APPLIED TEST SYSTEMS
THE MARK OF RELIABILITY

INSTRUCTION MANUAL

BBR3S

Bending Beam Rheometer 3S

This manual contains important operating and safety information. Carefully read and understand the contents of this manual prior to the operation of this equipment.

www.atspa.com

REVISED NOVEMBER 2024

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For assistance with set-up or operation, contact the ATS Service Department. Please have this manual and product serial number readily available when you call.

Table Of Contents

Introduction

A.1 – Unpacking

Retain all cartons and packing materials until the unit is in operation. If damage has occurred during shipping, notify Applied Test Systems (ATS) and the carrier immediately. If it is necessary to file a damage claim, retain **ALL** the packing materials for inspection by the carrier.

A.2 – Standard Users and Passwords

Every BBR3S is programmed with the three standard user settings. Each setting has a corresponding password and set of user restrictions. Please refer to the table below to login and operate your new equipment.

User Name	Password	Permissions
Operator	beamtest	Login Setup Test Run New Test View Old Test Verification Calibrate Calibration Data Monitor System Language
Default		Login Setup Test Run New Test View Old Test Verification Calibrate Calibration Data

A.3 – Warranty Information

All new ATS systems are shipped with a warranty. Units have a warranty against defective parts and workmanship for one calendar year from the date of shipment. Please see APPENDIX A of this manual for complete details on the warranty.

A.4 – After Sale Support

If there are any questions concerning the operation of the unit or software, contact the ATS Service Department at service@atspa.com.

Before emailing, please obtain the software revision number and the serial number from the unit's data tag. A sample data tag is illustrated below, and can be completed with the unit's information for easy reference. Please be prepared to give a complete description of the problem to the ATS Service Department.

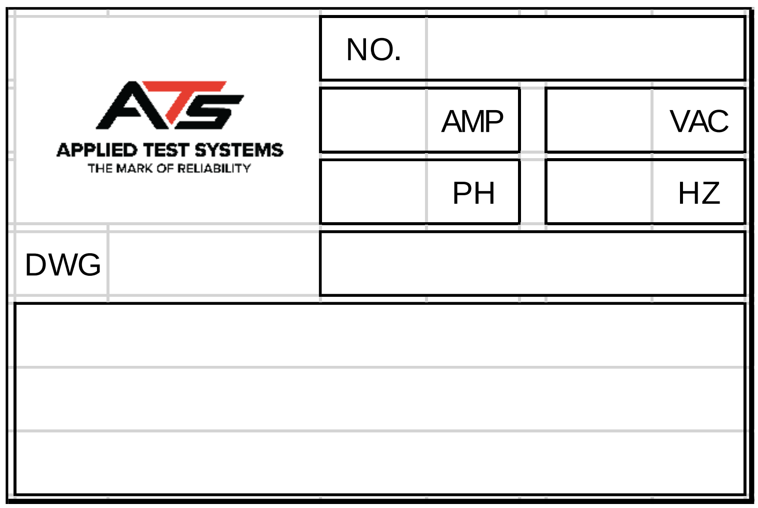


Figure A.4.1 ***- ATS Sample Data Tag***

Safety

B.1 – For Owners, Operators, and Maintenance

All ATS equipment is designed to be operated with the highest level of safety. This manual uses note, caution, and warning symbols throughout, to draw attention to important operational and safety information.

Read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions regarding the operation of the unit or instructions in this manual, contact the ATS Service Department at *+1.724.283.1212*.

Read and follow these important instructions. Failure to observe these instructions can result in permanent damage to the unit, significant property damage, personal injury or death.

B.2 – Cautions & Warnings

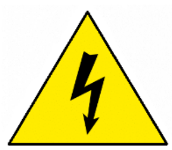
Read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions regarding operation of the unit or instructions in this manual, contact our Service Department.

Thoroughly understand the safety features and operation of the equipment. This manual will provide operators with safety concerns and general procedures. Be familiar with correct operating principals and use good judgment. Also, refer to the appropriate manuals for system component safety manuals.

Use caution when working with liquids at low temperatures. Protect skin by wearing protective clothing, and follow safety, operation, and maintenance procedures described in the appropriate instruction manuals.

Obey all national and local electric code requirements.

Handle the BBR3S carefully. Avoid dropping and jarring the BBR3S. Damage to the machine may result if dropping and jarring occurs.



Dangerous high voltages present. Do not attempt to open the enclosure or gain access to areas where you are not instructed to do so. Refer any possible servicing to qualified service personnel only.

Injury to the operator could occur if operational procedures are not followed. Follow all steps or procedures as instructed and refer to accompanying documents.

Flammable vapors may be emitted from bath. Operate fluid bath in a well-ventilated area. Do not smoke or use an open flame near the bath. Refer to fluid manufacturer's documentation for more detailed information specific precautions for the bath fluid being used.

Do not submerge hand and arm in extremely cold test bath. Do not attempt to pull the drain plug when the fluid bath level is high and temperature is extremely cold. Extremely cold fluid may cause frost bite.

Use caution when handling air hoses during operation or when performing maintenance as contents will be under pressure.

Handle load cell with care. The load cell will be damaged if the load frame is put on its side with the load nose attached, or if the load nose is over tightened.

Handle the refrigeration hose with care. The refrigeration hose may be damaged if it is twisted or pulled, especially when the unit is cold. Do not move the refrigeration unit unless it has been turned off for at least 8 hours and has reached room temperature.

Prevent damage to the cooling unit. Never operate the cooling unit if the ambient temperature is higher than 25°C.

The cooling unit should be placed in a well-ventilated area, on a stand at least six inches above the floor and not on the same surface as the BBR3S.

Carefully place the calibration weights on the load cell's weight pan. If the Linear Variable Differential Transducer (LVDT) shaft is bumped, it may become inaccurate or even permanently damaged.

Avoid damage to the Confidence Beam. Do not leave a load on the Confidence Beam for an extended period of time. This may cause the beam to bend and could result in inaccurate readings for future tests.

Before energizing the electrical power to the bending beam rheometer, turn off all power switches and place all controls in an OFF or neutral position. Check that your power source is of the appropriate voltage and is surge-protected. Use appropriate power adapters based upon your region.

FLAMMABLE CHEMICALS may be located within enclosure. Exposure may result in severe injury. Refer to maintenance manual before servicing.

