PROVIDER TEST KIT

OPERATOR'S MANUAL

Original Instructions

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This manual supports the BTE Provider Test Kit™
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Manufacturer's Information

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1. WARRANTY

We guarantee that the BTE rehabilitation products are free of manufacturer defects in both workmanship and material. We will replace or repair defective parts or equipment for a period of time and in accordance with the conditions set forth below:

This warranty covers the structure and framework for 1 year of normal institutional use. All mechanical components including bearings, bushings, pulleys and glides are warranted from manufacturer defects in both workmanship and material for a one-year period. Cords and padding are covered for a 1-year period under normal use.

This limited warranty is in lieu of all warranties, expressed or implied and all other obligations or liabilities on the part of BTE. We neither assume nor authorize any person to assume any other obligation or liability in connection with the sale of this product.

Under no circumstances shall BTE be liable by virtue of this warranty or otherwise, for damage to any person or property what so ever for any special, indirect, secondary or consequential damage of any nature however arising out of the use or inability to use this product.

This limited warranty applies only while the BTE product remains in the possession of the original purchaser and has not been subject to accident, misuse, abuse, unauthorized modification, failure to follow instructional use, failure to do proper maintenance, incorrect adjustments or failure due to cause beyond the manufacturer's control.

2. DISCLAIMER

The information presented in this manual is given in good faith and is to the best of our knowledge accurate. However, anyone who uses this information in any way does so entirely at his or her own risk. Neither BTE, its officers nor their representatives can accept any responsibility for any damage or injury incurred as a result of information presented here except under the terms of the product warranty.

Your system may not include all components described in this manual. Please contact BTE Customer. Service at BTE if you have any questions

Product Description, Use, and Application Specification

General Description

The PTK model 1 is a system used to assess physical capacity of specific human functions.

The system includes load cells, mechanical adapters for various applications, tool communication hardware, software, attachment frame, and Range of Motion (ROM) devices. Calibration weights and fixtures allowing in-field calibration are also included.

Intended Use

The PTK is intended to be used by physical therapists, occupational therapists, biokineticists, exercise physiologists, physicians, or athletic trainers for musculoskeletal testing. Applications include occupational and physical therapy and industrial rehabilitation. The system is intended to assess strength and ROM.

Contraindications for use include conditions where tensile strength of tissues and/or structures is compromised, i.e. healing bone fractures and tendon, ligament, and muscle repairs. Clinical judgment is required to determine whether subject should perform assessments.

Intended Medical Indication

The system is intended to assess strength and ROM.

Intended Patient Population

General Population: Anyone whose muscle strength needs to be measured. There are no age, weight, or height restrictions. Contraindications for use include conditions where tensile strength of tissues and/or structures is compromised, i.e. healing bone fractures and tendon, ligament, and muscle repairs. Clinical judgment is required to determine whether subject should perform assessments.

Intended Anatomical Applicability

Evaluation of the musculoskeletal system

Intended User Profile

Medical healthcare professionals

Intended Conditions of Use

Office or clinic setting

Frequency of Use

There are no frequency of use restrictions for this device.

Essential Functions

- Provides means to asses push, pull, grip, pinch and lift forces to quantify muscle strength.
- Record setup information and data.
- Save results to a client record database.
- Create reports presenting results and trending.

Essential Performance

The device does not have any essential performance characteristics.

Operating Principle

The PTK is a device that supplies a means for assessing strength and range of motion through the use of a hand grip, pinch strength, ROM devices, pull/push devices, and lifting apparatus. The tools include a pinch gauge, hand grip, and a portable load cell. The PTK measures isometric push/pull forces applied to the tool by the client and the duration of time force is applied. The data collected allows the program to track a client's capabilities through multiple calculated variables. Reports are generated from the computer program that can be used to evaluate a client's capabilities over single or multiple uses of the PTK.

Applied Parts

PTK applied parts include all tools, tool attachments, heart rate monitor, and the Portable Dock and Transmitter. All applied parts are type B.

Performance Characteristics

- Support Column safe workload is 300 lbs
- Hand Grip has the capability to measure push forces in range 1 lb to 200 lbs (± 0.75 lb.)
- Pinch Gauge has the capability to measure push forces in range 1 lb to 45 lbs (± 0.2 lb.)
- PTK Portable Load Cell (PLC) has the capability to measure push and pull forces in range 1 lb to 300 lbs. Tolerances are: ± 0.75 lbs in 1 -100 lbs range and ± 2 lbs in 101-300 lbs range
- Goniometer has the capability to measure 0 to 360 degrees of movement in 1 degree increments (± 3 degrees)
- Inclinometer has the capability to measure 1 to 360 degrees of movement in 1 degree increments (± 1 degree)
- Heart rate system allows for constant and real time monitoring during testing. The systems measures the heart rate in beats per minute and functions within 2 feet from Portable Dock and Transmitter and 30 feet from the Hub.
- Two Functional Range of Motion (FROM) Panels are on the system.

EXPLANATION OF SYMBOLS AND CERTIFICATION MARKINGS

Manufacturer		Temperature Limit	
Catalogue Number (Product and Model Number)	REF	Humidity Limit	
Serial Number	SN	Atmospheric Pressure Limitation	
Follow instructions for use		General Warning Sign	
Type B Applied Part		Direct Current	
Pinch Point Hazard		General Mandatory Action Sign	
Safety Certification	SGS C S 710101	Electromagnetic Field	

CAUTION AND WARNING

Marking on the Equipment

REF PTK 1

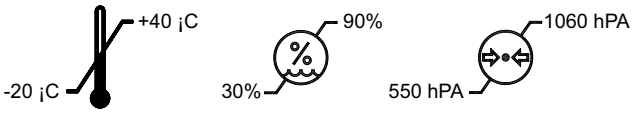
SGS C S 710101

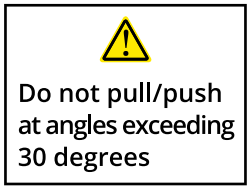
BTE

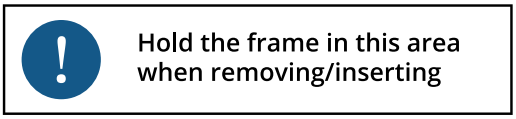
BTE

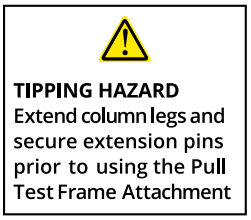
SN Serial Number

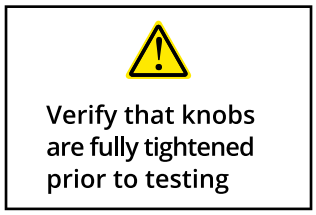
Permissible Environmental Conditions for Transport and Storage

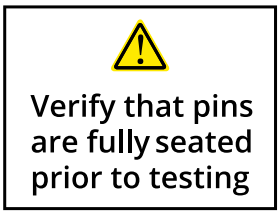












Weights used for lifting tests are marked as follows:

- 20 Lb Weight (Green Label)
- 10 Lb Weight (White Label)
- 5 Lb Weight (Yellow Label)

Important Information for Safety

Prior to Each Use

- Check that the PTK Portable Load Cell (PLC) and PTK Portable Load Cell (PLC) Tools are not damaged.
- Prior to conducting testing, verify that the Support Legs are unfolded and the Leg Pull Pins are in place.
- Check that the Provider Test Kit system is securely placed against a structurally supported wall.

Warnings in the PTK Manual

WARNING

The heart rate system is not intended for use with clients that are in life-threatening circumstances or in condition that precludes performing activities required for physical assessment.

WARNING

Do not modify this equipment without authorization of the manufacturer.

CAUTION

TIPPING HAZARD Do not place Support Column against non-structural wall.

CAUTION

TIPPING HAZARD Extend Column Legs and secure Leg Pull Pins prior to using Pull Test Frame Attachment.

CAUTION

TRIPPING HAZARD When the Pull Test Frame Attachment is not in use, the Column Support Legs should be folded to reduce tripping hazard.

CAUTION

TIPPING HAZARD Do not lean on Pull Test Frame Attachment.

CAUTION

PINCH POINT Do not place hands near hinges located at each end of the Pull Test Frame Attachment gate.

CAUTION

Do not hold the Pull Test Frame Attachment outside of the designated area that includes 1/3 of the frame arm's length from the gate outwards.

CAUTION

TIPPING HAZARD Do not push using Pull Test Frame Attachment or pull using the Carriage Mounting Block.

CAUTION

Do not pull/push at angles exceeding 30 degrees.

CAUTION

Verify that pins are fully seated prior to testing.

CAUTION

Verify that knobs are fully tightened prior to testing.

CAUTION

Do not perform testing without verifying Lift Test Integration Fixture is properly assembled.

CAUTION

Portable Load Cell (PLC) and PLC attachments shall not be serviced while in use with a client. Inspections of these components shall be performed prior to use.

WARNING

To avoid the risk of electric shock, the computer must only be connected to supply mains with protective earth.

CAUTION

Anti-virus software is installed on the computer. If the computer is connected to the Internet, the software must be updated regularly to protect the computer against viruses.

CAUTION

The PTK is not intended to be connected to a network, do not do so unless instructed by BTE.

CAUTION

The PTK shall only be transported unassembled.

ELECTROMAGNETIC FIELD WARNING

The Mio Alpha watch and USB charger contain magnets that could affect pacemakers and implantable cardioverter-defibrillators (ICDs).

Permissible Environmental Conditions for Transport and Storage

Ambient temperature: -20°C to +40°C

Relative humidity: 30% to 90%

Atmospheric pressure: 550 hPa to 1060 hPA

Permissible Environmental Operating Conditions

Ambient temperature: +10°C to +40°C

Relative humidity: 30% to 75%

Atmospheric pressure: 700 hPa to 1060 hPa

Electromagnetic Interference

The Equipment needs to be placed into service according to electromagnetic compliance information provided in the manual Appendix.

Environmental Protection

- Dispose of batteries in accordance with all local, state, and federal laws.
- At the end of the equipment service life, dispose of the device components in accordance with all local, state, and federal laws for electronic recycling.

Interchangeable or Detachable Parts by Service Personnel.

- There are no components that are designated as repairable by service personnel. Components will be replaced if needed in accordance with BTE service policy

Servicing

- No parts shall be serviced or maintained while in use with a client.
- Upon request BTE will provide circuit diagrams, component parts lists, descriptions, calibration instructions, or other information to assist customer service personnel to repair parts.

PROVIDER TEST KIT

TABLE OF CONTENTS

SETUP AND OPERATION

I. SETUP & OPERATION

1. PTK EQUIPMENT CHECKLIST

It is recommended that while unpacking the equipment you also review your packaging slip to ensure you have all required parts.

A. EQUIPMENT

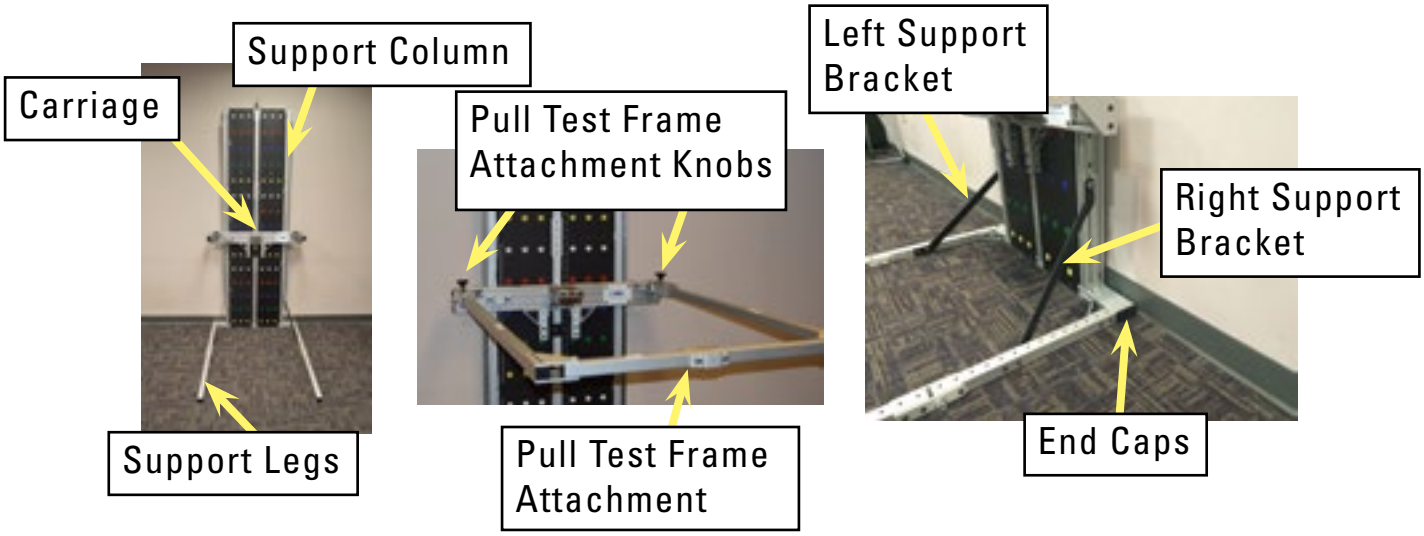
- PTK Assembly Component Parts
  - Support Column (Including two Functional Range of Motion Panels (FROM))
  - Carriage
  - Pull Test Frame Attachment
  - Bottom Cross Tube
  - Counterweight
  - PTK Lifting Shelf
  - Pulley Assembly
  - Support Legs (2)
  - Left & Right Support Bracket
  - Top Hard Stops (2)
  - Endcaps (4)
  - Adhesive Backed Pads (2)
- PTK Portable Load Cell (PLC) Attachments
  - PTK D-Handle
  - PTK Narrow Round Grip
  - PTK Straight Bar
- RJ45 Cables (3 ft cables and 5 ft cables)
- Plastic Pegs (Qty: 30)
- Hand Grip with Convex and Concave Handle
- Hand Grip 5 to 1 Calibration Fixture
- Pinch Gauge (Pinch Grip)
- Pinch Gauge Calibration Block
- Pinch Gauge Calibration Fixture
- PTK Portable Load Cell (PLC)
- Lift Test Kit (2 Platforms & 1 Calibration Plate)

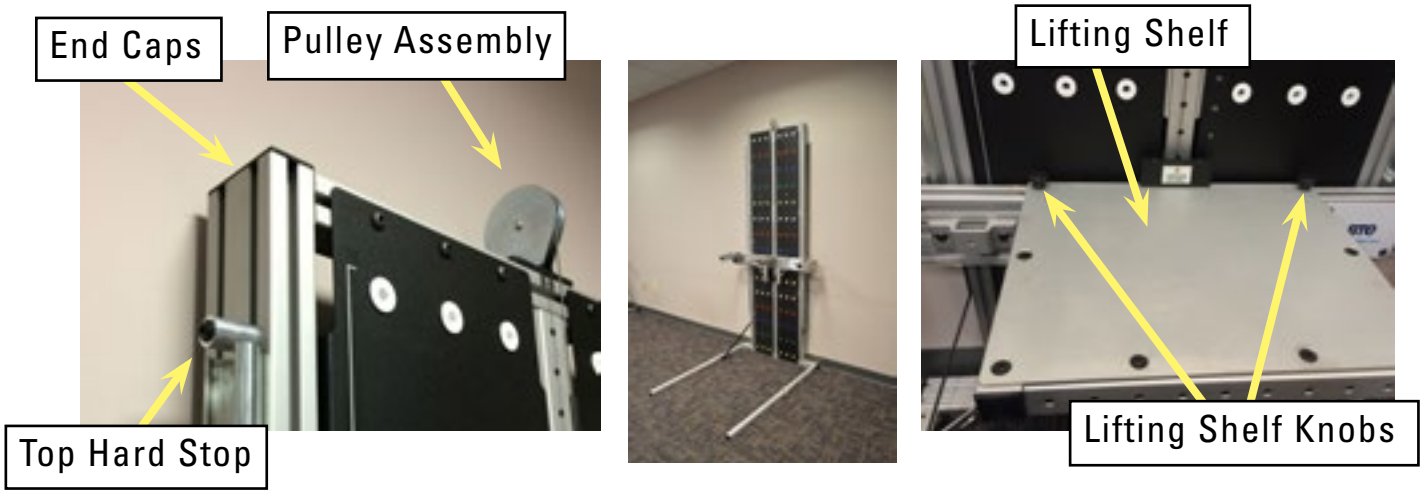
- 10 Lb & 15 Lb Calibration Weights
- Portable Dock & Transmitter, 900 MHz, with Antenna
- Hub URFIO Assembly, 900 MHz, with Antenna
- 10 Lb Lifting Crate
- PTK Weight Set
  - 20 Lb Weight, Qty: 4
  - 10 Lb Weight, Qty: 1
  - 5 Lb Weight, Qty: 1
- Bluetooth Heart Rate System
- NiMH AA Rechargeable Batteries (or AA Alkaline Batteries) Qty: 8
- AA Battery Charger
- PTK Computer with Software
- PTK Operator's Manual
- EvalTech Software Operator's Manual
- Optional Equipment
  - Dual Inclinometer
  - Goniometer

B. TOOLS

- 3/16" Hex L-Key Wrench
- 9/16" Open Ended Wrench
- 1/4" Ball End Hex Key

C. IDENTIFICATION OF PTK SYSTEM COMPONENTS



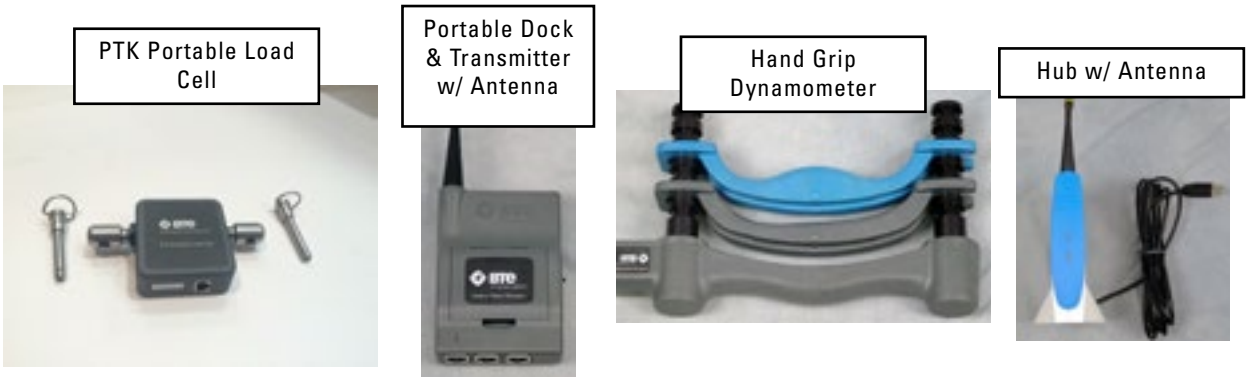


- Support Column (With FROMs)
- Counterweight
- Carriage
- Lifting Shelf Knobs
- Support Legs
- Left and Right Support Bracket
- Pulley Assembly
- Pull Test Frame Attachment
- Pull Test Frame Attachment Knobs
- Top Hard Stops
- End Caps and Adhesive Backed Pads

D. IDENTIFICATION OF EVALUATION TOOLS & ATTACHMENTS

Included in the system are tools and attachments that evaluate the client's strength and range of motion.

Data Acquisition Devices & Portable Electronic Tools



Pinch Gauge

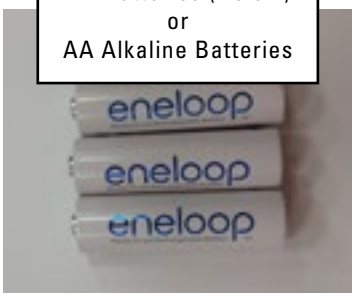
Heart Rate System, Portable Dock & Transmitter, and Hub

Heart Rate Monitor & Strap

Battery Charger

RJ45 Cables
(3ft & 5ft)

NiMH Rechargeable
AA Batteries (Below)
or
AA Alkaline Batteries



PTK Portable Load Cell Attachments

PTK D-Handle

PTK Straight Bar

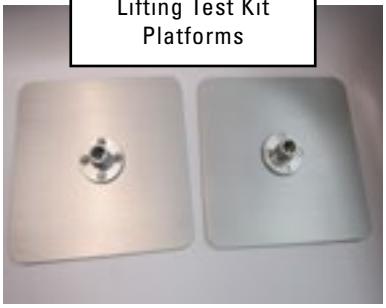
PTK Narrow Round Grip

Dynamic Lifting Crate and Weights

Lifting Shelf

PTK Weight Set &
10 lb Lifting Crate

Lifting Test Kit
Platforms



Calibration Equipment

Hand Grip Dynamometer Calibration Fixture

Pinch Gauge Calibration Fixture

PTK PLC Calibration Plate

Calibration Weights (10lbs & 15 lbs)

Pinch Gauge Calibration Block

Support Manual

Software Manual

FROM Panel Plastic Pegs

Plastic Pegs

2. PTK ON-SITE ASSEMBLY

The PTK System requires on-site assembly. Refer to work instructions 751W3120 for assembly instructions.

