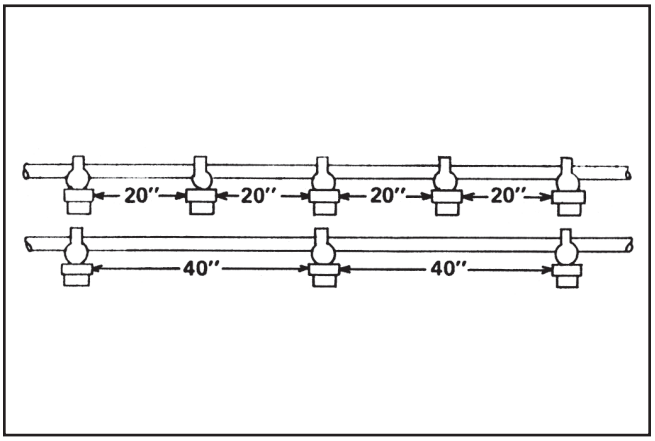


A 20 gallon per acre nozzle allows .3 gallons per minute at 40 pounds pressure.



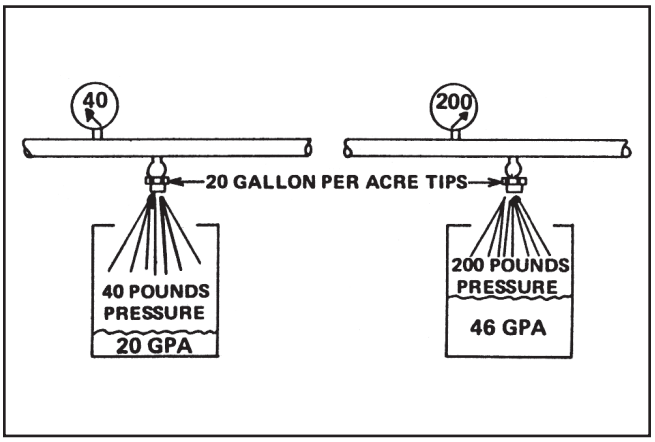
A 40 gallon per acre nozzle allows .6 gallons per minute at 40 pounds pressure.

NOZZLE SPACING AFFECTS G.P.A.



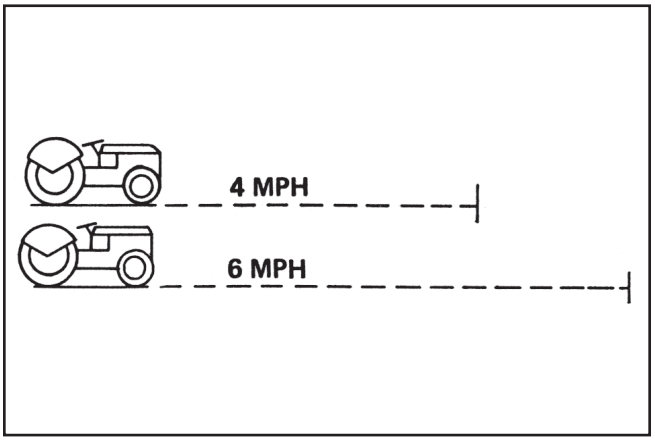
20 GPA nozzles spaced 20 inches apart will apply 20 gallons per acre. Spaced 40 inches apart, 10 gallons per acre.

PRESSURE AFFECTS G.P.A.



When you increase pressure, you increase nozzle output. Double nozzle output increases pressure four times. Too much pressure also causes drifting.

