INSTALLATION AND OPERATING

INSTRUCTION MANUAL

MODEL 454

AUTOMATIC CONTROL SYSTEM

HARVEST TEC
P.O. BOX 63
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010-0454
Rev. 2-99

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INSTALLATION AND OPERATING INSTRUCTIONS FOR THE HARVEST TEC MODEL 454 AUTOMATIC SPRAY CONTROL

INTRODUCTION

Harvest Tec model 454 is a microprocessor based hay moisture measurement and spray control system. Along with the #1986 baler sensor, the meter measures the moisture content of a bale at a rate of 5 readings per second. The meter also stores three user programmable setpoints to control the SPRAY PUMP and TWO SOLENOID VALVES which, in turn, control a set of nozzles used for controlling the spray of chemicals. A buzzer is provided to give an audio signal whenever the indicated average moisture goes above 30%.

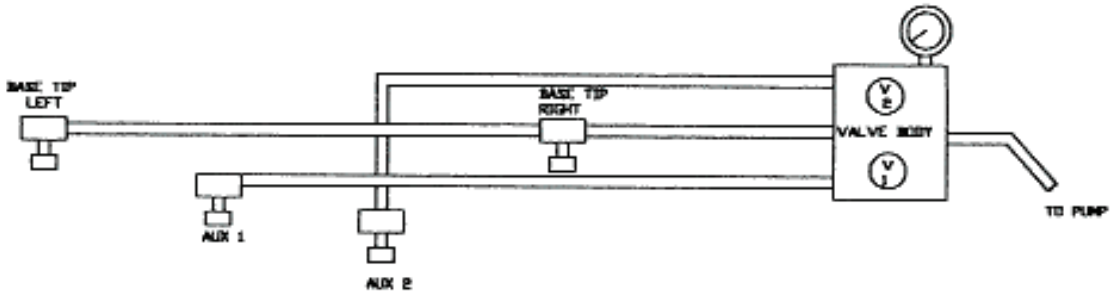
INSTALLATION INSTRUCTIONS

In addition to the steps in the installation manual with your applicator, complete the following steps.

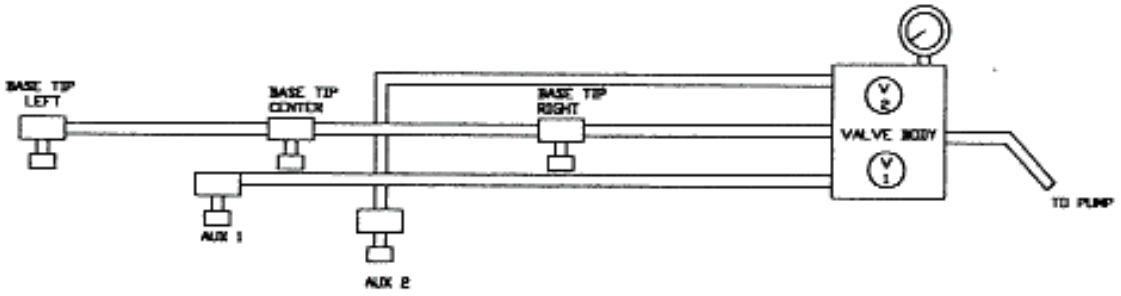
STEP 1: LOCATE THE GAUGE WHERE IT CAN BE VIEWED FROM THE TRACTOR'S OPERATING PLATFORM.

STEP 2: **CONVENTIONAL SQUARE AND LARGE ROUND BALERS**
Run the lines to the auxiliary nozzles according to the diagrams below.

Conventional Square Balers



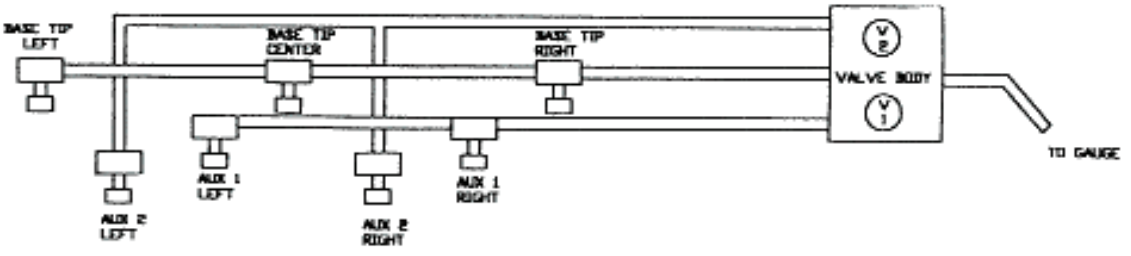
Large Round Balers



STEP 2:

LARGE SQUARE BALERS: Locate the pre-plumbed head piece on the baler according to the instructions in the applicator's manual. Run a line to the gauge and from the gauge to the pump.

Large Square Balers



STEP 3. INSTALL THE MOUNTING BRACKET INSIDE THE TRACTOR CAB.

Use two 1/4" bolts and two 1/4" (1/2" O.D.) flat washers. Pass the bolt/washer pair through each of the slots in the bottom of the bracket and then attach the bracket to the tractor. Drill two holes (9/32") in the tractor if necessary.