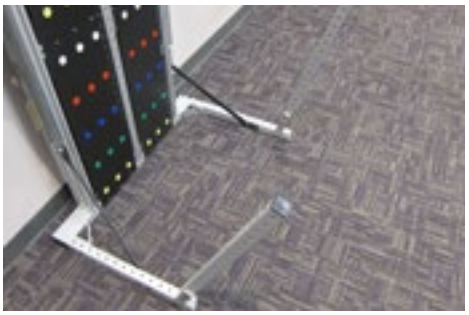
CAUTION

TIPPING HAZARD Do not place Support Column against non-structural wall.

Adjust accordingly so that the backside of the support column is making contact with the wall.

CAUTION

TIPPING HAZARD Extend Column Legs and secure Leg Pull Pins prior to using Pull Test Frame Attachment.



The PTK system weighs approximately 125 lbs. When moving the system, it is recommended that two or more people are used to safely lift the PTK.

3. GENERAL OPERATION OF THE SYSTEM

WARNING

Do not modify this equipment without authorization of the manufacturer.

Any changes or modifications, not expressly approved by BTE shall void the user's authority to operate equipment.

CAUTION

TIPPING HAZARD Do not place Support Column against non-structural wall.

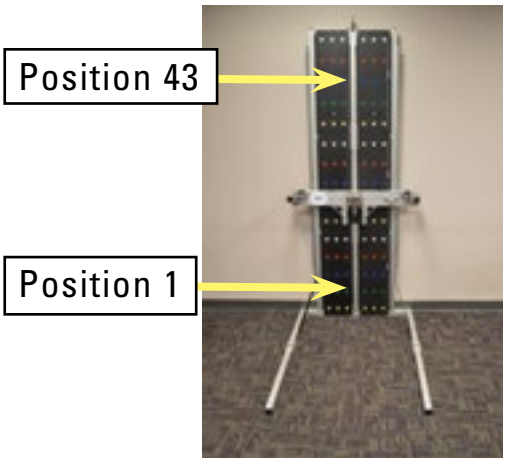
A. WORKING SPACE REQUIREMENTS OF THE PTK SYSTEM

Space requirements - The PTK System requires a minimum working area of:

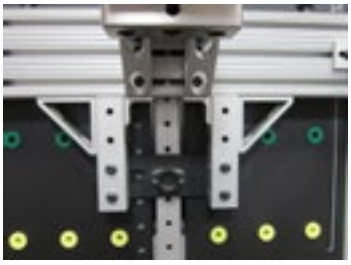
- Wall Width: 48 inches
- Wall Height: 96 inches
- Floor Depth: 70 inches

B. SETTING THE SYSTEM HEIGHT

1) The PTK Carriage adjusts vertically from Position 1 to Position 43, with Position 1 being closest to the floor. The Carriage is held in place at a position by the Carriage Pull Pin.



2) To disengage the Carriage Pull Pin, pull it outwards, towards the user.



3) Then, while the Carriage Pull Pin is disengaged, raise or lower the Carriage to the desired position. Then, once the desired position is achieved, re-engage the Carriage Pull Pin, thus locking the Carriage in place. Verify that the pin is fully engaged. The Carriage is connected to a Counterweight system which allows for assisted vertical adjustment with minimal lifting force from the user.

4) The PTK can be used for Push Tests, Pull Tests, Pull Down Tests, and Dynamic Lifting Tests. Each position on the PTK has a corresponding height relative to the floor that is dependent on the type of test being performed and the tool being used with that test. For tests involving the D-Handle, Straight Bar, or Narrow Round Grip, the height is measured from the floor to the center axis or the handle. For Dynamic Lifting Tests, the distance is from the floor to the top of the Lifting Shelf. The positions and corresponding heights for all tests are listed below:

	Push Test			Pull Test			Pull Down Test			
Position	D Handle	Straight Bar	Narrow Round Grip	D Handle	Straight Bar	Narrow Round Grip	D Handle	Straight Bar	Narrow Round Grip	Dynamic Lifting Test
1										22.0
2										23.5
3										25.0
4										26.5
5										28.0
6										29.5
7	30.0	30.0	30.0	30.0	30.0	30.0	20.1	22.4	22.4	31.0
8	31.5	31.5	31.5	31.5	31.5	31.5	21.6	23.9	23.9	32.5
9	33.0	33.0	33.0	33.0	33.0	33.0	23.1	25.4	25.4	34.0
10	34.5	34.5	34.5	34.5	34.5	34.5	24.6	26.9	26.9	35.5
11	36.0	36.0	36.0	36.0	36.0	36.0	26.1	28.4	28.4	37.0
12	37.5	37.5	37.5	37.5	37.5	37.5	27.6	29.9	29.9	38.5
13	39.0	39.0	39.0	39.0	39.0	39.0	29.1	31.4	31.4	40.0
14	40.5	40.5	40.5	40.5	40.5	40.5	30.6	32.9	32.9	41.5
15	42.0	42.0	42.0	42.0	42.0	42.0	32.1	34.4	34.4	43.0
16	43.5	43.5	43.5	43.5	43.5	43.5	33.6	35.9	35.9	44.5
17	45.0	45.0	45.0	45.0	45.0	45.0	35.1	37.4	37.4	46.0
18	46.5	46.5	46.5	46.5	46.5	46.5	36.6	38.9	38.9	47.5
19	48.0	48.0	48.0	48.0	48.0	48.0	38.1	40.4	40.4	49.0
20	49.5	49.5	49.5	49.5	49.5	49.5	39.6	41.9	41.9	50.5
21	51.0	51.0	51.0	51.0	51.0	51.0	41.1	43.4	43.4	52.0
22	52.5	52.5	52.5	52.5	52.5	52.5	42.6	44.9	44.9	53.5
23	54.0	54.0	54.0	54.0	54.0	54.0	44.1	46.4	46.4	55.0
24	55.5	55.5	55.5	55.5	55.5	55.5	45.6	47.9	47.9	56.5
25	57.0	57.0	57.0	57.0	57.0	57.0	47.1	49.4	49.4	58.0
26	58.5	58.5	58.5	58.5	58.5	58.5	48.6	50.9	50.9	59.5
27	60.0	60.0	60.0	60.0	60.0	60.0	50.1	52.4	52.4	61.0
28	61.5	61.5	61.5	61.5	61.5	61.5	51.6	53.9	53.9	62.5
29	63.0	63.0	63.0	63.0	63.0	63.0	53.1	55.4	55.4	64.0
30	64.5	64.5	64.5	64.5	64.5	64.5	54.6	56.9	56.9	65.5
31	66.0	66.0	66.0	66.0	66.0	66.0	56.1	58.4	58.4	67.0
32	67.5	67.5	67.5	67.5	67.5	67.5	57.6	59.9	59.9	68.5
33	69.0	69.0	69.0	69.0	69.0	69.0	59.1	61.4	61.4	70.0
34	70.5	70.5	70.5	70.5	70.5	70.5	60.6	62.9	62.9	71.5
35	72.0	72.0	72.0	72.0	72.0	72.0	62.1	64.4	64.4	73.0
36	73.5	73.5	73.5	73.5	73.5	73.5	63.6	65.9	65.9	74.5
37	75.0	75.0	75.0	75.0	75.0	75.0	65.1	67.4	67.4	76.0
38										
39										
40										
41										
42										
43										

C. ATTACHING THE PTK PORTABLE LOAD CELL (PLC) TO THE MOUNTING BLOCK

1) Locate the PTK PLC. The PTK PLC is designed to interface with any of the three mounting blocks on the PTK System. Two of these Mounting Blocks are located on the Carriage and are used for Push Tests and Pull Down Tests. The third Mounting Block is located on the Pull Test Frame Attachment, and is used for Pull Tests.

2) The PTK PLC comes with two PLC Pins. A PLC Pin is used to secure the PTK PLC to the PLC Mounting Block.

3) Insert the PTK PLC into the desired PLC Mounting Block. The “Carriage” side label should be oriented towards the Carriage for the two Mounting Blocks located on the Carriage, with the label visible to the user.

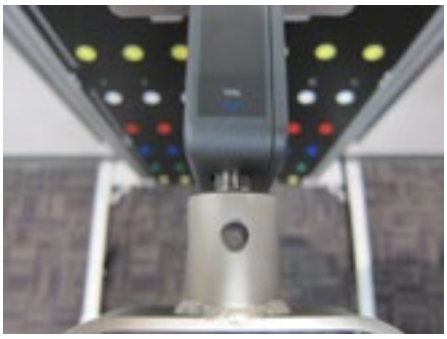
4) Then, press the button on the end of the PLC Pin; insert it through the PLC Mounting Block and through the PTK PLC Shaft. The PLC Pin must be fully seated in the Mounting Block.

5) The PTK PLC is now secured to the PLC Mounting Block. To remove the PTK PLC, simply press the button on the PLC Pin and remove it. Then, remove the PTK PLC from the Mounting Block.

D. SECURING PTK PORTABLE LOAD CELL ATTACHMENTS

1) The PTK PLC is designed to interface with the PTK D-Handle, Straight Bar, and Narrow Round Grip tool attachments. The PTK tool attachments can be oriented in 90 degree increments. Of note, for Pull Down Tests the Straight Bar and Narrow Round Grip tool attachments may only be secured in one orientation.

2) Select the desired PTK tool attachment to interface with the PTK PLC. Place the PTK tool attachment onto the PLC Shaft on the side designated "Tool". Rotate the tool into the desired orientation.



3) Then, press the button on the end of the PLC Pin and insert it through the tool attachment and through the PTK PLC Shaft. The pin must be fully seated and extend through both sides of the attached tool.

4) The tool attachment is now secured to the PTK PLC. To remove the tool attachment from the PTK PLC, simply press the button on the PLC Pin and remove the pin. Then, remove the tool from the PTK PLC.

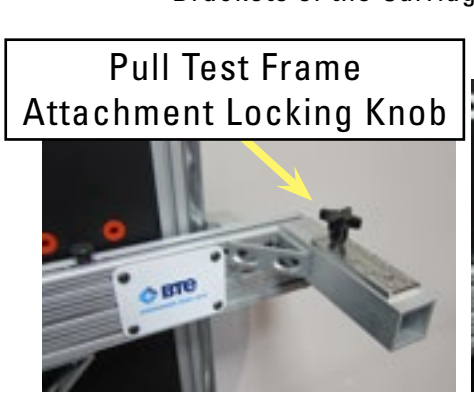
E. ATTACHING THE PULL TEST FRAME ATTACHMENT TO THE CARRIAGE

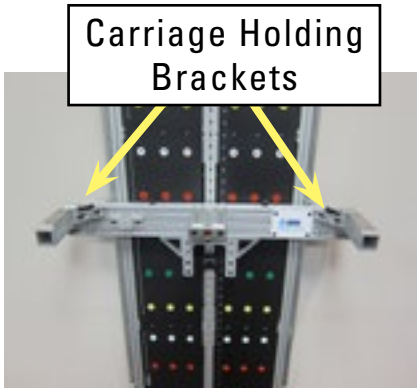
1) In order to use the Pull Test Frame Attachment, the Lifting Shelf and the PTK PLC must not be connected to the Carriage. If either of these components are connected, remove them and set them aside.

2) If the Pull Test Frame Attachment has not been previously assembled, this must be done first. Locate the Pull Test Frame Attachment components. Orient the Center Tube (Gate) of the Pull Test Frame Attachment as shown below, and secure it using the two Pull Pins.



3) Locate the two Pull Test Frame Attachment Locking Knobs. If the Pull Test Frame Attachment Locking Knobs are secured into the Receiving Tubes of the Carriage, unscrew them, remove them from the receiving tubes, and place them into the Holding Brackets of the Carriage.





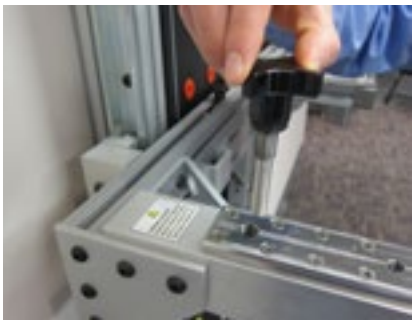
4) Next, grasp the Pull Test Frame Attachment side tubes, and insert them into the receiving tubes of the Carriage. The attachment will bottom out when fully inserted into the Carriage.

CAUTION

Do not hold the Pull Test Frame Attachment outside of the designated area that includes 1/3 of the frame arm's length from the gate outwards.



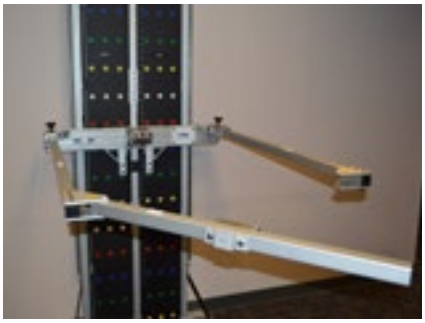

5) Locate the two Pull Test Frame Attachment Locking Knobs. Screw them into the Receiving Tubes of the Carriage until they bottom out. To reduce excessive play and potential binding between the Pull Test Attachment and the Carriage when screwing the knobs in, lift up gently on the Pull Test Frame Attachment.

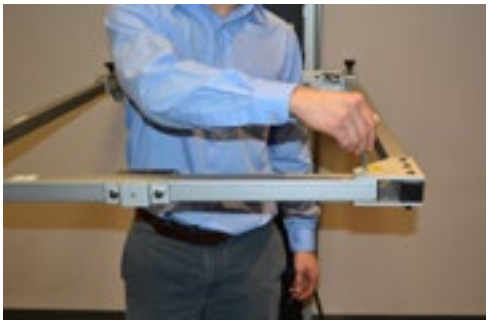


6) The Pull Test Frame Attachment is now ready for use. When using the Pull Test Frame Attachment, it does not need to be removed for ingress and egress. Simply pull out one of the Pull Test Frame Attachment Pins and swing the center tube out of the way. Once ingress and egress has been completed, swing it back into place and fully secure with the pin.

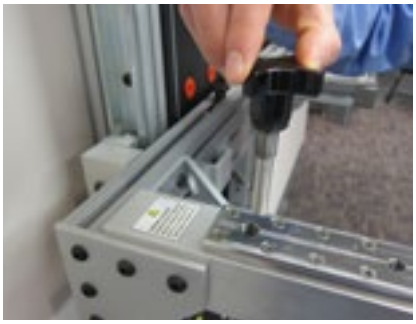
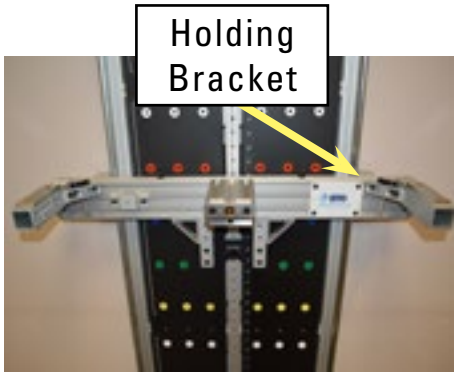
CAUTION

PINCH POINT Do not place hands near hinges located at each end of the Pull Test Frame Attachment Gate.

7) To remove the Pull Test Frame Attachment, simply unscrew and remove the Pull Test Frame Attachment Locking Knobs located on the Carriage. Lifting up gently on the attachment while unscrewing may allow for easier removal. Place the Pull Test Frame Attachment Locking Knobs into the Holding Brackets of the Carriage.

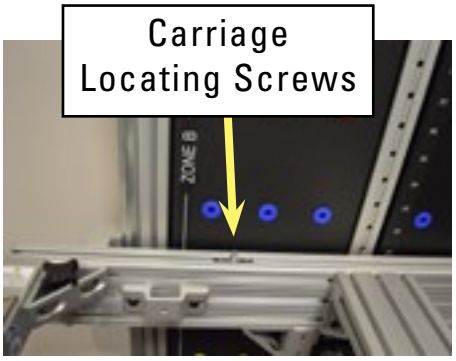
8) Then, remove the Pull Test Frame Attachment out of the Carriage and set it aside.

F. ATTACHING THE LIFTING SHELF TO THE CARRIAGE

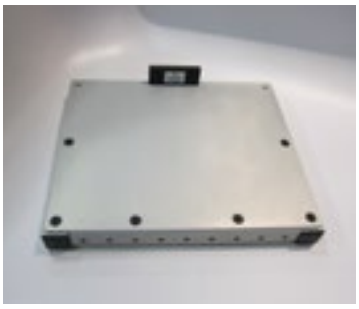
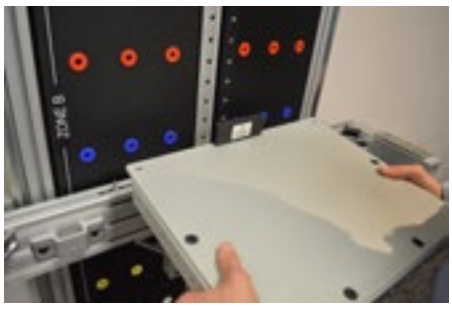
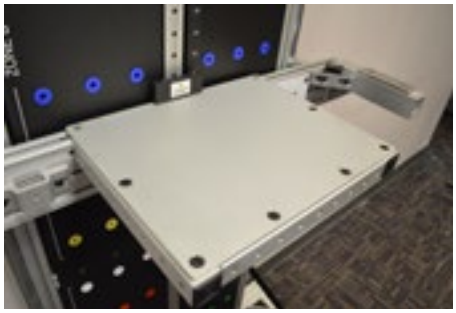
1) In order to use the Lifting Shelf, the PTK PLC and the Pull Test Frame Attachment must not be connected to the Carriage. If either of these components are connected, remove them.

2) Position the top of the Carriage to a convenient working height.

3) Remove the two Lifting Shelf Knobs that are connected to the Carriage Locating Screws of the Carriage as shown below.

4) Locate the Lifting Shelf and place it onto the Carriage. The Lifting Shelf must be centered with the two holes in alignment with the Carriage Locating Screws.

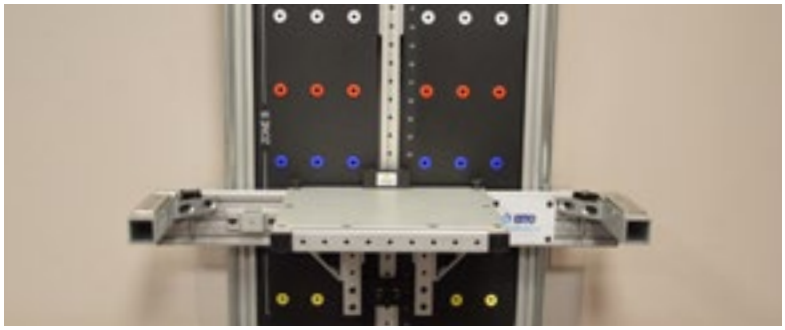




5) Once the Lifting Shelf is placed onto the Carriage, fully secure it to the Carriage with the two Lifting Shelf Knobs. Of note, there is a small amount of play with the Carriage Locating Screws. They may be required to be moved slightly in order to properly seat the Lifting Shelf onto the Carriage prior to screwing on the Lifting Shelf Knobs onto the locating screws.

CAUTION

Verify that knobs are fully tightened prior to testing.

6) The Lifting Shelf is now ready for use. Adjust the Carriage height accordingly for testing. To remove the shelf, simply unscrew the two Lifting Shelf Knobs, remove the Lifting Shelf, and then screw the two knobs back onto the Carriage Locating Screws so that they are not misplaced.



