AMVAC CHEMICAL CORPORATION

SmartBox® System

Parts and Operator's Manual
CONGRATULATIONS! By purchasing the SmartBox® system, you have obtained the world’s first variable-rate, speed-compensated, and totally enclosed system for the application of low-rate granular insecticides. The SmartBox® system was created to allow granular insecticides to be applied accurately, efficiently, and safely to your crops.

The information presented in this Parts & Operator’s Manual will introduce you to the components of the SmartBox® system, provide step-by-step instructions on how to install the system on your planter, and lead you through the programming and operating steps required to obtain the most accurate application and record keeping possible. Please read all of the information in Section A before proceeding to Sections B, C, & D. Section A will tell you the tools needed for installation and operation, as well as give you helpful hints to make installing the system as effortless as possible.

From all of the employees at AMVAC Chemical Corporation who have worked to offer you the SmartBox® system, we are confident that you will enjoy the many benefits of our product. Should you have any questions or comments, please feel free to contact your local AMVAC sales representative or call our Customer Service Center at 1-888-SMARTBOX (1-888-762-7826). Or, you may write to us at the following address:

AMVAC Chemical Corporation
Attn: SmartBox® Customer Services
2110 Davie Avenue
Commerce, CA 90040
www.amvac-chemical.com or www.smartboxsystem.com

SmartBox® is a registered trademark of AMVAC Chemical Corp.
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NOTICE — SAFETY PRECAUTIONS

Persons using a SmartBox® system to apply granular insecticides are responsible for obtaining, reading, and following all safety recommendations as stated on the manufacturer’s product label. Read and follow all use directions and precautions specified on the product label(s), including, but not limited to, the following sections:

- Emergency Response Telephone Numbers
- Personal Protective Equipment (PPE)
- User Safety Requirements
- User Safety Recommendations
- Environmental Hazards
- Directions for Use
- Agricultural Use Requirements
- Storage and Disposal

In addition, all SmartBox® system maintenance must be performed in compliance with product safety precautions as stated on the product label. If you have questions regarding any of the use directions and precautions specified on the product label, or require additional information, contact your local AMVAC sales representative or call 1-888-462-6822. You may also visit the AMVAC Chemical Corporation website at www.amvac-chemical.com for access to product labels and other information.

NOTICE — WARRANTY

All parts and assemblies supplied with the SmartBox® application system are intended for use only with this system and only with the insecticide products licensed for application using this system. Any usage of the SmartBox® system which is inconsistent with the intended usage will result in the following actions:

- The entire warranty for the SmartBox® system will be voided immediately.
- User will be in violation of U.S. Patent laws and will be prosecuted to the fullest extent of the law.
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System Overview

System Description:

The AMVAC SmartBox® system is a closed transfer application system which uses electronically controlled metering technology to accurately apply low-rate granular insecticides. The system features a controller which can store and record the necessary information required by the Environmental Protection Agency (EPA) for record keeping.

The controller can easily download the stored information to a personal computer at the user’s convenience. This transfer of information is performed by connecting the controller to the personal computer. Windows-based record-keeping software is also included with the system.

An added feature of the SmartBox® system is the ability to program controller functions by entering information into the personal computer. That information can then be transferred from the personal computer to the controller.

An additional option is GPS capability. The SmartBox system can connect to an external GPS controller for mapping and/or variable rate application.

The SmartBox® system provides the operator with on-the-go flexibility to monitor and change various operating parameters or set the system and allow it to run automatically. The controller, which mounts inside the tractor cab, enables the user to quickly change the chemical application rate or shut off flow to one, all, or any combination of planter rows.

Input from a lift switch mounted on the planter will shut the system off when the planter is raised. Audio and visual alarms on the controller alert the user of a possible plugged row tube, non-flowing meter, or empty chemical box by row.

The accuracy of the SmartBox® system is optimized if true ground speed is measured using radar or another true wheel speed measurement device. With accurate speed input and proper calibration, the meters will automatically compensate for variations in planter speed to keep the chemical application rate steady. If true ground speed is not available, a fixed planting speed can be entered but application accuracy will depend on how closely actual ground speed matches fixed speed entered in controller.
What’s Included:

The AMVAC SmartBox® system consists of the components listed below. All components will be received in the quantities required for your planter according to the manufacturer, row count, and fold type of the planter.

Controller: The controller is the central control of the SmartBox® system. It is installed in the tractor cab and connects to the 12-volt electrical system of the tractor. All mounting hardware is included.

SmartBox® System Manager: The software is Windows-based. Information such as Grower ID and Applicator License Number can be added for record-keeping.

Meter: The meter is attached to the base container and includes both the metering device and a flow sensor. Once the meters are configured, the controller is able to identify the exact meter and row number if a problem occurs. A 24” discharge tube (a 30” braided nylon tube may be purchased if needed), and tube clamp are included with each meter.

Wiring Cables: These cables include the hitch cable, hitch extension cable (if required), 8-row and / or 4-row wiring harnesses, and meter extension cables (if required) used to make the electrical connection between the controller and the meters. Also included as needed are the battery extension cable and lift switch extension cable.
**Lift Switch:** The mechanical lift switch with cable is used to signal the controller that the planter is either in the raised or lowered position. This input tells the controller when to start and stop the meters to avoid discharge of chemical on row turns. The lift switch is connected to the system through the 4-row or 8-row wire harness.

**Base Container:** The base container will hold a range of 8 to 15 pounds of chemical. Each base container comes with a rain cover for use when a transfer container is not installed.

**Universal Mounting Cradle:** The universal mounting cradle is designed to fit onto most of the major planter row configurations to hold the base container and meter securely on the row frame. Mounting hardware (with clips and brackets for various planter manufacturers and series) is included.

**Transfer Container:** The transfer containers are available only through a Chemical Dealer. The boxes will be delivered with product loaded and ready for use. With a transfer container locked in place on the base container and with valves opened, product will flow to fill the base container for discharge through the meter and discharge tube. A loaded transfer container can be dispersed into many base containers, so a new transfer container may not be needed every time a base container empties. This feature is handy when finishing a field or at the end of the planting season.

The controller, lift switch, battery cable, hitch cable, and software are part of the Controller System. The transfer container, base container, cradle, and meter with discharge tubing make up the SmartBox® Row Unit. These will be discussed in greater detail later in the manual.
What’s Not Included:

The following items are not included with the AMVAC SmartBox® system. If any of these items are required for installation and operation of the SmartBox® system on your planter, please contact your chosen Equipment Dealer or the appropriate source shown below to purchase the item(s) separately. These items will not be part of the SmartBox® system shipped to you from AMVAC.

Radar or true wheel speed sensor: Input to the controller from radar or a true wheel sensor is required to get the most accurate chemical application rate. The system is operable in a fixed speed mode, but automatic speed compensation will not be available in this mode.

The SmartBox® controller has a 4-pin radar connector compatible with the connector of many leading radar brands. Other radar and true-wheel sensors (some true wheel speed sensors are not compatible) may be used; if your sensor has a different connector arrangement, an adapter will be required and must be purchased separately. Radar signals routed through tractor wiring must match the pin assignments of the controller; some systems have been found to feed voltage to the controller through a signal pin resulting in a “buzzing” of the controller when the controller is shut off. While this arrangement does not damage the controller, the radar signal may not be read correctly. There is a cable available to filter the voltage feed. Contact your local AMVAC representative for further information.

Radar or true wheel speed sensor Y-cable or signal booster: When using radar to more than one monitor (planter monitor and SmartBox®), a Y-cable will be required. If the sensor’s signal will be split for several monitors, then a signal booster may be required. For help with the requirements of your setup, including compatibility of specific true wheel sensors and radar wiring arrangements, we can suggest these sources:

AG-EXPRESS Electronics Des Moines, IA 515-289-2746
Sulphur Springs, IN 765-533-4809
Grand Island, NE 308-381-2905
White planter series 6000 & 8000 seal lid kits or seed hopper extension rings: When installing the SmartBox® system on a White series 6000 planter, seal lid kits or seed hopper extension rings may be required. These planters use seed boxes with lids designed to slide backward over the insecticide hopper for filling. The SmartBox® transfer containers will extend approximately two inches above the seed box lids, preventing the lids from sliding backward. If liquid fertilizer tanks are installed in front of the seed boxes, the tanks may prevent the seed box lids from sliding forward. In this situation, either the seed box lids may be replaced with hinged lids (White’s seal lid kit), or the seed boxes must be lifted with spacer rings. Contact your local White Equipment Dealer or your AMVAC sales representative for recommendations.

In-furrow kits and discharge tubes: Recommendations on product application (in-furrow vs. T-band) must come from your Chemical Dealer or AMVAC. Discharge tubes currently are supplied in 30” lengths and should be cut to fit the specific planter. L-brackets should be used on John Deere, Kinze, White, and Buffalo planters to position the discharge tube. Attention should be given to planters using seed firmers to verify the discharge tubes are not hitting the firmers while the planter is in the down position. In-furrow kits and different diameter or length tubing must be obtained from a source other than AMVAC.

Case IH row unit brackets: When installing the SmartBox® system on a Case IH planter which has not previously used insecticide boxes, any additional row unit frames or brackets may be purchased through an Equipment Dealer. Rear mount brackets for the Case 1200 Series planters may be purchased through Redball, LLC. Contact Redball, LLC at 1-877-332-2551 for pricing and bracket options.

John Deere 1770NT, 1790, and DB model planters: Brackets have been developed to mount the SmartBox® on these model planters. Contact Redball, LLC at 1-877-332-2551 for pricing and bracket options.

In addition, as new planter designs and folds are introduced to the market, some modifications may be required. If you have any questions concerning compatibility of the SmartBox® system with your particular planter configuration, you may contact your AMVAC Sales Representative (1-888-SMARTBOX) for answers to your questions.
How To Get Started

Tools Required:
The following tools will be required to install your SmartBox® system:

cordless drill          drill bits
7/16” wrenches           3/8” socket bit
7/16” sockets            nut driver
pliers                  3/8” wrench

Additional tools may be required for lift switch and controller mounting.

Time Required:
The amount of time required to install your system will depend on your planter
design, fold type, and number of rows. Also, the amount of information you enter
into the controller will have an affect on installation time. The following chart
presents estimated time requirements.

<table>
<thead>
<tr>
<th>number of planter rows</th>
<th>hours required</th>
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<tbody>
<tr>
<td>4</td>
<td>4-6</td>
</tr>
<tr>
<td>8</td>
<td>6-8</td>
</tr>
<tr>
<td>12</td>
<td>8 - 10</td>
</tr>
<tr>
<td>16</td>
<td>10 - 12</td>
</tr>
<tr>
<td>24</td>
<td>12 - 14</td>
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Installation

This section will include instructions on installation of the SmartBox® controller system, row units, and wiring cables. Suggested cable routings and lift switch mounting locations will be shown at the end of this section (Appendix A). The order in which you install your system components may vary from the order shown in this manual. These instructions are grouped by system. One recommended installation sequence is as follows:

1. Remove existing insecticide boxes and chains. (If necessary)
2. Install cradles.
3. Install meters onto base containers.
4. Install base containers in cradles.
5. Loosely route all wiring and harnesses. Do not use cable ties at this point.
6. Adjust wiring and use ties to secure.
7. Install controller in tractor.
8. Install battery cable.
9. Install lift switch.

Due to the vast number of existing planter configurations and continuous introduction of new ones, your planter may differ slightly from the figures shown here. If you have questions concerning fit of the SmartBox® system on your planter, please contact your AMVAC sales representative or call 1-888-SMARTBOX.
Controller System:

The front and back of the SmartBox® controller are shown in Figures 1 and 2 below. The controller should be installed inside the tractor cab (or mounted on the tractor if there is no cab) in a position where the user can easily see the screen during operation and where there is no possibility of the controller being damaged. When a 2-way FM radio is installed in the tractor cab, care should be taken to position the controller to avoid potential interference. Also, sufficient room must be provided behind the controller to connect the necessary cables (see Figure 2).
Controller System (continued)

WARNING!

- Only connect the SmartBox® Controller to the 12-volt battery of the tractor
- Secure machinery from sudden or unwanted movement when working on or near it. Remove key from the tractor ignition to prevent unwanted starting.