Adjust the bracket position as required to provide easy display viewing before tightening the screws.

STEP 4. INSTALL CONTROLLER CABLE HARNESS

Locate each end of the cable harness. Note which ends match up to the plugs in the control box. Route this end of the harness in close proximity to the mounting bracket installed previously. Allow enough service loop to facilitate installation and removal of the 454 unit.

STEP 5. CONNECT THE MAIN POWER LEADS

Locate the fused power leads of the harness. The RED wire is the POSITIVE power feed. Check the fuseholder to verify the fuse type and installation.

NOTE: USE a 10A Slo-Blo, 3AG type (Littlefuse #313010 or eq.)!!! REPLACING THE FUSE WITH AN IMPROPER TYPE MAY RESULT IN EQUIPMENT DAMAGE AND/OR FAILURE AND WILL VOID THE WARRANTY!!!

FOR NEGATIVE GROUND TRACTOR:

Connect the RED wire to an ignition switched POSITIVE terminal. Connect the BLACK wire to the chassis ground.

FOR POSITIVE GROUND TRACTOR:

Connect the BLACK wire to an ignition switched NEGATIVE terminal. Connect the RED wire to the POSITIVE ground.

CAUTION: THE OUTER SHELL OF THE COAXIAL SENSOR CONNECTOR (SHIELD) IS DIRECTLY CONNECTED TO THE "NEGATIVE" SUPPLY OF THE 454. FOR POSITIVE GROUND SYSTEMS, CARE MUST BE TAKEN TO AVOID ACCIDENTAL SHORTING OF THESE SURFACES WITH THE VEHICLE POSITIVE GROUND.

NOTE: IMPROPER POWER CONNECTION/POLARITY WILL RESULT IN UNIT FAILURE AND DAMAGE. BE SURE TO CHECK THE POLARITY WHEN INSTALLING.

NOTE: Some tractor alternators may generate DC power spikes in excess of 14 volts. These spikes may cause high moisture readings, resulting in excess product application. Check with your tractor dealer for T.V.P. (Transient Voltage Protection) if your alternator does not have spike protection built in.

STEP 6. INSTALL THE CONTROLLER UNIT

Install the unit to the mounting bracket by using the two black studded knobs. Make sure the rubber isolator blocks are in place between the control and the mounting bracket. Adjust the viewing angle as necessary and tighten the knobs to hold the unit in the place.
There are two receptacles on the rear of the unit for wiring connections. Connect the sensor cable and wiring harness to their appropriate receptacles.

STEP 7. INSTALL THE BALER SENSOR (#1986)

A. CONVENTIONAL SQUARE BALERS

The sensor pad is located in the baler chamber as close to the plunger face as possible. The sensor can be located on the smooth size (outside) or cut side (inside) with the same results for alfalfa hay. The cut side of the bale will give a more accurate reading in grasses or alfalfa/grass mixtures because the sensor will be able to see some of the inside plant moisture. For center line balers, mount the sensor on the top hay compression rail unless grass is the crop being baled.

LARGE ROUND BALERS

Locate the sensor pad approximately 3" to 6" up from the bottom belts, chains or rollers on the side sheet of the baler.

Locate the sensor as close as possible to the intake so that a reading can be given soon after the bale starts. Inspect the inside of the baler to see where the paint is worn off to make sure there will be good contact between the hay and the sensor. The beveled edge of the sensor pad and diverter should face the incoming hay. Route the wire up over the top pivot of the baler.

For John Deere round balers, follow the placement instructions in Figure 1 below.