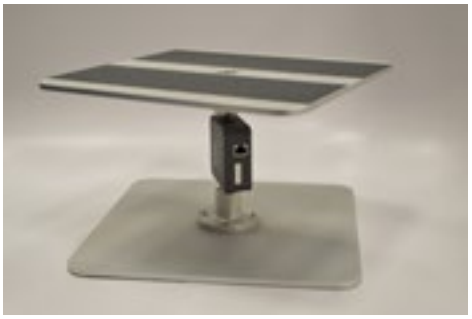
G. ASSEMBLING THE LIFT TEST INTEGRATION FIXTURE

1) Locate the PTK PLC and the two Lift Test Platforms.

2) Each Platform has a screw located on the inside of the Platform Hub. This screw will be used to assemble the platforms to the PTK PLC Shafts.

3) Take the PTK PLC and screw it onto the Platform in a clockwise rotation. The PTK PLC should be spun onto the Platform until the shaft bottoms out in the Platform Hub and is restrained from moving.

4) Then, take the remaining Platform and screw it onto the other PTK PLC Shaft in a clockwise rotation. The platform should be spun onto the PLC Shaft until the shaft bottoms out in the Platform Hub and is restrained from moving.



NOTE: THE PLATFORMS ARE NOT REQUIRED TO BE IN ROTATIONAL ALIGNMENT WITH ONE ANOTHER. OVER TWISTING OF A PLATFORM MAY RESULT IN DAMAGE TO THE PTK PLC AND THE PLATFORM.

5) Place the now assembled Lift Test Integration Fixture onto the floor in the desired location, and then orient the fixture accordingly. The fixture is now ready for use. Of note, the bottom and top Platform are not required to be in alignment with one another.

CAUTION

Do not perform testing without verifying Lift Test Integration Fixture is properly assembled.

6) To disassemble the Lift Test Integration Fixture, twist both of the platforms off the PTK PLC.

H. GENERAL SOFTWARE AND TOOL OPERATION

1. SETUP

Step 1. Attach one of the antennas to the Hub and plug the Hub USB cable into the laptop.

Step 2. Attach the other antenna to the Portable Dock & Transmitter and insert the batteries.

Note that the batteries are charged before shipping; however, rechargeable batteries will self-discharge over time. It is recommended that you recharge the batteries before using the system for an extended length of time.

ACCEPTABLE ANTENNA(S)

This device has been designed to operate with the antenna(s) listed below and having a maximum gain of 2.7 dBi. Antennas not included in this list or having a gain greater than 2.7 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

Acceptable antenna(s) include:

1. Linx Technologies 916MHz 1/4 Wave Whip Antenna (ANT-916-CW-QW)

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

2. CONNECTING A TOOL TO THE PORTABLE DOCK & TRANSMITTER

RJ45 cables are included with the system. These are the only cables that should be used to connect the tools to the Portable Dock & Transmitter.

Step 1. Turn on the Portable Dock & Transmitter and verify the green LED is lit; which is located adjacent to the antenna.

Step 2. Plug one end of the RJ45 cable into any of the ports on the Portable Dock & Transmitter.

Step 3. Plug the other end of the RJ45 cable into the desired tool.

A maximum of 3 tools may be connected to the Portable Dock & Transmitter at one time.

Note that each tool requires power from the Portable Dock & Transmitter - the more tools that are plugged in, the faster the batteries will drain.

3. IDENTIFYING TOOL SERIAL NUMBERS

Each tool is assigned a unique serial number, which is how the calibration data is stored in the software.

The serial number can be found on the label near the RJ45 jack on each tool and on the back of the Portable Dock & Transmitter.

4. MANAGING TOOLS

The Tool Management feature can be accessed in the software by going to the Administration menu and selecting Manage Tools. Refer to Chapter 02c-V [Administration Menu - Manage Tools] of the EvalTech Software Operator's Manual for more information.

The screen includes a snapshot of all the tools which are plugged into a powered Portable Dock & Transmitter. Note that the Heart Rate icon will be green whenever the Portable Dock & Transmitter is turned on.

In addition, the screen may display the input values whenever a tool name is selected. The tool icon must be green in order for the input values to be displayed.

5. UTILIZING THE WIRELESS SYSTEM WHILE TESTING

Take the following into consideration while testing:

The Portable Dock & Transmitter must be turned on and the tool must be connected prior to starting a test. The software will not recognize the tool if it is connected after the test has started or if the Portable Dock & Transmitter is turned on after the test has started.

A tool must be calibrated prior to testing with it.

6. BATTERIES

The provided rechargeable batteries are charged before shipping; however, rechargeable batteries will self-discharge over time. It is recommended that you recharge the batteries before using the system for an extended length of time.

When fully charged, the batteries should power the Portable Dock for up to 5 hours of continuous testing. This will vary depending on how much battery capacity is available, how many tools are plugged in at once, and which tools are being used (e.g. the Dual Inclinometer and Goniometer use more battery power than the Hand Grip, Pinch Gauge, and Portable Load Cell).

The amount of charging time depends on the remaining capacity of the battery in addition to the charge rate set on the charger. Refer to the battery charger manual for information on the estimated charge time. Whenever possible, only charge the batteries after they have been drained. Short-charging batteries can degrade them over time.

I. MAINTENANCE & CARE

1. COMPUTER CARE

Since computers are sensitive to temperature extremes, do not place equipment close to a direct source of heat or cold (for example, in direct sunlight, next to a radiator, or next to an air conditioner).

Do not install any additional software onto the controlling computer. The BTE PTK system is in constant communication with the computer, so a “clean”, dedicated computer system is crucial to the integrity of this communication system.

If your computer was purchased through BTE and unapproved software has been installed, the computer will not be covered under the warranty.

2. ANTI-VIRUS SOFTWARE

The BTE warranty is void if the product malfunctions as a result of a software virus.

Anti-virus software is installed on the computer. If the computer is connected to the internet, the software must be updated regularly to protect the computer against viruses. In addition, the software must be renewed each year.

CAUTION

Anti-virus software is installed on the computer. If the computer is connected to the Internet, the software must be updated regularly to protect the computer against viruses.

3. CHECK COMPUTER INTERFACES

Check that all cables are securely connected to the computer. Just about every cable connector is made in such a way that it will only attach in its appropriate location. If the cables are not secured properly, there may be an interruption of the data transmission, resulting in error messages.

4. COMPUTER MAINTENANCE

Using proper Windows shut-down procedures, shut down the computer every night to keep it running smoothly during testing.

Periodically defragment the computer. Go to Start - Programs - Accessories - System Tools - Disk Defragmenter; note that this process may take several hours.

Only use a non-abrasive cleaner when cleaning the laptop.

5. TOOLS AND ATTACHMENTS

Regularly wipe down the tools and attachments with an alcohol-based solvent.

Periodically inspect the tools and attachments for any unusual wear or damage.

6. PORTABLE DOCK AND HEART RATE SYSTEM

Replace the rechargeable batteries every 6 months if used frequently and every year if used occasionally.

Replace the Polar Heart Rate chest strap every 2 years or 2500 hours of use. Contact BTE at 410-850-0333 or 800-331-8845 for a replacement.

Periodically inspect the entire length of the cables used to attach to the tools to the Portable Dock. Replace any that are damaged.

CAUTION

Portable Load Cell (PLC) and PLC attachments shall not be serviced while in use with a client. Inspections of these components shall be performed prior to use.

7. STRONGLY RECOMMENDED ADDITIONAL PURCHASES

In addition to the equipment shipped to you from BTE, the purchase of the following items from a local supplier is strongly recommended for adequate protection of your client data:

USB flash drives, or a USB external hard drive for backing up and archiving copies of client data

Disinfectant wipes to clean the commonly used surfaces on the tools and accessories

TABLE OF CONTENTS

SYSTEM USE - TEST CONFIGURATIONS AND PARAMETERS

II. SYSTEM USE - TEST CONFIGURATIONS AND PARAMETERS

The PTK system can be used for the following tests: Push Test, Pull Test, Pull Down Test, Dynamic Lifting Tests, Pinch Grip Test, Hand Grip Test, and Range of Motion using FROM Panels.

CAUTION

Do not pull/push at angles exceeding 30 degrees.

1. PUSH TEST

A. CAPACITY:

Force range is 0 to 250 lbs

B. TEST PARAMETERS:

Test requires the use of the PTK PLC. The following tools may be used with a Push Test: D-Handle, Straight Bar, Narrow Round Grip

PTK D-Handle

PTK Straight Bar

PTK Narrow Round Grip

C. PUSH TEST SETUP

1) Verify that the Lifting Shelf and Pull Test Frame Attachment are not attached to the system at this time. If they are attached, remove them and set them aside accordingly.
2) Verify that both Support Legs are fully deployed and secured with the Leg Pull Pin before performing a Push Test, and that the system is firmly against a structural support wall.

CAUTION

TIPPING HAZARD Do not place Support Column against non-structural wall.

CAUTION

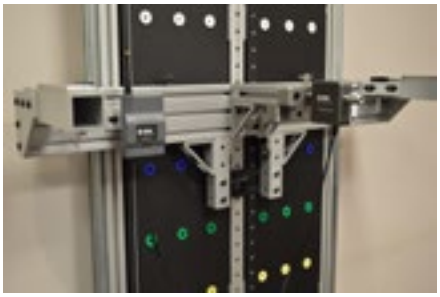
Verify that pins are fully seated prior to testing.

3) Set the Carriage to the desired height using the Carriage Pull Pin.

4) Insert the PTK PLC into the PLC Mounting Block on the Carriage. The PTK PLC must be oriented so that the "Carriage" label is on top and is facing the Carriage side. Fully secure the PTK PLC with the PLC Pin.

5) Attach the Portable Dock to the Carriage Bracket. Connect the RJ45 cable to both the Portable Dock and the PTK PLC.

6) Attach the desired tool to the PTK PLC and secure it using the PLC Pin.



7) The PTK PLC is now ready to use for a Push Test. When performing a Push Test, the user should push horizontally into the center axis of the load cell. Pushing at an angle not in line with the load cell axis will cause reduced readings.

D. SOFTWARE SETUP

Now that the system is ready for use, verify that the PTK PLC is connected and calibrated per the General Software and Tool Operation section and the PTK PLC Calibration section. Additionally refer to the EvalTech Software Operators Manual for software test setup and operation.

2. PULL TEST

A. CAPACITY:

Force range is 0 to 250 lbs.

B. TEST PARAMETERS:

Test requires the use of the PTK PLC. The following tools may be used with a Push Test: D-Handle, Straight Bar, Narrow Round Grip.

PTK D-Handle

PTK Straight Bar

PTK Narrow Round Grip

C. PULL TEST SETUP

1) Verify that the Lifting Shelf and PTK PLC are not attached to the system at this time. If they are attached, remove them and set them aside accordingly.
2) Verify that both Support Legs are fully deployed and secured with the Leg Pull Pins before performing a pull test, and that the system is firmly against a structural support wall.

CAUTION

TIPPING HAZARD Do not place Support Column against non-structural wall.

CAUTION

TIPPING HAZARD Extend Column Legs and secure Leg Pull Pins prior to using Pull Test Frame Attachment.

3) Set the Carriage to the desired height using the Carriage Pull Pin.

4) Attach the Pull Test Frame Attachment to the Carriage. Fully secure it using the Pull Test Attachment Knobs. Verify that the Pull Test Attachment Gate is secured with pins.


5) Insert the PTK PLC into the PLC Mounting Block on the Pull Test Frame Attachment. The PLC must be oriented so that the “Carriage” label is on top and facing the Mounting Block. Fully secure the PTK PLC to the Mounting Block with the PLC Pin.

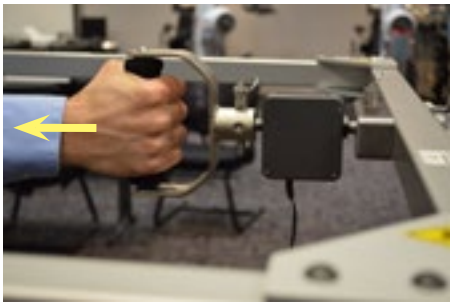
6) Attach the Portable Dock to the Pull Test Attachment Bracket. Connect the RJ45 cable to both the Portable Dock and the PTK PLC.

Attach the desired tool to the PLC Shaft and secure it using the PLC Pin.

The PTK PLC is now ready to use for a Pull Test. When performing a pull test, the user should pull horizontally from the center axis of the load cell. Pulling at an angle not in line with the load cell axis will cause reduced readings.

CAUTION

Verify that pins are fully seated prior to testing.






D. SOFTWARE SETUP

Now that the system is ready for use, verify that the PTK PLC is connected and calibrated per the General Software and Tool Operation section and the PTK PLC calibration section. Additionally refer to the EvalTech Software Operators Manual for software test setup and operation.

3. PULL DOWN TEST

A. CAPACITY:

Force range is 0 to 300 lbs.

B. TEST PARAMETERS:

Test requires the use of the PTK PLC. The following tools may be used with the Pull Down Test: D-Handle, Straight Bar, Narrow Round Grip. Of note, the Straight Bar and Narrow Round Grip may only be placed in one orientation.

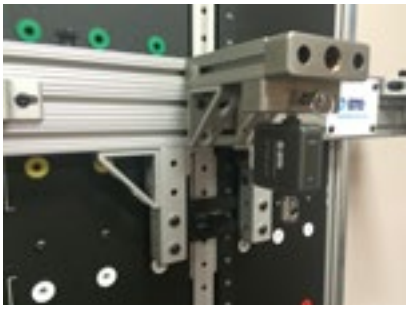
PTK D-Handle

PTK Straight Bar

PTK Narrow Round Grip

C. PULL DOWN TEST SETUP

1) Verify that the Lifting Shelf and Pull Test Attachment are not attached to the system at this time. If they are attached, remove them and set them aside accordingly.
2) Verify that both Support Legs are fully deployed and the Leg Pull Pins are secured before performing a Pull Down Test, and that the system is firmly against a load bearing wall.
3) Set the Carriage to the desired height using the Carriage Pull Pin.
4) Insert the PTK PLC into the bottom Mounting Block on the Carriage. The PTK PLC must be oriented so that the “Carriage” label points towards the Carriage. Fully secure the PTK PLC to the Mounting Block with the PLC Pin.



5) Attach the Portable Dock to the Carriage Bracket. Connect the RJ45 cable to both the Portable Dock and the PTK PLC.

6) Attach the desired tool to the PLC shaft and secure it using the PLC Pin. Note that the Narrow Round Grip and the Straight Bar can only be placed in one position.

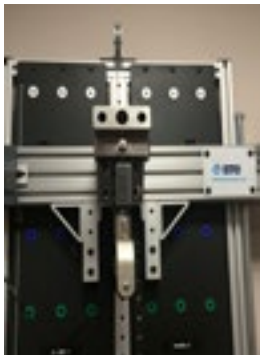
7) The PTK PLC is now ready to use for a Pull Down Test. When performing a Pull Down Test, the user should pull down vertically in line with the center axis of the load cell. Pulling down at an angle not in line with the load cell axis will cause reduced readings.

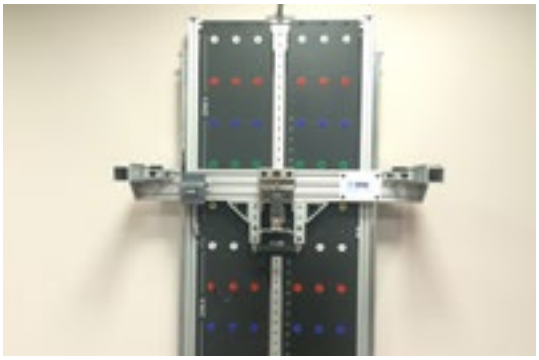
CAUTION

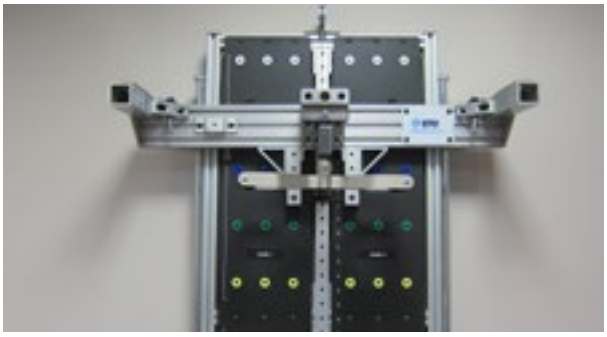
Verify that pins are fully seated prior to testing.

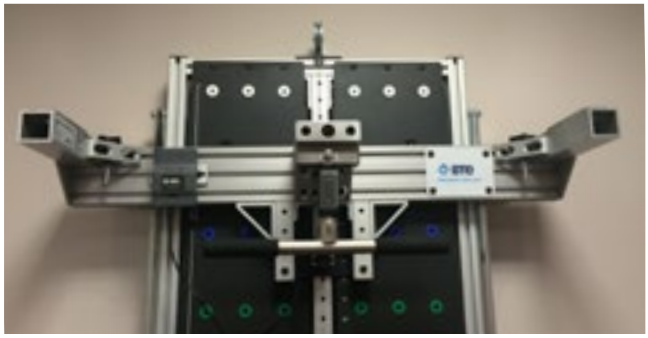
CAUTION

Verify that knobs are fully tightened prior to testing.










D. SOFTWARE SETUP

Now that the system is ready for use, verify that the PTK PLC is connected and calibrated per the General Software and Tool Operation section and the PTK PLC calibration section. Additionally, refer to the EvalTech Software Operators Manual for software test setup and operation.

4. DYNAMIC LIFTING TEST

A. CAPACITY:

Weight range is 10 to 100 lbs.

B. TEST PARAMETERS:

Lift Test Integration Fixture, Lifting Shelf, Lifting Crate, and Weights

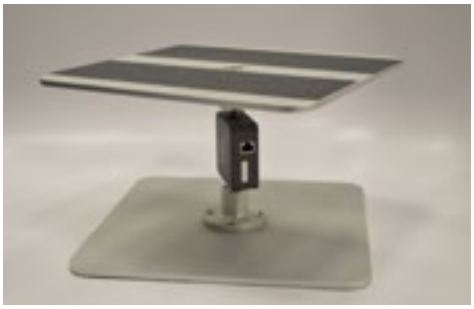
C. DYNAMIC LIFTING TEST SETUP

1) Verify that the Pull Test Attachment and PTK PLC are not attached to the system at this time. If they are attached, remove them and set them aside accordingly.
2) Verify that both Support Legs are fully deployed and the Pull Pins are secured before performing a Lift Test and that the system is firmly against a stuctural support wall.

3) Position the height of the Carriage at a convenient working height and remove the two Lifting Shelf Knobs that are connected to the Carriage locating screws. Place the Lifting Shelf onto the Carriage and secure it with the Lifting Shelf Knobs.

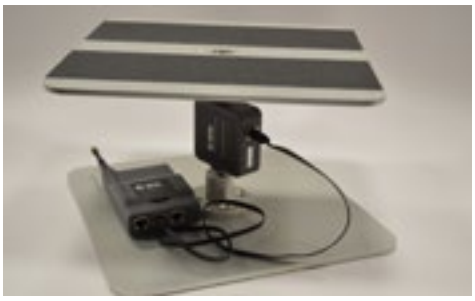
4) Raise or lower the Carriage(Lifting Shelf) to the desired location.

5) Attach the two Lift Test Platforms to the PTK PLC. Note that each Platform has a screw located inside the Platform Hub and that the platforms screw into the PTK PLC Shafts. The platform should be screwed securely onto the PTK PLC Shaft until the shaft bottoms out on the hub and is restrained from moving. The platforms are not required to be in rotational alignment with each other.



6) Place the Lift Test Integration Fixture at the desired position on the floor. Note that the bottom and top Platforms are not required to be in alignment with one another. Do not over-tighten the Platforms as it may result in damage to the PTK PLC and the Platforms.

7) Place the Portable Dock underneath the Lift Test Integration Fixture, next to the PTK PLC. Attach the RJ45 cable to both the Hub and the PTK PLC.

