



# OPERATIONS GUIDE

## MFE EDGE TANK FLOOR EDGE SCANNER



REV. 2

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## SAFETY NOTICE

This equipment makes use of very powerful rare earth magnets. Great care should be exercised when disassembling the unit or moving the magnetic bridge to prevent damage to either the operator or equipment.

This equipment should only be handled and operated by personnel who have received the necessary training from MFE ENTERPRISES, INC. Should it be necessary to unpack the transportation case prior to any training, please note that this equipment uses very powerful magnets that can be hazardous if mishandled and the equipment itself can be damaged. The magnetic bridge is mounted to a keeper plate in the transportation case for shipping purposes and should not be disturbed prior to the arrival of the MFE-trained personnel.

It is strongly recommended to fully charge the unit prior to use. Do not use any battery chargers other than the ones provided to charge this equipment.



# TANK SETUP

## CHECKLIST

- 1) Remove handle assembly from case.
- 2) Attach the handle assembly to the bridge assembly (with bridge on keeper plate).
- 3) Attach all three cables.
- 4) Adjust the sensor bar to the lowest setting possible without it scraping the tank floor on a consistent basis.
- 5) Press the power button to turn on the scanner (should automatically boot into MFE Edge software).
- 6) Select the Manual option for a real-time, manual scanning.
- 7) Select the configuration screen and adjust the plate thickness to 1/2 inch and coating thickness to 0. (The keeper plate is 1/2" thick and requires this change to perform a function test.)
- 8) Scan the keeper plate to verify that you received a signal response on all 6 channels.
- 9) Select the configuration screen and adjust the plate/coating thickness to match the conditions of the tank floor.
- 10) Remove the scanner from the keeper plate and place the scanner on the tank floor.

**SCANNER IS READY TO BEGIN TANK FLOOR INSPECTION**



# MFE EDGE TANK FLOOR SCANNER

## INTRODUCTION

The content of the Edge Scanner Operations Guide is intended to provide guidance during setup, assembly, and to familiarize operators with the various parts of the MFE Edge. It is not a substitute for the MFE Edge Training Course that is necessary for the proper use of the MFE Edge Tank Floor Scanner.

The MFE EDGE uses Magnetic Flux Leakage as a detection tool. The powerful magnetic bridge allows for saturation of the inspected material. Any localized reduction in the thickness of the inspected material will result in a flux leakage at the surface. A series of sensors are placed between the poles of the magnetic bridge to detect these leakage fields. The strength of the leakage field is a function of volume loss and is not a reliable indication of remaining wall thickness. Although the amplitude of the signal generated by the sensors gives some relative severity information, it is not recommended that amplitude alone be used for accept/reject criteria purposes. Flux leakage should only be used as a detection tool. Quantitative information can only be obtained using ultrasonic assessment of the areas identified by the magnetic flux leakage scanner.





# MFE EDGE TANK FLOOR SCANNER

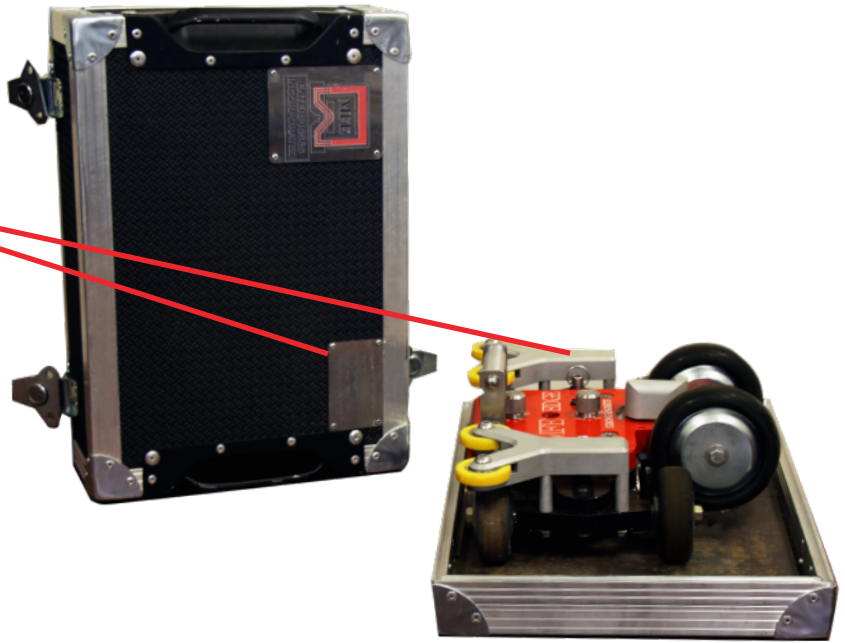
## LARGE CASE WITH HANDLE ASSEMBLY



### EQUIPMENT ID NUMBER

Each case exterior displays the ID number of the equipment it carries.

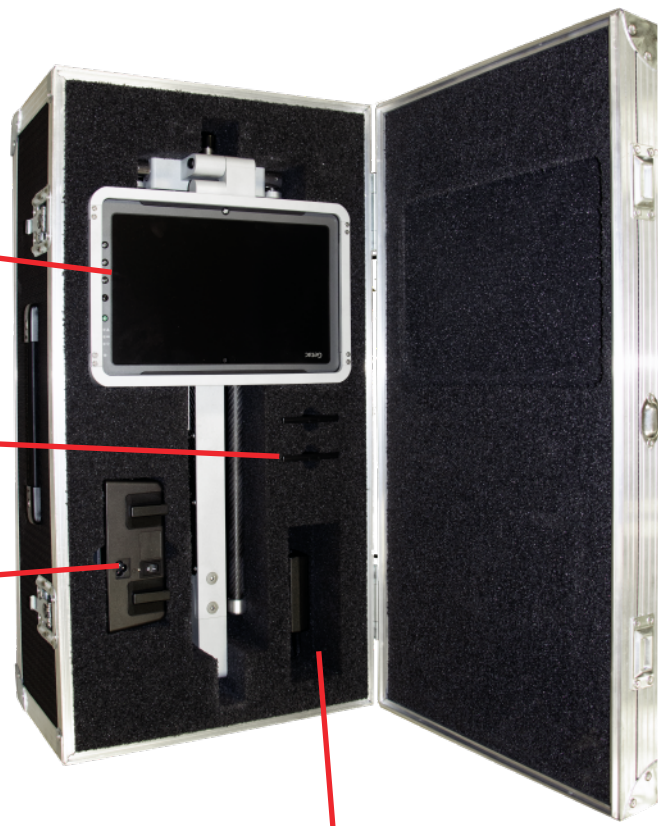
Before removing the MFE Edge Handle Assembly from the case, remove the battery charger and foam insert. Remember the location of these items as they will be needed to properly repackage the equipment.