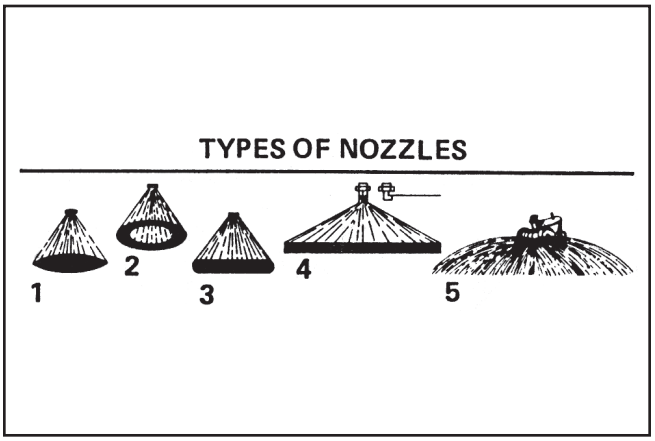
TRACTOR SPEED AFFECTS G.P.A.



If you are using 30 Gallon, Per Acre Tips and traveling 4 miles per hour, you are applying 30 gallons per acre. If you increase your speed to 6 miles per hour, using the same nozzle, you will apply 20 gallons per acre.

NOZZLE TYPE

The first step in setting up a sprayer is to select the proper nozzle type. Be sure to check nozzle type, spray angle, and boom height as described below.



There are many types of nozzles. Select the type and size best suited for the work to be done. Popular types used are:

1. FLAT FAN nozzles have a tapered edge pattern so a slight overlapping gives uniform coverage. Spray tips should be rotated approximately 12 degrees so that patterns are slightly offset. They are used primarily for broadcast spraying of herbicides and insecticides.

2. HOLLOW CONE nozzle pattern is also slightly overlapped for uniform coverage. Misalignment is impossible. Used for broadcasting of herbicides or insecticides. Gives excellent plant coverage with drops.

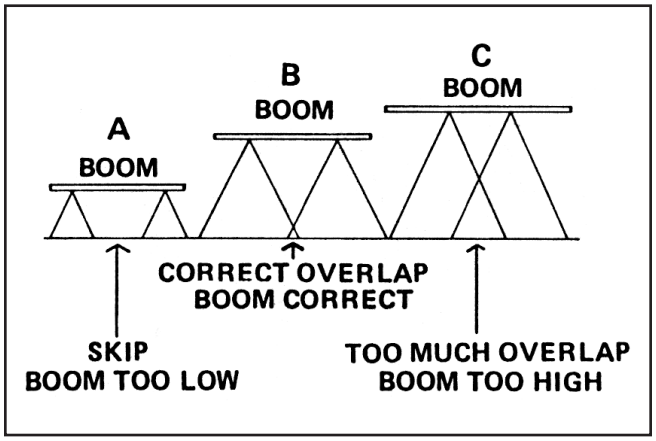
3. EVEN SPRAYS give an even pattern that does not taper at the ends. They are used only for pre-emergence brand spraying. Do not use on a boom, the overlap would cause double dosage.

4. FLOODING nozzles provide an extra wide, flat spray pattern and are usually spaced every 40 inches along the boom. There is less drifting because the droplets are larger and the boom can be carried closer to the ground. Because their output is double that of fan nozzles, they do not plug easily. They are slightly less accurate.

5. JET or BOOMLESS nozzles provide wide coverage (up to 50 feet from a single nozzle). They are used in large fields where drifting is not a problem or for fence rows, roadsides, or where there are many obstacles a boom would hit. The pattern is easily affected by wind conditions.

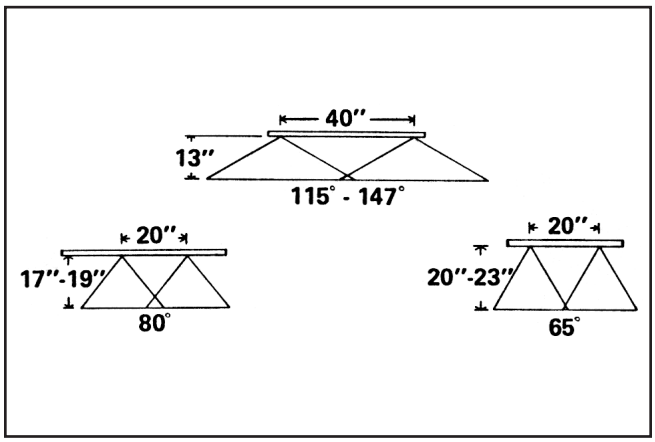
BOOM HEIGHT IS IMPORTANT

Proper boom height is important. Too much or too little spray overlap causes skips or heavy dosage. Refer to nozzle output charts for proper spraying height.



