



# **Alere Health Scale**

**Model: 27127**





# Amendment Record

## Alere Health Scale

### Document 51144

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Kansas City, Missouri 64106

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# Table of Contents

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<b>SECTION 1: GENERAL INFORMATION .....</b>	<b>7</b>
Scale Description.....	7
Scale Specifications.....	8
Display.....	9
Environmental Characteristics .....	9
<b>SECTION 2: INSTALLATION.....</b>	<b>10</b>
Unpacking and Setup .....	10
<b>SECTION 3: BLUETOOTH COMMUNICATIONS .....</b>	<b>11</b>
Bluetooth® Introduction .....	11
Definitions and Abbreviations.....	11
Bluetooth Communications .....	12
<i>Measurement Sequence</i> .....	12
<i>Measurement Storage and Transmission</i> .....	15
Bluetooth Connection Sequence (Inquiry).....	15
<i>Scale Connection Types</i> .....	15
<i>Scale Inquiry</i> .....	16
<i>Scale Inquiry Trigger Events</i> .....	16
<i>Scale Inquiry for Secure Connections</i> .....	17
<i>Scale Inquiry for Normal Connections</i> .....	18
Scale Sequences.....	21
<i>Stand Alone Scale Sequence</i> .....	21
Bluetooth Inquiry Standard Connection Sequence.....	21
Bluetooth Inquiry Secure Connection Sequence.....	22
Bluetooth Measurement Sequence.....	23
<b>SECTION 4: CALIBRATION .....</b>	<b>26</b>
Calibration Procedure .....	26
Hi-Resolution Mode .....	27
Calibration Cycle.....	28
<b>SECTION 5: OPERATION.....</b>	<b>29</b>
Modes of Operation .....	29
<i>Stand Alone Weighing Operations</i> .....	29
<i>Weighing with Bluetooth® Communications</i> .....	30
<i>Manual Zero Operation</i> .....	31



**SECTION 6: SERVICE & MAINTENANCE ..... 32**

Scale Error Codes ..... 32

*LCD Display Indications*..... 32

*Audible Beep errors/Signals* ..... 33

Scale Maintenance ..... 34

*Installing Batteries*..... 34

*Finding the Best Location* ..... 34

*Cleaning the Scale*..... 34

Disassembling/ Reassembling the Unit..... 35

*Tools Required*..... 35

*Steps to Disassembly* ..... 35

*Replacing a Load Cell*..... 37

*Replacing the Weight Controller I/O Assembly*..... 38

*Replacing the Plate Assembly* ..... 38

*Steps to Reassembly*..... 39

**SECTION 7: PARTS..... 40**

Parts List..... 40

Parts Diagrams..... 42

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# Section 1: General Information

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## Scale Description

The Alere Health Scale is designed for weighing people and communicating that information to a variety of devices, via wireless Bluetooth®. The scale has its own calibration parameters and a display for showing measurements and audible alerts for signaling the user. The scale has the ability to store up to 10 measurement results in memory. A settable real time clock is also included for measurement time stamping.

- The scale is capable of working in a Stand Alone mode. In this mode the scale displays weight to the LCD display. The weight is shown in either pounds (lb) or kilograms (kg) depending on the setting of the slide switch on the bottom of the scale. See Section 2 step 5.

or

- BT mode - connected to a Remote Device which is equipped for Bluetooth® communications.

- Battery powered.

Uses (4) AA Alkaline batteries



**Figure 1.1**  
**Alere Health Scale**

## Scale Specifications

Dimensions	<ul style="list-style-type: none"> <li>• <b>14" x 14" x 2"</b></li> </ul>
Overall Weight	<ul style="list-style-type: none"> <li>• <b>Less than 10 lbs. without batteries</b></li> </ul>
Material Construction	<ul style="list-style-type: none"> <li>• Rigid metal platform frame</li> <li>• Composite base</li> <li>• Composite top-over platform</li> </ul>
Weight Capacity	<ul style="list-style-type: none"> <li>• <b>500 lbs / 226.8 kg</b></li> </ul>
Division Size	<ul style="list-style-type: none"> <li>• 0.5 lbs / 0.2 kg</li> </ul>
Power	<ul style="list-style-type: none"> <li>• <b>6VDC (4 AA Alkaline)</b></li> </ul>
Power On Switch	<ul style="list-style-type: none"> <li>• Integrated within the platform</li> </ul>
Automatic Shutdown	<ul style="list-style-type: none"> <li>• Shuts the scale down automatically to conserve battery life.</li> </ul>
Mode Switch	<ul style="list-style-type: none"> <li>• <b>lb</b></li> <li>• <b>kg</b></li> <li>• <b>BT (Bluetooth® Communications)</b></li> </ul>
Filtering	<ul style="list-style-type: none"> <li>• Three levels, adjusted using <b>Remote Communications</b></li> </ul>
Time / Date	<ul style="list-style-type: none"> <li>• Stored in volatile RAM</li> </ul>
Overload Protection	<ul style="list-style-type: none"> <li>• <b>50% above rated capacity</b></li> </ul>
Annunciators	<ul style="list-style-type: none"> <li>• <b>lbs</b></li> <li>• <b>kg</b></li> <li>• <b>Ready / Stable</b></li> <li>• <b>Connected</b></li> </ul>
Load cell Interface	<ul style="list-style-type: none"> <li>• Utilizes (4) internal load Cells. No external load cell interface</li> </ul>
Wireless Communications	<ul style="list-style-type: none"> <li>• Class I Bluetooth® device</li> </ul>



## Display

<b>Display Type</b>	<ul style="list-style-type: none"> <li>• <b>LCD, 1.25 in.</b></li> <li>• Seven (7) segment display</li> <li>• No backlight</li> <li>• 4-digits plus annunciators</li> </ul>
<b>CZ</b>	<ul style="list-style-type: none"> <li>• Upper-left corner</li> <li>• <b>“C”</b> used in <b>Test Mode</b></li> </ul>
<b>Gross, Tare Net</b>	<ul style="list-style-type: none"> <li>• Gross only</li> </ul>
<b>Lb and Kg</b>	<ul style="list-style-type: none"> <li>• Small diamond indicates which unit of measure</li> </ul>
<b>Ready Stable</b>	<ul style="list-style-type: none"> <li>• Small diamond indicates when weight is stable</li> </ul>
<b>Connected</b>	<ul style="list-style-type: none"> <li>• Small diamond indicates the scale is connected to the Remote Device in the <b>BT Mode</b></li> </ul>
<b>Low Battery</b>	<ul style="list-style-type: none"> <li>• Displays <b>“LbAt”</b></li> </ul>

## Environmental Characteristics

<b>Operating Environment</b>	<ul style="list-style-type: none"> <li>• <b>Home, Office, Light Industrial</b></li> </ul>
<b>Water Resistance</b>	Not designed for wash down or light spray, - Cleaning with damp cloth is acceptable.
<b>Operating Temperature</b>	0 deg C to +40 deg C
<b>Humidity</b>	0-90% Relative Humidity Non Condensing

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## Section 2: Installation

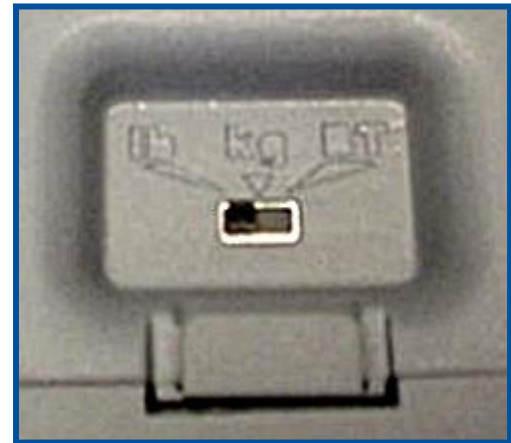
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### Unpacking and Setup

1. Remove the scale from the packing box.
2. To install the four (4) AA Batteries, **lift the battery cover**.
3. Match the correct poles and **insert two batteries** in one direction, then two in the other direction.
4. Replace the **battery cover**.



5. On the bottom-side of the scale, move the switch to the appropriate setting.
  - **lb (Pounds)** is used for Standard English Weighments.
  - **kg (Kilogram)** is used for Metric Weighments.
  - **BT (Bluetooth® Communications)** is used for communicating the weighment from the scale to an external wireless Remote Bluetooth device.



6. Place the scale on a flat surface where it will be used. The scale should be level. Step on the scale briefly and then step off the scale. This will activate the scale. Allow the scale to zero itself and turn itself off.
7. If the scale is used for Stand-Alone operations, the scale is now ready for use.
8. If Bluetooth® Wireless Communications are required proceed to the next page for more detailed information.

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# Section 3: Bluetooth Communications

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## Bluetooth® Introduction

The Fairbanks TeleWeigh™ Health Scale, shown in Figure 3.1 below, is designed to communicate with external Bluetooth® enabled devices using compatible communications software. These devices are called Remote Devices in this document.

**NOTE:** Not all Bluetooth® enabled devices have software to communicate with the TeleWeigh™ Health Scale. The scale is designed to be part of a system when the Bluetooth® interface is used. The system consists of the scale plus a Remote Device.