### HANDLE ASSEMBLY

### EXTRA BATTERIES

### BATTERY CHARGER



### AC ADAPTER & BATTERY CHARGER STORAGE

# CASE CONTENTS

## LARGE CASE WITH HANDLE ASSEMBLY



GETAC BATTERY CHARGER  
OPERATION GUIDE

GETAC BATTERY PACK  
USER GUIDE

EXTRA BATTERY #1

EXTRA BATTERY #2



MFE EDGE TANK SCANNER  
OPERATIONS GUIDE

MICROFIBER SCREEN  
CLEANING CLOTH

GETAC TABLET  
REFERENCE GUIDE

ENCODER  
CABLE

BATTERY CHARGER

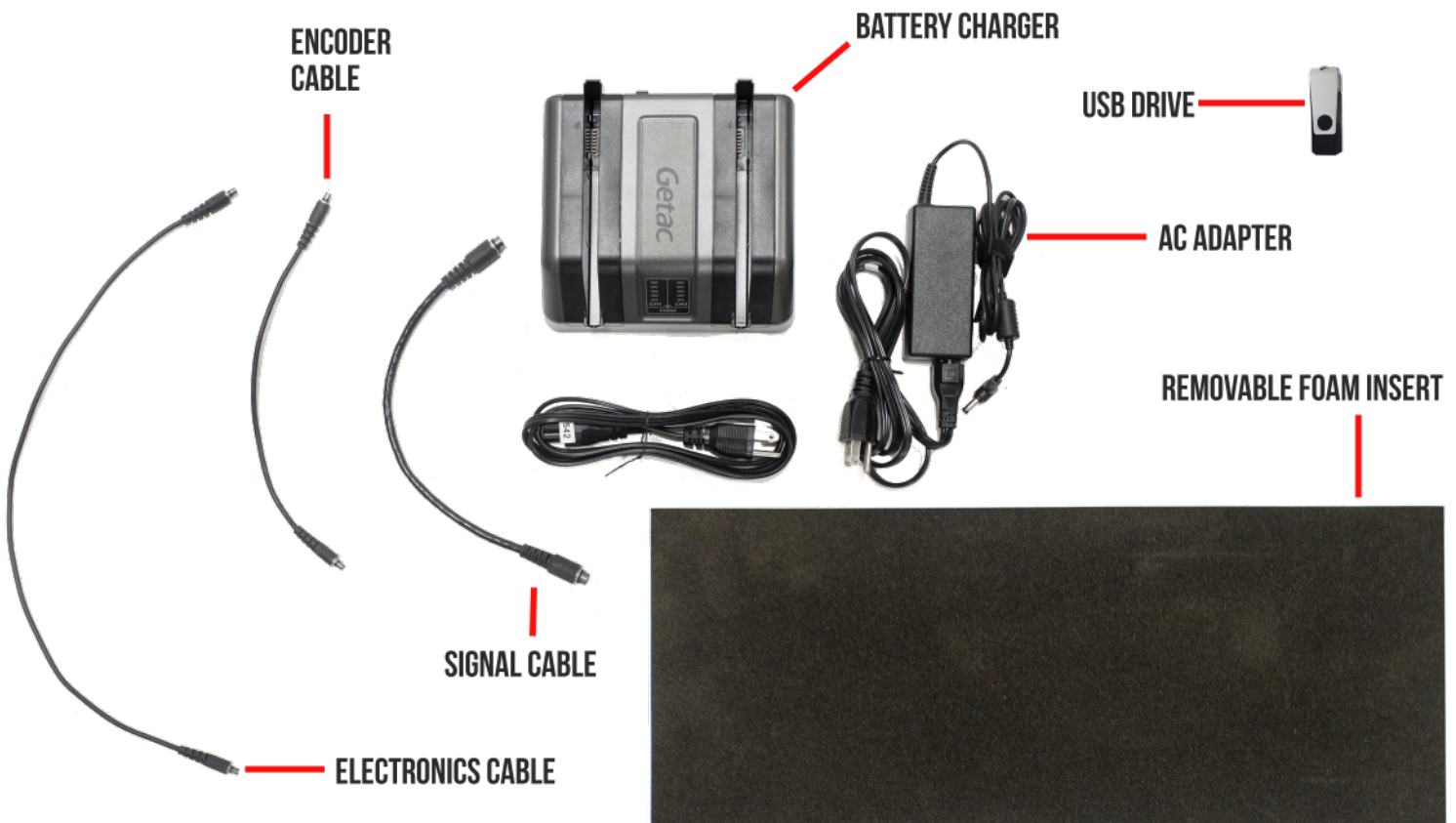
USB DRIVE

AC ADAPTER

REMOVABLE FOAM INSERT

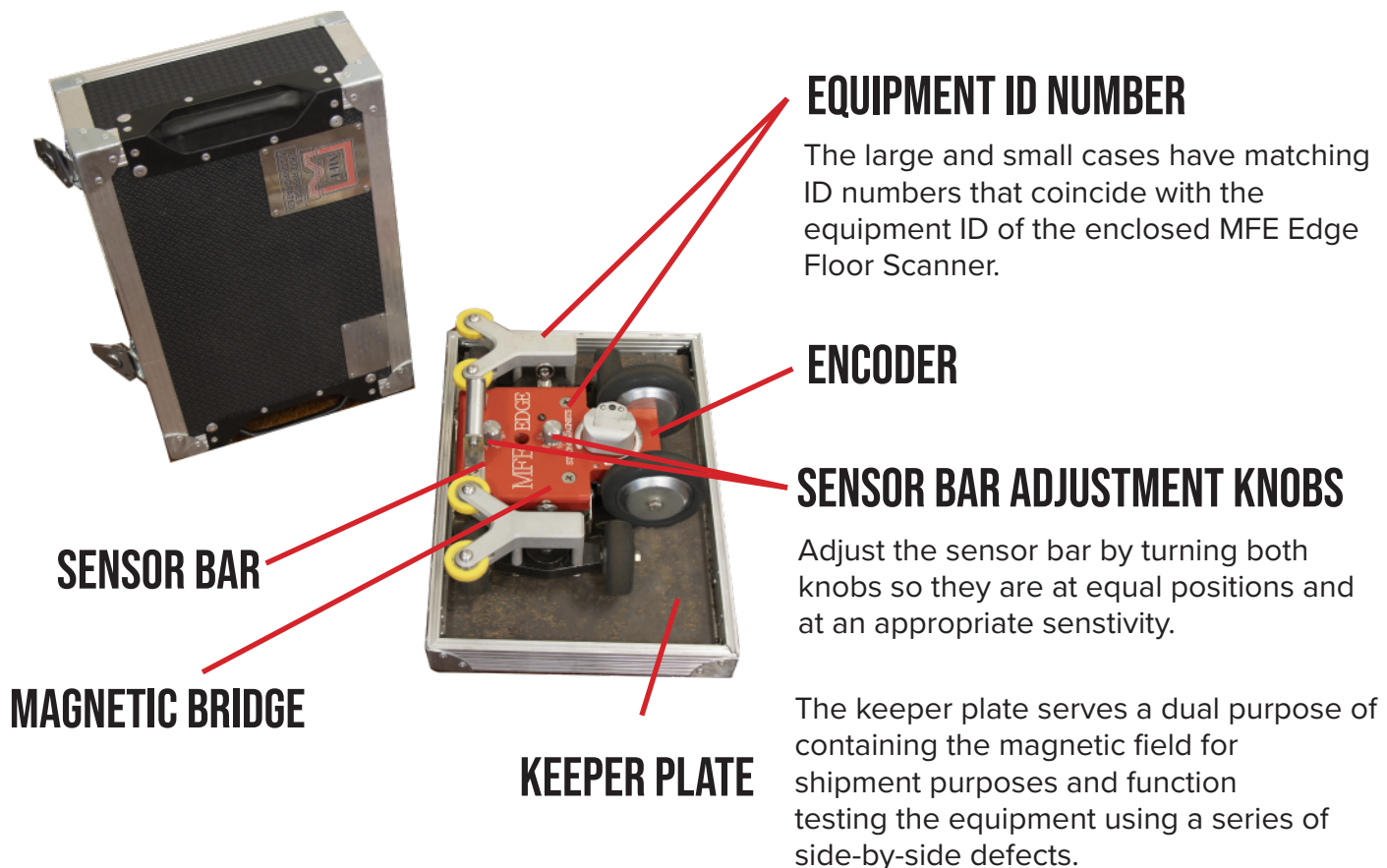
SIGNAL CABLE

ELECTRONICS CABLE



# CASE CONTENTS & ASSEMBLY

## SMALL CASE CONTAINING BRIDGE



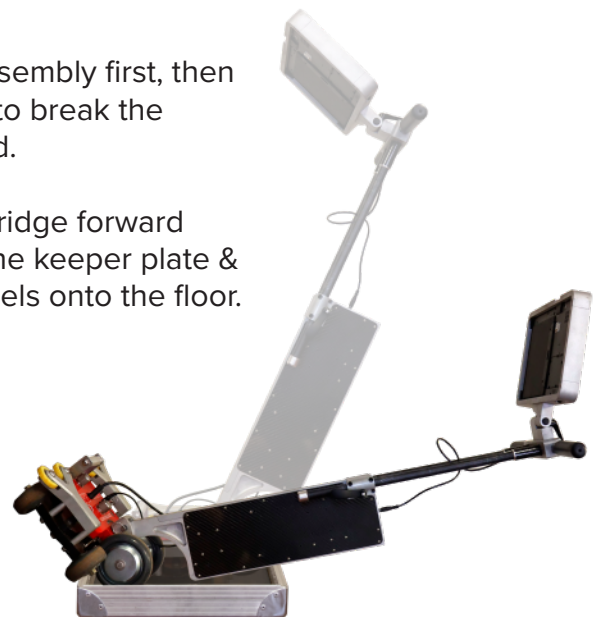
When **detaching the magnetic bridge** from the keeper plate:

- Attach the handle assembly first, then lower the handlebars to break the connection as pictured.
- Push the magnetic bridge forward towards the edge of the keeper plate & rest the front four wheels onto the floor.

