



LT CONTROL®

The LT Control is an open loop system, which is easy to install and compatible with most pulse width modulated valves. The LT Control, coupled with the SFCC15 cartridge kit, allows utilization of the existing “two knob manual valves” and provides an economical solution to equip a vehicle with a ground speed control system.

When interfaced with the speedometer of the truck, the LT Control synchronizes the ground speed of the truck with the conveyor. This reduces wasted material at intersections, and provides a more uniform application of material on the road for safer and consistent driving conditions.

The LT Control will also work without a ground speed input. Simply set the **SPREADER CONTROL SWITCH** to manual and rotate the **CONVEYOR** dial to a higher setting to apply more material. When you are ready to stop spreading, set the spreader control to OFF or rotate the conveyor dial to ZERO.

The LT Control provides the following features:

- Variable conveyor control that is related to ground speed
- 20 position rotary dials, one for conveyor control and one for spinner adjustment
- Momentary blast switch for spot spreading
- **SPREADER CONTROL SWITCH** for OFF, AUTO, and MANUAL operation
- 2 digit LED display to assist with setup

The LT Control® is programmed at the factory with default values to operate the SFCC15 cartridges. The Blast timer has been preset at 5 seconds. The default values may need to be fine tuned to improve performance of the control with SFCC15 valves or likely will need to be modified for other values. Likewise, the Blast timer can be adjusted for optimum turn-off delay. The Ground Speed Set Point is the only constant that does not have a default value and must be set by the operator due to the variations found in ground speed sensors.



Figure 1
LT Control





SYSTEM OVERVIEW

The LT Control system has been designed to increase the efficiency of the material spreading operation and allow the hydraulic spreader control valve to be installed outside of the cab. When in the **AUTOMATIC** mode, the LT Control varies the speed of the conveyor in proportion to ground speed to maintain a uniform application of material on the road. Spreading automatically starts when the vehicle begins to move and automatically stops when the vehicle stops. When in the **MANUAL** mode, the conveyor and spinner are active when the truck is moving or stationary. The control system will not vary the speed of the conveyor in proportion with the ground speed of the vehicle.

The LT Control system consists of a control console, a ground speed sensor, and two valves. There are two types of ground speed sensors available for use with this system. One installs in line with the mechanical speedometer cable and the other interfaces with the electronic speed signal.

OPERATOR CONTROLS

SPREADER CONTROL SWITCH

The **SPREADER CONTROL SWITCH** is a three position switch.

- OFF position turns the spreader and spinner off.
- AUTO position provides automatic spreading control based on vehicle ground speed.
- MANUAL position provides for spreading of material without vehicle ground speed.

CONVEYOR DIAL

The conveyor dial is a twenty position detented switch used to adjust the output of granular material application. Rotate the conveyor dial to a higher setting to increase the material output or a lower setting to decrease the material output.

SPINNER DIAL

The spinner dial is a twenty position detented switch used to adjust the spread width or spinner speed. Rotate the spinner dial to a higher setting to increase the spread width or a lower setting to decrease the spread width of material. In the AUTO mode, the spinner will automatically stop when the vehicle stops. In the MANUAL mode, the spinner runs continuously.

BLAST SWITCH

The blast switch is a momentary switch that will run the conveyor at its maximum speed to apply a maximum output of material at intersections or bridges. Blast is active when the vehicle is stationary or moving.

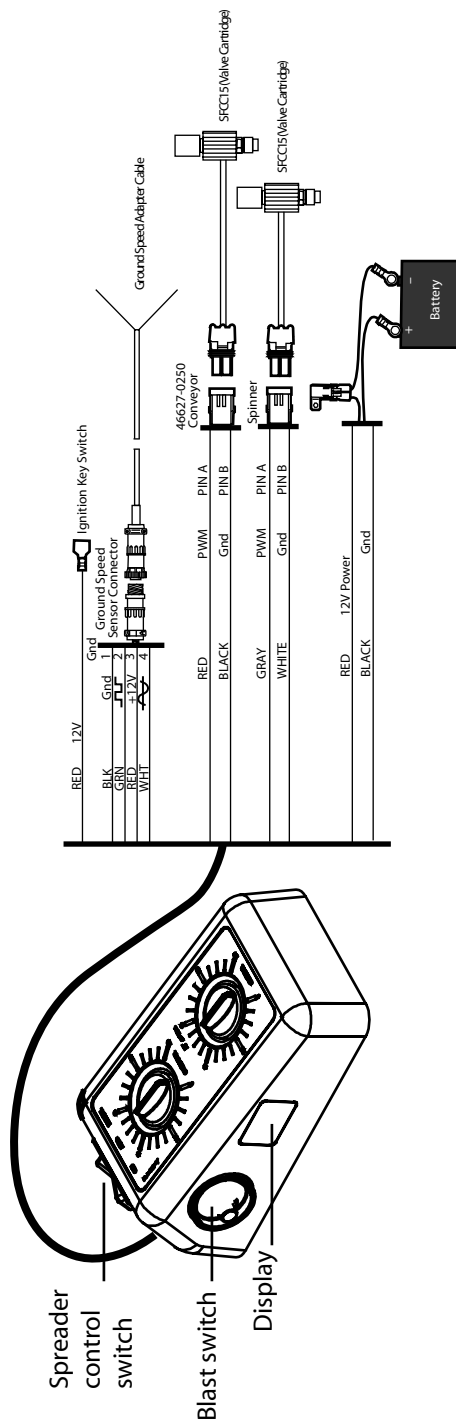
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INSTALLATION

