1 OPERATION

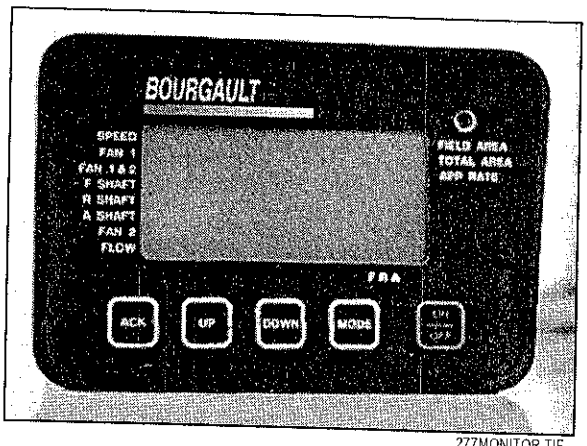
1.1 CONTROL CONFIGURATIONS

AIR SEEDER MONITOR

The monitor will display the current status for:

- fan(s) R.P.M.
- shaft R.P.M.
- bin level
- ground speed
- acreage
- metering augers
- case drain pressure

The 277 monitor is also used when calibrating the air seeder.



277MONITOR.TIF

Figure 1.1 - 277 Monitor

1.2 277 AIR SEEDER MONITOR

This control box contains the microprocessor that monitors, displays and controls the specified parameters for the Air Seeder and its operation. It uses a multiplex data communication system to monitor all the sensors on the machine. A nonvolatile memory is used in the monitor so the memory is always retained even if the power is disconnected.

The operator can select up to 11 different functions to monitor and display. The functions are listed on the face plate and identified by the triangular icon pointing to the function listing. Use the UP or DOWN switches to step through the functions as desired. The selected function will always be listed on Line 1.

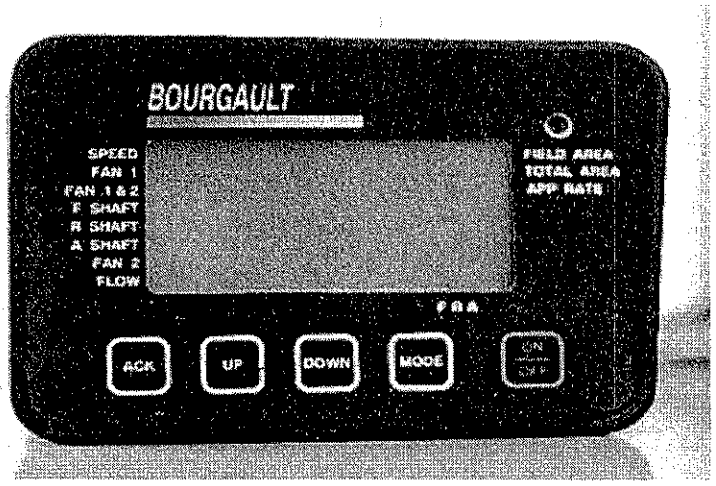
NOTE

IF A FUNCTION DOES NOT APPLY, IT WILL DISPLAY OFF. I.E., FAN 2 IF ONLY EQUIPPED WITH ONE FAN.

Unit of Measure: The unit of measurement for the selected function is displayed in the Units area of the panel.

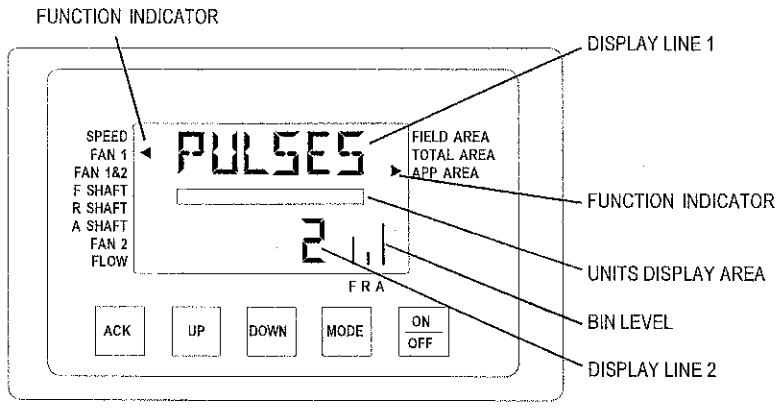
Bin Level Sensor: Bar graphs are used to display the status of each bin level function and are identified by F R A for front, rear and auxiliary tank respectively on the front panel. If a bin level sensor has been disabled, the bar graph is blank. If the bin level alarm is activated, the alarm will sound and the upper portion of the bar graph will flash to indicate a low bin level.

Audio Alarm: The monitor is equipped with an audio alarm to alert the operator of: low or high fan speed, low shaft speed or low bin level. The audio alarm sounds until the alarm condition is removed. All alarms can be acknowledged except the fan speed alarm. For the other alarms, pressing the ACK button will remove the audio alarm, but the triangular icon beside the alarmed function will still flash. For the fan speed alarm, the condition causing the alarm must be removed to turn off the alarm. For ease of understanding, the face plate is divided into sections.



277 Monitor

MONITOR.TIF



Schematic of Faceplate

MONITOR2.CAD

Figure 1.3 - 277 Air Seeder Monitor

A. Function Indicator:

The monitor functions are listed on the left and right side of the face plate and the selected function is identified by the triangular icon next to it. These icons will flash when alarm conditions for that function are tripped. Use the UP and DOWN switches to change the selected function and move the icon.

B. Display LINE 1:

The upper display line is designated LINE 1. It is used primarily for displaying the selected function and alarm conditions. This line also gives information during Change Setting Modes and initial system installation.

C. Display LINE 2:

The lower display line is designated LINE 2. It is used primarily for displaying numerical values for the selected function and alarm conditions. This line also gives information during Change Settings Modes and system installation.

D. Units Area:

The area between LINE 1 and LINE 2 is used for indicating the units. During operation the appropriate text is used to indicate the units associated with the numeric reading on LINE 2 of the display.

E. Bin Level:

Three 10 segment bar graphs indicate bin levels of up to three bins F (front), R (rear) and A (auxiliary). When Standard Low/High Sensors are used, the graphs indicate whether a bin level is in alarm.

F. ACK:

Primarily used for acknowledging alarms. Also used for exiting from special modes of operation, such as Change Settings Modes and for resetting area counts. Depress the switch to acknowledge.

G. UP:

Primarily used for changing the active display function. It is also used to increase a displayed number in the Change Settings Modes. Depress the switch once to move.

H. DOWN:

Primarily used for changing the active display function. It is also used to decrease a displayed number in the Change Settings Modes.

J. MODE:

Used to enter Change Settings Modes. Also used for advancing a display number in Change Settings Modes.

K. ON/OFF:

Used to turn the unit ON and OFF.

Function	Line 1 Text	What Appears on Line 2
a. SPEED	SPEED	Ground speed in M.P.H. or K.P.H. (Kilometres per hour)
b. FAN 1	FAN 1	Fan 1 speed in RPM
c. FAN 1 & 2	Fan 1 speed in RPM	Fan 2 speed in RPM
d. F SHAFT	F SHAFT	Metering shaft speed in RPM for front tank
e. R SHAFT	R SHAFT	Metering shaft speed in RPM for rear tank
f. A SHAFT	A SHAFT	Metering shaft speed in RPM for auxiliary tank (3 tank A/S only)
g. FAN 2	FAN 2	Fan 2 speed in RPM
h. FLOW	FLOW	Not available at this time.
i. FIELD AREA	FAREA	Area covered by the air seeder in ACRES or HECTARES since the last time the counter was zeroed. The field counter can be cleared alone; clearing TOTAL also clears field.
j. TOTAL AREA	TAREA	
k. APPLICATION AREA	APRATE	Determined application rate in pounds/acre or kg/hectare. Shows 0 after powerup and until procedure is complete.

Table 1 - Controller Function Definition TABLE2.XLS

1.4 277 MONITOR PREPARATION

Each operator should review this section of the manual at the start of each season and periodically during the season as required to remain familiar with monitor operation. Review the applicable section when using the monitor and Air Seeder.

1.4.1 START-UP AND SYSTEM INSTALLATION

The monitor is designed to cycle through a specific sequence when it is turned on at start-up to inform the operator about the monitor, system, and sensors.

When the monitor is turned ON:

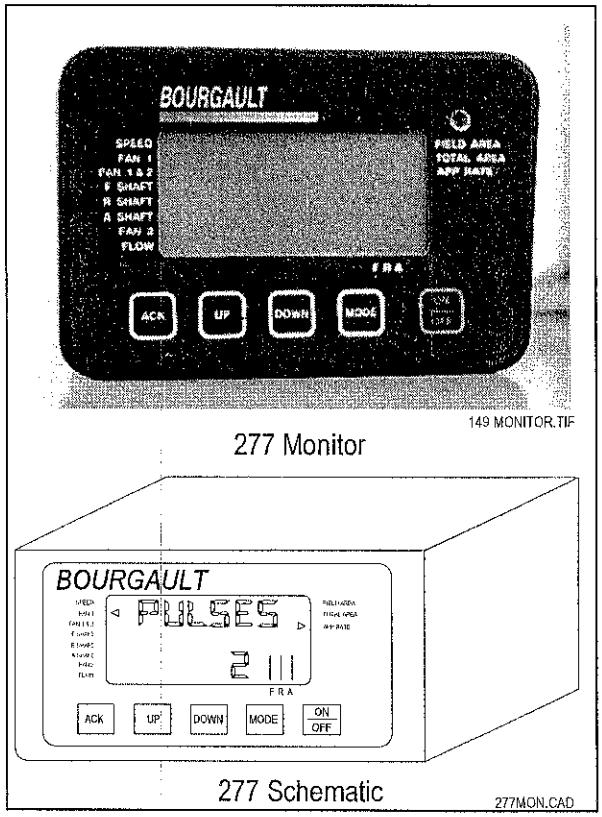
1. All of the display segments turn on one at a time and off one at a time to verify that all functions and systems in the monitor box are working.
2. The Version/Issue number of the monitor software is displayed. This number should be included with any reports of faulty or unexpected system operation.

SCREEN1.CAD

3. The sensor numbers of all previously learned sensors are displayed in sequence as initial communication with each sensor takes place.
4. The normal operating display starts with the ground speed function active.

NOTE

IF AN ERROR OR MALFUNCTION IS DISCOVERED DURING THE START-UP CYCLE SEQUENCE, THE MONITOR WILL INDICATE "MISSED" ON THE DISPLAY FOR SENSORS THAT ARE UNHOOKED OR DEFECTIVE.



149 MONITOR.TIF

277 Monitor

277 Schematic

277MON.CAD

Figure 1.6 - 277 Monitor

1.4.2 SPECIAL START-UP

There are several types of special modes that can be selected when starting up the unit.

1.4.2.1 RESET SETTINGS

Select this start-up mode when it is necessary to reset one or all stored settings. When this mode is selected, all settings revert to pre-selected factory settings and the areas go to zero. (e.g. High/low fan, Implement width, etc.).

Depress and hold the ACK and MODE switches, while turning the monitor power ON. Continue to hold the keys down until KEY OFF appears on the display to activate the reset settings mode.

1.4.2.2 FORCED SENSOR LEARN/RESET SETTING (THREE KEY START-UP)

Select this start-up mode for the first time to learn new sensors and to reset the internal values and zero the areas. This is done at the factory for new units or when a replacement monitor is installed in the field.

Depress and hold the ACK, DOWN, and MODE switches, while turning the monitor power ON. Continue to hold the keys down until KEY OFF appears on the display to indicate the monitor is ready to set.

NOTE

IT IS RECOMMENDED THAT THIS "3 KEY" START-UP BE USED WHEN CONFIGURING A BRAND NEW MONITOR OR AT THE START OF A NEW SEASON.

1.4.2.3 SENSOR REPLACEMENT

The monitor will alert the operator if a sensor is faulty by sounding the alarm for that function. The display will flash the faulty sensor.

A. Single sensor replacement:

i. Turn the monitor off.

ii. Disconnect the faulty sensor from the wiring harness.

iii. Connect the replacement sensor to the wiring harness.

iv. Turn the monitor on.

v. The monitor will automatically learn the new sensor.

B. Two or more sensor replacement:

i. Turn monitor off.

ii. Disconnect faulty sensors from harness.

iii. Install replacement sensors but do not connect to harness.

iv. Turn monitor on.

v. The monitor will prompt for disconnected sensors.

vi. Connect replaced sensors to the wiring harness as prompted by the monitor.

vii. When all sensors are connected, the monitor cycles to normal operation and "SPEED" for ground speed is displayed.

1.4.2.4 FORCED SENSOR LEARN

Select this start-up mode when it is necessary for the monitor to learn a new sensor configuration. In this start-up mode, the existing sensor configuration will be cleared from memory but the previous settings will be retained.

Depress and hold the ACK and DOWN switches, while turning the monitor power ON. Continue to hold the keys down until KEY OFF appears in the display to activate the forced sensor learn mode.

Use the Forced Sensor Learn start-up mode when:

1. Configuring a system for the first time.
2. Upgrading a system with new sensors.
3. Configuration information has been lost due to a system failure.

IMPORTANT

MONITORS ARE NOT INTERCHANGEABLE UNLESS THE ENTIRE SYSTEM IS RESET. ONLY THE MONITOR USED DURING INSTALLATION WILL OPERATE PROPERLY ON THE SYSTEM.

When going through the forced sensor learn mode, follow this procedure:

1. Disconnect all the sensors from the working harness. The Ground Speed sensor does not have to be disconnected, since it is the first sensor prompted.
2. Depress and hold the ACK and DOWN switches, while turning the monitor power ON. Continue to hold the keys down until "KEY OFF" appears on the display. Release the keys.

3. The monitor will prompt the operator for the sensors that should be connected to the harness by flashing "MISSED" and the sensor. The Ground Speed sensor will be picked up by the monitor and proceed to the FAN 1 sensor if the Ground Speed sensor was never disconnected.

4. Connect sensors in this order as prompted by the monitor display.
   1. Ground speed sensor (If this sensor was not disconnected, the prompts would begin with location 2.)
   2. FAN 1 sensor
   3. FAN 2 sensor
   4. Front bin auger shaft sensor
   5. Rear bin auger shaft sensor (3170/3225/5200) or Centre bin auger shaft sensor (3200/5245)
   6. 3rd Tank bin auger shaft sensor (3170/3225) or Rear bin auger shaft sensor (3200/5245) (not used on 5200)
   7. Front bin level sensor
   8. Rear bin level sensor (3170/3225/5200) or Center bin auger shaft sensor (3200/5245)
   9. Auxiliary bin level sensor (3170/3225) or Rear bin auger shaft sensor (3200/5245) (not used on 5200).
5. After the proper sensor has been connected to the harness, the monitor will sound a beep to signify that it accepts the sensor and then it will prompt for the next sensor.
6. If your installation does not use all the potential sensors in the system, depress the ACK switch when the monitor prompts for this sensor to tell the monitor to skip this position. The sensor will be assigned a disabled status and will prompt for the next sensor. **To activate a skipped sensor, the operator must go through the Forced Sensor Learn procedure again.**
7. Case Drain Pressure Switch - After all of the sensors have been connected, the monitor will attempt to detect whether or not the learned fan sensor or sensors can accept a pressure switch input or if the pressure switch is closed, indicating a low pressure state.

   The monitor will report the status of the pressure switch detection with a beeping alarm. The top line will display "FANPRS" and the bottom line will display the number of fan sensors detected. A correct learn should result with a "1" when a pressure switch is being used.

A "0" indicates that the fan sensor:

- cannot accept pressure switch monitoring
- the connection was not completed
- the connection was completed incorrectly

Pressure switch monitoring will not occur, if a "0" is shown.

Check the fan sensor for an additional set of wire leads, one black for ground and one red for signal. If the wires are not present then the sensor can not accept pressure switch monitoring. Ensure that the wires are connected to the pressure switch. If the wires were connected then it likely indicates a faulty pressure switch or a broken lead. The pressure switch can be indirectly tested by short circuiting (connecting) the red and black wires and if good learn results (i.e. a "1" is indicated rather than a "0") then the switch is faulty. If a "0" is still indicated then there is likely a faulty fan sensor or leads.

A "1" indicates that the fan sensor can accept pressure switch monitoring, it is connected properly and the switch is in the low pressure state. "1" is the expected number when a "good" install is completed.

A "2" indicates that there are two fan sensors with additional leads for connecting to the pressure switch and there is a closed circuit between the red and black wires on both sensors.

If a "2" condition is reported, ensure that the red and black wire leads from the main fan sensor are connected to the pressure switch and clip the wire leads on the auxiliary fan sensor off at the edge of the sensor, to avoid a short circuit and an incorrect reading from that sensor.

NOTE

ONLY THE MAIN FAN SENSOR SHOULD BE CONNECTED TO THE PRESSURE SWITCH, EVEN IF THE AIR SEEDER IS EQUIPPED WITH AN AUXILIARY BLOWER. ALSO, ENSURE THAT THE CASE DRAIN LINE IS NOT PRESSURIZED DURING THE LEARN SEQUENCE. CONNECT THE LINE TO THE TRACTOR OR RELIEVE ANY PRESSURE AT THE COUPLER.

A good test after completing the learn is to disconnect the red lead from the pressure switch. After 30 seconds an alarm should be generated which can only be corrected by reconnecting the red lead to the switch. Once the correct number is displayed for the Case Drain Pressure Sensor, press ACK button to acknowledge the setting for the sensor.

8. The monitor will now automatically advance to the Operating Mode and displays "SPEED" for ground speed.
9. Alarms for ground speed and fan speed(s) will sound as there is no shaft movement in any of those systems.
10. Turn the alarms off by cycling the function selector to each of the SPEED and FAN functions and depressing the ACK switch.
11. Check and verify that the system is ready by turning the monitor OFF and then ON. When the unit comes ON, the monitor will cycle through all the learned sensors and their names will flash on the display in sequence. Then the monitor will advance to its default operating mode in which the Ground Speed function is active.
12. Several functions can use the same type of sensor and the monitor cannot distinguish if the correct one has been connected to the harness. Similar sensors used in different locations can have different sensing ranges (for example, metering shaft speed and ground speed) resulting in incorrect monitor readings.

IMPORTANT

ALWAYS CONNECT THE SENSORS TO THE WIRING HARNESS IN THE PROPER SEQUENCE, AS LISTED IN STEP 4.

1.4.3 CHANGING MONITOR SETTINGS

Most of the monitor functions have settings that can be changed to reflect the application requirements. These include configuration details, alarm trip points and convenience options (Imperial vs metric display).

Follow this procedure when entering or exiting the change mode:

A. **Entering the Change Settings Mode:**

a. Turn the monitor on.

b. Use the UP or DOWN switch to select the desired function.

c. Depress and hold the MODE switch until you hear 4 short beeps followed by one long beep. Release switch.

d. The monitor is now in the Change Monitor Settings mode.

e. Display Line 1 will show a description of what the setting is. For example: FAN 1.

NOTE

NO ALARMS WILL SOUND WHEN THE MONITOR IS IN THE CHANGE SETTING MODE.

f. Display Line 2 will show the present numeric value of the setting. For example: 2000.

g. Units line will show the appropriate units for the function. For example: RPM.

h. Press the UP or DOWN button until the desired setting is shown.

i. Depress the MODE switch to advance the display to the next changeable item for that function.

j. After cycling through all the changeable items for that function, SAVE appears on the display to allow the operator to save or not save as desired.

k. Depress MODE and the display returns to the starting changeable item.

B. **Exiting from the Change Settings Mode:**

a. Depress MODE until SAVE appears in Line 1, on the display.

b. If settings should be saved, depress the UP switch to choose yes (Y).

c. Depress and hold ACK switch until you hear 4 short beeps followed by 1 long beep. Release switch.

d. If settings should not be saved and the settings remain as they were before entering Change Setting Mode, depress the DOWN switch to choose no (N).

e. Depress ACK and this mode will be exited immediately.

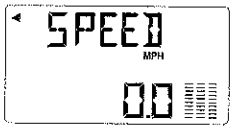
NOTE

SAVED SETTINGS WILL BE RETAINED IN THE MEMORY EVEN IF THE POWER IS DISCONNECTED.

1.4.3.1 SETTING PULSES PER MILE

When setting the pulses for your machine, follow this procedure:

1. Turn the monitor on and wait until it advances to the operating mode and the display reads SPEED.



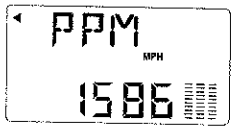
2. Depress and hold the MODE switch until you hear 4 short beeps and one long beep.
3. Release the MODE switch and the monitor is now in the Change Settings Mode.
4. The monitor will prompt for each input.

DISPLAY 1	FUNCTION	RANGE
PPM	Pulses per mile for the Ground Speed Sensor	Refer to Table 3 for correct setting
PPR	Pulses per revolution for the Ground Speed Sensor (Number of magnets in the pick-up)	2

TABLE4-2.XLS

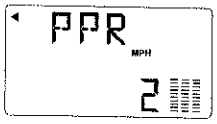
Table 2 - Speed Function Definition

5. The first prompt will be PPM on Line 1 for the number of pulses per mile for the specific tire used on your machine and the existing setting will appear on Line 2. Refer to *Table 3* for the PPM for your tire.



6. Use the UP or DOWN switch as required to change setting.
7. Depress the MODE switch to move to the next prompt.
8. The monitor will prompt PPR in Line 1 to set the pulses per revolution for the ground speed shaft sensor and the existing setting will appear in Line 2.

9a. **2135 & 3000 Series** - Use the UP or DOWN switch as required to **set PPR at 2**. The number "2" represents the number of magnets in the actuator disc for the speed pickup.

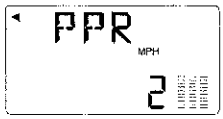


Air Seeder Size	Tire Manufacturer	Tire Type	Rear Tire Size - Ply Rating	Tire Pressure	Pulses per Mile (PPR set to 2)	Pulses per Mile (PPR set to 1)
2135	Goodyear	A.W.T.	12.4 x 16	32 psi (221 kpa)	3856	1928
			12.5 x 16		4162	2081
		Softrac	16.5L x 16.1 - 6ply	20 psi (138 kpa)	3520	1760
		Traction Lug			3400	1700
3170/3200/ 3225	Goodyear	Softrac	21.5L x 16.1 - 10ply	28 psi (193 kpa)	3172	1586
	Firestone	Rib Imp.			3326	1663
	Goodyear	Tractor Lug	21.5L x 16.1 x 8/10 ply	24 psi (165 kpa)	3100	1550
5200 Tow Behind	Goodyear	A.W.T.	18.4 x 26 - 10ply	16 psi (110 kpa)	5036	2518
		Rice			5112	2556
5200 Leading	Goodyear	A.W.T.	28L x 26 - 12ply	12 psi (83 kpa)	5152	2576
		Rice	28L x 26 - 10/12ply		5152	2576
5245 Tow Behind	Goodyear	A.W.T.	23.1 x 26 - 8ply	12 psi (83 kpa)	5024	2512
		Rice	23.1 x 26 - 10 ply		5152	2576
		Tractor Lug	23.1 x 26 - 8 ply		5084	2542

Table 3 - Pulses Per Mile vs Tires

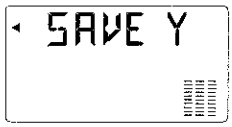
TABLE5-2.XLS

9a. **5000 Series** - Use the UP or DOWN switch as required to **set PPR at 2**. This represents the number of magnets in the actuator disc for the speed pickup.