## QUICK-RELEASE PINS ATTACH THE HANDLE BAR ASSEMBLY TO THE BRIDGE ASSEMBLY

**Attach** the handle to the bridge by using the quick-release pins and inserting them one at a time until they lock into place.

When ready to **detach** the handle, gently raise the top of the handle while using the ring on the quick-release button to detach the pins one at a time.





# HANDLE ASSEMBLY

## PARTS & CABLE SETUP



### COLLAPSIBLE HANDLE GRIPS

Unfold handle grips and they automatically lock into place. To fold them for storage, gently pull handles out while pressing them down.

### TELESCOPING HANDLE RODS

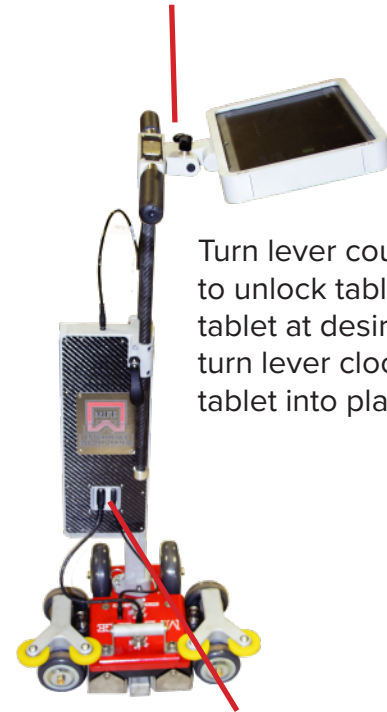
Lift both CAM levers to unlock telescoping handle rods.

### ELECTRONICS CABLE

Plug in electronics cable after expanding telescopic handle rods.

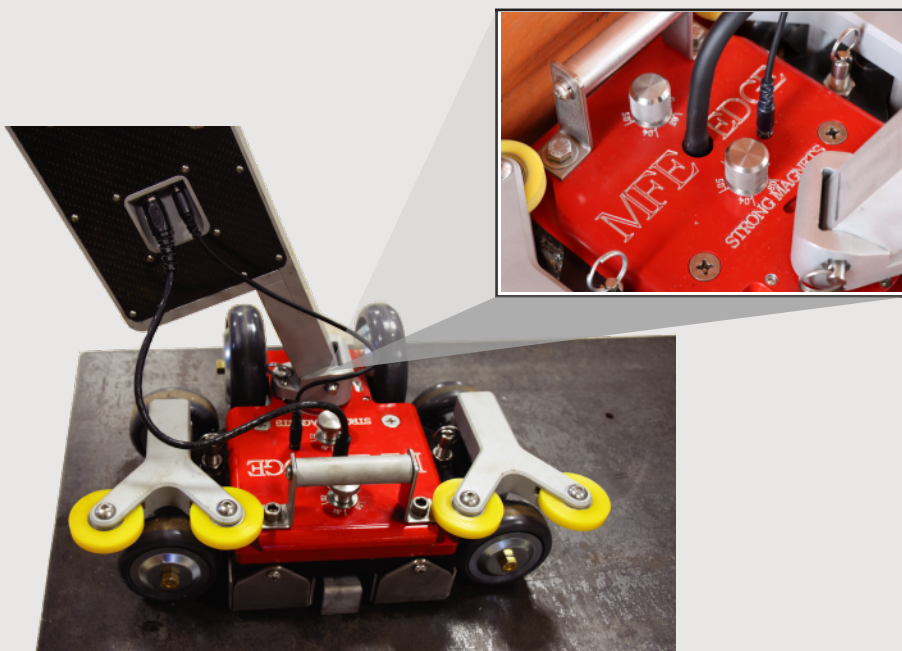
### CAM LEVERS

## TABLET ADJUSTMENT LEVER



Turn lever counterclockwise to unlock tablet holder. Set tablet at desired angle and turn lever clockwise to lock tablet into place.

## RECEPTACLE FOR SENSOR CABLE & ENCODER CABLE



## MAGNETIC BRIDGE TO HANDLE ASSEMBLY CABLE CONNECTIONS

Connect the signal cable and the encoder cable from bridge to handle by lining up the red dots on the cables and receptacles.

Since the sensor bar is not visible from the top, the cable can be gently pressed in to the receptacle and slowly rotated until the proper alignment is discovered.

# TABLET

## POWERING THE TABLET & MFE EDGE



### POWER BUTTON

The green power button is used to turn the power to the tablet (and tank floor scanner) on and off.

Once powered on, the Mark IV Scanner Software will automatically boot up as your home screen. In the event that the software fails to boot up, then press the green button to power off the tablet and then turn the power back on.

Powering up the software may take 1-2 minutes.

## HOT SWAPPABLE BATTERIES

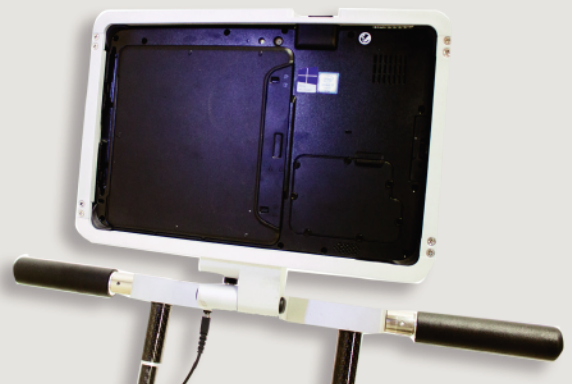


The tablet batteries power both the GETAC tablet as well as the entire Mark IV Tank Floor Scanner. Operators are able to replace one battery at a time with no power interruption to the Mark IV.

When replacing the batteries, insert the side opposite of the clear tab first and push in the interior side adjacent to the yellow tabs second. When inserted the clear tabs on each battery will be on the same side as the yellow tabs.

Pressing the power buttons located directly on each battery will light up a battery power indicator.

For additional details on the tablet, please refer to the GETAC F110 Operation Guide included with the scanner.