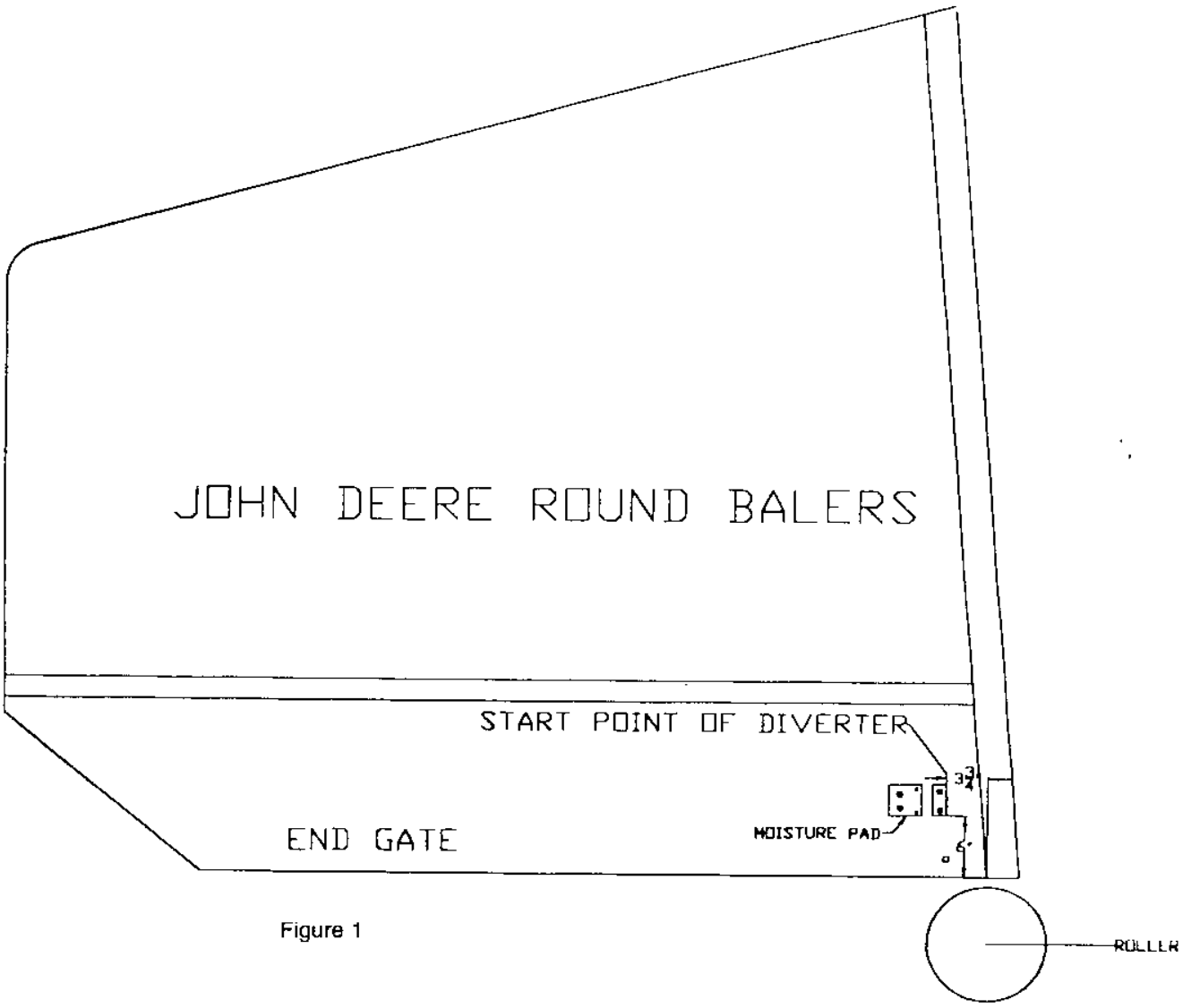
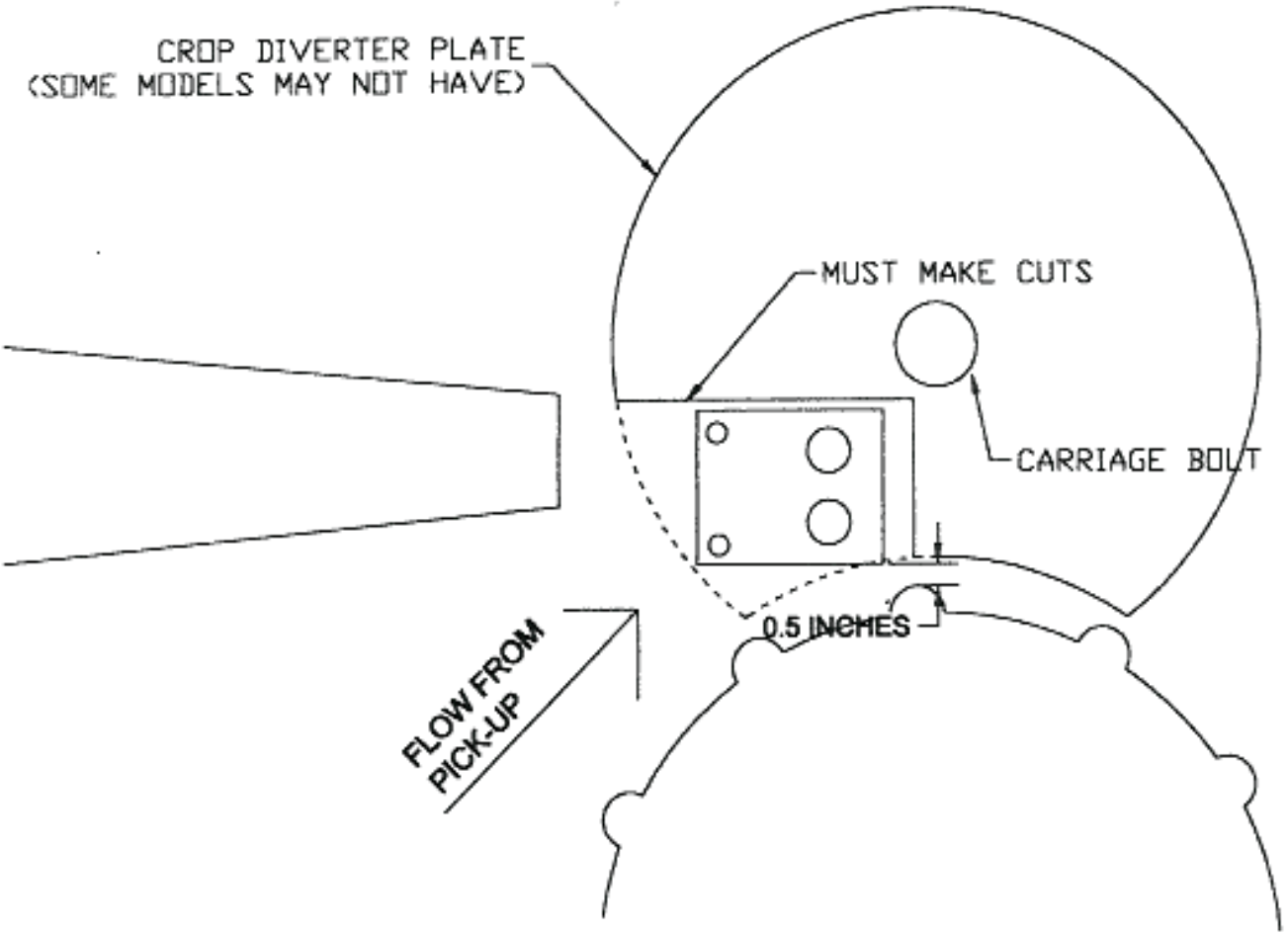


