

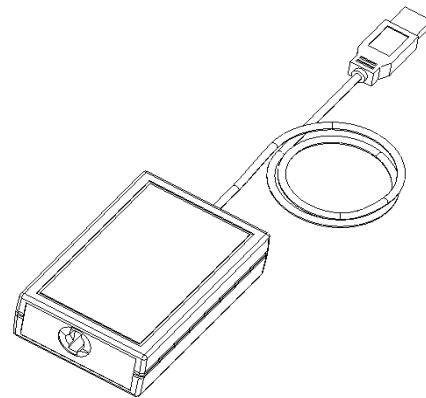
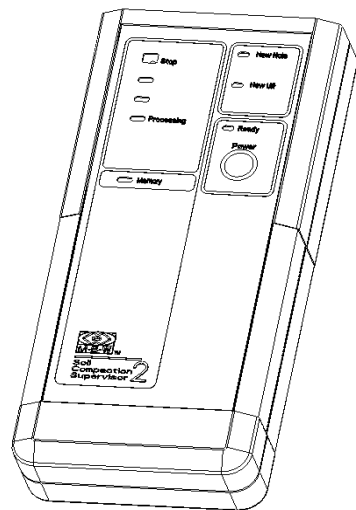
# OPERATOR'S SAFETY AND SERVICE MANUAL



## SCS2 & KEY READER

This manual covers the following serial numbers  
and higher for each model listed:

SCS2.....6060007



## SOIL COMPACTION SUPERVISOR 2 & KEY READER

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# SAFETY PRECAUTIONS



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**READ AND STUDY THE FOLLOWING SAFETY INFORMATION BEFORE ATTEMPTING TO OPERATE THIS EQUIPMENT. IN ADDITION, ENSURE THAT EVERY INDIVIDUAL WHO OPERATES OR WORKS WITH THIS EQUIPMENT IS FAMILIAR WITH THESE SAFETY PRECAUTIONS.**

## **Noise Protection**

Wear O.S.H.A. specified hearing protection devices.

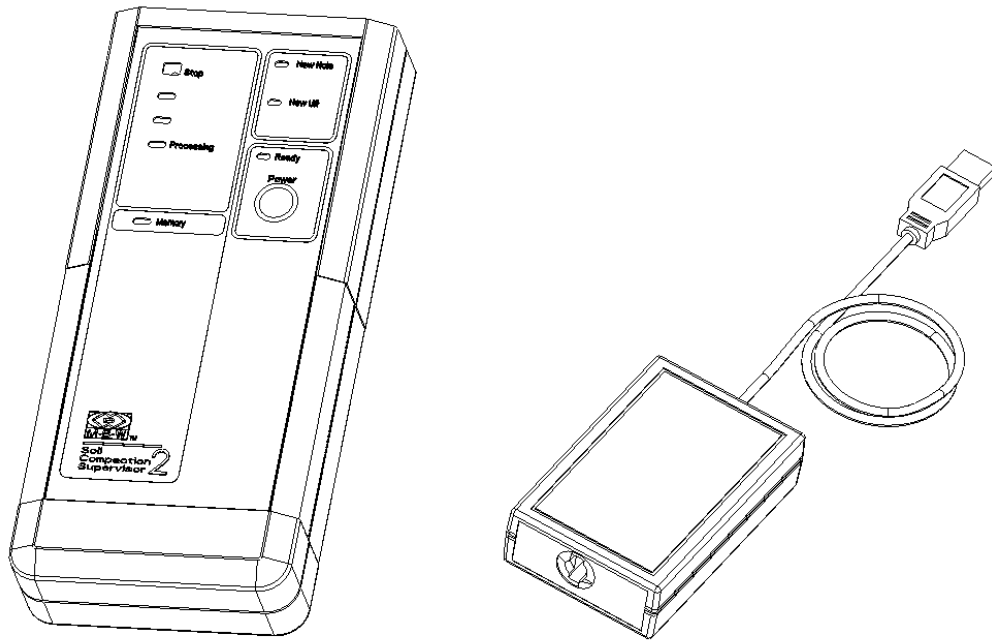
## **Eye Protection**

Wear O.S.H.A. specified eye shields, safety glasses, and sweat bands.

## **References**

For details on safety rules and regulations in the United States, contact your local Occupational Safety and Health Administration (OSHA) office. Equipment operated in other countries must be operated and serviced in accordance and compliance with any and all safety requirements of that country. The publication of these safety precautions is done for your information. MBW does not by the publication of these precautions, imply or in any way represent that these are the sum of all dangers present near MBW equipment. If you are operating MBW equipment, it is your responsibility to insure that such operation is in full accordance with all applicable safety requirement codes. All requirements of the United States Federal Occupational Safety and Health Administration Act must be met when operated in areas that are under the jurisdiction of that United States Department.