# SCANNING SOFTWARE

## MANUAL MODE

### MANUAL REAL-TIME DISPLAY



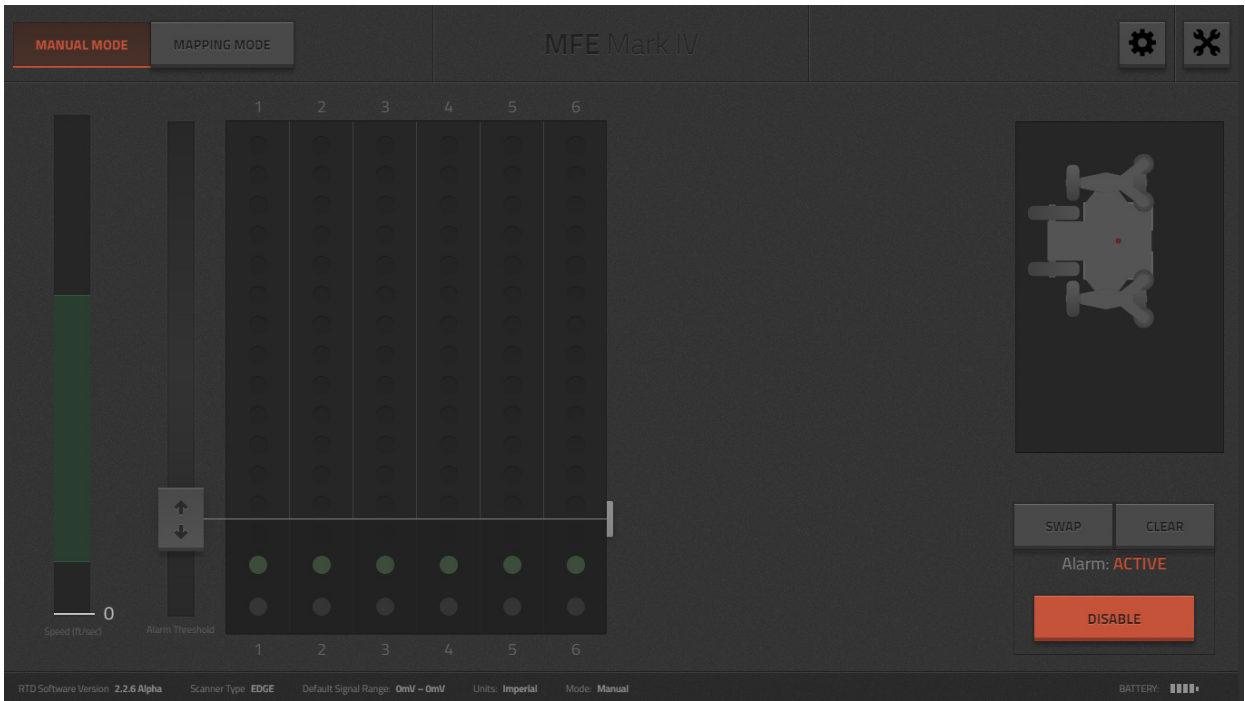
- 1 Displays current mode of operation: Manual or Mapping.
- 2 Plate and Coating Configuration - Options for changing the settings for different plate and coating thickness.
- 3 General Settings - Select between Imperial and Metric./
- 4 Speed Meter: Displays speed at which scanner is moving. All signals generated inside the green zone are speed-corrected; signals generated outside the green zone are not.
- 5 Alarm Threshold: Active when the alarm is on. Slide the bar to the desired position. Once the signal reaches this level, the alarm will trigger with a red screen.
- 6 Displays measurement system currently selected in the configuration screen: imperial or metric.
- 7 C-Scan Type Image - Overhead display of signals used to easily located defects. Move your thumb and pointer finger away from each other to zoom in, and "pinch" them together to zoom out.
- 8 6 Channel Real Time Display (RTD) - 6Channel display of the MFL signals generated by the scanner.
- 9 Alarm Enable/ Disable: Click to enable/disable Alarm Mode. The alarm is triggered once the signal reaches the threshold level.
- 10 Adjust the threshold slider higher prior to hitting the reset alarm button.



