

# **NDT**

## **JAMES INSTRUMENTS**

Non Destructive Test Equipment



## **R-C-400, R-C-450, R-C-410**

### **Rebarscope®**

Operator's Manual

Original Instructions: Revision July 2018

## Notice

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The Rebarscope® System has been tested in accordance with the EU regulations governing Electro-Magnetic compliance and it meets required directives.

Rebarscope® System is a registered trademark of James® Instruments Inc. and is property of its respective owner.

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We: James® Instruments Inc.

Of: Chicago, IL

*In accordance with the following Directive(s):*

2006/95/EC      Low Voltage Directive

*hereby declare that:*

Equipment      Rebarscope® System

Model Number      R-C-400, R-C-450, R-C-410

*is in conformity with the applicable requirements of the following documents*

Ref. No.	Title	Edition/date
ACI 318	Building Code Requirements for Structural Concrete and Commentary.	2008
DIN 1045	Concrete, reinforced and prestressed concrete Structures.	2008
EN 61000-6-3	Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments.	2007
EN 61000-6-2	Electromagnetic Compatibility (EMC) Part 6-2: Generic Standards—Immunity for Industrial Environments.	1999
BS 1881-204	Testing concrete. Recommendations on the use of electromagnetic covermeters.	1988

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable Essential Requirements of the Directives.

Signed:



Name: Michael Hoag

Position: President, James® Instruments Inc.

Location: Chicago, IL

On: 7/2/2018

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## Introduction

The James® Instruments Rebarscope® utilizes the latest in eddy current sensing and micro-processor technology to accurately locate, determine the depth of, and estimate the size of metal objects in concrete. The eddy current sensor is specifically designed to react to the outer surface of the metal object only. It is uninfluenced by small particles in the concrete, whether the concrete is fresh or hardened, wet or dry.

The Rebarscope® has built-in test modes for rebar/post tension cable, conduit and copper pipe. The sensor allows the unit to locate both ferrous and nonferrous metals in concrete.

With an easy to view display, the Rebarscope® provides the user with an instantaneous structural analysis. The user is aided by using a graphic bar in the display, and an audio tone to quickly and accurately locate metal objects. Large numbers in the display show the estimate of cover. This information can then be used to display a map of the cover throughout the structure. Further options allow a 2-dimensional cross-section of the concrete under test.

The Rebarscope® was developed for real world application and everyday durability in mind. It's rugged and splash resistant case allows the user to use the Rebarscope® in the field. It's small but sturdy sensing probe can withstand test after test with little wear on the probe face. Additionally, the Rebarscope® is able to compensate the sensor signal for a wide temperature range; as may be seen during in-situ field testing.

The Rebarscope® enables the user to store field test data, and later upload it to a Personal Computer. Once downloaded, the software allows the user to analyze the data, while a graphing tool function allows the creation of a contour map.

## Data Logger Unit

The data logger unit is a standard with the James® Instruments Rebarscope®. It is a sophisticated, rugged field proven unit. The embedded microprocessor technology enables the user to easily locate, determine the amount of cover, record, and analyze ferrous and non-ferrous metals.

The large easy to read numbers on the data logger display make the Rebarscope® user friendly when estimating cover or bar size. Plus, with a memory capacity of 8000 data points, the data logger allows for a large sum of data to be stored for later analysis.

The front panel of the data logger unit allows the user to interface with the sensor probe, scan cart, headphones, charger and a personal computer via a USB port. The large viewing window protects the LCD display from possible damages that may occur during operation. Additionally, large control buttons on the front panel enable the user to easily scroll through menu options.

## Instrument Contents List

Each Rebarscope® comes with the following items included in the carrying case.

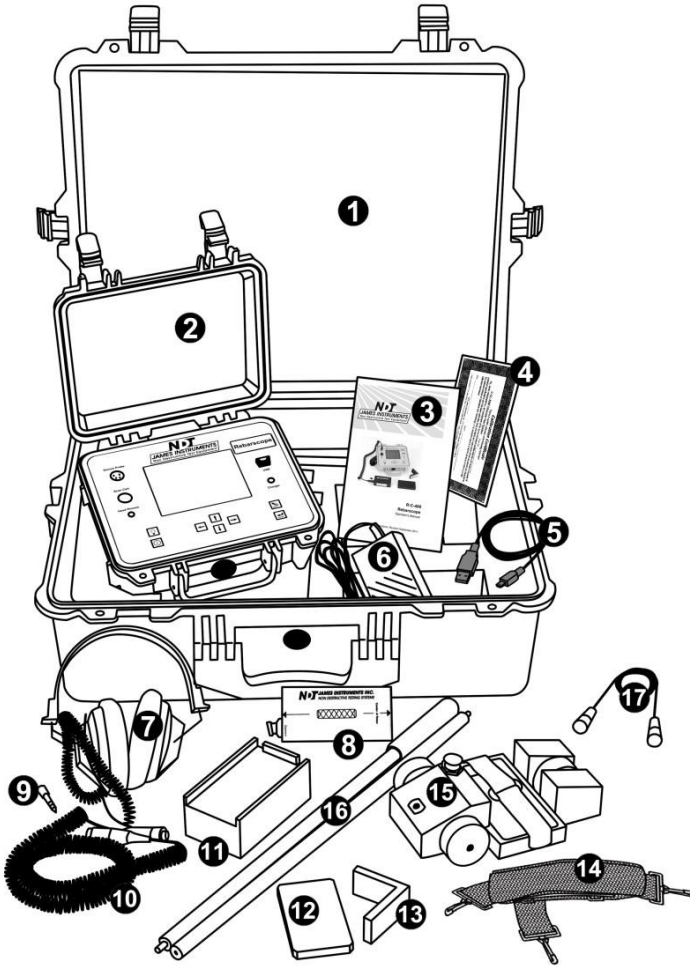


Figure 1: Rebarscope® System Contents



## Contents List

- | Item # | Description   |
|--------|---|
| 1      | <b>Case</b> – Used for carrying the Rebarscope® and accessories.  |
| 2      | <b>Rebarscope® Instrument</b> – Rebar locator encased in a durable protective case.   |
| 3      | <b>Instruction Manual</b> – Operating instructions for Rebarscope®.   |
| 4      | <b>Calibration Certificate</b> – Certificate to confirm that the instrument has been calibrated to meet or exceed published specifications. |
| 5      | <b>USB Cable</b> – Serial cord used to connect the Rebarscope® to a PC to upload data.  |
| 6      | <b>AC Power Adapter</b> – Used to power the Rebarscope® and recharge the unit.  |
| 7      | <b>Headphones</b> – Used in noisy environments.   |
| 8      | <b>Sensor Probe</b> – Shows direction of rebar.   |
| 9      | <b>Phone Jack</b> – For headset.  |
| 10     | <b>8' Coiled Cable</b> – Used with the Sensor Probe.  |
| 11     | <b>1 5/8" Spacer Block</b> – Used to add space in lower cover situations.   |
| 12     | <b>3/8" Spacer Block</b> – Used for sizing feature.   |
| 13     | <b>Locating Template</b> – Used for sizing feature.   |
| 14     | <b>Support Strap</b> – Used to secure the Rebarscope® to the user during testing.   |
| 15     | <b>Scan Cart</b> – (opt.) Comes with Complete system only.  |
| 16     | <b>Scan Cart Extension Poles</b> – (opt.) Used to guide Scan Cart   |
| 17     | <b>Scan Cart Cable</b> – (opt.) Yellow cable used to connect Scan Cart to main unit.  |

## Control Panel

The following buttons appear on the James® Instruments Rebarscope® System.

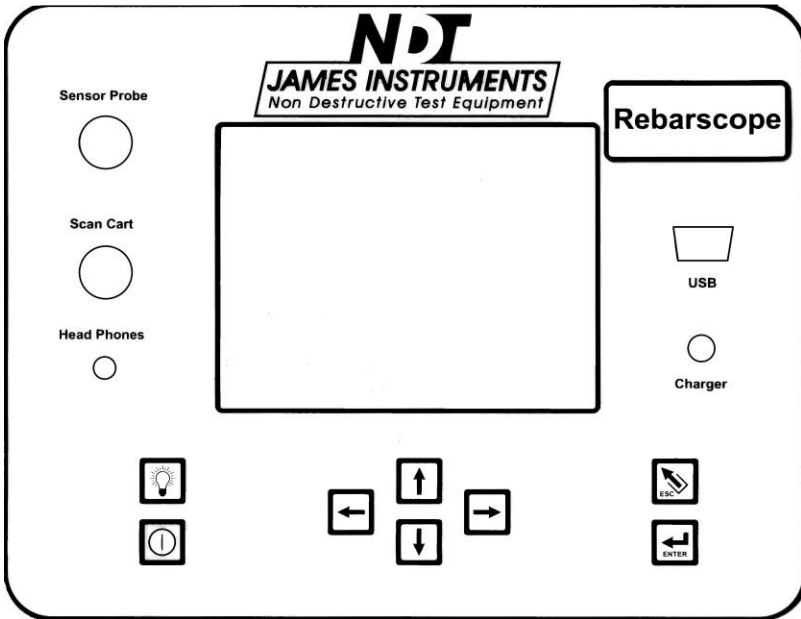










Figure 2: Rebarscope® System Buttons

## Control Panel Buttons

Key	Definition
	The power button. Momentarily push this key to turn “on” the unit. Pressing it again turns off the unit. Upon power up, the unit will display the locate screen. Press the escape key to get to the Main Menu.
	The up arrow button. This key is used to scroll through various settings and wave frames.
	The down arrow button. This key is used to scroll through various settings.
	The left arrow button. This key allows you to scroll through various settings.
	The right arrow button. This key allows you to scroll through various settings.
	The enter button. Pressing this key allows you to choose main menu selections. The enter key also allows you to prepare the Rebarscope® for operation.
	The escape button. Pressing this key allows you to return to the main menu screen from any sub screen.
	The back light button. Depressing this key the backlight of the display comes on. Depressing the key again turns the backlight off.