**Figure 3.1.**  
**TeleWeigh™ Health Scale**

This section will describe the communications protocol between the Bluetooth® remote device and the Fairbanks TeleWeigh™ Health scale. The details of the packet data and the sequences of steps involved in sending the packets are defined.

## Definitions and Abbreviations

Remote Device	The device the scale will communicate with.
Friendly Name	The Bluetooth® Friendly Name the remote device returns to for Friendly Name Requests. Some devices use this parameter as part of the connection setup between the scale and Remote Device.
Scale	Fairbanks TeleWeigh™ Health scale.
Bluetooth® PIN Code	The Bluetooth® PIN Code is a unique sequence of numbers used to create Secure Bluetooth® Connections. This is basically a security password that allows communications between Bluetooth® devices using secure connections.
Bluetooth®	Bluetooth

## Bluetooth Communications

Communications between the scale and the remote device will be accomplished using a sequence of predefined packets sent via the Bluetooth Interface. We are taking advantage of the Bluetooth interface's packet integrity via packet checksums to ensure data integrity. Additional checksums are not required.

There are two basic sequences, the **Bluetooth Connection Sequence** and the **Measurement Sequence**. The **Bluetooth Connection (Scale Inquiry) Sequence** is performed as part of the system setup, either at the factory or at the user's location. The scale must successfully complete a connection sequence before it can send measurements via the **Measurement Sequence**. The **Measurement Sequence** and the **Bluetooth Connection Sequence** are described in their respective sections.

### Communications Options

The scale is designed to communicate via both **Secure** and **Normal** connections. It is factory programmed to **default** to **Normal** connections. The scale can be reprogrammed using Configuration parameters to default to **Secure** connections.

**Secure** connections will require a Bluetooth Friendly Name, limited to fifteen (15) characters plus a Null for a total of sixteen (16) characters, and a Bluetooth PIN code in order to perform successful connections.

The method for changing the Friendly Name and PIN Code parameters involves the data sent in the Configuration Packet and used in the **Measurement Sequence**.

**Normal** connections will require only a Bluetooth Friendly Name. The details for finding a Bluetooth paired device for each type connection will be discussed in Section 3.3. The method for changing the Friendly Name and PIN Code parameters involves the data sent in the Configuration Packet and used in the **Measurement Sequence** defined below.

### *Measurement Sequence*

Scale measurements will be uploaded to the Remote Device after each completed measurement cycle using a Measurement Packet ('A'). Successful Measurement transfer to the Remote Device is indicated by the receipt of an Acknowledgement Packet ('B') with the Acknowledgement Byte set to 'A'. If the Acknowledgement Packet is returned with an error, the Acknowledgement Byte set to 'N', the Measurement Packet will be resent. This sequence will be attempted a maximum of 5 times before it is aborted. Data not successfully transmitted will be saved, and will be sent after the next measurement sequence. The scale will then power down after a period of 15 seconds.

If the paired Remote Device is not available due to a connection loss or failure, the scale will try to reconnect and upload the scale data a maximum of five (5) times. Reconnection would be via retries of the Measurement Sequence. If the Remote Device is still not available, the scale will store the reading data and power down. It will transmit the stored results at the end of the next measurement.

When the scale has been forced to store ten (10) readings due to the inability to connect to its paired Remote Device, it will consider the Remote Device unavailable and will set its internal status to start the next power up in the Scale Inquiry state. This allows the scale to recover when the paired device is incapacitated or stops communicating.

After a successful Measurement Packet upload the scale will send a Configuration Request packet ('C') to the Remote Device to determine if the scale needs to modify its operating parameters. The Remote Device will reply with a Configuration Packet ('D') or a No Configuration Packet ('E'). If the No Configuration Packet is received, the scale checks to see if there are any previous Measurements to transmit. If so, it transmits them (see Figure 3 for details). After all Measurements have been transmitted the scale closes the connection to the Remote Device and the Measurement Sequence terminates.

If a Configuration Packet ('D') is received the Scale will:

1. Update its internal Real Time Clock if there is a difference of more than 1 second between the time passed in the packet and the internal clock time.
2. Change the Scale Filter Factor if requested.
3. Change its Scale Units if requested.
4. If the Send Complete Buffer flag is set, the scale will send a series of Measurement Packets containing all stored measurements as requested. This forces both new and previously sent measurements to be transmitted.
5. If the Send Complete Buffer flag is **not** set, the scale determines if there are more Measurements which must be sent. If so, the scale will create and send the next Measurement Packet and will repeat this cycle until each previously unsent measurement has been successfully transmitted.
6. Zero the scale if requested.
7. Check for and implement a connection mode change. A change from a **Normal** connection to a **Secure** connection will require a new **Scale Inquiry** to be run.

8. Set a new PIN Code if requested.
9. Set a new Friendly Name if requested.
10. The scale closes the connection to the Remote Device.
11. Turn off the scale if requested, but only after the fifteen (15) second User interface delay is complete.
12. Send the Config Response Packet ('F').
13. Wait for the Config Response Ack Packet ('G').
14. Terminate the **Measurement Sequence**.

At the termination of a measurement the scale will power down after a period of fifteen (15) seconds in order to give the user time to see the weight. The scale will store up to the last ten (10) weight measurements internally when it is unable to successfully communicate the Measurement Data.

If there are multiple stored measurements in the scale that have yet to be transmitted, a series of Measurement Packets will be sent to transmit those measurements from the scale buffer. Each successfully acknowledged measurement will be marked as sent in the scale buffer.

The Measurement Packet includes the critical data related to the measurement:

1. The weight.
2. The units of measurement
3. The Filter Factor used to make the measurement
4. The measurement time, including month, day, year, hour, minute, second.
5. The scale serial number
6. The scale firmware version number
7. The scale Battery Status
8. The scale Error Status

Each **Measurement Sequence** consists of a series of individual packets sent. All sent packets will have a related return packet to acknowledge the receipt of the sent packet. The first byte of each packet is the Packet Type. It determines how the packet is to be read by the receiving device. Each packet type has a unique byte format for its internal data. Detailed descriptions of the communications sequence and packet data can be found in the document Fairbanks Engineering Standard Health Scale Bluetooth Communications Specification, presently at Rev. 5.

## Measurement Storage and Transmission

The scale incorporates a circular buffer of up to the ten (10) most recent measurements. Each measurement includes a data field to indicate whether the measurement has successfully been transmitted to the paired device. As part of the normal **Measurement Sequence** all measurements not previously transmitted successfully will be re-transmitted as a series of Measurement Packets until all measurements have the status transmitted. Each successful transmission will result in the status of the measurement changing from Not Transmitted to Transmitted.

In addition there is a command byte, Send Complete Buffer, in the Configuration Packet which requires the scale to send **ALL** measurements presently stored in its buffer to the paired device. Devices which do not support this feature must set the Send Complete Buffer byte to 'N' in the Configuration Packet.

## Bluetooth Connection Sequence (Inquiry)

The Bluetooth role of the scale is Master for both pairing and connecting. The scale must find a Remote Device to pair with. The **Connection Sequence**, or **Inquiry**, is the method used by the scale to determine which Remote Device is its "pair". Pairing is a setup function performed at the factory or user's location. Several events can trigger a new **Inquiry**. They are listed under **Scale Inquiry Trigger Events**.

### Scale Connection Types

**Secure Connections** use the Bluetooth PIN Code to create an encrypted communications link. To make this connection the scale needs a Bluetooth address of the device to connect with and the PIN code. **Inquiry** searches require the scale to find devices which match those parameters.

To set the scale connection type to **Secure Connections**, the scale must successfully pass an Inquiry where it connects to the default 'ScalePort' device with a **Normal Connection**. The scale can then be programmed to perform secure connections with the Remote Device whose Friendly Name and PIN Code match the values entered in the Configuration Packet sent to the scale after a measurement is received. The values can be changed during any **Measurement Sequence**. However, a change in the values will cause the scale to perform an **Inquiry** during the following power cycle. See **Scale Inquiry Trigger Events** item 4.

**Normal Connections** use the Friendly Name to find the Remote Device the scale will pair with during future connections. The scale is set at the factory to default to **Normal Connections** with a Remote Device with the Friendly Name set to 'ScalePort'. The PIN Code is set at the factory to '123456789012', but is not used in **Normal Connections**.

## Scale Inquiry

The scale uses the Bluetooth Friendly Name to determine which Remote Device it will pair with. **Secure Connections** also require the PIN Code for a successful pairing to occur.

At power up, the unpaired scale initiates a Bluetooth **Inquiry** procedure to discover the Bluetooth devices in range. The scale's buffer is limited to the first ten (10) devices with the matching Friendly Name which respond to the **Inquiry**. The scale will attempt to connect to each device the **Inquiry** found until a successful connection is obtained or the connection attempt limit of three (3) attempts for each device in the buffer is reached. If the scale connection mode is secure, the scale will attempt a **Secure Connection** based on the PIN Code. The Remote Device that successfully connects to the scale is set as the scale's Bluetooth pair, and its address will be stored in the scale's configuration. After a successful connection the scale will display *PA55* before it powers down.

If the matching Remote Device is not found after cycling through the device buffer and is repeated a maximum of three (3) times the scale will assume the Remote Device is not available or within range. The scale will send a five (5) beep error code and display *FR 1* before it powers down if the Remote Device hasn't been found. The scale will initiate a new **Inquiry Sequence** the next time it powers up.