System Overview

C.1 Equipment Parts

Front of Unit

Figure C.1.1 ***- Front of BBR3S Unit***

1. LOAD Regulator
2. Power Indicator
3. ZERO Regulator
4. Load Frame
5. Touch Screen Computer
6. USB Port
7. Leveling Feet
8. Chiller

Back of Unit

Figure C.1.2 ***- Back of BBR3S Unit***

1. Network / Ethernet
2. USB Connection
3. Load Frame Electrical Cables
4. Chiller RTD Cable
5. Air Bearing Connections
6. Air Connector
7. Unit Power

Load Frame

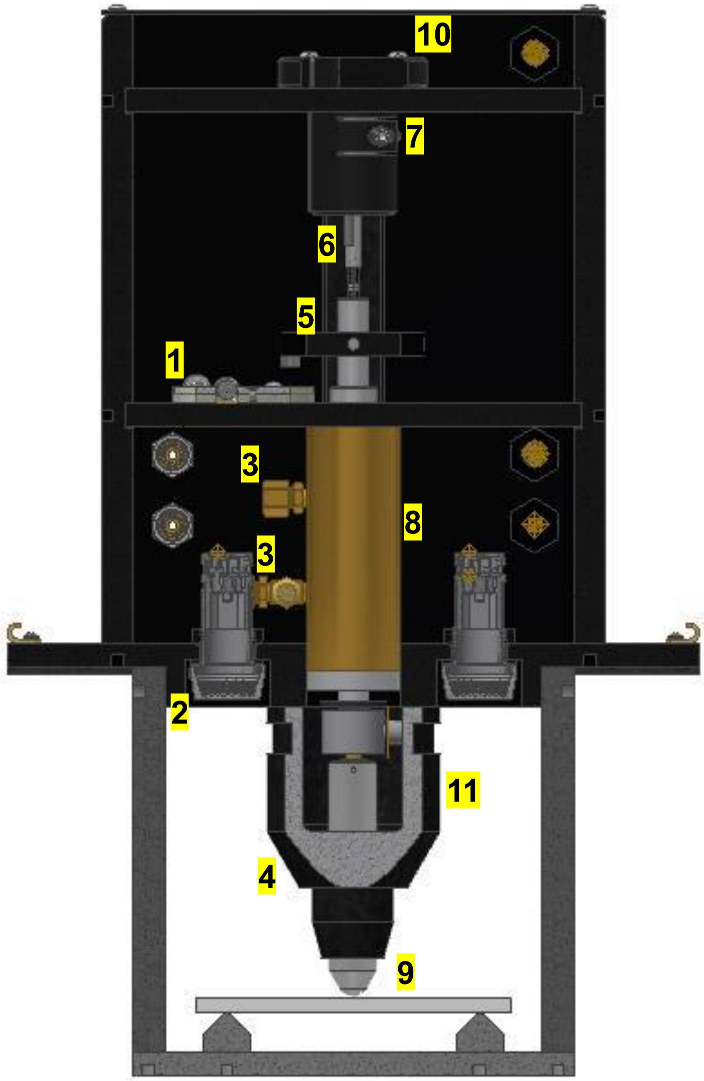


Figure C.1.3 - ***Load Frame***

1. LVDT Shaft
2. Weight Pan
3. Gaging Disk
4. Bearing Air Supply / Control
5. Lamps
6. Shroud
7. LVDT Housing
8. LVDT
9. Air Bearing
10. Load Cell
11. Load Nose

Tank Interior

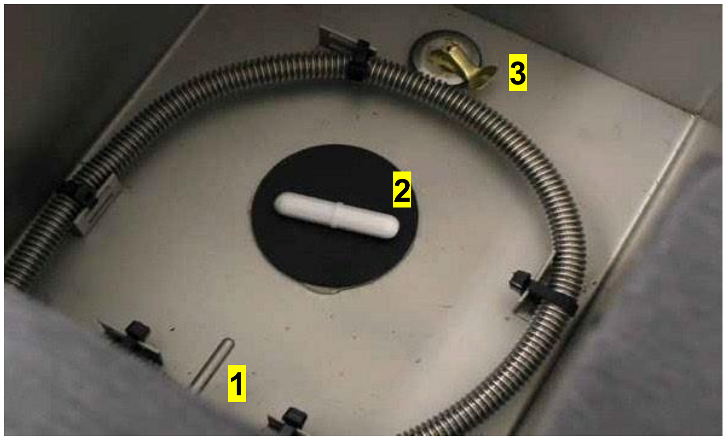


Figure C.1.4 ***- Tank***

1. RTD
2. Magnetic Stirrer
3. Drain

Gauge Kit

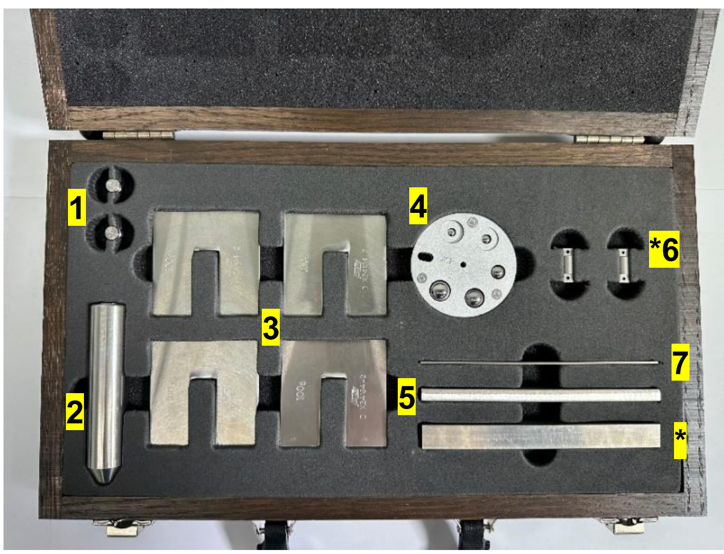


Figure C.1.5 ***- Gauge Kit***

Figure C.1.6 ***- Gauge Kit (2)***

1. 2g Weights
2. Load Nose
3. 100g Weights
4. Step Disk
5. Non-Compliant Beam
6. Anvil Adapters
7. Non-Compliant Beam
8. * Crack Sealant (CS) Non-Compliant Beam

****Optional with Crack Sealant Test***

C.2 Product Description

The ATS Bending Beam Rheometer 3S (BBR3S) is designed to provide a state-of-the-art means for testing the flexural creep stiffness properties of asphalt binders in a temperature range from 0 to -40°C. This testing is in accordance with the Strategic Highway Research Program (SHRP) Test Method B-002, AASHTO Designation T313, AASHTO TP 87, BS EN14771, and ASTM D 6648 specifications. The BBR3S's design does not allow for it to perform any additional functions other than those specified in this manual.

The BBR3S test control function and data acquisition are operated by a Windows®-based and records the load, deflection, and temperature data received from the unit. When tests are not being performed, the software permits access to test information including graphs, raw data tables, and test analysis.

The BBR3S is a fully integrated, modularized system consisting of the following:

Major Components

- Base Unit
- Load Frame Assembly
- BBR3S Software
- Mechanical Refrigeration Unit

Accessory Items

- Specimen Molds (5 Molds)
- Confidence Beam
- Step Disk
- Load Cell Calibration Weights (4) 100-gram and (2) 2-gram
- Crack Sealant Specimen Molds
- Non-Compliant Beam
- Crack Sealant (CS) Non-Compliant Beam

Product Specifications

Load Frame Construction	Integral stainless steel, frictionless construction
Loading Shaft Point	In-line stainless steel with blunt point
Test Load	Variable test range from 0 to 4,500 mN (459 g) standard. System maintains required test load within +/- mN (0.5 g) throughout test cycle.
Test Cycle Times	Cycle times for pre-load, recovery, and test load are completely operator-adjustable.
Load Cell	500 g (temperature-compensated)
Mechanical Overload Protection	Standard
Testing Temperature Range	0 to -40°C (32 to -40°F)
Temperature Measurement	Platinum RTD
Power Requirements	115 VAC, 1 ph, 50/60 Hz, 2 A or 230 VAC, 1 ph, 50/60 Hz, 2 A
Air Pressure	60 PSI Inlet Pressure (414 kPa) @ Class 3 Quality Max Particle of 5 µm
Test Weights	Calibrated and traceable to NIST
Rating	IP20 Enclosure rating
Sample Supports	3 mm (0.118 in) radius stainless steel spaced 101.6 mm (4.00 in) apart
LVDT Displacement Transducer	0.25 in (6.35 mm) calibrated range to provide 2 µm resolution throughout testing and verification range.
Data Display	Large on-screen display of load, displacement, and bath temperature provides ease of setup and operation. Real time displacement, loading, and temperature graphs are displayed during the test cycle and can be re-plotted and re-scaled as needed for easy viewing.
Tank Liquid Volume	1.5 Gallons (5.5 liters)
Weight	150 lb.
Dimensions	BBR: 24 in W x 26.5 in D x 23.5 H (with load frame) Chiller: 10.5 in W x 20 in D x 9.25 in H

Environmental Conditions

The BBR3S is designed for use in an industry/laboratory setting in an indoor and dry environment. The base unit should be placed on a clean, stable work surface with the connecting mechanical refrigeration unit nearby. The mechanical refrigeration unit should be placed 6 inches above the floor and in an area that will not constitute a tripping hazard.