# Menu Layout

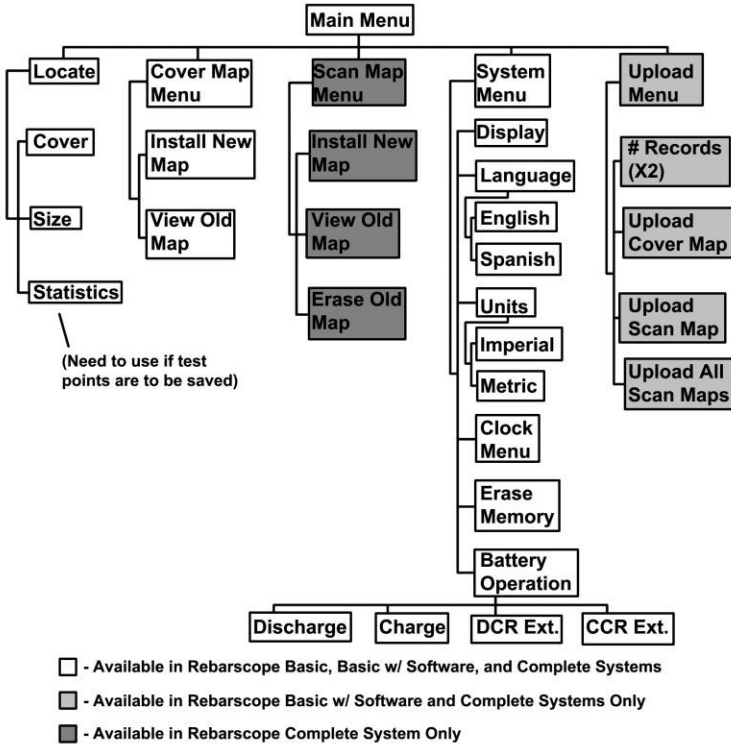


Figure 3: Rebarscope<sup>®</sup> Function Flow Chart

For Quick Reference, in “LOCATE COVER” screen:

1. For Automatic (RS), Short or Deep mode, go to line [REDACTED] and press the Left arrow button to change between settings.
2. For Audio Feature – go to [REDACTED] and press the Right arrow button once for beeps, twice for continuous tone, and three times for audio off.
3. Material Options – Rebar (Post Tension Cable) / Conduit / Copper.

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System Menu

## Using the Rebarscope® on Location

### Removing the Lid

For ease of use in the field, the Rebarscope® lid can be removed and the shoulder straps installed. To do so, fully open the lid and the cover can be carefully pushed off of the case hinge pins.

### Attaching the Shoulder Support Straps

The Rebarscope® support straps can be used to hold the Rebarscope® once the Rebarscope® lid has been removed. When using the Rebarscope® support straps, make sure that an eyelet hook is connected to each corner of the Rebarscope® . Two of the hooks clip to the O-rings, while the other two clip around the hinge pins.

#### ► Follow the step below:

1. Attach the straight portion of the support strap to the two front metal O-rings of the Rebarscope®.
2. Attach the other two straps (which are stitched to the straight portion of the harness) to the new exposed hinges of the case.
3. Pull the supplied support strap over your head so that the rubber guard is resting on the back of the user's neck.

4. Now adjust the strap accordingly so that the Rebarscope® is within easy reach and readable. (see Figure 4)

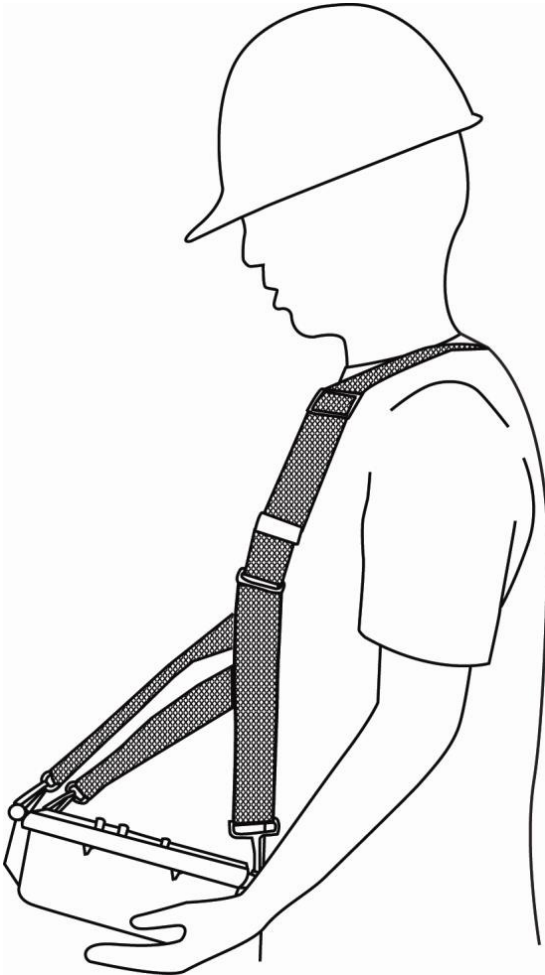


Figure 4: Rebarscope® Support Strap

## Sensor Probe

The James® Instruments Rebarscope® utilizes the latest in eddy current sensing technology. The heart of this technology can be found in the sensor probe which has been specifically designed to react to the outer surface of metal objects. With this ability, the unit is able to accurately locate, determine the depth of, and estimate the size of metal objects within reinforced concrete structures. This makes the Rebarscope® sensor probe far superior to other commercially available rebar location systems.


The Rebarscope® sensing probe is compact, weighing only 1 lb and dimensioned at 5"x 2.4"x1.6" and still very tough and durable for field application. The sensing probe has been calibrated in our facility for operation with only the data logger unit it was purchased with. If a new sensor probe is needed it is recommended to send the complete unit in for proper calibration. Not calibrating the sensor probe and the data logger unit together can cause unacceptable location, cover and bar size readings. For further information regarding repair and calibration please contact our office.

## Short / Deep Mode

The Rebarscope® facilitates the analysis of rebar location, cover and bar sizing; allowing the user to do measurements in short mode or deep mode. The Rebarscope® also provides the user the ability to automatically switch between deep and/or short mode.

**Note:** The single sensing probe operates efficiently in both modes.

When the system is initially turned “on”, the Automatic (RS) mode is the default setting. To change this, go to the Locate Cover screen.

- Once in the Locate Cover screen, use the up or down arrow keys on the front panel to highlight the graphic bar  1.
- When the highlight is on the bar, press the left arrow key to change between modes. (**Note:** The letters **RS** in the upper left hand corner of the screen indicate auto ranging is “on”.)
- Follow the procedure above to turn off Auto ranging, and to manually switch between Deep and Short modes as seen on line 1 of this screen.

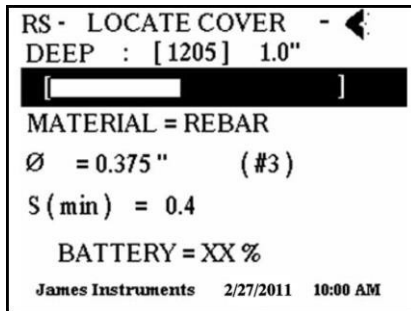


Figure 5: Locate Cover Screen



Short mode: Ideal when reinforcement cover ranges from .5" to 3.0". Locating, determining cover and bar size can all be measured while in this mode. An error of  $\pm .125"$  must be accounted for during measurement of metal bar or pipe location.

Deep mode: Ideal when reinforcement cover ranges from 2.75" to 8". Locating, determining cover and bar size can all be measured while in this mode. An error of  $\pm .125"$  must be accounted for during measurement of metal bar or pipe location.

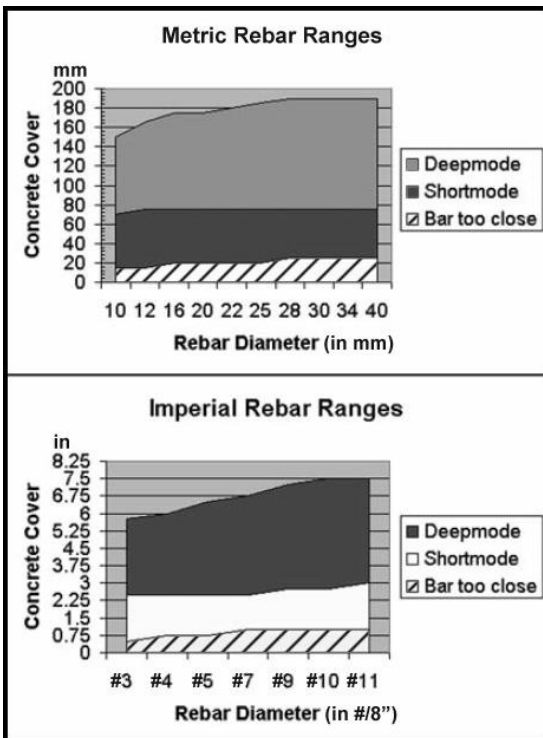


Figure 6: Metric and Imperial Graphs for Rebar Ranges

## Locating Ferrous and Non-Ferrous Metals

The Rebarscope® uses eddy current sensing and micro-processing technology, and is ideal for locating ferrous and non-ferrous metals. Metals located with ease are the following:

- Imperial and Metric reinforcement bars
- Standard copper pipe
- Standard conduit pipe
- Post tension cable (use Rebar mode)

The Rebarscope® allows the user to locate metals by using two options on the LCD display.

### Option 1 – Graphic Bar Display

The action bar displayed on the second line of the location screen enables the user to determine when the center of the metal bar/pipe has been detected. When the sensor probe is directly over the center of the metal bar/pipe, this bar display will have reached its highest point. When the sensor probe has passed the center of the metal bar/pipe, the bar display will decrease in size.

### Option 2 – Number Display

This option consists of a numerical output value in brackets displayed on line 1 of the locate cover screen. The range of this number is 0 to 4095. As the probe moves toward the rebar/pipe the number will increase. Then when the probe is over the center of the rebar/pipe you will see the largest number displayed. As you move the probe away from the center of the rebar/pipe the number will begin to decrease.

This technique can also be useful in determining whether short or deep mode is necessary for proper location, cover, and sizing analysis.

## Determining Cover

The Rebarscope® allows the operator to easily determine the concrete cover of rebar. Since the Rebarscope® utilizes eddy current technology, cover is determined with even more accuracy than its predecessor. With this, only the bar/pipe is located and no small particles of metals (such as fly ash) in the concrete can influence the measurement. The following steps allow for proper cover measurements:

**Step 1:** Choose either Imperial or Metric units on the system menu screen.

**Step 2:** Decide whether short or deep mode is necessary for your testing. If needing to adjust this setting, go to the Locate Cover screen and follow the steps.

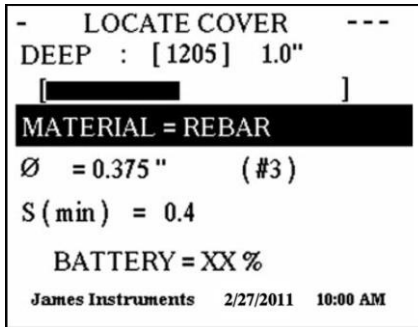


Figure 7: Locate Cover Screen

**Step 3:** Using the down arrow key, scroll the highlighted section down to the bar diameter category. Once this line is highlighted, use the right or left arrow keys to choose the proper bar diameter.

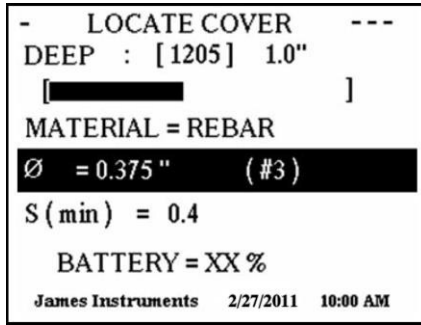


Figure 8: Choosing Bar Diameter

**Step 4:** Now, pass the sensing probe on the surface of the test structure until the smallest cover is displayed on the right hand corner of the screen.

**Step 5:** The Rebarscope® allows the user to choose the minimum cover to analyze with. This feature is referred to as the S min. Using the up or down arrow key, scroll the highlighter down to the S min category and use the left or right arrow keys to choose an S min that ranges from 0.4 - 5.0.