Suggestion: Before mounting the controller, estimate the length of cable required to run between the controller and the connecting wiring harness. Each SmartBox® system includes one 12’ hitch cable plus enough 12’ or 20’ extension cables for the planter indicated on the order. Locate the controller in a position which will not require additional extension cables.

1. Secure the controller mounting bracket to the tractor using the three screws provided.

2. Use the two controller knobs to secure the controller to the mounting bracket.

3. Connect the controller’s power socket to the 12’ battery cable provided. An additional 12’ battery cable extension is available if needed.

Connect the battery cable terminals directly to the 12-volt battery with red wire to positive and black wire to negative.

If the tractor is powered by two 6-volt batteries instead of one 12-volt battery, then the terminals must be connected at a location where a 12-volt supply is available. The controller will not operate if sufficient power is not supplied.
Controller System (continued)

Do not use a fuse greater than 30 amps in the supply; use of a larger amperage fuse may result in controller damage.

Do not remove the fuse when attaching power port adapter. Be sure to check polarity with positive to fuse.

Once the cables are routed and a speed sensor (if used) has been installed, connect the hitch cable and speed sensor cable to the controller. If the speed sensor’s connector is not compatible with the controller’s 4-pin radar connector, then an adapter must be obtained by the user.

The 9-pin parallel port extending from the controller will not be used during planting. This port is provided for transfer of data from the controller to a personal computer.
Row Units:

The SmartBox® row unit is made up of the cradle, base container with rain cover, meter with discharge tube, and transfer container. The transfer container is shipped from the insecticide supplier and is not part of the system shipped. Installation of each of these items is shown below.

Cradle installation will differ according to the make and model of the planter. Existing insecticide hoppers and drive chains should be removed prior to installation of the SmartBox® cradles.

Instructions for cradle installation on each of the major planter groups are shown beside Figures 3 through 8. General precautions for all planter types are as follows:

1. Use hardened steel for mounting pins.
2. Do not over-tighten. Doing so will cause the cradle sides to bend inward.
3. Check for clearance between hoppers on vertical fold planters. Insecticide transfer containers may need to be removed for transport on vertical fold planters.
SmartBox® System - System Installation
Section A

Installation: Cradle - John Deere Planter Series 7000 and 7100

1. Remove existing insecticide hoppers and drive mechanisms.
2. Orient SmartBox® cradle as shown in Figure 3.
3. Position cradle so that legs of cradle slide back into rear cross brace of row unit frame.
4. Position cradle so that vertical posts on row unit frame come through slots in cradle.
5. Place existing cotter pins through hole in frame posts to lock cradle in place.
6. If cotter pins do not hold cradle securely in place, use SmartBox® cradle clips as a spacer between the frame and pins; or secure the cradle to the frame using the SmartBox® cradle clips and fasteners as shown in Figure 3a.

Installation: Cradle - John Deere Planter Series 1700, 7200 and 7300

1. Remove existing insecticide hoppers and drive mechanisms.
2. Orient SmartBox® cradle as shown in Figure 4.
3. Place the 5/16” x 1-1/2” bolt with washer through the rear hole in the cradle in line with the rear hole in the row unit frame (as shown), lightly secure with washer and lock nut.
4. Place the 5/16” x 1-1/2” bolt with washer through the cross frame (as shown) and lightly secure with washer and lock nut.
5. Center cradle in relation to planter frame and tighten all bolts securely.
Installation: Cradle - Kinze and Buffalo Planters

1. Remove existing insecticide hoppers and drive mechanisms.
2. Orient SmartBox® cradle as shown in Figure 5.
3. Position cradle so that legs of cradle slide back into rear cross brace of row unit frame.
4. Position cradle so that vertical posts on row unit frame come through slots in cradle.
5. Place existing cotter pins through hole in frame posts to lock cradle in place.
6. If cotter pins do not hold cradle securely in place, use SmartBox® cradle clips as a spacer between the frame and pins; or secure the cradle to the frame using the SmartBox® cradle clips and fasteners as shown in Figure 5a.

Installation: Cradle - Great Plains Planter

1. Remove existing insecticide hoppers and drive mechanisms.
2. Orient SmartBox® cradle as shown in Figure 6.
3. Place 5/16" x 1-1/2" bolt with washer through rear hole of the cradle down through spacer and slotted mounting clip (oriented as shown to catch underside of planter frame) and secure with lock nut.
4. Place 5/16" x 1-1/2" bolt with washer through slotted hole of the cradle down through SmartBox® cradle mounting clip (oriented as shown to catch underside of planter frame) and secure with lock nut.
Installation: Cradle - Case IH Planter Models 800 - 950 and White Series 5000

1. Remove existing insecticide hoppers and drive mechanisms.
2. Orient SmartBox® cradle as shown in Figure 7.
3. Place 5/16” x 3/4” bolt with washer through cross slot in cradle, through hole in row unit frame and secure with lock nut.
4. Using SmartBox® cradle mounting clips to secure rear of cradle, orient clips underneath planter row unit frame so short bend is facing toward center and upward (as shown).
5. Place 5/16” x 3/4” bolt with washer through rear hole of cradle down through planter row unit frame and SmartBox® cradle mounting clip and secure with lock nut.

Installation: Cradle - Case IH Planter Model 1200

1. Remove existing insecticide hoppers and drive mechanisms.
2. Orient SmartBox® cradle as shown in Figure 7A.
3. Place 5/16” x 3/4” bolt with washer through cross slot in cradle, through hole in row unit frame and secure with lock nut.
4. Using SmartBox® cradle mounting clips to secure rear of cradle, orient clips underneath planter row unit frame so short bend is facing toward center and upward (as shown).
5. Place 5/16” x 3/4” bolt with washer through rear hole of cradle down through planter row unit frame and SmartBox® cradle mounting clip and secure with lock nut.
Installation: Cradle - White Planter Series 6000

1. Position seed hoppers so that lids slide toward front of planter (SmartBox® transfer containers will interfere with lids sliding toward rear of planter).
2. Remove existing insecticide hoppers and drive mechanisms.
3. Orient SmartBox® cradle as shown in Figure 8.
4. Attach White planter brackets to rear of row unit frame (as shown) using 5/16” x 3/4” bolt with washer.
5. Position cradle so that open-ended slot of cradle slides forward underneath head of row unit frame post.
6. Secure cradle to White planter bracket using double holes on both sides at rear of cradle using 1/4” x 3/4” bolt and washer with lock nuts.

Installation: Cradle - White Planter Series 6000 Vertical Fold Planter and Planter with Liquid Fertilizer Tanks Mounted in Front of Planter Seed boxes - Using White Seal Lid Kits

1. Replace sliding lids on seed hoppers with lids purchased separately in White seal lid kits.
2. Repeat steps 2 through 6 above.

Installation: Cradle - White Planter Series 6000 Vertical Fold Planter and Planter with Liquid Fertilizer Tanks Mounted in Front of Planter Seed boxes - Using White Seal Lid Kits

1. Remove seed hoppers.
2. Place hopper ring into position and secure.
3. Insert seed hopper into the ring and secure.
4. Repeat steps 2 through 6 on the previous page.
For easier installation, mount the meter to the base container before installing the base container in the cradle. Install the meter discharge tube onto the meter after the base container is installed in the cradle. **Note:** These instructions are for initial meter installation. For meter replacement, see instructions in Section D of the manual. Always use a new meter gasket when installing or replacing a SmartBox® meter.

**Installation: Cradle - Meter to Base Container**

1. Position the meter with the 45° meter discharge opening facing forward (pointing toward the short side of the base container and pointing toward the planter tool bar).
2. Ensure the gasket and meter screen are properly installed on the meter. **NOTE:** Always use a new gasket when replacing or re-installing a meter. Place a thin layer of silicone caulk around edge of gasket to seal.
3. Place the 1/4" x 1" bolts up through the meter, base container flange, and washer. Lightly secure with the lock nuts (see Figure 9).
4. Examine meter gasket to make sure it is centered to provide a good seal.
5. Tighten all bolts securely. Torque all bolts to 25 – 30 in-lbs. **NOTE:** Do not over-tighten or under-tighten bolts; meter-to-base gasket must be compressed 60%-75% for proper sealing. Over-tightening can cause the meter-to-base gasket to tear.

**Installation: Base Container to Cradle**

1. Orient the base container into the cradle with the shorter sloped end of the container toward the planter tool bar.
2. Loosely secure the base container to the cradle using the 1/4" x 1/2" bolts with washers. Tighten all bolts securely.
Installation: Transfer Container

1. Remove rain cover from base container (see Figure 12). Store rain cover for use whenever transfer container is not installed on base container.

2. **Apply a light dusting of baby powder/talc on the base container seal prior to seating transfer container.** This step is necessary to avoid damage to the seals during removal of transfer container. Do not use a petroleum based silicon spray to lubricate the seals. Do not use graphite.

3. Remove the transfer container valve cover. Store cover for return of used container to Chemical Dealer.

4. Orient the transfer container so that the valve handles face away from the planter seed hopper.

5. Lower the transfer container so each valve is fully inserted into the mating base container valve. If valves are not fully seated, they will not open to release product to the base container.

6. Clamp transfer container to base container. **Rock each transfer container from side to side to make sure that clamps are secure.** If the transfer container is not clamped securely, the clamps may be made more secure by increasing the bend in the clamp arm which hooks onto the transfer container. If your base containers are supplied with locking pins, insert the pins through the clamps to further secure the transfer containers.

7. Turn valves counter-clockwise 60° to open. If valve does not open smoothly, then the valve is not seated properly; unclasp container and repeat steps 4 through 6 above. Both valves must be closed before the transfer container can be removed.
Wiring Cables:

Cable routings and extension requirements vary according to the planter manufacturer, fold style, and number of planter rows. All cables must be routed and secured to the planter in such a way to eliminate damage during folding or planting. Damage resulting from improper installation will not be covered by the AMVAC Chemical Corporation warranty.

The SmartBox® system includes the following cables (quantities supplied depend on the planter design):

- battery cable
- battery extension cable (optional)
- 12' hitch cable
- 20' hitch extension cable (optional)
- 4-row wiring harness
- 8-row wiring harness
- 15' meter extension cable
- lift switch extension cable (optional)

Wiring harness connections are as shown in Figure 13 for a 4-row wiring harness. Suggested routings are shown in the specific planter arrangement drawings which follow in "Installation: Wiring Harness, Planter Wiring Instructions".

![Figure 13 - 4-Row Wiring Harness](image)

The battery cable and hitch cable are supplied in the Controller System discussed earlier. Installation instructions are included in "Installation: Wiring Harness, Tractor Wiring Instructions".

Use of existing planter seed monitor wiring paths (if equipped) will help to avoid pinch points or obstructions. Slack should be left in the cables when wiring around hinge points.
Installation: Wiring Harness

Planter Wiring Instructions

Note: See Appendix A for detailed wiring diagrams on different planters.

1. Position the 1st wiring harness in the center of the rows the harness will service.
2. Run the 20’ 9-pin connection cable on the harness to the tractor-hitch point.
3. If more than one wiring harness is needed, wire the 9-pin connection cable of one harness to the 9-pin pigtail connector of the other (Do not connect).
4. Run the individual 4-pin cables from the wiring harness to the meters. The row numbers on the 4-pin cable are for manufacturing purposes only and do not reference to row routing. Do not connect at this time. Meters and wiring harnesses will be connected during meter configuration.
5. Reposition or add cable extensions (if needed) for proper length.
6. Carefully fold the planter (if not already folded) and check for correct cable lengths and pinch points.
7. Install and connect the lift switch to the 2-pin connector of the wiring harness.
8. Secure the wiring using the cable ties included starting at each meter. Loop excess wire and tie to the tool bar.

Installation: Wiring Harness

Tractor Wiring Instructions

1. Connect the 12’ hitch cable to the 9-pin round Deutsch connector in the back of the controller and run the other end of the hitch cable to the tractor-planter hitch point.
2. If not previously connected, connect the radar unit (if used) to the round 4-pin connector (see Figure 3).
3. If not previously connected, connect the 12’ power cable from the 2-prong connector of the controller to the 12-volt battery of the tractor. See instructions for Controller System earlier in this Section for details. See warnings listed above.
4. Connect the hitch cable to the wiring harness at the tractor-planter hitch point.