Figure 2
System Diagram





Use the mounting bracket provided to mount the console in the cab of the truck in a location easily accessible by the driver. Connections are as follows:

HARNESSES

- The red, fused lead hooks directly to the truck battery (the red connects to the positive battery terminal).
- The black lead hooks to the battery's ground (black or negative terminal).

RED WIRE

- There is a separate red wire that connects to the truck's ignition (12Vdc when the key is in the ON position).

2-PIN CONNECTORS

There are two 2-pin female connectors. They attach to the Pulse Width Modulator (PWM) valve.

- Red/black lead connects to the conveyor side of the PWM.
- Gray/white lead connects to the spinner of the PWM.

4-PIN CPC

- The 4-pin CPC attaches to the Ground Speed input.



PROGRAMMING/CALIBRATION MODE

For further explanation of the calibration parameters being entered, refer to CALIBRATION DEFINITIONS.

Start the vehicle. This will ensure that calibrations will be stored properly during the initial setup of the system. Upon initial startup, one red decimal point should be lit in the display.

To enter the calibration mode, set the **SPREADER CONTROL SWITCH** to OFF and depress and hold the **BLAST SWITCH**. Two decimal points on the LED display, along with the code "C1" will flash to confirm entrance you are in calibration mode.

Once the console is in calibrate mode, set the PWM Valve frequency.

SETTING THE PWM VALVE FREQUENCY

NOTE: To save the settings, it is imperative to only cycle the SPREADER CONTROL SWITCH from OFF to AUTO to OFF again. Do not cycle the switch to the MANUAL position, as this will erase the settings you have selected, and the process must be restarted.

SLOWLY rotate both the **CONVEYOR** and **SPINNER** dials simultaneously. The direction or magnitude is irrelevant. The LED display will show decimal points flashing alternately to verify the PWM frequency is being set. The PWM frequency default is 250 Hz. The display only allows for two characters at a time. Thus, if setting the PWM frequency for 250 Hz, only the numbers "25" will be displayed. Pressing the **BLAST SWITCH** will increase the PWM frequency in increments of 10, up to a maximum of 250 Hz (displayed as 25). The next press of the **BLAST SWITCH** will cycle the PWM frequency to 50Hz (displayed as 5), the minimum on which the system can run. Once the desired PWM frequency is displayed, store this value by cycling the **SPREADER CONTROL SWITCH** from OFF to AUTO to OFF. The status in the LED display will show "C1" and both red decimal points will be flashing simultaneously. If a change to the PWM valve frequency is not required, cycle the **SPREADER CONTROL SWITCH** from OFF to AUTO to OFF to advance to setting the blast timer.

SETTING THE BLAST TIMER

Press and release the **BLAST SWITCH**. The blast time will be displayed on the LED display and both red decimal points will light up to verify the blast timer is being set. The blast timer can be set from 0 – 9 seconds. Increase the number of seconds displayed by pressing the **BLAST SWITCH**. Once the desired blast time is displayed, store this value by cycling the **SPREADER CONTROL SWITCH** from OFF to AUTO to OFF. The LED display will show "C1" and both red decimal points will be flashing simultaneously.

SETTING THE PWM OFFSET AND SATURATION VALUES.

In order to achieve maximum performance of the conveyor and spinner, the PWM offset and saturation values may be adjusted to control the range of PWM duty cycle for each of these channels.



CAUTION

Once the hydraulics are engaged, the conveyor and spinner become operational. Please take proper precautions to avoid personal injury.