Once a successful connection has occurred, the scale will attempt to connect with the known Remote Device using its Bluetooth Address, and PIN Code if in Secure Connection Mode, at the beginning of each **Measurement Sequence**. The scale will indicate successful connections using the LCD display enunciator.

A new Remote Device must be programmed with the scale's default Friendly Name in order to make the initial **Inquiry** successful.

The scale **Inquiry Sequence** is shown in Figure 3.3 and 3.4.

## Scale Inquiry Trigger Events

1. The scale is first powered up. It has no initial paired device so it performs an **Inquiry** to attempt to find a pair.
- or**
2. The scale's hidden forced Scale Inquiry switch is pressed during power up. The location of the switch is shown in Figure 3.2.
  3. The scale has attempted unsuccessfully to connect to its pair during ten (10) consecutive measurements. The scale will attempt to find a device with the stored Friendly Name and PIN Codes.
  4. The scale's Friendly Name, Connection Type or PIN Code is updated during a **Measurement Sequence**.



5. If the scale **Inquiry** failure counter reaches eight (8) failed attempts to find its secure pair, the scale will assume the pair is no longer available and default to the factory Friendly Name and PIN Code. The mode changes to factory defaults and only a single beep is sounded instead of the 5 beep error.
6. The hidden Bluetooth Factory Defaults switch is pressed. The location of the switch is shown in Figure 3.2. The hidden switches are in the two holes to the left of the lb-kg-BT slide switch.

The switches perform these functions only when the Scale is displaying ‘- - - -’.

The top switch will force a **Scale Inquiry** when pressed.



The bottom switch will load the factory **Default** Bluetooth Settings

Figure 3.2. Hidden Switches

### Scale Inquiry for Secure Connections

1. Perform a Bluetooth **Inquiry** with the Friendly Name. Look for devices that return the stored Friendly Name. The scale Friendly Name is set at the Factory to ‘ScalePort’. The PIN Code is set at the factory to ‘123456789012’. They can be modified using the Configuration Packet after the scale successfully connects to a Remote Device. The scale display during this **Inquiry Sequence** will be **INQ** when using the programmed Friendly Name and PIN Code variables. The display will alternate between **INQ** and **FALL** at 2 second intervals when using the factory default Friendly Name and PIN Code.
2. The scale will collect a list of devices and information about the first ten (10) devices that respond to the **Inquiry** with the matching Friendly Name.
3. The scale will attempt to connect to each device in the list using the stored Bluetooth PIN Code until a successful connection occurs or no device has responded after three (3) cycles through the list of devices. For successful connections continue with step 5, otherwise continue to step 4.

4. If there was no connection made, the scale will indicate on the display a *FR I* message. After displaying the message for a short time the scale will power off. A counter is updated to keep track of **Inquiry** failures. When the counter reaches eight (8) failed attempts to find its secure pair, the scale will assume the pair is no longer available and default to the factory Friendly Name and PIN Code. This will cause **Trigger Event 5**.
5. If the scale successfully connected to a remote device, it will indicate this on its display using the *PASS* message. The scale sets the Remote Device as its pair and stores the information in its configuration memory. All future communications will be made to the paired device unless a new **Inquiry Sequence** is performed.

### **Scale Inquiry for Normal Connections**

1. Perform a Bluetooth **Inquiry** with the Friendly Name. Look for devices that return the stored Friendly Name. The scale Friendly Name is set at the factory to 'ScalePort'. It can be modified using the Configuration Packet after the scale successfully connects to a Remote Device.
2. The scale will collect a list of devices and information about the first ten (10) devices which respond with the matching Friendly Name.
3. The scale will attempt to connect to each device in the list until a successful connection occurs or each device has failed to respond after three (3) cycles through the list of devices. For successful connections continue with step 5, otherwise continue to step 4.
4. If there was no connection made, the scale will indicate on the display a *FR I* message. After displaying the message for a short time, the scale will power off. A counter is updated to keep track of the **Inquiry** failures. When the counter reaches eight (8) failed attempts to find the pair, the scale will assume the pair is no longer available and default to the factory Friendly Name and PIN Code. This will cause **Trigger Event 5**.
5. If the scale successfully connected to a remote device, the scale will indicate on its display the *PASS* message. The scale will set the Remote Device as its pair and stores the information into its configuration memory. All future communications will be made to the paired device unless a new **Inquiry Sequence** is performed.

Secure Scale Inquiry

1. Assumes Remote Device is preprogrammed with the Scale's Friendly Name and PIN Code.
2. Assumes Remote Device and Scale have not been paired.
3. Scale will pair with the first Remote Device it connects with successfully.
4. The Scale Power Down includes a disconnect of any existing connection between the Scale and the Remote Device.

Inquiry initiated by Scale Power On

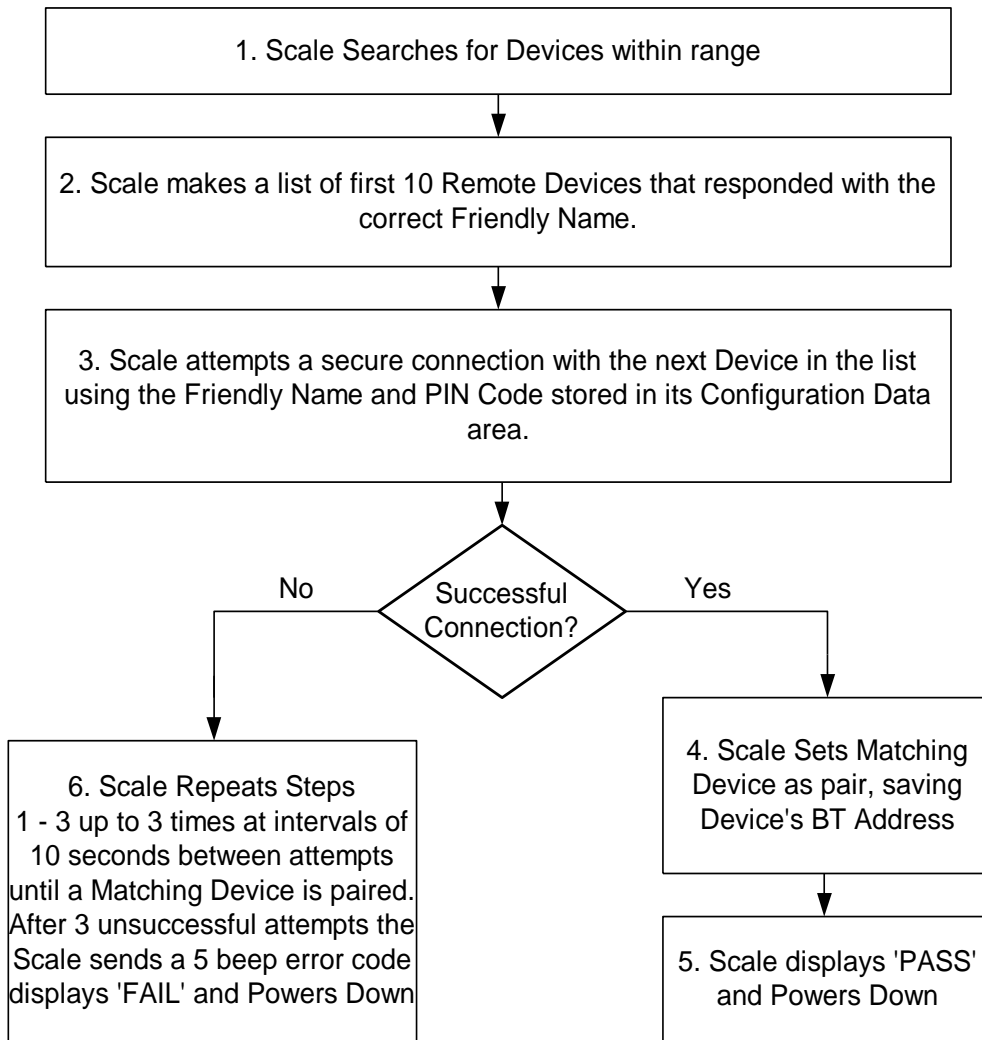


Figure 3.3 Secure Scale Inquiry Sequence

Normal Scale Inquiry

1. Assumes Remote Device is preprogrammed with the Scale's Friendly Name.
2. Assumes Remote Device and Scale have not been paired.
3. Scale will pair with the first Remote Device it connects with successfully.
4. The Scale Power Down includes a disconnect of any existing connection between the Scale and the Remote Device.