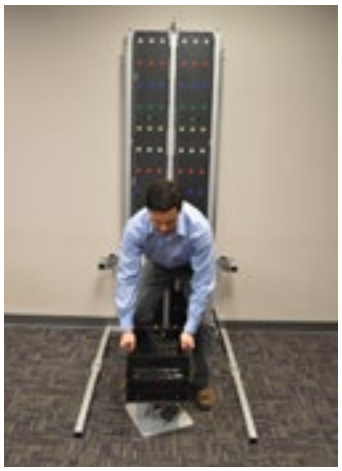


8) The Lifting Crate weighs 10 lbs. Additionally, there are 6 weights that are provided with the system. The following weights are available:

- 20 Lb Weight (Green Label), Qty: 4
- 10 Lb Weight (White Label), Qty: 1
- 5 Lb Weight (Yellow Label), Qty: 1

1) The system is designed for the Lifting Crate to be lifted from the Lift Test Integration Fixture to the Lifting Shelf. The Lifting Crate may be loaded with the desired weight by placing the weights into the Lifting Crate.






D. SOFTWARE SETUP

Now that the system is ready for use, verify that the PTK PLC is connected and calibrated per the General Software and Tool Operation section and the PTK PLC calibration section. Additionally, refer to the EvalTech Software Operators Manual for software test setup and operation.

5. FUNCTIONAL RANGE OF MOTION

A. TEST PARAMETERS FROM PANELS

The PTK system has two standard FROM panels.

B. FUNCTIONAL RANGE OF MOTION (FROM) TEST SETUP

1) Verify that the Lifting Shelf, PTK PLC and Pull Test Attachment are not attached to the system at this time. If they are attached, remove them and set them aside accordingly.

2) Verify that both Support Legs are fully deployed and that the Leg Pull Pins are secured before performing a FROM test and that the system is firmly against a structural support wall.

3) There are two FROM Panels on the PTK. The panels are labeled Panel 1 and Panel 2. Each FROM Panel has three Zones, A, B, & C. Each Zone has 5 rows of position holes. Each row has a color designation. The rows from top to bottom are White, Red, Blue, Green, and Yellow.

4) The system is designed to allow for the use of Zones A & B together, or Zones B & C together. If using Zones A&B, lower the Carriage to Position 1. If using Zones B & C, raise the Carriage to Position 43.

5) The system has 30 FROM Panel Pegs. These pegs are designed to be used with the FROM panels, and are designed to be inserted into FROM position holes. Be mindful not to leave any pegs in the position holes while moving the Carriage up or down, as this will permanently damage the pegs.



C. SOFTWARE SETUP

Refer to the EvalTech Software Operators Manual for software test setup and operation.

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PTK PORTABLE LOAD CELL

III. PTK PORTABLE LOAD CELL (PLC)

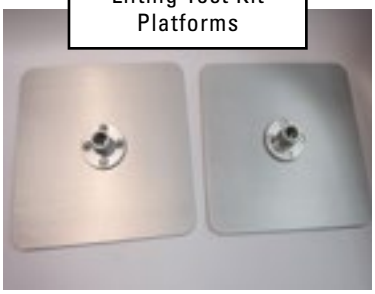
1. INTRODUCTION

The PTK Portable Load Cell's is designed to measure up to 250 lbs for Push and Pull Tests and 300 lbs for Pull Down Tests.

All of the PTK Portable Load Cell attachments can be used with the PTK PLC. These include the D-Handle, Straight Bar, and the Narrow Round Grip.

PTK Portable Load Cell

Lifting Test Kit Platforms



PTK D-Handle

PTK Straight Bar

PTK Narrow Round Grip

2. UTILIZING THE PTK PORTABLE LOAD CELL

A. CONNECTING TO THE SYSTEM

Always connect the PTK Portable Load Cell to the Portable Dock & Transmitter via the RJ45 jack. Refer to the SYSTEM USE-TEST CONFIGURATION AND PARAMETERS section of this manual for a pictorial example.

> Verify that the Portable Dock is turned on and receiving power before starting a test.

B. SETTING UP THE PTK PLC

These steps must be completed prior to testing:

1. Attach the PTK PLC to the desired Mounting Block using the PTK PLC Pin.
2. Attach the desired Portable Load Cell Tool Attachment to the "Tool" side of the PTK PLC using the PTK PLC Pin.

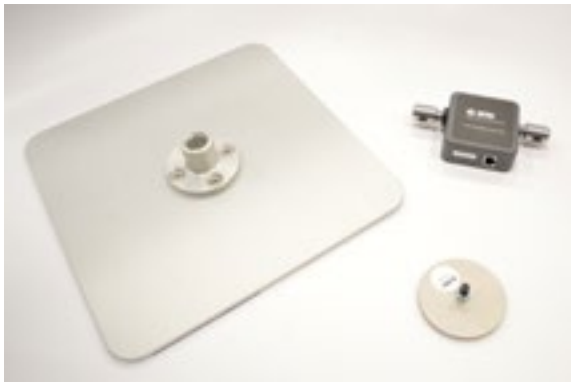
3. PRE-DEFINED TESTS & TESTING TEMPLATES

The EvalTech software includes several pre-defined tests and testing templates. For information on assigning and administering tests in the software, refer to Chapters 4 and 5 of the EvalTech Software Operator's Manual. Note that the names of the pre-defined tests contain the name of the extremity that is being analyzed.

4. CALIBRATION & VERIFICATION

It is recommended calibration is performed on a weekly basis, and verification is performed on a daily basis.

A. CALIBRATION EQUIPMENT



B. ACCESSING THE CALIBRATION & VERIFICATION SCREENS

Refer to Chapter 02c-V-C [Administration Menu - Manage Tools - Calibration] of the EvalTech Software Operator's Manual for additional information on the tool management and calibration screens.

The Calibration Screen may be accessed within the Testing Screen and within the Tool Management Screen.

The Verification Screen may only be accessed within the Tool Management Screen.

1. FROM THE TESTING SCREEN

Click on  , which is located at the bottom-center of the screen.

2. FROM THE TOOL MANAGEMENT SCREEN

Step 1. Access the Tool Management screen via one of the following two methods:

- Within the Test Administration screen, click on  , which is located at the bottom-left corner of the screen.
- Select the Administration Taskbar Menu and click on Manage Tools.

Step 2. On the left side of the screen, click on the Portable Load Cell. The right side of the screen will show the current input values for the tool.

Step 3a. Click on  in the bottom lower-center to access the calibration screen.

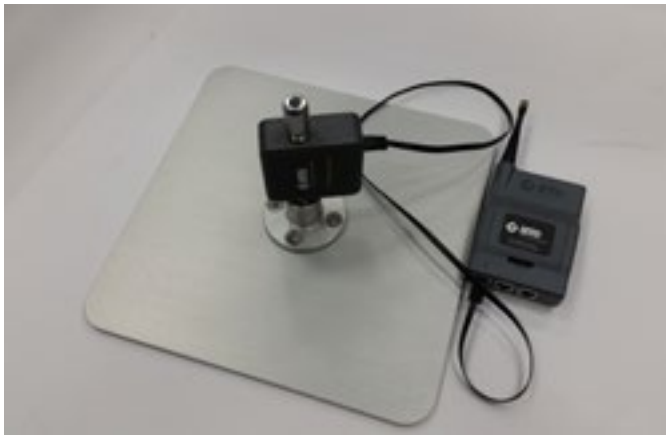
Step 3b. Click on  in the bottom lower-center to access the verification screen.

C. PERFORMING CALIBRATION

Prior to starting the calibration process, setup of the PTK PLC hardware is required.

Step 1. Place one of the Platforms on the ground and screw the PTK PLC shaft labeled Carriage into the Platform. Note: Do not over torque the PTK PLC.

Step 2. Connect the PTK Portable Load Cell to the Portable Dock and turn on. Verify the Portable Dock and PTK PLC are communicating (Green Tool Icon) under the Tool Management Screen.

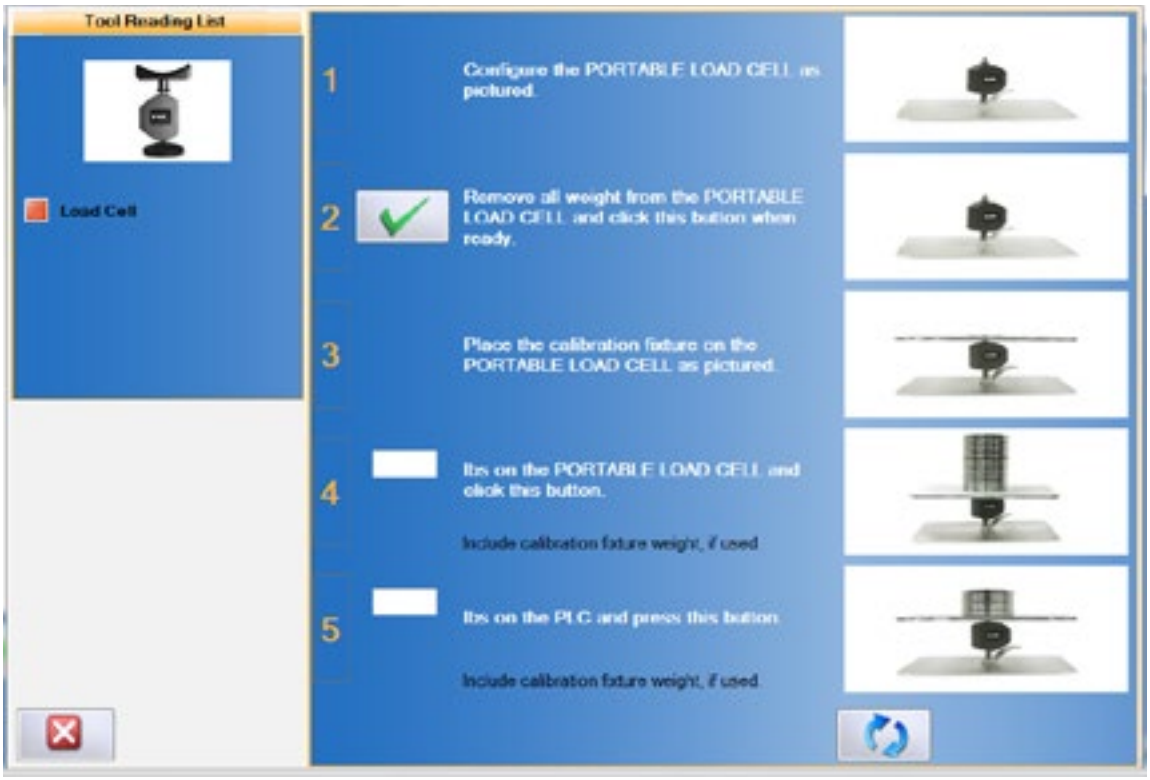


Step 3. Proceed to the PTK PLC Calibration Screen

The initial calibration screen provides instructions with corresponding pictures.

> Note: Pictures in software may differ from actual hardware depending on version; however, the calibration process remains the same.

The initial calibration screen should look as follows:

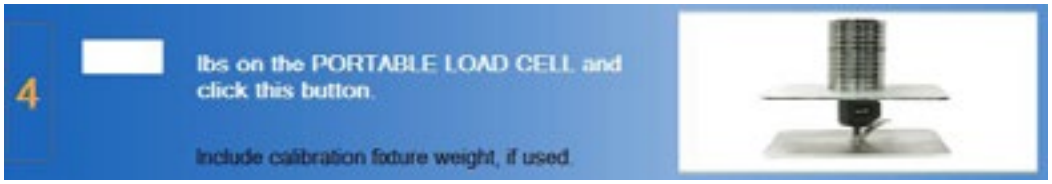


Step 4. Position the PTK PLC as shown in the calibration screen and verify the PTK PLC is stable.

Step 5. Click on  to set the zero point.

Step 6. Attach the Calibration Plate to the PTK PLC Shaft on the “Tool” side of the PTK PLC. Verify the Calibration Plate is stable and the screw does not extend past the Calibration Plate.

Step 7. Place both Calibration Weights on the Calibration Plate and type 25.52 (Calibration Plate plus Calibration Weight) in the text field.



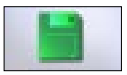
Step 8. Click on  to set the weight.

Step 9. Remove both of the Calibration Weights and then place the 15 lb Calibration Weight back on the Calibration Plate. Type 15.52 in the text field.

Step 10. Click on  to verify the weight.

If the PTK PLC was properly calibrated, then the screen will say the verification was successful and the measured weight will be in a green box.

If the PTK Portable Load Cell was not properly calibrated, then the screen will say the verification failed and the measured weight will be in a red box. You may try re-verifying the weight or re-calibrating the tool until the verification is successful

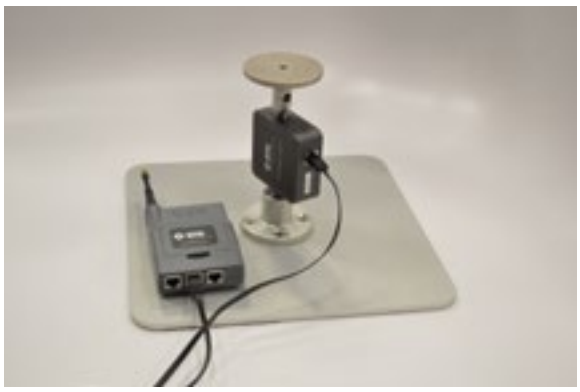
Step 11. Once the tool has passed verification, click on  to save the calibration data.

D. PERFORMING VERIFICATION

The verification screen allows for quick verification of the tool. In addition, all verifications performed through the verification screen are included in the tool's calibration report.

> Note: A tool may not be verified with the same weight value that was used for calibration.

Step 1. If not previously secured, attach the Platform and Calibration Plate as described in the previous section.



Step 2. Place the 10 lb Calibration Weight on the Calibration Plate and type 10.52 (Calibration Plate plus Calibration Weight) in the text field.

Step 3. Click on  to verify the weight.

If the PTK PLC was properly calibrated, then the screen will say the verification was successful and the measured weight will be in a green box.

If the PTK PLC was not properly calibrated, then the screen will say the verification failed and the measured weight will be in a red box. You may try re-verifying the weight or re-calibrating the tool until the verification is successful.

Step 4. Once the tool has passed verification, click on  to save the data.

5. TROUBLESHOOTING

A. TOOL NOT READING ANY VALUE OR NOT RECOGNIZED

There are multiple reasons why the PTK Portable Load Cell may not be reading any value or is not recognized.

1. CHECK THE FOLLOWING:

- The batteries in the Portable Dock & Transmitter are charged and less than a year old.
- The antennas are properly secured to the Portable Dock & Transmitter and the Hub.
- The Hub is plugged in to the computer and the Dock is powered on.
- There is no interference between the Hub and Dock (refer to Chapter 8 of the EvalTech Software Manual).
- The Hub has not been dropped or struck hard - if so, further troubleshooting is required, please contact BTE.
- The Dock has not been dropped or struck hard - if so, further troubleshooting is required, please contact BTE.
- The PTK Portable Load Cell, Portable Dock & Transmitter, and cable are not damaged, dirty at the connections, or have loose components.

2. ATTEMPT THE FOLLOWING:

- Turn off the Portable Dock & Transmitter, attach a new cable to the PTK PLC and Portable Dock & Transmitter, and then turn the Portable Dock back on.
- Turn off the Portable Dock, plug the cable into another port on the Dock, and then turn it back on.
- Turn off the Portable Dock, insert freshly charged batteries, and then turn it back on.
- Try a different combination of batteries - if one of the batteries has gone bad, then the Portable Dock will not work properly.

B. FORCE NOT RECORDING IN STRENGTH TEST

- Make sure to secure the tool attachment to the PTK PLC labeled "Tool" (not the "Carriage" side).
- Check the actual test situation (i.e. how the client is performing the test) matches the expected test setup (i.e. what is specified under the EvalTech Software Test Setup).
- Check all of the settings within the EvalTech Software Test Setup are correct (e.g. the test is set properly to Push or Pull).

C. UNABLE TO CALIBRATE OR VERIFY

- Ensure that the PTK PLC calibration Assembly is placed on a stable and level surface during calibration.
- Make sure the Calibration Plate is not on the PTK PLC for the zeroing step of calibration.
- Make sure to add the Calibration Plate Weight (0.52 lb) to the weight entered in the calibration screen (e.g. 25.52 or 15.52).
- Check the calibration weight is entered correctly in the text fields.
- Remove the weights from the Calibration Plate before placing the verification weight on the plate. This will allow the load cell to return to zero.
- Click on  within the calibration screen and repeat the steps, but wait 3 seconds between applying the weight and clicking on the checkmark icon.

CAUTION

Verify that pins are fully seated prior to testing.

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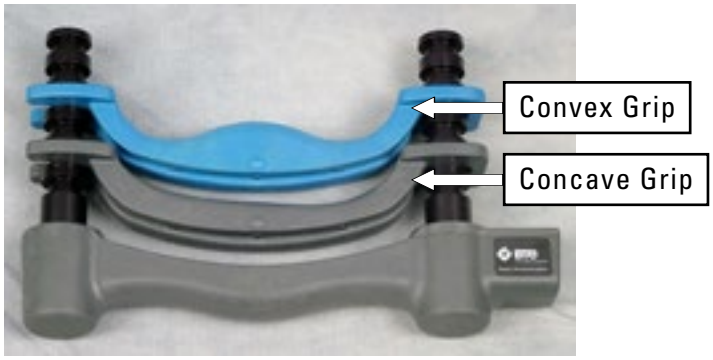
HAND GRIP DYNAMOMETER

IV. HAND GRIP DYNAMOMETER

1. INTRODUCTION

The Hand Grip Dynamometer, also known as the Hand Grip, is used to measure hand grip strength up to 200 lbs (890 N). Through the use of multiple attachments and protocols, a client's hand grip strength can be evaluated through several different scenarios.

The Hand Grip comes with 2 different grips: convex (blue) and concave (grey). The concave grip is used for all of the standardized tests and may be used for custom tests. The convex grip is provided to simulate custom applications.



Hand Grip Dynamometer

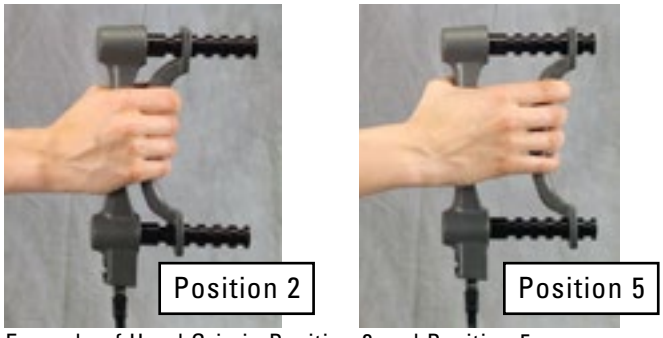
Actual Hand Grip may be different then the picture depending on version

2. UTILIZING THE HAND GRIP DYNAMOMETER

A. CONNECTING TO THE SYSTEM

Always connect the Hand Grip to the Portable Dock & Transmitter via the RJ45 jack. Refer to The System Use-Test Configuration and Parameters of this manual for a pictorial example.

Remember to verify the tool is plugged in and the Portable Dock Transmitter is turned on and receiving power before starting a test.



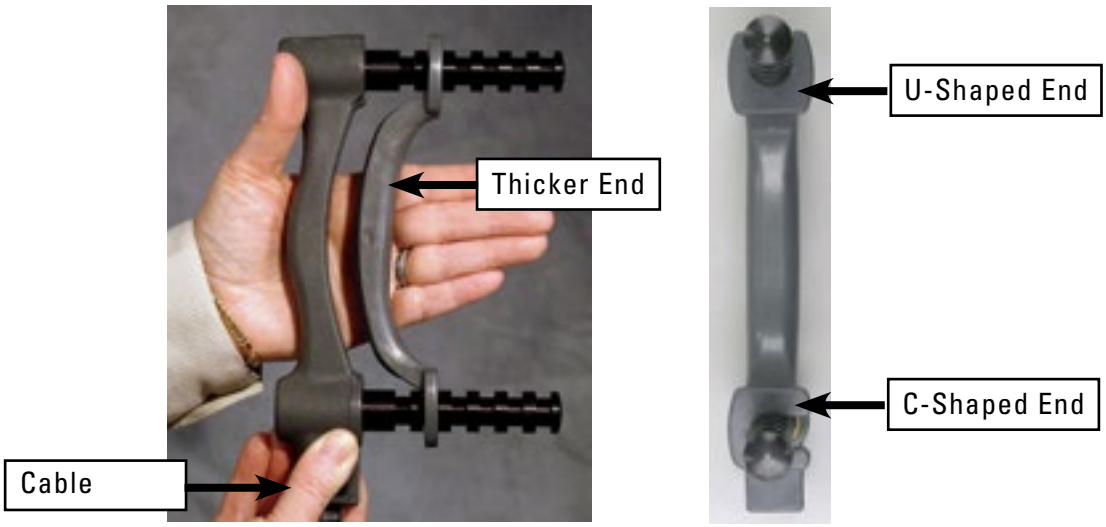
Example of Hand Grip in Position 2 and Position 5

B. HAND GRIP POSITIONS

The Hand Grip was designed such that the detachable grip may be located in 5 different positions. Make sure to read each protocol to determine which position the grip must be in.

