

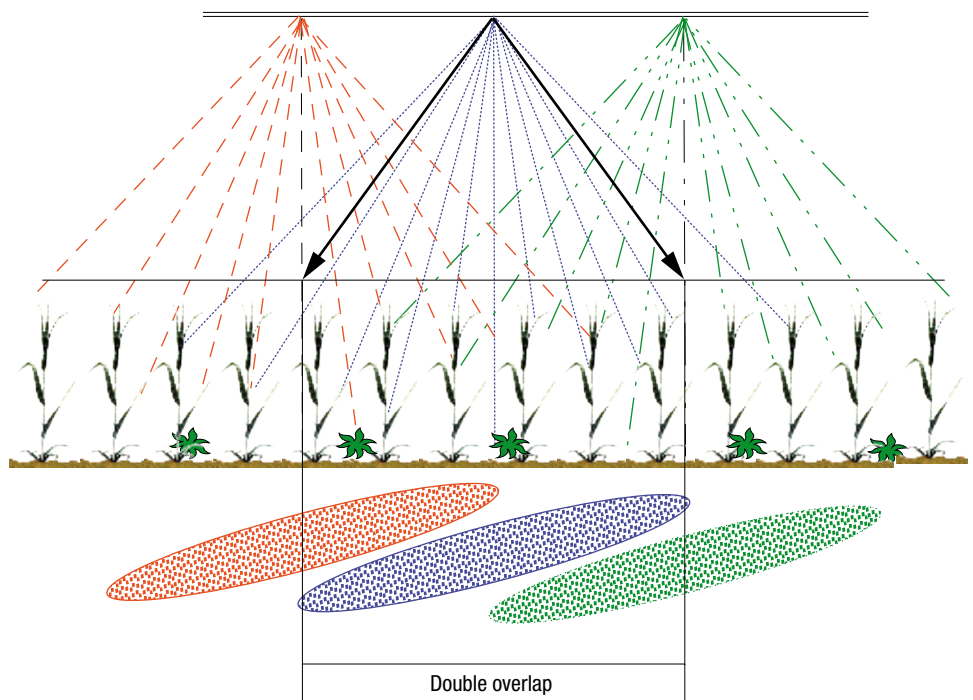
SPRAY HEIGHT CONTROL FACT SHEET

NORTHERN, SOUTHERN AND WESTERN REGIONS AUTO BOOM HEIGHT CONTROLLERS

KEY POINTS

- Auto boom height can help to maintain correct nozzle height above the target, which improves the evenness of the spray deposit and reduces spray drift through excessive boom height.
- Operators should have realistic expectations of how an auto boom height system will perform.
- Higher travel speeds and greatly undulating terrain may reduce the ability of a height control system to perform as intended.
- Electronic auto boom height controllers require regular calibration and may not be suited to all boom designs.

FIGURE 1 Nozzle Height Above Target or False target.



SOURCE: GRAHAM BETTS

Types of auto height boom systems

Mechanical: This may be as simple as a wheel (ideally with suspension) mounted onto the boom to prevent the boom from striking the ground.

Hydraulic (using load sensors): These systems also utilise a wheel with suspension mounted to the boom, however, the wheel is used in conjunction with a hydraulic load sensor and lift ram that can adjust the boom height.

Introduction

Auto boom height is used to maintain the spray nozzle at the correct height above the target area.

When properly adjusted, auto boom height control systems can allow the operator to focus on monitoring other machine functions, which improves spray accuracy and reduces operator fatigue. When correctly functioning, auto boom height control systems can also assist in preventing damage to the boom, nozzles and spray components by preventing ground strikes.

Importance of maintaining optimum height

When using a boom sprayer the spray pattern from each nozzle should fan out so that the edge of the spray pattern meets the target area directly underneath the adjacent nozzle. The target area may be the weeds themselves when no stubble or crop is present or, the top of the stubble or crop canopy.

If the nozzle height is too low the overlap will not be achieved, which can result in uneven deposits of spray across the boom. Excessive height increases the risk of spray drift.



An auto boom height sensor mounted on a boom arm.

What types of auto height boom systems are available?

1 Electronic sensors mounted on the boom.

Electronic boom-mounted sensors generally generate ultrasonic pulses which are reflected back to the sensor by the ground or canopy in order to determine the distance between them and the boom. The more uniform the surface is, the more accurate the determination of height will be.

The height of the boom is adjusted hydraulically, based on the output of the sensors. The number of sensors required may vary depending on the width of the boom and the nature of the terrain where the sprayer is likely to be operated.

Most booms are set up with at least three sensors (centre, left and right wing) and often five sensors (additional sensors placed on the break-away sections).

2 Wheel-based systems mounted on the boom

Wheel-based systems may be mechanical (wheel only) or hydraulic (wheel and hydraulic load sensor).