Inquiry initiated by Scale Power On

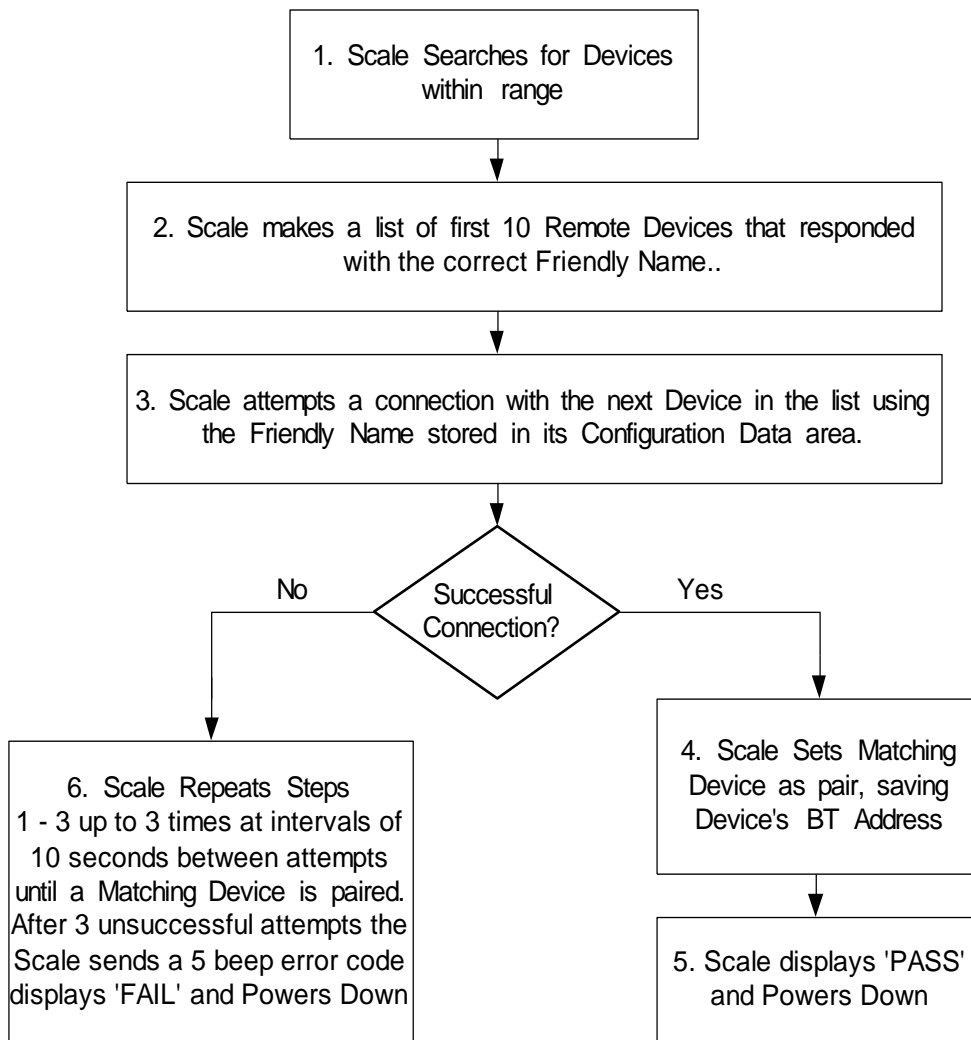


Figure 3.4 Normal Scale Inquiry Sequence

## Scale Sequences

There are three (3) different sequences for the scale. They are the **Bluetooth Connection Sequence (Inquiry)**, the **Bluetooth Measurement Sequence** and the **Stand Alone Scale Sequence**. They are described in the following sections.

### *Stand Alone Scale Sequence*

The Stand Alone Scale Sequence is used when the Mode switch on the scale is set either to **lb** or **kg**. This mode **disables** the Bluetooth interface. The scale weight is shown on the display. The steps of the sequence are:

1. The patient steps on the scale to initiate a weight measurement.
2. The scale powers up. The display shows all segments on for two (2)seconds.
3. The display then changes to - - - - while it is initializing the hardware.
4. The scale measures the weight. When it is stable, the scale displays the weight in the correct units, turns on the stable display annunciator, and the audible double beep is sent. For stable weights continue with Step 6. If the weight does not stabilize or is over load or under load after thirty (30) seconds continue to Step 5.
5. The scale sounds two (2) beeps, the Stable Display annunciator stays off, and the scale displays the weight, -  $\square$  L - or -  $\cup$  L - for fifteen (15) seconds and then shuts down.
6. The weight is displayed for fifteen (15) seconds and then the scale powers down.

### **Bluetooth Inquiry Standard Connection Sequence**

The Bluetooth Inquiry Standard Connection Sequence is run when a scale has not been paired with a Remote Device. The Scale Mode Switch must be set to **Bluetooth Communications (BT)** for this sequence to be run. The **Bluetooth Connection Sequence** causes the pairing between the scale and the Remote Device to occur. Refer to Figure 3.2 for communications details. The sequence steps are listed below:

1. The patient steps on the scale to initiate the sequence.
2. The scale powers up. The display shows all segments on for two (2) seconds.
3. The scale concurrently does a Bluetooth Search for devices in range.

4. The display concurrently changes to *INQ* indicating the Inquiry Sequence is running.
5. The scale attempts a connection with each responding Remote Device in the list using the stored Friendly Name. If the factory defaults are being used the display alternates between *INQ* and *FAIL* with two (2) second intervals. If a successful connection occurs continue with Step 7.

---

**Note:** *It is assumed only one Remote Device programmed for communicating with the scale is within radio range. If not the scale will pair with the first Remote Device that it successfully connects to.*

---

6. Step 5 is repeated as necessary up to three (3) times through the list of responding devices in an attempt to find a paired Remote Device. If no connection is made continue with step 8.
7. If the scale finds a pair it sets the display to *PASS* and sends a single audible beep, saves the pair's Bluetooth Address, waits five (5) seconds and powers down. The sequence is complete.
8. If no Remote Device to pair is found, the scale sets the display to *FAIL* and sends five (5) audible beeps. The failed attempt counter is updated. If the counter has reached eight (8), the Friendly Name and PIN Code are reset to factory defaults.
9. The scale displays *FAIL* for an additional five (5) seconds and powers down. The sequence is complete.

## Bluetooth Inquiry Secure Connection Sequence

The Bluetooth Inquiry Secure Connection Sequence is run when a scale has not been paired with a Remote Device. The Scale Mode Switch must be set to **BT (Bluetooth Communications)** for this sequence to be run. The Bluetooth Connection Sequence causes the pairing between the scale and the Remote Device to occur. Refer to Figure 3.2 for communications details. The sequence steps are listed below:

1. The patient steps on the scale to initiate the sequence.
2. The scale powers up. The display shows all segments on for two (2) seconds.

3. The scale concurrently does a Bluetooth Search for devices in range.
4. The display concurrently changes to *INQ* indicating the **Inquiry Sequence** is running.
5. The scale attempts a secure connection with each responding Remote Device in the list using the stored PIN Code and Friendly Name. If the factory defaults are being used the display alternates between *INQ* and *FRCE* with two (2) second intervals. If a successful connection occurs continue with Step 7.

---

**Note:** *It is assumed only one Remote Device programmed for communicating with the scale is within radio range. If not the scale will pair with the first Remote Device that it successfully connects to.*

---

6. Step 5 is repeated as necessary up to three (3) times through the list of responding devices in an attempt to find a paired Remote Device. If no connection is made, continue with step 8.
7. If the scale finds a pair, it sets the display to *PASS* and sends a single audible beep, saves the pair's Bluetooth Address, waits five (5) seconds and powers down. The sequence is complete.
8. If no Remote Device to pair is found, the scale sets the display to *FAIL* and sends five (5) audible beeps. The failed attempt counter is updated. If the counter has reached eight (8), the Friendly Name and PIN Code are reset to factory defaults.
9. The scale displays *FAIL* for an additional five (5) seconds and powers down. The sequence is complete.

## Bluetooth Measurement Sequence

The Bluetooth Measurement Sequence is run whenever the scale is powered up and the scale has **previously** been paired. The scale attempts a secure connection with its paired Remote Device. **This is the normal operating sequence for the scale.** The Scale Mode Switch must be set to **BlueTooth Communications(BT)** for this sequence to run. This sequence sends the patient's weight and scale parameters to the Remote Device and it displays the weight on the scale display. It also requests any new configuration parameters from the Remote Device and updates them.

The steps for the Bluetooth Measurement Sequence are:

1. The patient steps on the scale to initiate the sequence.



2. The scale powers up. The display shows all segments on for two (2) seconds.
3. The scale concurrently attempts a Bluetooth connection to its paired Remote Device. The connection type attempted is based on the Connection Mode parameter in the configuration memory. Normal connections use only Friendly Names while secure connections require both the Friendly Name and the PIN Code.
4. The display concurrently changes to - - - - while the scale is initializing the hardware.
5. If the Bluetooth Connection is not successful, the scale repeats step 3 in the background while continuing with the measurement. It will attempt to connect up to five (5) times before determining the Remote Device is unavailable and continuing to Step 16 after the Measurement has been stored in the buffer. See step 6 for the concurrent Measurement Process. If a connection is made, the Connection annunciator on the display is turned on. The measurement continues at step 6 while the connection process is occurring.
6. The scale measures the weight. When it is stable, the scale displays the weight in the correct units and the audible dual beep is sent. The Stable display annunciator is turned on. The scale stores the weight in its internal buffer. The stored information includes the time stamp and several scale configuration parameters. See [Measurement Data](#) details. The fifteen (15) second timer is started. Continue with Step 8. If the weight does not stabilize or is over load or under load after thirty (30) seconds continue with Step 7.
7. The scale updates the error flags in the Measurement Packet. The scale sounds two (2) beeps the Stable Display annunciator stays off, and the scale displays the weight, -  $\square$  L - or -  $\square$  L - for fifteen (15) seconds and then continues with step 8.
8. If a successful connection has been made, the Measurement Packet is sent to the Remote Device. The scale waits for confirmation. Failed packets are resent up to five (5) times before the scale determines the connection is lost. If the connection is lost continue with step 15.
9. The scale has received a Measurement ACK Packet. The Measurement is marked as transmitted in the scale measurement buffer. The scale then requests configuration updates by sending a Configuration Request Packet to the Remote Device.
10. The scale waits for the Configuration Packet from the Remote Device. If the connection is lost continue with step 14.