Note: Position 1 is closest to the Hand Grip base.

C. HAND GRIP & CLIENT POSITIONING



Proper Grip Positioning

Verify the grip is properly positioned:

1. The end of the Hand Grip base where the RJ45 cable attaches should be facing down.
2. For the concave grip, the thicker end of the grip, which has the U-shaped end, must be facing up such that the pointer finger comes in contact with it. The convex grip is symmetric, so it may be positioned in either direction.

Prior to testing, the client must be positioned as follows:

1. Both feet flat on the floor
2. Upper arm next to body

Proper Client Positioning

3. Elbow flexed at 90°
4. Forearm neutral (thumb up)
5. Hand and forearm in slight shoulder internal rotation (toward the center front of the torso)
6. Forearm should not be resting on any surface while gripping

If possible, the client should remove all rings because they may interfere with the performance of the test.

3. PRE-DEFINED TESTS & TESTING TEMPLATES

The EvalTech software includes several pre-defined tests and testing templates. For information on assigning and administering tests in the software, refer to Chapters 4 and 5 of the EvalTech Software Operator's Manual.

A. HAND GRIP - STANDARD

Access this test through the pre-defined test list (refer to Chapter 04a-II-A of the EvalTech Software Operator's Manual).

The Standard Hand Grip Test is optimally used for comparing the client's data to normative data, which is displayed as a solid line (average percentile). This test requires the Concave Grip to be in position 2 and calls out for the client to maximally grip the tool for 3 seconds on each side for 3 trials each side.

B. HAND GRIP - MAXIMUM VOLUNTARY EFFORT

Access this set of tests through the pre-defined template list (refer to Chapter 04a-II-C of the EvalTech Software Operator's Manual).

The Maximum Voluntary Effort (MVE) Testing Template is optimally used for finding the power position of the client. This template requires the concave grip to be in all 5 positions and calls out for the client to maximally grip the tool for 3 seconds on each side for 3 trials each side.

Generally, the average strength bar graph should represent a bell-shaped curve, thus indicating the client's power position is one of the middle positions. A lack of the bell-shaped curve indicates the client was non-compliant with the strength test. For the COV bar graph, the ideal value should be 15% or below for each side. If the value is higher than 15%, the client did not test consistently across the 3 trials.

C. HAND GRIP - MODIFIED MAXIMUM VOLUNTARY EFFORT

Access this set of tests through the pre-defined template list (refer to Chapter 04a-II-C of the EvalTech Software Operator's Manual).

The Modified Maximum Voluntary Effort (MMVE) Testing Template is the same as the Maximum Voluntary Effort Template except that it differs in the number of trials performed for each position. This template is most helpful when time is a constraint: instead of performing 3 trials for each position and each side, the test only calls out for 1 trial per side in positions 1, 3, 4 & 5, and 3 trials per side in position 2.

D. HAND GRIP - RAPID EXCHANGE

Access this test through the pre-defined test list (refer to Chapter 04a-II-A of the EvalTech

Software Operator's Manual).

The Rapid Exchange Test is optimally used for monitoring consistency of the client. The test consists of six 1-second trials per side. If the client has completed the MVE Test, the position of the concave grip should be based on the power position determined from the MVE Test. If the client has not completed the MVE Test, the concave grip should be set to position 2.

Hold Hand Grip at Base During Rapid Exchange

When passing the Hand Grip from the client's one hand to the other, hold the Hand Grip at the base. This ensures that the trial won't start prematurely.

Calibration Weights and Fixtures may differ from the picture depending on version.

4. CALIBRATION & VERIFICATION

It is recommended calibration is performed on a weekly basis and verification is performed on a daily basis.

A. CALIBRATION EQUIPMENT

Hand Grip Calibration Equipment

B. ACCESSING THE CALIBRATION & VERIFICATION SCREENS

Refer to Chapter 02c-V-C [Administration Menu - Manage Tools - Calibration] of the

EvalTech Software Operator's Manual for additional information on the tool management and calibration screens.

The calibration screen may be accessed from the testing screen or from the Tool Management screen.

The verification screen may only be accessed from the Tool Management screen.

1. FROM THE TESTING SCREEN

Click on  , which is located at the bottom-center of the screen.

2. FROM THE TOOL MANAGEMENT SCREEN

Step 1. Access the Tool Management screen via one of the following two methods:

a) Within the Test Administration screen, click on  , which is located in the bottom-left corner of the screen.

b) Select the Administration Taskbar Menu and click on Manage Tools.

Step 2. On the left side of the screen, click on Hand Grip. The right side of the screen will show the current input values for the tool.

Step 3a. Click on  at the bottom lower-center to access the calibration screen.

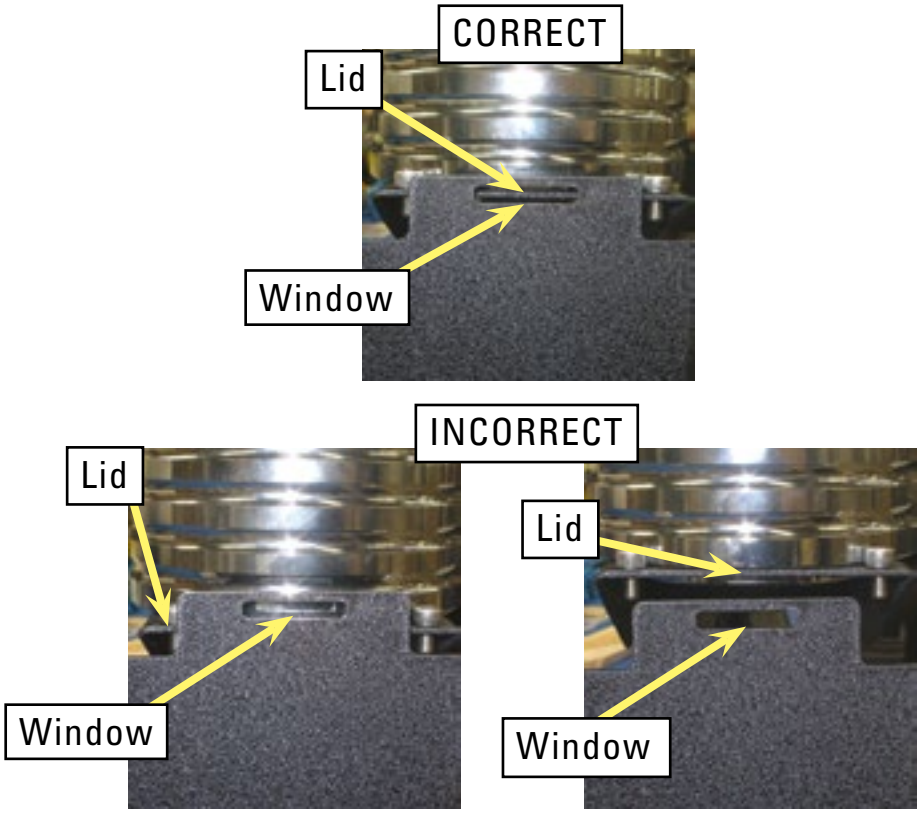
Step 3b. Click on  at the bottom lower-center to access the verification screen.

C. TIPS FOR A SUCCESSFUL CALIBRATION

The following tips are recommended for a successful calibration:

- Ensure that the calibration fixture is placed on a stable and level surface during calibration.
- Make sure the calibration fixture lid is not down for the first 2 steps of the calibration.
- After the weight is on the lid, verify the front edge of the lid is visible through the window, which is at the top front edge of the base.

  If the lid is not visible through the window, turn the 4-arm knob, which is on the lid above the Hand Grip, in either direction until the lid is visible. This ensures the lid is level with the weight on it and the weight is applied evenly to both rods.



Proper Location of Lid after Weight is Applied

- Lift the lid before placing the 10 lb weight on the fixture. This will allow the Hand Grip to return to a zero weight.
- If the calibration was not successful, click on  within the calibration screen and repeat the steps, but wait 3 seconds between applying the weight and clicking on the checkmark icon.

D. PERFORMING CALIBRATION

Prior to entering the calibration screen, verify the Hand Grip is connected to the Portable Hub & Dock and the Portable Hub & Dock is turned on.

The initial calibration screen should look as follows:

Hand Grip Calibration Screen

Step 1. Remove the detachable grip (concave or convex grip) from the Hand Grip and place the Hand Grip in the calibration fixture as shown on the screen.

Step 2. Once the Hand Grip is in place, click on  to set the zero point.

Hand Grip - Set the Zero Point

Step 3. Lower the lid of the calibration fixture.

Step 4. Place the 15 lb calibration weight on the calibration fixture. Make sure the lid is

visible through the window.

Step 5. Click on  to set the weight.

Hand Grip - Set the Weight

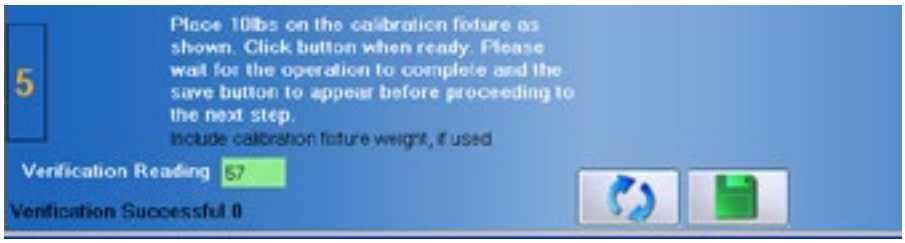
Step 6. Remove the 15 lb calibration weight and lift the lid up.

Step 7. Place the 10 lb calibration weight on the fixture. Make sure the lid is visible through the window.

Step 7. Click on  to verify the weight.

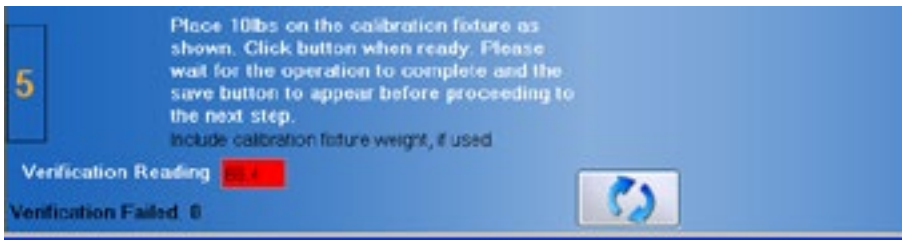
Hand Grip - Verify the Weight

If the Hand Grip was properly calibrated, then the screen will say the verification was successful and the measured weight will be in a green box.



Hand Grip - Verification Successful

If the Hand Grip was not properly calibrated, then the screen will say the verification failed and the measured weight will be in a red box. You may try re-verifying the weight or re-calibrating the tool until the verification is successful. Also refer to the Troubleshooting section for help.



Hand Grip - Verification Failed

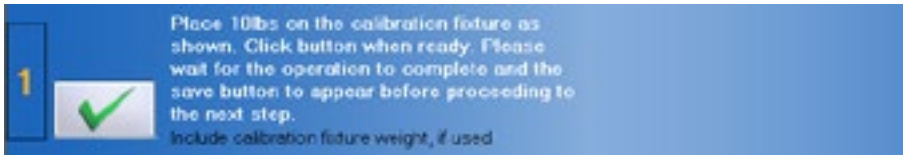
Step 7. Once the tool has passed verification, click on  to save the data.

E. PERFORMING VERIFICATION

The verification screen allows you to quickly to verify the tool without having to go through the whole calibration. In addition, all verifications performed through the verification screen are included in the tool's calibration report.

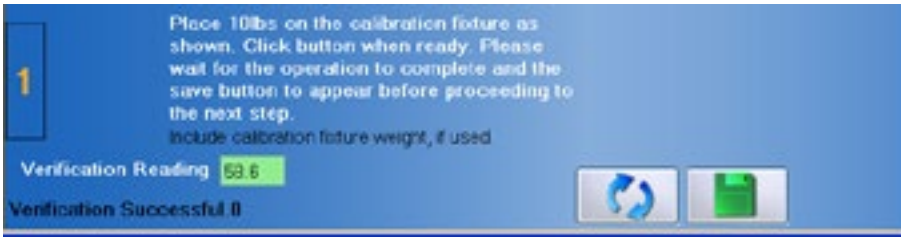
Step 1. Place the Hand Grip in the calibration fixture and lower the lid.

Step 2. Place the 10 lb calibration weight on the fixture and click on  to verify the weight. Make sure the lid is visible through the window.



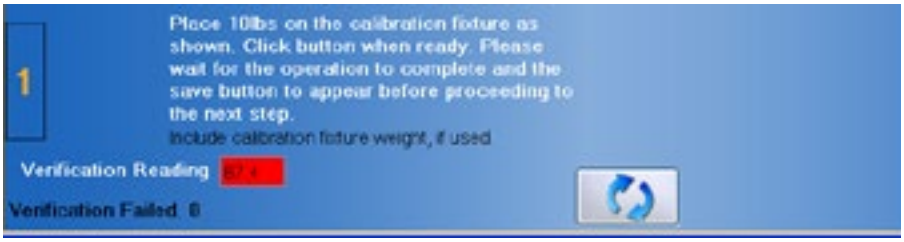
Hand Grip - Verify the Weight

If the Hand Grip was properly calibrated, then the screen will say the verification was successful and the measured weight will be in a green box.

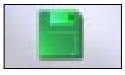


Hand Grip - Verification Successful

If the Hand Grip was not properly calibrated, then the screen will say the verification failed and the measured weight will be in a red box. You may try re-verifying the weight or re-calibrating the tool until the verification is successful. Also refer to the Troubleshooting section within this chapter for help.



Hand Grip - Verification Failed

Step 3. Once the tool has passed verification, click on  to save the data.

5. TROUBLESHOOTING

A. TOOL NOT READING ANY VALUE OR NOT RECOGNIZED

There are multiple reasons why the Hand Grip may not be reading any value or is not recognized.

1. CHECK THE FOLLOWING

- The batteries in the Portable Dock & Transmitter are charged and less than a year old.
- The antennas are properly secured to the Portable Dock & Transmitter and Hub.
- The Hub is plugged in to the computer and the Portable Dock & Transmitter is powered On.
- There is no interference between the Hub and Dock (refer to Chapter 12 of the EvalTech Software Manual)
- The Hub has not been dropped or struck hard - if so, further troubleshooting is required, contact BTE.
- The Dock has not been dropped or struck hard - if so, further troubleshooting is required, contact BTE.
- The Hand Grip, Portable Dock, and cable are not damaged, dirty at the connections, or have loose components

2. ATTEMPT THE FOLLOWING

- Turn off the Portable Dock, attach a new cable to the Hand Grip and Portable Dock, and then turn the Dock back on.
- Turn off the Portable Dock, plug the cable into another port on the Dock, and then turn it back on.
- Turn off the Portable Dock, insert freshly charged batteries, and then turn it back on.
- Try a different combination of batteries - if one of the batteries has gone bad, then the Portable Dock will not work properly.

B. UNABLE TO CALIBRATE OR VERIFY

If you are having trouble completing calibration or verification of the Hand Grip, verify and attempt the following:

- Ensure that the Hand Grip is placed on a stable and level surface during calibration.
- Make sure the Calibration Plate is not on the Hand Grip for the zeroing step of calibration.
- Make sure to add the Calibration Plate Weight (0.52 lb) to the weight entered in the calibration screen (e.g. 25.52 or 15.52).
- Verify the calibration weight is entered correctly in the text fields.
- Remove the weights from the Calibration Plate before placing the verification weight on the plate. This will allow the load cell to return to zero.
- Click on  within the calibration screen and repeat the steps, but wait 3 seconds between applying the weight and clicking on the checkmark icon.

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PINCH GAUGE

V. PINCH GAUGE

1. INTRODUCTION

The Pinch Gauge, also known as the Pinch Dynamometer, is used to measure finger strength up to 45 lbs (200 N).

Pinch Gauge

2. UTILIZING THE PINCH GAUGE

A. CONNECTING TO THE SYSTEM

- Always connect the Pinch Gauge to the Portable Dock & Transmitter via the RJ45 jack. Refer to The System Use-Test Configuration and Parameters of this manual for a pictorial example.
- Remember to check that the tool is plugged in and the Portable Hub & Dock is turned on and receiving power before starting a test.

B. CLIENT POSITIONING

Prior to testing, the client must be positioned as follows:

1. Both feet flat on the floor
2. Upper arm next to body
3. Elbow flexed at 90°
4. Hand and forearm in slight shoulder internal rotation (toward the center front of the torso)
5. Forearm should not be resting on any surface while gripping

3. PRE-DEFINED TESTS & TESTING TEMPLATES

The EvalTech software includes several pre-defined tests and testing templates. For information on assigning and administering tests in the software, refer to Chapters 4 and 5 of

A. PINCH GAUGE - KEY

The Key Pinch Test is used to measure the strength of the hand in the key (lateral) pinch position. Prior to beginning the test, the client should hold the Pinch Gauge between the thumb and the lateral aspect of the index finger, middle phalanx; the position is intended to simulate the client holding a key.

Pinch Gauge - Key

B. PINCH GAUGE - TIP

The Tip Pinch Test is used to measure the strength of the hand in the tip-to-tip pinch position. Prior to beginning the test, the client should hold the Pinch Gauge between the tip of the thumb and the tip of the index finger.

Pinch Gauge - Tip

C. PINCH GAUGE - PALMAR

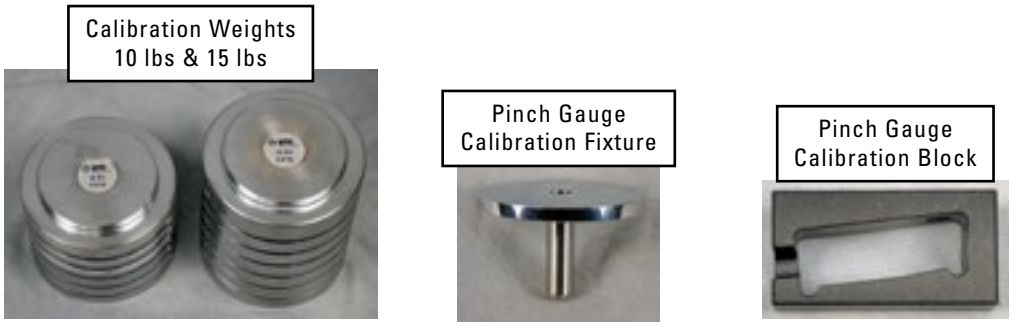
The Palmar Pinch Test is used to measure the strength of the hand in the Palmar Pinch position. Prior to beginning the test, the client should hold the Pinch Gauge between the tip of the thumb and the tips of the index finger and middle finger.

Pinch Gauge - Palmar

4. CALIBRATION & VERIFICATION

It is recommended calibration is performed on a weekly basis, and verification is performed on a daily basis.

A. CALIBRATION EQUIPMENT



Pinch Gauge Calibration Equipment

> Calibration equipment may vary depending on version.

B. ACCESSING THE CALIBRATION & VERIFICATION SCREENS

Refer to Chapter 02c-V-C [Administration Menu - Manage Tools - Calibration] of the EvalTech Software Operator's Manual for additional information on the tool management and calibration screens.

The calibration screen may be accessed from the testing screen and from the Tool Management screen.

The verification screen may only be accessed from the Tool Management screen.

1. FROM THE TESTING SCREEN

Click on  , which is located at the bottom-center of the screen.

2. FROM THE TOOL MANAGEMENT SCREEN

Step 1. Access the Tool Management screen from one of the following two methods:

- From the Test Administration screen, click on  , which is located at the bottom-left corner of the screen.
- Select the Administration Taskbar Menu and click on Manage Tools.