# SPECIFICATIONS

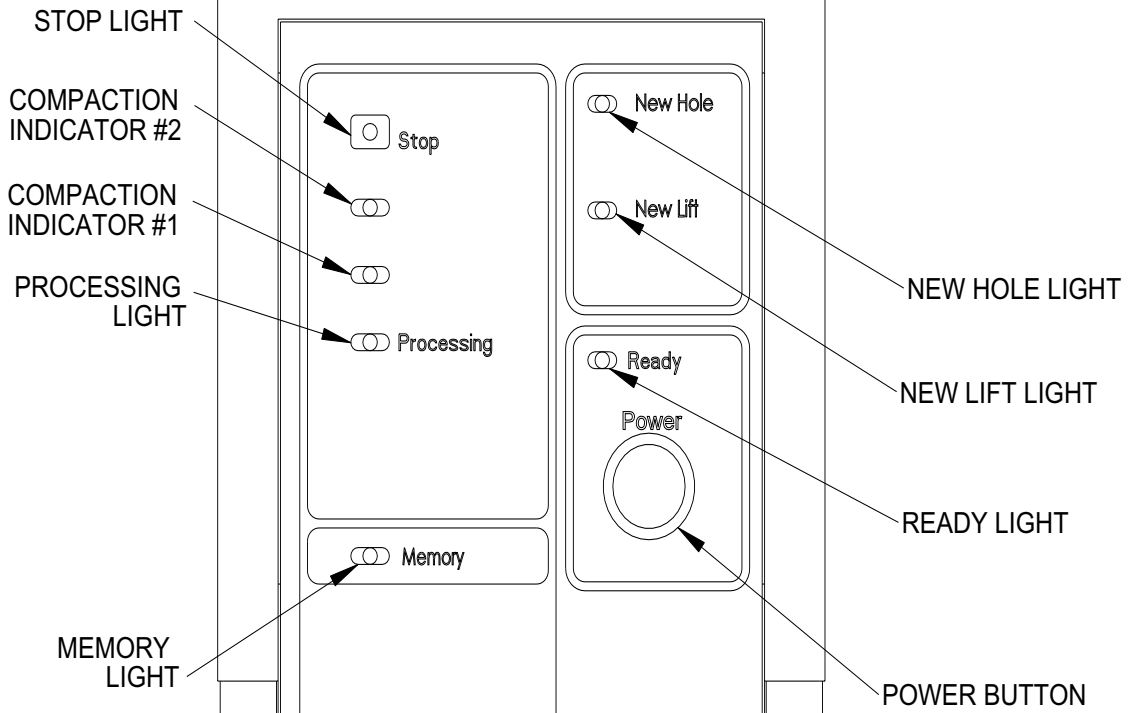


	<b>SCS2</b>
<b>Batteries</b>	4 "AA" type alkaline
<b>Battery Life</b>	Up to 40 hours of continuous use
<b>Automatic Power Off</b>	After 10 minutes of inactivity
<b>Meter Memory Capacity</b>	90 records
<b>Key Memory Capacity</b>	200 records
<b>Key Memory Life</b>	10 years minimum
<b>Key Contact Life</b>	15,000 insertion/removal cycles minimum
<b>Clock</b>	Internal with 10-year battery

Specifications subject to change without notice

KEY RECEPTICLE

SENSOR RECEPTICLE



# Layout

# INTRODUCTION

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The Soil Compaction Supervisor 2 is a low cost, easy to use instrument that assists with optimizing the compaction of backfill by eliminating over and under compaction. The Soil Compaction Supervisor 2 also provides the ability to record compaction data for analysis and quality control.

The system consists of a portable, battery powered Soil Compaction Supervisor 2, a disposable sensor, and a reusable data key. In use, the sensor is placed in the bottom of the excavation and its cable is connected to the Soil compaction Supervisor 2. As each lift is compacted the sensor sends a signal to the Soil Compaction Supervisor 2 which determines when the maximum compaction has been achieved under the current conditions. When the lift has been compacted to the optimum level, the Soil Compaction Supervisor 2 signals the user to stop and the data for that lift is recorded. The Soil Compaction Supervisor 2 has internal memory, so it can record data either with or without the data key in place. This data can later be downloaded to a personal computer with the MBW Key Reader



## **CAUTION**



**The use of the SCS2 (Soil Compaction Supervisor 2) does not, in any way lessen the importance of following good soil reinstatement practices. Backfill soils MUST be acceptable for specific backfill purposes. Lift thickness MUST be controlled relative to soil type and capacity of the compaction device. Soils MUST have moisture contents in a reasonable range relative to optimum. The compaction equipment MUST be in good operating condition. Failure to consistently apply the accepted principles of good soil reinstatement can result in failure, with or without the use of quality control instrumentation.**

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# USING THE SOIL COMPACTION SUPERVISOR

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## Power On/Off

- To turn the Soil Compaction Supervisor on, press and release the “Power” button.
- To turn the SCS2 off, press and hold the “Power” button for about four seconds. Release the button when the READY light turns off.

