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An Automatic Boom Control For Potato Harvesters

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An automatic system has been developed to control the height of the outer section of a potato harvester boom. The system permits manual or automatic height positioning of the boom at the tractor operator's selection. Use of an automatic boom control can reduce potato bruising because it maintains proper boom height continuously. Additionally, an automatic control can appreciably reduce the need for the tractor operator to monitor and reposition the boom.

The control system is composed of two sensors located on the end of the boom, two relays and a solenoid-operated hydraulic valve located on the harvester, and a control box located in the tractor cab. The system uses 12-volt DC power from the tractor.

This publication describes the major features of the control system and provides information for obtaining additional details for "do-it-yourself" installation.

The Sensors

Two identical sensors, each in a weather-tight enclosure, are mounted approximately 15 inches beyond the outer end of the boom as shown in Fig. 1. Each sensor transmits an infrared signal. If the boom is too high above the potato pile in the bulk truck, the infrared signal will cause one sensor to actuate an internal switch. The switch operates a solenoid-type hydraulic valve to lower the boom. Similarly, if the boom is too close to the potatoes in the bulk truck, the signal will actuate a switch to raise the boom. When the boom moves to the pre-determined desired height above the potato pile, the sensor switches are disengaged to stop boom travel.

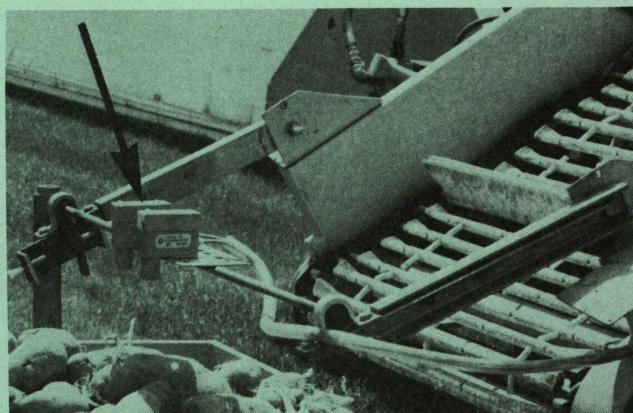


Fig. 1. Note the two sensors located at the end of the potato harvester boom which help regulate the height position of the boom.

Solenoid Hydraulic Valves

For automatic operation, the harvester must be equipped with at least one 3-position, 4-way hydraulic valve which can be operated by electric solenoids. This controls the positioning of the outer harvester boom. Valves of this type can be installed on most existing harvesters. Tractor hydraulic power is used to supply fluid to the solenoid valve. A second optional solenoid valve provides electrical control of the inner boom cylinder.

Operator's Control Box

A small electrical control box mounted in the tractor cab provides manual or automatic height control of the outer boom. An electric cable connects the operator's control box to the harvester. An optional electrical circuit provides manual control of the inner boom cylinder through a switch in the operator's control box.

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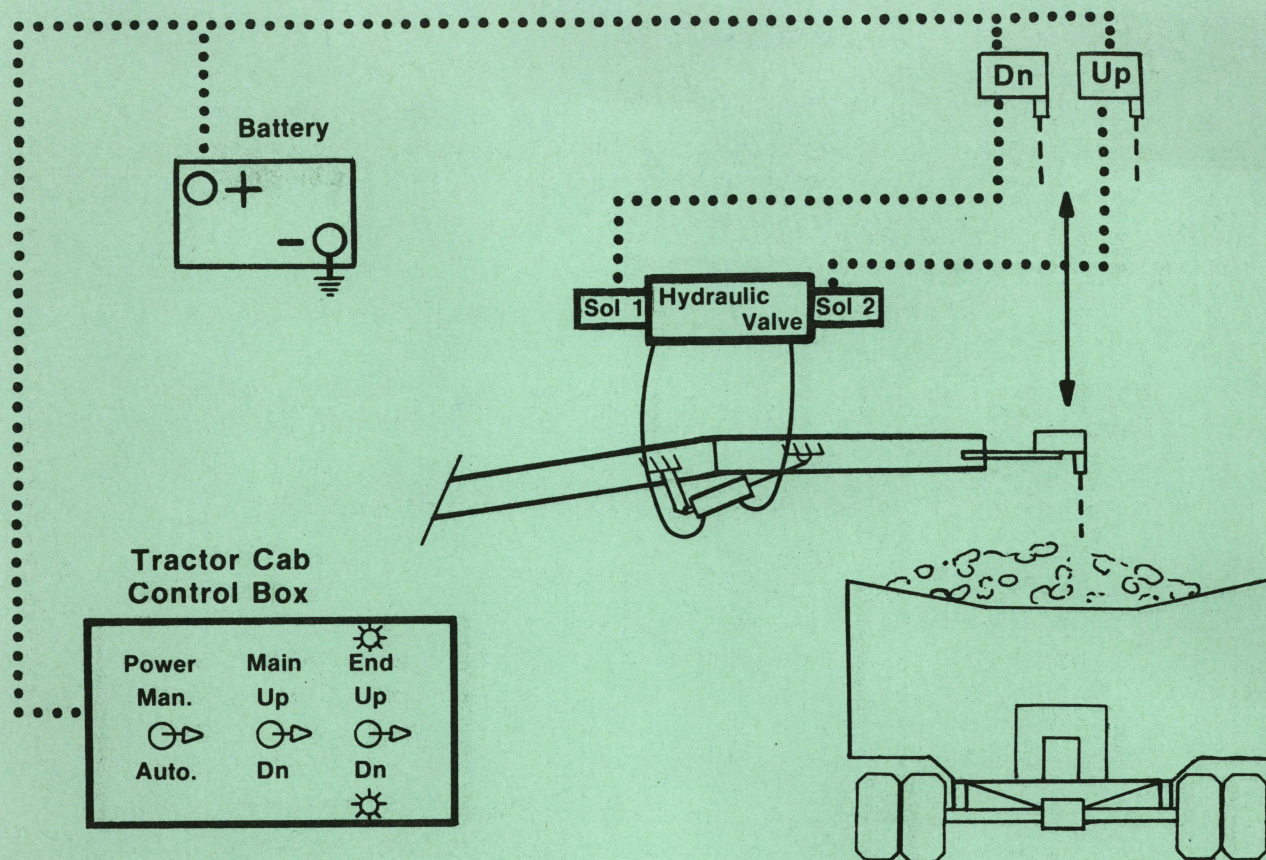


Fig. 2. Conceptual diagram of components for automatic boom control.

Sensor Positioner

Both sensors must be controlled to maintain a vertical orientation for any position of the boom. This is accomplished by a simple parallel arm control cable mounted on the side of the boom. This device can be fabricated in most farm shops by following recommendations in the plans.

Cost

Each sensor costs approximately \$120 (April 1980 prices). Additional parts and supplies would bring the total equipment cost to approximately \$300, exclusive of hydraulic parts.

Obtaining Detailed Plans

Detailed plans are available from the University of Idaho Potato Extension Specialists:

Arthur Walz, Route 2, Box 40A, Parma 83660; Gary Kleinschmidt, 634 Addison Ave. W., Twin Falls 83301; and C. E. Dallimore, P.O. Box 188, Idaho Falls 83401.

Plans can also be obtained from the author at the University of Idaho Research and Extension Center, Aberdeen 83210. Plans contain complete information on source of components, devices to fabricate, installation and adjustment procedures. The author will provide assistance as needed for special applications.

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