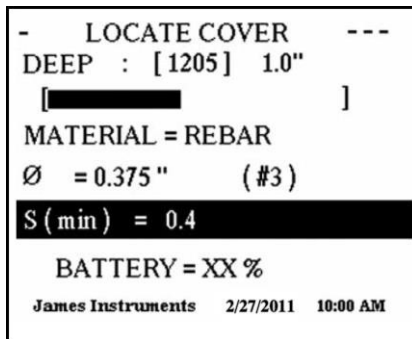


Figure 9: Setting Minimum Cover

**Step 6:** Now pass the sensing probe on the surface of the test structure until the smallest cover is displayed on the right hand corner of the screen. The audio/ headphone feature also allows the user to precisely locate the center of the rebar using the audio signal. This audio feature helps give even more cover precision. The steps below show how to properly choose the audio signal for your application.

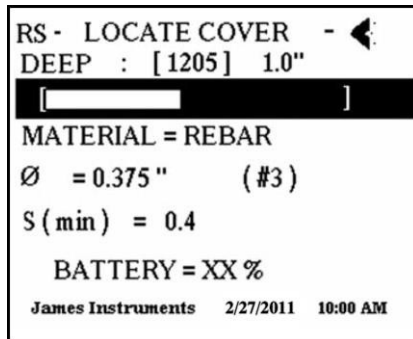


Figure 10: Dynamic Bar Display

**Step 6A:** In the Locate Cover screen, use the up / down arrow keys to scroll the cursor down to the action bar in the display.

**Step 6B:** Use the right arrow key to choose either a beeping type audio signal, or a continuous tone audio signal. A small speaker icon will appear on the upper right hand corner of the display when the audio feature has been enabled. Headphones have also been supplied with the Rebarscope® to help the user hear a clearer audio signal in noisy environments.

**Step 6C:** Pressing the right arrow key one more time after the continuous tone will turn off the audio feature, and the speaker icon on the upper right hand corner will no longer appear on the display screen.

## Determining Bar Size

The bar diameter can be easily determined with the Rebarscope® without the prior knowledge of cover. This is possible by taking two readings, one at surface of the structure and another at the same location but 3/8 inches away. A 3/8 inch spacer block is provided with the system along with a locating template. This L shaped template helps keep the exact location of the first reading when taking the second reading with the 3/8 inch spacer block (see pictures below).

**(Note: Bar sizing is done in Deep mode only, and at a maximum depth of approximately 4.5 inches.)**



Figure 11: Locating Rebar



Figure 12: 3/8" Spacer with L Shaped Template



Figure 13: Locating Rebar with Spacer



Figure 14: Analyzing Data



If the unit shows out of range in the **BAR SIZE** screen, and the display reading is 3000 or larger, this means the rebar is too close to the surface. The first reading should then be taken with the supplementary 1 5/8" spacer block, and the second with a 3/8" spacer block. See pictures below. (The supplement spacer block is used only to add space between the surface and the sensor probe. It's size is not critical when performing the sizing function.)

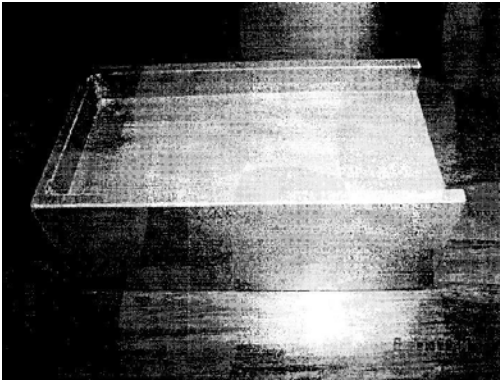


Figure 15: 1 5/8" Block



Figure 16: 3/8" Block

The following steps allow for proper bar sizing measurements:

**Step 1:** Press ESC to exit the Locate Cover screen.

**Step 2:** In the Main menu screen use the up or down arrow keys to navigate the highlight to the Locate category.



Figure 17: Bar Size Function

**Step 3:** Press the right arrow key on the front panel to choose **Locate: Size** and press Enter.

**Step 4:** In the **BAR SIZE** screen, use the sensor probe to locate the center of the rebar either by using the bar display or the numerical output value in brackets [ ].

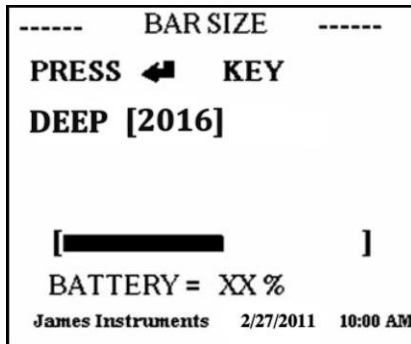


Figure 18: Bar Size Screen

**Step 5:** Place the sensor on top of the surface where the rebar diameter is to be measured. If the reading on the first line is larger than 3000, use the 1 5/8 inches spacer block between the concrete surface and the sensor. If reading is still above 3000 it may be necessary to add an additional non-metallic block underneath the 1 5/8 block. (**Note:** The optimal cover range for sizing is between 1.7” and 4.2”. Also, the most accurate sizing of rebar occurs when the first measurement is about 1200.)

**Step 6:** Once the center has been determined, press Enter for a few seconds to store the result.

**Step 7:** The Rebarscope® will now read **ADD BLOCK PRESS ENT** on the top line.

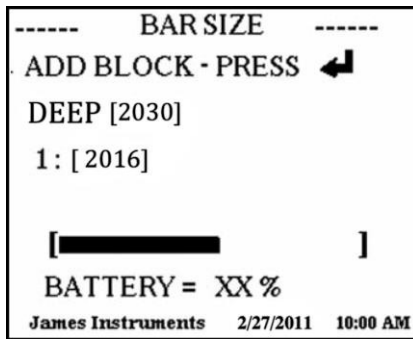


Figure 19: Add Block is displayed

At this point the locating template needs to be placed alongside of the sensor probe; so the exact location of the first reading can be kept. **Note:** Taking the second reading at the exact location as the first is critical for precision. While holding the locating template, remove the sensor probe and place the 3/8 inch spacer block along the locating template.

**Step 8:** Now place the sensing probe over the 3/8 inch spacer block and press Enter. The Rebarscope® will now display the estimated diameter of the measured rebar. The Rebarscope® can accurately determine bar size up to a cover of 4.5" (115mm) in Deep mode.

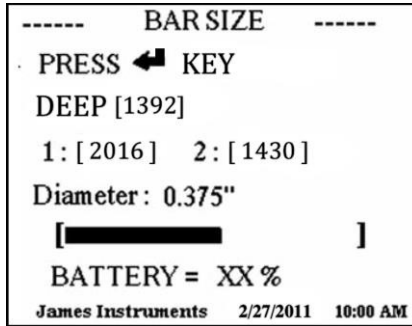


Figure 20: Estimated Diameter is Displayed

## Rebar Sizing Guidelines

1. Sizing is done in Deep Mode only, and to a maximum depth of 4.5 inches (~114mm).
2. If the Rebar is too close to the surface (< 2.5 inches), use the 1\_5/8" plastic spacer block (or some wood) to raise the sensor off the surface. (Rebar Size is best determined when the cover is between 2.5 - 4.5 inches.)
3. Sizing is also best determined when the rebar is isolated - no metal objects are near the sensor - including the main unit. This may require the user to move the main unit away from the sensor when testing for rebar size.
4. Sizing can be done when the rebar "on-center" spacing is equal to, or greater than 6 inches (~150mm) from any adjacent rebar, conduit pipe, copper pipe, post tension cable and wire mesh.
5. Sizing accuracy is +/- 1 Bar size for Imperial rebar, and ~ 3mm for Metric rebar sizes. This variance is due to the physical appearance of rebar, which has ribs (or ridges) along the length of the reinforcement bars. It is also due to the program settings of the unit itself. (Imperial sizes: 3, 4, 5, 6, 7, 9 & 11. Metric sizes: 6, 10, 13, 16, 19, 22, 25, 29, 32, 35, 38, 41 & 51mm.)
6. Due to the high concentration (and/or close proximity) of rebar within a Column, sizing (and location) is nearly impossible for a Column. It is **not** recommended to use the rebar locator for testing Columns.

## Pitch & Resolution

Measurements can often be influenced by neighboring parallel bar(s). The graph below shows the minimum spacing to a corresponding bar.

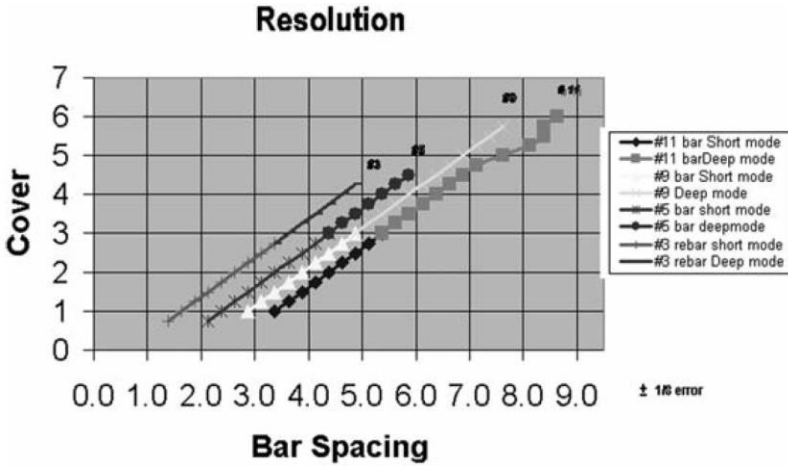


Figure 21: Minimum Bar Spacing

## Utilizing Cover Map Function

The James® Instruments Rebarscope® has incorporated a user friendly cover map to further assist in field analysis. The cover map mode allows the user to mark the cover and location of a rebar on a grid. The grid lines are numerically numbered with the Y axis starting at 1 from left to right. The X axis is also numerically numbered with number 1 starting at the top of the grid.

The Three symbols below have been selected to allow the user to distinguish the status of the current reading. A full shaded box represents that the cover is less than the selected S min. The S min is the selected minimum cover you have told the Rebarscope® to detect. A box with 3 thick shaded lines means that the cover is within range of the selected S min. A box with 3 thin inner lines means that the Rebarscope® has not detected a bar/tube.



Figure 22: Cover Map Symbols

Please follow this procedure to correctly prepare the Rebarscope® for Cover Map operations:

**Step 1:** Press the escape key on the front panel to get to the Main Menu screen.

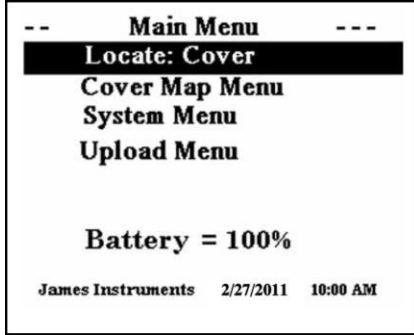


Figure 23: Cover Function

**Step 2:** Navigate the highlighted cursor using the up or down arrow keys to **COVER MAP MENU** option and press Enter.