11. The scale performs the requested updates and sends a Configuration Response Packet indicating the updates that were made.
12. The scale checks to see if it holds any measurements not previously transmitted in its buffer. All measurements not previously transmitted are sent via the cycle starting at Step 8 and proceeding to step 11 for each measurement.
13. The scale waits for the fifteen (15) second timer to complete. If the time has expired, the scale checks to determine if it has received a command to Remain On in the Config Packet. If it did, the scale continues with step 6. Otherwise the scale powers down. The cycle is complete.
14. Check the Measurement buffer. The buffer holds the most recent 10 readings. If all 10 readings in the buffer are marked Not Transmitted the Scale sets its Power Up State to be Inquiry. The Scale Powers Down. The paired device is assumed to be missing or disabled. The next Scale Power Up will be a Bluetooth **Inquiry Sequence**. The cycle is complete.
15. If no Remote Device connection was made, the scale sends three (3) audible beeps and displays  $n\lceil \square n$  for five (5) seconds then shuts down. The cycle is complete. The Remote Device must be able to handle errors when it receives no data from the scale. It could possibly have the patient attempt another weightment. The scale will attempt to connect with its paired Remote Device up to five (5) times with each measurement. The scale will indicate to the operator that it has not been able to connect to the Remote Device with a three (3) beep error plus the  $n\lceil \square n$  display. The Remote Device is in control of measurement frequency and must provide the proper recovery procedure after either the beep errors or if a no connection error has occurred.

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## Section 4: Calibration

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### Calibration Procedure

1. Place the **Mode Slide Switch** on the bottom-side into the desired units of calibration
  - The test weight value equals either **200 pounds (lb)** or **100 kilograms (kg)**.
2. The scale runs its **Power-on Cycle** to detect switch position.
  - If the scale is off, step on it briefly to start it.
  - Otherwise wait for it to turn off, or remove, then replace the batteries for a few seconds.
  - Step on it again briefly to run its **Power-on Cycle**.
3. After its **Warm-up Test**, the scale displays the weight (or *UL/OL*) in desired units.
  - May also read **UL (Underload)** or **OL (Overload)**
  - The scale stays on for **thirty (30) seconds**, or until a stable weight of more than fifty-five (55) pounds is captured.
4. While the display is still active (**thirty seconds**), press the **Calibration Button**. using an item such as a straightened paper clip.
  - This is the bottom hole on the back, near the **Mode Switch**.
5. The display shows “**-OO-**”.
  - This indicates it is gathering **Zero Reference Counts**.
6. Place scale on floor with all load removed.
7. Once the **Zero Reference** has stabilized, the display flashes and displays "**LOAD**", along with the **test weight value**.
  - Apply this test load relatively quickly and consistently.
  - The scale captures the first stable value.
8. Once the weight is stabilized, the scale will calculate all the necessary span factors.



9. If these factors are within the proper range, the display will indicate "**Good**".
  - If there is an error in calibration, the display will indicate "**ErrC**", meaning **Error in Calibration**.
  - Calibration must be performed again to resolve the issue.
10. If the calibration is **good**, then the scale will store the new calibration parameters.
11. The scale will automatically turn itself off.

## Hi-Resolution Mode

The scale can be put into a **Hi-Res Mode (1/10 d)** for testing purposes in either the **Lb** or **Kg Stand Alone Modes** described on the previous page.

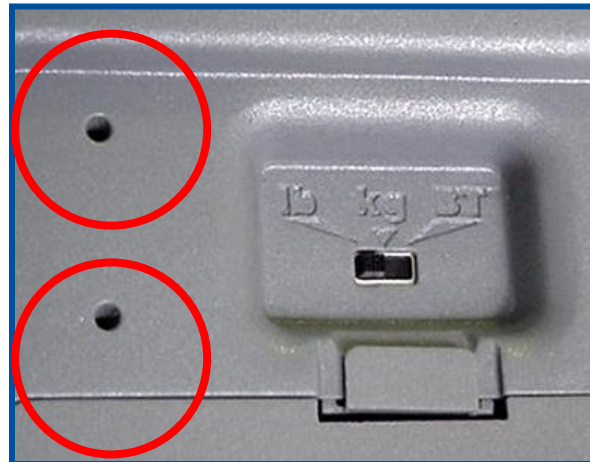
1. After the scale **Powers-on**, it displays weight at or near zero (below the capture limit)
2. Press at the same time, both of the **Hi-Res Buttons** on the top and bottom holes on the back.

- The display shifts **one (1) position** to the **left**.
- It then displays at a higher resolution.

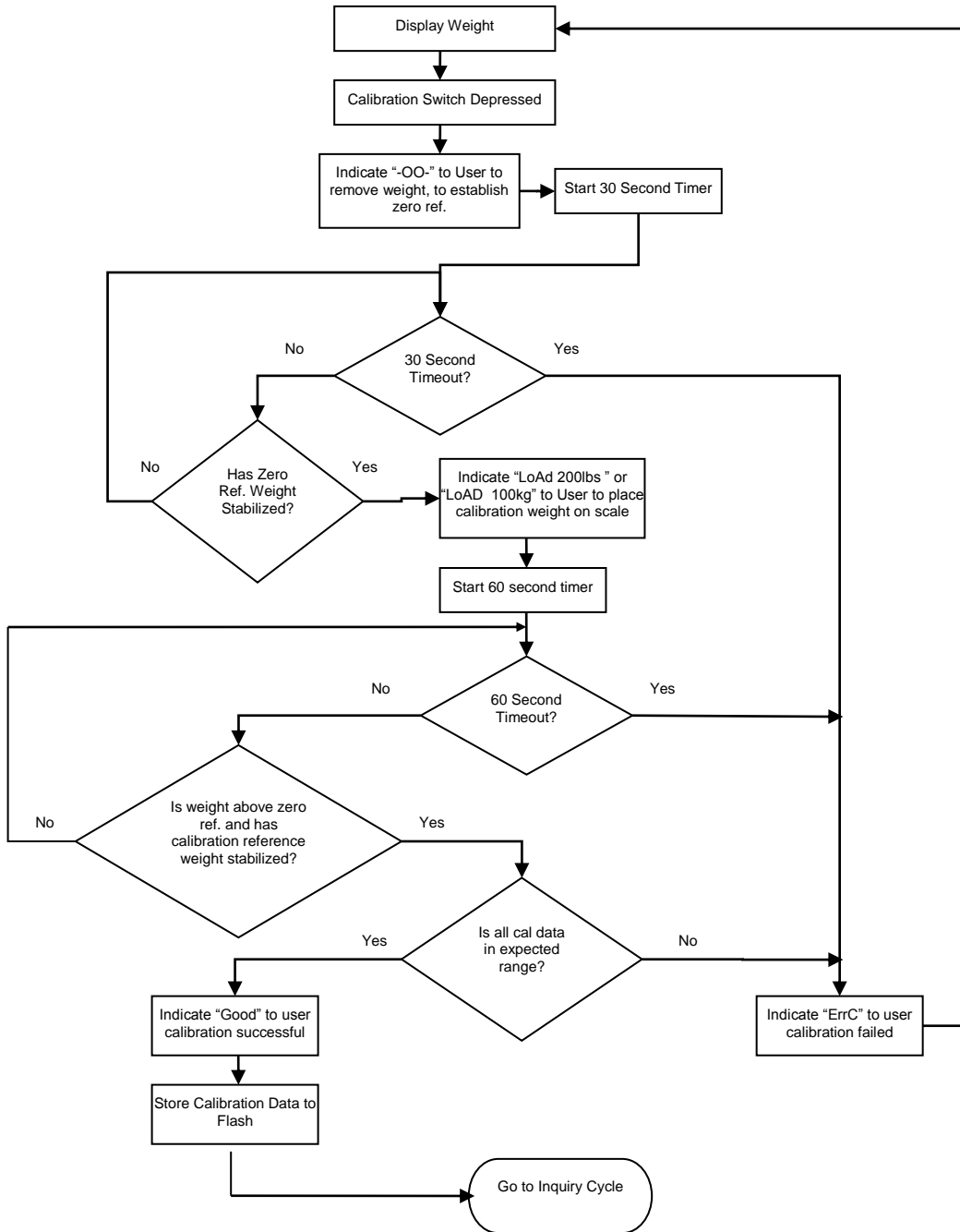
Due to the **four (4) digit limit** of the display, weights equal to or greater than 100.00 suppress the left most digit.