The SCS2 performs a short self-test immediately following power up. These tests include: data transfer to the key (if inserted), memory level check, and sensor check. If any of the tests fail, an error will be displayed.

**Note: An error is signified by the flashing STOP light. See the “Errors Lights” section (page 8) for information about errors.**

If all tests pass, the READY light will turn on.

## Inserting and Removing Key

- To insert the key, push it into the middle slot on the top of the SCS2 and turn in clockwise 90°.
- To remove the key, turn it counter-clockwise 90° and pull it out of the SCS2.

## Attaching/Removing Sensor

- To attach the sensor insert the plug end of the cable into the rectangular receptacle on the top of the SCS2. The plug can only be inserted one way and will “click” when it is inserted all the way.
- To remove the sensor depress the tang on the plug and gently pull away from the SCS2.

## Monitoring Compaction

1. Place sensor on a firm flat surface at the bottom of the excavation. Cover the sensor with a small pile of soil to keep it in place and protect it from the initial backfill.

**Note: The words “THIS SIDE UP” molded into the sensor must face the top of the excavation.**

2. Route the cable up the side wall of the excavation.
3. Backfill the excavation to a depth of 6-12 inches.

**Note: The maximum working depth for the sensors is approximately four feet depending on soil type. Multiple sensors may need to be used on excavations over four feet deep.**

4. Position the sensor cable so it will not get damaged during compaction.
5. Plug the sensor into the top of the SCS2.
6. Start running the compactor toward the sensor.

**Note: For keyhole applications, place sensor in the center of the hole, and run tamper in a circular pattern.**

7. **Turn on the SCS2 3-4 feet before the compactor reaches the sensor.** See “Power On/Off.”
8. Continue running the compactor past the sensor and compact in a normal pattern. The PROCESSING light will begin to flash (after about 5 seconds). The SCS2 is now done calibrating itself. The PROCESSING light will now flash slowly (once per second) when the SCS2 is calibrated for a percussion machine or quickly (3-4 per second) for a vibratory machine.

**Note: If the SCS2 misidentifies the machine, Turn the unit off, and restart.**

9. Toggle to the correct hole/lift condition by pressing the POWER button. See “Toggling New Hole/New Lift” section for more information.
10. Continue to compact the entire lift. The SCS2 will monitor the compaction as consecutive passes are made over the lift. The PROCESSING light will continue to flash as long as the SCS2 is receiving data from the sensor. The COMPACTION INDICATOR lights will light, indicating the approximate stage of compaction as additional passes are made over the lift.
11. When the STOP light comes on, finish the current pass. Again, if the current pass over the lift is incomplete, finish the pass and then stop compacting.

**Note: At this point, the “MEMORY” light will quickly flash indicating the data has been stored to the data key (if inserted) or to the SCS2’s internal memory.**

12. Press and hold the “POWER” button to turn the SCS2 off. See “Power On/Off” section for more information.

**Note: The SCS2 will automatically turn off after 30 seconds after the STOP light comes on.**

## Toggling New Hole/New Lift

To toggle between a “NEW HOLE” and a “NEW LIFT” press the “POWER” button any time when “READY” light is on.

The purpose of this function is explained in the “Data Management”

## Data Management

The following data is recorded by the SCS2: Compaction Start Date/Time, compaction time in minutes and seconds, job number, lift number, machine type, and completion status. The only data the user defines is new hole or new lift. Using the appropriate New Hole/New Lift setting is important for managing data. The user may need to toggle this setting if it does not describe the correct compaction process. The SCS2 defaults to “NEW HOLE” when it is turned on.

### Example of Data Management

The following example will describe the proper way to use the SCS2 to record the data for two holes that will require two lifts each to be completely backfilled. This example does not describe all of the steps required to operate the SCS2. See the “Monitoring Compaction” section for complete instructions.

- As the first lift of the first hole is being compacted the SCS2 should be powered on and the “NEW HOLE” light should be toggled “on” to signify the first lift of a hole.

After the first lift is completed the data is saved as Hole #1, Lift #1.