Installation Suggestions:

1. Place the planter in the planting position.
2. Layout the wiring harness without tying down the cables.
3. Locate ideal places for wire tying the harness to the planter frame. Do not tie down the cables at pinch points; this allows the cable to flex during folding. Ideal locations are to follow existing electrical and hydraulic lines.
4. When attaching the meter cables to the planter, remember that it may be more advantageous to connect a longer cable to a closer row and a shorter cable to a meter extension cable and then to the further row.
5. If more than one wiring harness is used, it is usually more convenient to connect the harness on the left side (from the back of the planter) to the hitch extension cable. This is due to the massive number of hydraulic and electrical cables threaded through the right side of the tongue.
6. Secure the harness(es) to the planter by connecting the wire ties.
7. Attach the hitch extension cable to the hitch cable and place the cable along the tongue.
8. Fold the planter to the transport position and then check all of the pinch points to be sure that the wires stay in place and the connections remain intact.
9. Unfold the planter to the planting position and check all of the pinch points to be sure that the wires stay in place and the connections remain intact.
**Lift Switch (Whisker) Installation:** Locate a protected location on the implement that will allow the lift switch to contact the implement when the implement is in the lower position. Mount the lift switch in the “neutral” position when the implement is in the raised position. As the implement is lowered, the lift switch contact arm should be pushed to the side, turning “on” the SmartBox® System.

A magnetic mounting bracket is provided, but you may need to fabricate a special bracket, based on your particular mounting location and configuration. The lift switch mounting should allow for adjustment of the lift switch to allow for switch activation at different implement heights.

To obtain maximum magnetic holding force, it is very important that the mounting surface be smooth and free of dirt, weld splatter, paint runs, etc. It is also important that any debris be removed from the magnet before mount is made.

Connect the lift switch cable to the 2-pin connector on one of the 4-row or 8-row wiring harness. On systems using more than one wiring harness, only one lift switch is required and may be connected to the 2-pin connector on any of the harnesses used. The 2-pin connector on any other harnesses used will remain empty.

---

**Lift Switch (Whisker) Wiring**

- **Common**
- **Normally Open**
- **Normally Closed**
- **Black**
- **White**

---

**Mounted Lift Switch**
Appendix A

Suggested Wiring Configurations by Planter Type:

The following figures show suggested routings for the SmartBox® hitch cable, hitch cable extensions, row harnesses, and meter extension cables for various planters. Please use the tables included to locate the drawings pertaining to your planter manufacturer, number of planter rows, and fold type. These arrangements are presented as suggestions only. Routing of cables and lift switch placement are left to the discretion of the user. Due to the large number of planter arrangements available, some planters will not be included in this section. For further information concerning planters not included in this section, please contact your local AMVAC Representative.
<table>
<thead>
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<th>Manufacturer</th>
<th>Series</th>
<th>Rows</th>
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<th>Number</th>
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<td>24</td>
<td>front</td>
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SYSTEM NUMBER: SBSS120

12 ROW FLEX FOLD WIRING DIAGRAM. FOR FOLDED VIEW SEE NEXT PAGE.

JOHN DEERE: 1760, 7000, 7200
KINZE: 2200

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS CONTROLLER
LIFT SWITCH CABLE
12’ HITCH CABLE

BATTERY WITH POWER CABLE

RADAR WITH SPLITTER

CONTROLLER

12’ HITCH EXT. CABLE

8 ROW HARNESS

PLANTER DRAWING 1
SYSTEM NUMBER: SBSS120
12 ROW FLEX FOLD FOLDED VIEW WIRING DIAGRAM.

JOHN DEERE: 7000, 7200, 1760
KINZE: 2200

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
METER EXT. CABLE
HITCH EXT. CABLE

12' HITCH EXT. CABLE

4 ROW HARNESS

8 ROW HARNESS

PLANTERDRAWING 2
PLANTER DRAWING 3
SYSTEM NUMBER: SBSS123
12 ROW WIRING DIAGRAM FOR FRONT FOLD, NARROW ROW, AND FRONT FOLD PLANTERS

JOHN DEERE: 7000, 7100, 7200
1780, 1770
CASE IH: 950, 955

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
20' HITCH CABLE
METER EXT. CABLE

BATTERY WITH CABLE
RADAR
CONTROLLER

12' HITCH EXT. CABLE
4 ROW HARNESS
12' HITCH EXT. CABLE
15' METER EXT. CABLE
8 ROW HARNESS
15' METER EXT. CABLE

PLANTER DRAWING 4
SYSTEM NUMBER: SBSS123

12 ROW 30° FRONT
FOLD WIRING DIAGRAM.

JOHN DEERE: 1770NT

BATTERY (CONTROLLER) ————
9 ROW HARNESS ————
8 ROW HARNESS ————
CONTROLLER ———
20' HITCH CABLE ———
METER EXT. CABLE ———
12' HITCH CABLE ———

PLANTER DRAWING 6
SYSTEM NUMBER: SBSS123
12 ROW 30° FRONT
FOLD WIRING DIAGRAM.

JOHN DEERE: 1790

BATTERY (CONTROLLER) ...................
4 ROW HARNESS — — — — —
8 ROW HARNESS — — — — —
CONTROLLER — — — — —
20' HITCH CABLE — — — — —
METER EXT. CABLE — — — — —
12' HITCH CABLE — — — — —

PLANTER DRAWING 7
SYSTEM NUMBER: SBSS124
12 ROW STACK FOLD WIRING DIAGRAM.

JOHN DEERE: 1720, 7300
KINZE: 2100

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
METER EXT. CABLE

BATTERY WITH CABLE
RADAR

4 ROW HARNESS

8 ROW HARNESS

PLANTER DRAWING 9
SYSTEM NUMBER: SBSS125
KINZE MODEL 2300 12 ROW FRONT FOLD WIRING DIAGRAM.

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
20' HITCH CABLE
METER EXT. CABLE

BATTERY WITH CABLE
RADAR
CONTROLLER
12' HITCH EXT. CABLE

4 ROW HARNESS
8 ROW HARNESS
LIFT SWITCH CABLE

PLANTER DRAWING 12
SYSTEM NUMBER: SBSS125
12 ROW KINZE TWIN LINE
WIRING DIAGRAM FOR SERIES
2600 PLANTERS.

RADAR
BATTERY CABLE
8 ROW HARNESS
LIFT SWITCH CABLE
CONTROLLER
20' HITCH CABLE
12' HITCH CABLE

BATTERY WITH POWER CABLE
CONTROLLER
12' HITCH EXT. CABLE
20' HITCH EXT. CABLE
4 ROW HARNESS
8 ROW HARNESS

PLANTER DRAWING 13
SYSTEM NUMBER: SBSS127

12 ROW FLEX FOLD WIRING DIAGRAM. FOR FOLDED VIEW SEE NEXT PAGE.

WHITE: 6200, 6300

4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
12' HITCH CABLE
METER EXT. CABLE

BATTERY WITH POWER CABLE
RADAR WITH SPLITTER
CONTROLLER
12' HITCH EXT. CABLE
8 ROW HARNESS

PLANter DRAWING 14
SYSTEM NUMBER: SBSS127
12 ROW FLEX FOLD FOLDED
VIEW WIRING DIAGRAM.
WHITE: 6200, 6300

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
METER EXT. CABLE
HITCH EXT. CABLE

12' HITCH EXT. CABLE
4 ROW HARNESS
8 ROW HARNESS

PLANTER DRAWING 15
SYSTEM NUMBER: SBSS127

12 ROW 3 POINT MOUNTED WIRING DIAGRAM FOR STANDARD, VERTICAL FOLD, AND NARROW ROW PLANTERS.

WHITE: 5100, 6102, 6702 6762 6122, 6722

BATTERY CABLE
RADAR
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE

PLANTER DRAWING 16
SYSTEM NUMBER: SBSS128
WHITE MODEL 6180 12 ROW
FRONT FOLD WIRING DIAGRAM.
FOR FOLDED VIEW SEE NEXT PAGE.

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
20' HITCH CABLE
METER EXT. CABLE

BATTERY WITH CABLE
RADAR WITH SPLITTER

12' HITCH EXT. CABLE

4 ROW HARNESS
8 ROW HARNESS

15' METER EXT.

LIFT SWITCH WITH CABLE

PLANTER DRAWING 17
SYSTEM NUMBER: SBSS128
WHITE MODEL 6180 12 ROW FRONT FOLD WIRING DIAGRAM.

BATTERY CABLE
RADAR
4 ROW HARNESS
6 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
20' HITCH CABLE
METER EXT. CABLE

BATTERY WITH CABLE
RADAR
CONTROLLER

12' HITCH EXT. CABLE

4 ROW HARNESS
LIFT SWITCH CABLE

8 ROW HARNESS

15' METER EXT.

PLANTER DRAWING 18
SYSTEM NUMBER: SBSS167
16 ROW 30° FRONT FOLD WIRING DIAGRAM.

JOHN DEERE: 1790

BATTERY (CONTROLLER) ........................
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
20' HITCH CABLE
METER EXT. CABLE
12' HITCH CABLE

PLANTER DRAWING 21
SYSTEM NUMBER: SBSS167
16 ROW 30" FRONT
FOLD WIRING DIAGRAM.

JOHN DEERE: 1790

BATTERY (CONTROLLER)  
4 ROW HARNESS  
8 ROW HARNESS  
CONTROLLER  
20' HITCH CABLE  
METER EXT. CABLE  
12' HITCH CABLE  

SmartBox® System - System Installation
Section A
SYSTEM NUMBER: SBSS167

16 ROW 30" FRONT
FOLD WIRING DIAGRAM.

JOHN DEERE: 1770NT

BATTERY (CONTROLLER) ..................
4 ROW HARNESS --- --- ---
8 ROW HARNESS
CONTROLLER
20' HITCH CABLE --- --- ---
METER EXT. CABLE --- --- ---
12' HITCH CABLE --- --- ---

PLANTER DRAWING 23
PLANTER DRAWING 24
SYSTEM NUMBER: SBSS163
16 ROW KINZE TWIN LINE
WIRING DIAGRAM FOR SERIES 2600 PLANTERS.

RADAR
BATTERY CABLE
8 ROW HARNESS
LIFT SWITCH CABLE
CONTROLLER
20' HITCH CABLE
12' HITCH CABLE

BATTERY WITH POWER CABLE

RADAR

12' HITCH EXT. CABLE

20' HITCH EXT. CABLE

8 ROW HARNESS

PLANTER DRAWING 29

51
Section A
SYSTEM NUMBER: SBSS167
WHITE MODEL 6180 16 ROW FRONT FOLD WIRING DIAGRAM.

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
20' HITCH CABLE
METER EXT. CABLE

BATTERY WITH CABLE
RADAR

12' HITCH EXT. CABLE
12' HITCH EXT. CABLE

8 ROW HARNESS
8 ROW HARNESS

LIFT SWITCH CABLE

PLANTER DRAWING 31
SYSTEM NUMBER: SBSS240

24 ROW FRONT FOLD WIRING DIAGRAM.

JOHN DEERE: 7000, 7100, 7200, 1770
CASE IH: 950, 955

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
20' HITCH CABLE
METER EXT. CABLE
12' HITCH CABLE

BATTERY WITH CABLE

RADAR

CONTROLLER

8 ROW HARNESS

12' HITCH EXT. CABLE
20' HITCH EXT. CABLE

8 ROW HARNESS

15' METER EXT. CABLE

8 ROW HARNESS

15' METER EXT. CABLE

PLANTER DRAWING 33
SYSTEM NUMBER:  SBSS240
24 NARROW ROW FRONT
FOLD WIRING DIAGRAM.
JOHN DEERE:  7000, 7100, 7200,
1780
CASE IH:  950, 955

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
20' HITCH CABLE
METER EXT. CABLE
12' HITCH CABLE

BATTERY WITH CABLE
RADAR
CONTROLLER
12' HITCH EXT. CABLE
20' HITCH EXT. CABLE

8 ROW HARNESS

15' METER EXT.