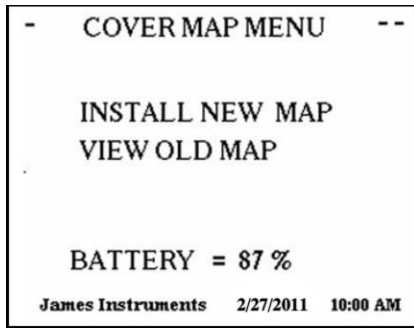


Figure 24: Cover Map Menu

**Step 3:** Choose whether you would like to **INSTALL NEW MAP** or **VIEW OLD MAP** by highlighting one and pressing Enter.



Figure 25: Install New Map or View Old Map

**Step 4:** If **View Old Map** is chosen please proceed to step 4B, if not please follow the instruction directly below for installation of a new map.

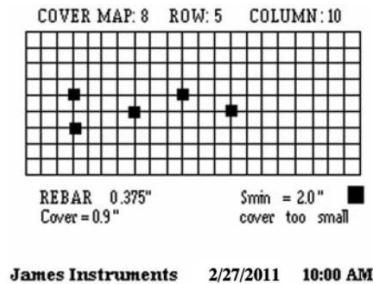


Figure 26: Map Display

**Step 4A:**

- 1 The Rebarscope® automatically generates a map number.
- 2 Under the Material category line, choose the material under investigation. (rebar, conduit, copper)
3. Choose the diameter of the material under investigation.
4. Choose the S min (minimum cover)



5. Choose the detection range **DEEP** or **SHORT**, that the cover analysis will be done in.
6. Press Enter.
7. The screen now displays the cover map grid.

**Step 4B:**

1. After choosing to view old map a **REVIEW COVER MAP** menu screen will appear.

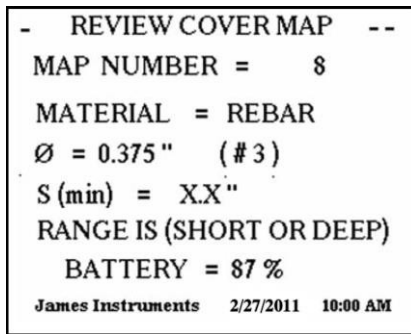


Figure 27: Review Cover Map Screen

2. The system does not allow adjustment of previous set parameters.
3. The only function that can be changed is that of which map to view.
4. Choose the map number to view and press Enter.
5. The screen now displays the cover map grid with previously saved data. New data can be saved into the gridded map along with the older data.

**Step 5:** Utilizing the Up or Down arrow keys on the front panel chose the location for your first mark.

**Step 6:** Pass the sensor probe over the area being investigated; the blinking cursor will turn into one of the three cover symbols.

**Step 7:** Pressing the Enter key will save that symbol onto the screen and store into memory the location information seen on the bottom of the screen. This information will also appear for this particular point on the upload screen of the PC software.

## System Menu

The system setup option on the main menu screen allows you to make modifications to system configurations. Once in the system setup sub menu modification can be made to the following

- Display
- Language
- Units
- Clock menu
- Erase Memory
- Battery operation
- Pressing the escape key takes you back to the main menu screen

### Display Cursor

To change the visibility of the display cursor, follow these steps:

- Press the up or down key until you get to the system setup menu option. Press Enter. The Setup Menu sub screen should appear.
- Scroll through the Setup menu using the up or down arrow key. Select the Display option by pressing Enter. The display should read the following.

DISPLAY= Black Lines

- Pressing the left or right arrow keys will give the user the option to choose Black (highlighted) Lines or White (highlighted) Lines, as well as the background color.

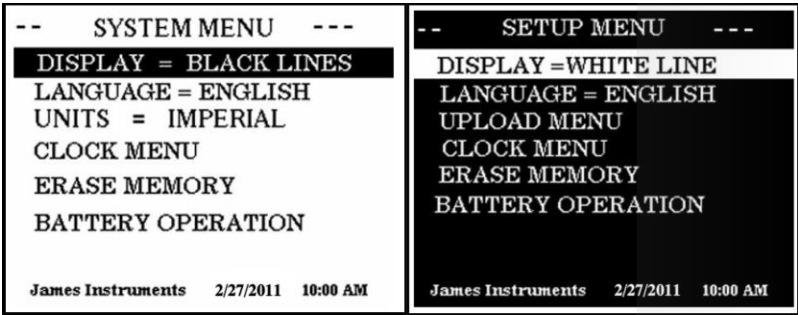


Figure 28: Display with Black or White Lines

- Pressing the Escape key will return you to the Main Menu Screen.

### Language Options

To choose which Language the Rebarscope® will be operating in, follow these steps:

- Press the up or down key until you get to the system setup menu option. Press Enter. The Setup Menu sub screen should appear.
- Scroll through the Setup menu using the up or down arrow key. Select the Language menu option by pressing Enter. The display should read the following.

LANGUAGE=

- Use the left or right arrow keys to choose English or Spanish as the language that your Rebarscope® operates in.



Figure 29: Setting the Language

- Pressing the Escape key will return you to the Main Menu Screen.

## Measuring Units

English and Metric units are available for the user to choose from. The following steps allow the user to choose the measuring units viewed:

**Step 1:** In the main menu screen use the up or down arrow keys on the front panel to navigate down to the system set up category.

**Step 2:** Press Enter.

**Step 3:** In the system setup screen use the up or down arrow keys on the front panel to navigate down to the **UNITS** category.

**Step 4:** Use the right arrow key to choose either Imperial (English) or metric measuring units.

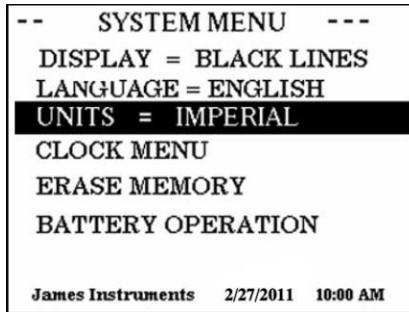


Figure 30: Setting the Units

**Step 5:** Press the ESC key to go back to the main menu screen and continue measurements.

## Clock Menu

To change date and time, please follow these steps:

- Press the up or down key until you get to the setup menu option. Press Enter. The Setup Menu sub screen should appear.



Figure 31: Clock Menu is Highlighted

- Scroll through the Setup menu using the up or down arrow keys. Select the Clock Menu option by pressing Enter. The display should be similar to the following.

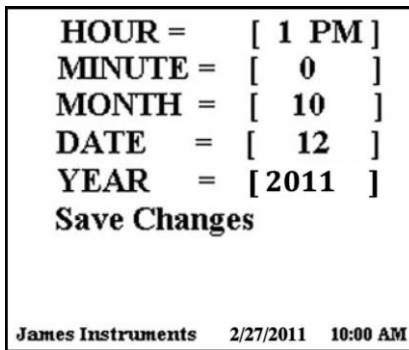


Figure 32: Setting the Date and Time

- Pressing the left or right arrow key will increment the digits on the display.
- Use the up and down key to select each hour and date options.
- Scroll to the save changes option using the up or down arrow key.

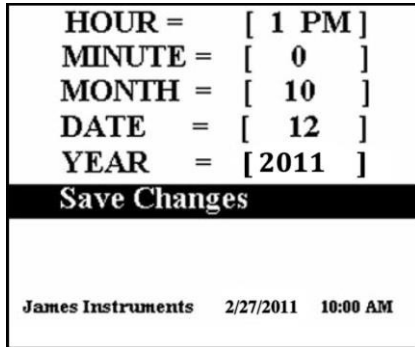


Figure 33: Save Changes When Finished

- Pressing the Enter key will store the date and time and return you to the Main menu screen.

## Erase Memory

To erase stored memory from the Rebarscope®, follow these steps:

- Press the up or down keys until you get to the system setup menu option. Press Enter. The Setup Menu sub screen should appear.

### SETUP MENU

- Scroll through the Setup menu using the up or down arrow key. Select the Erase Memory option by pressing Enter. The display should read the following.

### ERASE MEMORY

- Press Enter once and a message telling you to press Enter again to verify this action should appear.

### PRESS ENTER AGAIN

- Pressing Enter a second time will erase **ALL** stored memory in the Rebarscope® system. When complete, the phrase “Ø errors” should be seen on the display screen.
- Pressing the Escape key will return you to the Main Menu Screen.

## Battery Operation

The Rebarscope® uses a 14.4V Lithium-Ion battery with a built-in thermo-sensing circuit. This circuit allows for a suitable charge, and maintains the voltage to the cells (< 4.1V). Additionally, this circuit provides the proper charge current to lengthen the battery's life.

At full charge, the bottom of the display will show **BATTERY=100%**.  
(**Note:** This value may be inaccurate, if the battery counters were reset without properly charging the unit.)

- The battery status can be viewed in the “**System Menu**”, under the “**Battery Operation**” mode. (Fig.34 & 35)
- When the charger is supplying power to the unit, the battery is charging, and the charge counter (“**Charge CTR**”) will increase.
- When the unit is ON, and the charger is disconnected from the unit, the discharge counter (“**Discharge CTR**”) will increase.
- The battery will continue to charge even after the microcontroller times out - display and unit turn OFF automatically.
- When the mode is set to any of the following settings: **Locate-Cover**, **Size**, **Statistic**, or **Cover Map** (or **Scan Cart** for R-C-410) the charge operation is disabled.



Figure 34: Battery Operation Menu is Highlighted



```
-- BATTERY STATUS--  
DISCHARGE CTR = XXXX  
CHARGE CTR = XXXX  
DCR EXT = 0  
CCR EXT = 0  
Hit ENT to Clear Reg  
BATTERY = 100%
```

Figure 35: Clearing Charger Register

### Battery Charge:

1. Connect the charger to a working outlet, and then to the charger input on the unit's front panel. Although, it is recommended for the unit to be OFF during a charge, the user can monitor the charging process in the screen above.

2. If the Charge counter slows to a stop (and does not increase), this is an indication the charge is complete. The battery now has a full charge, and needs to be reset. To do this, go to: **Main Menu / System Menu / Battery Operation** - press "Enter" to zero the counters. This action also resets the battery circuit mentioned above, and will correct any miscounts. (If charging is still an issue, review the Troubleshooting section on p.57.)

**Resetting the battery counters should be done both before and after (at least) a 4hr charge.**

When done so, the battery status % on the display will be accurate.