The Bending Beam Rheometer 3S (BBR3S) should be kept in the following conditions, in an ideal setting:

- Temperature of 15° C to 35° C
- Relative humidity should not exceed 75%
- Air Pressure of 75 kPa to 106 kPa
- No hard-frost, percolating water rain, solar irradiation, etc.
- Installation category II
- Pollution degree 2

Load Frame

The load frame is an independent three-point loading device designed to apply a load of up to 4500 mN (459 g). The load frame may be operated in the supplied fluid bath, or it may be used in ambient conditions. The load frame is made with a space-saving design, rigid construction, and corrosion resistance material.

The load frame is constructed of stainless steel plates and durable high-strength PVC uprights that are designed to be dimensionally stable and provide accurate force control. The load frame consists of an integral free-floating loading shaft within an air bearing to permit specimen loads in the range of 0 to 4500 mN. The air bearing also provides reliable and rapid loading with an accuracy of ± mN.

The load frame is constructed with a horizontal shelf that extends across the top of the unit to provide supports to suspend the lower portion of the load frame in the fluid bath. The upper part of the load frame is covered by an access panel that permits the user to easily view the top of the loading shaft. This panel also provides access to the weight pan for easy calibration of the load cell and the Linear Variable Differential Transformer (LVDT). Two low weight pans for easy calibration of the load cell and the Linear Variable Differential Transformer (LVDT). Two low voltage, sealed lamps are mounted in the base of the load frame in order to illuminate the specimen in the fluid bath.

The load frame is made up of an LVDT shaft, weight pan, air bearing, load shaft, load cell, and adapter. A metal plate cover is mounted to the front of the load frame and serves to protect the load cell from splashing fluid and minimize the effect of fluid movement on the load nose.

Specimen Support

The bottom half of the load frame consists of an anvil with two metal supports designed for alignment of the specimen. These specimen supports have a 3 mm contact radius and are fixed 102 mm apart from each other. They are designed to align samples that are approximately 127.00 mm x 12.70 mm x 6.35 mm.

Resting on each of the anvil's specimen supports are two anvil adapters (see Figure C.1.8). During crack sealant testing these anvil adapters need to be removed by lifting STRAIGHT UP on the adapter and pulling it off of the guide pin. The load frame should be removed from the bath and allowed to warm to room temperature before removing the anvil adapters.

The specimen supports and lower portion of the load frame are designed to be submerged in the constant-temperature fluid bath during the test. The fluid in the bath provides a buoyant force that counterbalances the weight of the specimen.

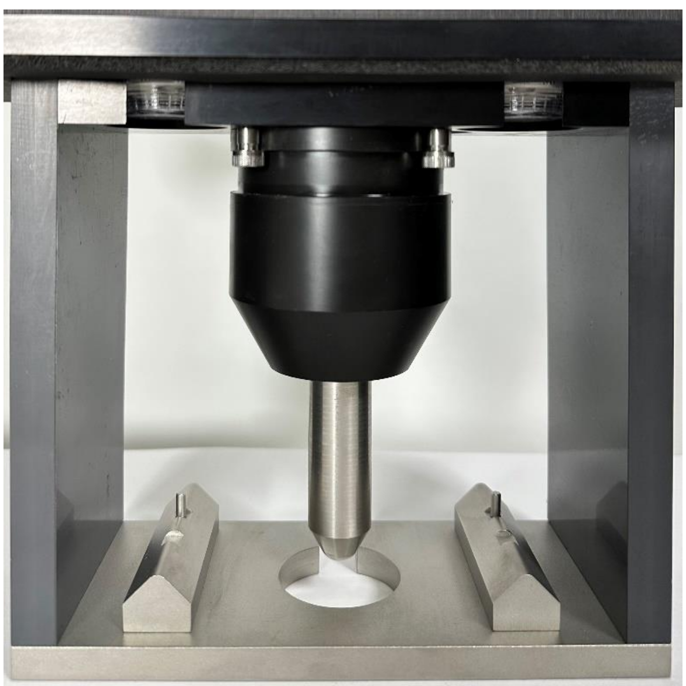


Figure C.1.7 ***- Load Frame Without Anvil Adapters***

Picture Coming Soon.

Figure C.1.8 **– Load Frame with Anvil Adapters**

Air Bearing

The BBR3S incorporates an air bearing to provide frictionless loading performance. The air bearing control system requires a constant 60 – 65 PSI (414 – 448 kPa) minimum clean and dry air supply, @ Class 3 Quality max particle of 5 µm. The air pressure to the air bearing is controlled by a set of high-precision air regulators located on the front panel of the base unit.

Linear Variable Differential Transformer (LVDT)

The LVDT is calibrated between 0 and 6 mm and is mounted in the upper section of the load frame assembly. A free-floating core rod is attached directly to the load shaft. It measures the displacement of the specimen as the test load is applied.

Load Cell

The load cell is a precision strain gauge-type, with 500 gram (4903 mN) force capacity. It is constructed of stainless steel to prevent corrosion or damage by the fluid during test procedures.

CAUTION: The load cell can be easily damaged, especially from side loading and excessive torque. Use caution while handling the test frame when the loading shaft is attached. Remove loading shaft before laying load frame on its side, especially before shipping.

Resistance Temperature Detector (RTD)

The RTD is a platinum device that measures the cooling fluid bath temperature. It is connected to the chiller and relays the information to the computer control system software. It is mounted in the BBR3S bath directly under the test specimen supports.

Computer Control System Software

The computer control system software provides user control of the BBR3S system in a Windows® environment with touchscreen access. The software provides pull-down menus, button selections, and data entry text boxes for easy updates and access to information.

The base unit contains an integrated personal computer, designed to efficiently run the software. During operation, the software collects and records the data from the various sensors on the load frame. During tests, the software controls specimen loading and unloading. The software is organized so all the information required to conduct a particular test is stored internally.

Mechanical Refrigeration Unit (Chiller)

The refrigeration unit (chiller) is an immersion designed to act as a cooling source for sub ambient work in liquid baths. It maintains the cooling fluid at a constant temperature using the unit’s temperature controller and the magnetic stirrer located in the bath. The single stage refrigeration system is equipped with one compressor. A hose carries refrigerant through the cooling probe located in the bath.

Refer to the separate manufacturer’s literature for more detailed information regarding safety, operation, and maintenance of the refrigeration unit.