15' METER EXT.
8 ROW HARNESS

PLANTER DRAWING 35
SYSTEM NUMBER: SBSS240
24 ROW 30’ FRONT
FOLD WIRING DIAGRAM.

JOHN DEERE: 1770NT

BATTERY (CONTROLLER)
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
20’ HITCH CABLE
METER EXT. CABLE
12’ HITCH CABLE

PLANter DRAWING 36
SYSTEM NUMBER: SBSS240

24 ROW 20" FRONT
FOLD WIRING DIAGRAM.

JOHN DEERE: 1790

BATTERY (CONTROLLER) ......................
4 ROW HARNESS ———— ————
8 ROW HARNESS ———— ————
CONTROLLER ———— ————
20' HITCH CABLE ———— ————
METER EXT. CABLE ———— ————
12' HITCH CABLE ———— ————

PLAN TER DRAWING 38
PLANTER DRAWING 40
SYSTEM NUMBER: SBSS243
24 ROW KINZE 2700 WIRING DIAGRAM

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
20' HITCH CABLE
METER EXT. CABLE

BATTERY WITH CABLE
RADAR
CONTROLLER

20' HITCH EXT. CABLE

8 ROW HARNESS
8 ROW HARNESS

20' HITCH EXT. CABLE
15' METER EXT. CABLE
15' METER EXT. CABLE

8 ROW HARNESS

PLANTER DRAWING 41
PLANTER DRAWING 42
SYSTEM NUMBER: SBSS244

24 ROW FRONT FOLD WIRING DIAGRAM.

WHITE: 6500

BATTERY CABLE
RADAR
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
LIFT SWITCH CABLE
20' HITCH CABLE
METER EXT. CABLE
12' HITCH CABLE

BATTERY WITH CABLE

RADAR

CONTROLLER

12' HITCH EXT. CABLE

20' HITCH EXT. CABLE

8 ROW HARNESS

8 ROW HARNESS

15' METER EXT.

15' METER EXT.

8 ROW HARNESS

PLANTER DRAWING 43
SYSTEM NUMBER: SBSS360
36 ROW 22" FRONT
FOLD WIRING DIAGRAM.

JOHN DEERE: DB66

CASE:

BATTERY (CONTROLLER)
BATTERY (JUNCTION BOX)
4 ROW HARNESS
8 ROW HARNESS
CONTROLLER
20' HITCH CABLE
METER EXT. CABLE
12' HITCH CABLE
JUNCTION BOX
6' EXT. CABLE (JCT. BOX)

PLANTER DRAWING 44
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Controller Setup

The SmartBox® controller requires several setup steps to produce accurate chemical application. This section of the Operator’s Manual will show those steps required as a minimum, as well as additional steps which may be followed to increase the benefits of the SmartBox® system.

One added feature of the SmartBox® system is the ability to upload field and user information from a personal computer to the controller. Instructions for uploading information are given in Section C. Instructions provided in this section are for programming directly into the controller.

- The controller screen will show only four menu choices at a time. To view all of the selections available in a menu, press the down arrow button repeatedly to scroll through the selections.

- To make a selection from the menu, push the up or down arrow button repeatedly until the arrow on the menu screen points toward your selection. Then push the “ENTER” button to move into the next level of menu choices.

- The “RETURN” option is available in each menu. Selecting this option will return the controller to the previous menu.

- To return to the original menu during operation, press the “PREVIOUS PAGE” and “NEXT PAGE” buttons at the same time.

A “map” of controller menus is presented on the next pages. Those steps required for accurate insecticide application are shaded. Other steps are optional but will greatly enhance operation and record keeping of the system. Instructions for particular functions (such as inputting user information, programming A/B switches, and recording weather conditions) are shown following the controller function map. The instructions are given in an order of probable use, but programming sequence and use of optional functions are at the discretion of the user.
Controller Functions

Row Configuration

The Row Configuration routine is used to assign row numbers to each of the meters. This routine is needed at initial system setup or whenever more than one new meter is attached. Note: If you have previously configured all rows and are replacing only one meter, see applicable instructions in Section D.

Step 1
From Main Menu select SETUP and press ENTER.

Step 2
Using the arrow keys, scroll to ROW CONFIG and press ENTER.

Step 3
Using the arrow keys, select the number of rows and press ENTER.

Step 4
Disconnect the 4-pin connector from each meter. Press NEXT PAGE to begin configuration.

Step 5
Attach the 4-pin connector for the row which is to be designated as Row 1 and wait for three “beeps”. The screen will automatically sequence to the next row.

Step 6
Repeat Step 5 until all rows have been configured.

End
After all rows have been configured, the system will automatically advance to the SETUP menu.
Planter Configurations

The planter Configuration routine is used to record or change the number of planter rows and row spacing. This information is required for calculation of acreage values.

**Step 1**
From Main Menu select SETUP and press ENTER.

**Step 2**
Using the arrow keys, scroll to PLANTER CONFIG and press ENTER.

**Step 3**
Using the arrow keys, select NUMBER OF ROWS and press ENTER.

**Step 4**
Use the arrow keys to increase or decrease the value shown until it equals the number of planter rows (1 to 48). Press ENTER.

**Step 5**
Using the arrow keys, select ROW SPACING and press ENTER.

**Step 6**
Use the arrow keys to increase or decrease the value shown until it equals the planter row spacing in inches (10.0 to 100.0). Press ENTER.

**End**
Using the arrow keys, select RETURN and press ENTER to return to the main menu.
### Speed Calibration

The Speed Calibration routine is used to accomplish two objectives: to choose either true or fixed speed and to calibrate the true speed device if used. “True” speed here indicates use of either radar or a true wheel speed sensor; a wheel sensor is considered true speed, however no compensation is made for wheel slippage.

The SmartBox® system will work in either fixed or true speed mode. The meters will compensate for changes in planter speed only when the system is set in the true speed mode.

The in-field calibration described below is critical for accurate speed measurement and insecticide application. This calibration is separate from calibrations of the radar itself; you must calibrate the speed device with the SmartBox® controller by performing the 200’ in-field calibration steps stated below. Do not enter the radar calibration number used for other monitors. If speed calibration is not performed correctly, then the values recorded for planter speed will produce errors in calculations of acreage treated, pounds of chemical applied, and pounds of chemical applied per acre. Inaccuracies resulting from failure to properly calibrate are the responsibility of the user.

The in-field calibration routine should be used at the start of each new season or whenever a modification is made which could affect the output of the speed sensor. For greater accuracy, the 200’ in-field test should be run at the expected planting speed. Also, the test should be repeated two or three times and the average count value entered into the controller.

---

**Step 1**
From Main Menu select **SETUP** and press ENTER.

**Step 2**
Using the arrow keys, scroll to **SPEED CALIBRATION** and press ENTER.

**Step 3**
To choose true speed or fixed speed input, select **MODE RADAR..FIXED** and press ENTER. The screen shown on the left does not indicate the mode in use; to see which mode is in use, move to next screen by pressing ENTER.
**SmartBox® System - System Setup**

**Section B**

**Speed Calibration (continued)**

**Step 4**
Use the arrow keys to choose **RADAR** (for either radar or true wheel speed monitor) or **FIXED** speed. Press **ENTER** to advance.

**Step 5**
If **FIXED** speed is chosen, use the arrow keys to change the speed. Press **ENTER** to return to the **SPEED CALIBRATION** menu.

**Step 6**
If **RADAR** is chosen, press **ENTER** to return to the **SPEED CALIBRATION** menu. If an in-field calibration has already been done, scroll to **RETURN** and press **ENTER** to return to the **SETUP** menu.

**Step 7**
If an in-field calibration has not been done, use the arrow keys to scroll to **IN-FIELD CALIB** and press **ENTER**.

**Step 8**
Measure and mark a linear course of 200 feet.

**Step 9**
Press either arrow key as you enter the course. The controller will then measure the counts of the radar. If your controller fails to count pulses as you move through the course, re-start controller and repeat above steps. If pulses still do not register, you may need a signal booster for the radar system. See recommended contacts in Section A.
**Step 10**
Press the opposite arrow key as you exit the course. The controller will then calibrate according to the counts of the radar.

**Step 11**
Press **ENTER** to accept the calibration and return to the **SETUP** menu. Or, push either arrow to return to the **MEASURE 200 FEET** screen to redo the in-field calibration.

**Step 12**
To change radar counts per 200 feet (6096 counts is preset), select **COUNTS / 200 FEET** and press **ENTER**.

**Step 13**
Use the arrow keys to change the radar count value. Press **ENTER** to the **SPEED CALIBRATION** menu. This step may be done to move the radar reading slightly to agree with a monitor already calibrated and correct. **Do not use the value provided in the radar system owner's manual or obtained from calibration with a different monitor without confirming calibration with an in-field test.**
Step 14
To reduce the count number for certain wheel sensors, select **RADAR DIVIDE NUM** and press **ENTER**.

Step 15
Using the arrow keys, select a number that will put the counts under 10,000. Press **ENTER** when complete.

End
Select **RETURN** to go to the **SETUP** menu.
AB Control Switch

The AB Control Switch routine is used to select certain meters to be controlled by the A or B switch. This function is beneficial when planting point rows or planting along the edge of a field. Those rows which are not needed can be shut off simply by pre-assigning those rows to the A or B switch, and then flipping the corresponding switch to the off, or down, position.

The simplest way to understand this function is to ask the following question while programming the controller: When the A (or B) switch is off (pushed to the down position), do I want row 1 (or other row) shut off? If the row is to be shut off, then the answer is “yes”. If the row is to be on, then the answer is “no”.

Use of this function is optional.

Step 1
From the Main Menu select SETUP.

Step 2
Using the arrow keys, scroll to AB CONTROL SWITCH and press ENTER.

Step 3
Using the arrow keys, select YES or NO for row 1 on the A switch. If YES is selected, then the meter on row 1 will shut off when the A switch is flipped to the down position. Press the “NEXT PAGE” button to advance to the next row. Press ENTER to move to the B switch.

Step 4
Repeat Step 3 for B switch assignments. Press ENTER to return to the SETUP menu.
Controller Adjust

The Controller Adjust routine is used to set date and time, select English or metric units, and adjust the controller contrast and backlight. The SmartBox® systems are preset with standard Eastern time and English units.

**Step 1**
From the Main Menu select **SETUP**.

**Step 2**
Using the arrow keys, scroll to **CONTROLLER ADJUST** and press **ENTER**.

**Step 3**
Using the arrow keys, scroll to **SET DATE TIME** and press **ENTER**.

**Step 4**
Using the arrow keys, scroll to the correct year. Press the “NEXT PAGE” button to move to the next screen.

**Step 5**
Using the arrow keys, scroll to the correct month. Press the “NEXT PAGE” button to move to the next screen.

**Step 6**
Using the arrow keys, scroll to the correct day of the month. Press the “NEXT PAGE” button to move to the next screen.
Controller Adjust (continued)

**Step 7**
Using the arrow keys, scroll to the correct hour. Press the “NEXT PAGE” button to move to the next screen.

**Step 8**
Using the arrow keys, scroll to the correct minute. Press ENTER to save settings and return to the CONTROLLER ADJUST menu.

**Step 9**
Using the arrow keys, scroll to ENGLISH METRIC and press ENTER.

**Step 10**
Using the arrow keys, scroll to select either English or metric units of measure. Press ENTER to return to the CONTROLLER ADJUST menu.

**Step 11**
Using the arrow keys, select ADJUST CONTRAST.

**Step 12**
Using the arrow keys, scroll to increase or decrease controller contrast. Press ENTER to return to the CONTROLLER ADJUST menu.
Step 13
Using the arrow keys, select **ADJUST BACKLIGHT**.

Step 14
Using the arrow keys, scroll to increase or decrease controller backlight. Press **ENTER** to return to the **CONTROLLER ADJUST** menu.

End
Select **RETURN** to go to the **SETUP** menu.
Chemical Information

The Chemical Information routine is used to input a chemical name and EPA registration number. The information input in this location will be displayed and recorded for all of the fields as one description. If different chemicals are to be used and identified on separate fields, then the chemical name must be input and stored in the FIELD LOCATION lines.