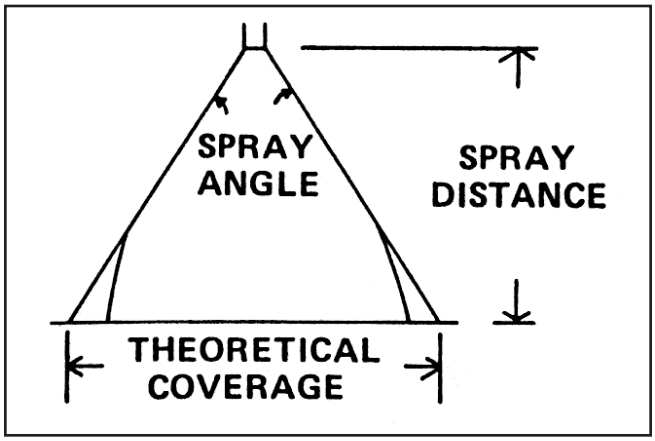
SPRAY ANGLE

The spray angle of the nozzle determines the boom height. Flooding nozzles have a wide angle, from 115 to 147 degrees. Standard cone and fan nozzles, from 65 to 80 degrees. The wider the spray angle, the lower the boom can be carried.



SPRAY COVERAGE INFORMATION

This table lists the theoretical coverage of spray patterns as calculated from the included spray angle and the distance from the nozzle orifice. These values are based on the assumption that the spray angle remains the same throughout the entire spray distance. In actual practice, the tabulated spray angle does not hold for long spray distances.