It is important to note that the conveyor and spinner are active during the setting of the PWM offset and saturation values to allow the spinner and conveyor speeds to be observed. This makes it easier to determine the proper PWM offset and saturation values to enter for each of these parameters. If the PWM offset and saturation values are already known, they can be entered without activating the hydraulics of the truck.

To prepare for the calibration, SLOWLY turn the **CONVEYOR** and **SPINNER** rotary dials to "0". If the knobs are turned too quickly, too many volts may be present and valve settings may be incorrect. Engage the hydraulics.

NOTE: Starting the vehicle at this point in the calibration process may interrupt the 12Vdc power supplied to the LT Control. You may be required to re-enter the calibrate mode. To eliminate this potential problem, leave the vehicle on during the entire calibration process.

Set the **SPREADER CONTROL SWITCH** from OFF to MANUAL. The LED display window will show "C2" and one red decimal point will be flashing.

CONVEYOR DIAL CALIBRATION

The **CONVEYOR** dial should be in the "0" position. Rotate the **CONVEYOR** dial SLOWLY clockwise until the conveyor chain starts to creep. Turn the **CONVEYOR** dial counter-clockwise one click. The LED display will show a number, and the left decimal point will be lit (not blinking). This indicates the current PWM offset value that will be stored in memory for the conveyor. Cycle the **SPREADER CONTROL SWITCH** from MANUAL to AUTO to MANUAL to store the conveyor PWM offset value in the memory of the LT Control. The LED display will show "C2" and one red decimal point will be flashing.

SLOWLY rotate the **CONVEYOR** dial completely clockwise. The conveyor chain will be turning at its maximum RPM. The right decimal point on the LED display will be lit (not blinking) to indicate that the PWM saturation value is being set. A number will be displayed which represents the PWM saturation value currently stored in memory. SLOWLY turn the **CONVEYOR** dial counter-clockwise. The number on the LED display (PWM saturation value) will change. Continue to rotate the **CONVEYOR** dial counter-clockwise until the conveyor starts to slow down. The maximum PWM saturation value has been reached. Cycle the **SPREADER CONTROL SWITCH** from MANUAL to AUTO to MANUAL to store the conveyor PWM saturation value in the memory of the LT Control.



SPINNER DIAL CALIBRATION

The **SPINNER** dial should be in the "0" position. Rotate the **SPINNER** dial SLOWLY clockwise until the spinner starts to turn slowly or at the desired speed. To prevent the spinner from creeping when turned to 0, turn the **SPINNER** dial counter-clockwise one click. The left decimal point on the LED display will be lit (not blinking) and a number will be displayed which indicates the current PWM offset value that will be stored in memory for the spinner. Cycle the **SPREADER CONTROL SWITCH** from MANUAL to AUTO to MANUAL to store the spinner PWM offset value in the memory of the LT Control.

Rotate the **SPINNER** dial completely clockwise. The spinner will be turning at its maximum RPM. The right decimal point on the LED display will be lit (not blinking) to indicate the PWM saturation value is being set. A number will be displayed which represents the PWM saturation value currently stored in memory. SLOWLY turn the **SPINNER** dial counter-clockwise. The number on the LED display (PWM saturation value) will change and the spinner RPM will decrease. Continue to rotate the **SPINNER** dial counter-clockwise until the spinner is turning at a speed corresponding to the desired maximum spread width or the desired PWM saturation value has been reached. Cycle the **SPREADER CONTROL SWITCH** from MANUAL to AUTO to MANUAL to store the spinner PWM saturation value in the memory of the LT Control.

After the LT Control has been in operation for a period of time, it may be desirable to modify the PWM offset or saturation values for the spinner or conveyor. This is accomplished by entering the PWM OFFSET AND SATURATION CALIBRATION MODE and rotating the dial associated with the PWM value to change. Rotating the dial completely counter-clockwise (the left decimal point is lit, not blinking) allows the PWM offset value to be changed. Rotating the dial completely clockwise (the right decimal point is lit, not blinking) allows the PWM saturation value to be changed. Cycling the **SPREADER CONTROL SWITCH** from MANUAL to AUTO to MANUAL stores the new PWM value.

Once again (the second time), cycle the **SPREADER CONTROL SWITCH** from MANUAL to AUTO to MANUAL. This stores the desired values and prepare the LT Control for the next step. The LED display shows "C2" and there is one red decimal displayed (not blinking).