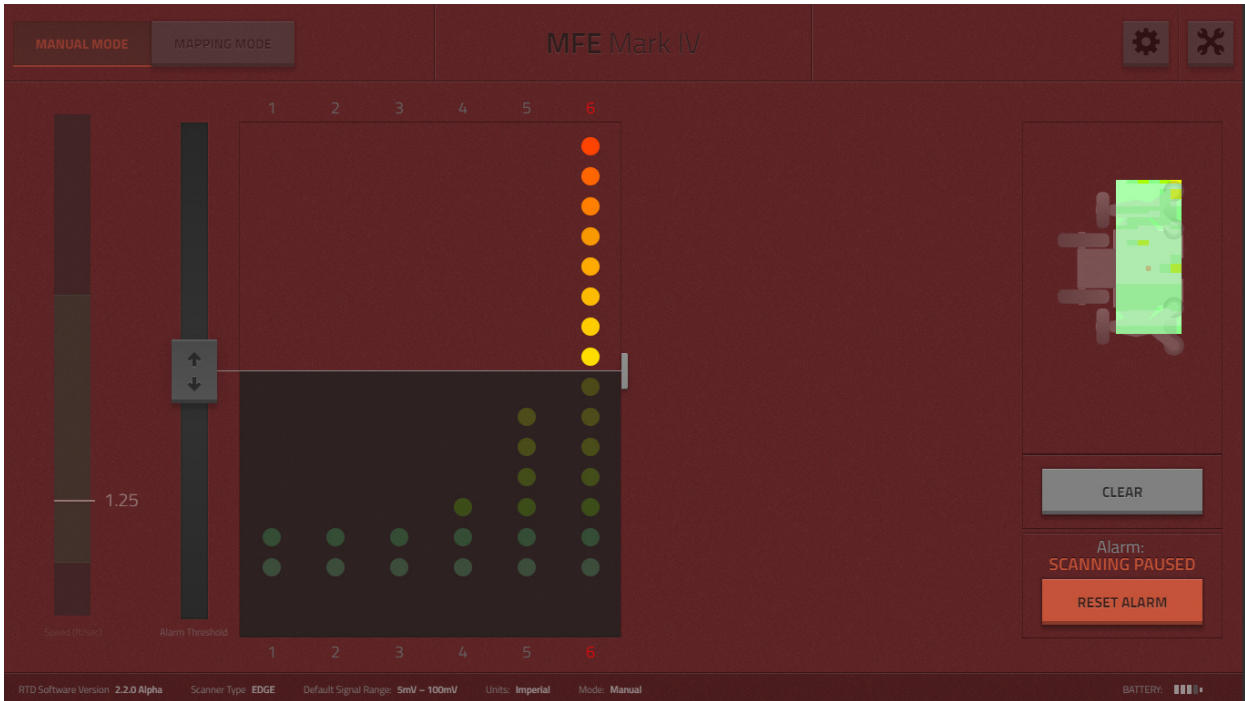
# SCANNING SOFTWARE

## MANUAL MODE

ALARM ENABLED



ALARM TRIGGERED

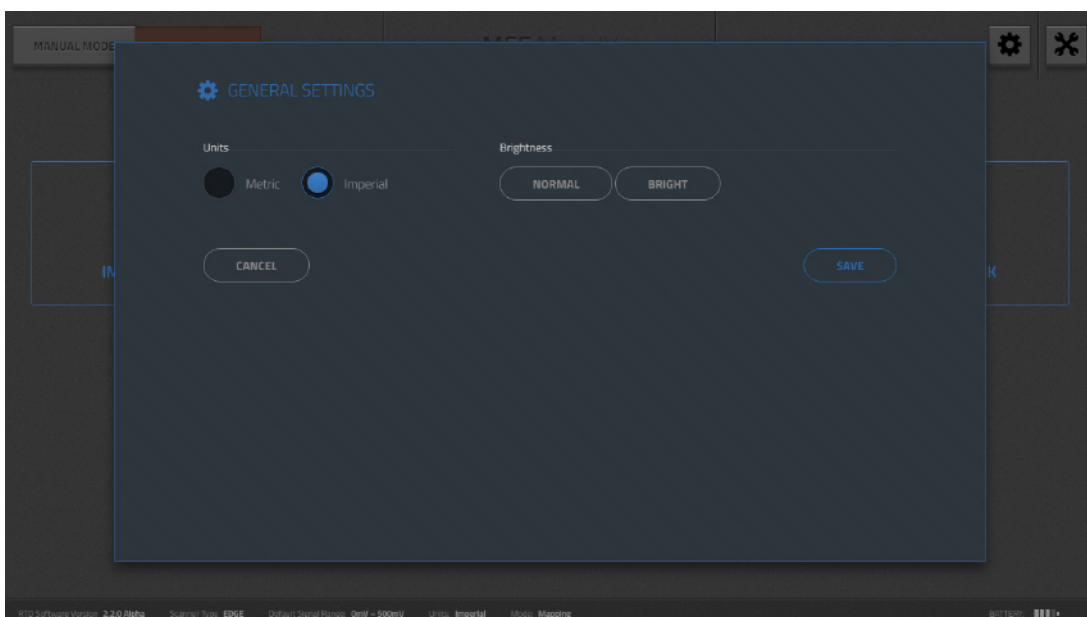


## MANUAL MODE

### PLATE DIMENSIONS & THICKNESS



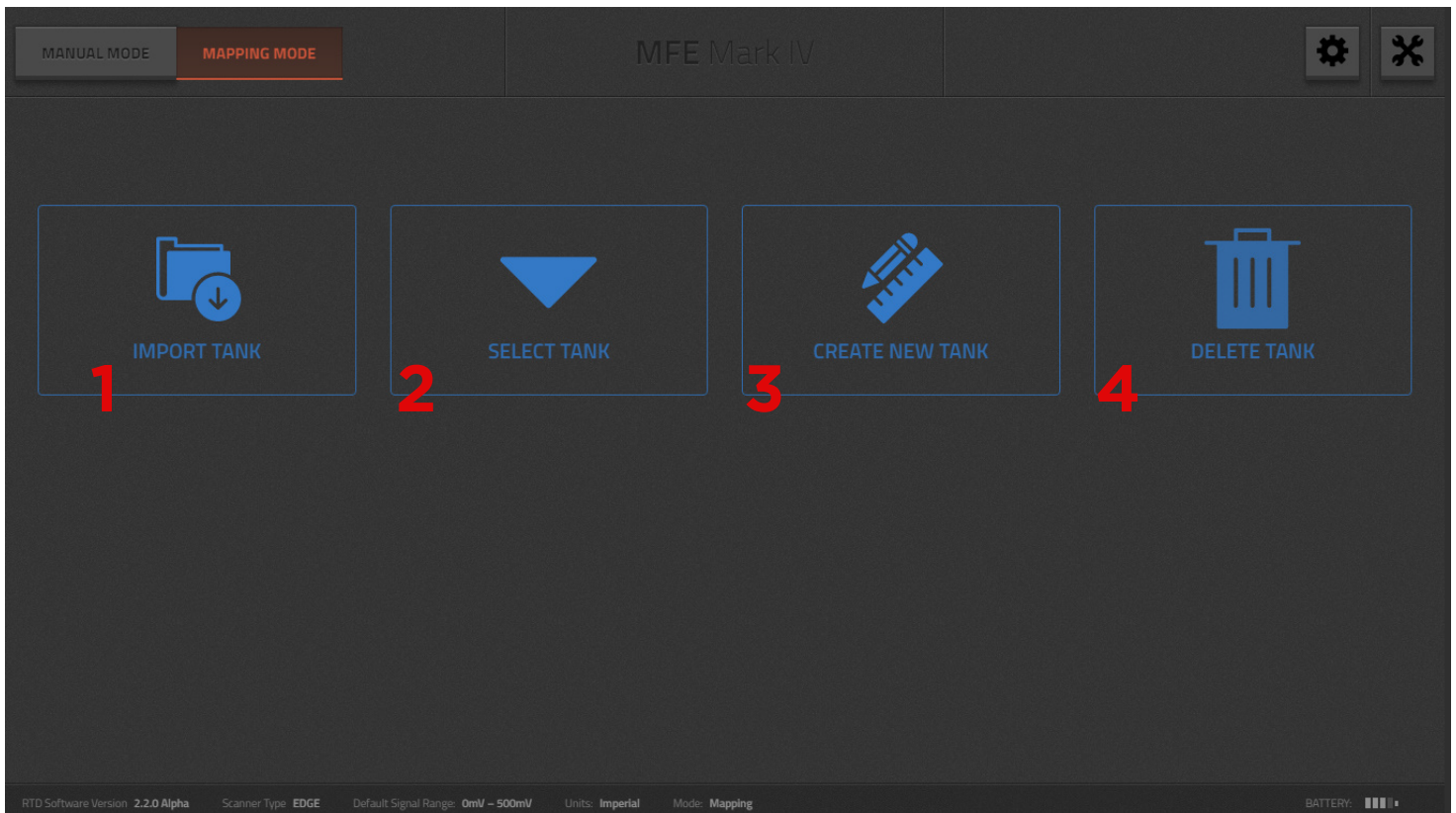
- 1** SELECT PLATE THICKNESS: Selecting the plate will adjust the signal accordingly.
- 2** COATING THICKNESS: Selecting the coating thickness will adjust the signal accordingly.
- 3** FILTER: The higher the number the more noise reduction.
- 4** GAIN: For advanced users. Gain is adjusted by coating and plate thickness selection. Operator can change signal for less or more strength. The lower the mV number, the more signal strength. The higher the number, the less signal strength.



# SCANNING SOFTWARE

## MAPPING MODE

### HOME SCREEN



- 1** Select 'Import Tank' to import a previously saved tank from a USB Drive.
- 2** Choose the 'Select Tank' option to go to a menu that lists your previous tanks.
- 3** Selecting 'Create New Tank' takes you to the tank creation screen before scanning a new tank.
- 4** Selecting 'Delete Tank' takes you to a selection screen to allow you to choose which tank you would like to delete.



## MAPPING MODE

### TANK CREATION SCREEN

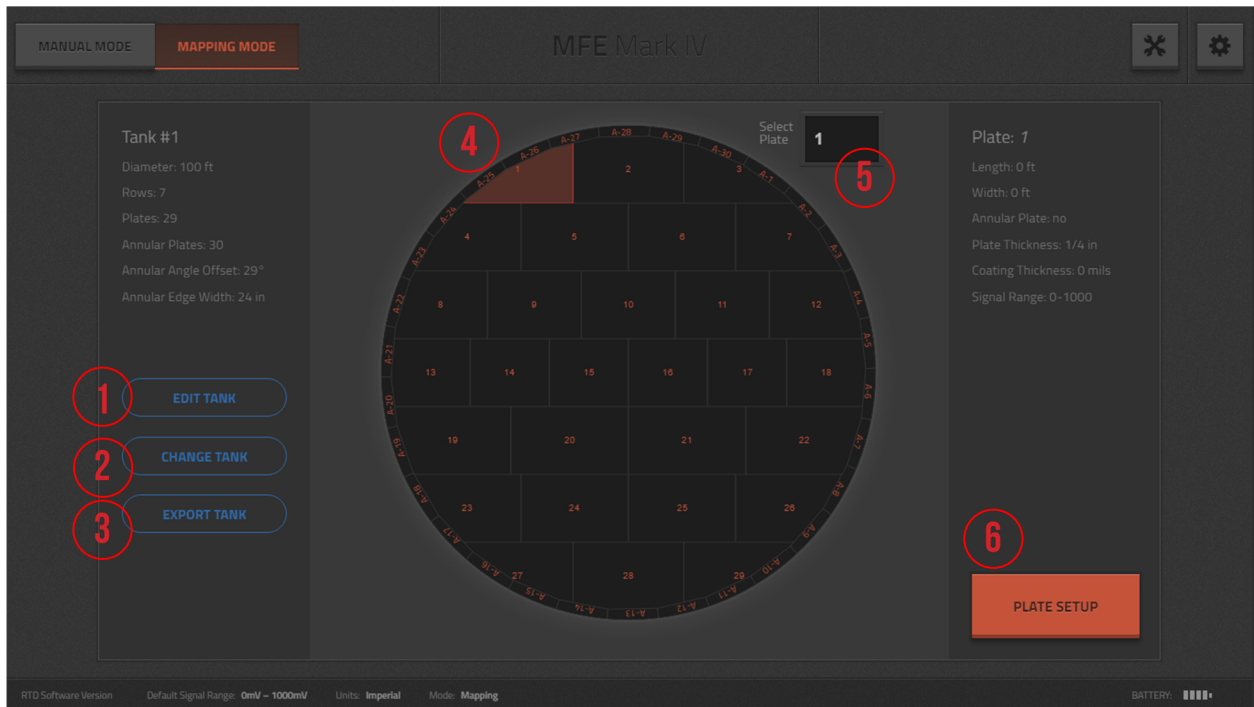
The screenshot displays the 'Create New Tank' interface in 'MAPPING MODE'. The central element is a circular tank diagram with 29 numbered segments. The interface includes several input fields and controls:

- 1** Tank Name input field.
- 2** Tank Diameter input field (100 ft).
- 3** Number of rows in tank input field (7).
- 4** Number of annular plates input field (0).
- 5** Angle Offset input field (0°).
- 6** Edge Width of Annular Plates input field (0 in).
- 7** Number of plates per row input field (3).
- 8** Number of plates per row input field (4).
- 9** Number of plates per row input field (5).
- 10** Number of plates per row input field (6).
- 11** CANCEL button.
- 12** FINISH button.