3. When the Battery percentage reaches ~ 40-50%, be sure to charge the unit again. (Go to step 1)

4. A charged battery allows for 4-6 hours of continuous field testing.

5. To extend the battery's run time in the field, to turn "OFF" the background light.

## Simple Guidelines for Battery Maintenance.

1. When allowed to discharge and charge regularly, the end user will experience a better Battery life span (or cycle).
2. Lithium-ion batteries do not need to be fully charged; as the charger can aid its performance.
3. Shallow discharges provide more cycles than deep discharges.
4. It is recommended to fully charge the unit (4-6hrs) before a lengthy field test is performed.
5. As a general rule, it is best to charge the battery both before and after each use. There is no memory effect, so it is a good practice to recharge the unit after each use, or at the end of the day - if used daily.
6. Charge the battery at a moderate temperature. Do not charge below 0deg C (or < 32deg F).
7. Lithium-Ion batteries suffer from stress when exposed to heat. Therefore, to lengthen the life of the battery, avoid elevated temperatures > 30deg C (or > 86deg F).
8. Lithium-Ion batteries may fail when stored for long periods of time in a discharged state. Thus, before a prolonged storage period, be sure to apply a charge to the battery. It's recommended once every 2 months to recharge the battery to keep it fresh. You should store the Unit (and battery) during this period at room temperature.
9. Replacing or repair of the battery should be done by a trained James® Instruments technician. Please follow the repair procedure found on page 68.

## Scan Cart (R-C-410 Only)

The Rebarscope® Scan cart feature allows the end user to quickly and easily determine the location and cover of reinforcement in a concrete structure. The scan cart can be used in a vertical or horizontal position. The B-Scan diagram generated by the Rebarscope® facilitates cover readings of a specified rebar.

The following steps allow for proper scan cart application:

**Step 1:** Insert Rebarscope® probe in scan cart unit with company logo facing up.

**Step 2:** Connect scan cart cable (yellow) to front panel of Rebarscope® unit and scan cart back cover.

**Step 3:** Turn Rebarscope® and allow unit to initialize.

**Step 4:** Upon initialization unit defaults to Locate cover screen.

**Step 5:** Press Esc key.

**Step 6:** Rebarscope® will now go to the main menu screen. Using the up or down arrow to highlight the Scan Map Menu.

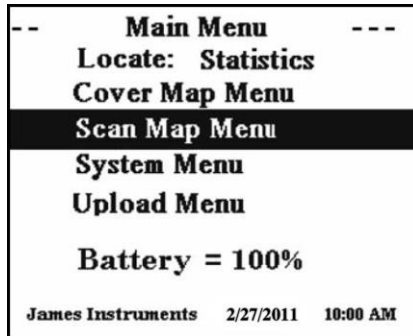


Figure 36: Highlighted Scan Map Menu

**Step 7:** Press Enter

**Step 8:** The Scan Map Menu screen will now appear

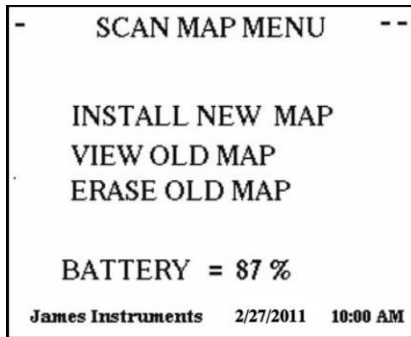


Figure 37: Scan Map Menu

**Step 9:** Using the up or down arrow keys navigate the highlighted line to one of the three sections on the scan map menu screen.

**Step 10:** Press Enter.

**Step 11:** The next screen allows you to enter your parameters. After choosing desired parameters press Enter.

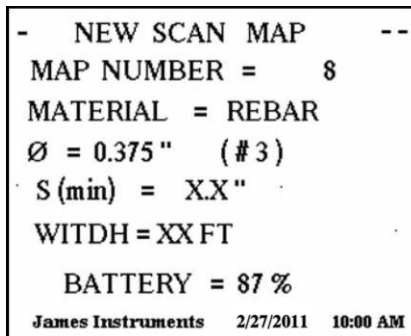


Figure 38: Scan Map Parameters

**Step 12:** The Rebarscope® now displays the scan cart diagram screen.

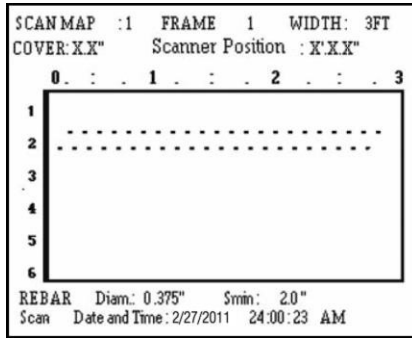


Figure 39: Scan Cart Diagram

**Step 13:** Position scan cart at beginning of area to be analyzed.

**Step 14:** Press Enter on Rebarscope® Front Panel. The display will now read "Scanner is ON", and the user is ready to start testing.

**Step 15:** Measuring from the front of the scan cart, begin pushing the cart at a very slow pace from the starting point; using the extended handle. (See picture below.)

**Step 16:** Remain at this same pace until Rebarscope® notifies the end of scan by producing an end beep noise.

**Step 17:** The Rebarscope® does not present real time data of a scan, it is necessary to back the cursor toward the start point to view data. The results will be displayed in a B-Scan diagram.



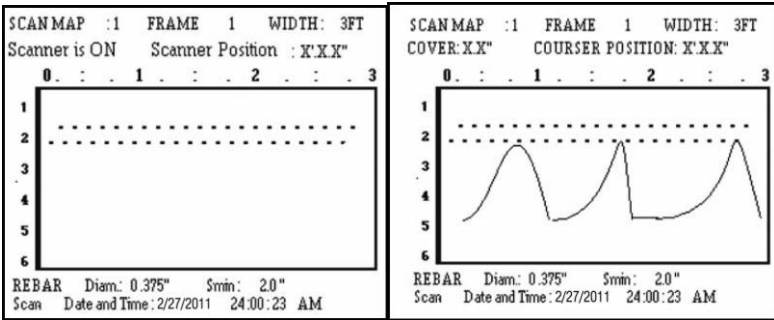


Figure 40: Scan Map Graph

The scan cart B-Scan diagram can be translated as follows:

- Cover is represented on the left axis.
- Distance measured is represented on the top axis.
- The two dotted lines represent the predetermined setting for Smin.
- The waveform will start at distance zero and it will be at its lowest cover reading.
- As the electro- magnetic decay of the reinforcement bar is detected by the probe, the built in B-scan analyzer starts to graph every point of detected cover by its built correlation.
- Once the scan cart with inserted probe is above the center of a section of rebar the wave form will be displayed at its top peak.
- After the scan cart has moved past the center of the rebar a very noticeable downward decay will begin to display. The wave form will remain at its lowest possible cover until another rebar's electromagnetic decay can be detected by the scan cart.

## Data Handler Introduction

The Data Handler allows you to accept uploaded data from the Rebarscope® to the PC

### Features

- Easy to Use
- Quick
- Convenient
- Traceability
- Data Backup

### Minimum System Requirements Rebarscope® Data Handler

<b>Operating System</b>	Windows Vista or Windows 7
<b>Memory</b>	1 GB RAM
<b>Processor</b>	1 GHz Pentium class processor
<b>Capacity</b>	1 MB hard drive space

## Upload Data (R-C-450 and R-C-410 only)

- Connect the unit to the appropriate port of the P.C. using the supplied serial cable.

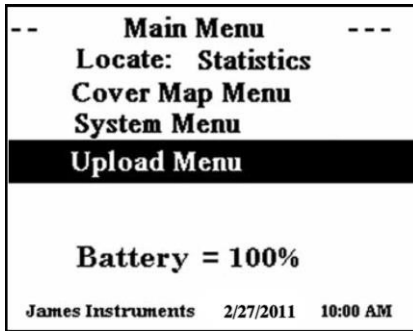


Figure 41: Upload Menu is Highlighted

- Press the up or down key to advance to the upload menu option. Press Enter. The following upload sub screen should appear.

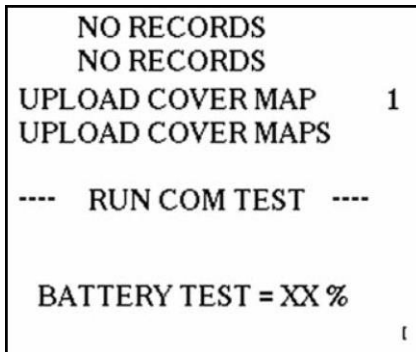


Figure 42: Upload Sub Screen

Scroll through the upload sub menu using the up or down arrow key. Select which upload menu function you would like to perform by pressing Enter. The display should read the following:

**UPLOAD SCAN MAP (R-C-410 only)**

**UPLOAD ALL SCAN MAPS (R-C-410 only)**



- Pressing the left or right arrow key allows the user to select which number of test data they want uploaded.
- Open the Rebarscope® software (“Rebarscope” will appear on the upper left corner) on the P.C.
- Press the Lightning Bolt (Upload) icon. The P.C. software will display “waiting for data”.
- Go to the Rebarscope® and press the Enter key. Rebarscope® software waits 50 seconds for the upload information. If no data is received after 50 seconds a “No data received” sub screen will appear.
- During Test upload the displays reads “Upload In Progress”
- Once the upload has been completed the display will read “Upload complete” and data will appear on the screen. Save the data in a desired folder.
- Pressing the Escape key will return you to the Main Menu screen.
- After upload, graphing of data should be done with PC software.
- Press the graph icon to graph the B-Scan diagram on the PC.

# Data Handler Overview

The following is an overview of all of the features of the Data Handler software.

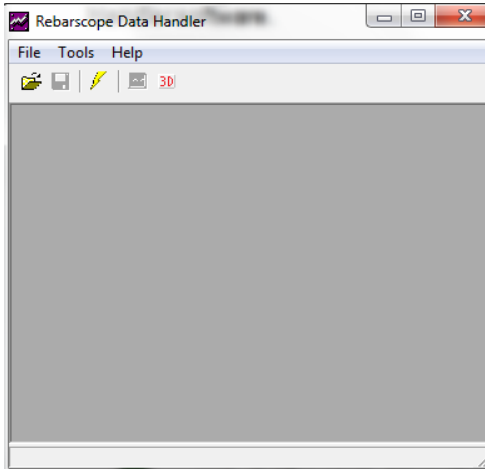







Figure 43: Data Handler Overview

## Software Functions

Key	Definition
	The “Open” command (Ctrl+O) – Opens a previously uploaded text file.
	The “Save” command (Ctrl+S) – Saves uploaded data to a text file.
	The “Upload” command (Ctrl+U) – Uploads data from the Rebarscope to the Data Handler program.
	The “Graph Time” command (Ctrl+T) – Graphs the stored data.
	The “3D” command (Ctrl+D) – Graphs the stored data as 3D.

## Software Installation

The PC software that has been developed for the Rebarscope is for data upload purposes. To install the software on your PC follow these instructions.

### To install the software:

1. Insert the Rebarscope PC Software CD into the CD-ROM drive.
2. If the CD does not load the setup automatically, go to My Computer, double click on the CD under devices and double click on setup.exe.