10. Depress the MODE switch to cycle to the next prompt.

11. The monitor will prompt SAVE Y/N to ask if the new settings should be saved.



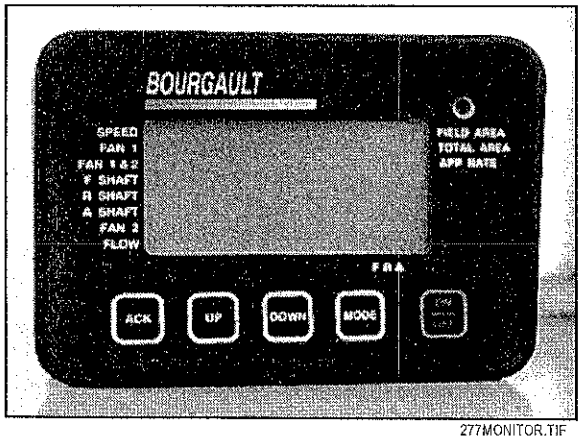
12. Depress UP (Y) to save changes or DOWN (N) to exit program mode without saving changes.

13. Depress MODE if you want to cycle through the settings again.

14. Depress and hold the ACK switch until 4 short beeps and 1 long beep is heard. The monitor is now out of the Change Settings Mode.

NOTE

SAVED SETTINGS WILL BE RETAINED IN THE MEMORY EVEN IF THE POWER IS DISCONNECTED.



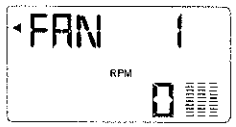
277MONITOR.TIF

Figure 1.7 - Monitor

1.4.3.2 SETTING FAN PARAMETERS

When setting fan parameters, follow this procedure:

1. Depress the UP or DOWN switch as appropriate to select FAN 1 or FAN 2 and its name appears in the upper display line.



2. Depress and hold the MODE switch until you hear 4 short beeps and one long beep.

3. Release the MODE switch and the monitor is now in the Change Settings Mode.

4. The monitor will prompt for each input.

5. The first prompt will be PULSES in Line 1 for the number of pulses per fan revolution and the existing setting in Line 2.

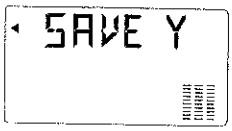
6. Enter "1" to enable and "0" to disable by using the UP or DOWN switches.

7. Depress the MODE switch to move to the next prompt.

8. The monitor will prompt LOW FAN in Line 1 for the low fan speed alarm setting and the existing setting will appear in Line 2.
9. Use the UP or DOWN switch to adjust the setting as desired. Set at 2000 RPM for normal operation.

10. Depress the MODE switch to move to the next prompt.
11. The monitor will prompt HIGH FAN in Line 1 for the high fan speed alarm setting and the existing setting will appear in Line 2.
12. Use the UP or DOWN switch to adjust the setting as desired. Set at 5000 RPM for normal operation.

13. Depress the MODE switch to move to the next prompt.
14. The monitor will prompt SAVE Y/N to ask if the new settings should be saved.



15. Depress UP (Y) to save changes or DOWN (N) to exit program mode without saving changes.
16. Depress MODE if you want to cycle through the settings again.
17. Depress and hold the ACK switch until 4 short beeps and 1 long beep is heard. The monitor is now out of the Change Settings Mode.

Refer to *Table 4* for a guide on fan settings.

DISPLAY 1	FUNCTION	RANGE	COMMENTS
PULSES	Pulses per revolution on the Fan Sensor	0 to 1	If 0, monitoring is disabled.
LOW FAN	Low Fan RPM alarm point	1000 to 4000	ACK button will NOT silence the alarm when the drive clutch is engaged. Silence the alarm by disengaging the clutch and acknowledging the alarm.
HIGH FAN	High Fan RPM alarm point	LOWFAN to 5000	

Table 4 - Fan Setting

TABLE3.XLS

1.4.3.3 SETTING SHAFT SENSORS & BIN LEVEL SENSOR PARAMETERS

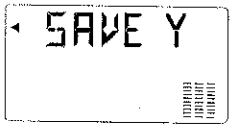
The bin level sensor and metering auger shaft sensors installed on the same tank work together. If the shaft sensor for the rear tank has been disabled, the bin level sensor for the rear tank will be disabled as well. When a metering auger sensor is disabled, it will generate no alarms.

When setting shaft and bin level parameters, follow this procedure:

1. Depress the UP or DOWN switch to select one of the shaft functions (F SHAFT, R SHAFT, A SHAFT). The function name will appear in the upper display line (Line 1).

2. Depress and hold the MODE switch until you hear 4 short beeps and one long beep.
3. Release the MODE switch and the monitor is now in the Change Settings Mode.
4. The monitor will prompt for each input.
5. The first prompt will be PULSES on Line 1 for the number of pulses per shaft revolution and the existing setting will appear on Line 2.

6. Refer to *Table 5* for Recommended Shaft Pulse Settings.
7. Enter "1" to activate bin/shaft alarm and "0" to disable bin/shaft alarm (turn off).
8. The next prompt LEVEL is not used with the standard low bin level sensor. The value remains at 20.
9. Depress the MODE switch, and SAVE Y/N appears in the display.



10. Depress UP (Y) to save changes or DOWN (N) to exit program mode without saving changes.
11. Depress MODE if you want to cycle through the settings again.
12. Depress and hold the ACK switch until 4 short beeps and 1 long beep is heard. The monitor is now out of the Change Settings Mode.
13. Note that as a bin/shaft alarm is disabled, the bar graph for that tank will turn off.
14. Select next SHAFT function and set parameters as required.

DISPLAY 1	FUNCTION	RANGE	COMMENTS
PULSES	Pulses per revolution on the Shaft Sensor	0 to 16	Set to 1 for normal use. Set to 0 to disable alarm monitoring for this Shaft/Bin Sensor pair.
LEVEL	Alarm point for Low Bin Level for Optical Sensor	0 to 100	Normal use setting is at 20. Set to 0 to disable this alarm.
HEIGHT	Not required for Optical Sensor		

Table 5 - Recommended Shaft Pulse Settings TABLE6.XLS

1.4.3.4 SETTING IMPLEMENT WIDTH AND SELECTING UNITS

Use either the FIELD AREA or TOTAL AREA to set the Implement Width or unit selection.

When setting implement width and/or unit selection, follow this procedure:

1. Depress the UP or DOWN switch as appropriate to select either F AREA (Field Area) or T AREA (Total Area) and its name appears in Line 1 of the display.

2. Depress and hold the MODE switch until you hear 4 short beeps and one long beep.
3. Release the MODE switch and the monitor is now in the Change Settings Mode.
4. The monitor will prompt for each input.
5. The first prompt will be WIDTH on Line 1 for the width of your implement in feet or meters to the nearest 0.1 ft. or m and the existing width will appear in Line 2.

6. Use the UP or DOWN switch to enter the width of the implement. The monitor default is set for 40.0 ft. (12.2 m) to start.

IMPORTANT

BE SURE THAT THE CORRECT IMPLEMENT SIZING SPROCKET IS ON THE MAIN DRIVE CLUTCH. REFER TO THE AIR SEEDER OPERATOR'S MANUAL.

7. Depressing the UP or DOWN switch once changes the width in a 0.1 increment.
8. Depress the MODE switch to move to the next prompt.
9. The monitor will prompt UNITS in Line 1 of the display and the existing setting will appear in Line 2.

10. Depress the UP switch to select English units and DOWN to select metric units. This selection will set the units for all parameters.
11. Depress the MODE switch to move to the next prompt.
12. The monitor will prompt SAVE Y/N to ask if the new settings should be saved.

13. Depress UP (Y) to save changes or DOWN (N) to exit program mode without saving changes.
14. Depress MODE if you want to cycle through the settings again.
15. Depress and hold the ACK switch until 4 short beeps and 1 long beep is heard. The monitor is now out of the Change Settings Mode.

Refer to *Table 6* for Width and Unit Settings

DISPLAY 1	FUNCTION	RANGE	COMMENTS
WIDTH	Implement width	0 to 100 ft. (0 to 30.5 m)	Default is 40 ft. or 12.2 m.
UNITS	Units used for display	0 to 1	DOWN selects 0 for Imperial units (default). UP selects 1 for metric units.

Table 6 - Width and Unit Settings

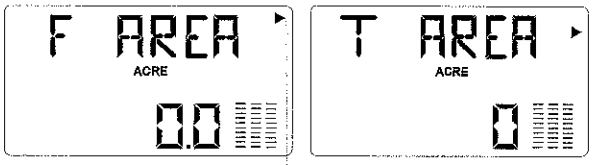
TABLE7.XLS

1.4.3.5 AREA DISPLAY MODE

The microprocessor in the monitor can calculate the field or total area covered after the implement width and ground speed pulses/mile have been entered.

The F AREA (field area) displays field acres to decimal place (0.1).

The T AREA (total area) displays total accumulated acres without a decimal.

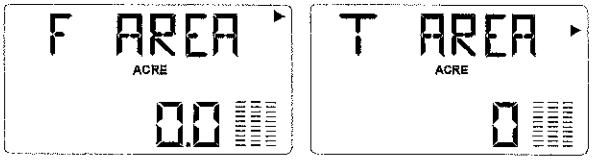


IMPORTANT

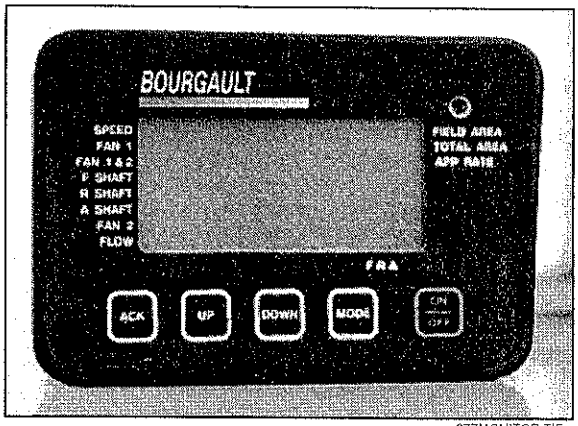
EITHER FUNCTION CAN BE RESET TO ZERO. F AREA (FIELD AREA) CAN BE ZEROED WITHOUT AFFECTING THE T AREA (TOTAL AREA). T AREA (TOTAL AREA), WHEN ZEROED WILL ALSO ZERO OUT THE F AREA (FIELD AREA).

To zero the function, follow this procedure:

1. Depress the UP or DOWN switch as appropriate to select either F AREA (field area) or T AREA (total area). It will display in Line 1.



2. Depress and hold the ACK switch until you hear 4 short beeps and one long beep.
3. The area function selected will now be reset to zero.



277MONITOR.TIF

Figure 1.8 - Monitor

All areas are stored in nonvolatile memory so they are not lost even when the power is disconnected. Field area will store to a maximum of 999.9 acres, total accumulated area to a maximum of 99999 acres. The display then resets back to zero. When displaying area in hectares, the display will reset at 404.69 Ha, and 40469 Ha (this is the metric equivalent of 999.9 and 99999 acres).

IMPORTANT

THE ACCURACY OF AREA ACCUMULATION DEPENDS ON A NUMBER OF CONDITIONS SUCH AS THE AMOUNT OF OVERLAP IN THE FIELD AND ON THE HEAD LANDS. THE MONITOR ASSUMES THERE IS NO OVERLAP WHEN COUNTING ACRES. IT HAS BEEN DETERMINED THAT ON AVERAGE THERE IS ABOUT 8% OVERLAP ON A TYPICAL FIELD. THIS WILL VARY BETWEEN OPERATORS.

IMPORTANT (FOR 2000 & 3000 SERIES)

IF THE UNIT IS CONTINUOUSLY COUNTING ACRES, CHECK THAT THE "BLUE" POWER SENSING WIRE ON THE SPEED SENSOR IS SPLICED INTO THE MAIN CLUTCH AND NOT BACK TO THE SPEED SENSOR WIRE. REFER TO THE TROUBLESHOOTING GUIDE AT THE BACK OF THIS MANUAL.

If the operator experiences area readings that are persistently high or low it is suggested that a quick calculation be performed to recalculate the PPM (Pulses Per Mile) that were entered.

Divide the acres displayed on the monitor by the actual field acres and multiply by the PPM that was entered into the monitor.

$$\frac{\text{Displayed Acres}}{\text{(Ha)}} \times \text{PPM} = \text{NEW PPM}$$

This will give a new PPM value that may be entered into the monitor. Refer to Section 1.4.3.1 Setting Pulses per Mile.

1. Refer to *Figure 1.9*. Set a distance for the seeding unit to travel. By knowing how far the seeding implement has travelled, the exact area can be determined.

   Example - Model 3225 with Goodyear Softrac 21.5L x 16.1 tires and 40ft seeding implement.

   - Distance measured to travel is 200ft.
   - Put monitor into Calibrate mode for a more accurate acreage reading.
   - Engage clutch and drive the measured 200ft.
   - Area covered = 200ft x 40 ft = 8000ft².
   - Actual Field Acres = 8000ft²/43560ft²/acre = 0.18 acres

2. Obtain the acreage from the monitor by checking the field area (F AREA).

   Example

   - Displayed Acres = 0.19 acres

3. Divide the acres displayed on the monitor by the actual field acres and multiply by the PPM that was entered into the monitor.

   Example

   - PPM for 40ft unit (see Table 3) = 1586
   - Apply formula: $\frac{0.19 \text{ acres}}{0.18 \text{ acres}} \times 1586 = 1674$
   - 1674 will be the new PPM value to enter in the monitor.

This will give a new PPM value that may be entered into the monitor. Refer to *Table 3 - Setting Pulses per Mile*.

IMPORTANT

AFTER CHANGING THE PPM VALUE IT IS RECOMMENDED TO RECALIBRATE YOUR AIR SEEDER. AREA CALCULATIONS AND CALIBRATION ARE CALCULATED ACCORDING TO THE PPM ENTERED. CHANGING THE PPM WILL CHANGE THE RESULTS OF CALIBRATION TESTS.

NOTE

WHEN THE GROUND DRIVE CLUTCH IS DISENGAGED, AREA ACCUMULATION IS NOT COUNTED.

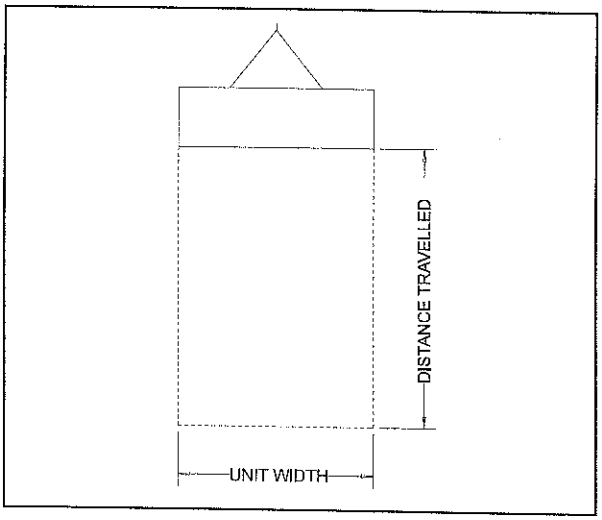


Figure 1.9 - Actual Area Calculation

1.4.3.6 COUNTING PPM (PULSES PER MILE)

The microprocessor in the monitor can count the pulses per mile automatically.

1. Turn the monitor on and wait until it advances to the operating mode and the display reads SPEED.

2. Depress and hold the MODE switch until you hear 4 short beeps and one long beep.
3. Release the MODE switch and the monitor is now in PPM counting.
4. Drive 1 mile (5280 feet) (1.61 km or 1609 metres) and the monitor will count the pulses per mile. Once the mile is complete, the monitor will give you the option of automatically setting the number it has calculated.

1.4.4 APPLICATION RATE MODE

The Application Rate Mode provides a way for the operator to determine the application rate in terms of measured weight per unit area.

To set or check the Application Rate Mode, refer to *Section 2 - Calibration.*

1.4.5 277 MONITOR ALARMS

All configured sensors are continuously monitored. Monitor alarms fall into these categories:

1. **Sensor Alarms:**

   Are generated when information returned by a sensor falls outside the operational limits that are either set by the operator or are default settings.

2. **Communication Alarms:**

   Occur when an individual sensor repeatedly does not communicate with the monitor.

3. **System Alarms:**

   Occur when all sensors fail to communicate with the monitor.

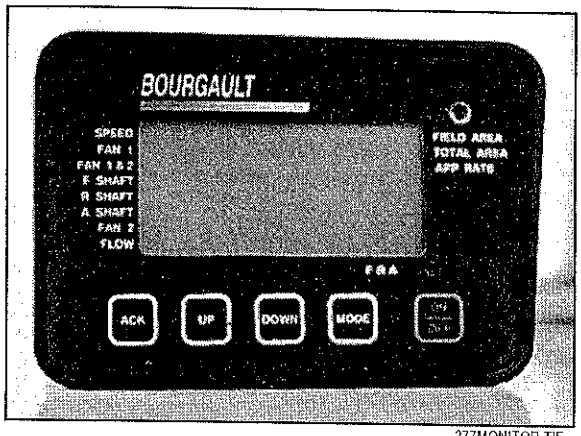
All alarms operate the same way. The monitor emits a beep and alarm information is displayed, either in a single message or two alternating messages. In some cases, a triangular function indicator will flash as well. The alarms will persist until the alarm condition is removed or until the alarm is acknowledged by the operator.

The user can press the ACK button to acknowledge the alarm, which (if there are no other alarms pending) results in the silencing of the beeper and the return of the normal display. An exception to this is the fan alarms, as is explained later.

After acknowledgement, the triangular function indicator (or the upper portion of the bar graph, in the case of the bin level alarms) will continue to flash as long as the alarm condition is present.

If more than one alarm occurs at the same time, pressing the ACK button will acknowledge each alarm in order of priority. Line 1 will indicate the highest priority alarm that has not been acknowledged. When all alarms have been acknowledged, the triangular function indicators for each alarmed function will continue to flash for as long as each alarm condition persists.

Once the alarm condition has been corrected, the 277 monitor will return to its normal operating mode.



277MONITOR.TIF

Figure 1.10 - Monitor

1.4.5.1 SENSOR ALARMS

The following list shows alarms which are generated when alarm thresholds are exceeded. Alarm points for some sensors are fixed, while others can be changed by the user.

1. Low or High Fan Speeds (alarm points may be changed).
2. Shaft speeds (fixed alarm points).
3. Low Bin Levels (set by physical position of Low/High Sensors).

Each of these alarms types are associated with a display function that is shown on the face plate of the monitor. When a new alarm condition arises, the beeper will sound, the appropriate triangular indicator will flash and Line 1 will indicate the fault condition.

To prevent nuisance alarms during setup, while the unit is in any of the special modes, none of the ordinary sensor type alarms will be generated. The special modes include Change Settings Mode, application Rate Mode, Pulses Per Mile Count Mode and Calibrate Modes, or any mode of operation that is initiated by holding down a button for 4 short beeps followed by one long beep.

1. **Low Fan Alarms**

   Low Fan Alarms are treated specially, because a stopped fan can result in plugging and misses in the field.

   Low Fan Alarms can not be acknowledged with the ACK button while the system is "in motion". The "in motion" condition means that the monitor, based on ground speed and clutch state, considers that the system is supposed to be actively applying product. Refer to *Section 1.4.3.2 - Setting Fan Parameters*.

   The monitor determines whether the system is intentionally active by examining both the ground speed and the ON/OFF clutch state. The monitor considers the system to be intentionally active and "in motion" when both of these are true:

   1. Sensed Ground Speed is greater than 2 m.p.h..
   2. The Drive Clutch is engaged.

   If a low fan alarm occurs while the system is not "in motion", the normal rules apply and the user will be able to silence the alarm with the ACK key.

   If a Low Fan Alarm occurs during active seeding, the user will not be able to silence the alarm with the ACK key, but will need to disengage the clutch or stop movement of the implement. When this happens, the monitor accepts it as an acknowledgement of the alarm and an effective "automatic acknowledgement" takes place, resulting in the beeper being silenced and normal display is resumed.

2. **Bin Level Alarms**

   Bin Level Alarms use the bar graphs and so are an exception to the above. There is still a Line 1 message and beeping, but instead of a triangular indicator, the bar itself indicates the alarm. The lower portion of the bar remains solid, while the upper portion will flash.

3. **Ground Speed and Drive Clutch Alarms**

   The Air Seeder main drive clutch and the metering auger shaft sensors work together to provide dependable monitoring of the product metering system. Product application takes place with the drive clutch engaged and with the ground speed above 2 m.p.h. Under normal operating conditions, there is a 15 second delay for the auger shaft sensor alarms.

1.4 277 MONITOR PREPARATION (CONT'D)

Each time the metering auger shaft turns, a magnet passes by the sensor, giving a pulse to the sensor. With the Air Seeder main drive clutch engaged and the ground speed above 2 m.p.h., 15 seconds must elapse after the pulse is received before an auger shaft sensor alarm is sounded. However, if the "In Motion" condition is no longer true, the monitor assumes that application of product has been temporarily suspended and a delay of 30 seconds will be needed before an alarm is generated.

Turning at the headlands of the field with the main clutch on may generate nuisance alarms. Avoid excessive alarms by turning the main clutch off in the headlands.

4. **Case Drain Pressure Alarm**

If the case drain hydraulic line is equipped with a pressure sensitive switch, an alarm will sound when the pressure in the case drain line reaches or exceeds 50 psi. Case drain pressure can be as high as 50 psi on cold days, but may reach as high as 200 psi when the case drain line is not properly connected.

When a high pressure condition occurs and this condition persists for approximately 30 seconds, the monitor alarm will sound and the top display line will show "FANPRS" and the bottom line will be blank.

The alarm cannot be acknowledged with the ACK key. **Disengage the motor immediately.** The pressure in the lines will drop, but it may take several minutes.

A good test after completing the learn is to disconnect the red lead from the pressure switch. After 30 seconds an alarm should be generated which can only be corrected by reconnecting the red lead to the switch.

IMPORTANT

THE MOTOR MUST NOT BE STARTED UNTIL THE CASE DRAIN LINE PRESSURE IS RELIEVED.

1.4.5.2 COMMUNICATION ALARMS

A communication alarm occurs when an individual sensor fails to communicate with the monitor.

A "COMERR" message would then be displayed on Line 1 of the monitor and the sensor that is being alarmed will alternate with the display on Line 1. For example, FSHAFT etc.

This example shows the front shaft sensor not responding to the monitor.

This alarm occurs when communication between the sensors and the monitor is interrupted. This means that there is a disconnection somewhere between the sensor and the Air Seeder harness, or the sensor has failed.

Once the alarm has been acknowledged, the triangular Function Indicator for that alarm will remain flashing until the alarm condition no longer exists. Check all connectors and refer to the "Troubleshooting" section if necessary.

1.4.5.3 SYSTEM ALARMS

A system alarm results from a disconnection or interruption in communication between the Air Seeder Monitor Harness and the Monitor Head.

A "COMERR" message would then be displayed on Line 1 followed by "FAN 1" which would alternate with the display on Line 1.

The displays on Line 1 can be acknowledged one at a time and will cycle until they have all been acknowledged. The triangular Function Indicators and Bin Levels will continue to flash until the system alarm has been corrected.

2 CALIBRATION

The factory has spent a great deal of time and effort developing charts, graphs and tables that are used as a ***GUIDE*** in setting the machine. This information should be used as a ***GUIDE ONLY*** in setting the machine. A variety of factors such as temperature, humidity, moisture content, kernel size, kernel shape, seed inoculant to name a few can affect chart accuracy.

It is recommended that a calibration be done to verify that the machine is performing as desired. Inaccurate application rates can and will affect planting performance, germination and yields. Always calibrate to know exactly how your machine is performing.