– Example: 101.55 displays as 01.55

- When in the **Hi-Res Mode**, the scale will not capture weighments.
  - It stays in the **Hi-Res Mode** as long as the batteries last.
3. A second press of the **Hi-Res Buttons** toggles back to the **Standard Weight Display Mode**.



# Calibration Cycle



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## Section 5: Operation

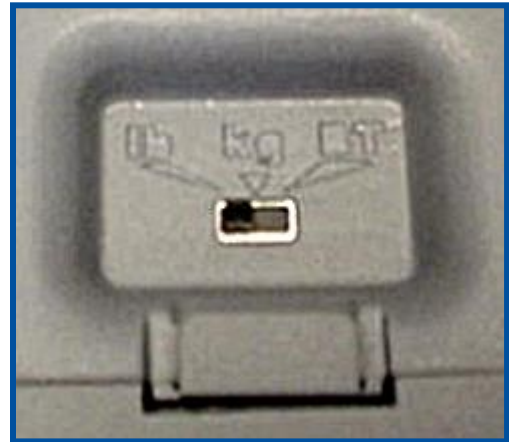
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### Modes of Operation

There are **two basic modes of operation**, **Stand Alone Weighing Operations** and **Weighing with Bluetooth® Communications**.

#### *Stand Alone Weighing Operations*

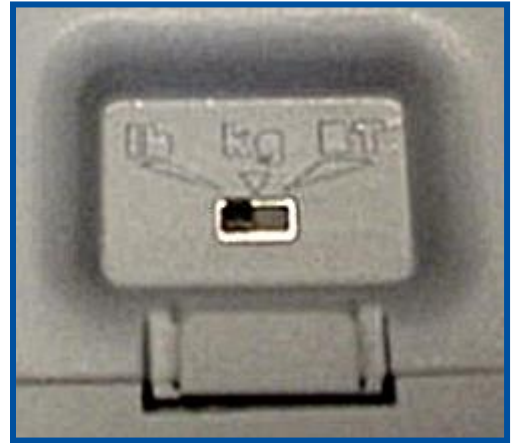
1. On the bottom-side of the scale, move the switch to the one of these settings.
  - **lb (Pounds)** is used for Avoirdupois Weighments.
  - **kg (Kilogram)** is used for Metric Weighments.
2. Once the switch is selected, place the scale on a flat surface where it will be used.
3. Stand on the scale. This will activate the scale.
4. The scale will beep once to indicate it has started a measurement cycle and start displaying the weight.
5. Once the weight is stable, the scale will beep twice, indicating the weight has been captured and the display will show the captured weight.
6. Step off the scale. The displayed weight is held on the display for about **ten (10) seconds**.
7. After the **ten (10) seconds**, the scale will briefly try to re-zero itself for the next weighment, provided there is less than **ten (10) pounds** on scale.
8. The scale will turn off and the weighing process is complete..



## Weighing with Bluetooth® Communications

1. On the bottom-side of the scale, move the switch to the appropriate setting.

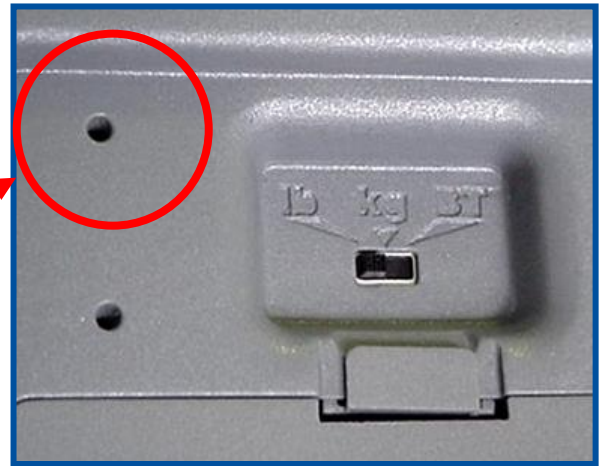
- **BT (Bluetooth® Communications)** is used for communicating the weighment from the scale to an external wireless Remote Bluetooth device.



2. Once the switch is selected, place the scale on a flat surface where it will be used.
3. Stand on the scale. This will activate the scale.
4. The scale will beep once to indicate it has started a measurement cycle and start displaying the weight. The scale will establish communications with the remote Bluetooth® device.
5. The scale will indicate a Bluetooth® connection has been established by turning on the CONNECTED indicator on the display.
6. Once the weight is stable, the scale will beep twice, indicating the weight has been captured and the display will show the captured weight.
7. Step off the scale. The displayed weight is held on the display for at least **ten (10) seconds**.
8. The captured weight is sent to the remote Bluetooth® device. If the Remote device does not confirm the weight has been received the scale will retry several times to resend the weight. If the weight is not accepted the scale will beep three times and display **n[0]n** to indicate the weight was not sent. The unsent weight is stored internally to be resent during the next measurement cycle. The scale can store up to 10 measurements internally.
9. After the communication is complete, the scale will briefly try to re-zero itself for the next weighment, provided there is less than **ten (10) pounds** on scale.
10. The scale will turn off and the weighing process is complete.

## Manual Zero Operation

The scale may need to be manually zeroed occasionally. The following procedure will perform a manual zero of the scale.



1. While the display is still active (**thirty seconds**), press the **Zero Button** using an item such as a straightened paper clip or toothpick.
  - This is the top hole on the bottom of the scale near the **Mode Switch**.
2. Once the switch has been pressed, place the scale on a flat surface where it will be used.
3. The scale will set itself to **zero (0.0)** and be ready for use.

# Section 6: Service & Maintenance

## Scale Error Codes

There are several error conditions and operational steps indicated by the scale.

- Not all are applicable in every sequence.
- Some errors are indicated using audible beeps and some are shown on the scale display.

### LCD Display Indications

Displayed Text or Annunciator	Description
----	The scale is initializing its hardware
All LCD Segments ON	Hardware test to check for a malfunctioning display.
LbALt	Scale battery requires changing
Motion/Stable Annunciator	Weight is stable on the scale
Lb Annunciator	Displayed weight is in pounds
Kg Annunciator	Displayed weight is in kilograms
-u l-	Weight Under Capacity
-o l-	Weight Over Capacity
PASS	Inquiry process done successfully. <i>This is a Setup Function display value.</i>
FAiL	Inquiry process found no Remote Device to connect with <i>This is a Setup Function display value.</i>
Good	Calibration sequence successful
ErrC	Error in Calibration sequence
inq	Inquiry taking place
nCon	Indicates no Remote Device was found during a Bluetooth Measurement Cycle
EEEE	7 Short chirps at five (5) second intervals for thirty (30) seconds. Weight is left on scale, and <b>On</b> switch contact closed.



## Audible Beep errors/Signals

Number of Beeps	Display message	Description
1	---- or 0.0	Scale is ready for the weighment.
2	Weight value and indicator on	Weight measurement is captured.
2	inq	Inquiry taking place
3	nCon	Indicates no Remote Device was found during a Bluetooth Measurement Cycle
5	FRIL	Indicates Inquiry failure. <i>This is a Setup Function error display .</i>
7	EEEE	7 Short chirps at five (5) second intervals for thirty (30) seconds. Weight is left on scale, and <b>On</b> switch contact closed.

## Scale Maintenance

### *Installing Batteries*

1. To install the four (4) AA Batteries, **lift the battery cover**.
2. Match the correct poles and **insert two batteries** in one direction, then two in the other direction.
3. Replace the **battery cover**.



### *Finding the Best Location*

- Place the scale on a flat, solid, level floor.
- When the scale is to be used with a remote Bluetooth® device the scale location must be within radio range of the remote device. Follow the Remote Device's setup procedure to confirm communication between the scale and the Remote Device.
- Keep the scale in a location completely away from all high water, such as low-lying areas that may flood, and away from any drain pipes.

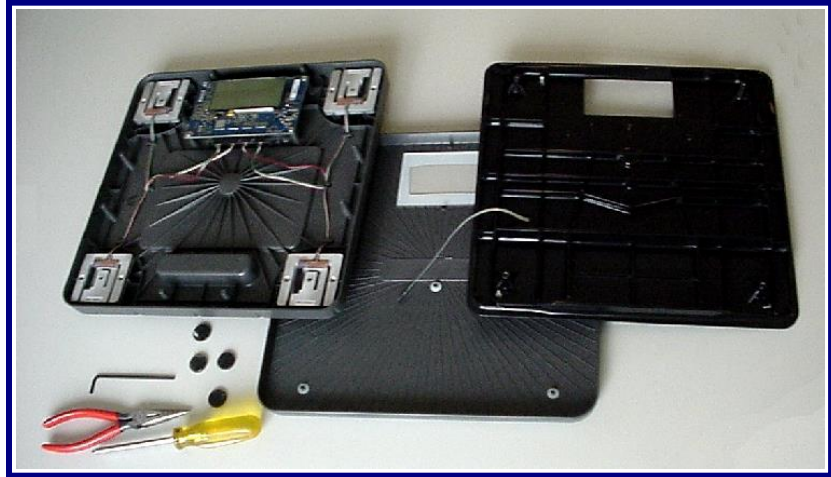
### *Cleaning the Scale*

- Use a moist cotton cloth to clean the scale.
  - If spray cleaner is needed for shoe sole marks, squirt it into the cloth, and not directly onto the scale.
  - Use only tap water in the cloth to wipe off the scale's clear plastic display.