**Step 1**
From the Main Menu select SETUP.

**Step 2**
Using the arrow keys, scroll to CHEMICAL INFO and press ENTER.

**Step 3**
Using the arrow keys, select CHEMICAL NAME and press ENTER.

**Step 4**
Use the arrow keys to scroll through the characters available for each space. Once located, enter and move to the following space by pushing the “PREVIOUS PAGE” or “NEXT PAGE” buttons. Press ENTER to return to the CHEMICAL INFO screen.

**Step 5**
Repeat Steps 3 and 4 above for EPA REGIS NUMBER.

**End**
Select RETURN to go to the SETUP menu.
INSTALLATION OF SMARTBOX® SYSTEM MANAGER

SmartBox® System Manager Setup:

The following steps describe proper installation of the SmartBox® System Manager software on Windows '98 or newer systems.

If installing a new version of SmartBox® System Manager software on a computer with an older version currently active, first remove the older version.

Before installing the SmartBox® System Manager software, close all programs. Always backup system files before installing new software. It is recommended to create a restoration point prior to installing new software.

Step 1
Insert the CD labeled SmartBox® System Manager into the CD drive.

Step 2
If the autorun starts, the following screens will appear:
SmartBox® System Manager Setup (continued):

Step 2 (continued)
If the autorun does not start, click on Start then select Run.

When the run window opens, click the Browse... button. Select the CD drive the SmartBox System Manager CD was inserted. Select the Setup file and click open, then click OK from the Run window.
SmartBox® System Manager Setup (continued):

Step 2 (continued)
The following screens will follow:

Step 3
Click the Next button.
SmartBox® System Manager Setup (continued):

Step 4
Click the **Install** button.

Step 5
The following window will appear:
SmartBox® System Manager Setup (continued):

Step 6
Click the Finish button.

Step 7
Remove the CD from the drive.
Add a New Controller:

**Step 1**
Open the **SmartBox® System Manager** by going to the Start menu, Programs, Amvac Chemical Corporation, then clicking on SmartBox System Manager.

![SmartBox System Manager](image)

**Step 2**
Click on the **Controller Information** button to add a new controller.
Add a New Controller (continued):

Step 3
The CONTROLLER INFORMATION screen is displayed.

From the Controller Information screen select the edit menu then choose **Add New Controller**. The grower information can now be added.

Select the Model controller. **Important:** The Model controller must be correct to complete the data download. The controller will have a model number under the SmartBox® logo.

- **Model:** SBC-2000 = 2004 or Earlier
- **Model:** SBC-2005 = 2005 or Later

In the **Controller Name** field, type in the name of the Controller. Note that the controller name is simply the name of the file in which information will be stored or transferred. The controller name should be kept to 20 characters or less. Do not use punctuation marks or special characters in the controller name.

The **Chemical Name**, **EPA Registration**, and **Controller Description** fields are **optional**. Enter information desired.
Add a New Controller (continued):

**Step 4**
Click on the **Save** button to add the Controller. Click the **OK** button to create the field records.

**Step 5**
Click the **Close** button
Set Current Controller:

**Step 1**
From the Main Menu, click the **Set Current Controller** button.

**Step 2**
Select the controller from the drop-down menu, then click **OK**.
Set Current Controller (continued):

End
The controller selected is displayed in the Current Settings section of the Main Menu screen.
Data Download - 2005 or Later Controllers:

Step 1
From the Main Menu, click on the **Transfer Data** button.

**Note:** A current 2005 or later controller must be selected before choosing Transfer Data. See Set Current Controller.
Data Download - 2005 or Later Controllers (continued):

Step 2
The SmartBox® Communication Center screen is displayed.

Follow the Instructions that are displayed.

A. Select the appropriate Communications Port that the Controller will be connected to.
B. Select the appropriate Controller.
C. Select the appropriate Operator. (Optional)
D. Connect the Controller to the COM port selected above on the PC.
Data Download - 2005 or Later Controllers (continued):

Step 3
Once the Controller is connected, click on the Connect to Unit button. The following screen will appear:
Data Download - 2005 or Later Controllers (continued):

Step 4
Use the SmartBox® Controller to initiate the data transfer.

When transferring information from the SmartBox® controller to a personal computer, there are four options:

1. **TRANSFER ONLY** - Transfers all stored application data without erasing any information from the controller to the computer.

2. **TRANSFER AND CLEAR** - Transfer all stored application data and erases all field data. User information, such as Field Locations, Chemical Info, and User Info remain in the controller.

3. **ERASE ALL DATA** - Does not transfer information, but clears all stored data from the controller memory.

4. **TRANSFER PC INFORMATION** - Transfers grower information, operator information, and field information (field name and address) from the SmartBox® System Manager to the SmartBox® Controller.
Data Download - 2005 or Later Controllers (continued):

Step 4 (continued)
Transfer Only Option

Connect the 9-pin RS232 port from the back of the controller to the computer.

Step 1
From the Main Menu select SETUP.

Step 2
Using the arrow keys, scroll to MEMORY TRANSFER and press ENTER.

Step 3
To transfer data without clearing it from memory, select TRANSFER ONLY and press ENTER.

Step 4
Press ENTER at the READY TO TRANSFER screen.

Step 5
While data is being transferred, the SENDING AREA INFORMATION screen will appear.

Step 6
When transfer is complete, the TRANSFER IS COMPLETE screen will display momentarily then advance to the Memory Transfer Menu.

Step 7
Click the DISCONNECT FROM UNIT button on the SmartBox® Communication Center.

End
To return to the Setup Menu, select RETURN and press ENTER.
Data Download - 2005 or Later Controllers (continued):

Step 4 (continued)
Transfer and Clear Option

Step 1
From the Main Menu select SETUP.

Step 2
Using the arrow keys, scroll to MEMORY TRANSFER and press ENTER.

Step 3
To transfer data and automatically clear all field related information while keeping user and chemical information in memory, select TRANSFER & CLEAR and press ENTER.

Step 4
Press ENTER and hold for three (3) seconds to confirm transferring and clearing data. CAUTION: Proceeding will clear valuable information.

Step 5
Press ENTER at the READY TO TRANSFER screen.

Step 6
Press ENTER to continue.
Data Download - 2005 or Later Controllers *(continued)*:

**Step 4 (continued)**
Transfer and Clear Option

---

**Step 7**
While data is being transferred and cleared, the **SENDING INFORMATION** and **CLEARING DATA** screens will appear.

**Step 8**
The **CLEARING DATA** screen will automatically advance to the **CONNECTED TO PC RECEIVING USER INFO** screen.

**Step 9**
When transfer is complete, the **TRANSFER IS COMPLETE** screen will display momentarily then advance to the Memory Transfer Menu.

**End**
To return to the Setup Menu, select **RETURN** and press **ENTER**.
Step 4 (continued)
Erase All Data Option

Step 1
From the Main Menu select SETUP.

Step 2
Using the arrow keys, scroll to MEMORY TRANSFER and press ENTER.

Step 3
To transfer data and clear memory, select ERASE ALL DATA and press ENTER.

Step 4
Press both arrow keys simultaneously and hold for ten (10) seconds to begin clearing data. CAUTION: Proceeding will erase all important user information.

Step 5
While data is being cleared, the CLEARING DATA screen will appear.

Step 6
When completed, the screen will automatically advance to the Memory Transfer Menu.

End
To return to the Setup Menu, select RETURN and press ENTER.
Data Upload - 2005 or Later Controllers:

This option is used to upload information from a SmartBox® System Manager controller file to the SmartBox® controller. Grower, Operator, and Field information can be entered into a controller file.

Step 1
From the Main Menu, click on the TRANSFER DATA button.

Note: A current 2005 or later controller must be selected before choosing Transfer Data. See Set Current Controller.
Data Upload - 2005 or Later Controllers (continued):

Step 2
The SmartBox® Communication Center screen is displayed.

Follow the Instructions that are displayed.

A. Select the appropriate Communications Port that the Controller will be connected to.
B. Select the appropriate Controller.
C. Select the appropriate Operator. (Optional)
D. Connect the Controller to the COM port selected above on the PC.
Data Upload - 2005 or Later Controllers (continued):

**Step 3**
Once the Controller is connected, click on the **Connect to Unit** button. The following screen will appear:
Data Upload - 2005 or Later Controllers (continued):

Step 4
Use the SmartBox Controller to initiate the data transfer.
Transfer PC Info Option

Connect the 9-pin RS232 port from the back of the controller to the computer.

Step 1
From the Main Menu select SETUP.

Step 2
Using the arrow keys, scroll to MEMORY TRANSFER and press ENTER.

Step 3
To transfer data from a personal computer with SmartBox Program Manager installed, scroll to TRANSFER PC INFO and press ENTER.

Step 4
Press ENTER to continue.

Step 5
While data is being transferred CONNECTED TO PC RECEIVING USER INFO screen will appear. The TRANSFER IS COMPLETE screen will display momentarily then advance to the Memory Transfer Menu.

End
To return to the Setup Menu, select RETURN and press ENTER.
Clear Growers, Operators, Controllers, Field Log Information, or Database:

**Step 1**
From the Main Menu, click on the **Database** menu and select the field to clear.

Note: If multiple controllers are in the SmartBox System Manager, the clear function will clear all fields, not just the current controller.

![Database Menu Screen](image1)

**Step 2**
Click **Yes** to continue.

![Grower Information Screen](image2)
Delete A Controller:

**Step 1**
From the Main Menu, select the controller you wish to delete and set it to the current controller. See Set Current Controller.

**Step 2**
From the Main Menu, click on the **Controller Information** button.
Delete A Controller (continued):

Step 3
Select the Edit Menu and select Delete Current Controller.

Step 4
Click the OK button to proceed. An additional window will pop up. Click Yes to proceed.
Grower Information

Add A New Grower:

Use this function to enter the Grower’s name, address and applicator’s License Number. This optional information is used for record keeping and reports.

Step 1
From the Main Menu, click on the Grower Information button.

Step 2
The GROWER INFORMATION screen is displayed. Select the Edit Menu and select ADD NEW GROWER.
Add A New Grower (continued):

Step 2 (continued)
Enter the appropriate information in the following fields, as needed:

1. **Name** - Enter the Grower’s name.
2. **Address 1/Address 2/City/State/Zip** - Enter the Grower’s address.
3. **App. Lic. No.** - Enter the Grower’s Applicator License Number.

Step 3
Click the **Save** button.

End
Click on the **Close** button to return to the **MAIN MENU**.
Update Grower Info:

Use this function to enter corrections to previously entered grower information.

**Step 1**
From the Main Menu, click on the Grower Information button.

**Step 2**
The GROWER INFORMATION screen is displayed, click on the Grower to be corrected to highlight it.
Update Grower Info (continued):

Step 3
From the Grower Information screen select the Edit Menu then choose Update Current Grower. The grower details can now be changed.

Step 4
Enter the corrections to each field, as needed.

Step 5
Click the Save button to accept the changes.

End
Click the Save button then the Close button to return to the MAIN MENU.
Delete A Grower:

Use this function to delete a previously entered grower.

**Step 1**
From the Main Menu, click on the **Grower Information** button.

**Step 2**
The **GROWER INFORMATION** screen is displayed, click on the Grower to be deleted to highlight it.
Delete A Grower (continued):

**Step 3**
From the Grower Information screen select the Edit Menu then choose Delete Current Grower.

**Step 4**
Click OK to proceed. An additional window will pop up, Click Yes to proceed.

**End**
Click the Close button to return to the MAIN MENU.
Print Grower Information Report:

Use this function to print the Grower Info Report.

Step 1
From the Main Menu, click on the **Grower Information** button.

Step 2
The **GROWER INFORMATION** screen is displayed.
Print Grower Information Report (continued):

**Step 3**
From the **Grower Information** screen select the File Menu then choose **Print Current Grower**.  
Note: To print the current grower, the grower must be selected (highlighted in yellow).