2.1 FIELD CALIBRATION

The field (rolling) calibration is done in the field under simulated operating conditions and most closely duplicates the actual operating environment. When using the Field (Rolling) Calibration method, follow this procedure:

1. **Preparation:**

a. Select and install the sprockets or transmissions for the product and rate you desire.

b. Inspect metering augers, tanks and transfer lines for rust and obstructions. Clean if rusty and remove obstructions.

c. Load the tanks with clean, dry product.

i. If moisture has condensed in the tanks, run sufficient dry product through each tank to absorb the water and dry the tank. When dry, add sufficient clean dry product for the calibration.

ii. At the beginning of the season or when the machine is new, apply product for 5 to 10 acres (2 to 4 hectares) to remove any rust and polish all the surfaces to establish a uniform and consistent flow pattern. With uniform and consistent material flow patterns, an accurate calibration will be obtained.

d. Ensure that the metering auger chamber is full of product before beginning the calibration.

IMPORTANT

ALWAYS CALIBRATE - RATES DISPLAYED ON THE SPROCKET CHARTS ARE AVERAGE RATES ONLY. CALIBRATE FOR ACCURATE RESULTS.

2. Remove the cleanout covers from the bottom of the augers.

3. **Calibration boxes:**

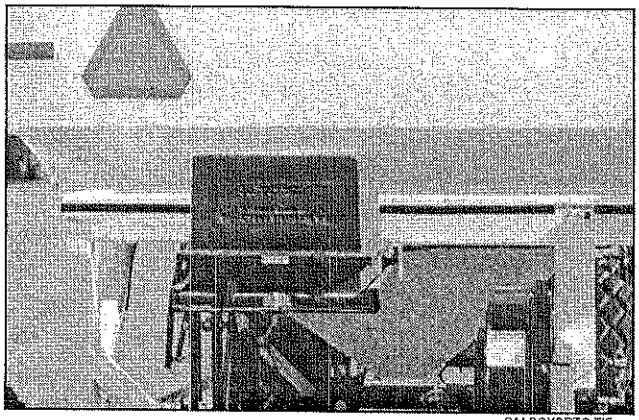
a. Remove the calibration boxes from their storage position at the back of the frame.

b. Attach the weigh scale to the anchor hook.

c. Hang a calibration box from the weigh scale and zero the scale. By zeroing the weigh scale, the scale reading will be the product weight. Ensure boxes are the same weight.

d. Use the straps and buckles to attach the calibration boxes directly under the auger cleanout ports. Secure straps over transfer line on each side of cleanout port.

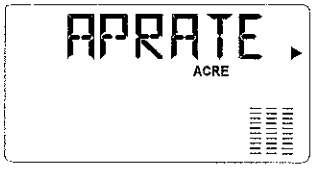
4. Review monitor operation and be sure that implement width and pulses per mile have been properly entered. Refer to *Section 1.4.3.4 - Setting Implement Width and Selecting Units.*



CALBOXSRTG.TIF

Figure 2.1 - Calibration Boxes

5. Use the UP/DOWN button on the monitor to select the "AP RATE" function.



6. Press and hold the MODE button for 5 seconds to initiate the calibration mode.

7. The monitor will display "AREA" on the upper line and the lower line will show "0.00" to indicate the start of calibration. The lower line will indicate area covered to the nearest 0.05 acres (0.01 hectares).

8. Turn the main clutch switch (Model 83000) ON. If the Air Seeder is equipped with a rear metering auger clutch, set the progressive clutch switch (Model 167000) for both augers, or front tank only.

   For the Model 5200 equipped with transmission clutches, turn the CAL switch on the Multiple Clutch Switch.

9. Drive forward until the auger(s) have metered out 20 to 30 lbs. (9 to 14 kgs) of product.

NOTE

SMALL AMOUNTS OF PRODUCT DO NOT PROVIDE THE ACCURACY OF LARGER AMOUNTS WHEN CALIBRATING. WHEN CALIBRATING LOW RATE PRODUCTS, IT WILL BE NECESSARY TO DRIVE FURTHER TO METER OUT 20 TO 30 LBS. (9 TO 14 KGS) OF PRODUCT FOR THE CALIBRATION.

10. Stop when the auger with the highest application rate has metered out 20 to 30 lbs. (9 to 14 kgs) of product into its calibration box.

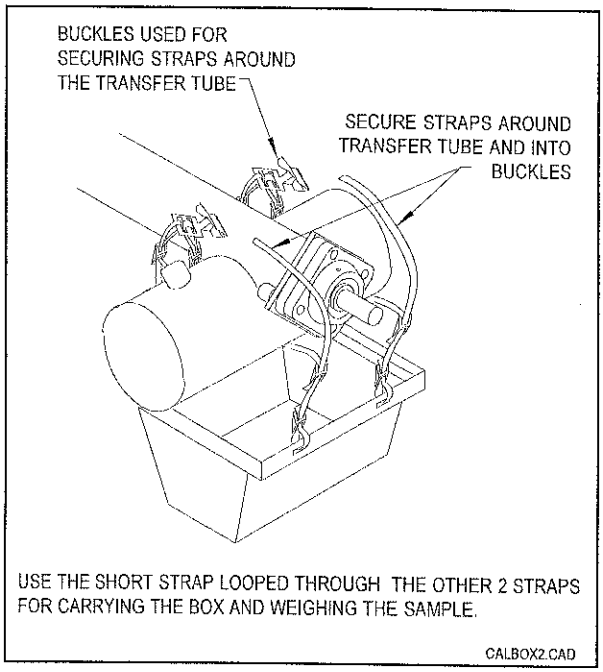


Figure 2.2 - Calibration Box Mount

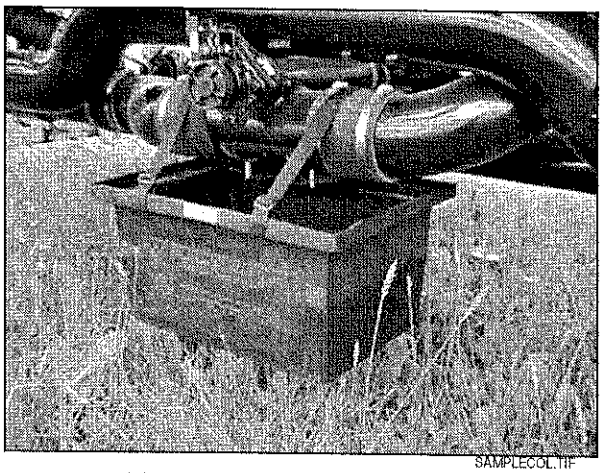


Figure 2.3 - Sample Collection

11. **Calculation:**

a. Remove the calibration box from under the cleanout port and weigh the box.

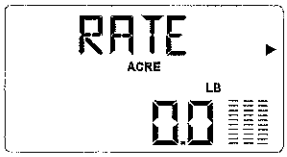
b. Press the MODE button on the monitor.

c. The monitor will display "WEIGHT" on the upper line and "0.00" on the lower line.

d. Use the UP or DOWN buttons to enter the weight of the sample. Depress the UP or DOWN button to move the display in "0.05" lb (0.01 kgs) increments until the measured weight is entered.

e. Press the MODE button to continue.

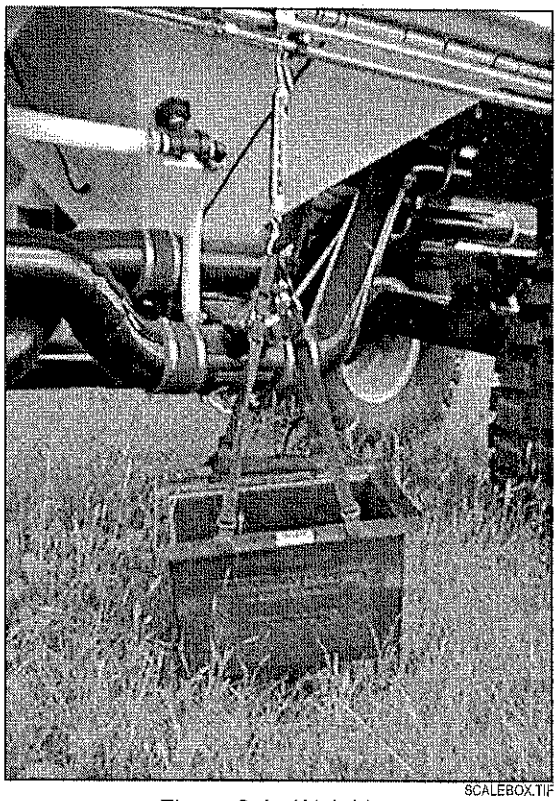
f. The monitor will display "RATE " on the upper line and will display the calculated rate on the lower line.



g. Press the MODE button twice to return to the" WEIGHT" display and enter the weight of the second sample if required.

NOTE

AFTER THE MONITOR IS RETURNED TO THE WEIGHT MODE, THE MACHINE CAN BE DRIVEN FURTHER TO METER ADDITIONAL PRODUCT INTO THE BOXES OF AUGERS WITH LOWER RATES. THE MONITOR WILL AUTOMATICALLY ACCUMULATE THE ADDITIONAL AREA INTO MEMORY FOR THE NEXT CALCULATION.



SCALEBOX.TIF

Figure 2.4 - Weighing

h. Enter the weight of the next sample.

i. The monitor will display "RATE " on the upper line and will display the second calculated rate on the lower line.

j. Press the ACK button and hold for 5 seconds to exit the program.

NOTE

THE MONITOR WILL NOT COUNT THE FIELD OR ACCUMULATED AREA WHEN IN THE CALIBRATION MODE.

12. If there is a product that has not yet metered 20 to 30 lbs. (9 to 14 kgs) in to the calibration box, install the cleanout cover on the line that is done, and move ahead until there is enough product in the second box. Repeat *step 11.*
13. Return calibration boxes to their storage place and secure.
14. Install and secure all the metering auger cleanout covers.
15. Activate drive clutches to place system in its normal operating mode.

2.2 STATIONARY CALIBRATION - 2135/3000 SERIES

The optional Stationary Calibration Crank Kit is available for all 3000 Series Air Seeders and for the 2135 Air Seeder. The kit allows the operator to perform a stationary or static calibration of the Air Seeder before performing a field calibration or rolling check.

The kit is easily assembled in the field. The existing main wheel drive shaft is removed and replaced with a new shaft and a manual clutch collar to engage and disengage the stationary calibration crank.

1. **Preparation:**

a. Select and install the sprockets for the product and rate you desire.

b. Inspect metering augers, tanks and transfer lines for rust and obstructions. Clean if rusty and remove obstructions.

c. Load the tanks with clean, dry product.

   i. If moisture has condensed in the tanks, run sufficient dry product through each tank to absorb the water and dry the tank. When dry, add sufficient clean dry product for the calibration.

   ii. At the beginning of the season or when the machine is new, apply product for 5 to 10 acres to remove any rust and polish all the surfaces to establish a uniform and consistent flow pattern. With uniform and consistent material flow patterns, an accurate calibration will be obtained.

d. Ensure that the metering auger chamber is full of product before beginning the calibration.

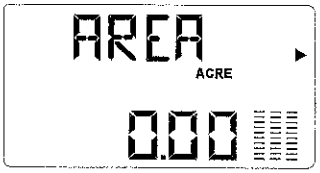
IMPORTANT

ALWAYS CALIBRATE - RATES DISPLAYED ON THE SPROCKET CHARTS ARE AVERAGE RATES ONLY. CALIBRATE FOR ACCURATE RESULTS.

2. Remove the cleanout covers from the bottom of the augers.

3. **Calibration boxes:**
   a. Remove the calibration boxes from their storage position at the back of the frame.
   b. Attach the weigh scale to the anchor hook.
   c. Hang a calibration box from the weigh scale and zero the scale. By zeroing the weigh scale, the scale reading will be the product weight.
   d. Use the straps and buckles to attach the calibration boxes directly under the auger cleanout ports. Secure straps over transfer line on each side of cleanout port.
4. Review monitor operation and be sure that implement width and pulses per mile have been properly entered. Refer to *Section 1.4.3.4 - Setting Implement Width and Selecting Units*.
5. Use the UP/DOWN button on the monitor to select the "AP RATE" function.

6. Press and hold the MODE button for 5 seconds to initiate the calibration mode.
7. The monitor will display "AREA" on the upper line and the lower line will show "0.00" to indicate the start of calibration. The lower line will indicate area covered to the nearest 0.05 acres (0.01 hectares).



8. Turn the main clutch switch ON. If the Air Seeder is equipped with a rear metering auger clutch, set the progressive clutch switch (Model 167000) for both augers, or front tank only.

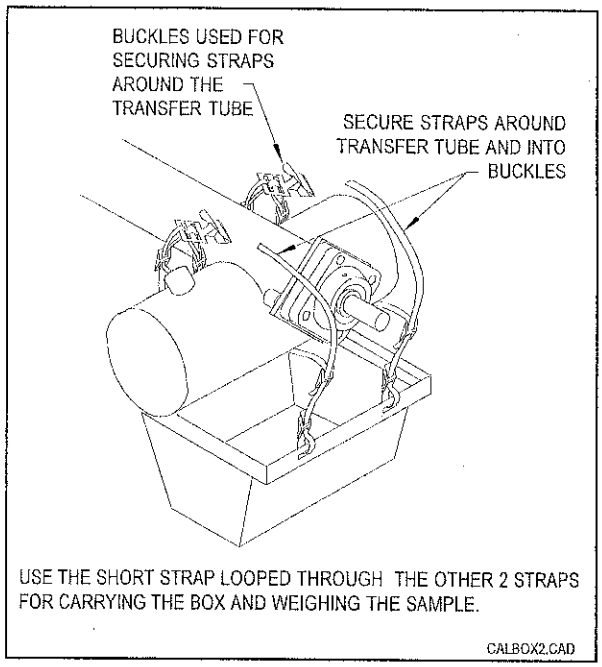


Figure 2.5 - Calibration Box Mount

9. Refer to *Figure 2.6*. **Disengage** the manual clutch collar at the drive wheel by pulling the manual clutch collar back about 1" (2.5cm) and turning it a quarter turn. Ensure that the manual clutch collar is firmly seated on the shoulder of the air seeder drive shaft, not the milled 1¼" (3.2cm) bore sprocket.

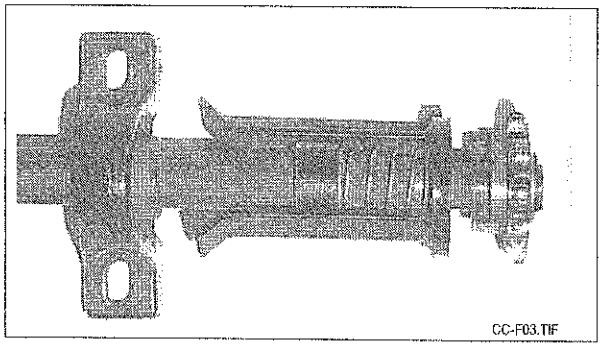


Figure 2.6 - Clutch Disengaged - 2135/3000 Series

10. Install the stationary calibration crank onto the calibration crank shaft and secure with a 3/8" x 1½" (9.5 mm x 38 mm) PTO pin.

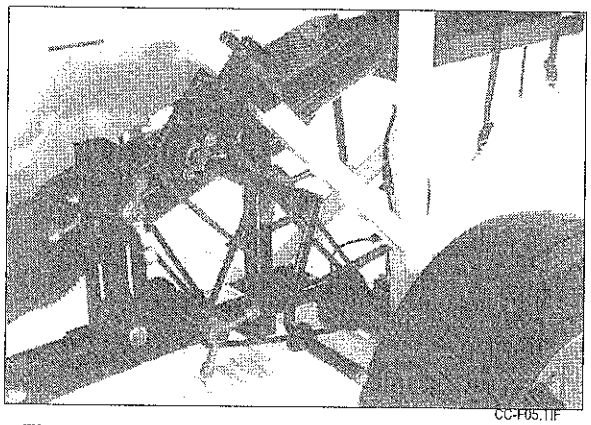


Figure 2.7 - Calibration Crank - 2135/3000 Series

11. Turn the crank **COUNTER CLOCKWISE** one (1) revolution per second. It is very important to turn the stationary calibration crank at a constant speed, to simulate field travel.

NOTE

SMALL AMOUNTS OF PRODUCT DO NOT PROVIDE THE ACCURACY OF LARGER AMOUNTS WHEN CALIBRATING. WHEN CALIBRATING LOW RATE PRODUCTS, IT WILL BE NECESSARY TO TURN THE CRANK MORE TO METER OUT 20 TO 30 LBS. (9 TO 14 KGS) OF PRODUCT FOR THE CALIBRATION.

12. Stop when the auger with the highest application rate has metered out 20 to 30 lbs. (9 to 14 kgs) of product into its calibration box. Proceed to **Step 15 Calibration**.

13. Close the cleanout cover to the completed metering auger.

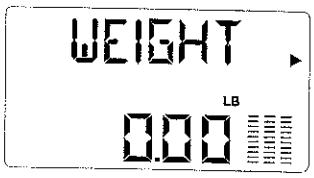
14. Turn the crank again until 20 to 30 lbs. (9 to 14 kgs) of product has been metered into the next calibration box.

15. **Calculation:**

    a. Remove the calibration box from under the cleanout port and weigh the box.

    b. Press the MODE button on the monitor.

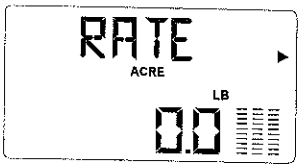
    c. The monitor will display "WEIGHT" on the upper line and "0.00" on the lower line.



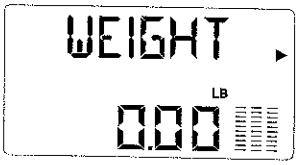
    d. Use the UP or DOWN buttons to enter the weight of the sample. Depress the UP or DOWN button to move the display in "0.05" lb (0.01 kgs) increments until the measured weight is entered.

    e. Press the MODE button to continue.

    f. The monitor will display "RATE" on the upper line and will display the calculated rate on the lower line.



    g. Press the MODE button twice to return to the "WEIGHT" display and enter the weight of the second sample if required.

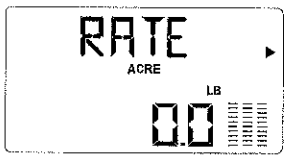


NOTE

AFTER THE MONITOR IS RETURNED TO THE WEIGHT MODE, THE CRANK CAN BE TURNED MORE TO METER ADDITIONAL PRODUCT INTO THE BOXES OF AUGERS WITH LOWER RATES. THE MONITOR WILL AUTOMATICALLY ACCUMULATE THE ADDITIONAL AREA INTO MEMORY FOR THE NEXT CALCULATION.

    h. Enter the weight of the next sample as required.

i. The monitor will display "RATE " on the upper line and will display the second calculated rate on the lower line.



j. Press the ACK button and hold for 5 seconds to exit the program.

16. Return to **Step 13** to calibrate for the second sample.

NOTE

THE MONITOR WILL NOT COUNT THE FIELD OR ACCUMULATED AREA WHEN IN THE CALIBRATION MODE.

17. Refer to *Figure 2.8*. After Stationary Calibration is complete **engage** the manual clutch collar by turning the calibration crank until the manual clutch collar is firmly seated over the milled 1¼" (32 mm) bore sprocket.

18. Remove the calibration crank and secure it in the holder provided.

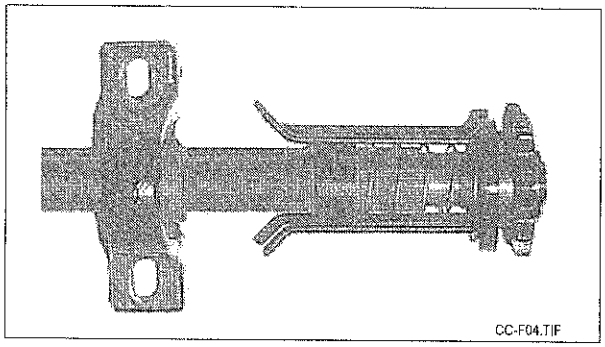


Figure 2.8 - Clutch Engaged - 2135/3000 Series

IMPORTANT

DO NOT LEAVE THE CALIBRATION CRANK ON THE CALIBRATION SHAFT OR THE MANUAL CLUTCH COLLAR DISENGAGED DURING OPERATION! DAMAGE TO THE UNIT WILL RESULT!

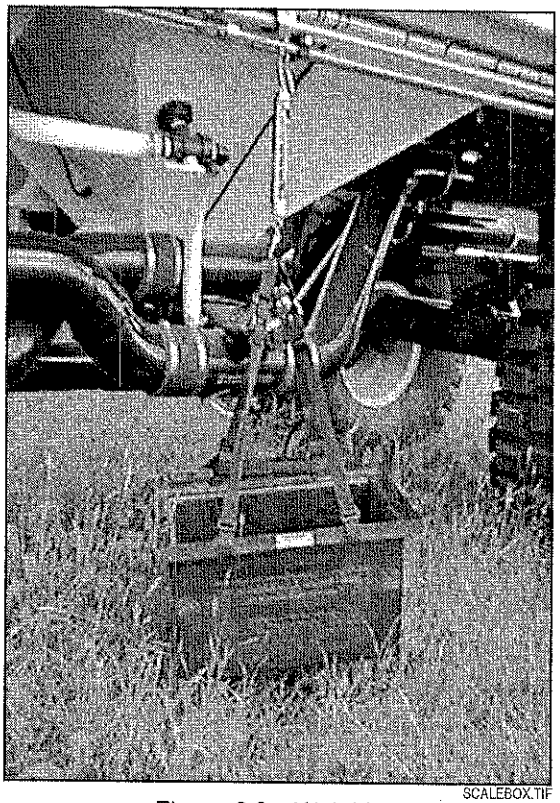


Figure 2.9 - Weighing

19. Return calibration boxes to their storage place on the back of the frame and secure.

20. Install and secure all the metering auger cleanout covers.

21. Activate drive clutch(es) to place system in its normal operating mode.

It is recommended that a field (rolling) calibration be done to verify the results from the static calibration.

IMPORTANT

OPERATION OF THE AIR SEEDER WITH THE MANUAL CLUTCH COLLAR DISENGAGED WILL RESULT IN DAMAGE TO THE MECHANISM.

3902-76

(for 2135/3000 Series Air Seeders)

2.3 STATIONARY CALIBRATION - 5000 SERIES

The Stationary Calibration Crank option is available for certain 5000 Series Air Seeders. The option allows the operator to perform a stationary or static calibration prior to seeding.

1. Set each transmission according to the chart for the desired rate for product being applied.
2. Ensure that the metering auger chamber is full of product before beginning the calibration.
3. **Check that the main clutch switch is OFF.**
4. Open the cleanout cover(s) from the bottom of the metering auger(s). Refer to *Figure 2.10*. The 4" Granular Line on the LDG Air Seeders does not have a cleanout cover, loosen the bottom connection of the 4" flexible hose and drop product directly into the calibration box.
5. **Calibration boxes:**
   a. Remove the calibration boxes from their storage position.
   b. Attach the weigh scale to the anchor hook.
   c. Hang a calibration box from the weigh scale and zero the scale. By zeroing the weigh scale, the scale reading will be the product weight.
   d. Use the straps and buckles to attach the calibration boxes directly under the auger cleanout ports. Secure straps over transfer line on each side of cleanout port.
6. Review monitor operation and be sure that implement width and pulses per mile have been properly entered. Refer to *Section 1.4.3.4 - Setting Implement Width and Selecting Units*.
7. Use the UP/DOWN button on the monitor to select the "AP RATE" function.