- 1 TANK NAME and DIAMETER:** Enter a name and the diameter of your tank.
- 2 NUMBER OF ROWS IN TANK:** Use the plus and minus buttons to input your rows or directly input them using the virtual keyboard
- 3 NUMBER OF ANNULAR PLATES & ANGLE OFFSET:** Enter the number of annular plates around your tank. 'Angle Offset' allows the operator to shift the angle of the tank diagram to better reflect the tank being scanned.
- 4 EDGE WIDTH OF ANNULAR PLATES:** Enter the edge width of annular plates to adjust their appearance in the tank diagram.
- 5 NUMBER OF PLATES PER ROW:** Enter the number of plates per row here. To access additional rows, swipe up or down on the row section of the screen.
- 6 CANCEL:** Clicking the cancel button will take you to the home screen. By clicking cancel before finishing your tank, you will restart the tank creation process and your work will not be saved.
- 7 FINISH:** When your tank details have been entered, click Finish to save your tank.

## MAPPING MODE

### PLATE SELECTION



- 1 EDIT TANK:** The 'Edit Tank' option allows you to revert back to the 'Tank Creation Screen' to make adjustments to your tank details.
- 2 CHANGE TANK:** Select this option to switch to a previously created tank file.
- 3 EXPORT TANK:** Select 'Export Tank' to save your tank to a USB drive.
- 4 PLATE SELECTION USING DIAGRAM:** Touch the plate within the tank diagram on the screen you would like to scan.
- 5 SELECT PLATE:** You may also enter the plate number that corresponds with the plate you are going to scan here by using the virtual keyboard.
- 6 PLATE SETUP:** When you have completed creating your tank and are ready to begin scanning your first plate, choose 'Plate Setup.' Once Plate Setup is selected and you begin scanning, you will not be able to make changes to your tank diagram.

## MAPPING MODE

### PLATE DIMENSIONS & THICKNESS

MANUAL MODE **MAPPING MODE** MFE Mark IV

Plate 1 **DIMENSIONS** THICKNESS CORNER & OFFSET DIRECTION TANK OVERVIEW

Set plate dimensions

Length [ft] 20 Width [ft] 12

2 NEXT

RTD Software Version Default Signal Range: 0mV - 1000mV Units: Imperial Mode: Mapping BATTERY

- 1 Enter the length and width of your tank on this screen.
- 2 Click NEXT to move onto the next screen.

MANUAL MODE **MAPPING MODE** MFE Mark IV

Plate 1 DIMENSIONS **THICKNESS** CORNER & OFFSET DIRECTION TANK OVERVIEW

Set plate thickness and signal range

Plate Thickness 1/4 in 3/8 in 1/2 in

Coating Thickness 0 125 250 375 500

Signal 0 mV 1000 mV

4 NEXT

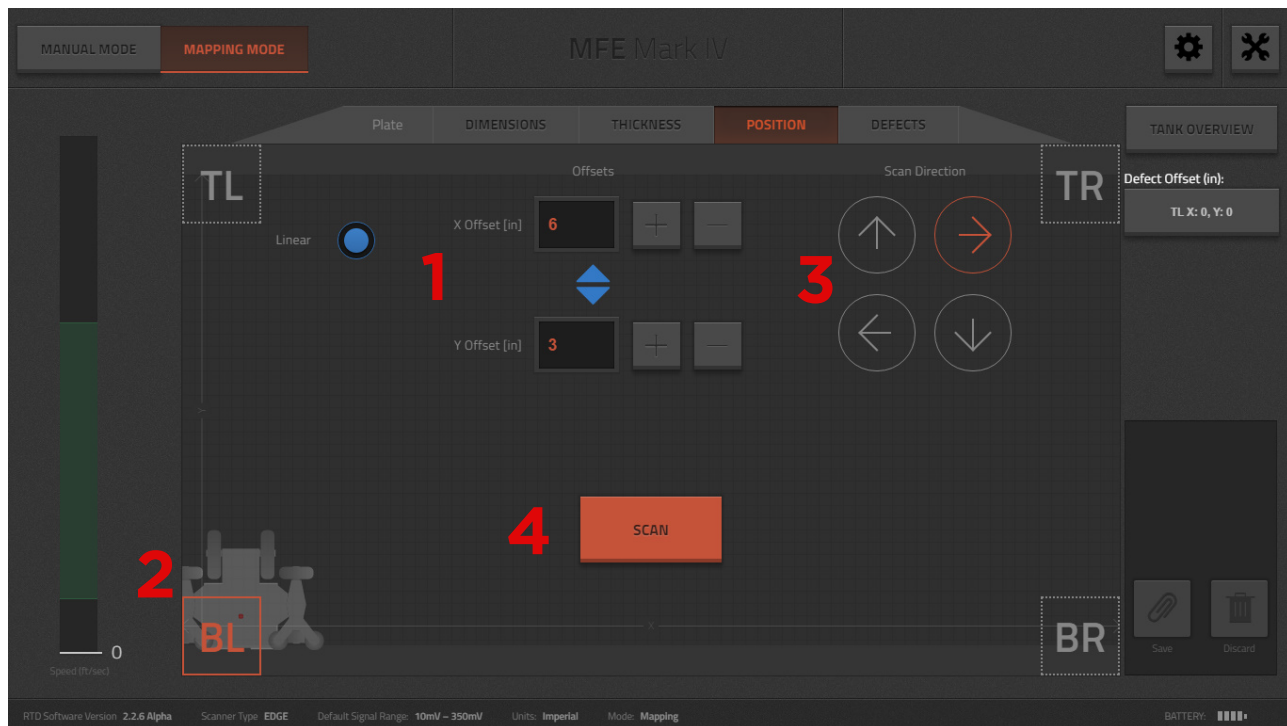
RTD Software Version Default Signal Range: 0mV - 1000mV Units: Imperial Mode: Mapping BATTERY

- 1 Select your plate thickness here.
- 2 Enter coating thickness here.
- 3 Signal range may be entered in this box.
- 4 Click NEXT to move onto the next screen.