Included Spray Angle	THEORETICAL COVERAGE AT VARIOUS DISTANCES (IN INCHES) FROM NOZZLE ORIFICE											
	2”	4”	6”	8”	10”	12”	15”	18”	24”	30”	36”	48”
5°	0.2”	0.4”	0.5”	0.7”	0.9”	1.1”	1.3”	1.6”	2.1”	2.6”	3.1”	4.2”
10°	0.4”	0.7”	1.1”	1.4”	1.8”	2.1”	2.6”	3.1”	4.2”	5.2”	6.3”	8.4”
15°	0.5”	1.1”	1.6”	2.1”	2.6”	3.2”	3.9”	4.7”	6.3”	7.9”	9.5”	12.6”
20°	0.7”	1.4”	2.1”	2.8”	3.5”	4.2”	5.3”	6.4”	8.5”	10.6”	12.7”	16.9”
25°	0.9”	1.8”	2.7”	3.5”	4.4”	5.3”	6.6”	8.0”	10.6”	13.3”	15.9”	21.2”
30°	1.1”	2.1”	3.2”	4.3”	5.4”	6.4”	8.1”	9.7”	12.8”	16.1”	19.3”	25.7”
35°	1.3”	2.5”	3.8”	5.0”	6.3”	7.6”	9.5”	1 1 .3”	15.5”	18.9”	22.7”	30.3”
40°	1.5”	2.9”	4.4”	5.8”	7.3”	8.7”	10.9”	13.1”	17.5”	21.8”	26.2”	34.9”
45°	1.7”	3.3”	5.0”	6.6”	8.3”	9.9”	12.4”	14.9”	19.9”	24.8”	29.8”	39.7”
50°	1.9”	3.7”	5.6”	7.5”	9.3”	11.2”	14.0”	16.8”	22.4”	28.0”	33.6”	44.8”
55°	2.1”	4.2”	6.3”	8.3”	10.3”	12.5”	15.6”	18.7”	25.0”	31.2”	37.5”	50.0”
60°	2.3”	4.6”	6.9”	9.2”	11.5”	13.8”	17.3”	20.6”	27.7”	34.6”	41.6”	55.4”
65°	2.5”	5.1”	7.6”	10.2”	12.7”	15.3”	19.2”	22.9”	30.5”	38.2”	45.8”	61.2”
70°	2.8”	5.6”	8.4”	11.2”	14.0”	16.8”	21.0”	25.2”	33.6”	42.0”	50.4”	67.2”
75°	3.1”	6.1”	9.2”	12.3”	15.3”	18.4”	23.0”	27.6”	36.8”	46.0”	55.2”	73.6”
80°	3.4”	6.7”	10.1”	13.4”	16.8”	20.2”	25.2”	30.3”	40.3”	50.4”	60.4”	80.6”
85°	3.7”	7.3”	11.0”	14.7”	18.3”	22.0”	27.5”	33.0”	44.0”	55.0”	66.0”	88.0”
90°	4.0”	8.0”	12.0”	16.0”	20.0”	24.0”	30.0”	36.0”	48.0”	60.0”	72.0”	96.0”
95°	4.4”	8.7”	13.1”	17.5”	21.8”	26.2”	32.8”	39.3”	52.4”	65.5”	78.6”	105.0”
100°	4.8”	9.5”	14.3”	19.1”	23.8”	28.6”	35.8”	43.0”	57.2”	71.6”	85.9”	114.0”
110°	5.7”	11.4”	17.1”	22.8”	28.5”	34.3”	42.8”	51.4”	68.5”	85.6”	103.0”	
120°	6.9”	13.9”	20.8”	27.7”	34.6”	41.6”	52.0”	62.4”	83.2”	104.0”		
130°	8.6”	17.2”	25.7”	34.3”	42.9”	51.5”	64.4”	77.3”	103.0”			
140°	10.9”	21.9”	32.9”	43.8”	54.8”	65.7”	82.2”	98.6”				
150°	14.9”	29.8”	44.7”	59.6”	74.5”	89.5”	112.0”					
160°	22.7”	45.4”	68.0”	90.6”	113.0”							
170°	45.8”	91.6”										

NOZZLE SIZE SELECTION

After selecting the correct nozzle TYPE, the correct nozzle SIZE and operating PRESSURE must be selected.

The following equation assumes you already know the desired Gallons Per Acre. This information is always supplied with the chemical being applied. Follow the chemical manufacturers instructions carefully. Ground speed in MPH is also required. Most spraying is done in the 4-to-5 MPH range. The Operator’s Manual for your sprayer should give you the manufacturer’s recommendations. Nozzle spacing is also required. This can be obtained from your sprayer Operator’s Manual. If you are setting up your own sprayer, the most common nozzle spacings are 20 inches or 40 inches.

To calculate nozzle SIZE, use the following formula:

$$\text{Gal. Per Minute (Per Nozzle)} = \frac{\text{Desired Gal./Acre x MPH x Noz. Sp.}}{5940}$$

Example: Suppose you want to spray 10 gallons per acre, with nozzles spaced 40 inches apart on the boom, while traveling at 5.2 miles per hour. Your formula would then look like this:

$$\text{GPM} = \frac{10 \times 5.2 \times 40}{5940} = .35$$

All nozzle tables or charts will give you gallons per minute (GPM) for several pressures. Using the correct table for the type of nozzle (flat, flood, etc.) that you selected, find the GPM closest to the desired nozzle PSI you would like to maintain. For example, a C-2 in the sample chart will provide .35 GPM at 30 PSI.

When selecting a nozzle size, chemical manufacturers normally recommend low pressure in the range of 20 - 40 PSI to prevent chemical drift, proper overlap and minimize wear. Nozzle manufacturers usually include recommended pressure ranges for their nozzles.