- The second lift is added to the first hole and compaction is started. After the SCS2 is powered on, the “NEW LIFT” light should be toggled on. The data for this lift will be saved as Hole #1, Lift #2.
- As the compaction of the first lift of the second hole is started the SCS2 should be powered on and the “NEW HOLE” indicator lit. The data from this lift will be recorded as Hole #2, Lift #1.

### Error Lights and Troubleshooting

The STOP light will blink when the meter encounters an error. The SCS2 will stop all functions when displaying the error code. The error codes are represented by additional lights flashing in unison with the STOP light. The errors and possible solutions are described in Table 1.

Flashing Light*	Error	Possible Solution
Data Transferred Light	Error reading/writing data key	Rotate key to fully locked position Use a different data key
Memory Light (slow flashing)	No additional data can be recorded	Transfer data from meter to key Use a different data key
Memory Light (quickly flashing)	Key has insufficient capacity to store the data from the meter	Use a data key with more capacity
Ready Light	No signal from sensor	Plug in sensor Replace sensor
Stop Light Only	Low battery	Replace batteries

\*The STOP light will also be flashing

Table 1 - Error Lights

### Data Location - Key vs. Meter

Compaction data can be stored in the SCS2’s internal memory or on data keys. The memory in the SCS2 allows about 90 records to be stored. The capacity of the key is about 200 records. The SCS2 functions the same regardless of where the data is stored.

- To use the key to store the data, insert the key into the SCS2 before monitoring the first compaction. Follow the instructions in the “Monitoring Compaction” section on page 5.
- To use the SCS2 to store the data, do not insert a data key. Follow the instructions in the “Monitoring Compaction” section on page 5.

### Memory Used

The SCS2 can display the amount of memory being used by compaction data.

**Note: To display the memory used on a data key, insert the key into the meter before following the steps below. To check the amount of internal memory being used, make sure a data key is not inserted into the meter.**

- Make sure the SCS2 is off and a sensor is not plugged in the top of the meter.
- Turn the meter on. The STOP and READY lights will flash, signaling a sensor error.
- Press and hold the “POWER” button until the MEMORY light comes on.

- The amount of memory being used is displayed according to Table 2.

Lights On*	Memory Used			
	0–30%	31–60%	61–94%	95+%
Stop				X
Indicator 2			X	X
Indicator 1		X	X	X
Processing	X	X	X	X

\*In addition to MEMORY FULL light.

Table 2 – Memory Indicator Lights

### Transferring Data From the SCS2 to the Key

- Turn the SCS2 power off.
- Insert a data key into the SCS2.
- Turn on the SCS2.
- The SCS2 will perform the self-test, check to see if there is room on the key for the data, and then immediately transfer the data in the SCS2 to the key.

**Note: The MEMORY light will flash while the data is transferring to the key. If the key contains data, the new records will be appended after the original records on the key.**

- When the data transfer is complete, the READY light will come on to signal the SCS2 is ready to monitor compaction.

### Updating the Date and Time in the SCS2

The procedure for updating the date and time requires a blank data key and a data key reader. The procedure is outlined in “Updating Date and Time In the Meter” on page 12.

### Replacing Batteries

- Slide the battery cover (located on the back of the SCS2) in the direction of the “open” arrow. Lift the cover off.
- Remove old batteries and dispose of properly.
- Insert four new batteries making sure the positive side is on the same side as indicated by the positive sign in the batter compartment.
- Put the battery cover back on the SCS2.



**Failure to install batteries in the correct orientation may result in damage to the unit.**



**Replace all batteries at the same time. Do not mix old and new batteries.**

# USING THE USB KEY READER

## Minimum System Requirements

- Processor: Pentium or greater.
- System Software: Windows 2000 or XP, and Microsoft EXCEL 2000 or 2002.
- Memory: 32MB installed ram.
- Hard Disc Space: 5MB available hard disc plus 10MB additional during installation.
- One unused USB port.

## Software Installation

1. Insert the supplied CD into computer.
2. Run "setup.exe" from the supplied CD. (May need administrative rights on computer for installation.)
3. Follow the onscreen instructions.

## Key Reader Installation

1. Remove the key reader and the interface cable from the shipping materials.
2. Insert the square end of the interface cable into the receptacle on the back of the reader.
3. Connect the large end of the cable into an open USB port on the computer.
4. Follow onscreen instructions to install drivers for keyreader. If prompted to find drivers, browse to the folder called "Keylink Ilu Drivers" on the cd.
5. On some systems, you may be prompted to install another driver. Repeat step 4.

## Starting the Key Reader Software

1. Click start from the taskbar.
2. Select programs.
3. Select MBW Key Reader menu.
4. Select MBW Key Reader icon.

## Inserting and Removing The Key

To insert the key, push it into the slot on the key reader and turn it 90° to secure it in place. To remove the key turn it 90° counter-clockwise and pull it out of the slot.