## MAPPING MODE

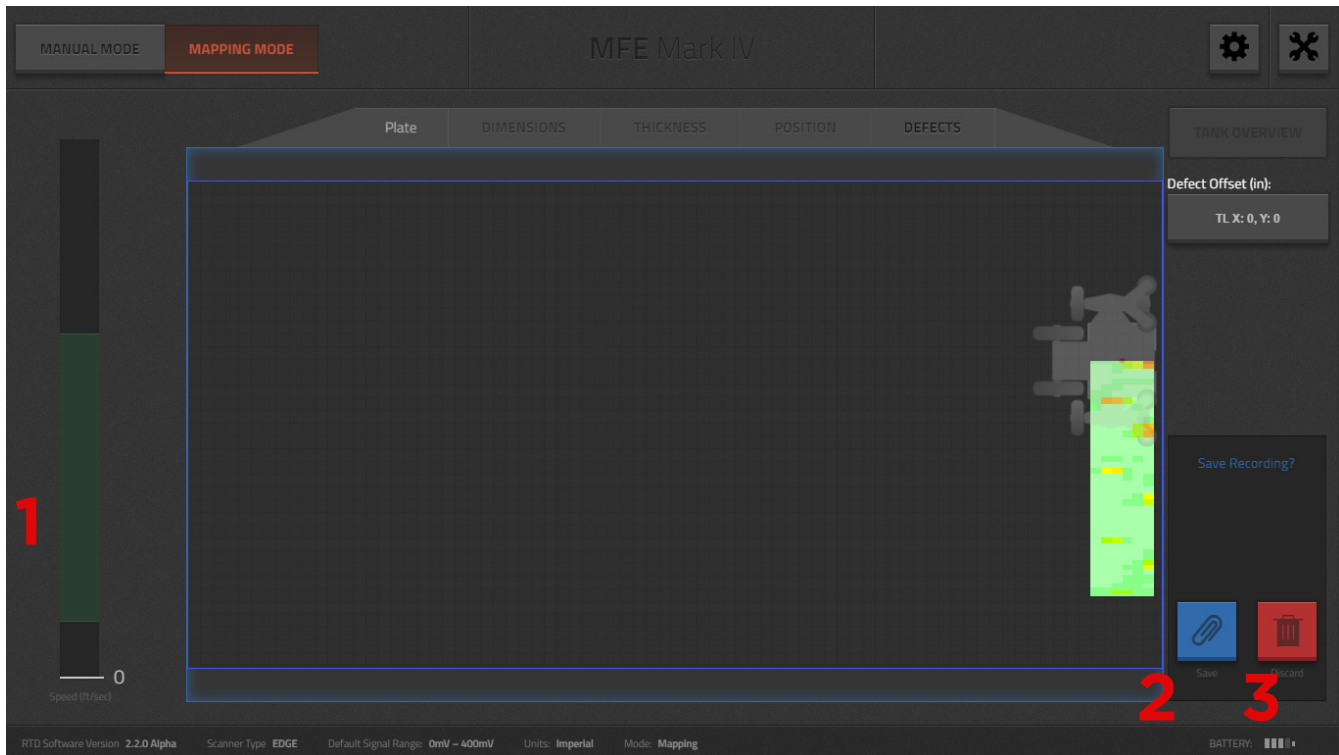
### CORNER, OFFSET & SCANNING DIRECTION



- 1** You may offset the location of the bridge by entering its specific location on the X and Y axis of the plate here.
- 2** Select your reference corner on the plate by touching BL (Bottom Left), BR (Bottom Right), TL (Top Left), or TR (Top Right).
- 3** Select your scanning direction on the 'Direction' screen.
- 4** This is the final selection of the plate setup process. You may now select 'Scan' and begin scanning the plate.

## MAPPING MODE

### SCANNING A PLATE



- 1 SPEED TRACKING:** The scanner will begin recording when the speed reaches the green zone. It will automatically stop recording when the speed exits the green zone (too fast, too slow, or stops). Speed Compensation Software allows operators scanning at different speeds to obtain the same results. The signal response is normalized when scanning within the speed tracking range.
- 2 SAVE:** Select this option once you've completed scanning your plate to save the data.
- 3 DISCARD TANK:** Select the discard button to discard your data and scan the plate again.

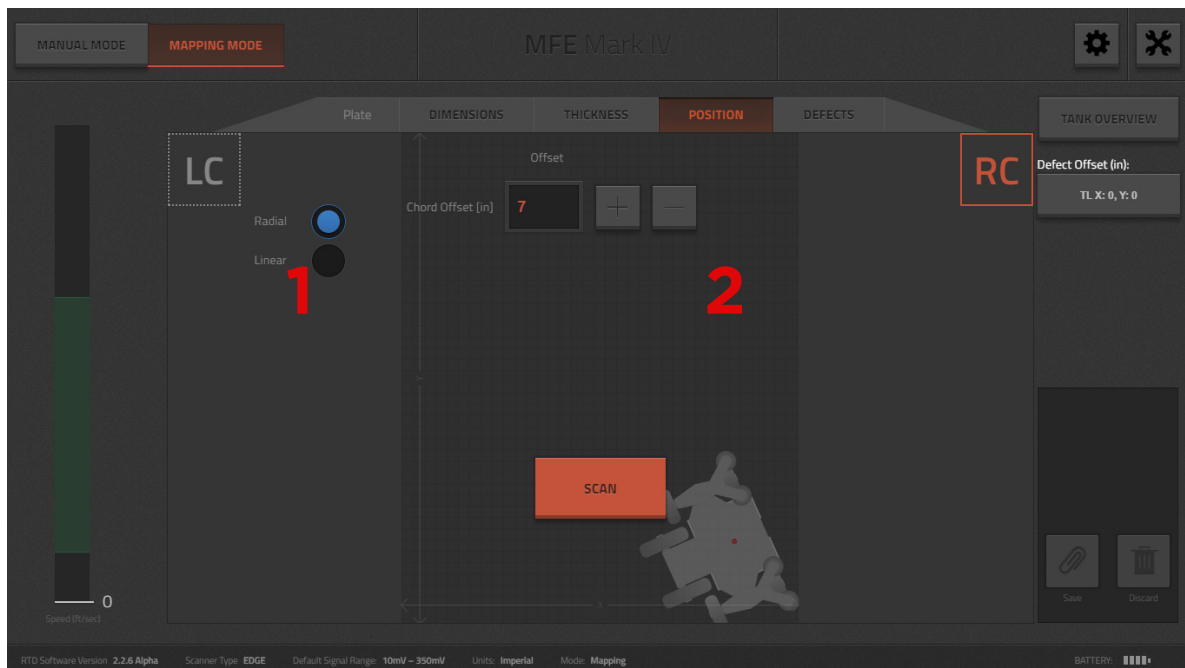
## MAPPING MODE

### RADIAL SCANS

Radial Scans are not available until one of these two requirements are met:

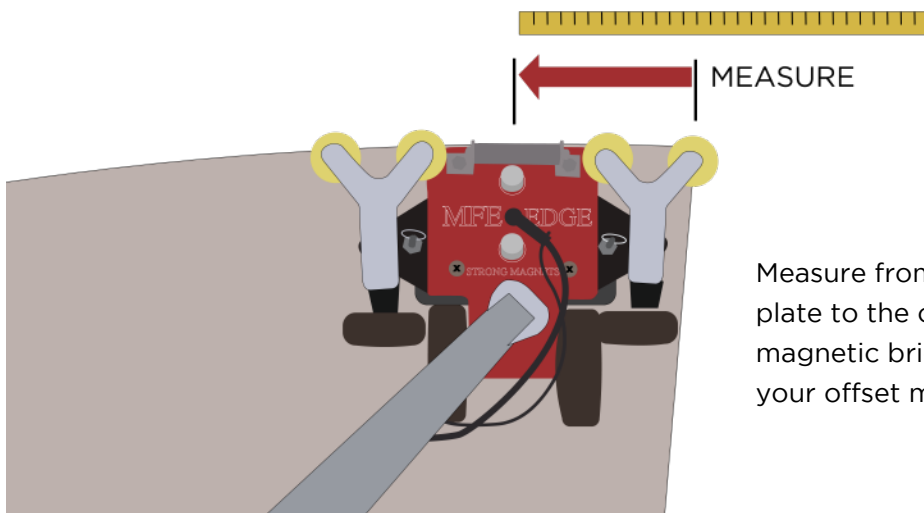
- 1) The tank is built with annular plates.
- 2) A tank without annular plates has all plates lengths and widths defined.

Once one of these requirements are met the radial radio button will appear as an option on the mapping screen.