**Step 4**
The **SmartBox Report Viewer** will appear. Click on the **print icon** at the top of the screen.
Print Grower Information Report (continued):

Step 5
Click the CLOSE button to close the SmartBox Report Viewer.
Operator Information

Add A New Operator:

Use this function to enter the Operator’s name, address, and Applicator’s license number. This optional information is used for record keeping.

Step 1
From the Main Menu, click on the Operator Information button.

Step 2
The OPERATOR INFORMATION screen is displayed. Select the Edit Menu and select ADD NEW OPERATOR.
Add A New Operator (continued):

Enter the appropriate information in the following fields, as needed:

1. **Name** - Enter the Operator’s name.
2. **Address 1/Address 2/City/State/Zip** - Enter the Operator’s address.
3. **App. Lic. No.** - Enter the Operator’s Applicator License Number.

**Step 3**
Click the **Save** button.

**End**
Click the **Close** button to return to the **MAIN MENU**.
Update Operator Info:

Use this function to enter corrections to previously entered Operator Information.

**Step 1**
From the Main Menu, click on the **Operator Information** button.

**Step 2**
In the **Operator Information** screen, click on the Operator to be corrected to highlight it.
Update Operator Info (continued):

**Step 3**
From the **Operator Information Screen** select the Edit Menu then choose **Update Current Operator**. The Operator Information can now be changed.

![Operator Information Screen]

**Step 4**
Enter the corrections to each field, as needed.

**Step 5**
Click the **Save** button to accept the changes.

**End**
Click the **Save** button then the **Close** button to return to the **MAIN MENU**.
Delete An Operator:

Use this function to delete a previously entered Operator.

**Step 1**
From the Main Menu, click on the **Operator Information** button.

**Step 2**
In the **Operator Information** screen, click on the Operator to be deleted to highlight it.
Delete An Operator (continued):

Step 3
Select the Edit Menu then choose Delete Current Operator.

End
Click on the OK button. An additional window will pop up. Click Yes and Close to return to the MAIN MENU.
Print Operator Listing:

Use this function to print the Operator.

Step 1
From the Main Menu, click on the **Operator Information** button.

Step 2
The **OPERATOR INFORMATION** screen is displayed.
Print Operator Listing (*continued*):

**Step 3**
From the **Operator Information** screen select the File Menu then choose **Print Current Operator**.

Note: To print the current operator, the operator must be selected (highlighted in yellow).
Print Operator Listing (continued):

**Step 4**
The SmartBox® Report Viewer will appear. Click on the **print icon** at the top of the screen.

![SmartBox Report Viewer](image1)

**Step 5**
Click the **Close** button to close the SmartBox® Report Viewer.

![SmartBox Report Viewer](image2)
Field Information

Update Field Info:

Use this function to update field information.

**Step 1**
From the Main Menu, click on the **Field Information** button.

**Step 2**
The **FIELD INFORMATION** screen is displayed. In the **Field Listing** section, click on the Field to highlight and select it.
Update Field Info (continued):

Step 3
From the Field Information screen, select the Edit Menu then choose Update Current Field. The field information can now be changed.

1. Field Number - Displays the number of the Field chosen.
2. Grower ID - Enter a Grower ID previously entered in the Grower Info function.
3. Description1/Description2 - Displays data transferred from the controller.
4. Crop Type - Enter Crop Type for this Field.
5. Landlord - Enter the landlord for this Field.
6. Total Acres - Enter the total acres in Field.
7. Acres Treated To Date - Displays data transferred from the controller.
8. Field Notes - Enter miscellaneous information about the Field.

Step 4
Click the Save button to accept the changes.

End
Click the Close button to return to the main menu.

NOTE:
1. THE FIELD NUMBER, DESCRIPTION 1, DESCRIPTION 2, AND ACRES TREATED TO DATE FIELDS DISPLAY INFORMATION DOWNLOADED.
2. THE FIELD NUMBER AND ACRES TREATED TO DATE FIELDS ARE DISPLAY ONLY AND CAN'T BE CHANGED.
3. THERE ARE 28 CHARACTER SPACES EACH ALLOCATED FOR CROP TYPE AND LANDLORD.
4. THERE ARE 9 CHARACTERS SPACES ALLOCATED FOR TOTAL ACRES.
5. THERE ARE 128 CHARACTER SPACES ALLOCATED FOR FIELD NOTES.
Print Field Listing:

Use this function to print the Field Info Report.

**Step 1**
From the Main Menu, click on the **Field Information** button.

**Step 2**
The **FIELD INFORMATION** screen is displayed.
Print Field Listing (continued):

**Step 3**
From the Field information screen select the file menu then choose Print Current Field Info.

**Step 4**
The SmartBox® Report Viewer will appear. Click on the print icon at the top of the screen.
Print Field Listing (continued):

**Step 5**
Click the **Close** button to close the SmartBox\textsuperscript{\textregistered} Report Viewer.

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<th>Field Description</th>
<th>Grower</th>
<th>Crop Type</th>
<th>Landlord</th>
<th>Total Acres</th>
<th>Acres Treated</th>
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<tbody>
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</table>
Report Options

Printing Reports:

Use this function to print reports.

Step 1
From the Main Menu, click on the Report button you wish to print.

1. The Lbs Applied Report (All Fields) button prints the FIELD LOG - LBS APPLIED REPORT.
2. The Field Report By Grower button prints the FIELD REPORT BY GROWER REPORT.
3. The Accumulated Acres Report button prints the ACCUMULATED ACRES REPORT BY DATE.
Printing Reports (continued):

**Step 2**
The SmartBox® Report Viewer will appear. Click on the print icon at the top of the screen.

![SmartBox® Report Viewer](image1)

**Step 3**
Click the Close button to close the SmartBox® Report Viewer.

![SmartBox® Report Viewer](image2)
Pre-Season Checklist

THE FOLLOWING STEPS ARE REQUIRED PRIOR TO THE START OF EACH SEASON.

In order to operate the SmartBox® system and obtain accurate application of insecticide, the following steps must be followed prior to the start of each season. In particular, failure to properly calibrate both the speed monitoring equipment and the SmartBox® meters will result in either over- or under-application of insecticide and incorrect calculation of chemical used, application rate, and area treated. Such application error resulting from failure to properly calibrate the system will void all claims, either stated or implied, concerning expected accuracy of the SmartBox® system.

The pre-season checklist below is divided into two sections:

1. System preparation - These steps include routine maintenance, and possible component upgrades that should be completed prior to each season’s initial calibrations.

2. System calibration - These steps include items normally conducted at the time of each season’s initial meter calibration.

System users should plan on attending a training session in late winter to review the steps involved in meter calibration. Contact your local AMVAC Representative for further information.
Operation

Once the controller has been setup by inputting the row and the planter configuration, both meters and speed input have been calibrated, and any additional optional information has been input for record keeping, then the system is ready to do its job.

The **OPERATE** mode must be used during application of insecticide. In this mode, the user can select the field in which to store information, change the insecticide application rate on the move, and either monitor true planter speed or change the fixed speed setting. The user is able to see the accumulated acres covered in the field. Also, information concerning functioning or failure of the system will be displayed on the controller and accompanied by auditory signals while in the **OPERATE** mode.

The **SET WEATHER SPECS** mode is available to identify weather conditions experienced during planting. The information entered in this mode is stored for record keeping. Use of the **SET WEATHER SPECS** mode is optional.

The **VARIABLE RATE = OFF MODE** is a new option for the SmartBox® controller to read prescription (variable) rates from an external GPS controller. An external GPS controller must be used with a prescription map to use this option. Contact your local AMVAC representative or call 888-SMARTBOX for more details.

The final mode available is the **MPH..AREA MONITOR** mode created to monitor speed and total acreage for a field in which no insecticide is being applied. In this mode, the controller will be active without use of the row units. Therefore, it may be used to view tractor speed and accumulate acreage covered with the planter or with other implements. When using this tool without the planter (and lift switch), the acre counter may be stopped by moving the main controller switch to the "OFF" position. This feature was added to the SmartBox® system as a benefit for the users, and its use is not required.

The Field **CAL ADJUST** option added to the **SETUP** menu allows the SmartBox® user to fine tune the system to specific planting conditions. To use this option, a complete set of insecticide boxes (one 50 pound container of insecticide per planter row) must be run completely through the SmartBox® system. The base containers should be empty when the new set of insecticide boxes are loaded, then the System should be operated until row alarms sound indicating the base containers have been emptied. Actual acres covered during the run must be carefully measured and noted. Once the complete load of insecticide has been dispersed, the actual acres covered may be inputted. This value will be compared with the expected acreage calculated for the planter (based on rate set, number of rows, and row spacing). This option may be used to adjust meter calibration by up to 10% of the set rate; adjustment beyond 10% will require the grower to do a complete meter calibration.

The following routines show the steps required to use each mode. For further information on controller messages and alarms, see the SmartBox® Troubleshooting Guides included in this manual.
Transfer Container

1. Remove rain cover from base container (see Figure 12). Store rain cover for use whenever transfer container is not installed on base container.

2. **Apply a light dusting of baby powder/talc on the base container seal prior to seating transfer container.** This step is necessary to avoid damage to the seals during removal of transfer container. Do not use a petroleum based silicon spray to lubricate the seals. Do not use graphite.

3. Remove the transfer container valve cover. Store cover for return of used container to Chemical Dealer.

4. Orient the transfer container so that the valve handles face away from the planter seed hopper.

5. Lower the transfer container so each valve is fully inserted into the mating base container valve. If valves are not fully seated, they will not open to release product to the base container.

6. Clamp transfer container to base container. **Rock each transfer container from side to side to make sure that clamps are secure.** If the transfer container is not clamped securely, the clamps may be made more secure by increasing the bend in the clamp arm which hooks onto the transfer container. If your base containers are supplied with locking pins, insert the pins through the clamps to further secure the transfer containers.

7. Turn valves toward off position before trying to open. Turn valves counter-clockwise 60° to open. If valve does not open smoothly, then the valve is not seated properly; unclasp container and repeat steps 4 through 6 above. Both valves must be closed before the transfer container can be removed.
Meter calibration is performed to adjust each meter to release an accurate insecticide rate. The meter calibration routine must be performed on all meters at the beginning of each season. In addition, any time a replacement meter is installed, that row must be re-configured and its new meter calibrated. **For best results, growers should recalibrate after planting 150 acres and/or when application rates are not accurate.**

**Pre-calibration Instructions:**
1. **Persons conducting meter calibrations must insure that proper safety equipment is used during calibrations.**
2. Prior to meter calibration, run each meter in the Operate mode for a minimum of five minutes with the tractor running. Meters may be run without chemical during the warm-up period.
   - To do this in the shop you will need to set the speed mode to fixed, instead of radar (refer to section D). Then go to operate on the main screen of your controller and set the controller as you would to plant your crop.
   - You will need to trip the lift switch to allow the meters to run.
   - This will also test your flow sensors on each meter.
3. Confirm that each base container is full of chemical. To fill, place a loaded transfer container on each base container and open valves.
4. Confirm that the scale used for weighing the catches is set to weigh grams and placed on a flat surface located out of the wind for proper measuring.

**Preliminary Steps**
- Number calibration bottles to correspond with the number of planter rows.
- Measure and record the tare (empty) weight of the empty catch bottle or apply tape to the calibration bottles to make the weight of each bottle match the weight of the heaviest one. Record the tare weight.
- Install a catch bottle under each meter discharge opening, matching the bottle number with the corresponding row number as configured in the controller. Position bottles so that bottle cap hinges are not damaged during installation. On John Deere planters with row mount brackets you will need to remove the bottle caps to allow them to fit over the meter discharge opening.
- Turn the main toggle switch in the lower left corner of the controller to the ON (up) position.
- Turn the A and B toggle switches to the ON (up) position.

**Step 1**
From the Main Menu select **SETUP** and press **ENTER**.

**Step 2**
Using the arrow keys, scroll to **METER CALIBRATION** and press **ENTER**.
Step 3
The value shown should equal the number of rows on the planter. The screen will automatically advance.

Step 4
Using the arrow keys, enter the desired calibration distance. The two options are 500' or 1,000'. The longer calibration distance, the more accurate the calibration will be.