## Key Reader Software Interface

Once the MBW key reader program is started, you will see the interface screen (see figure 1). The screen contains a message area and six buttons. The message area displays information about the key. The functions of the buttons are described below.

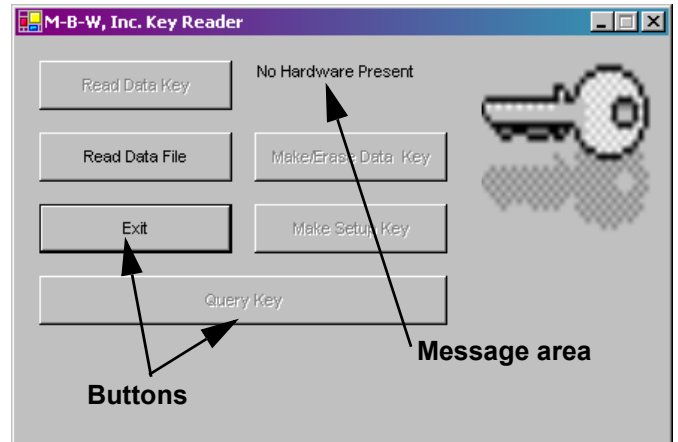


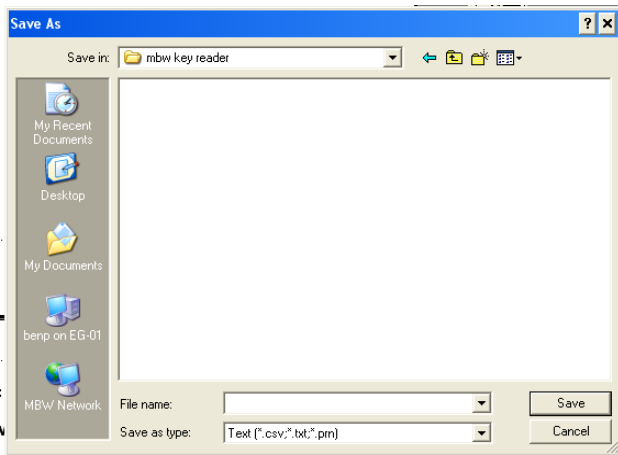
Figure 1

- Read Data Key: Download the data from the key, launch Excel to view and edit, and write original data to a ".mbw" file.
- Read Data File: Reads archived data from a ".mbw" file.
- Exit: Exits from the Key Reader Program.
- Make/Erase Data Key: Erase any information stored on the key.
- Make Setup Key: Writes the date and time from the computer to the data key for setting the date and time on the Soil Compaction Supervisor.
- Query Key: Check reader to determine if a key is inserted and what is on it.

## Reading Data from the Key

1. Start the MBW Key Reader program (if its not already running).
2. Insert the key into the reader and press the "Query Key" button. The status of the key will be displayed in the message are.
3. Press the "Read Data Key" button. A "Save As" dialog box will appear. (See Figure 2), and Excel will launch.

**Note: If the key does not contain data records, the “Read Data Key” will be disabled.**



**Figure 2**

4. Select the appropriate file location, type in the file name, and click the “save” button.

**Note: The file will be saved as a “.mbw” data file which will allow the user to maintain data security. See “Read Data File” section of the manual.**

5. After Excel launches, the data will appear and be auto-formatted. If desired, user may add notes such as “location” and “soil type” to data records.
6. Use Excel’s “Save As” command to store the modified spreadsheet.

**Note: Some older versions of Excel may require that it be left open between reads. If Excel is closed, and another data file is read, it may be necessary to close both Excel and the Key Reader program, then restart.**

## Erasing Data from the Key

1. Start the MBW key reader program (if it is not already running).
2. Insert the key into the key reader. The status of the key will be displayed after the “Query Key” button is pressed.
3. Press the “Make/Erase Data Key” button.

**Note: Erased data can not be recovered.**

## Read Data File

The MBW Key Reader Program features enhanced security to keep the data from being tampered with. When data is read from the key, (see “Reading data from the Key” section) it is stored in two places, the first is in a cryptic

“.mbw” file which cannot be altered, and the second is the Excel spreadsheet which is allowed to be manipulated for reporting purposes. If the integrity of the spreadsheet data ever comes into question, the unchangeable “.mbw” file can be re-read and compared to the modified spreadsheet.

1. Start the MBW key reader program (if it is not already running).
2. Press the “Read Data File” button. An “Open” dialog box will appear.
3. Navigate to where the original “.mbw” file is stored, select the file and click “open.”
4. Excel will launch and auto-format the data.
5. Use Excel’s “Save As” command to store the file in the desired location.