SETTING THE GROUND SPEED SET POINT

If the LT Control is connected to a ground speed sensor, the vehicle will have to be driven with the conveyor turning in order to set a relationship between ground speed and conveyor dial position. This relationship determines how fast the conveyor will turn (amount of material spread) at each conveyor dial setting for truck speeds between 1 to 60 m.p.h.

Establishing the ground speed set point is accomplished in the CALIBRATE MODE with the **SPREADER CONTROL SWITCH** in the MANUAL position. The desired conveyor PWM offset and saturation values must be entered in the LT Control's memory before setting the ground speed set point.



Position the **CONVEYOR** dial to the mid-scale point. Drive the vehicle at a speed that results in an average or typical density of material being applied. Once the desired density of material has been reached, cycle the **SPREADER CONTROL SWITCH** from MANUAL to AUTO to store the ground speed set point in the memory of the LT Control. The LED display shows "C3" and there is one red decimal displayed (not blinking).

The conveyor dial is now calibrated with the ground speed of the vehicle. The unit may be operated in the AUTO mode for spreading material. This provides a range of material density that can be applied on the road associated with increasing and decreasing the conveyor dial setting. In addition, as the vehicle speeds up and slows down, the LT Control will automatically speed up and slow down the conveyor to maintain a consistent density of material application.

NOTE: After the ground speed set point is stored, it is advised that the ignition key be turned off to prevent any accidental changes to the conveyor or PWM offset or saturation parameters. If the PWM offset or saturation values associated with the conveyor are altered after performing the ground speed set point calibration, the stored ground speed set point is cleared, requiring the ground speed set point calibration to be performed again. Error code "E0" will be displayed.

The calibration of the LT Control is now complete. All of the calibration values and settings that have been entered are stored in nonvolatile memory. These values will not be lost or cleared if the LT Control is disconnected from the vehicle battery.

To exit the calibration mode, power down the LT Control by turning the ignition key off.



OPERATION

AUTO MODE

In the AUTO mode, the control system will vary the speed of the conveyor automatically in proportion with ground speed to maintain a uniform output of material. The output of material being spread is changed by rotating the conveyor dial to a higher or lower setting. The conveyor and spinner will automatically stop when the vehicle stops.

MANUAL MODE

In the MANUAL mode, the conveyor and spinner are active whether the truck is moving or stationary. The control system will not vary the speed of the conveyor in proportion with the ground speed of the vehicle. The output of material being spread is changed by rotating the conveyor dial to a higher or lower setting. Spreading is stopped by setting the **SPREADER CONTROL SWITCH** to OFF or rotating the conveyor dial to "0".

BLAST MODE

The blast is active in the OFF, AUTO or MANUAL mode. If the **BLAST** switch has been programmed for time, pressing and releasing the **BLAST** switch will force the spreader to run at its maximum speed for the programmed blast time and shut down. The blast timer can be interrupted at any time by pressing the **BLAST** switch again. Blast is always active regardless of whether the vehicle is moving or stopped.

UNLOADING THE SPREADER

The MANUAL mode of operation is used to unload the spreader.