Step 2. On the left side of the screen, click on Pinch Gauge. The right side of the screen will show the current input values for the tool.

Step 3a. Click on  at the bottom lower-center to access the calibration screen.

Step 3b. Click on  at the bottom lower-center to access the verification screen.

C. TIPS FOR A SUCCESSFUL CALIBRATION

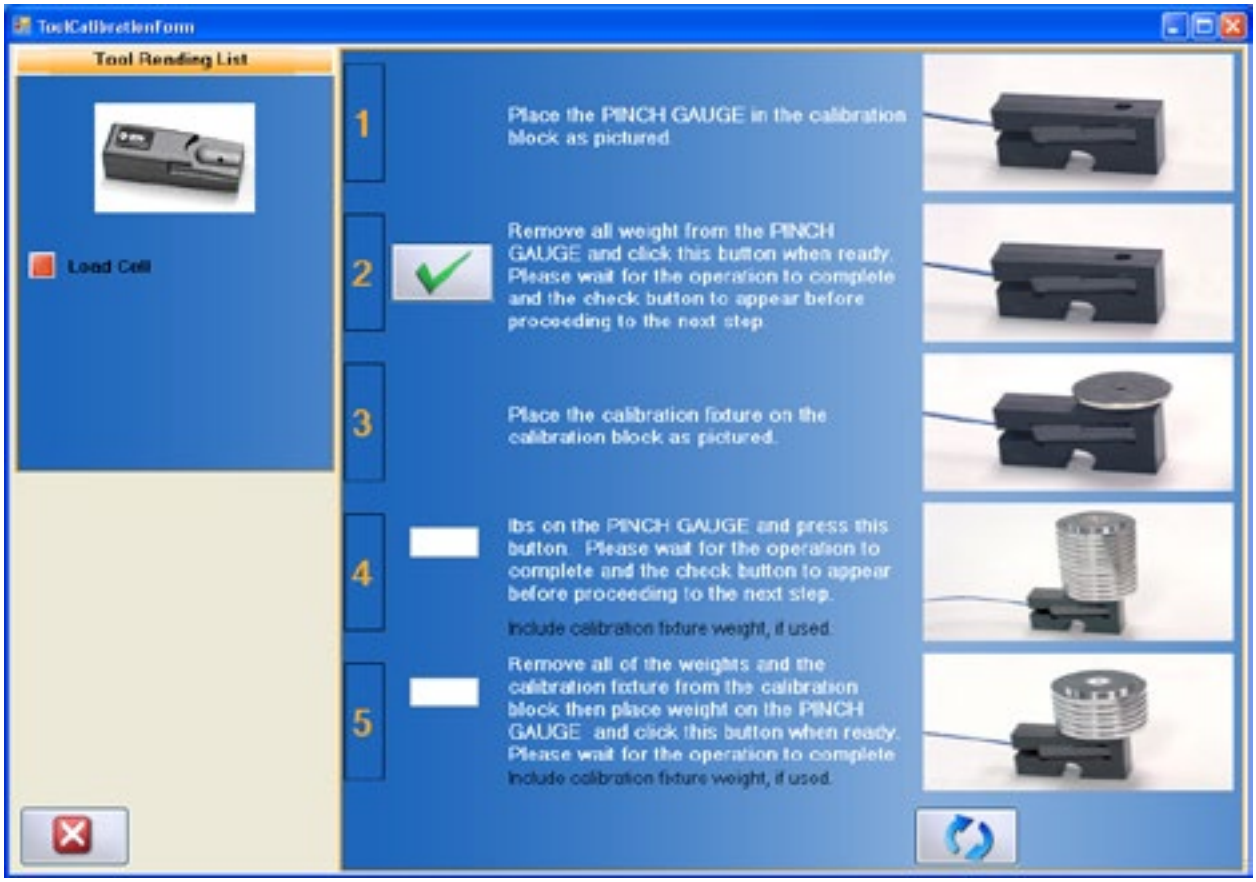
The following tips are recommended for a successful calibration:

- Ensure that the calibration block is placed on a stable and level surface during calibration.
- During the calibration and verification, gently place the weights on the calibration fixture. This ensures no excessive forces are applied to the load cell.
- Make sure to add the calibration fixture weight (0.6 lb) to the weight value entered in the calibration screen (e.g. 25.6 or 15.6).
- Check That the calibration weight value is entered correctly in the text fields.
- Remove the calibration fixture from the block before placing the verification weight on the fixture. This will allow the Pinch Gauge to return to zero.
- If the calibration was not successful, click on  within the calibration screen and repeat the steps, but wait 3 seconds between applying the weight and clicking on the checkmark icon.

D. PERFORMING CALIBRATION

Prior to entering the calibration screen, verify the Pinch Gauge is connected to the Portable Dock & Transmitter and is turned on.

The initial calibration screen should look as follows:



Pinch Gauge Calibration Screen

Step 1. Place the Pinch Gauge in the calibration block as shown on the screen.

Step 2. Once the Pinch Gauge is in place, click on  to set the zero point.

Pinch Gauge - Set the Zero Point

Step 3. Insert the calibration fixture into the calibration block.

Step 4. Place both calibration weights on the calibration fixture and type 25.6 (calibration fixture plus calibration weight) in the text field.

Step 5. Click on  to set the weight.

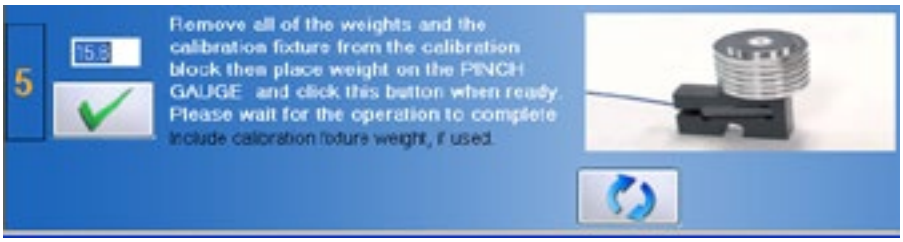
Pinch Gauge - Set the Weight

Step 6. Remove both of the calibration weights and calibration fixture. Re-insert the calibration fixture and then place the 15 lb calibration weight on the fixture. Type 15.6 in the text field.

Step 7. Click on  to verify the weight.

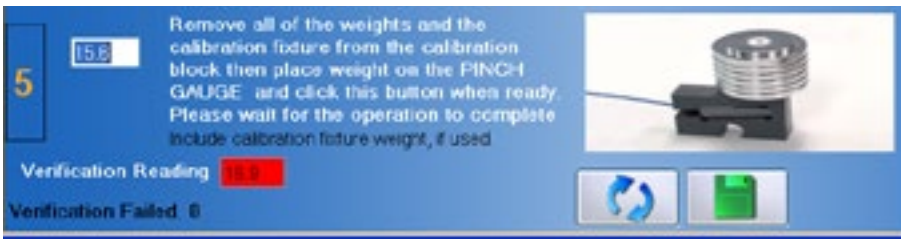
Pinch Gauge - Verify the Weight

If the Pinch Gauge was properly calibrated, then the screen will say the verification was successful and the measured weight will be in a green box.

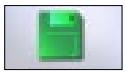


Pinch Gauge - Verification Successful

If the Pinch Gauge was not properly calibrated, then the screen will say the verification failed and the measured weight will be in a red box. You may try re-verifying the weight or re-calibrating the tool until the verification is successful. Also refer to the Troubleshooting section within this chapter for help.



Pinch Gauge - Verification Failed

Step 8. Once the tool has passed verification, click on  to save the data.

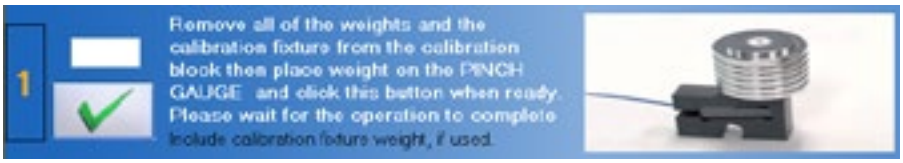
E. PERFORMING VERIFICATION

The verification screen allows for quick verification of the tool. In addition, all verifications performed through the verification screen are included in the tool's calibration report.

Note: A tool may not be verified with the same weight value that was used for calibration.

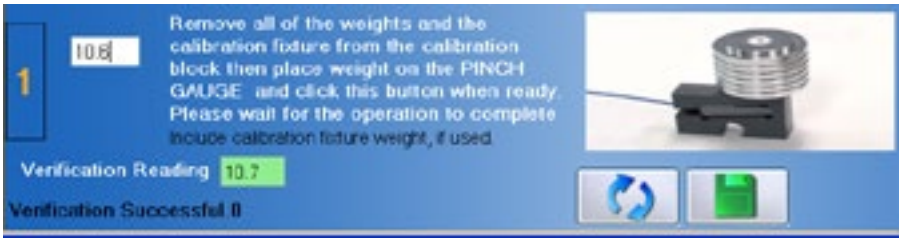
Step 1. Place the Pinch Gauge in the calibration block and insert the calibration fixture. Place the 10 lb calibration weight on the calibration fixture and type 10.6 (calibration fixture plus calibration weight) in the text field.

Step 2. Click on  to verify the weight.



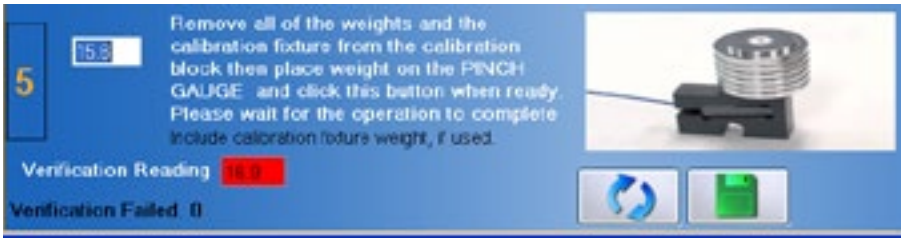
Pinch Gauge - Verify the Weight

If the Pinch Gauge was properly calibrated, then the screen will say the verification was successful and the measured weight will be in a green box.



Pinch Gauge - Verification Successful

If the Pinch Gauge was not properly calibrated, then the screen will say the verification failed and the measured weight will be in a red box. You may try re-verifying the weight or re-calibrating the tool until the verification is successful. Also refer to the Troubleshooting section within this chapter for help.



Pinch Gauge - Verification Failed

Step 3. Once the tool has passed verification, click on  to save the data.

5. TROUBLESHOOTING

A. TOOL NOT READING ANY VALUE OR NOT RECOGNIZED

There are multiple reasons why the Pinch Gauge may not be reading any value or is not recognized.

1. CHECK THE FOLLOWING

- The batteries in the Portable Dock & Transmitter are charged and less than a year old.
- The antennas are properly secured to the Portable Dock & Transmitter and Hub.
- The Hub is plugged in to the computer and the Dock is powered On.
- There is no interference between the Hub and Dock (refer to Chapter 12 of the EvalTech Software manual).
- The Hub has not been dropped or struck hard - if so, further troubleshooting is required, contact BTE.
- The Dock has not been dropped or struck hard - if so, further troubleshooting is required, contact BTE.
- The Pinch Gauge, Portable Dock, and cable are not damaged, dirty at the connections, or have loose components.

2. ATTEMPT THE FOLLOWING

- Turn off the Portable Dock, attach a new cable to the Pinch Gauge and Portable Dock, and then turn the Dock back on.
- Turn off the Portable Dock, plug the cable into another port on the Dock, and then turn it back on.
- Turn off the Portable Dock, insert freshly charged batteries, and then turn it back on.
- Try a different combination of batteries - if one of the batteries has gone bad, then the Portable Dock will not work properly.

B. UNABLE TO CALIBRATE OR VERIFY

- Ensure that the Pinch Gauge Calibration Fixture is placed on a stable and level surface during calibration.
- Make sure the Calibration Disk is not on the Pinch Gauge for the zeroing step of calibration.
- Make sure to add the Calibration Disk Weight (0.6 lb) to the weight entered in the calibration screen (e.g. 25.6 or 15.6).
- Check the calibration weight value is entered correctly in the text fields.
- Remove the weights from the Calibration Disk before placing the verification weight on the plate. This will allow the load cell to return to zero.
- Click on  within the calibration screen and repeat the steps, but wait 3 seconds between applying the weight and clicking on the checkmark icon.

TABLE OF CONTENTS

HEART RATE SYSTEMS

CHEST STRAP HEART RATE SYSTEM

BLUETOOTH 4.0 HEART RATE SYSTEM

VI. HEART RATE SYSTEMS

There are two heart rate system options for thePTK; a chest strap system and bluetooth system utilizing a wrist-watch. The software accommodates both systems, but only one can be used for data collection at a time. Refer to the EvalTech Software Operator's Manual for information on choosing which system to use.

CHEST STRAP HEART RATE SYSTEM

1. INTRODUCTION

Unlike other heart rate systems, the BTE Heart Rate System allows for constant monitoring during the tests while remaining fully integrated with the computer. In addition, since it is a radio frequency system, a line-of-sight signal is not required. Therefore, the client is free to move around without having to worry about the signal being blocked. Note that the Transmitter has been tested to perform up to 30 feet from the Hub.

This Heart Rate System is comprised of the Hub, Portable Dock & Transmitter, and Polar Heart Rate Monitor with elastic strap. Additional items include AA rechargeable batteries and a AA battery charger.

Hub w/Antenna

Portable Dock & Transmitter w/Antenna

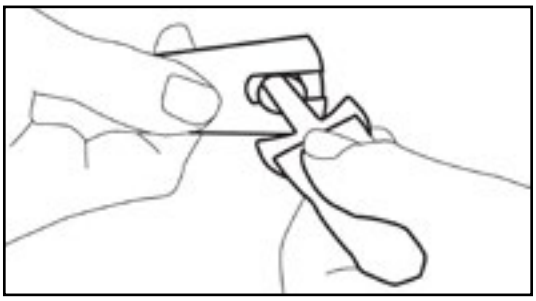
Heart Rate Monitor & Strap

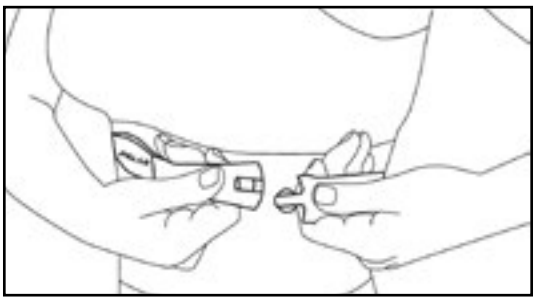
NiMH Rechargeable AA Batteries or AA Alkaline Batteries

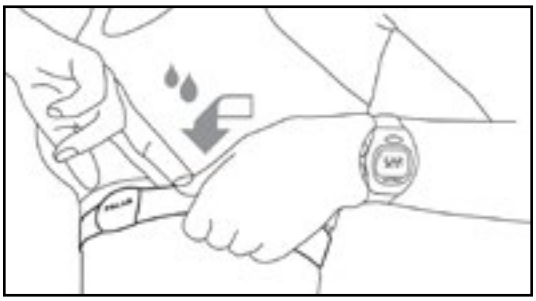
Battery Charger

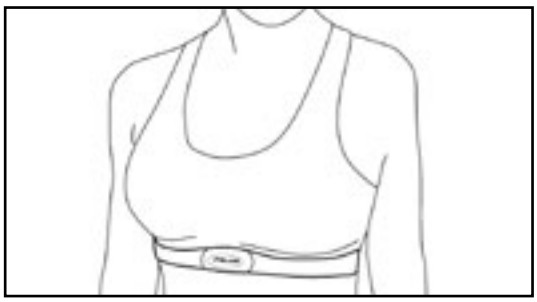
2. SETTING UP THE HEART RATE SYSTEM

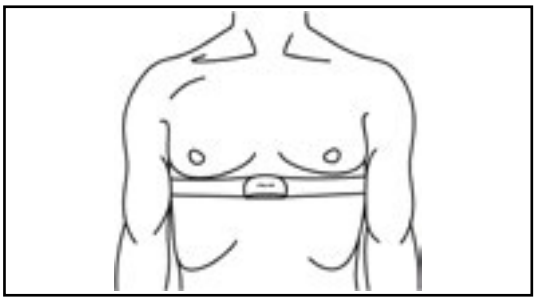
Step 1. With the elastic strap attached, have the client secure the monitor to his or her chest just below the chest muscles and directly against the skin. The Polar logo should be centered on the chest and in an upright position.











Polar Heart Rate Monitor Attached to Client

Tips for obtaining optimal results with the Polar Chest Strap:

1) Use water or electrode conductor gel between the client's skin and the strap

2) Place ***one*** ply of a damp paper towel between the client's skin and the strap

3) DO NOT USE ultrasound gel; it creates a layer of film that blocks the conductivity

Step 2. If you haven't done so already, attach the antenna to the Portable Dock & Transmitter.

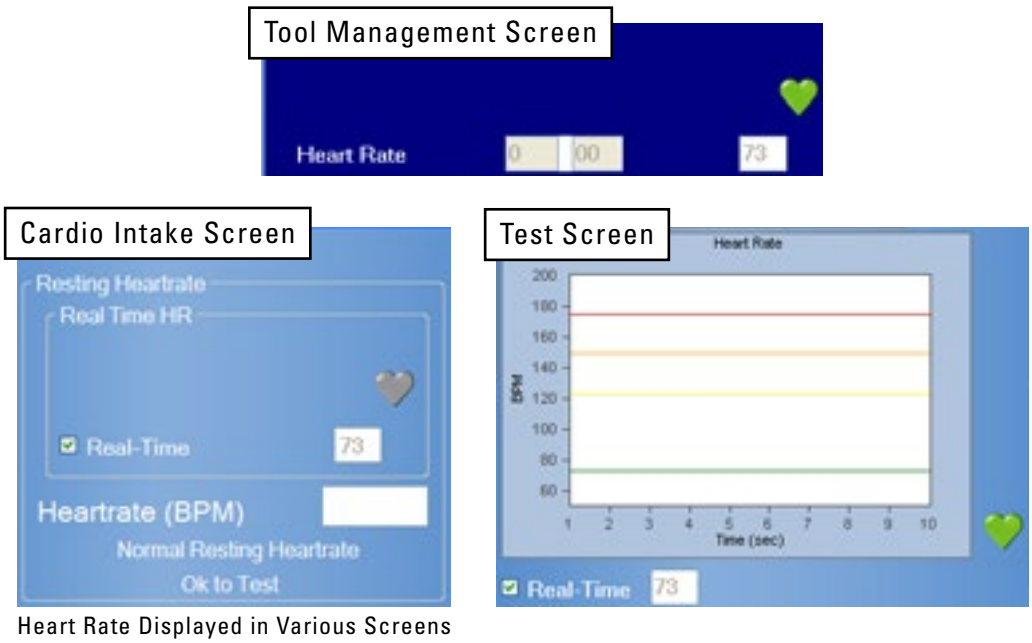
Step 3. Make sure the batteries are in the Transmitter and turn the Transmitter on using the switch on the side farthest from the antenna. Be sure the batteries are charged; otherwise, the system will give inconsistent results.

Step 4. Have the client place the Transmitter on the left back of his or her pants at belt-line level. These are the optimal positions since they prevent the Transmitter from obstructing movement during the tests. Ensure that the Transmitter will be less than 2 feet from the Polar Monitor during all activities.

Transmitter Power Switch and Attached to Back of Client or Left Arm

3. UTILIZING THE HEART RATE SYSTEM

Within the software, the heart rate (in beats per minute) may be actively viewed in the Tool Management screen, Cardiovascular Intake screen, and any applicable Test screen. Refer to the EvalTech Software Operator's Manual for information on accessing the screens.



Heart Rate Displayed in Various Screens

When you are ready to capture a client's heart rate, make sure the Transmitter is turned on. Once the Hub senses a heart rate, the capture screen will display the beats per minute. Be aware that it may take a couple of seconds for the software to average the heartbeat and give an accurate number.

Please note that the heart rate system does not operate like most Polar systems in that it does not store values; therefore, the readings are more accurate and up to date. However, as a result, if the heart rate is fluctuating too much, the monitor may not be able to pick up a constant value.

Remember that many physiological characteristics (e.g. obesity, skin conductivity, and body hair composition) play a role in obtaining a heart rate and differ from individual to individual. Therefore, you may have to make some modifications in order to obtain the best results.