Step 5
Using the arrow keys, enter the target catch amount corresponding to the desired application rate. The controller will be preset at 42.5 grams / 500 ft. (corresponding to 3.0 oz. / 1000 ft. of Fortress) but will allow a value between 5.0 to 120.0 grams / 500 ft. See chart below. Press ENTER to continue.

### SmartBox® Application Rate Table

<table>
<thead>
<tr>
<th>Product</th>
<th>Rate</th>
<th>Target Catch (500')</th>
<th>Passing Catch Range (500' cal. distance)</th>
<th>Target Catch (1,000')</th>
<th>Passing Catch Range (1,000' cal. distance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fortress® 5G</td>
<td>3.7 oz/1000 ft</td>
<td>52.5</td>
<td>49.9 - 52.5 grams</td>
<td>105.0</td>
<td>99.8 - 105.0 grams</td>
</tr>
<tr>
<td>Aztec® 4.67G</td>
<td>3.0 oz/1000 ft</td>
<td>42.6</td>
<td>40.5 - 42.6 grams</td>
<td>85.2</td>
<td>80.9 - 85.2 grams</td>
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<tr>
<td>Force® 3G</td>
<td>4.0 oz/1000 ft</td>
<td>56.8</td>
<td>53.9 - 56.8 grams</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Bolster™ 15G</td>
<td>5.5 oz/1000 ft</td>
<td>78.1</td>
<td>74.2 - 78.1 grams</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Step 6
Using the arrow keys, enter the test speed equal to the expected planting speed. For example, if the expected average planting speed is 5.5 mph, then scroll until the test speed is set at 5.5 mph. The controller will be preset at 6.0 mph but will allow a value between 1.0 to 14.0 mph. Press ENTER to continue.

Step 7
Press ENTER to start catch test.
Step 8
The **TIME REMAINING** value that first appears indicates the seconds required to plant 500 or 1000 feet of a row at the selected ground speed. The catch test will end automatically once the **TIME REMAINING** value has counted down to zero.

Step 9
Catch test completed. Press NEXT PAGE to enter catch amounts (or press ENTER to start another catch test).

Step 10
Weigh the caught amount for each row (not including the tare weight). A sample form to record the catch weights and the N and P number is included at the end of this section. Using the arrows, enter the caught amount for each row. Press ENTER to move to the next row. Once a catch amount has been entered for each row, the controller will automatically advance to the next screen.

End
If all catch amounts were within 5% of the target weight, then press ENTER to return to the SETUP mode. If any catch weight was outside of the 5% calibration variance, press NEXT and conduct another catch test. To complete another test catch return to step 4 and repeat.

AMVAC Chemical has provided calibration assistance and in-field calibration programs to allow you to monitor your application rate. The correct insecticide application rate is the responsibility of the farmer/operator.
## SmartBox® System - Operations
### SmartBox Calibration Record

<table>
<thead>
<tr>
<th>Used</th>
<th>Product</th>
<th>Rate</th>
<th>Target Catch (500’)</th>
<th>Passing Catch Range (500’ cal. distance)</th>
<th>Target Catch (1,000’)</th>
<th>Passing Catch Range (1,000’ cal. distance)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>49.9 – 52.5 grams</td>
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</tr>
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<td>74.2 – 78.1 grams</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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**Important:**
If the application speed and application rate differ from calibrated speed and calibrated rate more than +/-10%, then the system should be recalibrated at desired application speed and application rates.

### Catch Test Results

<table>
<thead>
<tr>
<th>Catch Test 1</th>
<th>Catch Test 2</th>
<th>Catch Test 2</th>
<th>Catch Test 3</th>
</tr>
</thead>
<tbody>
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<td>Row</td>
<td>Grams</td>
<td>Num</td>
<td>Grams</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>24</td>
<td>48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Replacing A Meter:

!!!! NOTICE !!!!

This meter assembly is intended for use only on the SmartBox® Insecticide Application System and only with products licensed for application using the SmartBox® system. Any other usage of this meter will result in the following actions:

1. All warranty for this meter and any other SmartBox® system component will be voided immediately.
2. User will be in violation of U.S. Patent laws and will be prosecuted to the fullest extent of the law.

!!!! Always replace the meter gasket !!!!

These instructions must be followed when removing or replacing a used meter:

A. Safety precautions: All SmartBox® system maintenance must be performed in strict compliance with all applicable product safety restrictions and recommendations as stated on the product label. Persons working with a SmartBox® system either containing or having contained a product are responsible for obtaining, reading, and following the product manufacturer’s safety instructions. The following instructions are included in, but are not a complete statement of, the requirements for use of AMVAC’s Fortress® 5G, a restricted use pesticide. These steps may or may not be applicable to the use of other products which may be available for use in a SmartBox® system. For detailed information concerning the safety requirements of any product, contact the applicable Chemical Dealer or manufacturer’s representative.

1. Comply with the following personal protective equipment requirements:
   a. long-sleeved shirt
   b. long-legged pants
   c. shoes plus socks
   d. coveralls
   e. waterproof gloves
   f. protective eyewear
   g. organic vapor respirator
2. Comply with the following user safety recommendations: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
3. Comply with all applicable storage and disposal regulations.

B. Removal of existing meter and / or meter gasket:

1. Turn off controller.
2. Unplug meter from wiring harness.
3. Close transfer container valves and remove transfer container.
4. Secure rain cover on base container.
5. Remove the eight bolts attaching the base container to the cradle as shown in Figure 1.
6. Invert the base container and remove the four 1/4" -20x3/4" bolts attaching the meter to the base container as shown in Figure 2. The 1/4" flat washer shown in Figure 2 may have been installed on the meter side of the joint as shown in the original SmartBox® Operator’s Manual.

7. Remove the meter from the base container.

8. Clear any wet product or obstruction from the meter screen and base container. If meter is to be re-installed, examine and clear any wet product or obstruction from the meter.

9. Properly dispose of the used meter gasket. If meter is being replaced, place the non-functional meter in a sealed plastic bag for return to AMVAC at a later date. Your AMVAC sales representative will provide instructions on the return procedures.

C. Installation of new meter and / or meter gasket:

1. Install the meter assembly as stated below and in the SmartBox® Operator’s Manual under “Installation: Meter to Base Container”.
   a. Position the meter with the 45° meter discharge opening facing forward (pointing toward the short side of the base container and pointing toward the planter tool bar).
   b. Ensure the gasket (always use a new meter gasket) and meter screen are properly installed on the meter.
   c. Place the 1/4" x 1" bolts up through the meter, base container flange, and 1/4" flat washer as shown in Figure 2 above. Lightly secure with the lock nuts.
   d. Examine meter gasket to make sure it is centered to provide a good seal.
   e. Tighten all bolts securely. Torque bolts to 25-30 in-lbs. Do not overtighten or under-tighten bolts. **NOTE: A 60% to 75% compression ration is required for the gasket to properly seal.**
2. Place the base container back on the cradle and replace the eight bolts holding it into position as stated in the SmartBox® Operator’s Manual under: “Installation: Base Container to Cradle”.

3. Replace the transfer container.

4. Turn on controller. Follow directions on controller screen to configure meter.

5. Plug meter into wiring harness. Configure and calibrate if a new meter has been installed. Used meters returned to their original rows do not require re-configuration or re-calibration.
The Speed Calibration routine is used to accomplish two objectives: to choose either true or fixed speed and to calibrate the true speed device if used. For further details on Speed Calibration, refer to Section B of the manual.

The in-field calibration described below is critical for accurate speed measurement and insecticide application. You must calibrate the speed device with the SmartBox® controller by performing the 200’ in-field calibration steps stated below. Do not enter the radar calibration number used for other monitors. If speed calibration is not performed correctly, then the values recorded for planter speed will produce errors in calculations of acreage treated, pounds of chemical applied, and pounds of chemical applied per acre. Inaccuracies resulting from failure to properly calibrate are the responsibility of the user.

**Step 1**
From the Main Menu select SETUP and press ENTER.

**Step 2**
Using the arrow keys, scroll to SPEED CALIBRATION and press ENTER.

**Step 3**
To choose true speed or fixed speed input, select MODE RADAR..FIXED and press ENTER.
Step 4
Use the arrow keys to choose **RADAR** (for either radar or true wheel speed monitor) or **FIXED** speed. Press **ENTER** to advance.

Step 5
If **FIXED** speed is chosen, use the arrow keys to change the speed. Press **ENTER** to return to the **SPEED CALIBRATION** menu.

Step 6
If **RADAR** is chosen, press **ENTER** to return to the **SPEED CALIBRATION** menu. If an in-field calibration has already been done, scroll to **RETURN** and press **ENTER** to return to the **SETUP** menu.

Step 7
If an in-field calibration has not been done, use the arrow keys to scroll to **IN-FIELD CALIB** and press **ENTER**.

Step 8
Measure and mark a linear course of 200 feet.

Step 9
Press either arrow key as you enter the course. The controller will then measure the counts of the radar. If your controller fails to count pulses as you move through the course, restart controller and repeat above steps. If pulses still do not register, you may need a signal booster for the radar system. See recommended contacts in Section A.
**Speed Calibration (continued)**

**Step 10**
Press the opposite arrow key as you exit the course. The controller will then calibrate according to the counts of the radar.

**Step 11**
Press **ENTER** to accept the calibration and return to the **SETUP** menu. Or, push either arrow to return to the **MEASURE 200 FEET** screen to redo the in-field calibration.

**Step 12**
To change radar counts per 200 feet (6096 counts is preset), select **COUNTS / 200 FEET** and press **ENTER**.

**Step 13**
Use the arrow keys to change the radar count value. Press **ENTER** to the **SPEED CALIBRATION** menu. This step may be done to move the radar reading slightly to agree with a monitor already calibrated and correct. Do not use the value provided in the radar system owner’s manual or obtained from calibration with a different monitor without confirming calibration with an in-field test.
**Speed Calibration (continued)**

**Step 14**
To reduce the count number for certain wheel sensors, select **RADAR DIVIDE NUM** and press **ENTER**.

**Step 15**
Using the arrow keys, select a number that will put the counts under 10,000. Press **ENTER** when complete.

**End**
Select **RETURN** to go to the **SETUP** menu.
The **OPERATE** mode is used during application of insecticide. **When ready to apply insecticide**, follow the **steps in this SELECT FIELD NUMBER routine**. Make sure the controller is showing the field number in which you want to collect and store data. If not, scroll to find the correct field number, then push the ENTER button to begin dispensing chemical. Verify rate in oz / 1000’ is set correctly. If the system does not dispense, refer to the Troubleshooting Guide located in Section C.

To return to the main menu during operation, press the “NEXT PAGE” and “PREVIOUS PAGE” buttons simultaneously.

### Important:
If application speed and application rate differ from calibrated speed and calibrated rate more that +/-10%, then the system should be recalibrated at desired application speed and applied rates.
Select Field Number *(continued)*

**Step 5**
Press NEXT PAGE, PREVIOUS PAGE, or ENTER to show date and time.

**Step 6**
The screen shown on the left is the planting screen displayed when using a fixed speed. Use the arrow keys to change the application rate. Press ENTER to move to the next screen.

**Step 7**
Use the arrow keys to change the fixed speed.

**Step 8**
Press NEXT PAGE, PREVIOUS PAGE, or ENTER to show date and time.

The following screen will appear every 30 seconds when the screen is operating properly.

If a message other than the “System OK” message is displayed indicating that the system is not dispensing chemical, then the Troubleshooting Guide located in Section D may be used to diagnose the cause and make the necessary corrections.
As stated previously, this option is used to fine tune the system to specific planting conditions. To use this option, a complete set of insecticide containers must be run completely though the SmartBox® system. Actual acres covered during the run must be carefully measured and noted. Once the complete load of insecticide has been dispensed, the actual acres covered value may be input. This value will be compared with the expected acreage calculated for the planter (based on rate set, number of rows, and row spacing), and the system will be adjusted to compensate for any environmental or field conditions affecting system accuracy.

Field Cal Adjust

Step 1
From the Main Menu select SETUP and press ENTER.

Step 2
Choose FIELD CAL ADJUST and press ENTER.