Name	Size	Type
program files		File folder
System32		File folder
0x0409.ini	22 KB	Configuration settings
Rebarscope Data Handler.msi	802 KB	Windows Installer Package
setup.exe	902 KB	Application
Setup.ini	6 KB	Configuration settings

Figure 44: Installation File Location

3. The Install Shield Wizard checks for the operating system you are using.

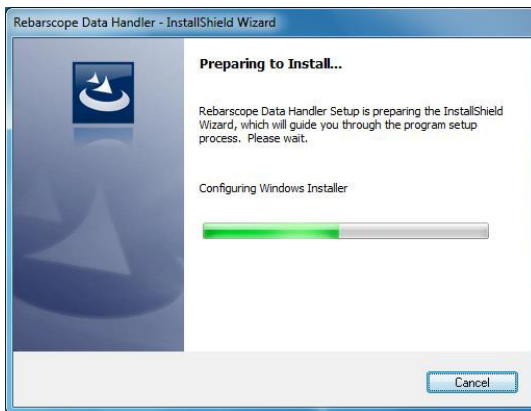


Figure 45: Install Shield Wizard

4. The Install Shield Wizard dialog appears. Click Next to proceed.

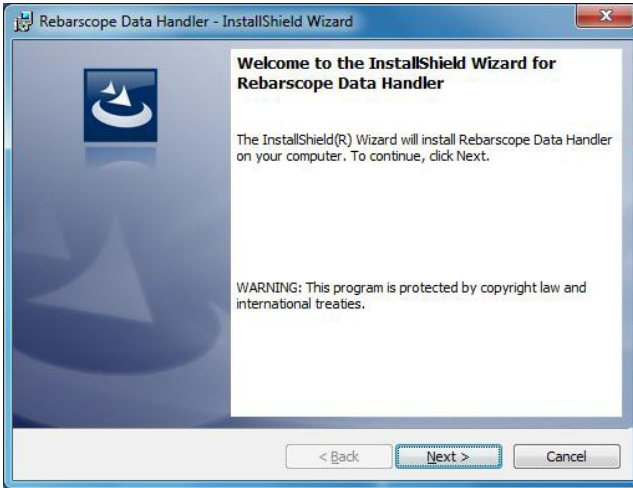


Figure 46: Install Shield Wizard

5. Accept the terms in the license agreement and click Next.

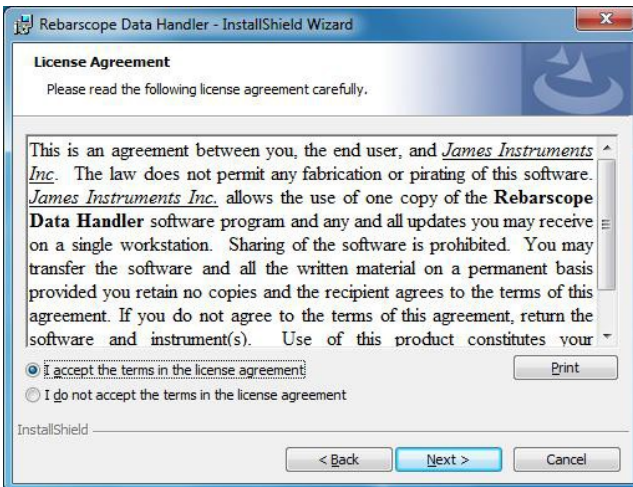


Figure 47: License Agreement Screen

6. Complete the customer information fields and click Next.

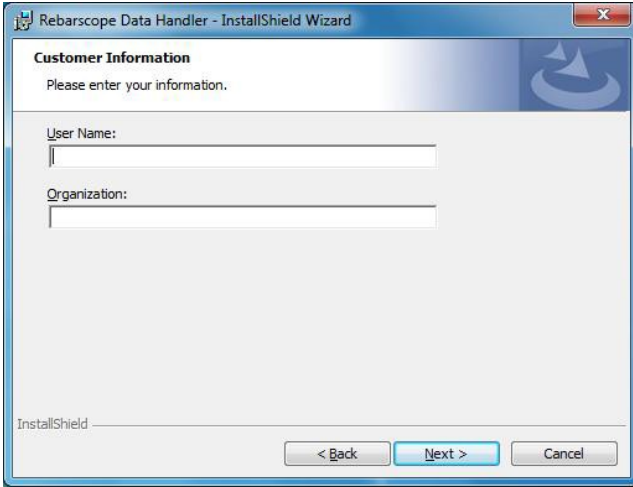


Figure 48: Customer Information Screen

7. The Install Shield Wizard confirms your installation. Click Install to continue.

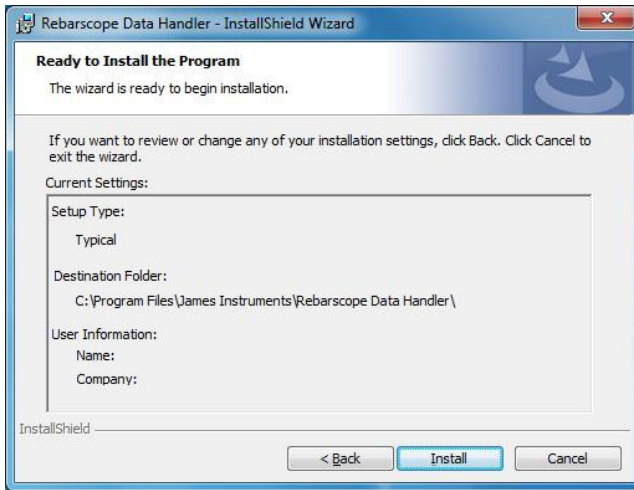


Figure 49: Install Shield Wizard Confirmation

8. The installation progress screen appears.

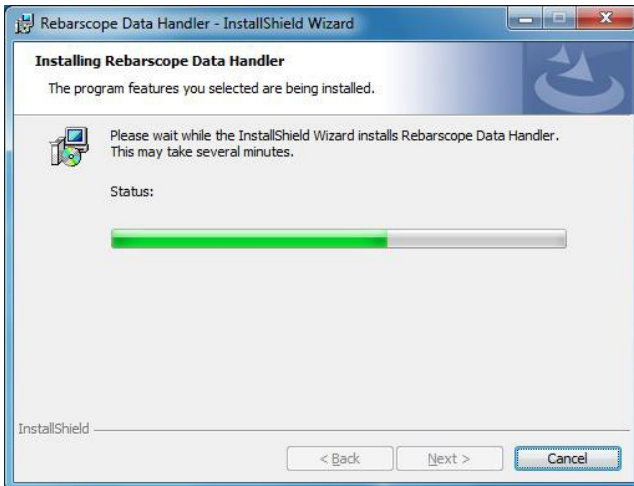


Figure 50: Installation Progress Screen

9. When the installation has completed the following message will appear. Click Finish to close the dialog.

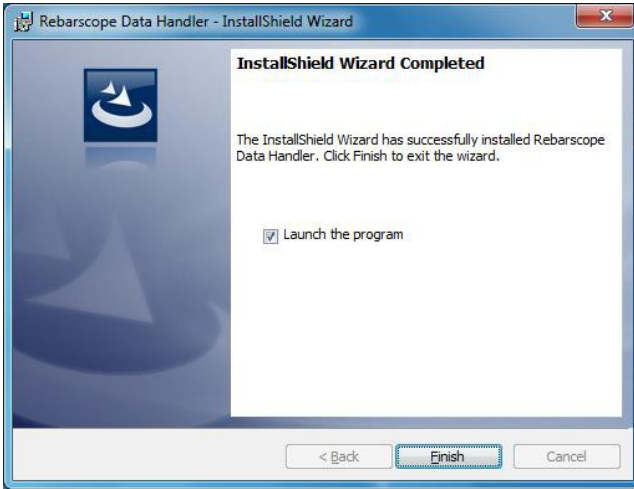


Figure 51: Install Shield Wizard Completed

10. The Data Handler shortcut appears on the desktop as well as the Start Menu.



Figure 52: Data Handler Shortcut

## Uploading Cover Map (R-C-450 and R-C-410 only)

- a. Uploading a single Cover Map.
  - i. On the Rebarscope® display, go to “Upload Menu”.

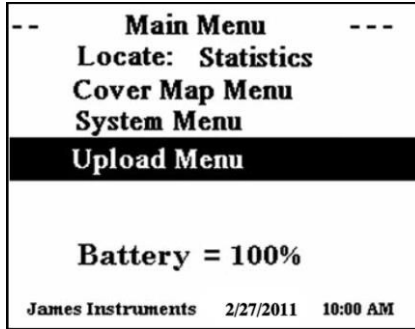



Figure 53: Main Menu Screen

- ii. On the Data Handler Software press the Upload Button. 
    - iii. On the Rebarscope® display, choose “Upload Cover Map”.
    - iv. Now save the results into the PC.



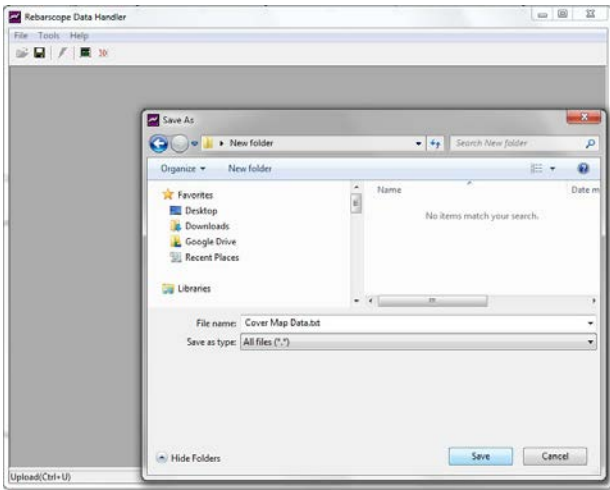


Fig. 54: Rebarscope Data Handler Screen

The display should show the Cover Map as a text.

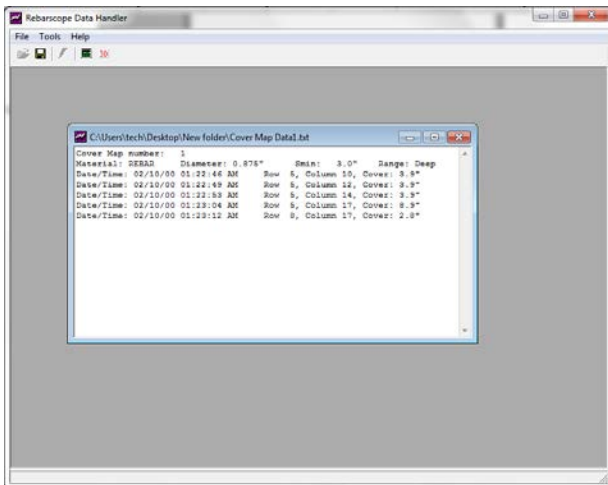


Fig.55: Data Handler Screen with Text Data

- b. Uploading multiple Cover Maps.
  - i. On the Rebarscope® display, go to “Upload Menu”.

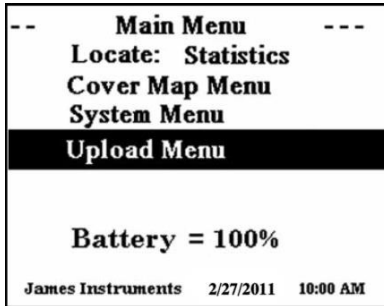



Fig. 56: Main Menu Screen

- ii. On the Data Handler Software press the Upload Button. 
- iii. On the Rebarscope® display, choose “Upload Cover Maps”.
- iv. Now save the results into the PC.