WARNING: Refrigeration unit (chiller) will cause the test bath to be extremely cold. Do not submerge hand or arm in extremely cold test bath. Do not attempt to pull the drain plug when the test bath level is high and the temperature is extremely cold. Extremely cold fluid may cause frostbite.

Accessories

Specimen Molds

A specimen mold is used to create specimens. Each mold consists of five aluminum bars of various sizes, three mylar strips, and two holding rings. Five of these molds are supplied with the BBR3S.

Confidence Beam

The BBR3S comes with a Non-Compliant Beam and a Crack Sealant Non-Compliance Beam. The Non-Compliance Beam is a length of stainless steel that has the same dimensions as a specimen. This beam is placed on the specimen supports when verifying and calibrating the load cell and when performing the compliance test.

The Crack Sealant Non-Compliance Beam is the thicker of the two beams, and is used only for Crack Selant tests.

Step Disk

The step disk, shown in Figure C.1.9, is used during LVDT calibration and verification. It has five positions containing high precision balls. The calibration positions include a zero gaging and four subsequent steps which decrease in increments of 1, 3, 5, and 6 mm. These steps are labeled on the disk using the letters A (1 mm), B (3 mm), C (5 mm), and D (6 mm). This provides the 6 mm test range required by both ASTM and AASHTO specifications.

Load Cell Calibration Weights

Four 100 gram and two 2 gram load cell calibration weights are supplied with the BBR3S. These weights are placed on the load frame weight pan during load cell verification. The weights are also used to calibrate the load cell and ensure system compliance.

Figure C.1.9 ***- BBR3S Step***

Controls

Internal Controls

Five Internal Controls are located inside the LEFT panel of the BBR3S base unit, when viewed from the front (Figure C.1.10). These controls are factory set.

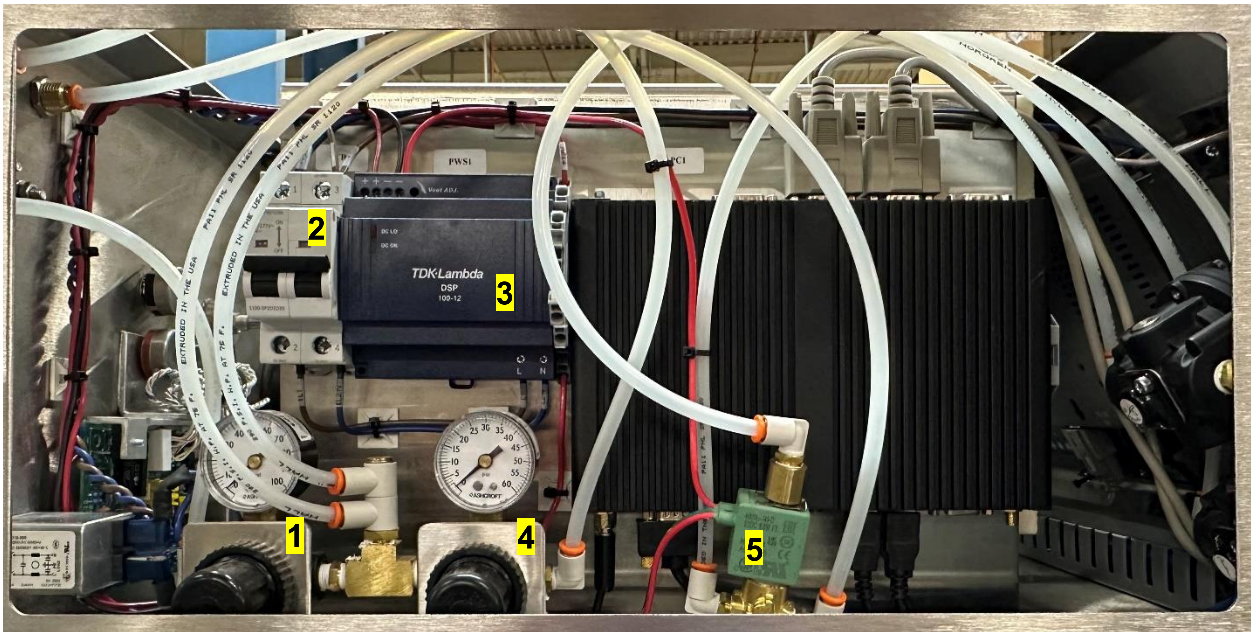


Figure C.1.10 ***- Internal Controls***

1. LINE PRESSURE REGULATOR – The line pressure is positioned on the LEFT inside the panel. This pressure is set at 60 PSI.
2. AMP CIRCUIT BREAKER – Provides over current protection for the electronics of the BBR3S. The circuit breaker handle should be in the UP position to allow current to flow to the BBR3S.
3. DC POWER SUPPLY – This supplies DC power necessary to operate the computer, touch screen display, and other operating systems of the BBR3S. A green LED on the module indicated that the power output from the power supply is in the desired range.
4. BEARING PRESSURE REGULATOR – The bearing pressure regulator is located to the RIGHT of the line pressure regulator, and the bearing pressure is set at 15 to 20 PSI. Verify the settings if necessary.

5. LOAD CONTROL SOLENOID VALVE – Switches control of the air flow to the load frame air bearing between the Zero and Load Control Valves on the front of the BBR3S during set-up and testing.

Data Instruments

The Data Instruments box and Signal Conditioner Modules, along with the 3 Solid State Relays, are all located on the RIGHT side of the BBR3S base unit as viewed from the front of the unit (see Figure C.1.11).