## Disassembling/ Reassembling the Unit

### Tools Required

- **7/64"** Allen Wrench
- Needle-nose Pliers
- Small Slot-head Screwdriver
- **#2** Phillips-head Screwdriver



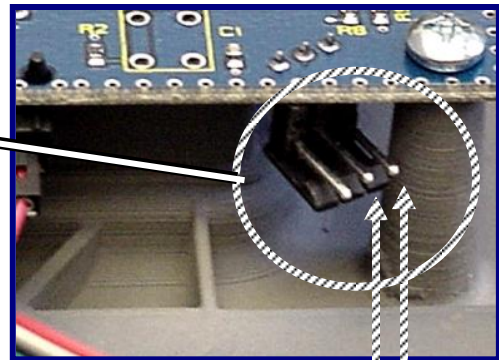
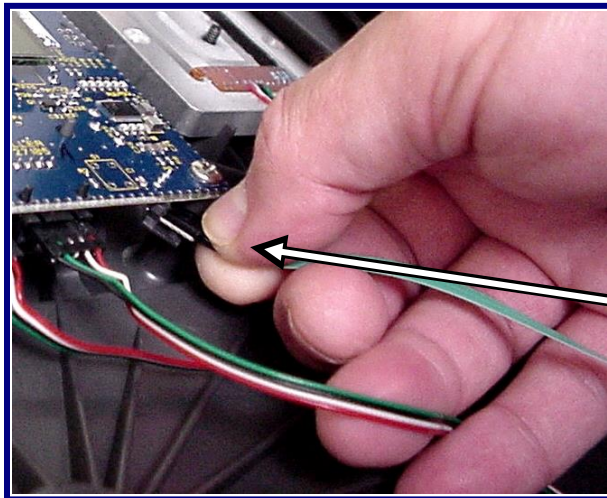
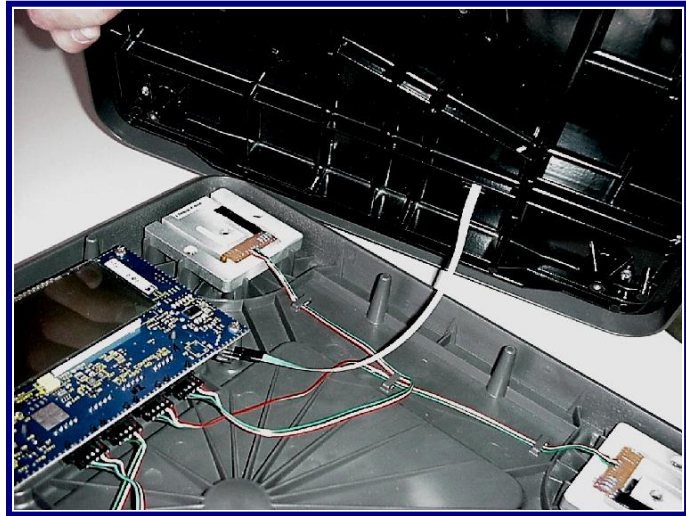
### Steps to Disassembly

1. Using a pair of needle-nosed pliers, remove the **four (4) Rubber Foot Pads**.
2. Remove the four (4) bottom Hex-head screws using the **7/64"** Allen Wrench.



## Steps to Disassembly, Continued

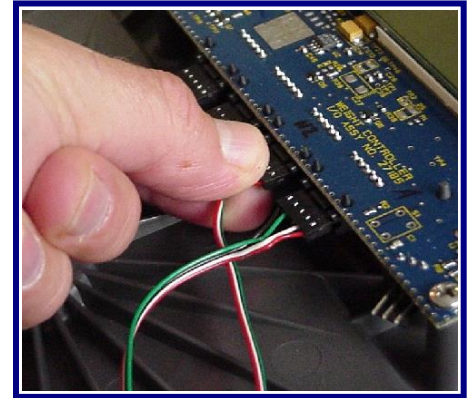
3. Carefully open the two Plastic Covers apart from the right side, unplugging the ribbon cable to completely separate the two.
  - Note the plug attaches to the prongs closest to the Control Board fastening post



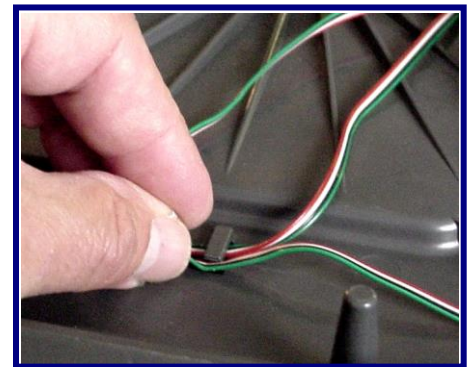
The plug attaches to the prongs closest to the Control Board fastening post

## Replacing a Load Cell

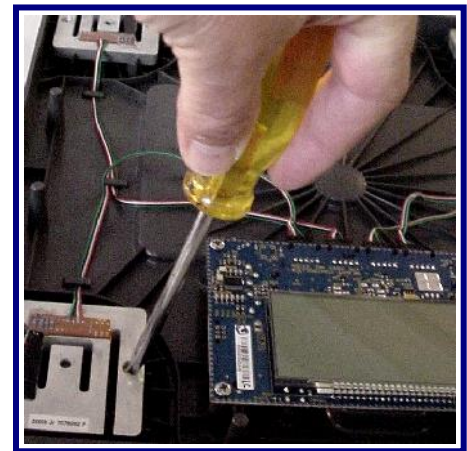
1. Unplug the Load Cell Wires from the Weight Controller I/O Assembly.



2. Pull away the Load Cell Wire from under its two (2) retainers.



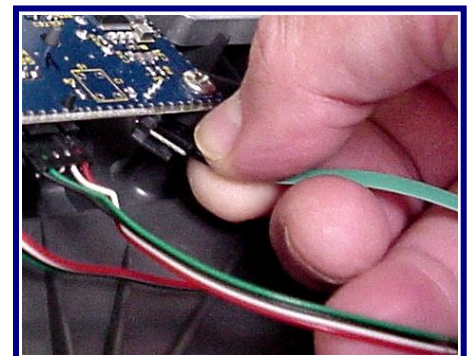
3. Remove the two (2) Phillips-head screws, then lift out the old Load Cell from the scale's bottom cover.
  - The hex-head retaining screw is in the center of the Load Cell.
  - Remove the hex-head screw, run it through the center of the new one, then place the new Load Cell where the other one was located.



4. Replace the two (2) Phillips-head screws.

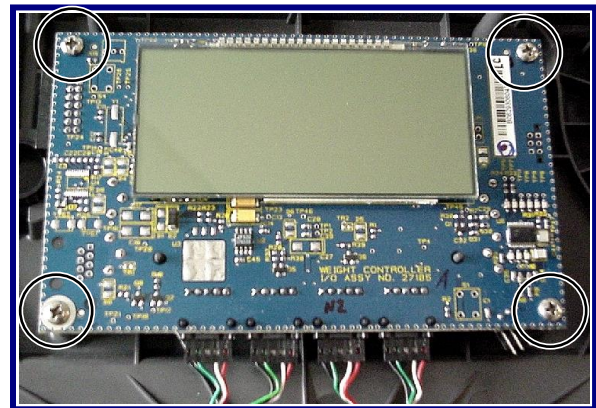
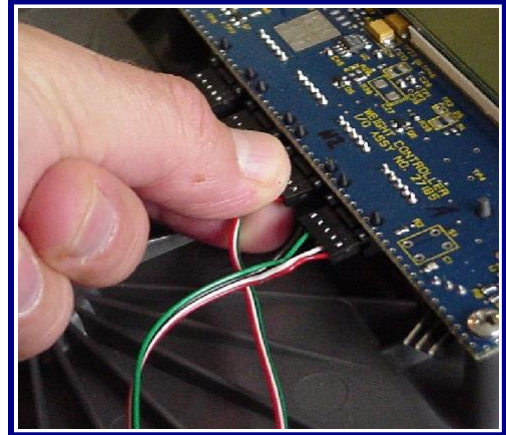
5. Place the Load Cell Wire under the retainers.

6. Plug the Load Cell wire into the Weight Controller I/O Assembly.



## Replacing the Weight Controller I/O Assembly

1. Unplug the four (4) Load Cell wires from the front of the Weight Controller I/O Assembly Unit, noting where each one goes.
2. Remove the four (4) Phillips-head fastening screws.
3. Replace the Weight Controller I/O Assembly Unit with another one, screwing the new one in with the four fasteners.
4. Using the wiring diagram, replace the four (4) Load Cell wires.