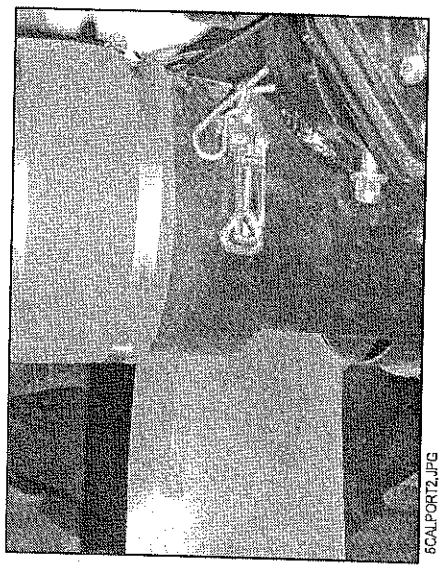


Figure 2.10 - Calibration Port, Open

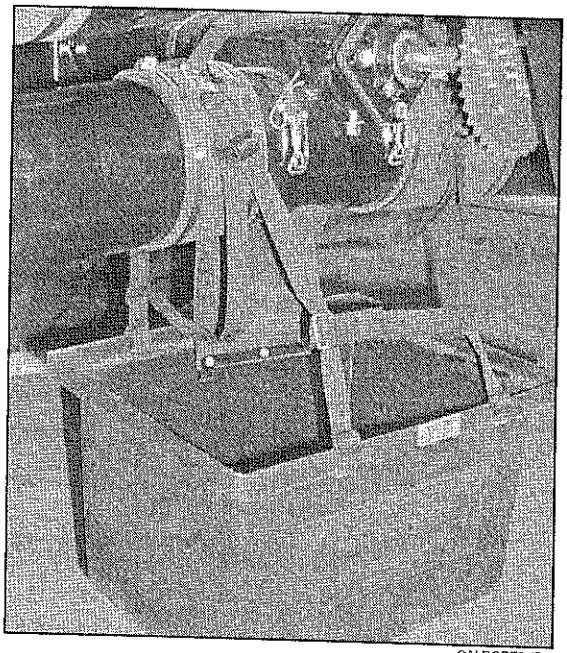


Figure 2.11 - Calibration Box Fill

8. Press and hold the MODE button for 5 seconds to initiate the calibration mode.
9. The monitor will display "AREA" on the upper line and the lower line will show "0.00" to indicate the start of calibration. The lower line will indicate area covered to the nearest 0.05 acres (0.01 hectares).

10. Install the Stationary Calibration Crank onto the calibration crank shaft and secure with a 3/8" x 1½" (9.5 mm x 38 mm) PTO pin. Refer to *Figure 2.12*.
11. Turn the crank **Counter Clockwise** two (2) revolutions per second. It is very important to turn the Stationary Calibration Crank at a constant speed, to simulate field travel.
12. Stop when the auger with the highest application rate has metered out 20 to 30 lbs. (9 to 14 kgs) of product into its calibration box. Proceed to ***step 15 Calculation.***
13. Close the cleanout cover to the completed metering auger.
14. Turn the crank again until 20 to 30 lbs. (9 to 14 kgs) of product has been metered into the next calibration box.
15. **Calculation:**
    a. Remove the calibration box from under the cleanout port and weigh the box.
    b. Press the MODE button on the monitor.

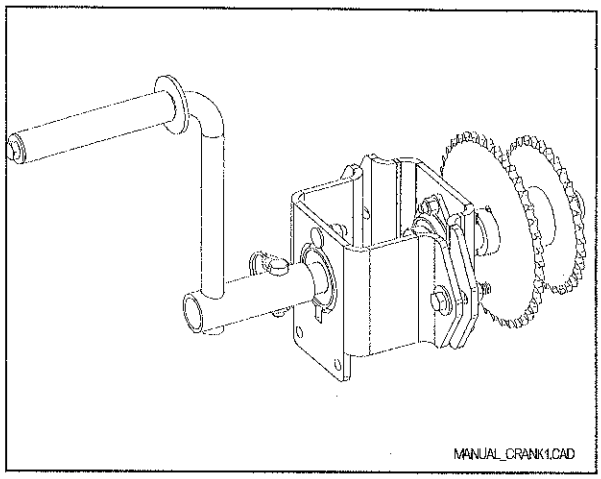


Figure 2.12 - Stationary Calibration Crank

NOTE

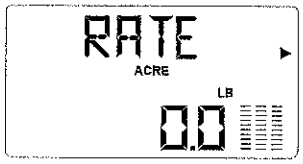
SMALL AMOUNTS OF PRODUCT DO NOT PROVIDE THE ACCURACY OF LARGER AMOUNTS WHEN CALIBRATING. WHEN CALIBRATING LOW RATE PRODUCTS, IT WILL BE NECESSARY TO TURN THE CRANK MORE TO METER OUT 20 TO 30 LBS. (9 TO 14 KGS) OF PRODUCT FOR THE CALIBRATION.

c. The monitor will display "WEIGHT" on the upper line and "0.00" on the lower line.

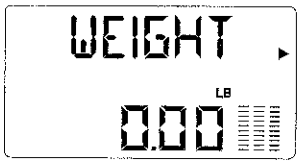
d. Use the UP or DOWN buttons to enter the weight of the sample. Depress the UP or DOWN button to move the display in "0.05" lb (0.01 kgs) increments until the measured weight is entered.

e. Press the MODE button to continue.

f. The monitor will display "RATE" on the upper line and will display the calculated rate on the lower line.



g. Press the MODE button twice to return to the "WEIGHT" display and enter the weight of the second sample if required.

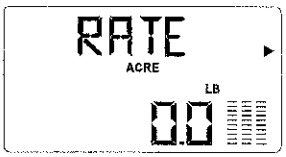


h. Enter the weight of the next sample as required.

NOTE

AFTER THE MONITOR IS RETURNED TO THE WEIGHT MODE, THE CRANK CAN BE TURNED MORE TO METER ADDITIONAL PRODUCT INTO THE BOXES OF AUGERS WITH LOWER RATES. THE MONITOR WILL AUTOMATICALLY ACCUMULATE THE ADDITIONAL AREA INTO MEMORY FOR THE NEXT CALCULATION.

i. The monitor will display "RATE " on the upper line and will display the second calculated rate on the lower line.



j. Press the ACK button and hold for 5 seconds to exit the program.

16. Return to **Step 13** to calibrate for the second sample.
17. Refer to *Figure 2.13*. Remove the calibration crank and secure it in the holder provided.
18. Return calibration boxes to their storage place and secure.
19. Install and secure all the metering auger cleanout covers.
20. Activate drive clutch(es) to place system in its normal operating mode.

It is recommended that a field (rolling) calibration be done to verify the results from the static calibration.

NOTE

THE MONITOR WILL NOT COUNT THE FIELD OR ACCUMULATED AREA WHEN IN THE CALIBRATION MODE.

IMPORTANT

DO NOT LEAVE THE CALIBRATION CRANK ON THE CALIBRATION SHAFT DURING OPERATION! DAMAGE TO THE UNIT WILL RESULT!

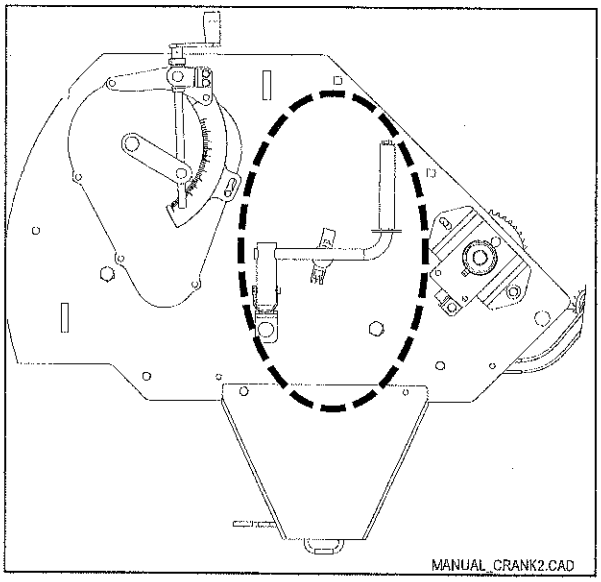


Figure 2.13 - Calibration Crank in Storage

3.1.3.1 AT START-UP, THE "SYSERR" MESSAGE IS DISPLAYED

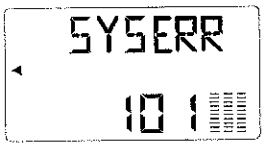
If after start-up one of the following "SYSERR" messages is displayed, the monitor has detected some kind of a problem.

To localize the problem for the first two cases, refer to the section on locating harness faults (*Section 3.2 - Implement Harness & Sensor Checking*). The type "102" error indicates an internal problem with the monitor and is should be replaced.

There are three types of "SYSERR" codes:

1. Data line is Shorted Low (as with a short to ground) - displays "100".

2. Data line is Shorted High (as with a short to +12V) - displays "101".



3. Transmitted Byte Not Also Received - displays "102".

3.1.3.2 AT START-UP, THE "MISSED" MESSAGE IS DISPLAYED

If after powering up the monitor the "MISSED" message is displayed, the sensor or the wires leading to the sensor may be faulty.

Start by replacing the suspect sensor with a new sensor to check if the sensor is the problem. Power down the unit and plug in the new sensor in place of the old sensor. Power the unit up. The monitor will try to automatically learn the new sensor. Refer to *Section 1.4 - 277 Monitor Preparation.*

If the monitor proceeds past the start-up sequence without a persistent "MISSED" message,

this indicates that the three wire path from the harness to the sensor is okay and the original sensor was faulty.

If the "MISSED" message persists, it is likely that at least one of the three wires is not reaching the harness side connector pins. This is an Open Circuit. Refer to *Section 3.2.4 - Open Circuits on the Harness.*

Refer to the subsections of *Section 3.2 - Implement Harness and Sensor Checking* for detailed information about each type of sensor.

3.2 IMPLEMENT HARNESS AND SENSOR CHECKING

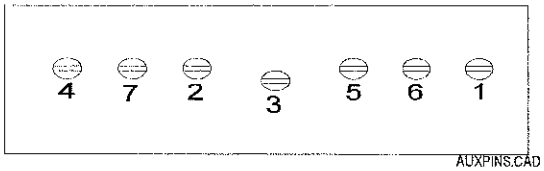
Most problems with agricultural electronics are mechanical. Problems with the harness connections and sensors are the most common. The sensors used on the Air Seeders are "Smart Sensors" and will report any problems that may occur on the monitor.

3.2.1 HARNESS CHECKING

If a problem occurs with the continuity of the implement harness, check for broken connections, loose terminals or loose wires in the connectors at each terminal of the harness. An ohm meter can be used to check the continuity of the wiring harness through the connector pins on the terminals.

Multiplexed Implement Harness

1 ..... Main Drive Clutch
2 ..... Sensor Data Transmission
3 ..... Auxiliary Clutch Power
4 ..... Sensor Power
5 ..... Auxiliary Clutch Ground
6 ..... Drive Clutch Ground
7 ..... Sensor Ground



If you cannot find the problem, contact your dealer for assistance.

3.2.2 METER MEASUREMENTS ON HARNESS CONNECTORS

The basic three wire connector at each sensor, consist of three conductors. Harness junctions have more than three lines because the clutch wires are also present. The pinout of the basic connectors that feed the sensors on the air seeder harness is as follows:

A)	white or red	positive supply
B)	black	ground
C)	green	data transmission

Voltage measurements should be done on equipment that is powered up. With the monitor powered up, the voltage;

- between supply and ground at a sensor
- between supply and harness junction after the monitor

should be at about 0.7V less than the voltage between the incoming supply and ground (the two wire connection from the battery to the monitor).

Example: In one reading, with the incoming supply was measuring 13.6V, while the supply to a sensor was 12.9V.

The voltage between the data line and the ground rapidly alternates between a high state of about a volt less than the sensor supply voltage (when no messages are travelling), and a low state of less than 1V above ground. A dc voltmeter will tend to average out the fluctuations.

With everything operating normally, the average value on the data line is close to but less than the high state voltage.

Example: One sample measurement was 9.7V, while the supply to the sensor was 12.9V.

These voltages should not vary extremely depending on how many sensors are connected to the harness.

If one or more of the sensors is absent at start-up, the monitor will display the "MISSING" message (277 Monitor) or the "UNABLE TO LOCATE SENSOR" message and will wait for a new sensor to be connected. In this case, the data line will be much less busy than normal, and a slightly higher than average voltage may be expected.

Example: One sample measurement showed 11V.

Resistance measurements should be done with the monitor turned off. Readings on the harness connectors may differ slightly according to the number of sensors connected and whether or not the monitor is connected.

NOTE

EXPECT VERY HIGH OHMS (FROM HUNDREDS OF KILO-OHMS UP TO SEVERAL MEGA-OHMS) BETWEEN THE SUPPLY AND GROUND LINES. SIMILAR READINGS MAY BE EXPECTED BETWEEN THE SUPPLY AND DATA LINES. EXPECT LOWER VALUES, IN THE RANGE OF 100 OHMS (0.1K) TO 10 KILO-OHMS, BETWEEN THE DATA LINE AND GROUND. VALUES SHOULD DECREASE WITH EACH ADDITIONAL CONNECTED SENSOR.

Similar readings may be expected when measuring resistance values of a single disconnected sensor.

3.2.3 SHORT CIRCUITS ON THE HARNESS

For the three sensor bus lines (power, ground and data), all pin to pin resistance measurements should be at least 100 ohms or much higher. A short circuit will show much less resistance (a few ohms or less) between any two of those points.

Note that every ohms measurement sees all parallel paths. It may be necessary to disconnect harness junctions and the monitor and successive sensors until the measured short goes away.

If there is a suspicion of a short;

- Disconnect the rear tractor junction and measure on both sides:
  - If a short appears on the monitor side, the junction connector or monitor has the short.
  - If a short appears on the harness side, proceed to check the remaining harnesses.
- For tow behind units, disconnect the cultivator harness from the air seeder harness. Measure both ends:
  - If a short appears on the cultivator harness side, check the cable and connectors for shorts.
  - If a short appears on the air seeder harness side, continue to check the harness and sensors.
- Disconnect the individual sensors, with a measurement performed on the air seeder harness after each step. When the problem disappears after a disconnect, the last item removed was the problem item.
  - The sensor connections should be carefully examined for the short and repaired or replaced.
  - If the short persists after all of the sensors have been unplugged from the harness, the problem is in the harness itself. The entire span of the harness, and especially all of its connectors, should be carefully examined. Repair or replace the air seeder harness.

Refer to *Section 3.3 - Monitor & Clutch Layouts.* Devise a test to help identify a fault in the circuit (such as: engage clutch and measure; disengage and measure again). At a suspect connector, with the system powered down, check for shorts from each pin to chassis ground and between adjacent pins. If the fault cannot be localized, or if it can be but is not visible, the harness may need replacement.

Connection Terminals:

- The connectors may be disassembled to check for damage, corrosion, or dirt.
- Check that the correct coloured wires are connected to the connector positions according to the harness drawings (this assumes that the system has not previously functioned properly with all the same equipment it now has). Refer to *Section 3.3 - Monitor & Clutch Cable Layouts.*

3.2.4 OPEN CIRCUITS ON THE HARNESS

1. Start with the voltage measurements. Disconnect one sensor from the harness, preferably the problem sensor, if one has been identified. Check for pin to pin values as previously described.
   - If the measurements taken are good, the removed sensor is likely in need of repair or replacement.
   - If the measurements are bad, but the whole system, except one sensor, was functioning normally, the problem should be isolated to the branch feeding that sensor. The harness should be repaired or replaced.
2. Try to find out if levels are faulty at other points in the system. A good test is to measure on the monitor side of the junction bringing monitor signals to the rest of the system (rear of tractor).
   - If measurements there are bad, the problem is somewhere between the monitor and that junction. Isolate the fault to the monitor connector, the junction connector, or on either side of a monitor-to-monitor junction extended harness if present. Identify, and repair or replace the faulty connector, monitor, or monitor-to-junction harness.
   - If the signals reaching the junction are good, reconnect the monitor junction and take more voltage measurements across the harness.
   - If all sensors give the same faulty measurement, check the connector at the incoming junction.

NOTE

IF SOME SENSORS GIVE A FAULTY MEASUREMENT, WHILE OTHERS READ GOOD, THE PROBLEM IS INTERNAL AND THE HARNESS WILL NEED TO BE REPLACED.

SUGGESTIONS

- When looking for problems that are associated with pins other than those on the basic three wire bus, refer to *Section 3.3 - Monitor & Clutch Layouts*. A long wire can be used to extend to one of the meter leads to check the continuity from a pin on one harness connector to the corresponding pin at another connector on the harness.
- When possible, disassemble the connectors of a suspect harness and check for visible signs damage, such as broken wires or wires which have come out of their screws. If the fault is not visible, the harness may need to be replaced.
- If, after disassembling the connectors, no obvious faults have been found, check that the correct coloured wires are connected to the connector positions according to the wiring diagrams (this assumes that the system has not previously functioned properly with all the same equipment it now has). The harness may be incompatible with the system that has been introduced.

3.2.5 REPAIRING BRYLITE CONNECTOR FAULTS

If a Brylite connector at any junction shows signs of damage, disassemble the connector and look for problems. Refer to the following guidelines:

1. Remove the two covers on the Brylite connector.
2. Clean all soil away from the pins as necessary. Check for broken or shorted wires and repair or replace.
3. Check if the correct colour wires go to the right pins as outlined in the wiring diagrams.
4. To protect from moisture, apply a layer of Bulldog Grip "Draft Stop", available at hardware stores, over the pins and replace cover. Do **NOT** use silicone or RTV for sealing: an agent released during curing is caustic and attacks metals, particularly wire and the plating on connector pins and sockets which provide electrical contact.

3.2.6 FAN SENSOR CHECKING

The fan sensors cannot be check with a meter reading. To check that the fan sensors are working, look on the sensor for a red LED (Light Emitting Diode). This LED will flash at a slow rate if the sensor has power to it, but is not detected by the monitor. The LED will flash once for every 16 pulses detected. If the sensor is not detected it must be relearned. Refer to Section *1.4.2 - Special Start-Up.*

- When the sensor has power to it and is recognized, turn the fan on and check the LED, it should flash at a steady rate while the fan is engaged.
- If the LED fails to flash when the system is first powered up or if the light flashes indefinitely, then either the sensor is faulty or some signals are not reaching the sensor connector. There would also be a "COMM ERROR" message for FAN1 or FAN2 on the display at start-up. Refer to *Section 3.2.1 - Harness Checking.*

Target to sensor gap effects signal strength and is critical with these sensors. The gap should be no larger than 1/8 inch (3 mm). Dirt that builds up on the sensor or the target can also affect signal strength. Keep them clean.

If the implement harness has been checked for continuity, power is reaching the sensor and there is still a problem, contact your Bourgault Dealer for assistance or replacement parts.

3.2.7 SHAFT SENSOR CHECKING

To check that the Shaft Sensors are working, look on the sensor for a red LED (Light Emitting Diode). This LED will flash at a slow rate if the sensor has power to it, but is not detected by the monitor. If the sensor is not detected it must re-learned. Refer to *1.4.2 - Special Start-Up.*

- When the sensor has power to it and is recognized, the LED will not flash. If a magnet is passed by the sensor, the LED will flash once for every pulse that it receives.
- If the LED fails to flash when the system is first powered up or if the light flashes indefinitely, then either the sensor is faulty or some signals are not reaching the sensor connector. There would also be a "MISSED" or "SYSERR" message on the display at start-up. Refer to *Section 3.2.1 - Harness Checking.*

If the LED flashes a few times when the system is first powered up and then remains off while the shaft is rotating, then the monitor is able to communicate with the sensor, but the sensor is not picking up the signal from the shaft actuator. Check the target to sensor gap. If this is okay, then the sensor is faulty.

Target to sensor gap effects signal strength and is critical with these sensors. The gap should be no larger than 1/8 inch (3 mm). Dirt that builds up on the sensor or the target can also affect signal strength. Keep them clean.

If the implement harness has been checked for continuity, power is reaching the sensor and there is still a problem, contact your Dealer for assistance or replacement parts.

3.2.8 BIN LEVEL SENSOR CHECKING

There are no LEDs to check on the Optical Bin Level Sensors. If the implement harness has been checked for continuity, power is reaching the sensor and there is still a problem, contact your dealer for assistance or replacement parts. If the readings do not agree, contact your dealer for assistance.

3.3 MONITOR & CLUTCH CABLE LAYOUTS

The layouts for the electronic cables are shown for the 277 monitor. The schematics represent the layouts required for both base clutch control and optional clutch control.

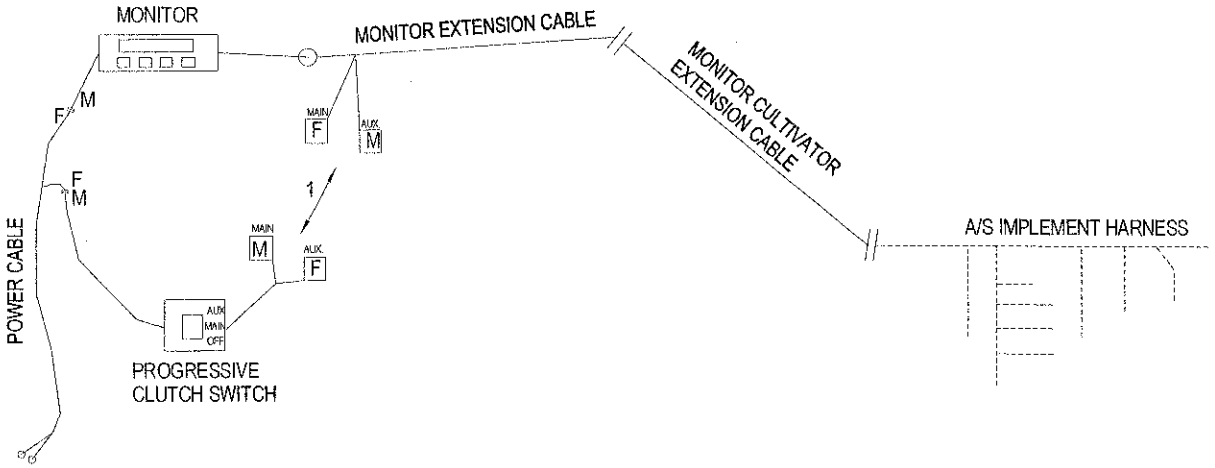


Figure 3.1 - 2135/3170/3225 - 277 Monitor Cultivator Extension Cable SCHEM BASE.CAD

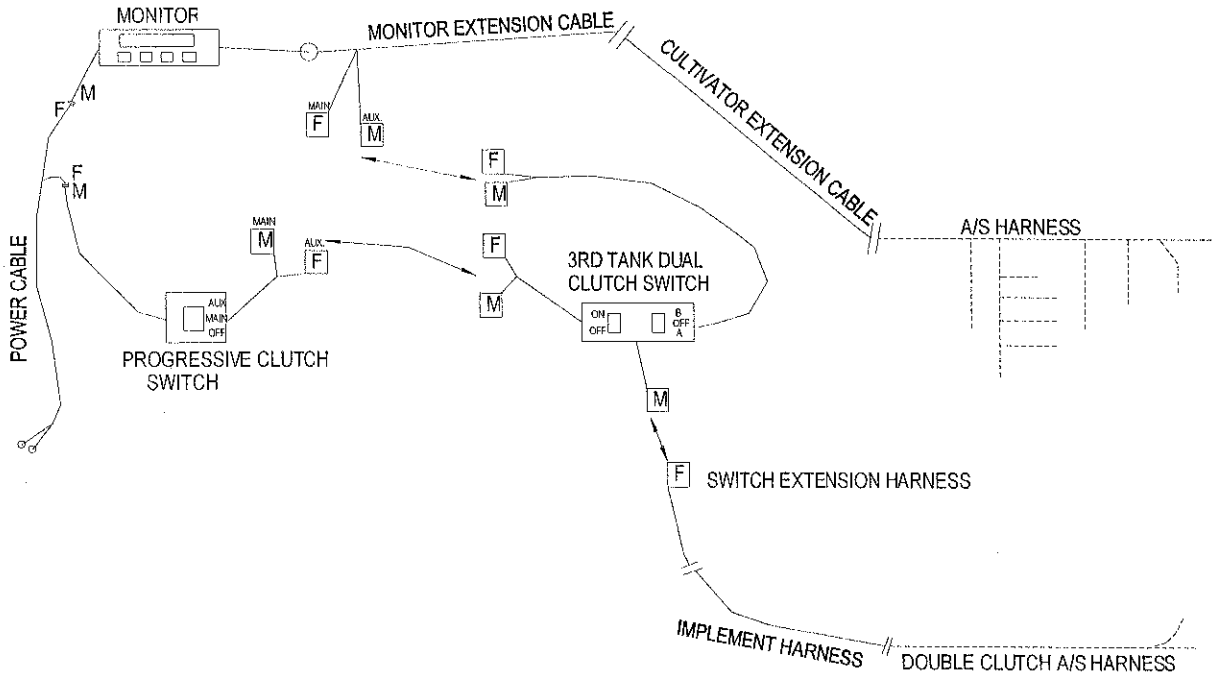


Figure 3.2 - 277 Monitor Cultivator Extension Cable - 3200 A/S SCHEM BASE 3200.CAD