**Note:** *The Data Handler Software doesn't provide graphical presentation of the Cover Map, as this only done inside the Rebarscope® software.*

To view the cover map data:

- From open menu or simply press the open button or press “Ctrl + O”



Then open the required file in the Data Handle Software.

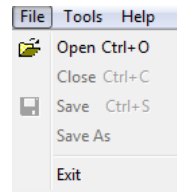


Fig. 56

- Also it is possible to open the Cover Map file as text file simple by double clicking it.

## Uploading Scan Map (*R-C-410 only*)

- c. Uploading a single Scan Map.
  - i. On the Rebarscope® display, go to “*Upload Menu*”.

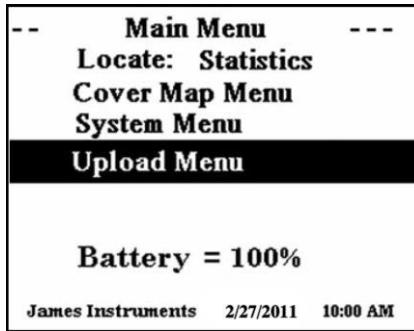




Fig. 58: Main Menu Screen


- ii. On the Data Handler Software press the Upload Button. 
    - iii. On the Rebarscope® display, choose “Upload Scan Map”.
    - iv. Now save the results into the PC.
  - d. Uploading multiple Scan Maps.
    - i. On the Rebarscope® display, go to “*Upload Menu*”.
    - ii. On the Data Handler Software press the Upload Button. 
    - iii. On the Rebarscope® display, choose “Upload Scan Maps”.
    - iv. Now save the results into the PC.

**Note:** *It is essential to move the scan cart at a slow rate: (1 inch/sec maximum) to avoid bad readings.*

# Graphic representation of the Scan Map data

## 1. 2D representation:

a. Open a saved Scan Map data.

b. Press the Graph Time command symbol. 

c. The software will show a 2D representation of Cover vs. Distance in inches, and it represents a cross section of the location that was crossed by the scan cart.

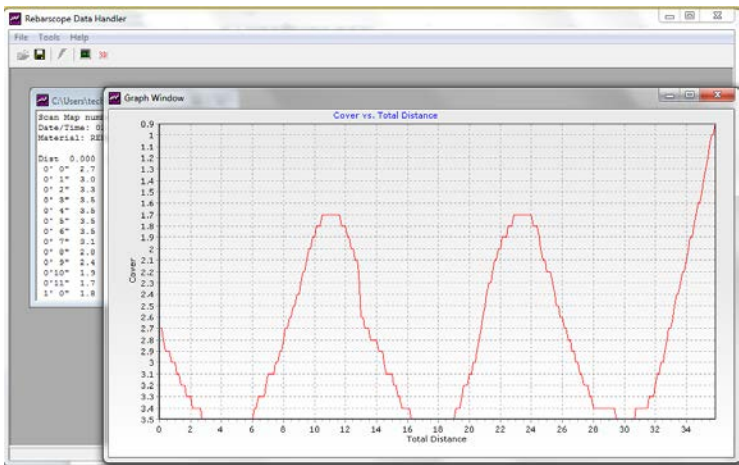
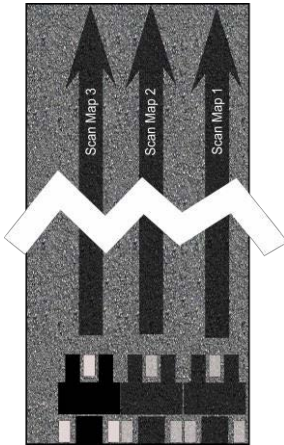


Fig. 59: Graph Window Screen

*As shown in the example above (3 foot map), it shows the existence of a rebar at a distance of 11" (1.7"cover), 22.7" (1.7" cover) and 36" (0.9" cover).*

## 2. 3D representation:

The 3D representation helps to show multiple Scan Maps in one graph, to use this feature; first it requires storing several Scan Maps (minimum two).



As shown in the figure to the left, by taking several scan readings, and upload all the Scan Maps to the computer, the 3D option will arrange these maps to generate a 3D graph showing the peaks that represents the existence of a rebar and valleys that correspond to absence of rebar, also a color code is implemented that shows a rebar in the dark blue area of the graph and the empty areas are in green or orange color.

Fig.60

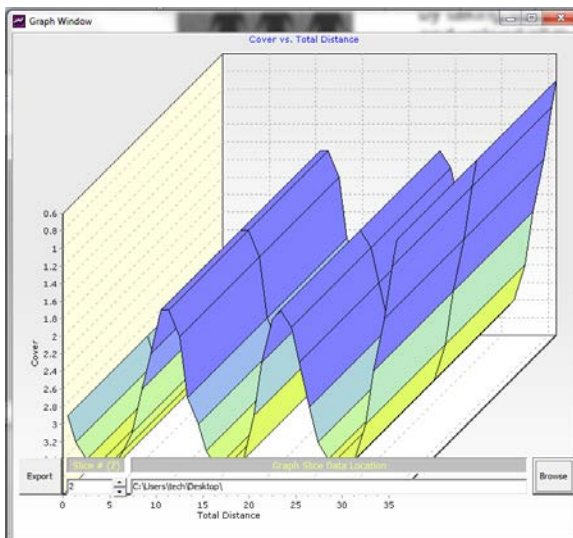



Fig. 61: Graph Window

Using the 3D graph option:

- a. Press the 3D command symbol. 
- b. Set the Slice number to 1
- c. Browse for the first Scan Map, select it and click open, at this stage nothing will appear on the graph space.
- d. Set the Slice number to 2.
- e. Browse for the second Scan Map (usually all Scan Maps are save in the same location), select it and click open.
- f. The graph starts to form, and by adding more slices the graph will expand in the Z-direction.
- g. To export the graph, click “Export”.
- h. Choose s suitable format and click Save.

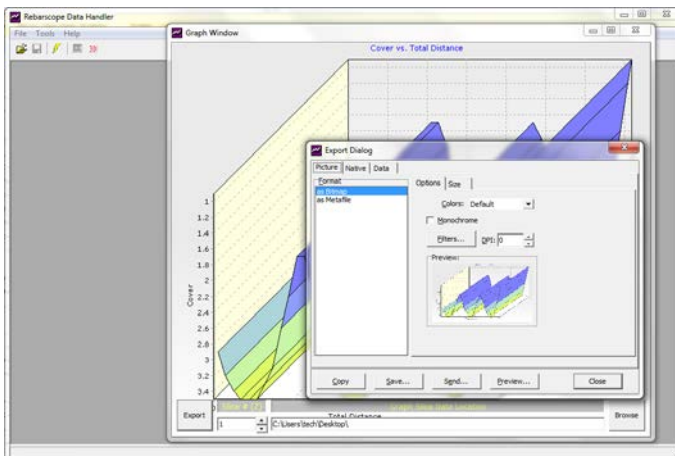


Fig. 62: Graph Window with Export Dialog Screen

## Troubleshooting

The James® Instruments Rebarscope® built in troubleshooting diagnostics helps the user identify problems with the system. This is a beneficial tool for the user which may help to resolve the problem without the need of sending the system “in” for repair. The troubleshooting diagnostics are the following: **(a) Sensor Cable Problem, (b) Sensor board Problem, (c) White Display, (d) Battery Charging problems, (e) Uploading Data issues.** Follow the steps below to properly diagnose the 5 problems listed:

### **(a) Sensor Cable Problem**

**Step 1:** Check cable connections between sensor and front panel.

**Step 2:** Check cable connectors for bent or pushed “in” pins. If yes, the sensor cable problem will appear.

**Step 3:** Check sensor and front panel connectors. If a pin(s) has been bent or pushed “in”, the sensor connector cable problem will appear.

If steps 1 thru 3 do not correct the problem please contact our office for assistance and possible repair options.

### **(b) Sensor Board Problem**

Please Contact our Office for repair options.

### **(c) White (or blank) Display**

This error condition may occur when using the White Line setting of the Display mode (under System Menu).

In this condition, the Black background becomes White, along with the letters; thus making the entire screen White. To correct this issue, try the following steps... (Note: This is a blind operation; until the end.)

1. Press the Escape button (x1)
2. Press the Down button (x2) for Basic systems, and (x3) for

Complete systems.

3. Press the Enter button (x1)
4. Press the Right (or Left) Arrow button (x1)

When completed, the display should become visible – with Black letters and a White background. If this does not reset the display condition, the user should Power cycle the unit “OFF”, and then back “ON”.

In the event this White Out condition remains, contact James® Instruments for further repair instructions. (or see Page 70)

#### **(d) Battery Charging Problems**

This condition can happen when the Charge Counters have not been reset for some time, or... if there is a problem with the battery itself. (Note: The main battery usually lasts ~ 3-5 years.)

Before sending the unit to James®, try to Reset (or zero) the battery counters in the Battery Status screen. Go to: **Main Menu / System Menu / Battery Operations** - press “Enter” to reset the Charge and Discharge counters to zero. These counters need to be reset periodically for the battery monitoring circuit to work properly. Also, Zeroing these counters will change the battery status value to 100%. This will happen whether or not the unit was charged.

Therefore, after resetting the counters, charge the unit for at least 4 hours, and reset the counters again. Doing so will provide the most accurate % status of the battery.

If this does not correct the charging problem, the system will need to be evaluated further at James® Instruments. (See Repair Services in the Calibration & Repair section.)

#### **(e) Uploading Data Problems**

This condition can happen when first attempting to use the James® Instruments software on a PC. It is due to the Comports not being set to the same setting within the software.



To find the correct Comport to use, follow the steps below...

1. Go to the PC's Device Manager... Start button / Control Panel / Device Manager / Ports.
2. Connect the USB cable to the unit. Then, while viewing the 'Ports' directory, connect the USB cable to one of the PC's USB ports. The correct Comport setting will become visible in the 'Ports' directory.
3. When the correct Comport is found, go to the James® software, and click on 'Tools' in the task bar (at the top). Select the correct Comport (1-20) from the drop down list.
4. Go back to the unit and select the Test Data to upload.
5. Go back again to the software, and click on the Lightning Bolt icon in the task bar...
6. Now press 'Enter' on the unit to start the upload process. The PC should say the computer is "Receiving Data".

If these steps do not work, it is possible the correct Drivers need to be installed on the PC. Go to the following website for more help...

<http://www.ftdichip.com/Drivers/D2XX.htm>

(Note: Although James® does not support Windows XP (any longer), the data handler should still work with XP.)

## Maintenance

- If the Main 14.4V Battery does not hold a charge, the system should come back to James® Instruments for battery replacement. (Review Troubleshooting section **(d)** before sending the unit back to James® Instruments.)
- Calibration is recommended to be done annually, or when display readings are suspected to be inaccurate.
- Keep the unit clean. If dust builds up in the unit, clean it out with compressed air.

## Safety

- Do not submerge unit in water. This can cause electrical shock.
- The sensor generates a magnetic field. Do not point the sensor on products that are sensitive to magnetic fields.