A nozzle size, in the middle of the pressure range, will allow some flexibility in changing application rates and ground speed. You may want to recalculate your GPM/per nozzle using your maximum MPH.

As shown in the table below, (for 40 inch nozzle spacing), a C-2 nozzle gives the most flexibility. When staying within the recommended 20 - 40 PSI nozzle pressure, you may adjust your application rate from 6.9 to 14.8 gallons per acre in the 4 - 6 MPH range. This enables you to tailor your application rate to field conditions without changing nozzles.

Instead of using a nozzle chart, the following formula can be used. For given nozzle size, nozzle spacing and ground speed the required pressure to apply a desired Gallons Per Acre can be found by solving:

where:

$$\text{Pressure (PSI)} = \left[\frac{\text{GPA x Spacing x Speed}}{\text{1878 x Size}} \right]^2$$

- GPA is desired Gallons Per Acre.
- SPACING is nozzle spacing in inches.
- SPEED is given in MPH.
- SIZE is nozzle size, given in GPM (Gallons Per Minute) at 10 PSI.
- [ ] 2 To find the “square,” multiply the result (inside brackets) times itself.

1. To find the maximum required pressure, use the above formula with the maximum speed that will be used.
2. To find the minimum pressure, use the minimum desired speed in the above formula.
3. After calculating the min. - max. pressure required, consult the nozzle manual or chart to ensure that the nozzle can be used at those pressures.

Stainless Steel Tip No .	Nylon Tip No.	Liquid Pressure in p.s.i	Capacity in G.P.M.	GALLONS PER ACRE* BASED ON WATER - 40” NOZZLE SPACING						
				2 M.P.H	3 M.P.H	4 M.P.H.	5 M.P.H	6 M.P.H.	7.5 M.P.H.	10 M.P.H.
TKSS 1.5	C-1.5	10	.15	11.1	7.4	5.6	4.5	3.7	3.0	2.2
		20	.21	15.7	10.5	7.8	6.3	5.2	4.3	3.2
		30	.26	19.2	12.9	9.7	7.7	6.4	5.2	3.9
		40	.30	22.0	14.9	11.1	8.9	7.4	6.0	4.5
TKSS 2	C-2	10	.20	14.9	9.9	7.4	5.9	5.0	4.0	3.0
		20	.28	21.0	14.0	10.5	8.4	6.9	5.6	4.2
		30	.35	26.0	17.2	12.9	10.3	8.7	6.9	5.2
		40	.40	30.0	19.8	14.8	11.8	10.	7.9	5.9
TKSS 2.5	C-2.5	10	.25	18.5	12.4	9.3	7.4	6.2	5.0	3.7
		20	.35	26.0	17.2	12.9	10.3	8.7	6.9	5.2
		30	.43	32.0	21.	16.0	12.8	10.6	8.5	6.4
		40	.50	37.0	25.	18.5	14.9	12.4	9.9	7.4
TKSS 3	C-3	10	.30	22.0	14.9	11.1	8.9	7.4	5.9	4.5
		20	.42	32.0	21.0	15.7	12.6	10.4	8.4	6.3
		30	.52	38.0	26.0	19.3	15.4	12.9	10.3	7.7
		40	.60	45.0	30.0	22.0	17.8	14.9	11.8	8.9
TKSS 5	C-5	10	.50	37.0	25.0	18.5	14.9	12.4	9.9	7.4
		20	.71	53.0	36.0	27.0	21.0	17.8	14.2	10.7
		30	.87	65.0	44.0	33.0	26.0	21.5	17.4	13.1
		40	1.0	75.0	50.0	38.0	30.0	24.8	20.0	15.1
TKSS 10	C-7.5	10	.75	56.0	37.0	28.0	22.0	18.6	14.9	11.1
		20	1.1	82.0	55.0	41.0	33.0	27.2	22.0	16.3
		30	1.3	96.0	64.0	48.0	39.0	32.2	26.0	19.3
		40	1.5	111.0	74.0	56.0	45.0	37.1	30.0	22.0

NOTE: The MOST common problem is failure to select the correct nozzle size and failure to perform the "Initial Set-Up" procedure!!