**Note: The “.mbw” can be re-read as often as desired. It is recommended that the “.mbw” file has the same file name as the Excel spreadsheet for easy reference.**

## Data Content

- Start Date/Time - Displays the date and time of the start of the compaction.
- Length Minutes - Displays the number of minutes from the start of the compaction until the STOP light turned on.
- Length Seconds - Displays the number of seconds past the length in minutes from the start of the compaction until the STOP light turned on.
- Job Number - Displays the job number of the compaction.
- Lift Number - Displays the lift number of the compaction.
- Machine type and Completion status - These two columns display information about the lift. The Machine Type column will display the type of compaction equipment used to compact the lift. If a problem occurs during the compaction process, an error message will be displayed in place of the machine type. The completion status column will contain one of three messages followed by a completion time. Table 1 describes the messages and their meanings.
- When an error occurs, the compaction time field will indicate how much compaction had been done before the error occurred. Errors will not be recorded within the first 15 seconds of compaction. This prevents multiple data entries being recorded in the event of a recording error such as a fractured sensor wire.

Machine Type	Completion status	Description
Percussion	Completed Normally	Normal results using a percussion compactor.
Vibratory	Completed Normally	Normal results using a vibratory compactor
Unknown Device	Lost sensor	Sensor was disconnected while monitoring compaction.
Unknown Device	Inactivity Time-out	Compaction was started, and then stopped before the STOP light was turned on. The meter then automatically powered off after 10 minutes.

**Table 1 - Machine type and completion status**

## Updating Date and Time In the Meter

The Soil Compaction Supervisor has an internal clock that supplies the date and time for the data records. The internal clock can be updated as required using a setup key. The update process requires steps to be performed using the key reader and the Soil Compaction Supervisor. Have both available before starting the procedure.

### Key Reader-

1. Make sure the date and time are correct on the computer.

**Note: The date and time from your computer will be written to the setup key when it is created.**

2. Start the MBW Key Reader program (if it is not already running).
3. Insert the key into the reader. The status of the key will be displayed in the message area.
4. Press the "Make Setup Key" button.

**Note: All data on the key will be erased when creating a setup key.**

5. Remove the setup key from the reader after it is created.

### Soil Compaction Supervisor 2-

1. Unplug the sensor from the SCS2 (if one is plugged in).
2. Press the power button to turn on the Soil Compaction supervisor.
3. Wait for the self test to finish, then insert the setup key into the Soil Compaction Supervisor.
4. Press and hold the power button. Release the power button when the lights on the right side of the unit blink in unison.

**Note: The SCS2 will turn off when the date and time are updated.**

5. Turn the SCS2 on with the setup key in place.

**Note: This will turn the setup key into a data key.**

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# REPLACEMENT PARTS

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The warranty is stated in this book on page 18. Failure to return the Warranty Registration Card renders the warranty null and void.

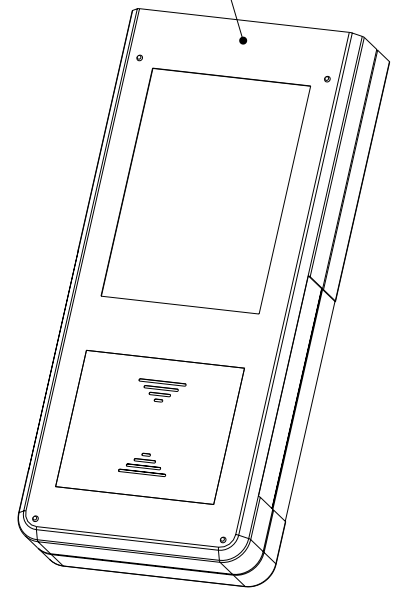
MBW has established a network of reputable distributors/dealers with trained mechanics and full facilities for maintenance and rebuilding, and to carry an adequate parts stock in all areas of the country. Their sales engineers are available for professional consultation. If you cannot locate an MBW distributor in your area, contact MBW or one of our Sales Branches listed below.