## Available Rebarscope Accessories

<b>Part #</b>	<b>Description</b>
<b>R-C-3015</b>	Probe
<b>R-C-3020</b>	Scan Cart
<b>R-C-3030</b>	Coiled Cable
<b>R-C-3031</b>	Scan Cart Cable
<b>R-C-3035</b>	Headphones
<b>R-C-3040</b>	Locating Template
<b>R-C-3051</b>	Basic Software
<b>R-C-3052</b>	Scanning Software
<b>R-C-3056</b>	USB Cable
<b>R-C-475</b>	Scan Cart Upgrade
<b>S-31800</b>	Charger

Specifications

**Rebarscope® System R-C-400, R-C-450, R-C-410**

<b>Sensor Dimensions</b>	5”L x 2.4” W x 1.6” H
<b>Sensor Weight</b>	1lb
<b>Instrument Dimensions</b>	10.625” L x 9.68” W x 4.875” H
<b>Instrument Weight</b>	5.4
<b>lbs Complete System Weight</b>	10 lbs
<b>Basic System Weight</b>	8 lbs
<b>LCD Dimension</b>	3.5”L x 4.65”H
<b>LCD Size</b>	320 x 240 pixels
<b>Operating Temperature</b>	-10 - 50 C
<b>Covered Rebar Sizes</b>	(#) 3, 4, 5, 6, 7, 9, 11 (mm) 6, 10, 13, 16, 19, 25, 29, 32, 35, 38, 41, 51
<b>Standard Copper Pipe Sizes</b>	.375, .500, .750, 1.00, .1.250
<b>Standard Conduit Sizes</b>	.750, 1.00, 1.250
<b>Power Source</b>	14.4V, 4hr continuous use

# Warranty Information

## 1. Contract

Unless otherwise stated all sales transactions are expressly subject to these terms and conditions. Modification or additions will be recognized only if accepted in writing by an authorized Officer of James® Instruments Inc. (hereinafter referred to as "James®" or the "Company"), or an officially designated representative. PROVISIONS OF BUYER'S PURCHASE ORDER OR OTHER DOCUMENTS THAT ADD TO OR DIFFER FROM THESE TERMS AND CONDITIONS ARE EXPRESSLY REJECTED. NO WAIVER OF THESE TERMS AND CONDITIONS OR ACCEPTANCE OF OTHERS SHALL BE CONSTRUED AS FAILURE OF THE COMPANY TO RAISE OBJECTIONS.

## 2. Warranties

The Company only warrants the equipment manufactured or supplied by the Company as set forth herein. James® makes no other warranties, either expressed or implied (including without limitation, warranties as to merchantability or fitness for a particular purpose). In no event shall James® be liable for any type of special, consequential, incidental, or penal damages, whether such damages arise out of or are a result of breach of contract, warranty, negligence, strict liability or otherwise. Warranty shall not apply where the equipment manufactured or supplied has been subject to accident, alteration, misuse, abuse, improper storage, packing, force majeure, improper operation, installation, or servicing. In addition, the following shall constitute the sole and exclusive remedies of Buyer for any breach by James® of its warranty hereunder.

### a. New Products

James® warrants the equipment manufactured or supplied by James® as set forth herein. This limited warranty can only be exercised by the original purchaser of the equipment from James® or authorized James® Agent and is not transferable to any subsequent owner or party. This limited warranty gives you specific legal rights, and you may also have other rights which vary from case to case.

#### i. For James® Equipment

James® warrants that James's equipment will be free from defects in materials and workmanship for a period of twenty- four (24) months on the electronic portion and six (6) months on the mechanical portion from the date of shipment of equipment from James® to Buyer. Should any defects be found and reported by the Buyer during the applicable limited warranty period, the defect will be corrected upon return of the item to James®. James® will, during the applicable new equipment warranty period, provide the necessary replacement parts and labor to correct the defect.

Excluded from the new equipment warranty are all

consumable and wear and tear items such as impact bodies, penetrators, connection cables, etc. These items are subject to usual wear and tear during usage. Refer to the Consumable, Wear and Tear Items section of this warranty document.

### **Option For Extended Limited Warranty Coverage**

The original purchaser of any new equipment of James® which have been identified or labeled by James® from time to time in James's sole discretion as being eligible for extended warranty coverage shall have the option to purchase certain extensions of the applicable limited warranty provided hereunder to the electronic portion of any such items for either a twelve (12), twenty-four (24) or thirty-six (36) month period (up to a possible maximum limited warranty coverage period for the electronic portions of such new James® equipment of sixty (60) months) by purchasing any such twelve (12), twenty-four (24) or thirty-six (36) month limited warranty extension period either all the time of the purchase of any such item(s) or within ninety (90) days from the date of delivery of the subject item(s) of the original purchaser of such item(s). The price for each such extended limited warranty coverage period shall be as determined by the Company from time to time and all such purchases of any extended warranty coverage periods shall only be effective upon a completed purchase order and payment directly between James® and the original purchaser of any such item(s). The extended warranty coverage periods are only valid with respect to the original purchaser of such item(s) from the Company and such extended warranty coverage is not transferable to subsequent owners of the subject item(s) or any other parties. Upon the purchase of any extended limited warranty coverage period, the Company will issue a certificate to Buyer evidencing the details of the applicable extended warranty coverage period purchased by the Buyer.

### **ii. For Other Manufacturer's Products Supplied by James®**

Products of other manufacturers supplied as such by James® are warranted by James® only to the extent of any warranty provided by the original manufacturer, if any.

### **iii. For Parts and Sub-Assemblies**

Parts or sub-assemblies purchased by the Buyer to perform its own repair work etc. are warranted as provided hereunder by James® for six (6) months from date of shipment of material from James® to Buyer.

#### **iv. For Consumables, Wear and Tear Items**

James® supplies consumable items and items subject to wear and tear during normal usage of James® supplied products. These items are not covered under warranty. Buyer is to check for proper fit, form and function of such items upon receipt of such items. In case of a defect condition, Buyer can return the item to James® for evaluation within thirty (30) days of the date of shipment to the Buyer. James® reserves the exclusive right to issue full, partial, or no credit to the Buyer based on the condition of the returned item and circumstances related to the return. Examples of items in this category: connection cables, test blocks, impact bodies, penetrators, probes, extraction liquids, calibration liquids, pins, recording paper, test plugs, etc.

#### **b. Calibration and Repair**

##### **i. For Calibration Services**

James® does not warrant the calibration of any equipment. James® does however warrant the equipment manufactured by it, in proper working condition, to be capable of being adjusted to meet James® printed specifications, if any, for accuracy and performance as to the particular model type during the period of warranty applicable as stated above.

##### **ii. For Repair Services**

James® warrants repair work performed under the direct control and supervision of James® personnel for a period of three (3) months from the date repairs are completed either at James® or at the customer site. Should the defect for which the repair work was performed reoccur within this period, James® will supply the necessary parts and labor (repair at James® facility) or parts (repair at Buyer facility) required to repair the original equipment defect for which the repair parts and labor were required. Additional repair charges that may be incurred in conjunction with any repair service warranty event will be invoiced at the James® customer service rates and policies in effect at the time of the event.

Excluded are all consumable and wear and tear items such as impact bodies, probes, connection cables, etc. These

items are subject to usual wear and tear during usage. Refer to the Consumable Wear and Tear Item section of this warranty document.



### **c. Warranty Claims**

#### **i. For Warranty Claim Processing**

James® has established James® organizations in the Americas, and Europe. Please visit the James® web site [www.ndtJames.com](http://www.ndtJames.com) for latest address and contact information for the James® organization nearest you.

### **3. Regulatory Laws and/or Standards**

The performance of the parties hereto is subject to the applicable laws of the United States. The Company takes reasonable steps to keep its products in conformity with various nationally recognized standards and such regulations, which may affect its products. However, the Company recognizes that its products are utilized in many regulated applications and that from time to time standards and regulations are in conflict with each other. The Company makes no promise or representation that its product will conform to any federal, provincial, state or local laws, ordinances, regulations, codes or standards except as particularly specified and agreed upon for compliance in writing as a part of the contract between Buyer and the Company. The Company prices can not include the cost of any related inspections or permits or inspection fees.

### **4. Notices**

Notice by either the Company or Buyer will be made only by facsimile or similar electronic transmission, effective on the first business day after confirmed receipt, or by letter addressed to the other party at its address as provided in this Agreement, effective three (3) business days after deposit with the U.S. Postal Services, postage prepaid, or one (1) business day after deposit with a recognized overnight express service.

### **5. Interpretation**

Should any term or provision contained in the contract contravene or be invalid under applicable law, the contract shall not fail by reason thereof but shall be construed in the same manner as if such term or provision had not appeared therein.

### **6. Assignability**

Neither this contract nor any claim arising directly or indirectly out of or in connection herewith shall be assignable by Buyer or by operation of law, without the prior written consent of Company. This document shall be binding upon and inure to the benefit of each party hereto and their respective permitted successors and assigns.

## 7. Governing Law

This Agreement shall be governed by and construed in accordance with the internal laws of the State of Illinois, without regard to its conflict of laws provisions. Buyer and the Company expressly agree to submit to the personal jurisdiction of the federal and/or state courts sitting in Chicago, Illinois, U.S.A. and agree that such courts may be utilized if necessary to obtain injunctive or any other relief. The Hague Convention and the United Nations Convention on Contracts for the International Sale of Goods shall not apply to the construction or interpretation of these Standard Terms and Conditions or affect any of its provisions.

END.

## Repair Policy

United States | Canada | International

Ship the instrument in a box that meets UPS, Fed Ex, and standard shipping regulations. Enclose a note describing the problem(s) you are having. Include the name and phone number of the contact person in your organization.

The instrument will be evaluated within one week of receipt. The contact person will be notified with an estimate of the cost of the repair.

Upon receipt of your authorization of repair and payment terms, delivery time will be 2 weeks from that day.

If you need the repair back sooner than this, you have the option of paying an express service fee of 10 percent of the purchase price of said instrument, plus the repair cost. With this service, you can receive the instrument back within 3 working days in the USA (5 working days for Europe).

International repair shipments must contain a commercial invoice listing the instrument being returned and must contain the words:

Country of manufacture: USA

Instrument being returned to manufacturer for repair – no value for customs, value for carriage only.

Ship the complete system to:

Attn: Repair Department James Instruments, Inc. - USA 3727 North Kedzie Avenue Chicago, IL 60618-4503 USA	Attn: Repair Department James Instruments, Inc. – Europe Windmolen 22 7609 NN Almelo The Netherlands
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Home page: [www.ndtJames.com](http://www.ndtJames.com)

E-mail: [info@ndtJames.com](mailto:info@ndtJames.com)  
[europe@ndtJames.eu](mailto:europe@ndtJames.eu)



**James Instruments Inc.**

3727 N. Kedzie Ave.  
Chicago, IL 60618-4503  
USA  
Tel: (773) 463-6565  
Fax: (773) 463-0009

**James Instruments Inc. - Europe**

Windmolen 22  
7609 NN Almelo  
The Netherlands  
Tel: +31 (0)548 659032  
Fax: +31 (0)548 659010

Purchase Date: \_\_\_\_\_

Serial Number: \_\_\_\_\_