When selecting a nozzle size, chemical manufacturers normally recommend low pressures in the range of 20 - 40 PSI to prevent chemical drift and minimize nozzle wear. Nozzle manufacturers usually include recommended pressure ranges for their nozzles.

You should pick a nozzle size in the middle of the pressure range to allow some flexibility in changing application rates and ground speed.

Our previous example requires .35 GPM at 5.2 MPH which could be provided by a C-2, C-2.5, or C-3 nozzle.

As shown in the table, a C-2 nozzle gives the most flexibility. While staying within the recommended 20 - 40 PSI nozzle pressure, you may adjust your application rate from 6.9 to 14.8 gallons per acre in the 4 - 6 MPH range. This enables you to tailor application rates with field conditions without changing nozzles.

Since all nozzle charts or tabulations are based on spraying water, which weighs 8.34 LBS per USA gallon, conversion factors must be used when spraying solutions which are heavier or lighter than water. Using conversion factors from the tables below, multiply by the catalog tabulator GPM and GPA rates - to arrive at the value for the solution to be sprayed.

WEIGHT OF SOLUTION	SPECIFIC GRAVITY	CONVERSION FACTORS
7.0 lbs. per gallon	.84	1.09
8.0 lbs. per gallon	.96	1.02
8.34 lbs. per gallon	1.00	1.00
9.0 lbs. per gallon	1.08	.96
10.0 lbs. per gallon	1.20	.91
11.0 lbs. per gallon	1.32	.87
12.0 lbs. per gallon	1.44	.83
14.0 lbs. per gallon	1.68	.77
16.0 lbs. per gallon	1.92	.72
18.0 lbs. per gallon	2.16	.68
20.0 lbs. per gallon	2.40	.65

To calculate gallons per minute, use this formula:

$$\frac{\text{Gal. Per Acre x MPH x Width (in feet)}}{495} = \text{Gal. Per Minute}$$

Divide the calculated GPM, by the conversion factor, to find the actual nozzle size required.

EXAMPLE: Using the previous example, the required size was .35 GPM. Assume you want to spray a fertilizer that weighs 10.0 LBS per gallon. As expected, a lower amount of this thicker, heavier material would go through a nozzle if the same pressure is used. To compensate, use the conversion factor in the table.

$$\frac{.35}{.91} = .38 \text{ GPM is the actual GPM required}$$

Again, refer to nozzle charts or tables to find the nozzle that is closest to .38 GPM at a given pressure. Use that SIZE and that PRESSURE.

NOTE: If this correction factor was not included, an additional error of 9% would be introduced.

BAND SPRAYING

The two key points for calibrating the 8150 for band spraying is: 1) the gallons per acre (Broadcast Rate) and 2) the total width of the actual ground being sprayed (sum of the individual band widths).

When band spraying, program the boom width to the total inches of each of the width of the bank per boom. For example, 4 rows with 15 inch wide bands would equal 60 inches. Suppose the chemical you are spraying has a recommended rate of say, 10 gallons per acre (Broadcast rate). No conversions are required; simply program your target RATE 1 or RATE 2 to 10 gallons per acre.

To recalculate the total ACRES, as might be the case if you used the 8150 for Band spraying and would like to know the total acres of the whole field, use the ratio procedure shown below.