When ordering replacement parts, be sure to have the following information available:

- Model and Serial Number of machine when ordering MBW parts
- Model and Serial Number of engine when ordering engine parts
- Part Number, Description, and Quantity
- Company Name, Address, Zip Code, and Purchase Order Number
- Preferred method of shipping

**REMEMBER - You own the best! If repairs are needed, use only MBW parts purchased from authorized MBW distributors.**

SERIAL NUMBER DECAL



**Write Model Number here**

**Write Serial Number here**

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## Contact Information

### **MBW, Inc.**

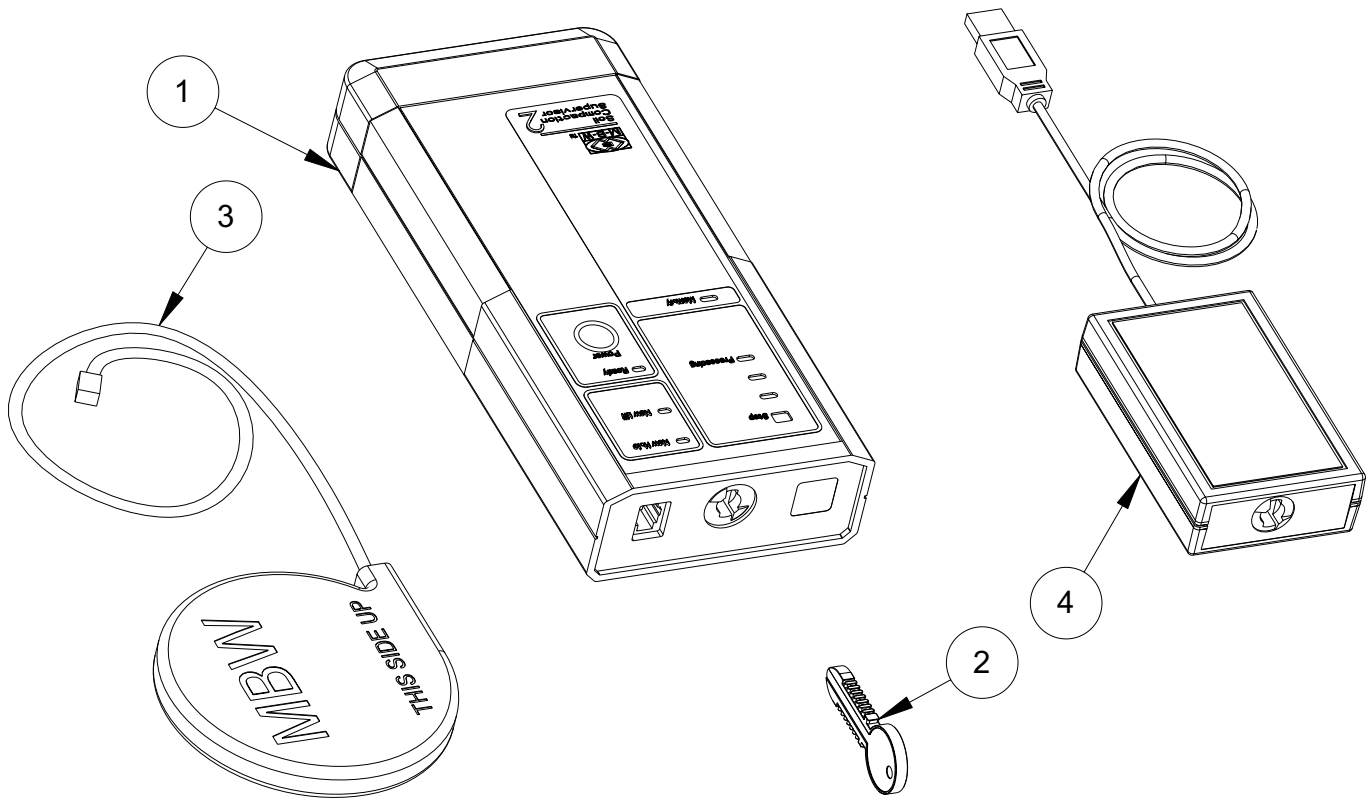
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## Soil Compaction Supervisor 2 Starter Kit



# WARRANTY

**WHAT DOES THIS WARRANTY COVER?** MBW, Incorporated (MBW) warrants each New Machine against defects in material and workmanship for a period of twelve (12) months. "New Machine" means a machine shipped directly from MBW or authorized MBW dealer to the end user. This warranty commences on the first day the machine is sold, assigned to a rental fleet, or otherwise put to first use.

MBW warrants each Demonstration Machine against defects in material and workmanship for a period of six (6) months. "Demonstration Machine" means a machine used by MBW or its agents for promotional purposes. This warranty commences on the first day the machine is sold, assigned to a rental fleet, or otherwise put to first use.

This warranty covers the labor cost for replacement or repair of parts, components, or equipment on New Machines or Demonstration Machines, and MBW shall pay labor costs at MBW's prevailing rate to affect the warranted repair or replacement. MBW reserves the right to adjust labor claims on a claim-by-claim basis.

This warranty covers the shipping cost of replacement parts, components, or equipment via common ground carriers from MBW to an authorized MBW dealer. Air freight is considered only in cases where ground transportation is not practical.

**MAY THIS WARRANTY BE TRANSFERRED?** This warranty is non-transferable and only applies to the original end user of a new machine or demonstration machine.