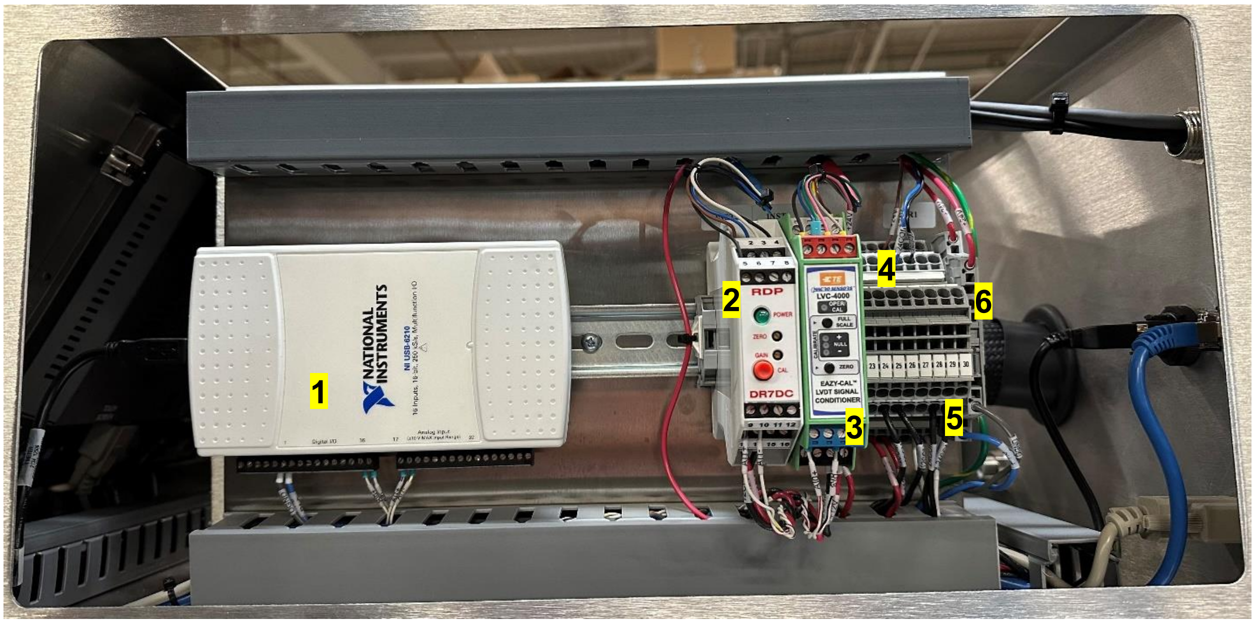


Figure C.1.11 ***- Data Instruments***

1. *DATA ACQUISITION BOX* – Digitizes the amplified voltages from the Load Cell and Signal Conditioner Modules and sends that information to the PC. Also receives command signals from the BBR3S Computer and sends those signals to the Solid State Relays to operate the stirrer motor, bath heater, and load control solenoid valve.
2. LOAD CELL SIGNAL CONDITIONER MODULE – Receives and conditions the output of the Load Cell, and supplies an amplified voltage output to the Data Acquisition Box.
3. LVDT SIGNAL CONDITIONER MODULE – Receives and conditions the output of the LVDT Displacement Sensor, and supplies an amplified voltage output to the Data Acquisition Box.

4. (4.-6.) DC VOLT SOLID STATE RELAYS – Used to control the functions of the Bath Heater (4), Stirrer Motor (5), and Load Control Solenoid Valve (6). These modules are identical and interchangeable.

Figure C.1.12 ***- Basic Unit Controls***

Basic Unit Controls

1. POWER INDICATOR – Orange light indicates power is ON.
2. ZERO REGULATOR – Provides the means of lifting the loading shaft and permits the operator to adjust the air pressure to provide a zero or preload on the specimen.
3. LOAD REGULATOR – Permits the operator to adjust the air pressure to provide a test load on the specimen.
4. TOUCH SCREEN – Operator interface that allows for all setup and running of tests, machine parameter entries, and calibration.
5. USB PORT – Provides access for data downloads and software updates. Users may also attach a mouse or keyboard if desired.

Installation

Please refer to www.atspa.com for a video further explaining Unpacking & Setting up the BBR3S (To access video, Downloads – Instruction Manuals – Asphalt / Bitumen Testing).

D.1 Recommended Tools

The following tools are recommended for use during installation and operation of the Bending Beam Rheometer.

Installation

- 9/16” Open Ended Wrench
- Set of Hexagonal Wrenches
- Flat Bladed Screw Driver

Operation

- Metal tongs for the placement and removal of the specimen from the fluid bath.
- Protective eye wear and gloves for use during testing.

D.2 Unpacking the BBR3S

* Please refer to www.atspa.com – Instruction Manuals – Asphalt / Bitumen Testing; for BBR Training video.*

To unpack and prepare the BBR3S for operation, complete the following steps.

CAUTION: Use care when moving the base unit. The refrigeration unit is attached, and the refrigeration hose may be damaged if it is twisted or pulled, especially when the unit is cold.

1. Remove the base unit and the refrigeration unit from the box, and place them on a sturdy work surface.

WARNING: Position the BBR3S in a well-ventilated area. Consider that flammable vapors may be emitted from the bath during operation. Refer to fluid manufacturer's MSDS documentation for further information.

2. Remove the load frame assembly and place it on a sturdy work surface near the base unit.
3. Remove any packing materials from the unit. The following items should also be located and set aside:
    - Case containing the step disk, a non-compliant test beam, a crack sealant non-compliant beam, a confidence check beam, two anvil adapters, the load nose, and a six-piece weight set.
    - Plastic bag containing specimen mold pieces.
    - Plastic bag containing crack sealant specimen mold pieces.
4. Inspect the base, the refrigeration unit, and the load frame for any obvious damage that may have occurred during shipment.

NOTE: If damage is found or suspected, notify the shipper and contact ATS immediately.

D.3 Assembling the Load Nose

Assemble the loading shaft to the load frame assembly.

1. There are four screws securing the shroud to the load frame (Figure D.3.1). Loosen the back two screws slightly, and completely remove the front two screws. This should allow you to remove the shroud from the frame.

There are (4) total screws.

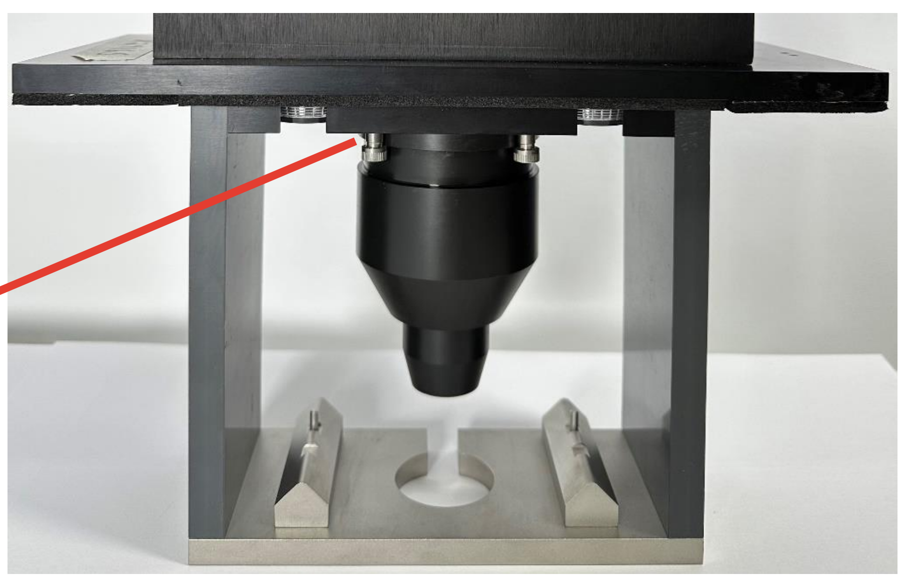


Figure D.3.1 ***- Load Frame Screw Location***

2. Unscrew the lower portion of the load shroud from the upper portion (Figure D.3.2). Set the lower portion aside.

Figure D.3.2 ***- Upper and Lower Portion of the Load Shroud***

3. Retrieve the load nose from the BBR3S gauge kit. Place the load nose in the upper portion of the load shroud.
4. Position the shroud and load nose at the base of the load frame. Lift the nose and carefully screw it on to the threaded stud in the bottom of the load cell until it is finger tight. When complete, secure the load nose in place by tightening the set screw on the side of the load nose (See Figure D.3.3 and D.3.4).

WARNING: Do not over tighten the load nose, or damage to the load cell may occur.