Step 3
If actual acreage has been measured while a complete set of full insecticide boxes have been run completely through the SmartBox® system, press ENTER to go on. Otherwise, do not use this function to adjust calibration.

Step 4
Use the up and down arrow keys to adjust the actual acre value. Press ENTER. The controller will then advance to the SETUP menu.
The On/Off routine is performed to turn individual flow sensors or meters on or off as needed. This function can be used to shut off individual rows during re-calibration, during troubleshooting of the system, or whenever a row will not be used.

This function may be used in place of the AB programming function. Once a meter or flow sensor has been turned off, it can only be turned back on by using this routine again.

Should a flow sensor malfunction during planting, this routine may be used to eliminate repeated auditory warnings concerning the meter. Should such a failure occur, however, it should be corrected as soon as possible to avoid the chance of running out of chemical in the row for which the flow sensor has been disabled.

**Step 1**
From the Main Menu select **SETUP**.

**Step 2**
Using the arrow keys, scroll to **ON/OFF** and press **ENTER**.

**Step 3**
Using the arrow keys, scroll to **FLOW SENSOR** and press **ENTER**.

**Step 4**
Using the arrow keys, select **ON** or **OFF** for the flow sensor on row 1. If **OFF** is selected, then the meter on row 1 will still operate but the flow sensor will be turned off. Press the “PREVIOUS PAGE” or “NEXT PAGE” button to move to another row. Press **ENTER** to return to the **ON/OFF** menu.
On/Off (continued)

Step 5
Using the arrow keys, scroll to METER and press ENTER.

Step 6
Using the arrow keys, select ON or OFF for the meter on row 1. If OFF is selected, then the meter on row 1 will not operate. Press the “PREVIOUS PAGE” or “NEXT PAGE” button to move to another row. Press ENTER to return to the ON/OFF menu.

End
Select RETURN to go to the SETUP menu.
Set Weather Specs

Step 1
From Main Menu select SET WEATHER SPECS and press ENTER.

Step 2
Using the arrow keys, scroll to CLOUD CONDITIONS and press ENTER.

Step 3
Use the arrow keys to find the applicable condition. Press ENTER to select the condition and return to the SET WEATHER SPECS menu. The condition selected will be stored for record keeping.

Step 4
Repeat Steps 2 and 3 for WIND DIRECTION, WIND SPEED AND TEMPERATURE.

Step 5
Press RETURN to return to the Main Menu.
AB Control Switch

The AB Control Switch routine is used to select certain meters to be controlled by the A or B switch. This function is beneficial when planting point rows or planting along the edge of a field. Those rows which are not needed can be shut off simply by pre-assigning those rows to the A or B switch, and then flipping the corresponding switch to the off, or down, position.

The simplest way to understand this function is to ask the following question while programming the controller: When the A (or B) switch is off (pushed to the down position), do I want row 1 (or other row) shut off? If the row is to be shut off, then the answer is "yes". If the row is to be on, then the answer is "no".

Use of this function is optional.

Step 1
From the Main Menu select SETUP.

Step 2
Using the arrow keys, scroll to AB CONTROL SWITCH and press ENTER.

Step 3
Using the arrow keys, select YES or NO for row 1 on the A switch. If YES is selected, then the meter on row 1 will shut off when the A switch is flipped to the down position. Press the "NEXT PAGE" button to advance to the next row. Press ENTER to move to the B switch.

Step 4
Repeat Step 3 for B switch assignments. Press ENTER and return to the SETUP menu.
Area Information

**Step 1**
From the Main Menu select **OPERATE** and press **ENTER**.

**Step 2**
Choose **AREA INFORMATION** and press **ENTER**.

**Step 3**
Use the arrow keys to scroll through the fields to view areas accumulated in each.

**Step 4**
To reset the acres to 0.0, press and hold **ENTER** for 3 seconds.

**Step 5**
Press **NEXT PAGE** to move to the next screen.
Area Information (continued)

Step 6
This acreage accumulator may be reset any time to keep track of acres planted during any period. Press NEXT PAGE to move to the next screen and repeat for Total Areas Steps 2 through 4. These accumulated values will be stored for record keeping. Press NEXT PAGE to return to the OPERATE menu.

Step 7
Select RETURN and press ENTER to return to the Main Menu, or choose SELECT FIELD # to continue planting.
Variable Rate

The Variable Rate option is used when operating an external GPS controller. The GPS controller can send prescribed application rates to the SmartBox® controller for variable rates across the field. Typically, the Variable Rate will be disabled (off) for standard planting conditions. The Variable Rate should be enabled if you are using an external GPS controller and sending prescribed application rates to the SmartBox® controller.

Step 1
From the Main Menu select VARIABLE RATE = OFF and press ENTER.

Step 2
Use the arrow keys to select either “DISABLED” or “ENABLED” mode.

Step 3
To return to the Main Menu, press ENTER.
MPH..Area Monitor

The MPH..Area Monitor routine is used to monitor speed and acreage when not applying insecticide. This function may be used with the lift switch (active) or without the lift switch (inactive). In the inactive mode, acreage accumulation is stopped by moving the main meter switch to the OFF position. Although the controller will show the speed and accumulated acres while in this mode, the information will not be stored for record keeping or printout.

Step 1
From the Main Menu select MPH..AREA MONITOR and press ENTER.

Step 2
Set the implement width using the arrow keys and press ENTER.

Step 3
Use the arrow keys to select either "ACTIVE" or INACTIVE" mode.

Step 4
To reset the area, press ENTER and hold for 3 seconds. The screen will automatically advance if the area is not reset.

Step 5
To Return to the Main Menu, press PREVIOUS PAGE AND NEXT PAGE simultaneously.
# TROUBLESHOOTING GUIDE

OPERATION

WHEN SYSTEM IS NOT DISPENSING IN THE OPERATE MODE, USE THE FOLLOWING CHECKS TO DETERMINE THE GENERAL CAUSE:

1. HAVE TRANSFER CONTAINERS BEEN LOADED ONTO THE BASE CONTAINERS, ARE THE TRANSFER CONTAINER VALVES OPEN, AND IS THERE CHEMICAL IN THE BASE CONTAINERS?
   - YES - GO TO NEXT QUESTION
   - NO - LOAD CHEMICAL AND OPEN VALVES

2. IS THE MAIN TOGGLE SWITCH IN THE ON POSITION?
   - YES - GO TO NEXT QUESTION
   - NO - MOVE SWITCH TO THE ON POSITION

3. ARE ALL METERS ASSIGNED TO A/B SWITCHES AND ARE THE SWITCHES IN THE OFF POSITION?
   - YES - MOVE SWITCHES TO THE ON POSITION
   - NO - GO TO THE NEXT QUESTION

4. ARE ALL METERS TURNED OFF IN THE SETUP ON/OFF ROUTINE?
   - YES - TURN METERS BACK ON
   - NO - GO TO NEXT QUESTION

5. IF USING RADAR (OR TRUE WHEEL SPEED), IS TRACTOR TRAVELLING AT LEAST 2.1 MPH?
   - YES - GO TO NEXT QUESTION
   - NO - INCREASE SPEED; METERS WILL NOT OPERATE BELOW 2.1 MPH

6. DO THE METERS OPERATE IN THE CALIBRATE MODE BUT NOT THE OPERATE MODE?
   - YES - PROBLEM IS A LIFT SWITCH OR SPEED SENSOR ISSUE
   - NO - PROBLEM IS A METER OR WIRING ISSUE

7. IF "YES" TO QUESTION 6, DO THE METERS OPERATE WITH FIXED SPEED BUT NOT RADAR (OR TRUE WHEEL SPEED)?
   - YES - PROBLEM IS A SPEED SENSOR ISSUE
   - NO - PROBLEM IS A LIFT SWITCH ISSUE

8. IF "NO" TO QUESTION 7, DO THE METERS OPERATE WHEN THE LIFT SWITCH IS ROTATED TO THE OPPOSITE POSITION (CHECK WITH PLANTER LOWERED AND USING FIXED SPEED)?
   - YES - LIFT SWITCH IS INSTALLED INCORRECTLY
   - NO - PROBLEM IS LIFT SWITCH OR LIFT SWITCH WIRING ISSUE

9. IF "NO" TO QUESTION 8, MOVE THE LIFT SWITCH TO ANOTHER WIRING HARNESS CONNECTOR. DO THE METERS OPERATE NOW (CHECK WITH PLANTER LOWERED AND USING FIXED SPEED)?
   - YES - PROBLEM IS DEFECTIVE HARNESS WIRING OR CONNECTOR
   - NO - PROBLEM IS DEFECTIVE LIFT SWITCH

### PROBLEM | GENERAL CAUSE | CONTROLLER MESSAGE | SPECIFIC CAUSE | SOLUTION
--- | --- | --- | --- | ---
SYSTEM (ALL METERS) NOT DISPENSING | NO CHEMICAL FLOW TO METERS | "CHEMICAL FAILURE ROW NUMBERS" | TRANSFER CONTAINERS AND BASE CONTAINERS CLOSED | LOAD CHEMICAL OR NEED TO RELEASE FLOW TO CONTINUE OPERATING | REPEAT OPERATE ROUTINE
METER ISSUE | "NOT DISPENSING CHEMICAL PRESS BOTH PREV/ NEXT TO GO TO MAIN MENU" | METERS TURNED OFF WITH MAIN TOGGLE SWITCH | TRANSFER CONTAINER VALVES CLOSED | OPEN VALVES TO RELEASE FLOW | REPEAT OPERATE ROUTINE
 | "1! WARNING!! 'A' SECTION OFF OR 'B' SECTION OFF!" | "NO ACTIVE ROWS" | ALL METERS NOT ATTACHED | ATTACH METERS | REPEAT OPERATE ROUTINE
WIRING PROBLEM | "NOT DISPENSING CHEMICAL PRESS BOTH PREV/ NEXT TO GO TO MAIN MENU" | "NO RESPONSE FROM ROW UNITS" | CONTROLLER CABLE NOT ATTACHED | ATTACH CONTROLLER CABLE | REPEAT OPERATE ROUTINE
 | "NOT DISPENSING CHEMICAL PRESS BOTH PREV/ NEXT TO GO TO MAIN MENU" | "NO RESPONSE FROM ROW UNITS" | HARNESS CABLE CUT | INSPECT HARNESS CABLE; SPlice OR REPLACE IF CUT | REPEAT OPERATE ROUTINE
 | "NOT DISPENSING CHEMICAL PRESS BOTH PREV/ NEXT TO GO TO MAIN MENU" | "NO RESPONSE FROM ROW UNITS" | HARNESS CABLE CUT | INSPECT HARNESS CABLE; SPlice OR REPLACE IF CUT | REPEAT OPERATE ROUTINE

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Section D
TROUBLESHOOTING GUIDE

MPH..AREA MONITOR

NOTE: IN THE MPH..AREA MONITOR MODE, JUST AFTER ENTERING THE IMPLEMENT WIDTH, MODE MAY BE SET TO EITHER "ACTIVE" OR "INACTIVE". "ACTIVE" MODE IS USED IF THE LIFT SWITCH IS CONNECTED. ACRE ACCUMULATION WILL DISCONTINUE WHEN THE LIFT SWITCH IS RAISED. "INACTIVE" MODE IS USED IF THE LIFT SWITCH IS NOT CONNECTED. ACRE ACCUMULATION WILL DISCONTINUE WHEN THE CONTROLLER'S MAIN SWITCH IS MOVED TO THE OFF POSITION.

IN AN EMERGENCY, PLEASE CONTACT YOUR LOCAL SMARTBOX EQUIPMENT DEALER. YOUR DEALER HAS BEEN FACTORY CERTIFIED AND TRAINED ON INSTALLATION, SETUP, AND OPERATION OF THE SMARTBOX SYSTEM. YOUR DEALER WILL HAVE REPLACEMENT PARTS ON HAND.

SHOULD YOU NEED ADDITIONAL HELP, PLEASE CALL THE SMARTBOX 24-HOUR HELP LINE AT 1-888-SMARTBOX.
The Employees of

AMVAC

would like to thank you for purchasing the SmartBox® System. We are proud of our quality and believe this product will exceed your expectations!

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