## **WHAT DOES THIS WARRANTY NOT COVER?**

1. This warranty does not cover any Used Equipment. "Used Equipment" means any MBW machine or equipment that is not a New Machine or a Demonstration Machine. All Used Equipment is sold **AS IS/WHERE IS WITH ALL FAULTS**.

2. This warranty does not cover any New Machine, Demonstration Machine, or their equipment, parts, or components altered or modified in any way without MBW's prior written consent. This warranty does not cover the use of parts not specifically approved by MBW for use on MBW products. This warranty does not cover misuse, neglect, shipping damage, accidents, acts of God, the operation of any New Machine or Demonstration Machine in any way other than recommended by MBW in accordance with its specifications, or any other circumstances beyond MBW's control. This warranty does not cover any New Machine or Demonstration Machine repaired by anyone other than MBW factory branches or authorized MBW distributors.

3. This warranty does not cover, and MBW affirmatively disclaims, liability for any damage or injury resulting directly or indirectly from design, materials, or operation of a New Machine or Demonstration Machine or any other MBW product. MBW's liability with respect to any breach of warranty shall be limited to the provisions of this document and in no event shall exceed an amount equal to the purchase price of the New Machine or Demonstration Machine purchased from MBW.

4. This warranty does not cover engines, motors, and other assemblies or components produced by other manufacturers and used on a New Machine or Demonstration Machine, as said engines, motors, and other assemblies or components may have warranties provided by the manufacturer thereof. This warranty does not apply to consumable items, such as v-belts, filters, trowel and screed blades, seals, shock mounts,

batteries, and the like, all of which are sold AS IS/WHERE IS WITH ALL FAULTS.

5. This warranty does not cover the cost of transportation and other expenses which may be connected with warranty service but not specifically mentioned herein.

6. This warranty does not cover any updates to any New Machine, Demonstration Machine, or any other MBW product. MBW reserves the right to improve or make product changes without incurring any obligation to update, refit, or install the same on New Machines or Demonstration Machines previously sold.

**WHAT MUST YOU DO TO OBTAIN WARRANTY COVERAGE?** Each New Machine or Demonstration Machine is accompanied by a Warranty Registration Card. You must sign, date, and return the Warranty Registration Card to the place of origin of the New Machine or Demonstration Machine, either to MBW, Inc. at P.O. Box 440, Slinger, Wisconsin 53086, MBW (UK), Ltd. at Units 2 & 3 Cochrane Street, Bolton BL3 6BN, United Kingdom or MBW FRANCE SARL at ZA D'Outreville, 5 Rue Jean Baptiste Neron, Bornel 60540 France, within ten (10) days after purchase, assignment to a rental fleet, or first use. This signed warranty card is the buyer's affirmation that he has read, understood, and accepted the warranty at the time of purchase. Failure to return the warranty card as specified herein renders the warranty null and void. In order to receive warranty coverage consideration, warranty claims must be submitted within thirty (30) days after the New Machine or Demonstration Machine fails. Warranty claims must be submitted to MBW, Inc., MBW (UK), Ltd. or MBW FRANCE SARL, and written authorization for the return of merchandise or parts under the warranty must be obtained before shipment to MBW.

**WHAT WILL MBW DO?** MBW's obligation under this warranty is limited to the replacement or repair of parts for a New Machine or Demonstration Machine at MBW factory branches or at authorized MBW distributors, and such replacement or repair is the exclusive remedy provided hereunder. Labor must be performed at an authorized MBW distributor. MBW reserves the right to inspect and render a final decision on each warranty case, and MBW's repair or replacement is solely within the discretion of MBW.

**IT IS EXPRESSLY AGREED THAT THIS SHALL BE THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY. UNDER NO CIRCUMSTANCES SHALL MBW BE LIABLE FOR ANY COSTS, LOSS, EXPENSE, DAMAGES, SPECIAL DAMAGES, INCIDENTAL DAMAGES, OR PUNITIVE DAMAGES ARISING DIRECTLY OR INDIRECTLY FROM THE USE OF THE NEW MACHINE OR DEMONSTRATION MACHINE WHETHER BASED UPON WARRANTY, CONTRACT, NEGLIGENCE, STRICT LIABILITY, OR ANY OTHER LEGAL THEORY.**

**THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR USE, AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER OBLIGATIONS OR LIABILITY ON MBW'S PART. MBW NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME ON BEHALF OF MBW ANY OTHER LIABILITY OR WARRANTY IN CONNECTION WITH THE SALE OR SERVICE OF ANY NEW MACHINE, DEMONSTRATION MACHINE, OR ANY OTHER MBW PRODUCT.**