4. ELASTIC STRAP

A medium elastic strap is provided with the system. Additional sizes may be purchased from Polar at www.shoppolar.com.

5. MAINTENANCE & CARE

- Store the Polar Heart Rate Monitor in a cool and dry place. Do not store it in a damp environment, in non-breathable material (such as a plastic bag or a sports bag) or with conductive material such as a wet towel. Sweat and moisture can keep the transmitter electrodes wet and the transmitter activated, shortening battery life.
- Keep the Polar Heart Rate Monitor clean. Clean it with a mild soap and water solution. Dry it carefully with a soft towel. Never use alcohol or any abrasive material such as steel wool or cleaning chemicals.
- The operating temperatures are -10 °C to +50 °C / +14 °F to +122 °F.
- Do not bend or stretch the Polar Heart Rate Monitor. This may damage the electrodes.
- Do not dry the Polar Heart Rate Monitor in any other way than with a towel. Mishandling may damage the electrodes.
- Replace the rechargeable batteries every 6 months if used frequently and every year if used occasionally.
- Replace the Polar Heart Rate chest strap every 2 years or 2500 hours of use. Contact BTE at 410-850-0333 or 800-331-8845 for a replacement.

6. TROUBLESHOOTING

A. UNABLE TO CAPTURE HEART RATE

1. CHECK THE FOLLOWING

- The batteries in the Portable Dock & Transmitter are charged and less than a year old
- The antenna is properly secured to the Portable Dock & Transmitter and Hub
- The Hub is plugged in and the Portable Dock & Transmitter is powered on
- The channel number on the grey FCC labels on the Hub and the Transmitter are the same

Verify Channel Numbers Match

- The Polar Monitor (chest strap) is making a direct and secure contact with the client's skin
- The client's undergarments are not interfering with the placement of the Polar Monitor
- The Transmitter is attached to the client such that it is **less than 2 feet** from the Polar Monitor
- There is no interference between the Hub and Transmitter (see Chapter 12 in the EvalTech Software Manual)
- The Hub has not been dropped or hit hard - if so, then unplug and replug the USB cable
- The Transmitter has not been dropped or hit hard - if so, then turn the power off for ~5 seconds and then back on

2. ATTEMPT THE FOLLOWING

- Try a different combination of batteries - if one of the batteries has gone bad, then the Portable Dock will not work properly.
- Refer to the next section to verify the Polar Heart Rate Monitor is properly positioned and secured.
- Attach a Velcro strap around the patient's upper left arm, and secure the Portable Dock to the strap.

- If you are in a test, tool management, or calibration screen, exit the screen for ~5 seconds, make sure the Hub is plugged in, turn the Transmitter off and then on, and then re-enter the screen.

B. ABNORMAL HEART RATE VALUES

There can be several reasons for abnormal or irregular readings during testing. Due to the same reasons, heart rate may stay at the same value for a long time or the heart rate stays at zero (0). The following is information provided by Polar. Visit www.polarusa.com for more support information.

1. POOR CONTACT BETWEEN THE SKIN AND THE ELECTRODES OF THE HR MONITOR

For accurate heart rate measurement, the contact between skin and the electrodes should be as good as possible. Polar monitors measure the ECG signal from the chest, where it is the strongest. The weak heart-generated signals need to be accurately measured before the calculation of the heart rate. It is therefore important to ensure that the contact between the skin and the electrodes is as good as possible. Here are some tips how to ensure good contact:

- Moisten the grooved electrode areas on the back of the HR monitor. At the beginning of the testing session the client's skin may be dry and the moisture will help ensure better contact. When the client starts to sweat the contact will improve because the salt in the sweat conducts the electrical signals very well. Saliva is a good conductor as well.
- Tighten the elastic strap of the monitor. If the monitor is loose, the movement of the electrodes disturbs the detection of the ECG signal. If the standard strap does not fit satisfactorily, larger and smaller elastic straps are available as accessories.
- The type of the ECG signal slightly varies from person to person. The form of the ECG signal can depend on form of the chest, the anatomical location and position of the heart, position of the electrodes and the amount of body fat. If the ECG signal is weak, disturbances can more easily spoil the signal.

> Find the best contact by turning the monitor left or right, or place it lower or higher. There have been cases where the monitor detects the heart rate better when it is turned upside down so that the Polar logo is upside down and facing out, or even when attached on the person's back with the Polar logo upside down and facing out.

- A hairy chest may also weaken the contact. Try to find the best possible position for monitor.
- In demanding cases, use conductive electrode lotion or gel to improve the contact. After using them, it is very important to wash the monitor carefully.

2. WEAR AND TEAR OF THE MONITOR

Proper care of the monitor after use ensures longer service life for the monitor.

- Wash the monitor regularly after use. It should be washed with a mild soap and water solution. Dry it carefully with a soft towel after washing.
- If the electrodes appear discoloured, the monitor needs to be washed. Do not use any alcohol or a solvent based detergent.
- Never store the monitor when it is wet. Sweat and moisture can keep the electrodes wet and the monitor activated, which shortens the battery life.
- Store the monitor in a cool and dry place. Make sure that the electrodes do not contact anything damp, such as sport towel or wet elastic strap. Do not store a wet monitor in any kind of non-breathing material, such as a plastic bag or a sports bag.
- Keep the monitor out of extreme cold and heat. The operating temperature is -10 ºC to 50 ºC/ 14 ºF to 122 ºF. Do not expose it to direct sunlight for extended periods, such as leaving it in a car.
- Do not bend or stretch the monitor. This may damage the electrodes.

3. ELECTROMAGNETIC DISTURBANCES

- Electromagnetic disturbances may occur near high voltage power lines, traffic lights, mp3 players, the overhead lines of electric railways, electric bus lines or tram lines, televisions, car motors, bike computers, some motor driven exercise equipment, cellular phones or when you walk through electric security gates. Check the surroundings and move away from the source of interference, or remove the source of the disturbance.
- Exercise equipment with electronic or electrical components such as LED displays, motors and electrical brakes may cause interfering stray signals. To solve these problems, try the following:

  1. Have the client move the monitor around until they find an area in which it displays no stray reading. Interference is often worst directly in front of the display panel of the equipment, while the left or right side of the display is relatively free of disturbance.
  2. Put the monitor back on your chest and keep the running computer in this interference-free area as much as possible.

     If the monitor still does not work with the exercise equipment, it may be electrically too noisy for wireless heart rate measurement.

4. DISTANCE BETWEEN THE MONITOR AND PORTABLE DOCK & TRANSMITTER IS TOO GREAT

The maximum transmission range between the monitor and the unit is 1 meter (3 ft). If the distance is greater, the Portable Dock may not get all the signals sent from the monitor.

5. SIGNALS FROM OTHER POLAR MONITORS WITHIN 1 METER TRANSMISSION RANGE

In cases where there are more than one monitor nearer than 3 ft (~1 m), the Portable Dock can pick up the signal from all monitors within the range. This can result abnormal high readings. To avoid signal crosstalk, keep a 6-9 ft (~2-3 m) distance from

the other monitors.

6. STATIC ELECTRICITY, TECHNICAL SPORTSWEAR, AND SPECIAL CONDITIONS

If the humidity of the air is low a fluttering shirt may rub the monitor and generate static electricity. This causes additional signals, especially if the contact between skin and monitor is poor. To avoid this:

- Moisten the electrodes before use, or use the conductive lotion or gel
- Use a cotton shirt instead of a synthetic shirt
- Use a tighter shirt to avoid fluttering of the material
- Use the monitor on a wet shirt
- Wet the shirt

7. BATTERY OF THE MONITOR IS GETTING EMPTY

The estimated average battery life of the monitor is 2500 hours of use. If the battery of the monitor is running low, the transmission range decreases and may cause errors similar to the ones listed above. If the battery is low, the monitor must be replaced.

BLUETOOTH 4.0 HEART RATE SYSTEM

1. INTRODUCTION

The Bluetooth 4.0 Heart Rate System is comprised of the Mio Alpha Heart Rate Monitor and USB Bluetooth 4.0 low energy radio adapter. Additional item includes the USB charging adapter that comes with the Mio Alpha.

The watch uses two green LEDs and an electro-optical cell which are integrated into the back plate of the watch. The LEDs shine light into the skin, which enables the electro-optical cell to detect the pulsing volume of blood flow.

ELECTROMAGNETIC FIELD WARNING

The Mio Alpha watch and USB charger contain magnets that could affect pacemakers and implantable cardioverter-defibrillators (ICDs).

A. SETTING UP THE BLUETOOTH 4.0 HEART RATE SYSTEM

If not done already, insert the Bluetooth USB adapter into an available USB port on the front of the computer.

Step 1. Fasten Mio ALPHA tightly on your arm above, not on, the wrist bone.

Note: Wear it higher on the forearm you have a small wrist.

Step 2. Press and hold the HR button until the watch beeps and the display says FIND.

Step 3. Hold your arm fairly still until the watch beeps again and displays heart rate

Notes: 1) It takes a few seconds for heart rate to register.
2) With proper fit, there should be no visible light between the watch and skin. Make necessary adjustments in fit.

B. CHARGING THE HEART RATE MONITOR BATTERY

Battery life of the watch varies from 8-10 hours of continuous heart rate collection. Always turn discontinue off when not collecting Heart Rate data to preserve battery life. The battery in the watch can be recharged with the included USB charger.

Step 1. Make sure that the four connection pads on the back of the watch are dry. If not, dry them with a towel.

Step 2. Insert the USB charger into one of the USB ports of the computer.

Step 3. Attach the Watch to the USB Charger. This is a magnetic fit which will help to two pieces fit.

Step 4. Once charging the LED will indicate that the battery is charging and the blue LED will flash.

Step 5. When the battery is finished charging the display will say FULL.

Note: If you put the watch in heart rate collection mode and the battery charge is below 1/3, the display will say LOW BATTERY. You can still use the heart rate monitor. If the watch says NO BATTERY, you must recharge before using the watch again.

2. MAINTENANCE AND CARE

- Recharge the battery at least once every 6 months.
- Do not expose the watch to high temperatures.
- Use the watch in the temperature range of 5°C to 45°C (41°F to 113°F).
- Store the watch in the temperature range of 0°C to 25°C (32°F to 77°F).
- Do not disassemble, puncture, or incinerate the watch or battery.
- Clean the sensor area and connection pads with mild soap and water as needed.
- Do not expose your watch to strong chemicals such as gasoline, cleaning solvents, acetone, alcohol, or insect repellents. Chemicals can damage the watch's seal, case, and finish.
- Wipe the watch with a damp cloth as needed. Use mild soap to remove oil or dirt
- Do not scratch the sensor area. Protect it from damage.

3. TROUBLESHOOTING

A. UNABLE TO GET THE WATCH INTO FIND MODE WHEN PRESSING THE HR BUTTON

- When pressing HR button on watch ensure that the button is pressed from the center. Pressing from one of the sides may cause this problem.

B. HEART RATE READING SEEMS INACCURATE

(e.g. Heart Rate is dropping or remaining stable during exercise)

- Ensure the watch is on tight. The watch should be snug so that if the face is pulled away from the wrist the LED light does not show. There should be no gaps between the underside of the watch and the wrist

C. UNABLE TO FIND HEART RATE ON WATCH / WATCH DISPLAYS "--"

- Verify that the watch is not placed on the wrist bone.
- You may need to tighten MIO Alpha's strap and/or move the watch further up the forearm.
- When pressing HR button on watch that the button is pressed from the center. Pressing from the sides of the HR button is used to toggle settings.

D. WATCH IS SHOWING HEART RATE – EVALTECH SOFTWARE IS NOT

- Go to Administration Menu -> Manage Tools
- Verify that under Heart Rate Use Bluetooth Watch is selected. If it is set to Use Chest Strap – Change to Use Bluetooth Watch.

E. WATCH BEEPING DURING USE

- This will have no impact on data collection in EvalTech. This may occur if the persons heart rate is exceeding the preset factory defaults of “Training zones” on the watch – or if settings have been changed via the Set Toggle button on left side of the watch. Refer to the Mio Alpha User Guide if you wish to change settings to avoid any confusion.
- Avoid contact with the Set/Toggle button.

F. WATCH SCREEN IS NOT DISPLAYING HR AND IS SHOWING THE TIMER OR TIME.

- The Set Toggle button the left hand side was hit to toggle to timer or the time. Press the Set toggle button until Heart Rate is shown again. This will not interfere with data collection.
- Avoid contact with the Set/Toggle button.

G. ERROR INITIALIZING BLUETOOTH USB! IF USB IS PLUGGED IN PLEASE REINSERT USB KEY.

- Press OK; Disconnect the USB adapter from the computer and plug back in.
- Go to Administration Menu -> Manage Tools
- Verify that under Heart Rate Use Bluetooth Watch is selected. If it is set to Use Chest Strap – Change to Use Bluetooth Watch.

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DUAL INCLINOMETER (OPTIONAL EQUIPMENT)

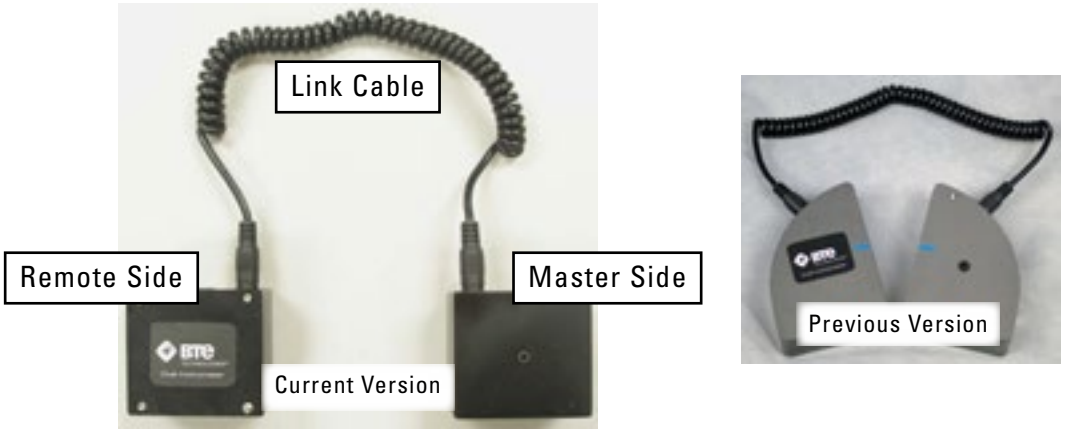
VII. DUAL INCLINOMETER (OPTIONAL EQUIPMENT)

I. INTRODUCTION

The Dual Inclinometer is used to evaluate range of motion while allowing for sections to be tested in isolation. This is accomplished by a sensor in each Inclinometer side calculating the rotational displacement and subtracting or adding the two values to arrive at a true range of motion value.

The Dual Inclinometer is comprised of two sensors: the master and the remote. The master side is identified by the button switch on the front side. In addition, the master side is connected to the Portable Dock & Transmitter unit via an RJ45 cable. A link cable then connects the remote to the master. Depending on the testing situation, you may choose to use a single Inclinometer side or both Inclinometer sides.

There are two versions of the Dual Inclinometer. Both versions operate in the same manner.



Dual Inclinometer - Current and Older Versions

Items in pictures may vary depending on version

Note that whenever you are testing with the Dual Inclinometer, the sides must always be positioned in the same plane (as shown in the previous figure). The sensors are not able to accurately measure the change in angle if the sides are not properly facing each other.

2. UTILIZING THE DUAL INCLINOMETER

A. CONNECTING TO THE SYSTEM

Always connect the master side to the Dock via the RJ45 jack. Refer to The System Use-Test Configuration and Parameters of this manual for a pictorial example.

Remember to verify the tool is plugged in and the Portable Dock & Transmitter is turned on and receiving power before starting a test.

B. COLLECTING DATA

Once the client is in the required initial or final position, press the black button on the front of the master side to obtain the angle.

C. UTILIZING ONE INCLINOMETER SIDE

If you wish to use only one Inclinometer side, then you must use the master side. Simply remove the coiled link cable from the master side and begin testing. Refer to the Cervical Rotation section of this chapter for a pictorial example.

D. UTILIZING BOTH INCLINOMETER SIDES

If you wish to use both Inclinometer sides for the testing, make sure the coiled link cable is properly secured to the master side and the remote side.

3. ADMINISTERING SPINAL RANGE OF MOTION TESTS

Note: All Range of Motion references were obtained from the AMA *Guides to the Evaluation of Permanent Impairment,* Fifth Edition.

The Dual Inclinometer is most useful in its ability to measure spinal range of motion. The most common evaluations are related to the cervical spine, thoracic spine, lumbrosacral spine, sacral hip flexion/extension, gross combined hip and spinal flexion/extension, and straight leg raise.

In order to administer an effective range of motion evaluation, you must make certain the same landmarks are used every time a client is tested.

Table 1 identifies the testing locations and their respective landmarks.

Table 1. Range of Motion Testing Landmarks

Testing Location	Superior Landmark	Inferior Landmark
Cervical Spine	Occiput	T1
Thoracic Spine	T1	T12
Lumbrosacral Spine	T12	Sacral Midpoint
Sacral Hip Flexion/Extension	Sacral Midpoint	Lateral Thigh
Gross Combined Hip & Spinal Flexion/Extension	T1	Sacral Midpoint
Straight Leg Raise	N/A	Anterior Lower Leg

Before beginning an evaluation, it is important to have the client wear appropriate clothing that exposes or provides easy access to the landmarks. You may wish to stock such items as cloth or paper client gowns for this reason.

Guidelines to locating the landmarks:

- **Occiput** – Locate the Occipital protuberance and place the lowest portion of the Inclinometer directly above it.
- **T1** – This is usually the larger of the two protruding spinous processes at the base of the cervical spine near the height of the shoulders. It is easily identified when the client flexes their cervical spine.
- **T12** – Follow the lower ribs posteriorly to the spinous process.

- **Sacral Midpoint** – Follow the iliac crests posteriorly to the PSIS, medially into the sacral sulcus and then medially to the midline. While maintaining one hand at the midline at this level, locate the sacrococcygeal joint. Now locate the midpoint between these two landmarks.
- **Lateral Thigh** – Locate the Greater Tuberosity and place the tip of the Inclinometer just inferior.
- **Anterior Lower Leg** –Locate the Tibial Tubercle and follow the anterior ridge of the tibia inferiorly approximately two-thirds down the lower leg.

For isolated joint movement, use a single Inclinometer side by placing it distally in the plane of movement of the joint being assessed.

For compound joint movement, use both Inclinometer sides by placing one side distally and one side proximally to the joint being assessed. Be sure no other joints are involved in the compound movement and make certain to align the sides in the plane of movement.

Note that these are only guidelines and were developed for the majority of cases. However, there may be clients who have anomalies from birth or injury that may cause these landmark guidelines to be difficult to use. In these cases, document the anomaly and the landmark location so that it may be duplicated in the future.

4. PRE-DEFINED TESTS & TESTING TEMPLATES

The EvalTech software includes several pre-defined tests and testing templates. For information on assigning and administering tests in the software, refer to Chapters 4 and 5 of the EvalTech Software Operator's Manual.

A. CERVICAL RANGE OF MOTION

1. FLEXION

Step 1. Align the Inclinometer sides in the sagittal plane and place one of the sides on the top of the head.

Step 2. Place the other side on T1.

Initial & Final Cervical ROM Flexion

Step 3. Take the initial reading by pressing the black button.

Step 4. Have the client maximally flex the head.

Step 5. Take the final reading by pressing the black button.

2. EXTENSION

Step 1. Align the Inclinometer sides in the sagittal plane and place one of the sides on the top of the head.

Step 2. Place the other side on T1.

Figure 3-3. Initial & Final Cervical ROM Extension

Step 3. Take the initial reading by pressing the black button.

Step 4. Have the client maximally extend the head.

Step 5. Take the final reading by pressing the black button.

3. LATERAL FLEXION

Step 1. Align the Inclinometer sides in the coronal plane and place one of the sides on the top of the head.

Step 2. Place the other side on T1.

Initial & Final Cervical ROM Lateral Flexion

Step 3. Take the initial reading by pressing the black button.

Step 4. Have the client maximally laterally flex the head to one side.