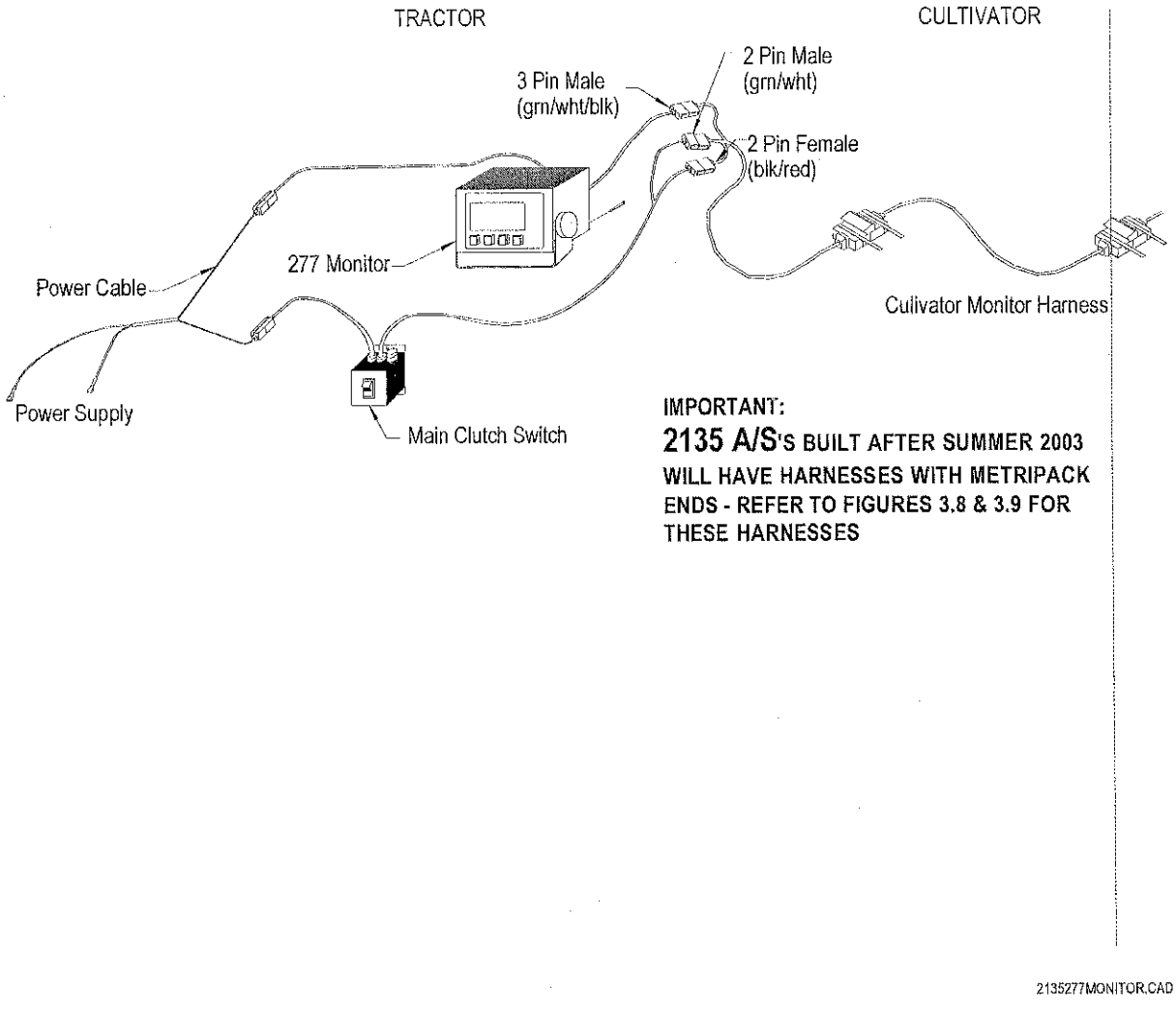


Figure 3.3 - 277 Monitor, Sensor and Clutch Layout - Models 2135/3170/3225

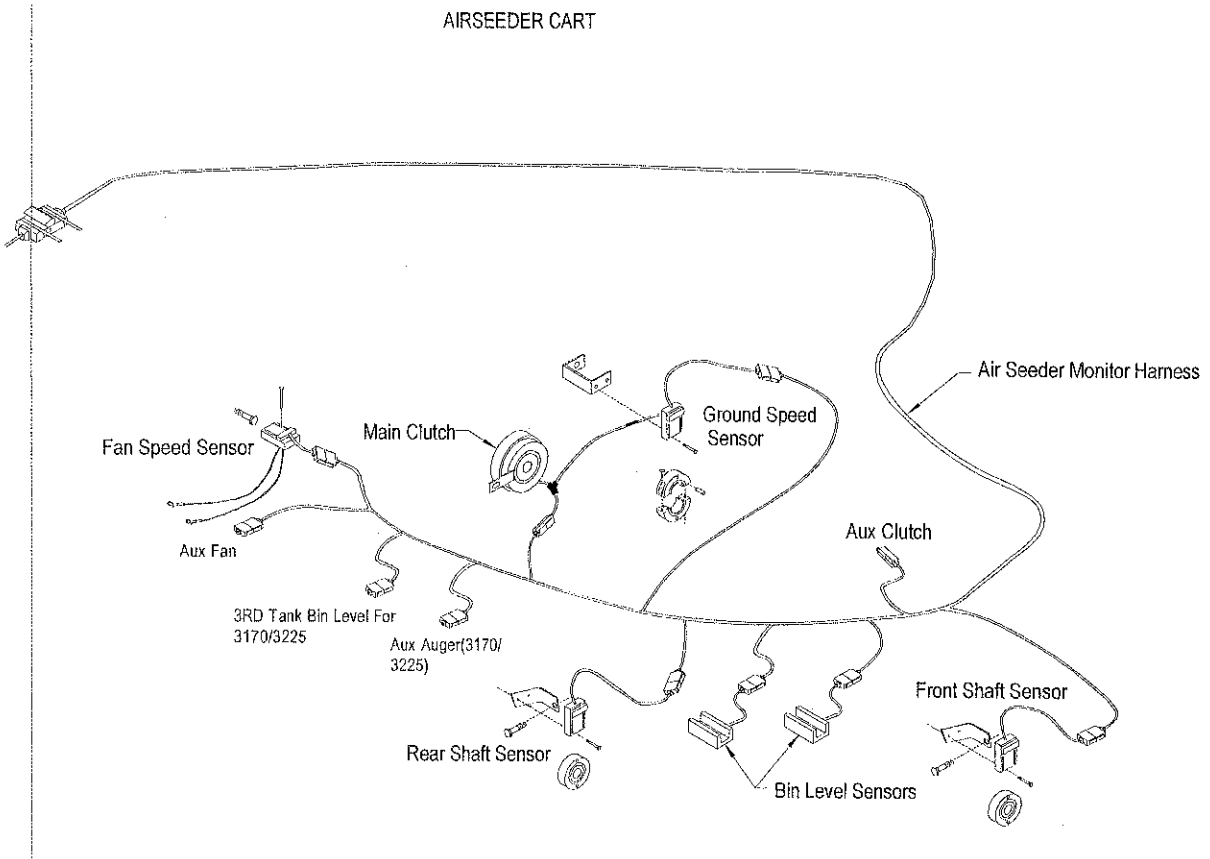


Figure 3.3 - 277 Monitor, Sensor and Clutch Layout - Models 2135/3170/3225

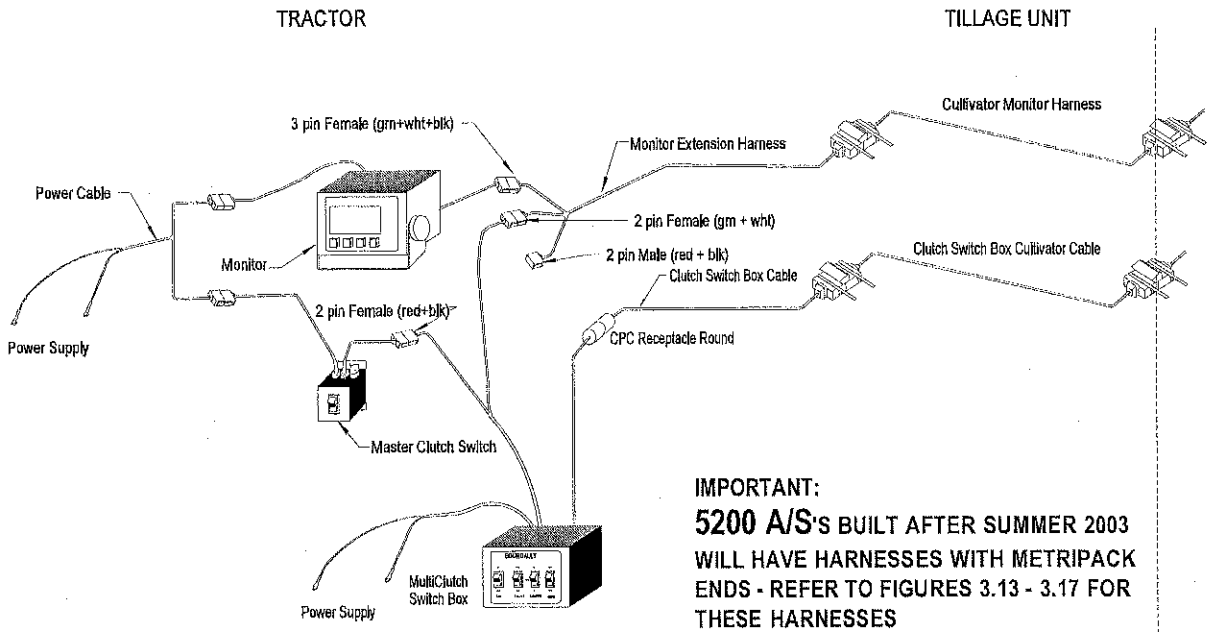


Figure 3.4 - 277 Monitor, Sensor and Clutch Layout - Model 5200 TBHD

5000-277TBHD.CAD

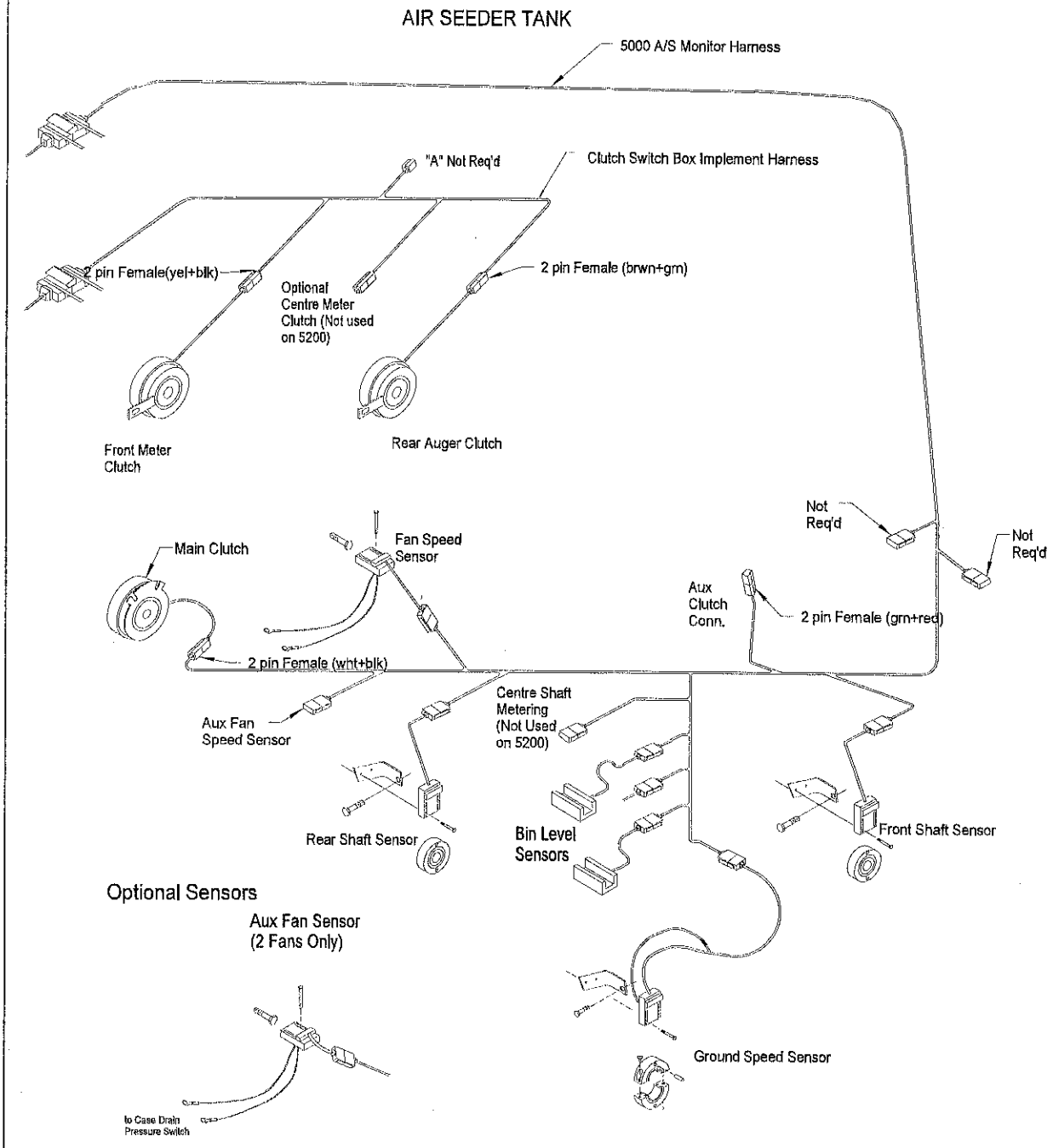
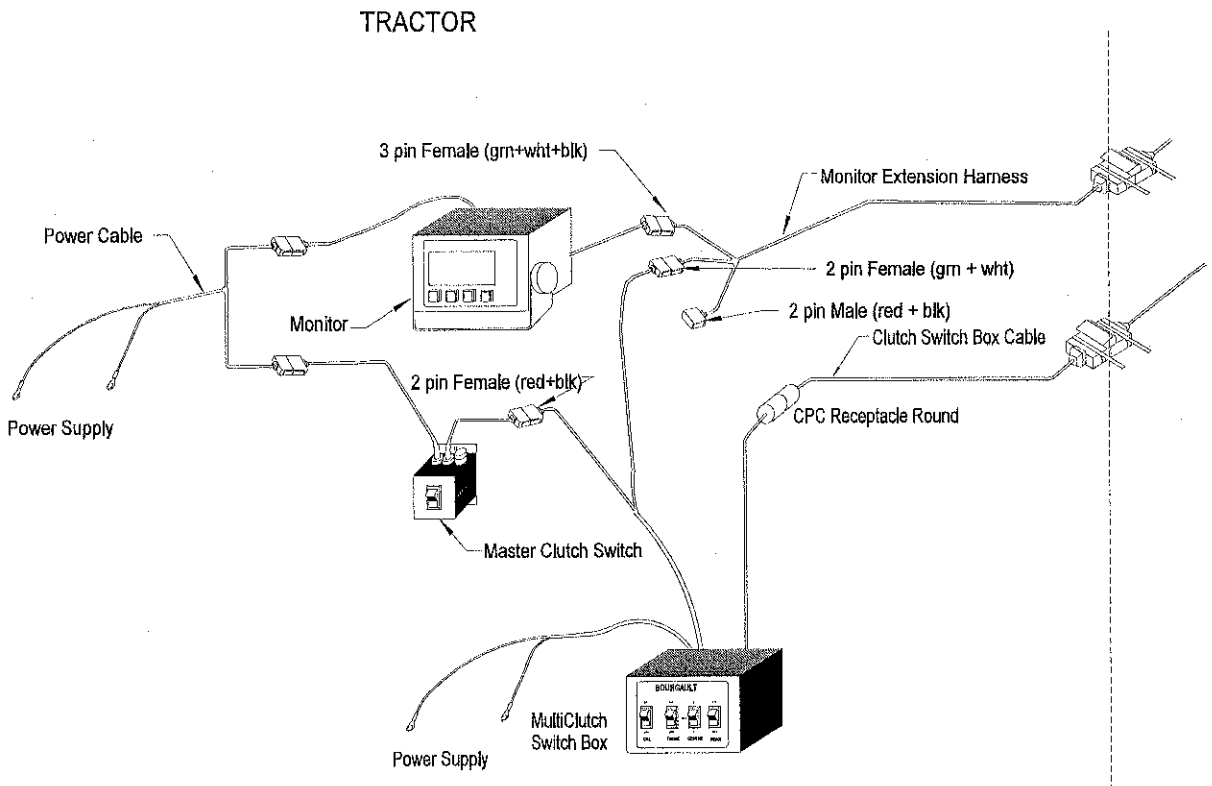


Figure 3.4 - 277 Monitor, Sensor and Clutch Layout - Model 5200 TBHD

5000-277TBHDP2.CAD



IMPORTANT:
5200 A/S'S BUILT AFTER SUMMER 2003 WILL HAVE HARNESSES WITH METRIPACK ENDS - REFER TO FIGURES 3.13 - 3.17 FOR THESE HARNESSES

Figure 3.5 - 277 Monitor, Sensor and Clutch Layout - Model 5200 LDG

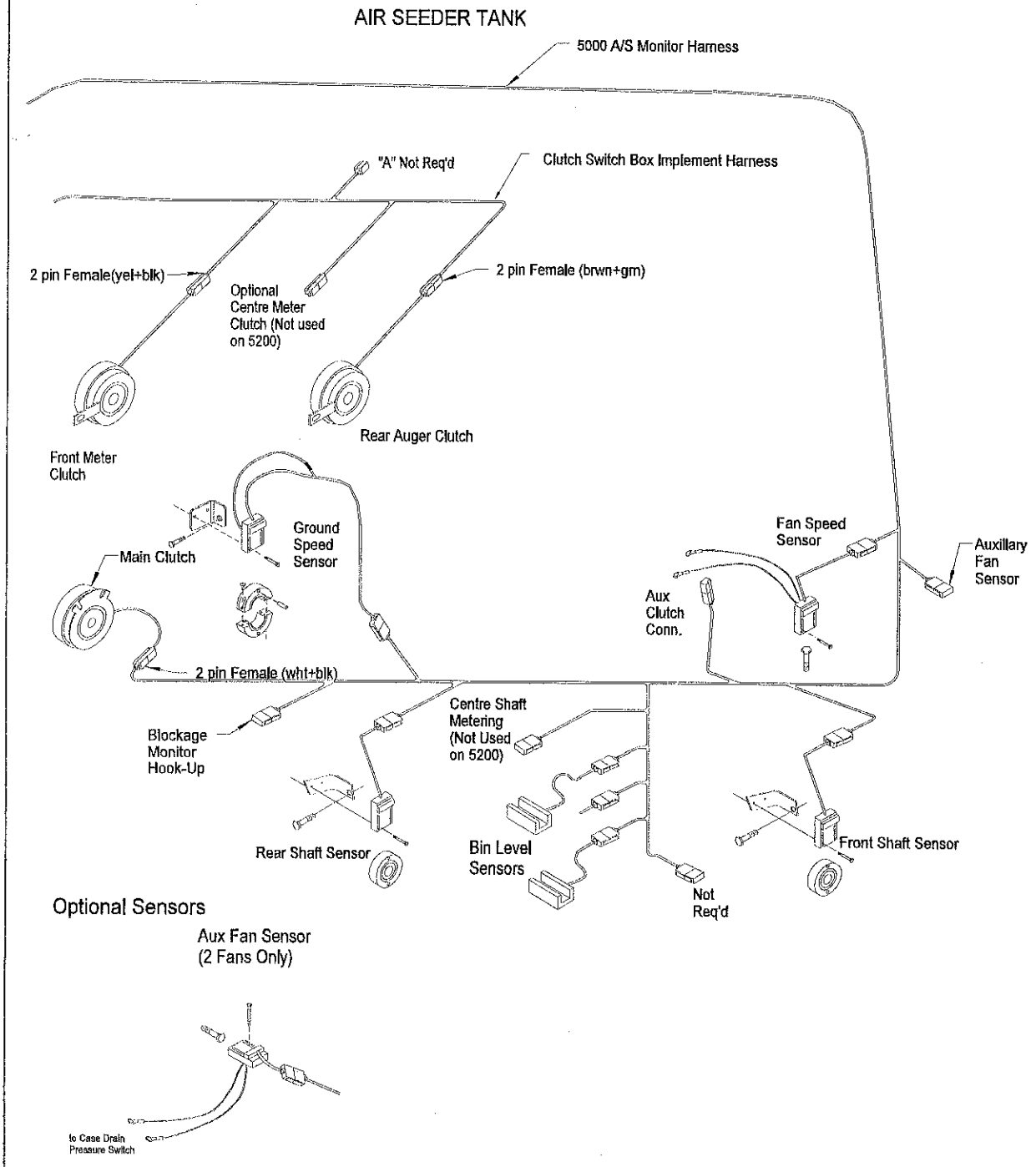


Figure 3.5 - 277 Monitor, Sensor and Clutch Layout - Model 5200 LDG

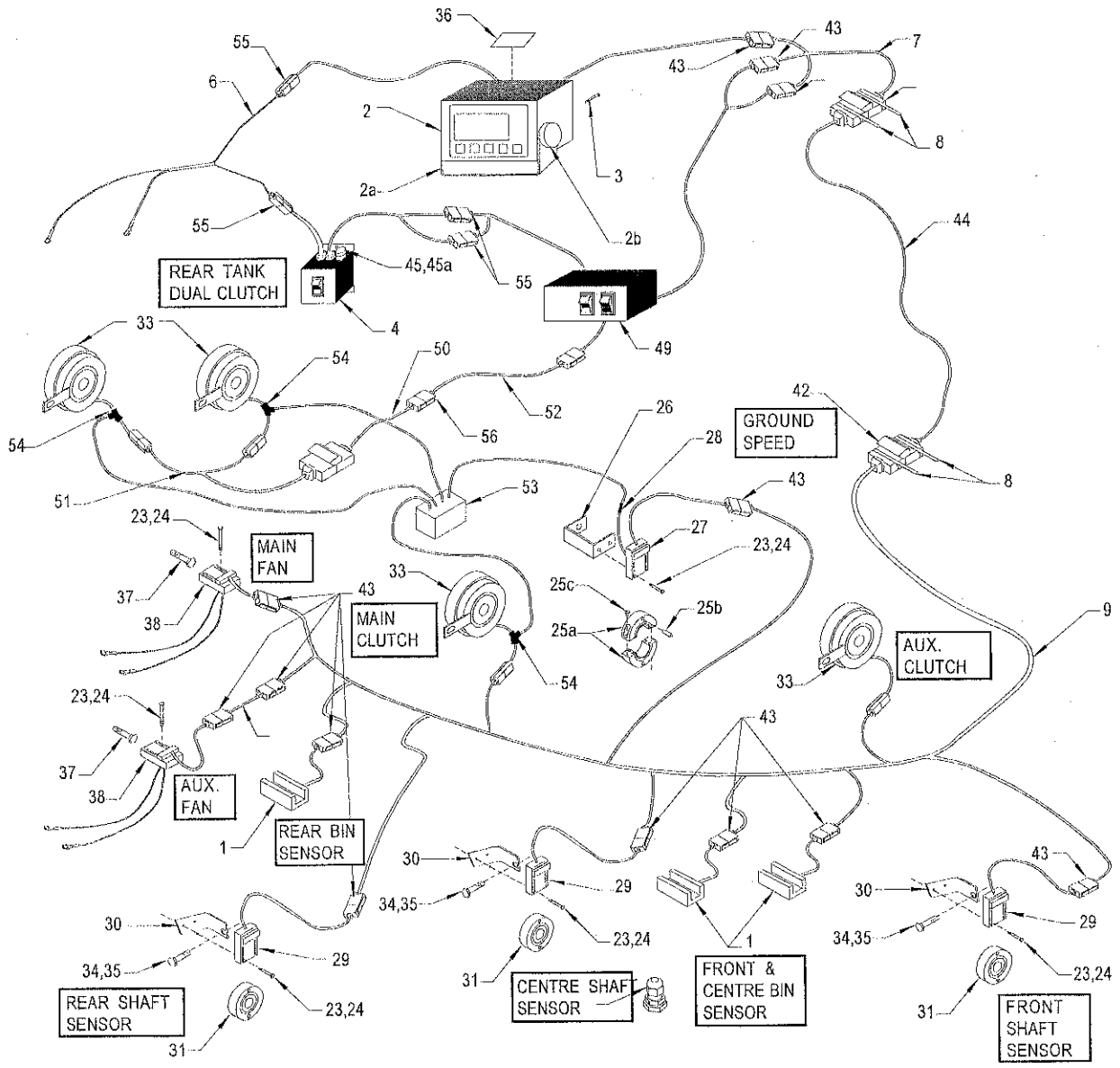
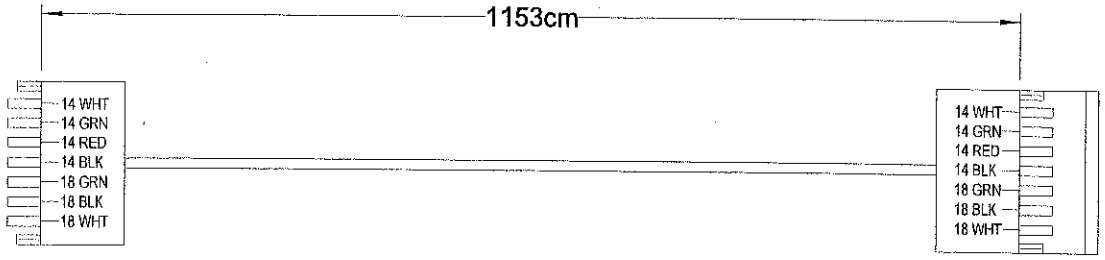