Figure 1

MOISTURE PAD PLACEMENT
FOR NEW HOLLAND ROUND BALERS



To install the moisture sensor, four holes need to be drilled in the wall of the bale chamber using the provided template as a guide. However, if your New Holland Round Baler contains a circular crop diverter plate it must be cut. A notch is cut in the plate as shown in the picture above. Re-install the plate and now use the template provided to drill the holes. Now install the four bolts. It is very important that the two larger carriage bolts are not grounded to the baler. Finally, install the wires and run to the control box.

LARGE SQUARE BALERS

Locate the sensor pad on the side door of the baler chamber, one to three flakes back from the plunger face. The sensor should be located between the bottom and middle channels on the door of the 3 x 3 square baler. The sensor should be located between the second and third channels on the door of the 4 x 4 baler.For balers running predominantly in grass, the sensor pad should be located in a bottom rail of the chamber, one to three flakes back from the plunger face. Mounting in this location requires cutting a round access hole in the center bottom rail on the bottom side, a more difficult installation, but in grass, it will show more reliable readings

For Hesston, Case-IH and New Holland balers, follow the placement instructions in figures 3 and 4 below.

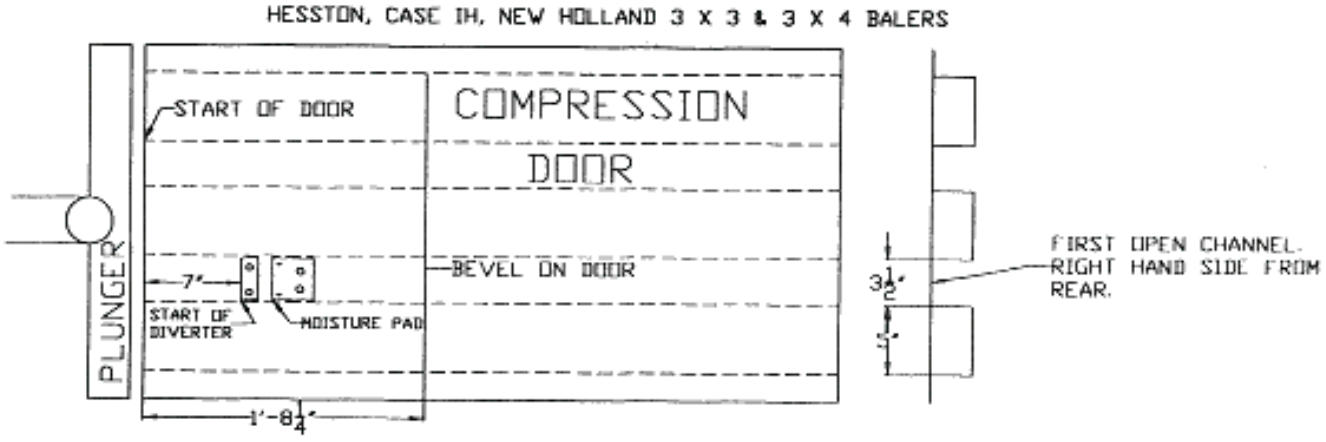


Figure 3

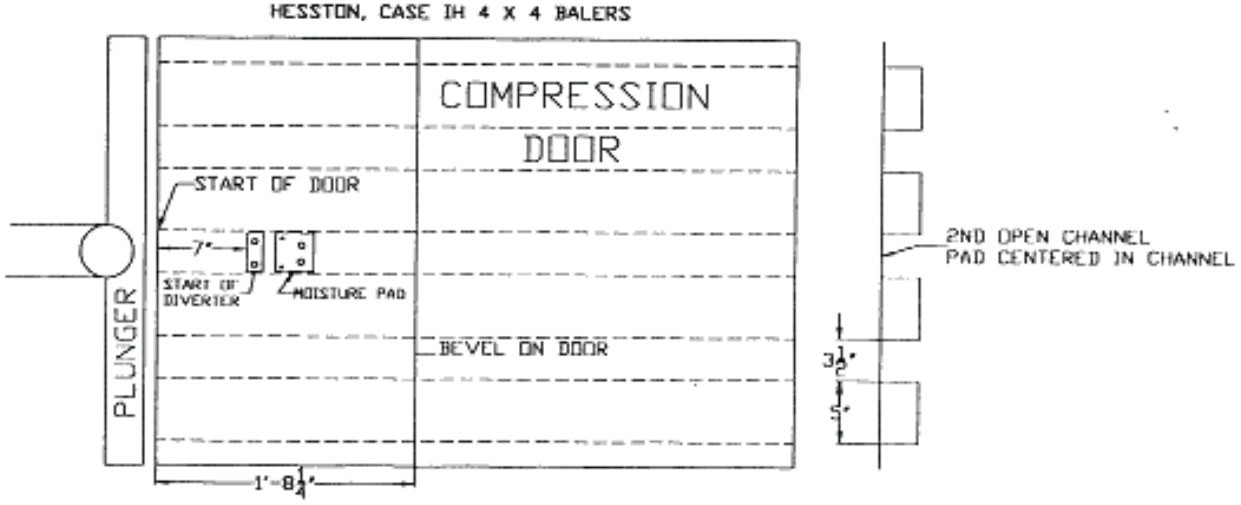


Figure 4

For Deere 100 balers, follow the placement instructions in Figure 5 below.

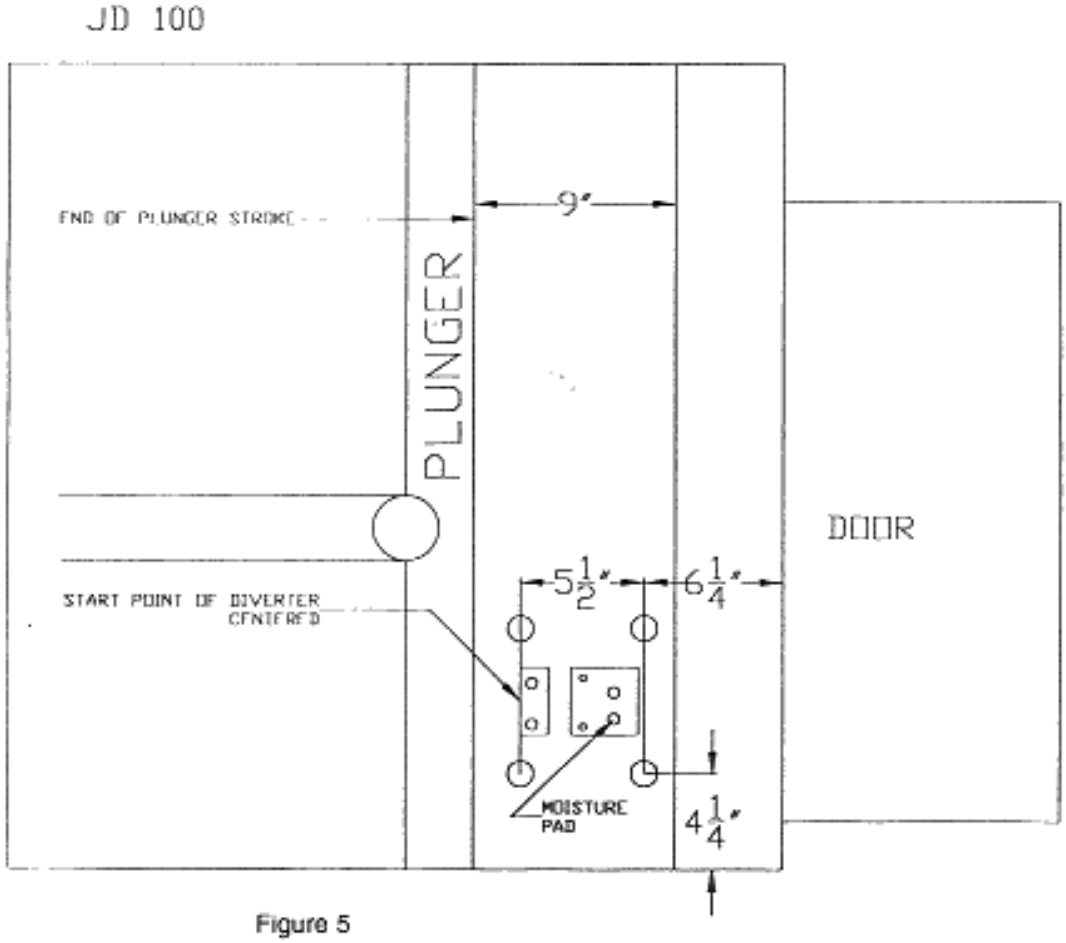


Figure 5

B. Install the sensor pad with only one thickness of steel between it and the backplates. Make sure the sensor bolts are at least 1/2" away from any external metal parts. Use the template provided to mark the 6 holes for the sensor and diverter and drill and mount the pad. Note the direction of hay movement arrow on the template. Install the sensor pad and diverter, making sure that there are 2 insulators in place on each sensor bolt and tighten all 4 bolts. Connect the two leads of the coaxial cable and tighten in place between the flat washers provided with the sensor bolts, making sure that the leads are not close to each other or to any other external metal parts. Slide the isolators over the wire connections in the pad.