Example:
Old Acres Sprayed - 300 inches
Old total boom width - 120 inches
New total boom width - 240 inches

1 $$\frac{\text{Old Acres Sprayer (300)}}{\text{Old Boom Width (120)}} = \frac{\text{New Recalculated Acres}}{\text{240 New Boom Width}}$$

2 $$\text{New Recalculated Acres} = \frac{\text{Old Acres Sprayed x New Boom Width}}{\text{Old Boom Width}}$$

3 $$\text{New Recalculated Acres} = 600 = \frac{300 \times 240}{120}$$

BEFORE YOU GO INTO THE FIELD

Check all your equipment - make certain that all components are clean ... including the tank, pump, control valves, check valves, hoses, boom, strainers, nozzles, and spray tips.

WARNING:Never use a metal object in cleaning nozzle orifices.

Adjust the boom height to give proper spray overlaps. Check the flow rate from all nozzles using a master pressure gauge mounted in the boom close to the nozzles. (After the test, remove the master pressure gauge and plug the connection). While this nozzle flow test is being conducted, check the pressure reading on the rig pressure gauge to compare its reading to the pressure at the nozzles. The flow rates can be determined from the following flow charts. Remember, the catalog tabulations are based on pressure at the nozzles.

GPM	Seconds To Collect 1 Quart	GPM	Seconds To Collect 1 Quart
.05	300	.20	75
.06	250	.22	67
.07	214	.25	60
.08	188	.30	50
.09	167	.35	43
.10	150	.40	38
.11	136	.50	30
.12	125	.60	25
.13	115	.70	21
.14	107	.80	19
.15	100	.90	17
.17	88	1.0	15

IMPORTANT: Replace all worn tips and those with streaky or uneven patterns.

AFTER SPRAYING

Rinse and clean all the spraying equipment including the spray tips, being careful not to use a metal probe in the orifice. This cleaning routine is especially important after the spraying of wettable powders. Wash spray tips thoroughly with water or cleaning solution (appropriate for chemicals sprayed). Blow out orifice, clean and dry. If orifice remains clogged, clean it with a fine bristle (not wire) brush ... or with a toothpick. Do not damage the orifice. Water-rinse and dry tips before storing.

CHOICE AND CARE OF SPRAY EQUIPMENT

All the factors in today's spraying applications, including chemical costs, pollution and driftage control, point to the importance of choosing the proper spray equipment and maintaining it in an efficient operating order. Therefore, the original purchased equipment should be made of materials which resist corrosion and wear ... such as stainless steel spray tips. Since usage of spray nozzles usually brings about orifice clogging problems, erosion, etc., it is very important that the tips be cleaned after each operation, and tested before using again. Finally, even when using precision spray tips, it is necessary to control all the other factors in the spraying application - such as rig speed, spraying pressure, spray height, etc., in order to place the proper amount of chemicals in the proper areas. An electronic monitor such as the 8150 will make this task very easy. An established routing of proper maintenance will soon pay for itself.

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 chemicals for the job. Handle them with care. Follow the instructions on the container label and instructions from the equipment manufacturer.

HINIKER WARRANTY

The only warranty Hiniker Company (Hiniker) gives and the only warranty the dealer is authorized to give is as follows:

We warranty new products sold by Hiniker or authorized Hiniker dealers 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 one year after date of retail delivery, to the original purchaser, any product not meeting the specification. **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 any liability for direct, indirect or consequential damage or delay. If requested by Hiniker Company, products or parts for which a warranty claim is made are to be returned freight prepaid to our factory. Any improper use, operation beyond rated capacity, substitution of parts not approved by Hiniker Company, 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.**

HINIKER reserves the right to make improvement changes on any of our products without notice.

HINIKER does not warrant the following:

1. Used products

2. Any product that has been repaired modified or altered in a way not approved by Hiniker Company.

3. Depreciation or damage caused by normal wear, lack of reasonable and proper maintenance, failure to follow Operator Manual Instructions, misuse, lack of proper protection during storage, or accident.

4. Parts replacement and service necessitated by normal wear or maintenance including, but not limited to, belts, cutting parts, and ground engaging parts.

A DELIVERY REPORT FORM must be filled out and received by HINIKER COMPANY to initiate the warranty coverage.

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