**1** Radio button to toggle Radial Scans

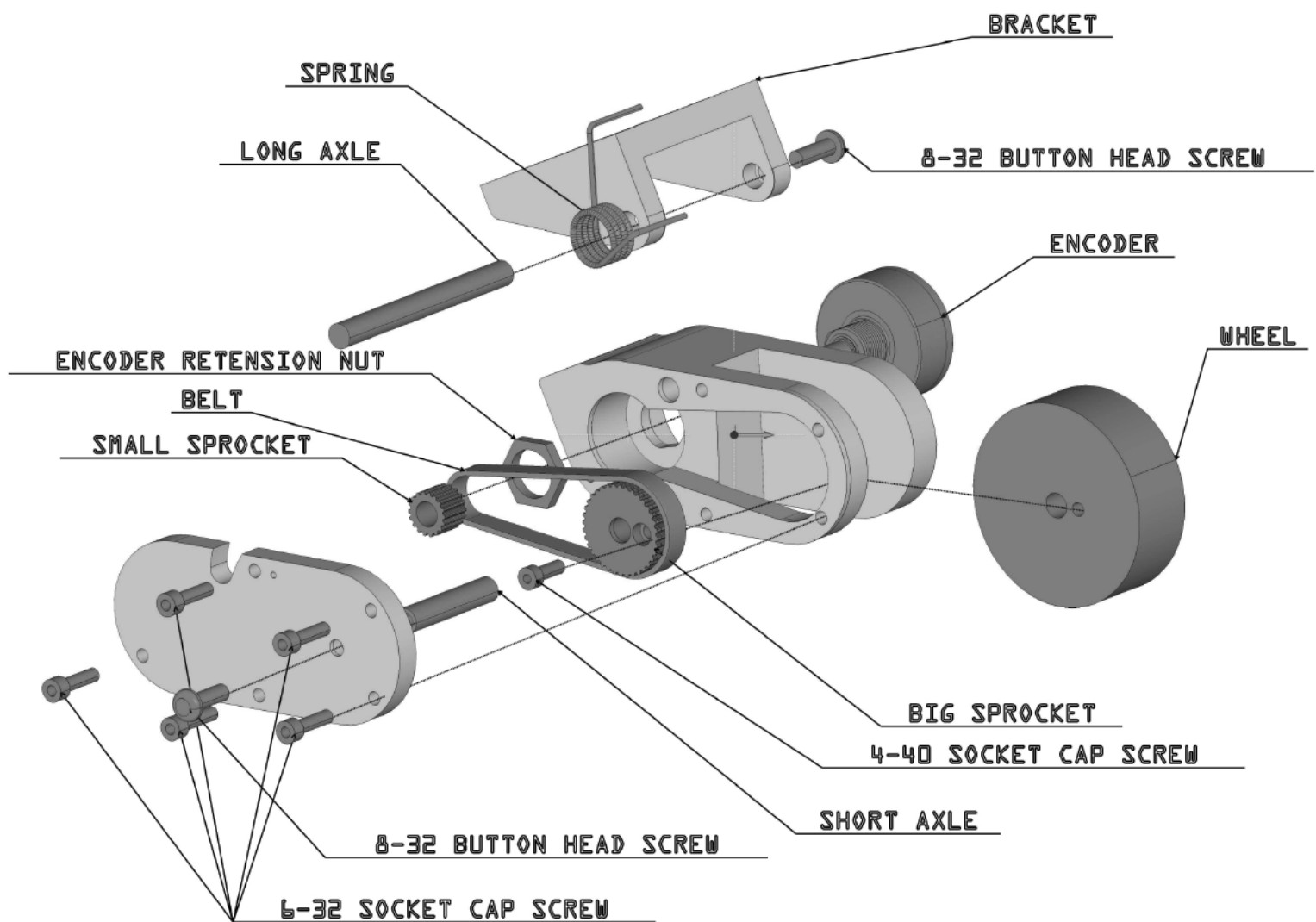
**2** Chord Offset.



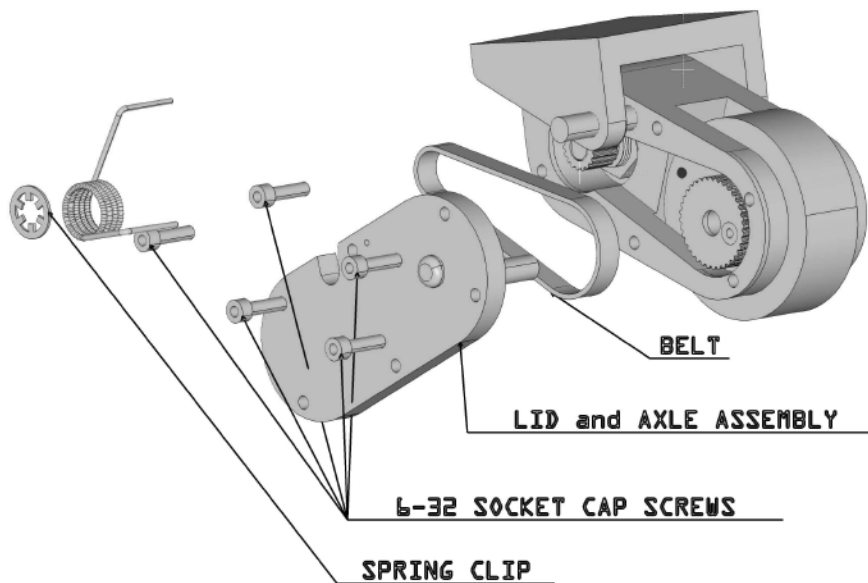
Measure from the edge of the plate to the center of the magnetic bridge to determine your offset measurement.



## MFE EDGE SCANNER ENCODER EXPANDED VIEW



## MFE EDGE SCANNER BELT REPLACEMENT



1. First remove the spring clip and spring.
2. Next remove the five 6-32 socket cap screws.
3. Now pivot the lid and axle assembly to clear the bracket and pull straight out.
4. Remove the belt and replace with new one.
5. Place the lid and axle assembly back onto the housing making sure to align the axle with the wheel.
6. Pivot the lid back into place and put the 6-32 socket cap screws back.
7. Finally, put the spring back by inserting one leg of the spring into the tiny hole on housing and the other leg in front of the bracket, making sure the loop in the spring is over the long axle.
8. Replace the spring clip and the procedure is finished.

Rev-1

## **General Cleaning Guidelines**

**Important note:** This section is for cleaning the scanner on an as-needed basis. All the parts referred to in this section are only the exterior parts of the scanner. **Under no circumstance should the internal parts be removed for cleaning using these instructions.**

Most of the metal/painted surfaces on the Mark 4 have been lacquered to help better protect the metal/painted surface. It is recommended applying a small amount of cleaning agent to a clean cloth rag in order to remove dirt from the surface of these parts. Water, paint thinner, and denatured alcohol are all safe to use to clean the scanner in small quantities.

### **THINGS TO AVOID:**

- 1) Do NOT use any cleaning agents on the tablet or carbon fiber parts.
- 2) Do NOT use lacquer thinner on any painted surface.

When cleaning the computer tablet:

- 1) Use a clean rag only!
- 2) It is strongly recommend to use a microfiber cloth that will help prevent surface scratches when cleaning the tablet display screen.
- 3) It is strongly recommended that cleaning agents are NOT used on any tablet surface. This can result in damage to the tablet.
- 4) It is recommended to initially gently remove any larger amounts of dirt with a clean cloth rag, then use a microfiber cloth to more thoroughly clean the remaining smudges on the tablet screen. Do NOT press down when using the microfiber cloth to clean the screen or the dirt will scratch the screen surface.

**IMPORTANT NOTE:** All Mark 4 scanner tablets are shipped with a screen protector film that is installed over the tablet's display screen. Any noticeable scratches are most likely not on the display screen itself but rather it is on the screen protector film. A replacement screen protector can be order directly from MFE Enterprises, Inc.