C. Secure the coaxial cable at several points with cable ties provided so that it does not interfere with any moving parts of the baler.

D. Connect the coaxial sensor cable to the lead coming from the cab.

NOTE: The rate of application of preservative will be adjusted on the basis of the moisture reading from the sensor pad. As the hay becomes higher or lower in moisture, the rate of application will be adjusted accordingly. Note that there is a lag in time from the position of the crop under the spray nozzles to the moisture sensor pad. Isolated wet "slugs" will not be treated at an elevated rate since the controller is applying preservative at the average moisture. In the first several hours of curing, however, the moisture will even out in the hay bale, so the lag time from the spray nozzles to the moisture sensor pad is not a significant factor.

STEP 8. RUN THE "AUTO TEST"

Fill the tank with several gallons of water and run the built-in "auto test" routine to check the wiring connection. Please read the section titled "RUNNING THE AUTO TEST" in the "Operating Instructions".

OPERATING INSTRUCTIONS

The 454 lets the user:

1. Change the meter operation to MANUAL MODE or AUTOMATIC MODE.
2. Adjust the four Set Points
3. Reset the meter
4. Check meter calibration
5. Run an automatic self test
6. Adjust set time

Push the ON/OFF switch momentarily to turn the meter ON (push and hold the ON/OFF switch for a second to turn it OFF). The "POWER" LED and the display should turn on. The three LEDs marked "PUMP", "VALV1" and "VALV2" should be off. THE METER ALWAYS STARTS IN THE MONITOR/CONTROLLER MODE.

After displaying the software version for a few seconds the display will read: "...WAIT... READING THE SENSOR"

After three seconds the average reading will be displayed along with the three set point values. A value of "-LO-" is displayed if the average M.C. is below 6% and a value of "-HI-" is displayed if the average M.C. is above 40%.
The default SET POINT VALUES are 18%, 22% and 26% respectively for the PUMP, VALVE 1 and VALVE 2. The user can change these values using the procedure described below.

IF THE METER IS IN THE "AUTOMATIC" MODE and if the displayed reading is above the first setpoint value, the spray pump will be turned on. If the displayed reading is between the second and third set point values then the first valve will also be turned on. If the reading is above the third set point value, the second valve will also be turned on and all three LEDs will light. If the average M.C. is above 30% the buzzer will sound.

IF THE METER IS IN THE "MANUAL" MODE then the pump, both valves and the buzzer will be turned off and remain off regardless of the moisture reading.The pump valve 1 and valve 2 can be manually turned on by pressing the "UP" arrow key, or turned off by pressing the "DOWN" arrow key

CHANGING THE OPERATION MODE

As mentioned above, the meter can be used as an AUTOMATIC CONTROLLED or it can be used in a MANUAL MODE. Every time the meter is turned ON, it always starts in the AUTOMATIC MODE. To check and change the mode:

1. Press the "SELECT" key until the display shows the current operating mode.

2. Press the "ENTER" key to change the mode (otherwise press any other key to return to end the function). The new mode will be displayed for two seconds.

TO CHANGE THE SET POINTS

As previously mentioned, the default values for the set points are 18% for the pump, 22% for valve 1 and 26% for valve 2. However, the user can change these values as follows:

I. Press the "Select" key.

2. Press the "Enter" key (within five seconds) when the display reads: "CHANGE SET POINT? (Press ENTER)"

3. Next the display will show: "S.P.(PUMP) = xx (Press UP/DOWN)"
where "xx" is the current set point value for the pump (default is 18%).

4. Within five (5) seconds press either the "UP" arrow key to increase the value or the "DOWN" arrow key to decrease the value (between 15% and 22%). When the proper value is displayed, press the "Enter" key.

Press the "Enter" key instead of the "UP" or "DOWN" key (or wait five seconds) if you do not want to change the set point value for the pump.

5. Next the meter will display: "S.P.(VLV 1) = xx (Press UP/DOWN)"
where "xx" is the current set point value for valve 1 (default is 22%).

6. Within five seconds press the "UP" or "DOWN" arrow key to increase or decrease the value (between 18% and 26%). Press "Enter" when the proper value is displayed. Do not press the arrow key if you do not want to change the set point.

7. Next the meter will display: "S.P.(VLV 2) = xx (Press UP/DOWN)"
where "xx" is the current set point value for valve 2 (default is 26%).

8. Within five seconds press the "UP" or "DOWN" arrow key to increase or decrease the value (between 22% and 30%). Press "Enter" when the proper value is displayed. Do not press the arrow key if you do not want to change the set point.

9. Next the meter will display: "S.P. (ALARM) = xx (Press UP/DOWN)"

10. Within five seconds press the "UP" or "DOWN" arrow key to change the point at which the alarm sounds.

The unit will retain these values even if it is turned OFF and the main power is removed. The values will be lost if the user RESETs the meter.