Figure D.3.3 ***- Set Screw Location on Load Nose***

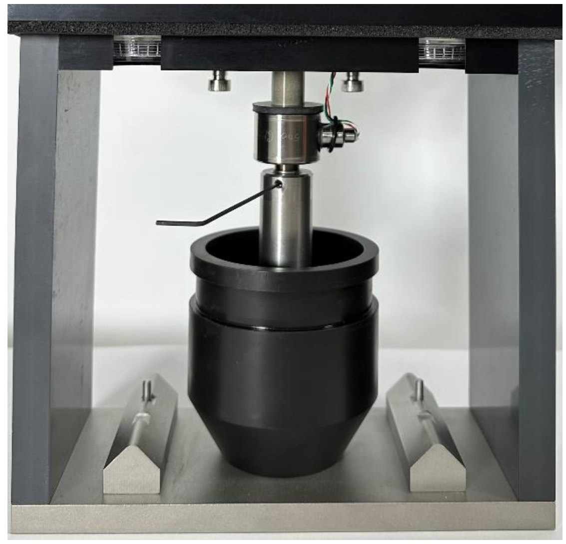


Figure D.3.4 ***- Tightening the Set Screw***

5. Once the load nose is secured, lift the upper portion of the shroud around it. Use the back two screws to guide it into place before tightening them and carefully screwing in the front two screws. See Figure D.3.5.

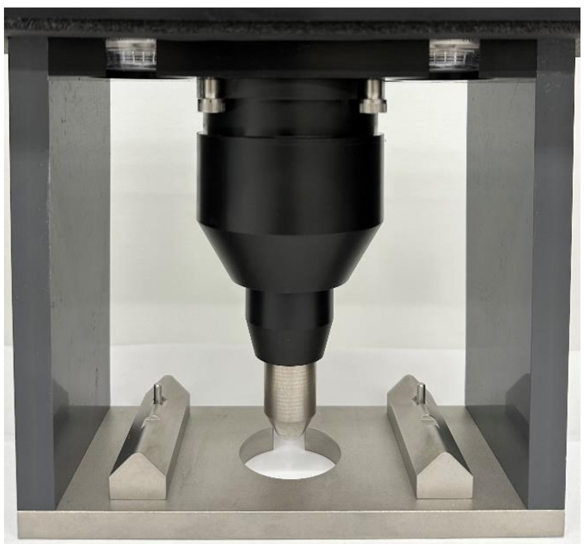


Figure D.3.5 ***- Upper Portion of Shroud***

CAUTION: Do not over tighten the loading shaft on the load cell, or the load cell may become damaged. The load cell is extremely sensitive to this twisting movement.

CAUTION: The load cell can be easily damaged, especially from side loading and excessive torque. DO NOT place Load Frame on its side once the Load Nose is in place. Improper handling will result in irreversible Load Cell damage.

6. To re-attach the lower portion of the load shroud, place the lower portion of the shroud on a flat surface. CAREFULLY lift the load frame, and position it so that the load nose is directly above the lower portion of the shroud (Figure D.3.6). Lift the lower portion of the shroud up and gently screw it into the upper portion (Figure D.3.7) until attached (Figure D.3.8).

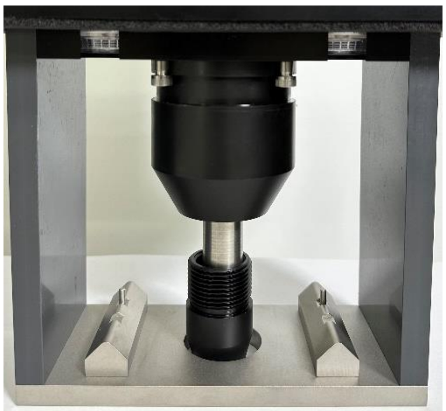


Figure D.3.6 ***- Attaching Lower Portion of Load Shroud***

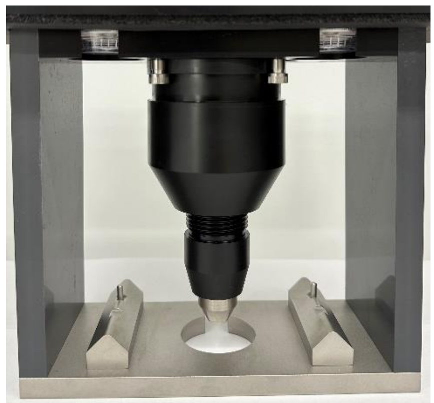


Figure D.3.7 ***- Attached Load Nose with Shroud (2)***

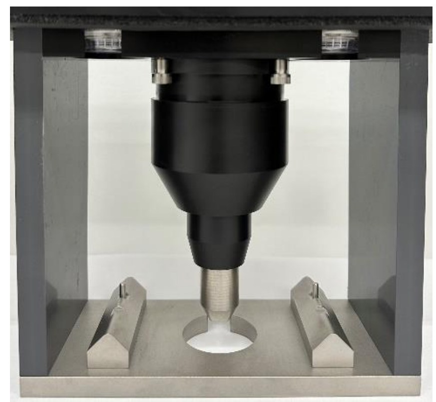


Figure D.3.8 ***- Attached Load Nose with Shroud***

D.4 Connecting Equipment

1. The following hoses and cables are shipped with the BBR3S. Use them for connecting the BBR3S equipment:

- Two air hoses
- Three color-coded electrical cables (integral to base)
- RTD cable (integral to base)
- Refrigeration Control Cable
- Main Electrical Power Cable

Picture Coming Soon.

Figure D.4.1 **– Connecting the BBR3S**

Load frame hook ups pre-wired and color coded:

- RED = LVDT
- BLUE = Load Cell
- GRAY = Light

WARNING: The cable for the lights should be connected to the load frame at all times while the BBR3S is in use. The electrical grounding for the load frame to the BBR3S chassis is done through the light cable.

2. Connect the air hoses to the ports on the rear of the load frame assembly and to the ports at the rear of base unit. The air supply connections supply a minimum of 60 PSI of clean dry air. Make sure the location of air hoses is such that they will not snag or catch on anything in the surrounding environment.

Figure D.4.2 ***- Load Frame Connections***

3. Connect the chiller RTD cable from the rear of the base unit to the refrigeration unit.

4. Connect the color-coded electrical cables from the rear of the base unit to the rear of the load frame assembly.

5. Plug the power cables from the base unit and the refrigeration unit into a surge-protected power source of appropriate voltage. Refer to the data tag on the BBR3S base unit.

6. Connect printer if desired using the USB port located in the rear of the BBR3S base.

NOTE: If at any point power is lost, disconnect all power sources and place all controls in an OFF position. Reconnect power sources and restart the system.

CAUTION: Be aware of placement of all cables and hoses in relation to the surrounding area. Surrounding area should provide no hazards resulting in involuntary disconnection of cables and hoses. Disconnection will result in inaccurate test results.

Operation

E.1 Filling the Bath

*WARNING: The protection of the device is impaired if used in a manner not specified in the manual.

*WARNING: Possible eye and / or skin irritant. Wear protective clothing and adequate eye protection during test procedures. Hazards can differ from fluid type to fluid type. Please refer to fluid manufacturer's MSDA documentation for detailed information.

*WARNING: During operation and testing, never use bare hands to place objects in the fluid bath. Wear protective clothing and adequate eye protection during test procedures and use metal tongs for object placement and removal. Extremely cold fluid may cause frostbite.

*WARNING: Depending on your temperature verification / calibration device, you may need to adjust the amount of fluid in the bath to reach proper submersion depths. Please refer to individual specifications for more information.

1. Fill the BBR3S with 1.5 gallons (5.5 liters) of fluid so the liquid is approximately 1 ½ to 2 inches from the top. Please refer to individual test specifications for fluid type.

E.2 Power Up the BBR3S

1. The power button on the rear of the BBR3S base unit. The power indicator light on the front of the unit will illuminate.