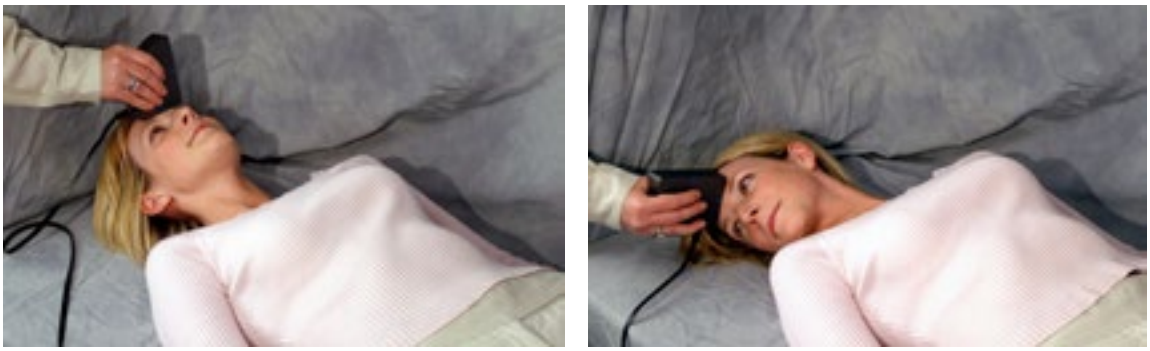
Step 5. Take the final reading by pressing the black button.

4. ROTATION

Use a single Inclinometer side for cervical rotation testing.

Step 1. Have the client lie in a supine position (this will stabilize the client's shoulders). The shoulders should be exposed in order to allow the evaluator to note any excessive shoulder rotation.

Step 2. Align the Inclinometer side in the transverse plane and place it at the superior portion of the head.



Initial & Final Cervical ROM Rotation

Step 3. Take the initial reading by pressing the black button.

Step 4. Have the client maximally rotate the head to one side.

Step 5. Take the final reading by pressing the black button.

B. THORACIC RANGE OF MOTION

Since evaluating the thoracic spine is quite dependent on the individual's posture, it is best to have the client use a military type stance. This will help to minimize the client's kyphosis.

1. FLEXION

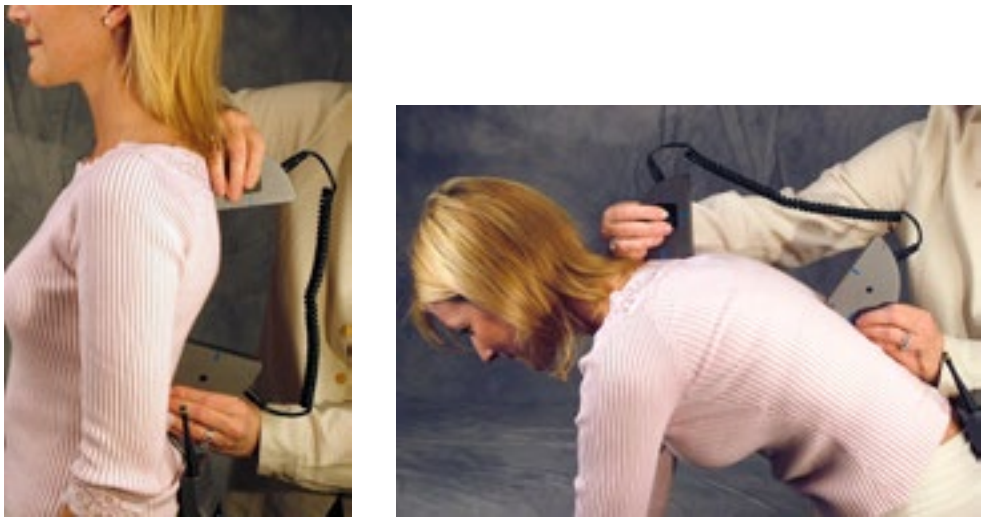
Step 1. Align the Inclinometer sides in the sagittal plane and place one of the sides on T1.

Step 2. Place the other side at T12.

Step 3. Take the initial reading by pressing the black button.

Step 4. Have the client maximally flex the thoracic spine.

Step 5. Take the final reading by pressing the black button.



Initial & Final Thoracic ROM Flexion

2. MINIMAL KYPHOSIS

Step 1. Align the Inclinometer sides in the sagittal plane. Take the initial reading by zeroing the Inclinometers against a true vertical surface such as a wall.

Step 2. Place one of the Inclinometer sides on T1 spinous process.

Step 3. Place the other side at T12 spinous process.

Step 4. Take the final reading by pressing the black button.

3. ROTATION

Step 1. With the client in a standing position, instruct them to flex forward until the thoracic spine is in as horizontal a position as possible.

Step 2. Align the Inclinometer sides in the axial and vertical planes and place one of the sides on T1.

Step 3. Place the other side at T12.

Step 4. Take the initial reading by pressing the black button.

Step 5. Have the client maximally rotate the thoracic spine to one side.

Step 6. Take the final reading by pressing the black button.

Initial & Final Thoracic ROM Rotation

C. LUMBROSACRAL RANGE OF MOTION

1. FLEXION

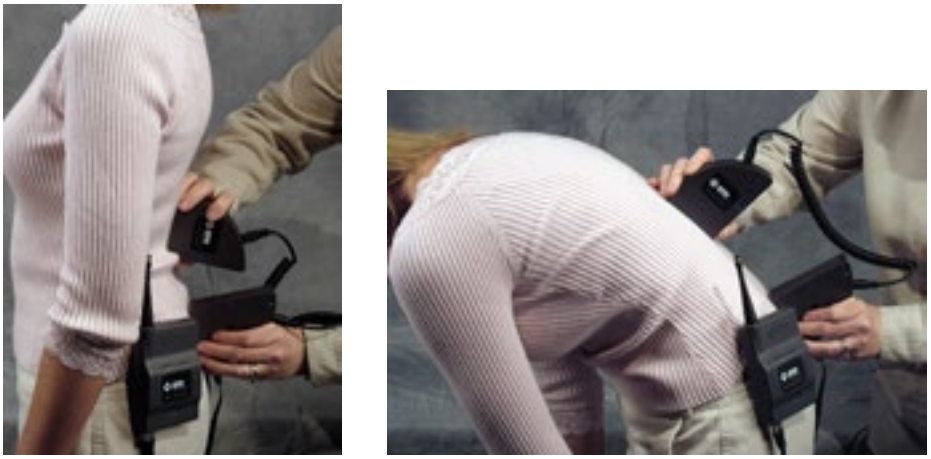
Step 1. Align the Inclinometer sides in the sagittal plane and place one of the sides on T12.

Step 2. Place the other side at S1.

Step 3. Take the initial reading by pressing the black button.

Step 4. Have the client maximally flex the lumbar spine.

Step 5. Take the final reading by pressing the black button.



Initial & Final Lumbar ROM Flexion

2. EXTENSION

Step 1. Align the Inclinometer sides in the sagittal plane and place one of the sides on T12.

Step 2. Place the other side at S1.

Step 3. Take the initial reading by pressing the black button.

Step 4. Have the client maximally extend the lumbar spine.

Step 5. Take the final reading by pressing the black button.

Initial & Final Lumbar ROM Extension

3. LATERAL FLEXION

Step 1. Align the Inclinometer sides in the coronal plane and place one of the sides on T12.

Step 2. Place the other side at the sacral midpoint.

Step 3. Take the initial reading by pressing the black button.

Step 4. Have the client maximally laterally flex the lumbar spine to one side.

Step 5. Take the final reading by pressing the black button.

Initial & Final Lumbar ROM Lateral Flexion

4. STRAIGHT LEG RAISE

Use a single Inclinometer side for straight leg raise testing.

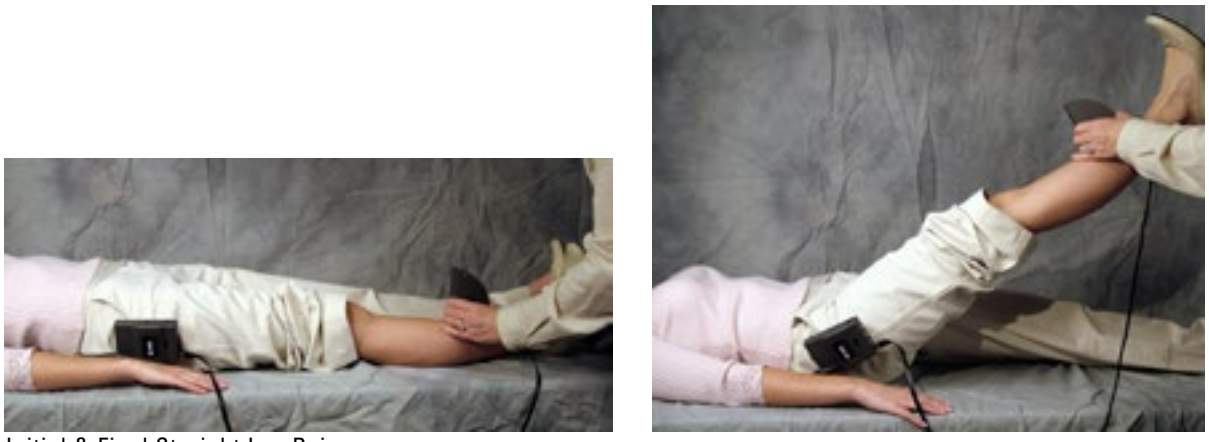
Step 1. Have the client lie in a supine position.

Step 2. Align the Inclinometer side in the sagittal plane and place it along the anterior lower third of the tibia.

Step 3. Take the initial reading by pressing the black button.

Step 4. Have the client perform a straight leg raise.

Step 5. Take the final reading at the end of the range by pressing the black button.



Initial & Final Straight Leg Raise

The straight leg raise on the tightest side should be within 10 degrees of the total hip motion (i.e. hip flexion + hip extension).

5. DETERMINING THE DEGREE OF ANKYLOSIS

When the degree of ankylosis needs to be documented, the steps listed above must be slightly adjusted:

Step 1. Take the first reading against a wall or on a tabletop.

Step 2. Place the client in as close to a neutral position as possible.

Step 3. Place the two Inclinometer sides at the appropriate landmarks.

Step 4. Take the second reading. This is the degree of ankylosis.

6. PERFORMING EXTREMITY RANGE OF MOTION EVALUATIONS

While the Goniometer is the ideal tool for performing range of motion evaluations on extremity joints, the single or dual Inclinometer sides may also be used.

7. TROUBLESHOOTING

A. TOOL NOT READING ANY VALUE OR NOT RECOGNIZED

There are multiple reasons why the Dual Inclinometer may not be reading any value or is not recognized.

1. CHECK THE FOLLOWING

- The batteries in the Portable Dock & Transmitter are charged and less than a year old.
- The antennas are properly secured to the Portable Dock & Transmitter and Hub.
- The Hub is plugged in to the computer and the Dock is powered on.
- There is no interference between the Hub and Dock (refer to Chapter 12 of the EvalTech Software Manual).
- The Hub has not been dropped or struck - if so, further troubleshooting is required, contact BTE.
- The Dock has not been dropped or struck - if so, further troubleshooting is required, contact BTE.
- The Dual Inclinometer, Portable Dock, and cable are not damaged, dirty at the connections, or have loose components.

2. ATTEMPT THE FOLLOWING

- Turn off the Portable Dock, attach a new cable to the Dual Inclinometer and Portable Dock, and then turn the Dock back on.
- Turn off the Portable Dock, plug the cable into another port on the Dock, and then turn it back on.
- Turn off the Portable Dock, insert freshly charged batteries, and then turn it back on.
- Try a different combination of batteries - if one of the batteries has gone bad, then the Portable Dock will not work properly.

B. REMOTE SIDE NOT READING ANY VALUE

Unplug and replug the link cable from *both* the Remote Side and the Master Side.

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GONIOMETER (OPTIONAL EQUIPMENT)

VIII. GONIOMETER (OPTIONAL EQUIPMENT)

1. INTRODUCTION

The Goniometer is used to evaluate extremity range of motion. The tool uses a sensor to calculate the amount of displacement in degrees and arrive at a true range of motion value.

Included with the Goniometer are three different types of arms: 2 small arms, 1 medium arm, and 1 long arm. Through the use of the various lengths of arms, you can evaluate the range of motion of smaller joints, such as in the hand and foot, as well as larger joints, such as the knee, hip, and shoulder.

Goniometer and Arms

Items in picture may vary depending on version

Note that the American Medical Association states that whenever an impairment evaluation is performed, a goniometer must be used for evaluating the range of motion of extremities.

2. UTILIZING THE GONIOMETER

A. CONNECTING TO THE SYSTEM

Always connect the Goniometer to the Portable Dock & Transmitter via the RJ45 jack and cable. Refer to The System Use-Test Configuration and Parameters of this manual for a pictorial example.

Remember to verify the tool is plugged in and the Dock is turned on and receiving power before starting a test.

B. COLLECTING DATA

Once the client is in the required initial or final position, press the black button on the side opposite the RJ45 jack to obtain the angle.

C. ATTACHING ARMS

The arms are screwed into the top of the Goniometer so they may be easily removed and attached. Use any combination of the small, medium, and long arms to aid in measuring the extremity's range of motion.

3. PRE-DEFINED TESTS & TESTING TEMPLATES

The EvalTech software includes several pre-defined tests and testing templates. For information on assigning and administering tests in the software, refer to Chapters 4 and 5 of the EvalTech Software Operator's Manual.

The following extremities may be tested with the Goniometer:

- Ankle
- Elbow
- Finger
- Forearm
- Hip
- Knee
- Shoulder
- Thumb
- Toe
- Wrist

Note that the names of the pre-defined tests begin with the name of the extremity that is being analyzed.

In assessing motion, the examiner should first observe what an individual can and cannot do by asking them to move each joint of the extremity, from the shoulder down, through its full range of motion. Both extremities should be compared. Individual joints can then be evaluated separately. In determining the range of motion of individual joints, the examiner must evaluate both the active and passive motion.

A. ADMINISTERING RANGE OF MOTION TESTS

Note: All Range of Motion references were obtained from the AMA *Guides to the Evaluation of Permanent Impairment,* Fifth Edition.

Step 1. For small extremity ROM tests (e.g. finger and toe), attach the small arms. For large extremity ROM tests (e.g. elbow and knee), attach the medium and long arms.

Step 2. Instruct the client to place his/her extremity in the initial position.

Step 3. Position the center of the top of the Goniometer in line with the joint and the Goniometer arms along the extremity being measured.

Step 4. Take the initial reading by pressing the black button.

Example of Initial & Final Goniometer ROM Positions

Step 5. Instruct the client to place his/her extremity in the final position and rotate the Goniometer arms as needed.

Step 6. Take the final reading by pressing the black button.

B. DETERMINING THE DEGREE OF ANKYLOSIS

When the degree of ankylosis needs to be documented, the testing procedure must be slightly adjusted:

Step 1. Align the Goniometer arms and place them on a wall or tabletop. Take the first reading by pressing the black button.

Step 2. Place the client in as close to a neutral position as possible.

Step 3. Place the Goniometer arms at the appropriate landmarks.

Step 4. Take the second reading by pressing the black button. This is the degree of ankylosis.

4. TROUBLESHOOTING

A. TOOL NOT READING A CHANGE IN ANGLE

If the top housing of the Goniometer is not properly secured, the Goniometer may not read a change in angle.

Step 1. Attach the long arm to the top of the Goniometer.

Check if Top Housing is Loose

Step 2. Place the Goniometer in a horizontal position and position the arms parallel to the floor.

Tighten Set Screw

Step 3. Let go of the top arm - if it falls freely, then the top rotation housing screw needs to be tightened.

Step 4. Use a 5/64" Allen key to tighten the top set screw.

B. TOOL NOT READING ANY VALUE OR NOT RECOGNIZED

There are multiple reasons why the Goniometer may not be reading any value or is not recognized.

1. CHECK THE FOLLOWING

- The batteries in the Portable Dock & Transmitter are charged and less than a year old.
- The antennas are properly secured to the Portable Dock & Transmitter and Hub.
- The Hub is plugged in to the computer and the Dock is powered On.
- There is no interference between the Hub and Dock (refer to Chapter 12 of the EvalTech Software Manual).
- The Hub has not been dropped or struck - if so, further troubleshooting is required, contact BTE.
- The Dock has not been dropped or struck - if so, further troubleshooting is required, contact BTE.
- The Goniometer, Portable Dock, and cable are not damaged, dirty at the connections, or have loose components.

2. ATTEMPT THE FOLLOWING

- While the Goniometer is connected to the Portable Dock & Transmitter, turn the Portable Dock & Transmitter off and then back on.
- Turn off the Portable Dock & Transmitter, attach a new cable to the Goniometer and Portable Dock, and then turn the Dock back on.
- Turn off the Portable Dock & Transmitter, plug the cable into another port on the Portable Dock & Transmitter, and then turn it back on.
- Turn off the Portable Dock & Transmitter, insert freshly charged batteries, and then turn it back on.
- Try a different combination of batteries - if one of the batteries has gone bad, then the Portable Dock & Transmitter will not work properly.

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APPENDIX

Guidance and manufacturer's declaration – electromagnetic emissions		
PTK is intended for use in the electromagnetic environment specified below. The customer or the user of PTK should assure that it is used in such an environment		
Emissions test	Compliance	Electromagnetic environment - guidance
RF Emissions CISPR 11	Group 1	PTK uses RF energy only for its internal function. The RF emissions from the PTK are very low and not likely to cause interference in nearby electronic equipment.
RF Emissions CISPR 11	Class A	PTK is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions IEC 61000-3-2	Class A	
Voltage Fluctuations/ flicker emissions 61000-3-3	Complies	

Guidance and manufacturer's declaration – electromagnetic immunity			
PTK is intended for use in the electromagnetic environment specified below. The customer or the user of PTK should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance Level	Electromagnetic environment guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be non-conductive.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV	± 2 kV	
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	.
Power Frequency, Magnetic Fields IEC 61000-4-8	3A/m	3A/m	

Guidance and manufacturer's declaration – electromagnetic immunity			
PTK is intended for use in the electromagnetic environment specified below. The customer or the user of PTK should assure that it is used in such an environment.			
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 10mS 40 % U_T (60 % dip in U_T) for 100mS 70 % U_T (30 % dip in U_T) for 500mS <5 % U_T (>95 % dip in U_T) for 5 s	<5 % U_T (>95 % dip in U_T) for 10mS 40 % U_T (60 % dip in U_T) for 100mS 70 % U_T (30 % dip in U_T) for 500mS <5 % U_T (>95 % dip in U_T) for 5 s	

<table>
<tr><th colspan="4">Guidance and manufacturer’s declaration – electromagnetic immunity</th></tr>
<tr><td colspan="4">PTK is intended for use in the electromagnetic environment specified below. The customer or the user of PTK should assure that it is used in such an environment.</td></tr>
<tr><td>Conducted RF
IEC 61000-4-6</td><td>3 Vrms
150 kHz to 80 MHz</td><td>3 Vrms</td><td rowspan="2">Portable and mobile RF communications equipment should be used no closer to any part of PTK, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Recommended separation distance
d =1.2 P
d =1.2 eP 80 MHz to 800 MHz
d = 2.3 eP 800 MHz to 2.5GHz
where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).
Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [1]
should be less than the compliance level in each frequency range.[2]
Interference may occur in the vicinity of equipment marked with the following symbol:
  </td></tr>
<tr><td>Radiated RF
IEC 61000-4-3</td><td>3 V/m
80 MHz to 2.5 GHz</td><td>3 V/m</td></tr>
<tr><td colspan="4">NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</td></tr>
</table>

Guidance and manufacturer's declaration – electromagnetic immunity

PTK is intended for use in the electromagnetic environment specified below. The customer or the user of PTK should assure that it is used in such an environment.

Recommended distance between portable/mobile RF communication equipment and PTK

PTK does not need to be used in a radiated RF controlled environment. Customers or users of PTK shall maintain the minimum safe distance between portable/mobile RF communication equipment (transmitter) and PTK to prevent electromagnetic interference. The minimum distance shall be accordance with the maximum output of the communication equipment as recommended below.

Rated Maximum output power of transmitter W	Separation distance according to the frequency of the transmitter		
	150Khz to 80Mhz $d = 1.2\ e\sqrt{P}$	80Mhz to 800Mhz $d = 1.2\ e\sqrt{P}$	800Mhz to 2.5 GHz $d = 1.2\ e\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.