TO RESET THE SYSTEM

1. Press the "Select" key and then the "UP" arrow key ONCE.

2. Press the "Enter" key when the display reads:"
RESET the METER? (Press ENTER)"

3. The meter will reset itself. Default set point values will be restored. Both valves and the pump will be turned off.

TO CHECK CALIBRATION

1. Disconnect the sensor from the meter.

2. Press "first the Select" key and then the "UP" arrow key TWICE.

3. Press the "Enter" key when the display reads: "CHECK CAL.? (Press ENTER)"

4. Display should read "CALIBRATION CHECK = 20.0 "
A tolerance of ± 0.5 (i.e. 19.5 to 20.5) is acceptable.

NOTE: ALTHOUGH THE SYSTEM SHOULD RETAIN ITS CALIBRATION INDEFINITELY, AN OCCASIONAL CHECK IS RECOMMENDED TO ASSURE THE OPERATOR THAT IT IS IN CALIBRATION.

RUNNING THE AUTO TEST

1. Turn the meter ON. Press the "Select" key until the display reads "AUTO TEST?". Press the "Enter" key within five seconds to start the test.

2. The meter will automatically activate the Pump, Valve I, Valve 2 and the buzzer in sequence for a few seconds. Make sure that the devices turn on as expected, otherwise check the wiring connections.

CHANGING THE ADJUST TIME

The 454 controller takes 5 moisture readings per second. Adjustments can be made between 1 and 30 seconds. It is recommended that the adjustment rate be set at:

Conventional Square Balers - 5 seconds • Large Round Balers - 2 seconds
Large Square Balers - 5 seconds

This is a function of the location of the sensor pad and the variation in the field to change set time.

1. Press the "SELECT" key and the "UP" arrow key until the display shows set time.

2. Press the enter key to change the mode (otherwise press any other key to return to end of function). The new mode will be displayed for two seconds.

PAUSING THE 454 CONTROLLER

A "PAUSE" feature is added which enables the operator to temporarily pause the monitor/controller operation.

To activate this feature:

1. Press the "ENTER/PAUSE" key BEFORE pressing any of the other keys.

2. Meter will display "...UNIT PAUSED..." The pump and all valves will be shut off and the buzzer will beep at one second intervals.

3. Press the "ENTER/PAUSE" key again to return to the normal mode. The meter will start operation from the point at which it was paused.

OPERATING INSTRUCTIONS - Model HS-454

Model 454 Applicators come with the following spray tips:

TIP NUMBER	COLOR CODED CAP	OUTPUT (lb./hr)
650033	WHITE	15
650050	BLACK	20
650067	BROWN	30
11001	ORANGE	45
110015	GREEN	65
11002	YELLOW	85
11003	BLUE	130
11004	RED	175

Set the tips up in the nozzles by selecting the application rates required and finding your baler's approximate harvesting rate from the application rate charts on the following three pages. Note that application is not as dependent on baling rate as it is on the application levels desired. Application rate ranges have been selected from some of the more common product labels currently on the market. If the application rates required are not on the following charts, tips can be re-combined from the preceding chart to achieve different levels of application at the setpoints entered into the controller.

APPLICATION RATE CHART - CONVENTIONAL SQUARE BALERS

BASE RATE • 2 tips - AUX 1 • 1 tip - Aux 2 • 1 tip

CHART 1: FOR APPLICATIONS OF 4 lb./ton • 8 lb./ton • 16 lb./ton

BALING RATE	LEFT TIP	RIGHT TIP	AUX 1	AUX 2
6 ton/hr.	White	White	Black	Orange
8 ton/hr.	Black	White	Brown	Green
10 ton/hr.	Black	Black	Orange	Yellow
12 ton/hr.	Brown	Black	Orange	Yellow
16 ton/hr.	Brown	Brown	Green	Blue
20 ton/hr	Orange	Orange	Yellow	Red

CHART 2: FOR APPLICATIONS OF 2 lb./ton • 6 lb./ton • 12 lb./ton

6 ton/hr.	White	Shut-Off	Black	Brown
8 ton/hr.	White	Shut-Off	Brown	Orange
10 ton/hr.	Black	Shut Off	Orange	Green
12 ton/hr.	White	White	Orange	Yellow
16 ton/hr.	White	White	Green	Yellow
20 ton/hr	Black	Black	Yellow	Blue

APPLICATION RATES ARE ACCURATE ONLY IF TIPS ARE KEPT CLEAN AND THE GAUGE READS BETWEEN 25 to 35 PSI.