2. On the refrigeration unit (chiller) by pressing the power switch in the rear of the unit.

3. One to two minutes after powering up the BBR3S unit before opening the program. The computer requires this time to properly load the software and

device drivers, and opening the program sooner will prevent it from opening as intended.

4. The BBR3S has loaded, a dialog window will appear on the screen. Press DISMISS.

5. Use the touchscreen to press the BBR3S software desktop icon to launch the program.

E.3 Stirrer Motor

1. Turn both Speed and Torque control pots to fully counter-clockwise position.

2. While observing Stirrer bar, adjust bottom control pot until stirrer bar begins to “twitch”. This will normally be at about 50% adjustment or less.

3. Turn upper control pot until spinner bar begins to rotate.

4. Slowly adjust bottom control pot until approximately at midpoint of adjustment. It is not recommended to turn control pot fully clockwise.

5. Set stirrer bar to desired rotational speed using upper control pot.

E.4 Overview of Touchscreen and Menus

- The chart in Figure E.4.1 outlines the BBR3S’s software screens. Once the BBR3S program has launched, the Main Screen (shown in Figure E.4.2) will launch. This screen allows you to setup, run, and view tests and machine components.

- The right part of the screen shows values for machine load, deflection, and temperature. The lower half has the system status lights and controls for the machine.

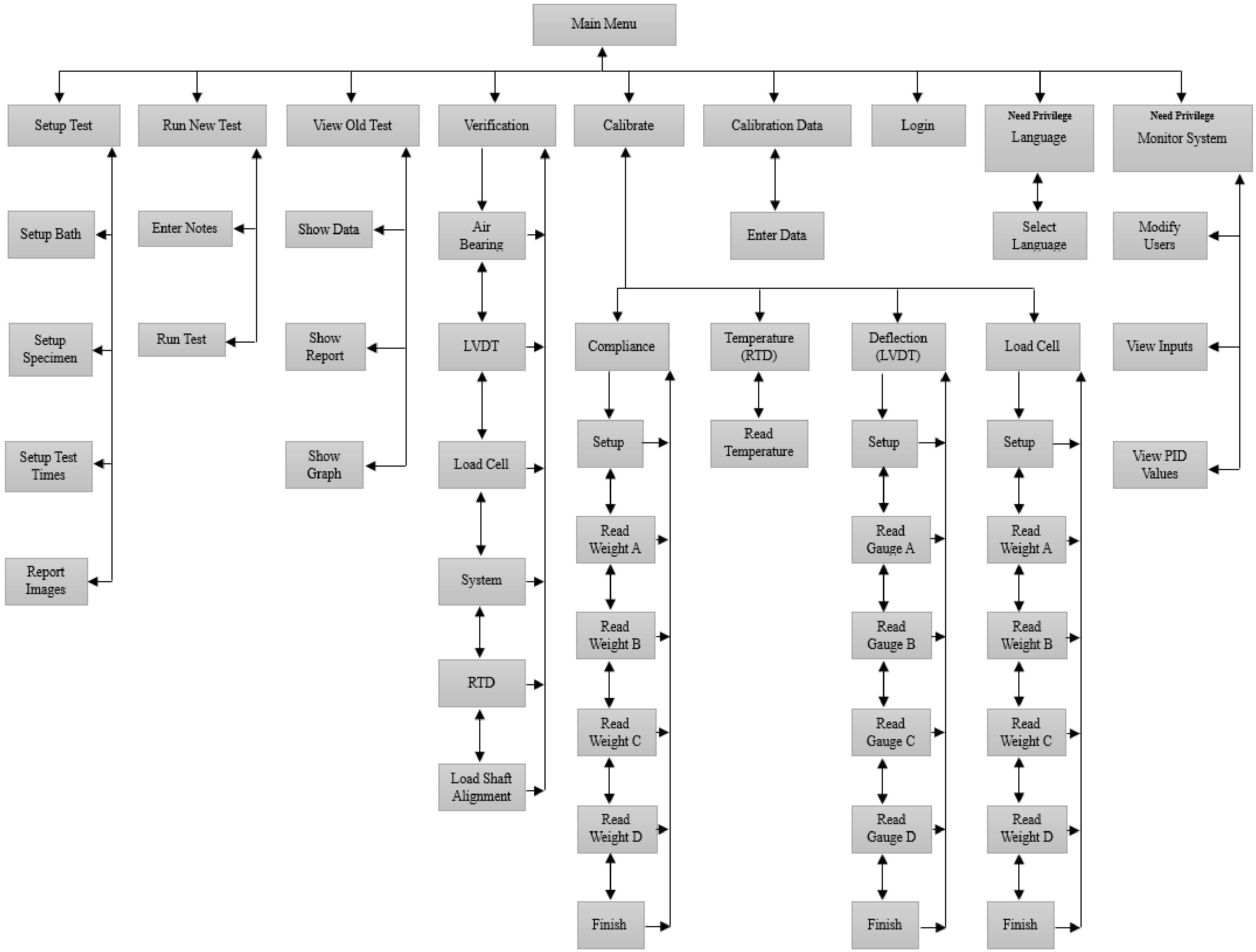


Figure E.4.1 ***– BBR3S Software Screen Map***

NOTE: The “Exit” button on the bottom right of the screen will exit the BBR3S program and return to Windows. To return to the Main Menu screen from any other BBR3S software screen, press the “Main Menu” button in the upper right corner.

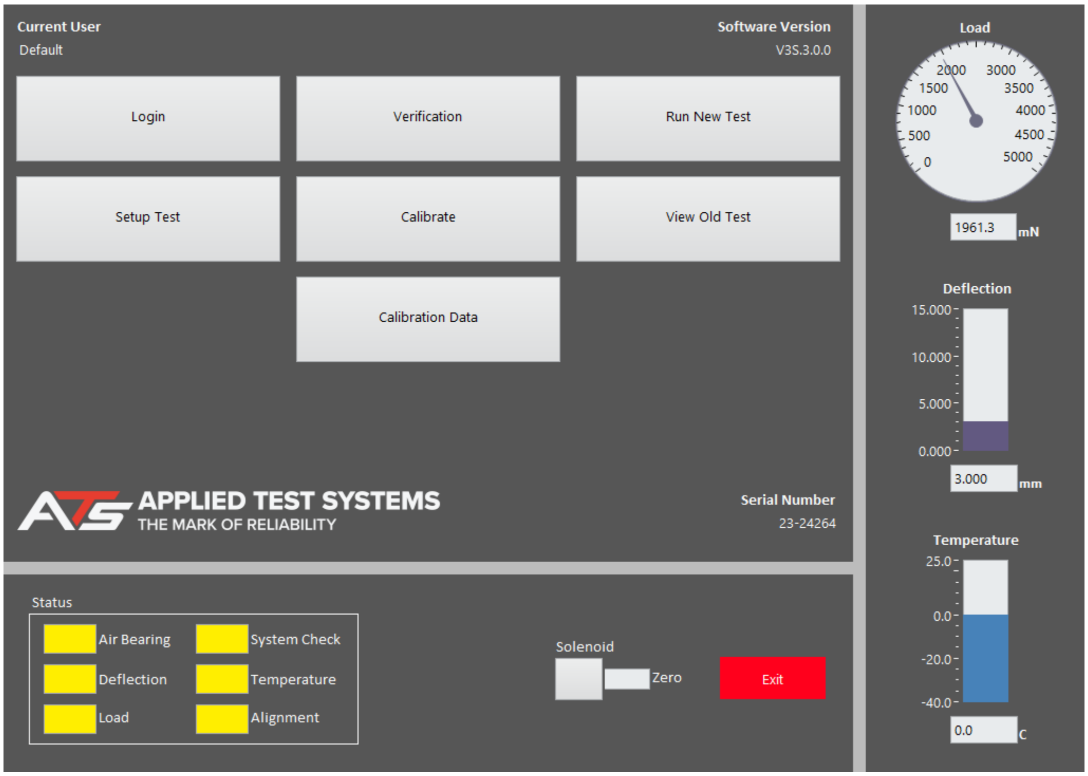


Figure E.4.2 ***- Main Menu Screen***

E.5 Editing Users and Permissions

When you press the “Modify Users” button on the Monitor System Screen the dialog shown in Figure E.5.1 is displayed. The “Monitor System” button will not be shown on the main menu unless the currently logged in user has permission to edit the users on the system.