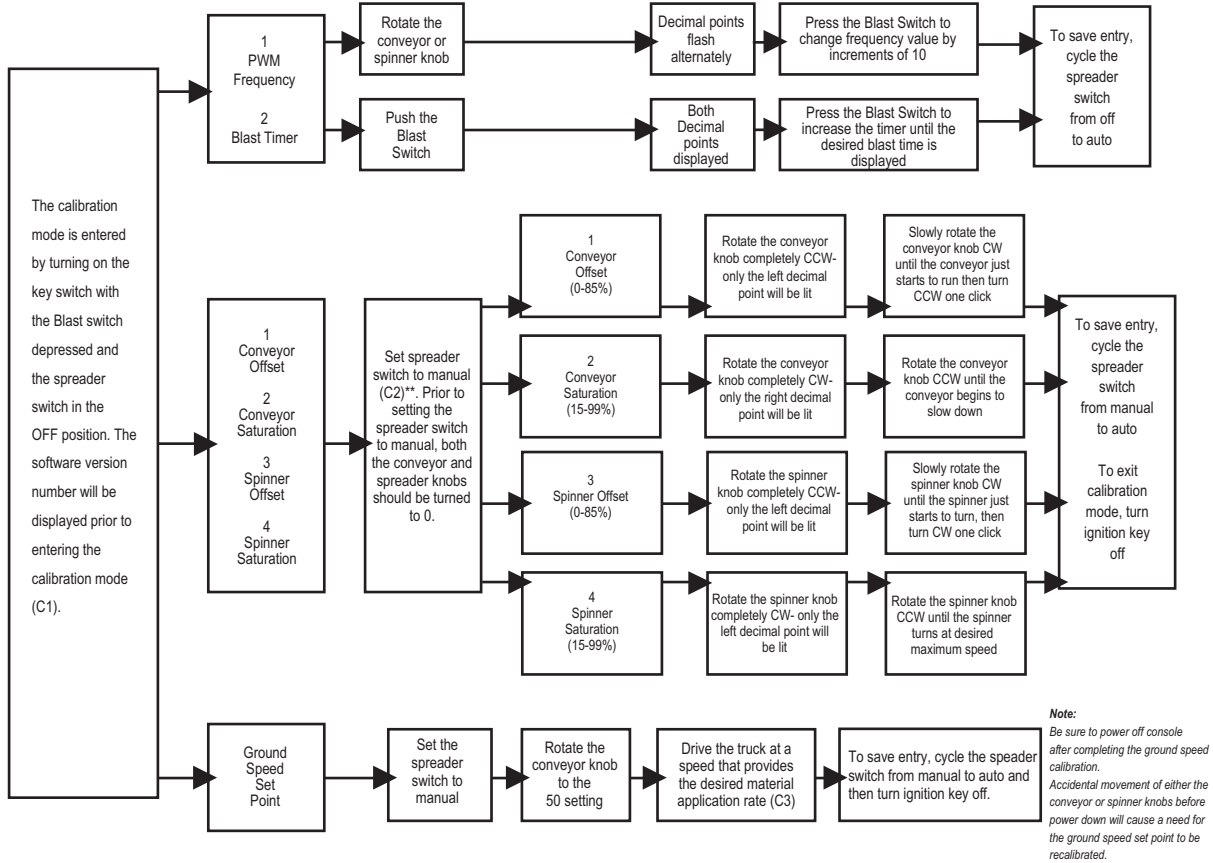
OPERATOR'S MANUAL





CALIBRATION

Calibration procedure flow chart



Note:

*Conveyor or Spinner offset and saturation values can be modified with or without engaging the hydraulics. The PWM value can be seen on the display.

**Any change to the conveyor PWM offset or saturation requires the ground speed set point to be recalibrated. An EO error will be displayed in the operate mode until the ground speed set point is calibrated.

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CALIBRATION DEFINITIONS

Following are definitions of the calibration settings discussed throughout this manual.

Pulse Width Modulation (PWM) Valve Frequency is the valve manufacturers suggested PWM operating frequency of the electric coil used on the hydraulic valve. This value can be found in the particular valve manufacturers specifications. The suggested PWM frequency for a Vickers Valve is 100 Hz, while 250 Hz is suggested for the SFCC15 valve. The range that can be entered into the LT Control is 50Hz to 250 Hz and is preset at the factory at 250Hz.

Blast Timer is the time in seconds that the LT Control will operate in blast when the **BLAST** switch is pressed and released. The range that can be entered into the LT Control is 0 – 9 seconds and is preset at the factory at 5 seconds.

PWM Offset and Saturation is the minimum and maximum PWM signal required to open a hydraulic valve to a desired position. The minimum PWM signal positions the valve to allow the minimum hydraulic oil flow required to start turning a hydraulic motor. The maximum PWM signal positions the valve to allow a hydraulic oil flow to a hydraulic motor to obtain a desired maximum motor RPM. The PWM range that can be entered into the LT Control for the spinner and conveyor is 0% - 85% for the offset and 15% - 99% for the saturation. The factory preset for the conveyor PWM min is 26% and max 80%, spinner PWM min is 26% and max 50%.

Ground Speed Set Point is a reference ground speed constant that is used with the actual ground speed signal input from the trucks ground speed speedometer sensor and the **CONVEYOR** dial position to obtain a desired conveyor speed by controlling the conveyor PWM signal. In the AUTO mode, the LT Control compares the ground speed input with the **CONVEYOR** dial setting to determine the appropriate PWM signal to send to the hydraulic valve based on the speed input during the calibration procedure. As the vehicle speeds up and slows down, the LT Control will automatically speed up and slow down the conveyor to maintain a consistent conveyor speed and material discharge.

OPERATOR'S MANUAL





ERROR CODES

E0 - AUTO MODE GROUND SPEED CONSTANT NOT SET

There is no output in auto mode. Follow procedures for SETTING THE GROUND SPEED SET POINT.

E1 - POWER UP NOT IN OFF

The LT Control will not power up until the **SPREADER CONTROL SWITCH** is set to the OFF position.

OPERATOR'S MANUAL