Figure 3.6 - 277 Monitor, Sensor and Clutch Layout - Model 3200

1	BIN LEVEL SENSOR OPTICAL
2	MONITOR A/S - MODEL 277
3	SCREW TYPE F TPG 1/4X3/4
4	SWITCH BOX CLUTCH
6	CABLE POWER MONITOR
7	MONITOR EXT CABLE
8	TIE NYLON MONITOR BROWN
9	HARNESS 4000 A/S MONITOR UNIV
10	NYLON TIE KIT - MONITOR CABLE
23	SCREW MACH #8-32X1 PLD
24	NUT #8-32 PLD
25	ASSY - SHAFT ACTUATOR
26	GROUND SPEED SENSOR BRACKET
27	GROUND SPEED SENSOR
28	TERM CONN BUTT 10-12GA YELLOW
29	SHAFT SENSOR
30	MOUNT DETECTOR METER AUGER
31	MAGNET DISC ACTUATOR
33	CLUTCH ELECTRIC MAIN DRIVE
34	BOLT 7/16X1-1/2 UNC PL
35	NUT 7/16 UNC PL
36	DECAL IMPORTANT CASE DRAIN PRESSURE
37	BOLT TAP 5/16X2 GR5 (FAN TARGET)
38	FAN SPEED SENSOR
44	MONITOR EXTENSION CABLE
49	DUAL CLUTCH SWITCH - REAR TANK
50	SWITCH EXTENSION HARNESS
51	DOUBLE CLUTCH A/S HARNESS
52	SWITCH EXTENSION CABLE
53	DIODE RELAY (#249000)
54	TERMINAL TAP-IN SPLICE 18 GA

AS HARNS OPT 2535.CAD



7 PIN MALE
BRYLITE CONNECTOR
FROM MONITOR EXT. CABLE

7 PIN FEMALE
BRYLITE CONNECTOR
TO A/S HARNESS

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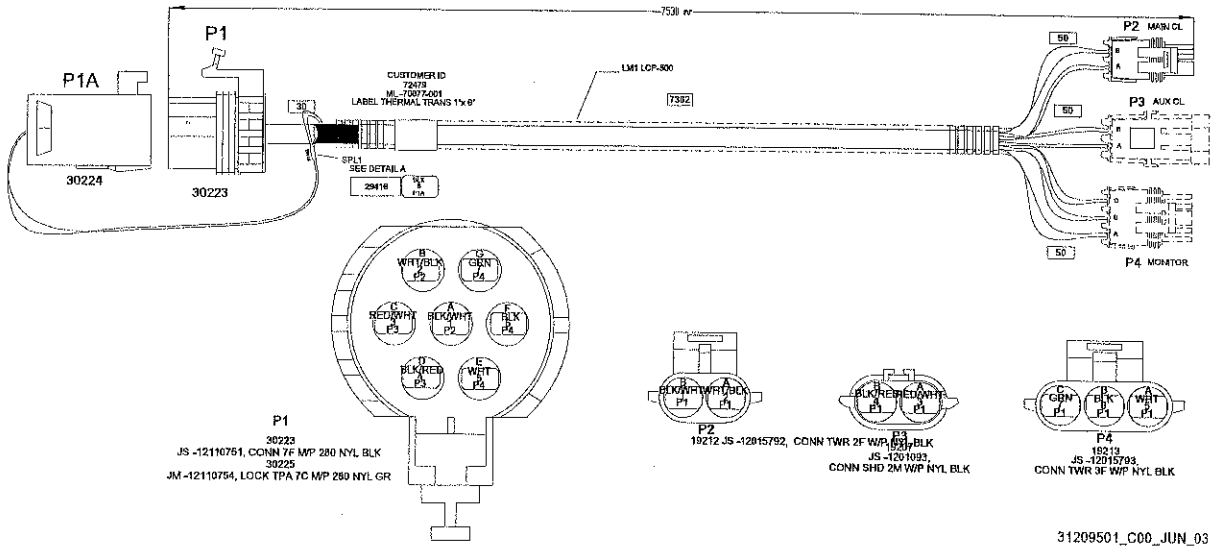
JAN 20/98

Figure 3.7 - Monitor Cultivator Extension Cable (3170/3225) & (2135 - BEFORE Summer 2003)



31209501_C00_JUN_03

Figure 3.7a - Multiplexed Air Seeder Monitor - Monitor Cable Assembly - 2135 - AFTER Summer 2003

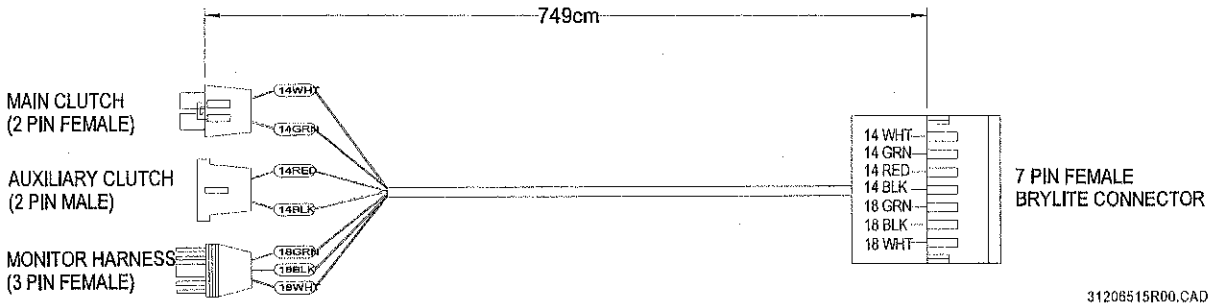


Figure 3.8 - Monitor Extension Cable (3170/3225) & (2135 - BEFORE Summer 2003)

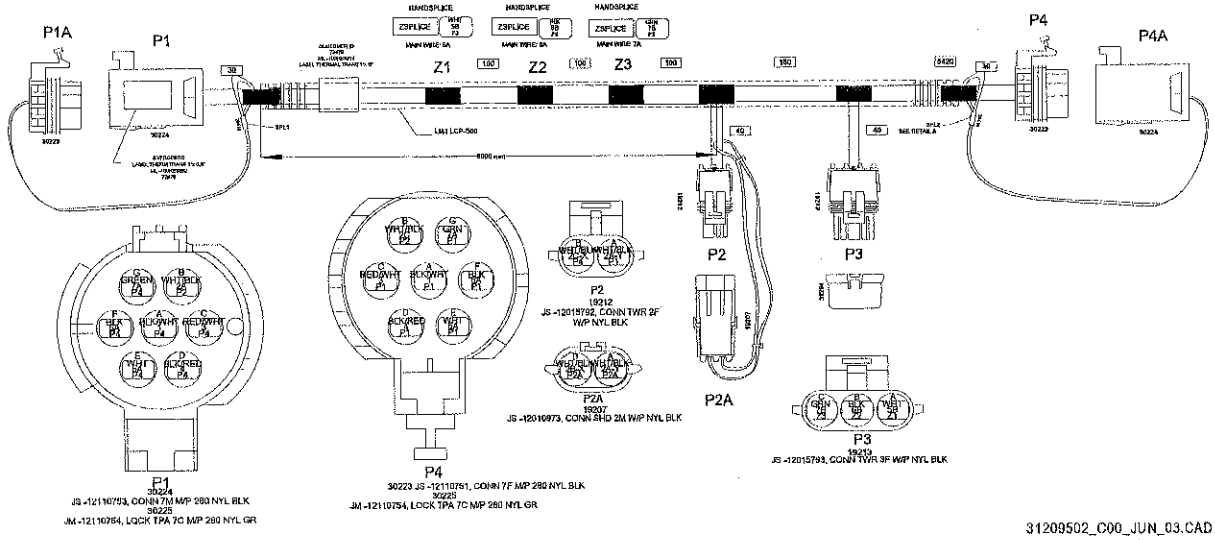


Figure 3.8a - Multiplexed Air Seeder Monitor - Cultivator Cable - 2135 - AFTER Summer 2003

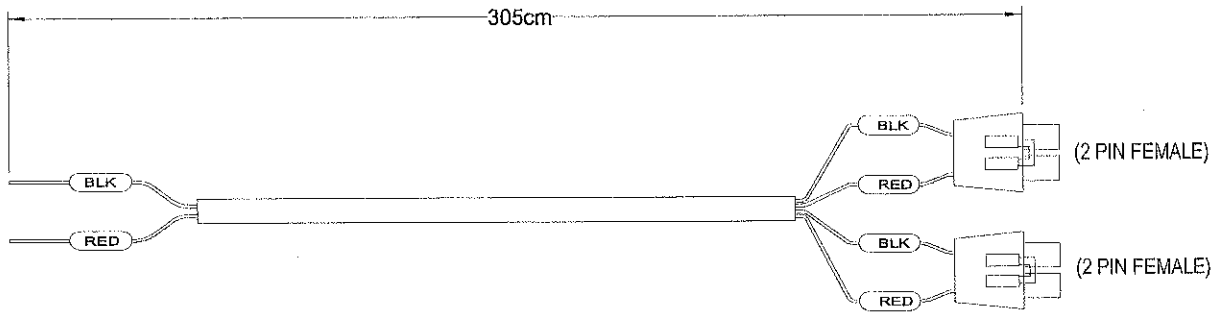


Figure 3.9 - Cable Power with 2 Connectors

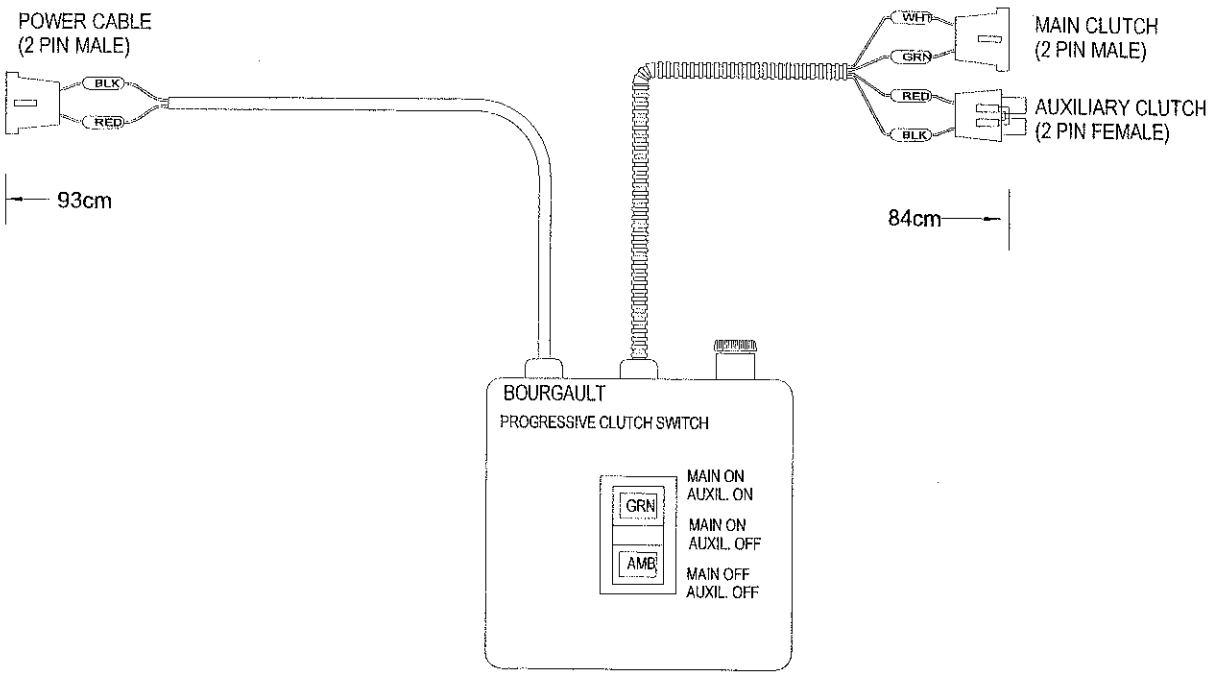


Figure 3.10 - Switch Progressive Clutch

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JAN 20/98

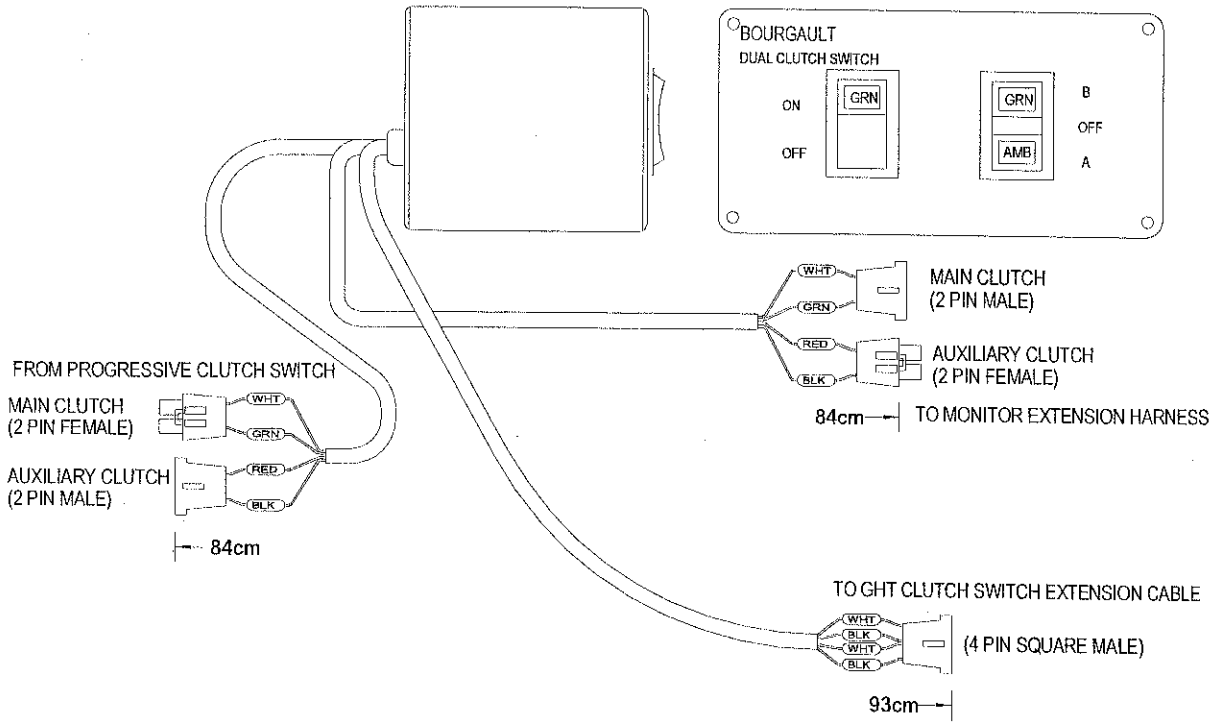
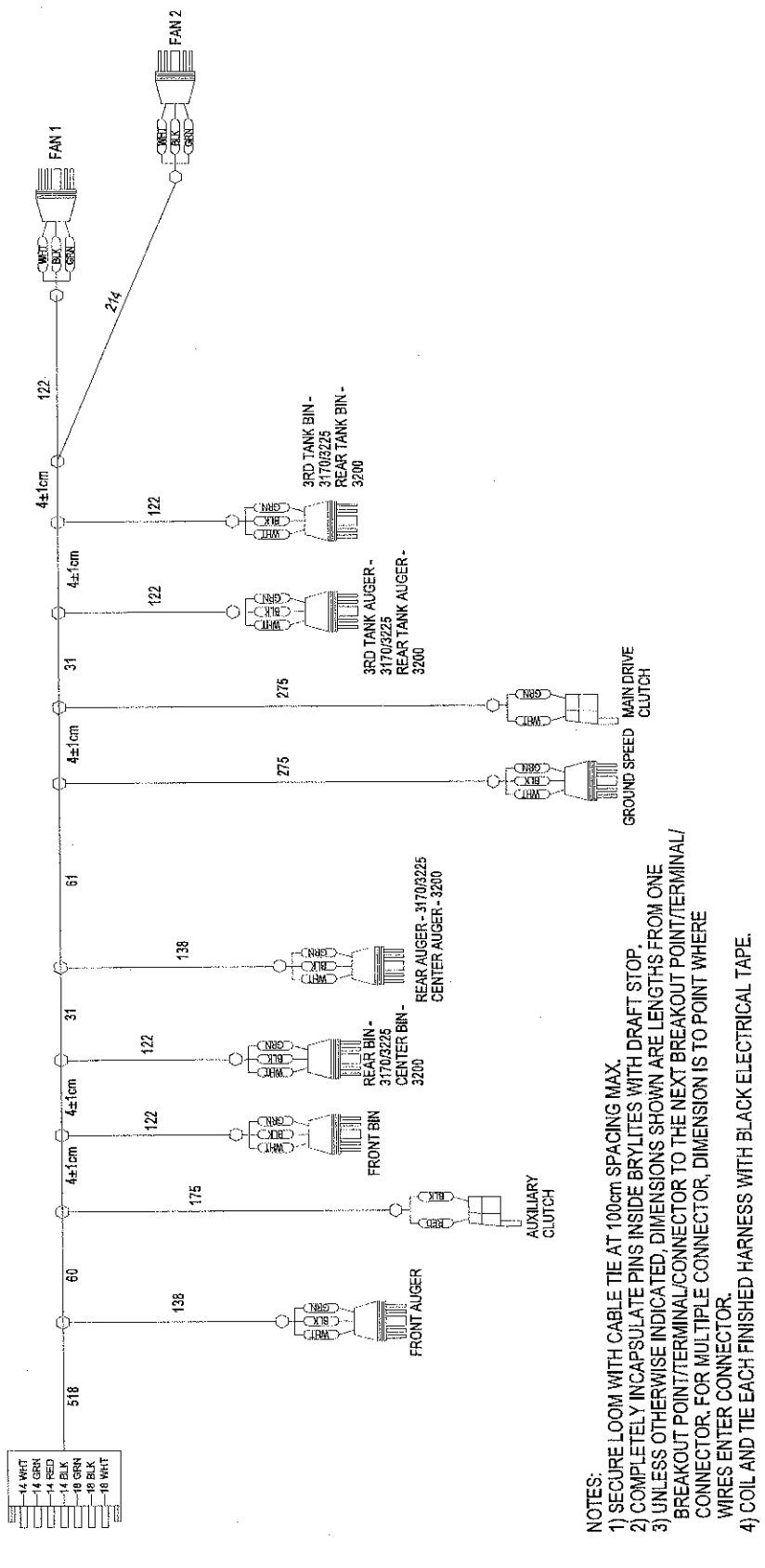


Figure 3.11 - Dual Clutch Switch - 3200 Air Seeder

31206518A00.CAD



NOTES:
1) SECURE LOOM WITH CABLE TIE AT 100cm SPACING MAX.
2) COMPLETELY INCAPSULATE PINS INSIDE BRYLITES WITH DRAFT STOP.
3) UNLESS OTHERWISE INDICATED, DIMENSIONS SHOWN ARE LENGTHS FROM ONE BREAKOUT POINT/TERMINAL/CONNECTOR TO THE NEXT BREAKOUT POINT/TERMINAL/ CONNECTOR. FOR MULTIPLE CONNECTOR, DIMENSION IS TO POINT WHERE WIRES ENTER CONNECTOR.
4) COIL AND TIE EACH FINISHED HARNESS WITH BLACK ELECTRICAL TAPE.