APPLICATION RATE CHART - LARGE ROUND BALERS

BASE RATE • 3 tips - Aux 1 • 1 tip - Aux 2 • 1 tip

CHART 1: FOR APPLICATIONS OF 4 lb./ton • 8 lb./ ton • 16 lb./ton

	LEFT NOZZLE	CENTER NOZZLE	VALVE 1 NOZZLE	VALVE 2 NOZZLE	RIGHT NOZZLE
12 ton/hr.	White	White	Orange	Yellow	White
16 ton/hr.	White	Orange	Green	Blue	White
20 ton/hr.	Black	Orange	Green	Blue	Black
24 ton/hr.	Black	Green	Yellow	Red	Black
28 tons/hr.	Brown	Green	Blue	Red	Brown

CHART 2: FOR APPLICATIONS OF 2 lb./ton • 6 lb./ton • 12 lb./ton

	LEFT NOZZLE	CENTER NOZZLE	VALVE 1 NOZZLE	VALVE 2 NOZZLE	RIGHT NOZZLE
12 ton/hr.	White	White	Orange	Yellow	White
16 ton/hr.	White	White	Orange	Yellow	White
20 ton/hr.	White	White	Green	Yellow	White
24 ton/hr.	White	White	Yellow	Blue	White
28 ton/hr.	White	Brown	Yellow	Blue	White

APPLICATIONS RATES WILL BE ACCURATE ONLY IF THE TIPS ARE KEPT CLEAN AND THE PRESSURE GAUGE READS 25 TO 35 PSI.

APPLICATION RATE CHART - LARGE SQUARE BALERS

BALE RATE • 3 tips - Aux 1 • 2 tips - Aux 2 • 2 tips

CHART 1: APPLICATION OF 4 lb./ton • 6 lb./ton • 10 lb./ton

	BASE TIPS			AUX 1		AUX 2	
	LEFT	CENTER	RIGHT	LEFT	RIGHT	LEFT	RIGHT
BALING RATE							
20 ton/hr.	White	Orange	White	Black	Black	Orange	Orange
24 ton/hr.	Black	Orange	Black	Black	Black	Orange	Orange
28 ton/hr.	Brown	Orange	Brown	Brown	Brown	Green	Green
32 ton/hr.	Brown	Green	Brown	Brown	Brown	Green	Green
36 ton/hr.	Brown	Green	Brown	Orange	Orange	Green	Green
40 ton/hr.	Orange	Yellow	Orange	Brown	Orange	Yellow	Yellow
44 ton/hr.	Orange	Yellow	Orange	Orange	Orange	Yellow	Yellow
CHART 2: Application of 3 lb./ton • 8 lb./ton • 16 lb./ton							
20 ton/hr.	White	Brown	White	Orange	Orange	Yellow	Yellow
24 ton/hr.	White	Orange	White	Green	Green	Yellow	Yellow
28 ton/hr.	Black	Orange	Black	Green	Green	Blue	Blue
32 ton/hr.	Brown	Orange	Brown	Yellow	Yellow	Blue	Blue

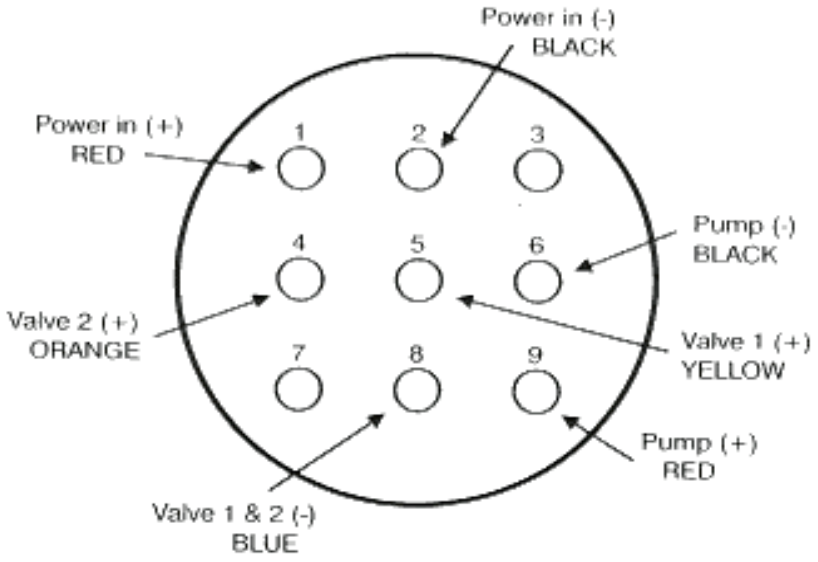
APPLICATION RATE WILL BE ACCURATE ONLY IF THE TIPS ARE KEPT CLEAN AND THE PRESSURE GAUGE READS 25 TO 35 PSI.

Trouble Shooting Checks

Problem	Possible Cause	Solution
Moisture reads high all the time	1. Baling too wet	Wait for moisture level to go down
	2. Electrodes touching each other or grounding out.	Keep electrodes clean. Clean chaff off bolts and from under pad. Make sure sure bolts are not touching metal.
	3. Tractor electronic Interference	Make sure power is hooked to battery or starter. Keep control away from 2-way radios.
Moisture reads low all the time	1. No conductivity to bale sensor	Inspect for loose connection or broken wires.
Moisture varies more than 10 points from reading to reading	1. Hay is varying in windrow wide amount	Improve mowing and raking Increase read time interval
	2. Loose connections or ground contact on sensor	Inspect wiring
Auxiliary tips are not coming on when box lights show they should	1. Loose wiring connects 2. Dirty tips	Inspect wire Clean auxiliary tips and strainers

WIRING DIAGRAM

Disconnects at cab box and inline



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