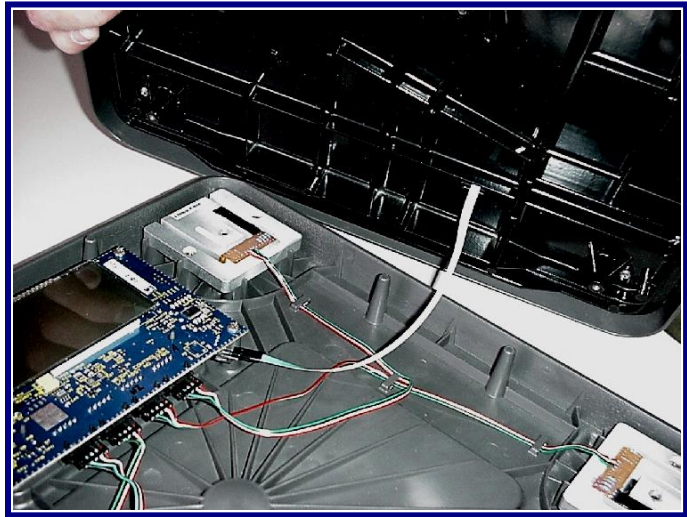
## Replacing the Plate Assembly

1. Remove the four (4) fastening screws of the Plate Assembly.
2. Pull the Plate Assembly away from the Scale Platform.
3. Screw down the new Plate Assembly onto the Scale Platform.



## Steps to Reassembly

1. Carefully position the two plastic covers together from the right side, plugging in the ribbon cable to completely connect the two.
  - Note the plug attaches to the prongs closest to the Control Board fastening post.



2. Install the four (4) bottom Hex-head screws using the **7/64"** Allen Wrench.
3. Install the **four (4) Rubber Foot Pads**. A good coat of rubber cement may be required when reattaching the rubber pads to the bottom.



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## Section 7: Parts

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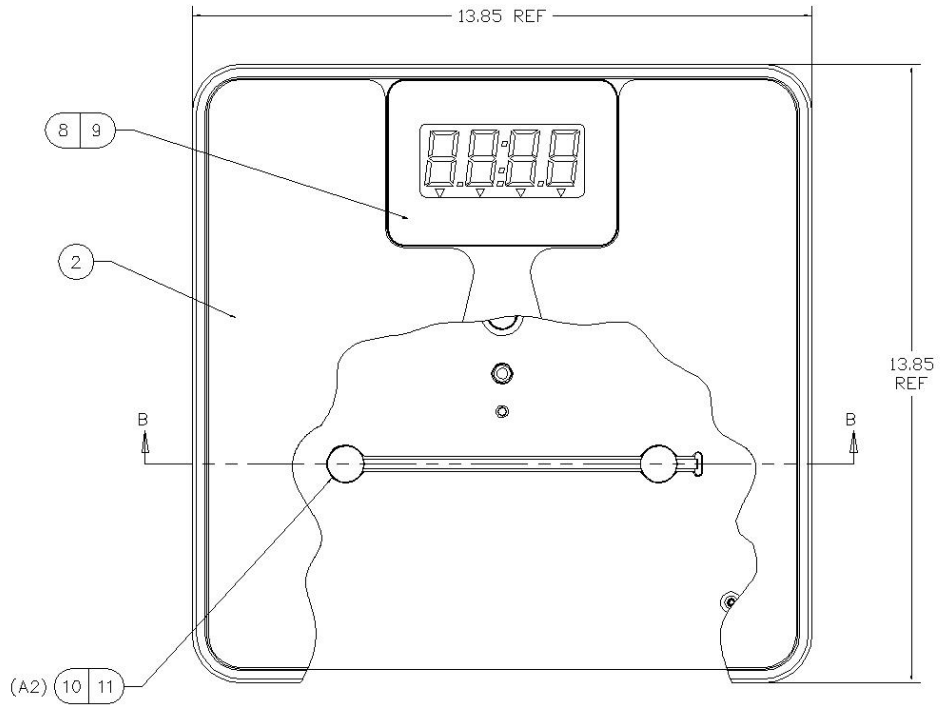
### Parts List

Diagram No.	Qty.	Part No.	Description
1	1	27114	Base
2	1	27132	Platform
4	1	27932	PCB Assy, Weight Controller I/O
5	4	24531	Load Cell, Wing Beam, Matched 200 lb.
8	1	27118	Window
9	1	27134	Overlay, Alere
10	2	27128	Foam Pad
11	1	27131	Double Switch Assy
12	4	20190	Self-adhesive Rubber Foot Pads
14	1	27125	Frame Casting
15	5	27117	Screw, Tapping, Pan Hd, Phil, Trilobular 6-19 x .25
19	12	18281	Screw, Tapping, Pan Hd, Phil, Trilobular 6-19 x .38
20	4	19316	Screw, Cap, Socket Hd 6-32 x .63
22	1	27113	Battery Cover
24	1	12366	Plug
27	1	27133	Name Plate

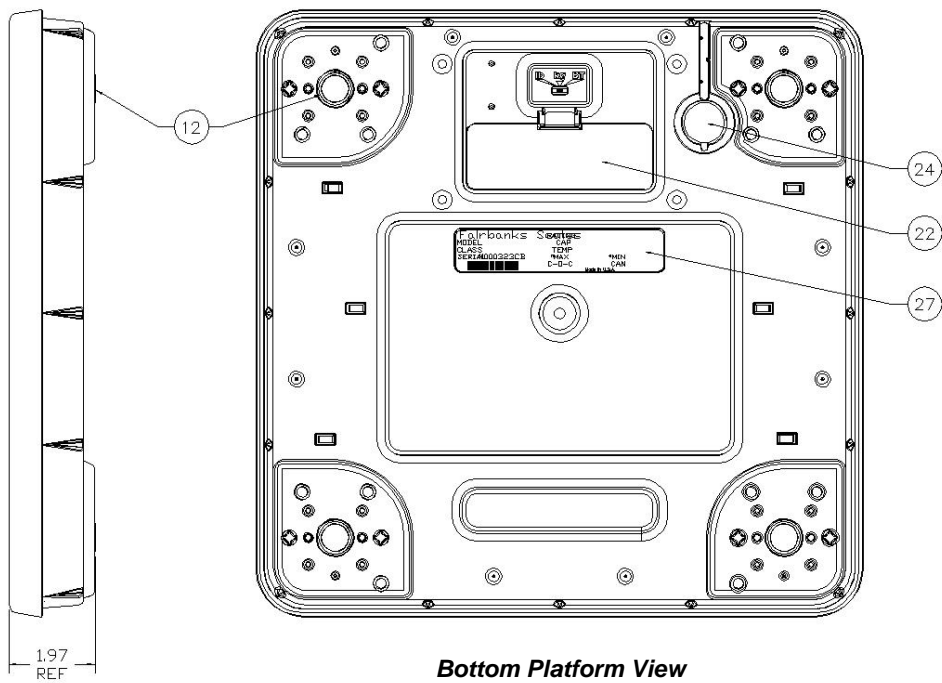




# Parts Diagrams

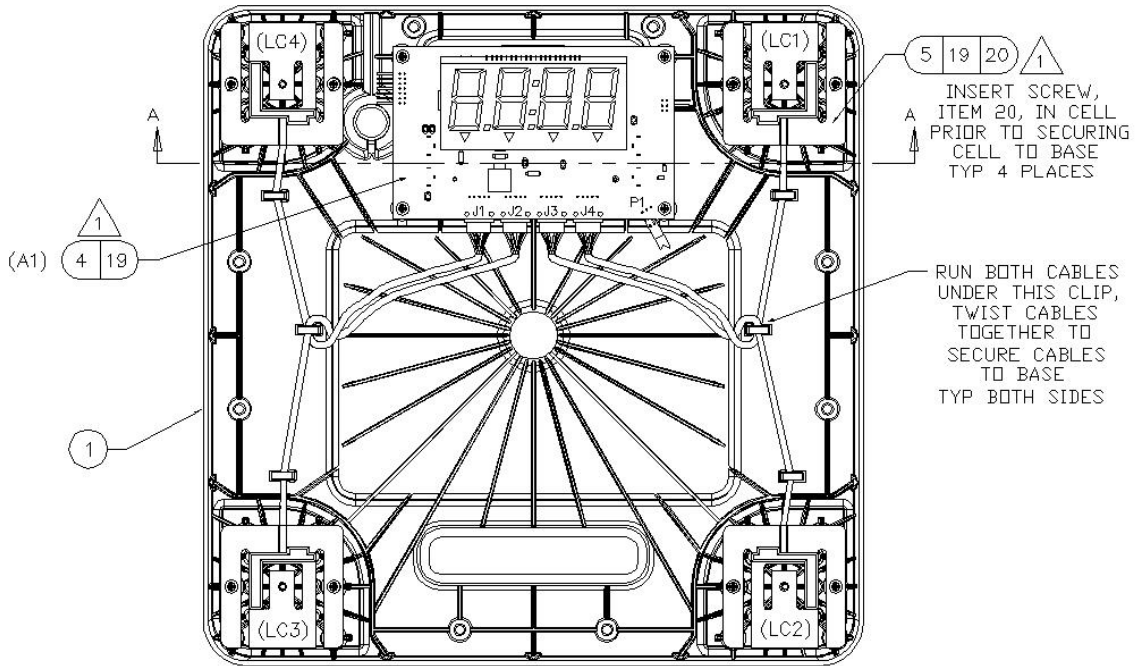


Top View



Bottom Platform View

# Parts Diagrams, Continued



Base Interior View



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Manufactured by Fairbanks Scales, Inc.  
821 Locust  
Kansas City, Missouri 64106  
[www.fairbanks.com](http://www.fairbanks.com)

**Alere Health Scale**  
**Service Manual**  
**Document 51144**