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DEC 24/97

Figure 3.12 - Air Seeder Implement Harness - 3000 Series A/S

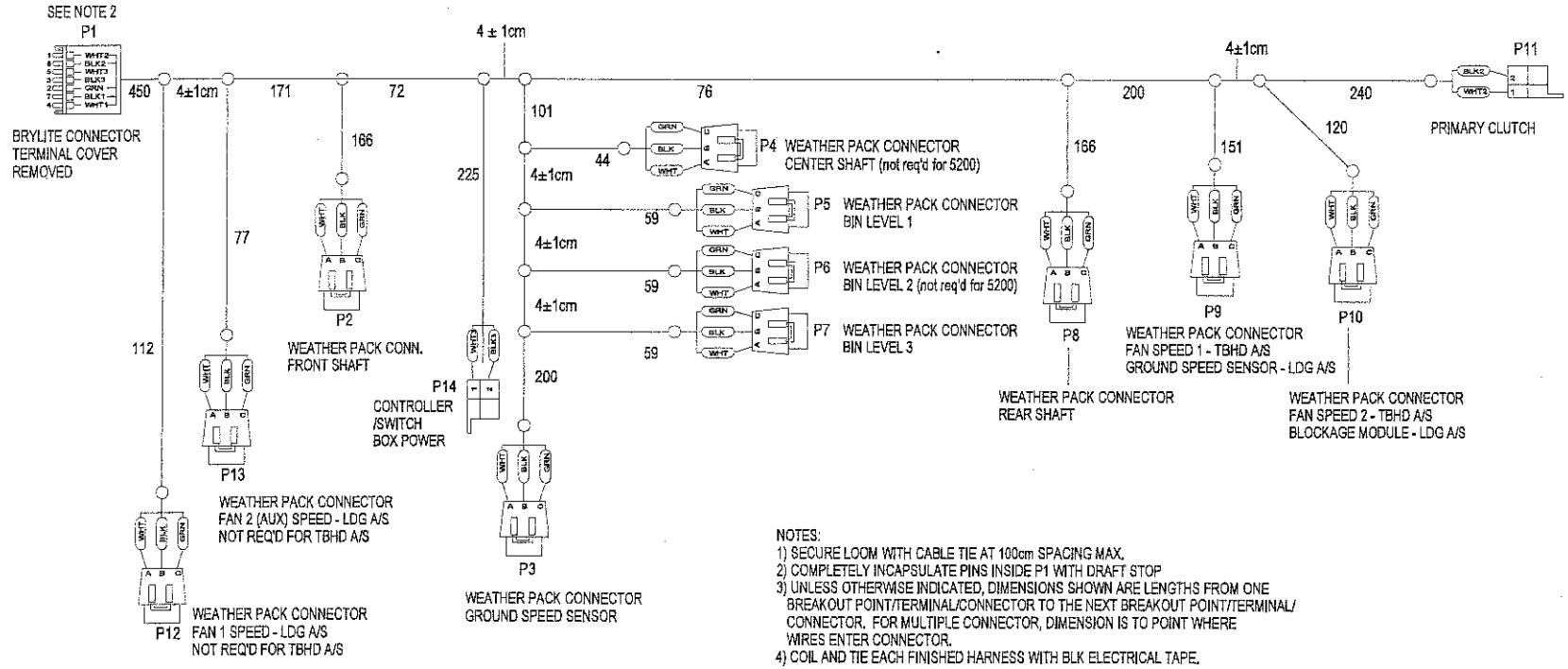

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Figure 3.13 - Air Seeder Implement Harness - 5000 Series (before summer 2003)

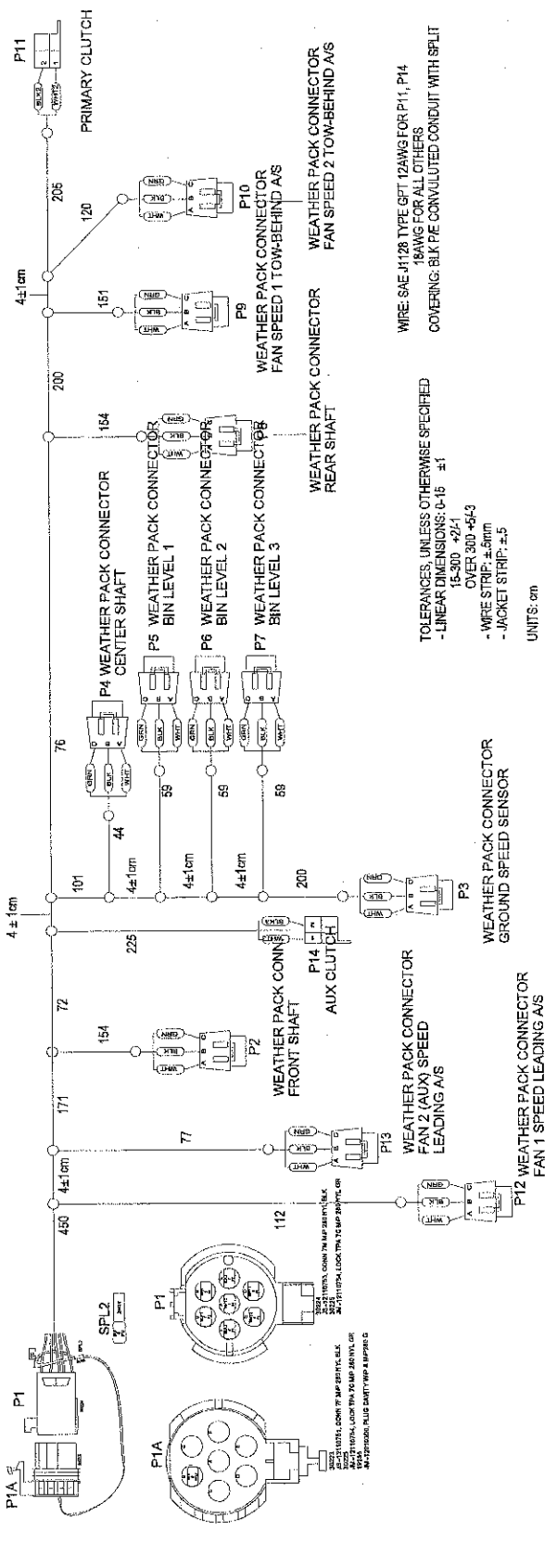

Figure 3.13a - Air Seeder Implement Harness - 5000 Series (AFTER summer 2003)

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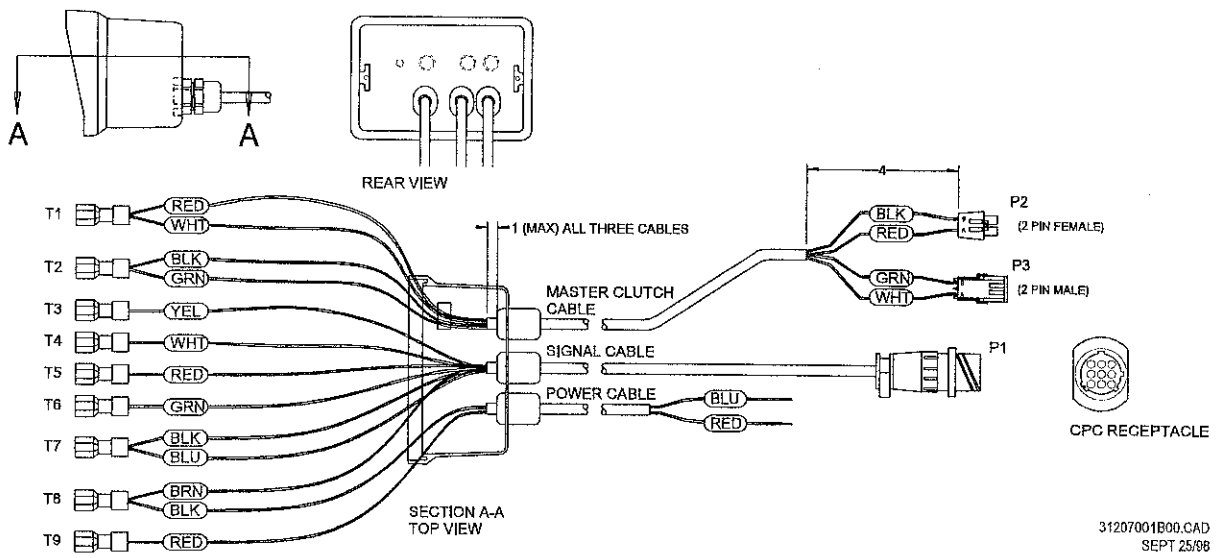


Figure 3.14 - Multiclutch Switch Box - Case/Cable Assembly
5245 Air Seeder with Centre Tank Metering

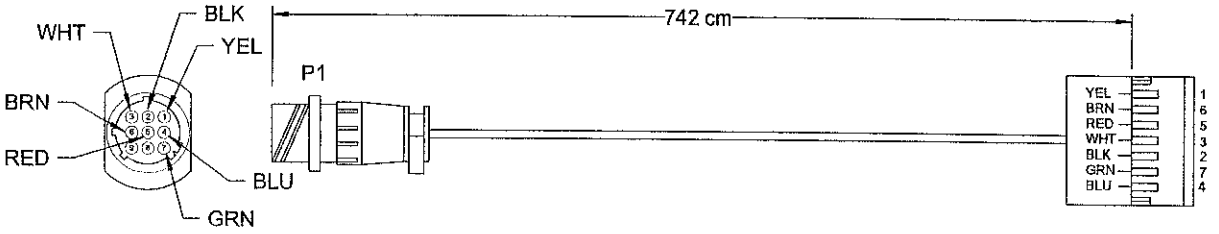


Figure 3.15 - Multiclutch Switch Box - Signal Extension Cable
5245 Air Seeder with Centre Tank Metering (BEFORE summer 2003)

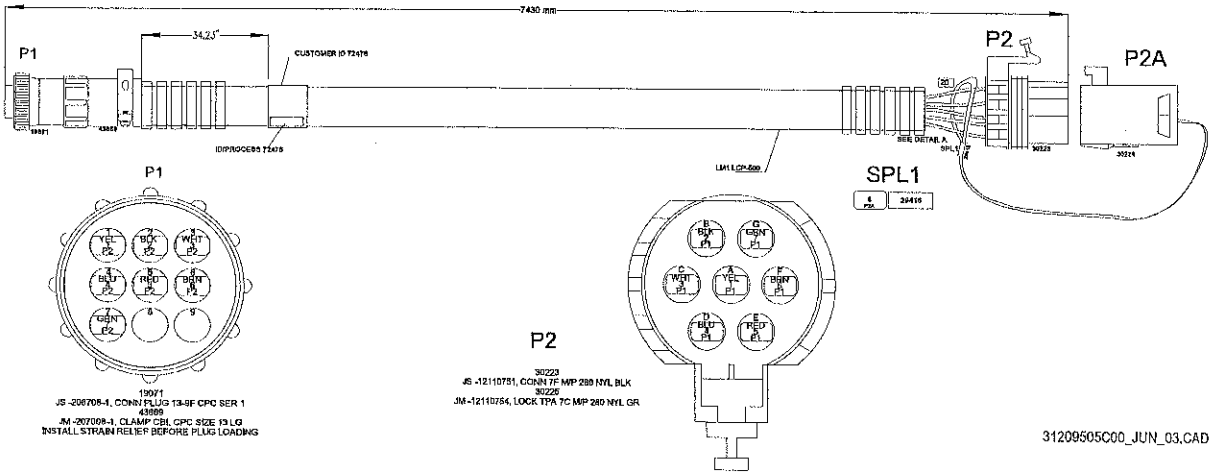


Figure 3.15a - Multiclutch Switch Box - Signal Extension Cable
5245 Air Seeder with Centre Tank Metering (AFTER summer 2003)

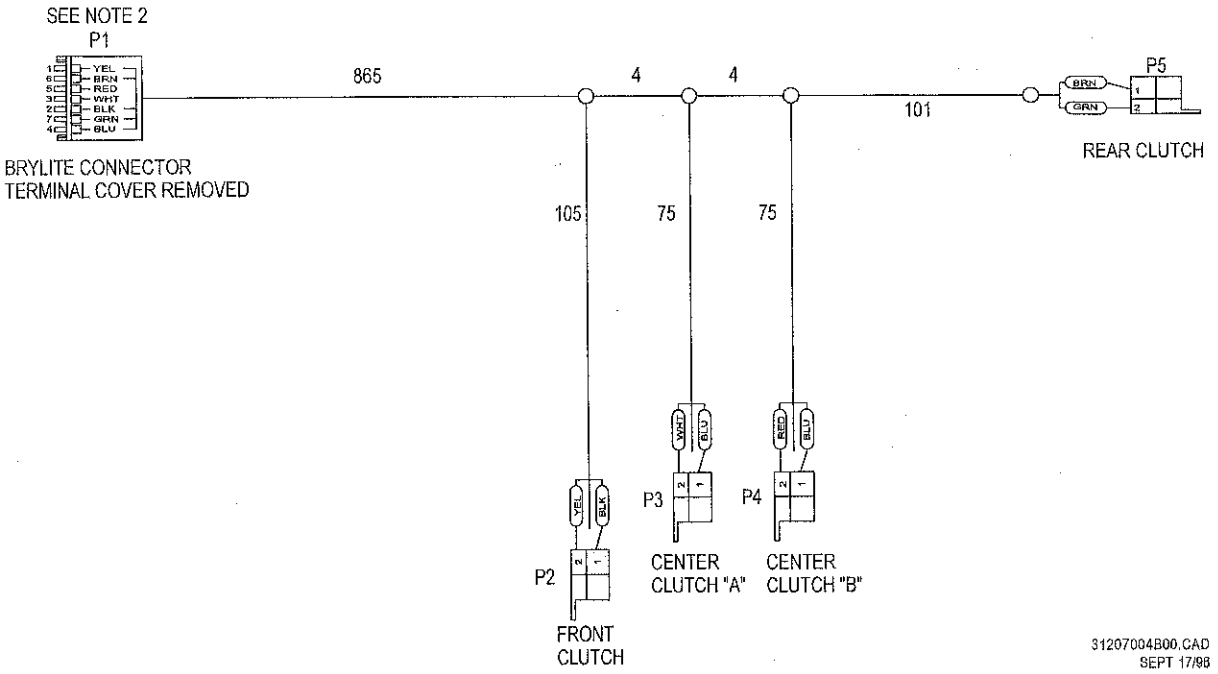


Figure 3.16 - Multi Clutch Switch Box - Implement Harness
5245 Air Seeder with Centre Tank Metering (BEFORE summer 2003)

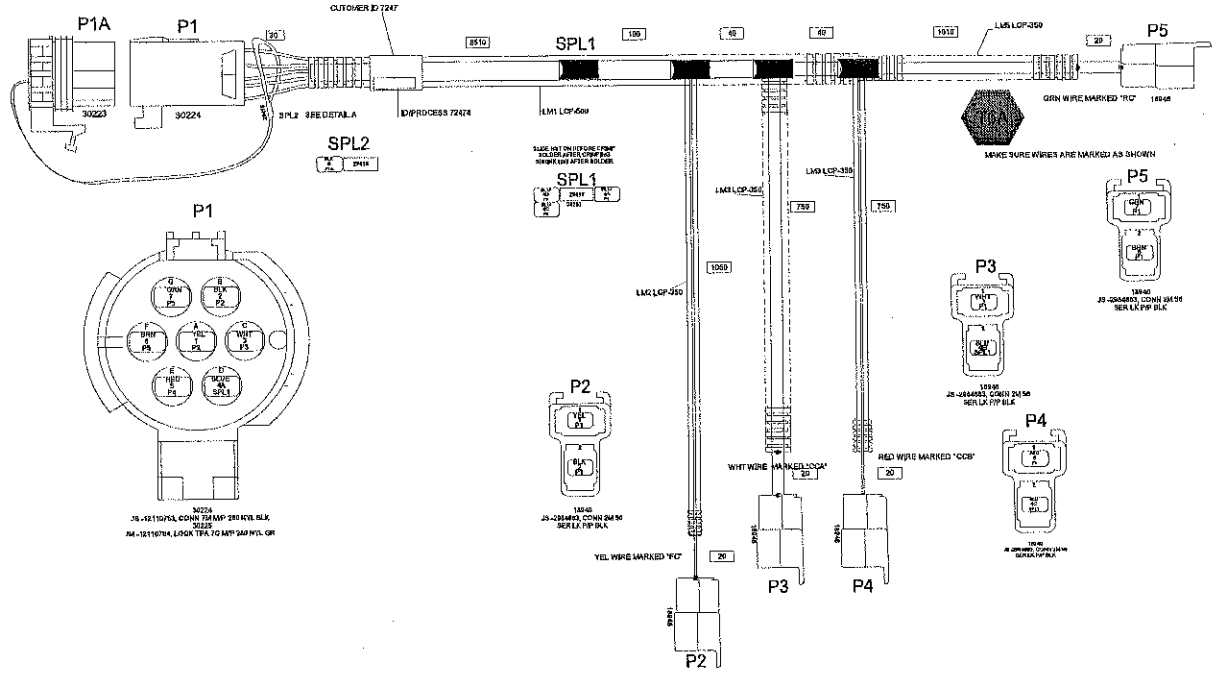
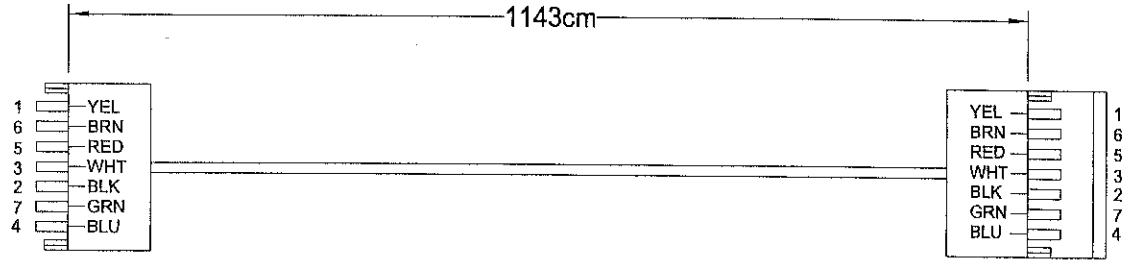


Figure 3.16a - Multi Clutch Switch Box - Implement Harness
5245 Air Seeder with Centre Tank Metering (AFTER summer 2003)



7 PIN MALE
BRYLITE CONNECTOR
FROM MONITOR EXT. CABLE

7 PIN FEMALE
BRYLITE CONNECT
TO A/S HARNESS

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Figure 3.17 - Multi Clutch Switch Box - Cultivator Extension Cable
5245 Air Seeder with Centre Tank Metering (BEFORE summer 2003)

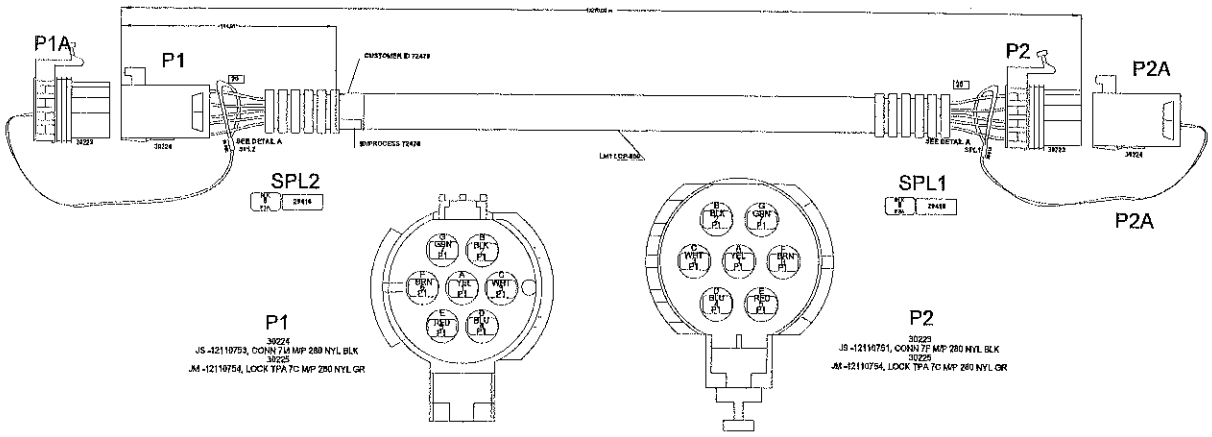

Figure 3.17a - Multi Clutch Switch Box - Cultivator Extension Cable
5245 Air Seeder with Centre Tank Metering (AFTER summer 2003)

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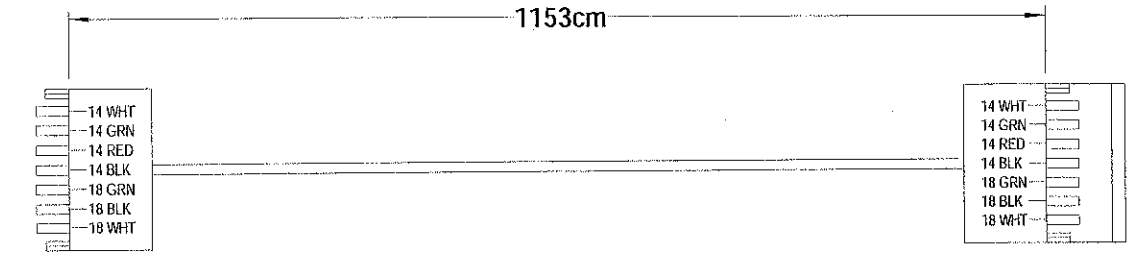
10.3 MONITOR & CLUTCH CABLE LAYOUTS (CONT'D)



7 PIN MALE
BRYLITE CONNECTOR
FROM MONITOR EXT. CABLE

7 PIN FEMALE
BRYLITE CONNECTOR
TO A/S HARNESS

Figure 10.26 277 Monitor Cultivator Extension Cable

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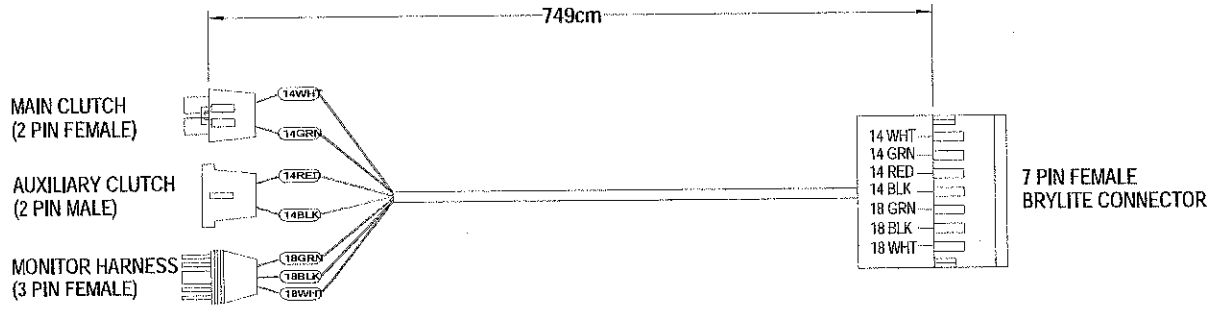