Typically, the boom-mounted wheel is positioned so that it is just in contact with the ground, which determines the required hydraulic pressure in the lift ram for the normal operating position. If the wheel lifts off the ground during operation, the load sensor detects the change in hydraulic pressure and lowers the height of the boom until the pressure returns to normal (when the wheel contacts the ground again). These systems may be manually or electronically controlled, with some systems allowing the sensitivity of the sensor to be adjusted.

Set up considerations

1 Position of the sensors

- Most electronic systems will respond better when the sensor is aimed at bare ground rather than a canopy, so it is useful if mounting points are adjustable.
- Electronic sensors should be positioned to avoid the nozzle spray pattern as this can interact with the sensor and give false height readings.
- Electronic sensors are best suited to rigid booms, however, they can be fitted to self-levelling booms fitted with bias control (however, this may place limits on the weight of the boom).

2 Position of wheels

- Wheel-based systems must have the wheel located between the crop or stubble row.

Calibration requirements

Electronic systems

- Before starting a calibration and making adjustments, record all the auto boom function settings including date and comments. Only ever change one setting at a time and record those changes.

- Make sure the boom is full of liquid before starting a calibration. If airbags are fitted ensure they are adjusted so that the boom is level.
- Complete a number of laps of the paddock using the auto boom height system and conduct an auto boom calibration after the oil is at operating temperature. Do the same after changing the hydraulic oil.

- Check that the settings are in metric (make sure that settings are exact conversions from imperial to metric if working in imperial).
- Physically test the response by placing your hand under the sensor before operating in the paddock.
- Make sure the height figures shown on the information screen are changing when raising and lowering the boom.
- Always turn the auto boom height system off when the boom is to be folded or in the cradle during travel.

Limitations of electronic systems

- Higher travel speeds may reduce the reaction of the system due to the increased distance between signals and the reaction time required for the hydraulic rams to adjust the height.
- Highly variable terrain may take the sensors out of operating range, requiring the operator to put the system into manual and make height adjustments manually.
- Variable canopies may make it difficult for the sensor to receive a consistent signal so the system may continually try to adjust the height.
- Hydraulic system capacity (volume, flow) may limit the ability of the auto boom height system to physically react to the signals it is receiving.
- Construction type of the boom centre may influence performance. Some booms work against the boom height control system (for example, self-levelling without bias control).

Limitations of wheel-based systems

- Wheel-based systems are better suited to wider rows. In dense crops, or between variable row spacings, the wheel may get caught and put added strain on the boom, so it is better suited to boom designs that can prevent the boom folding back when this occurs.
- Sensitivity of the load sensor may change with hydraulic oil temperature. With some systems it may be difficult to make fine adjustments to the sensitivity.



PHOTO: GRAHAM BETTS

Physically test the response by placing your hand under the sensor (with the spray off) before operating in the paddock.

FREQUENTLY ASKED QUESTIONS

Some auto boom height control systems seem to have a mind of their own, raising and lowering the boom when least expected. Why does this happen?

Often a combination of factors will affect the electronic systems, such as choice of the target (ground or crop), the position of the sensor (such as over stubble or variable canopy), incorrect or incomplete calibration, incorrect sensitivity adjustment, bent booms resulting in changes in actual sensor height, high travel speeds, or interference from the nozzle spray pattern.

How often do I need to calibrate electronic sensors?

Adjustments may need to be made for each field. Be prepared to adjust the sensitivity for different paddocks and, if required, return to manual control in uneven or undulating country.

Can auto boom height be fitted to any boom?

Ideally, electronic systems are fitted to

rigid booms, or self-levelling booms fitted with bias control appropriate for the weight of the boom. Wheel-based systems may need the boom to be fitted with cables or chains to prevent the boom folding back.

My height control is erratic and continually tries to adjust itself, can I stop this?

There are a number of reasons why the height control may be trying to correct itself continually, these include:

- the height control system is fitted to a self-levelling boom without adequate bias control, and will not be stable;
- the original settings for height above the target or ground may be incorrect or may require adjustment;
- the most appropriate setting (crop or ground) to match the situation has not been selected;
- the position of the sensor in relation to the crop/stubble may need to be adjusted to match the crop or ground setting selected;

- the sensitivity selected may be too responsive for the situation; or
- the system was not correctly calibrated before use or the hydraulic system was not at operating temperatures when the calibration was attempted.

How fast can I travel using auto height control?

Travel speed will largely depend on the boom type, height control system selected and the nature of the terrain. In flat country some systems work well into the mid 20-kilometre range. However in undulating country, or areas with contours and banks, this will be greatly reduced. Always consult the technical information supplied by the manufacturer to confirm suitable operating speeds

How often should my auto height control be calibrated?

Auto height control should be calibrated every time you spray, but only after the hydraulic system has had time to reach operating temperatures.

MORE INFORMATION

Bill Gordon, Bill Gordon Consulting

bill.gordon@bigpond.com
0429 976 565

Graham Betts, ASK GB

askgb@bigpond.com
0427 62214

Or contact your local spraying equipment agent to discuss the height control systems available on their equipment.

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