Figure 10.27 277 Monitor Extension Cable

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JAN 20/98

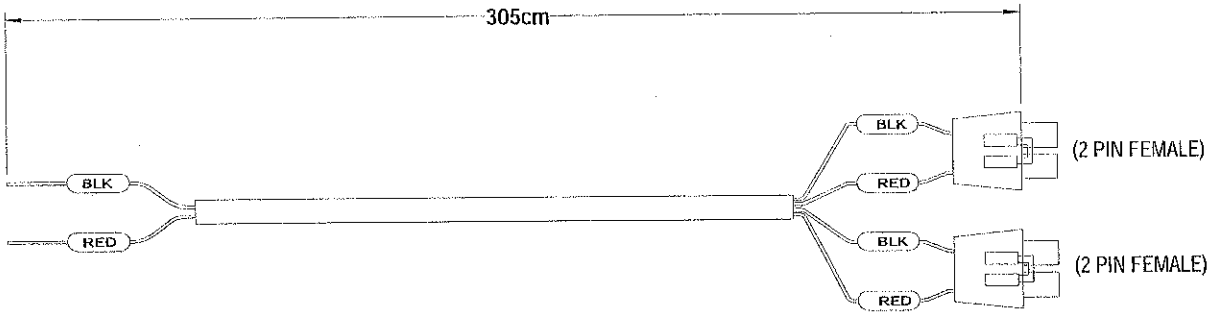

Figure 10.28 277 Cable Power with 2 Connectors

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JAN 30/98

10.3 MONITOR & CLUTCH CABLE LAYOUTS (CONT'D)

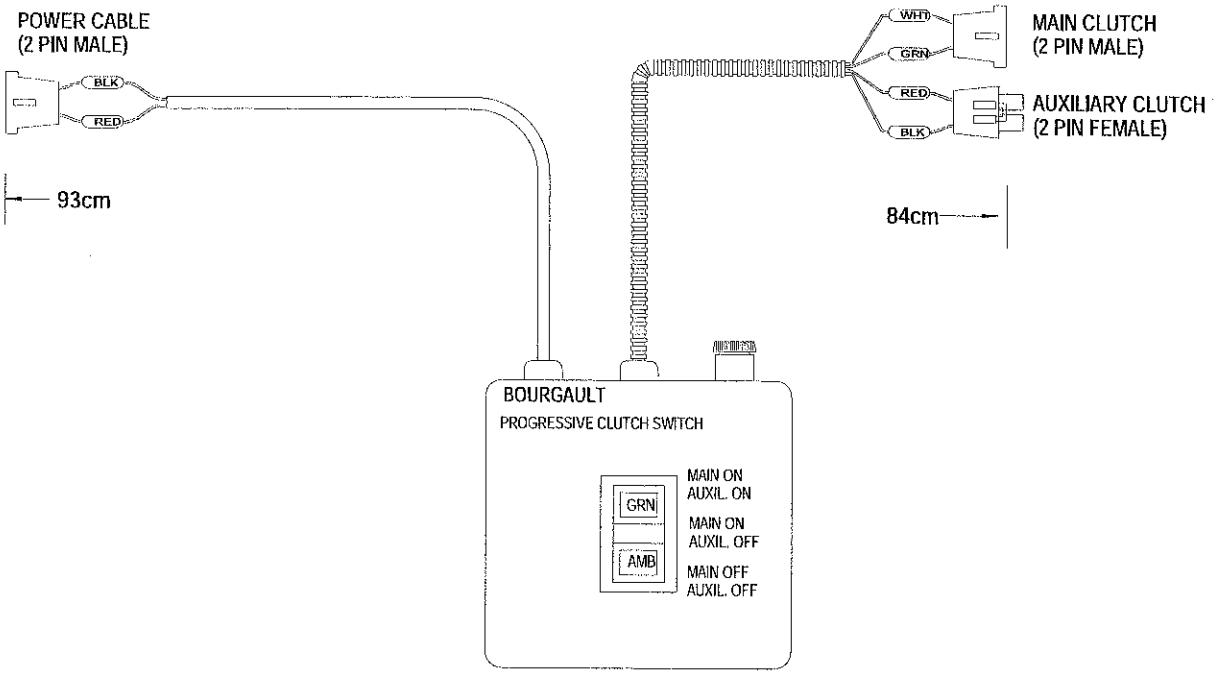

Figure 10.29 Switch Progressive Clutch

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JAN 20/98

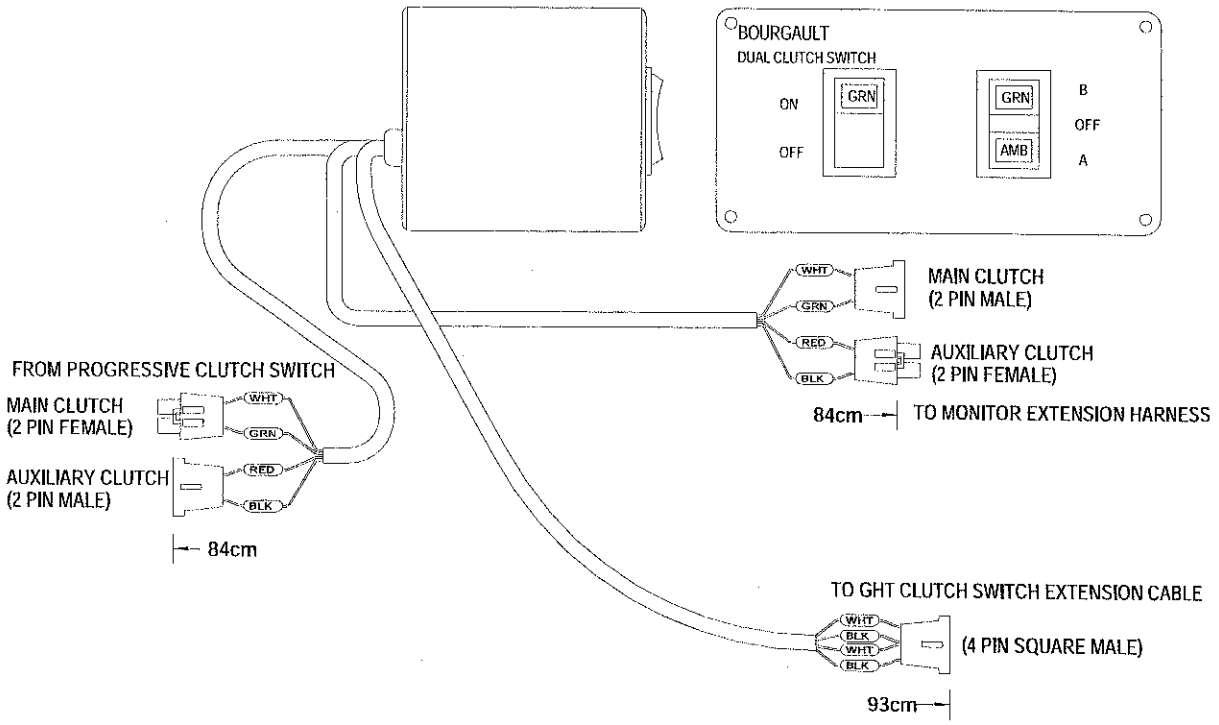

Figure 10.30 Dual Clutch Switch

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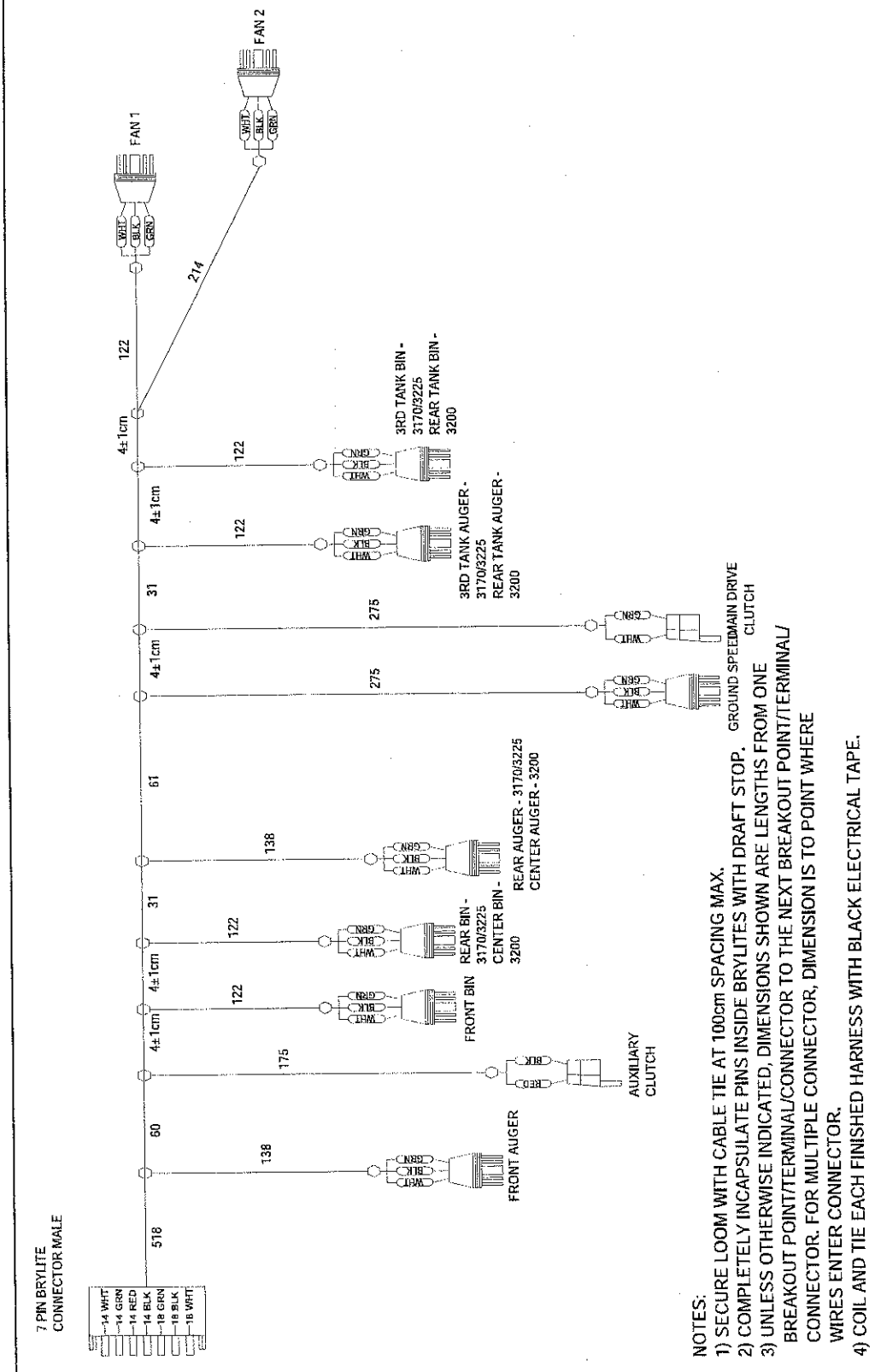
10.3 MONITOR & CLUTCH CABLE LAYOUTS (CONT'D)



NOTES:
1) SECURE LOOM WITH CABLE TIE AT 100cm SPACING MAX.
2) COMPLETELY INCAPSULATE PINS INSIDE BRYLITES WITH DRAFT STOP.
3) UNLESS OTHERWISE INDICATED, DIMENSIONS SHOWN ARE LENGTHS FROM ONE BREAKOUT POINT/TERMINAL/CONNECTOR TO THE NEXT BREAKOUT POINT/TERMINAL/ CONNECTOR. FOR MULTIPLE CONNECTOR, DIMENSION IS TO POINT WHERE WIRES ENTER CONNECTOR.
4) COIL AND TIE EACH FINISHED HARNESS WITH BLACK ELECTRICAL TAPE.

Figure 10.33 Air Seeder Implement Harness - 2000 & 3000 Series

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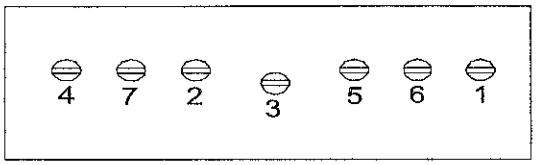
10.2.4 IMPLEMENT HARNESS AND SENSOR CHECKING

Most problems with agricultural electronics are mechanical in nature. Problems with the harness connections and sensors are the most common. The sensors used on the 4000 Series Air Seeders are Smart Sensors and will report any problems that may occur on the monitor.

10.2.4.1 HARNESS CHECKING

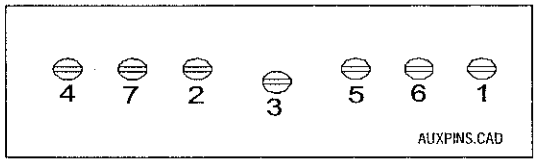
If a problem occurs with the continuity of the implement harness, check for broken connections, loose terminals or loose wires in the connectors at each terminal of the harness. An ohm meter can be used to check the continuity of the wiring harness through the connector pins on the terminals. Refer to *Figures 4.25 & 4.26* for electrical schematics.

A. **Multiplexed Implement Harness**



1..... Main Drive Clutch
2..... Sensor Data Transmission
3..... Auxiliary Clutch Power
4..... Sensor Power
5..... Auxiliary Clutch Ground
6..... Drive Clutch Ground
7..... Sensor Ground

B. **Auxiliary Clutch Harness**



1..... Front Clutch Power
2..... Front Clutch Ground
3..... Centre Clutch "A" Power
4..... Centre Clutch Ground
5..... Centre Clutch "B" Power
6..... Rear Clutch Power
7..... Rear Clutch Ground

If you cannot find the problem, contact your Bourgault dealer for assistance.

METER MEASUREMENTS ON HARNESS CONNECTORS:

The basic three wire connector at each sensor, consist of three conductors. Harness junctions have more than three lines because the clutch wires are also present. The pinout of the basic connectors that feed the sensors on the air seeder harness is as follows:

A) white or red positive supply

B) black ground

C) green data transmission

Voltage measurements should be done on equipment that is powered up. With the monitor powered up, the voltage;

- between supply and ground at a sensor
- between supply and harness junction after the monitor

should be at about 0.7V less than the voltage between the incoming supply and ground (the two wire connection from the battery to the monitor).

Example: In one reading, with the incoming supply was measuring 13.6V, while the supply to a sensor was 12.9V.

The voltage between the data line and the ground rapidly alternates between a high state of about a volt less than the sensor supply voltage (when no messages are travelling), and a low state of less than 1V above ground. A dc voltmeter will tend to average out the fluctuations.

With everything operating normally, the average value on the data line is close to but less than the high state voltage.

Example: One sample measurement was 9.7V, while the supply to the sensor was 12.9V.

These voltages should not vary extremely depending on how many sensors are connected to the harness.

10.2.4 IMPLEMENT HARNESS AND SENSOR CHECKING (CONT'D)

If one or more of the sensors is absent at start-up, the monitor will display the "UNABLE TO LOCATE SENSOR" message and will wait for a new sensor to be connected. In this case, the data line will be much less busy than normal, and a slightly higher than average voltage may be expected.

Example: One sample measurement showed 11V.

Resistance measurements should be done with the monitor turned off. Readings on the harness connectors may differ slightly according to the number of sensors connected and whether or not the monitor is connected.

NOTE

EXPECT VERY HIGH OHMS (FROM HUNDREDS OF KILO-OHMS UP TO SEVERAL MEGA-OHMS) BETWEEN THE SUPPLY AND GROUND LINES. SIMILAR READINGS MAY BE EXPECTED BETWEEN THE SUPPLY AND DATA LINES. EXPECT LOWER VALUES, IN THE RANGE OF 100 OHMS (0.1K) TO 10 KILO-OHMS, BETWEEN THE DATA LINE AND GROUND. VALUES SHOULD DECREASE WITH EACH ADDITIONAL CONNECTED SENSOR.

Similar readings may be expected when measuring resistance values of a single disconnected sensor.

SHORT CIRCUITS ON THE HARNESS

For the three sensor bus lines (power, ground and data), all pin to pin resistance measurements should be at least 100 ohms or much higher. A short circuit will show much less resistance (a few ohms or less) between any two of those points.

Note that every ohms measurement sees all parallel paths. It may be necessary to disconnect harness junctions and the monitor and successive sensors until the measured short goes away.

If there is a suspicion of a short;

- Disconnect the rear tractor junction and measure on both sides:
  - If a short appears on the monitor side, the junction connector or monitor has the short.
  - If a short appears on the harness side, proceed to check the remaining harnesses.
- For tow behind units, disconnect the cultivator harness from the air seeder harness. Measure both ends:
  - If a short appears on the cultivator harness side, check the cable and connectors for shorts.
  - If a short appears on the air seeder harness side, continue to check the harness and sensors.
- Disconnect the individual sensors, with a measurement performed on the air seeder harness after each step. When the problem disappears after a disconnect, the last item removed was the problem item.
  - The sensor connections should be carefully examined for the short and repaired or replaced.
  - If the short persists after all of the sensors have been unplugged from the harness, the problem is in the harness itself. The entire span of the harness, and especially all of its connectors, should be carefully examined. Repair or replace the air seeder harness.

Consult the harness drawings (*Figures 4.25 & 4.26*). Devise a test to help identify a fault in the circuit (such as: engage clutch and measure; disengage and measure again). At a suspect connector, with the system powered down, check for shorts from each pin to chassis ground and between adjacent pins. If the fault cannot be localized, or if it can be but is not visible, the harness may need replacement.

10.2.4 IMPLEMENT HARNESS AND SENSOR CHECKING (CONT'D)

Connection Terminals:

- The connectors may be disassembled to check for damage, corrosion, or dirt.
- Check that the correct coloured wires are connected to the connector positions according to the harness drawings (this assumes that the system has not previously functioned properly with all the same equipment it now has). Refer to *Section 10.3 - Monitor & Clutch Cable Layouts*.

LOOKING FOR OPEN CIRCUITS ON THE HARNESS

1. Start with the voltage measurements. Disconnect one sensor from the harness, preferably the problem sensor, if one has been identified. Check for pin to pin values as previously described.
   - If the measurements taken are good, the removed sensor is likely in need of repair or replacement.
   - If the measurements are bad, but the whole system, except one sensor, was functioning normally, the problem should be isolated to the branch feeding that sensor. The harness should be repaired or replaced.
2. Try to find out if levels are faulty at other points in the system. A good test is to measure on the monitor side of the junction bringing monitor signals to the rest of the system (rear of tractor).
   - If measurements there are bad, the problem is somewhere between the monitor and that junction. Isolate the fault to the monitor connector, the junction connector, or on either side of a monitor-to-monitor junction extended harness if present. Identify, and repair or replace the faulty connector, monitor, or monitor-to-junction harness.
   - If the signals reaching the junction are good, reconnect the monitor junction and take more voltage measurements across the harness.
   - If all sensors give the same faulty measurement, check the connector at the incoming junction.

NOTE

IF SOME SENSORS GIVE A FAULTY MEASUREMENT, WHILE OTHERS READ GOOD, THE PROBLEM IS INTERNAL AND THE HARNESS WILL NEED TO BE REPLACED.

SUGGESTIONS

- When looking for problems that are associated with pins other than those on the basic three wire bus, consult the wiring diagrams (*Figures 4.25 & 4.26*). A long wire can be used to extend to one of the meter leads to check the continuity from a pin on one harness connector to the corresponding pin at another connector on the harness.
- When possible, disassemble the connectors of a suspect harness and check for visible signs damage, such as broken wires or wires which have come out of their screws. If the fault is not visible, the harness may need to be replaced.
- If, after disassembling the connectors, no obvious faults have been found, check that the correct coloured wires are connected to the connector positions according to the wiring diagrams (this assumes that the system has not previously functioned properly with all the same equipment it now has). The harness may be incompatible with the system that has been introduced.

10.2.4 IMPLEMENT HARNESS AND SENSOR CHECKING (CONT'D)

10.2.4.2 REPAIRING BRYLITE CONNECTOR FAULTS

If a Brylite connector at any junction shows signs of damage, disassemble the connector and look for problems. Refer to the following guidelines:

1. Remove the two covers on the Brylite connector.
2. Clean all soil away from the pins as necessary. Check for broken or shorted wires and repair or replace.
3. Check if the correct colour wires go to the right pins as outlined in the wiring diagrams.
4. To protect from moisture, apply a layer of Bulldog Grip "Draft Stop", available at hardware stores, over the pins and replace cover. Do **NOT** use silicone or RTV for sealing: an agent released during curing is caustic and attacks metals, particularly wire and the plating on connector pins and sockets which provide electrical contact.

10.2.4.3 FAN SENSOR CHECKING

The fan sensors cannot be check with a meter reading. To check that the fan sensors are working, look on the sensor for a red LED (Light Emitting Diode). This LED will flash at a slow rate if the sensor has power to it, but is not detected by the monitor. The LED will flash once for every 16 pulses detected. If the sensor is not detected it must be relearned. Refer to *Section 4.9.1.2 - Sensor Learn.*

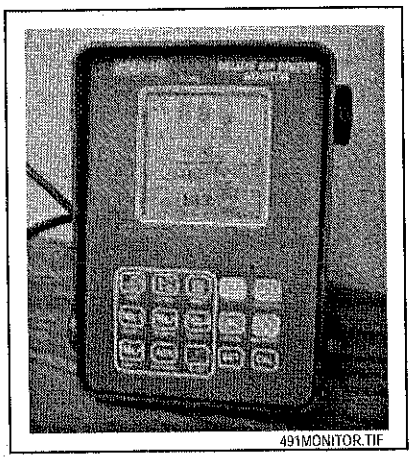


Figure 10.10 - Monitor

- When the sensor has power to it and is recognized, turn the fan on and check the LED, it should flash at a steady rate while the fan is engaged.
- If the LED fails to flash when the system is first powered up or if the light flashes indefinitely, then either the sensor is faulty or some signals are not reaching the sensor connector. There would also be a "COMM ERROR" message for FAN1 or FAN2 on the display at start-up. Refer to *Section 10.2.4.1 - Harness Checking.*

Target to sensor gap effects signal strength and is critical with these sensors. The gap should be no larger than 1/8 inch (3 mm). Dirt that builds up on the sensor or the target can also affect signal strength. Keep them clean.

If the implement harness has been checked for continuity, power is reaching the sensor and there is still a problem, contact your Bourgault Dealer for assistance or replacement parts.

10.2.4.4 SHAFT SENSOR CHECKING

To check that the Shaft Sensors are working, look on the sensor for a red LED (Light Emitting Diode). This LED will flash at a slow rate if the sensor has power to it, but is not detected by the monitor. If the sensor is not detected it must relearned. Refer to *Section 4.9.1.2 - Sensor Learn.*

- When the sensor has power to it and is recognized, the LED will not flash. If a magnet is passed by the sensor, the LED will flash once for every pulse that it receives.
- If the LED fails to flash when the system is first powered up or if the light flashes indefinitely, then either the sensor is faulty or some signals are not reaching the sensor connector. There would also be a "COMM ERROR" message for SHAFT 1 (2, 3) on the display at start-up. Refer to *Section 10.2.4.1- Harness Checking.*

10.2.4 IMPLEMENT HARNESS AND SENSOR CHECKING (CONT'D)

- If the LED flashes a few times when the system is first powered up and then remains off while the shaft is rotating, then the monitor is able to communicate with the sensor, but the sensor is not picking up the signal from the shaft actuator. Check the target to sensor gap. If this is okay, then the sensor is faulty.

Target to sensor gap effects signal strength and is critical with these sensors. The gap should be no larger than 1/8 inch (3 mm). Dirt that builds up on the sensor or the target can also affect signal strength. Keep them clean.

If the implement harness has been checked for continuity, power is reaching the sensor and there is still a problem, contact your Bourgault Dealer for assistance or replacement parts.

10.2.4.5 BIN LEVEL SENSOR CHECKING

There are no LEDs to check on the Optical Bin Level Sensors. Check the implement harness for continuity and power reaching the sensor. Check that there is no objects or buildup obstructing the optical eye on the sensor If the readings do not agree, contact your Bourgault Dealer for assistance or replacement parts.

10.2.4.6 ACREAGE READING CHECKING

It is recommended that the acreage reading on the monitor be checked occasionally to verify the accuracy.

To check the reading, follow this procedure:

1. Turn the monitor ON.
2. Be sure the tillage implement size and the required pulses per mile have been entered.
3. Select the monitor to Calibration Mode (CAL).
4. Install the manual crank on the metering system drive tower.
5. Turn the crank 50 resolutions in the counter-clockwise direction. Turn crank at about 1 revolution per second.
6. Check that the acre reading on the monitor is the same as given in *Table 13.*
7. If the readings do not agree, contact your dealer for assistance.

Implement Width	24'	24'5"	25'2"	28'	29'2"	29'5" & 30'	32'
Area Per 50 Revolutions of the Calibration Crank	0.23	0.24	0.25	0.27	0.28	0.29	0.31
Implement Width	**33'-4"**	**33'-7"**	**34'-4"**	**35'**	**36'**	**38'-6"**	**40'**
Area Per 50 Revolutions of the Calibration Crank	0.32	0.33	0.34	0.34	0.35	0.37	0.39
Implement Width	**40'-10"**	**42'**	**45'**	**48'**	**50'**	**51'-4"**	**52'**
Area Per 50 Revolutions of the Calibration Crank	0.40	0.41	0.44	0.47	0.49	0.50	0.50
Implement Width	**52'-6"**	**54'**	**58'-8"**	**60'**	**60'-8"**	**63'**	**63'-8"**
Area Per 50 Revolutions of the Calibration Crank	0.51	0.52	0.57	0.58	0.59	0.61	0.62

Table 13 - Acreage per 50 Revolutions TABLE13.XLS