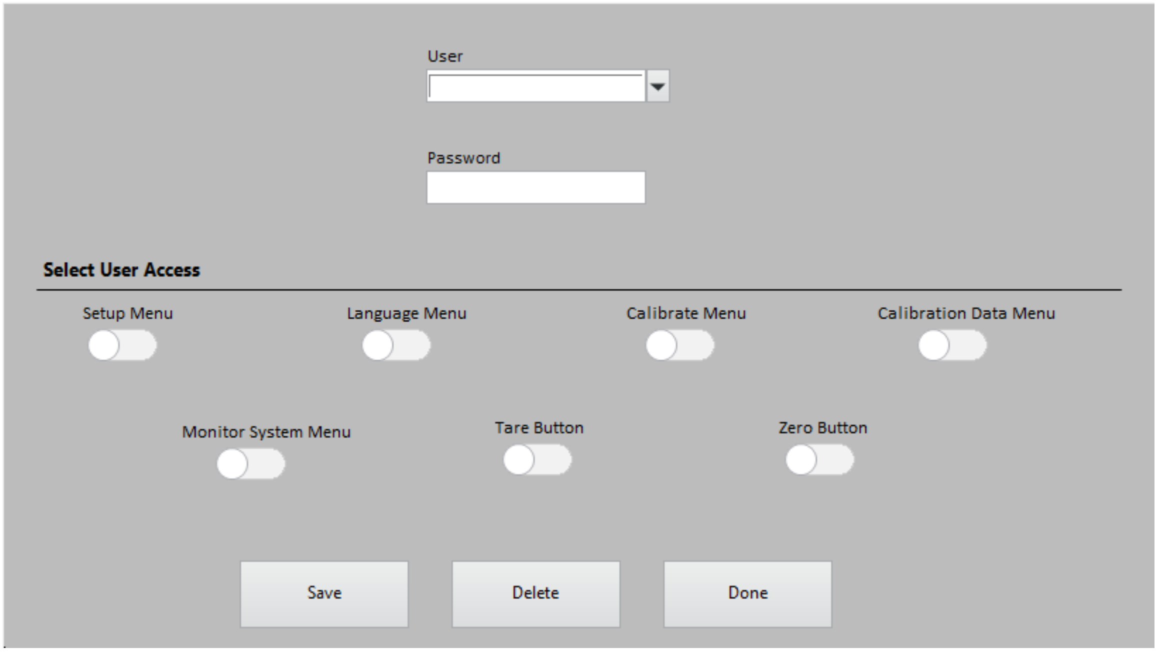


Figure E.5.1 ***- Modify Users***

Operator Name Field

Allows you to select a user to edit. Use the down arrow button to drop down a list of users saved on the system.

Password Field

Contains the current password for the selected user. If this field is left blank, no password will be required to log in as this user.

User Privilege Switches

The first three privilege switches set up privileges or permissions for the system:

- Setup Menu – Allows this user to enter the test setup menu.
- Calibrate Menu – Allows this user to perform a calibration on the system.

NOTE: Extreme caution should be used with this permission as there are no safety restriction in this screen.

- Calibration Data Menu – Allows this user to enter the calibration data.
- Language Menu – Allows this user to enter the language menu.
- Monitor System Menu – Allows this user to view the analog inputs and modify users.

- Tare Button – Allows this user to operate the tare button.
- Zero Button – Allows this user to operate the zero button.

Save Button

Saves the current user. **This should be done any time you make any changes you want to keep. If you exit this screen without pressing SAVE, you will lose any and all changes you have made.**

Delete Button

Deletes a saved user. Once pressed, it will verify that you want to delete the selected user. If you answer “Yes”, the user will be permanently deleted from the system. To prevent software lockout, the system will not allow you to delete the Default user.

E.6 Calibration Process

Please refer to www.atspa.com for further video explaining the Calibration & Verification process (To access video, Downloads – Instruction Manuals – Asphalt / Bitumen Testing).

Before calibration, verify that the bath is set at your desired testing temperature. To do this, press the “Setup Test” button on the Main Screen. Enter your desired temperature in the “Test Temperature” field and press “Save” to update and ramp to setpoint.

Figure E.6.1 ***- "Bath Temperature" Field on Setup Test Screen***

After you set your temperature, press "Main Menu" to return to the main BBR3S screen. From the Main Screen, press the 'Calibrate" button to enter the Calibration Screen (Figure E.6.2).

Figure E.6.2 - ***Calibration Screen***

The BBR3S's system status lights, located at the bottom left of the screen, indicate whether or not a component requires calibration.

- Red = the component requires calibration
- Yellow = the component requires verification
- Green = the component is ready for testing

Calibration requires a BBR3S gauge kit. Prior to calibration, verify that the information entered into the necessary fields matches the information provided on the Certificate of Conformance that was shipped with the gauge kit being used for the calibration. Make adjustments as necessary.

WARNING: Be certain to perform ALL STEPS in the calibration menu for each of the sensors EXACTLY AS DESCRIBED. Failure to perform all steps of the calibration procedure may result in incorrect or erratic operation of the BBR3S.

1. Calibrating the Temperature (RTD)

NOTE: Before calibration, verify that the bath is set at your desired testing temperature.

   a. From the Main Menu, select the “Setup” button, enter the desired temperature setpoint, and press the “Save” button.
   b. Verify the load frame is in the bath.
   c. Allow temperature to stabilize for one to two hours after setpoint is reached.
   d. After temperature has stabilized, select “Main Menu”, press the “Calibrate” button, and select “Temperature”.
   e. You will need a calibrated partial immersion reference thermometer suitable to ASTM 133C. Submerge the thermometer into the liquid bath at the appropriate depth beside the RTD.
   f. Leave the thermometer in place for a minimum of two minutes and note the temperature reading to the nearest tenth of a degree (within 0.1°C).
   g. Record this temperature in the field and select the “Finish” button.

2. Calibrating the Load (Load Cell)

   a. Select the “Load” button from the Calibration Screen.
   b. With the load frame in the bath, load the non-compliant beam into test position.
   c. Using the zero regulator, adjust the load nose so it is slightly above the beam.
   d. Press the “Tare” button.
   e. Using the zero regulator, gently lower the load nose lightly onto the beam with minimal load (20 mN ± 10 mN). Press the “Next” button.

f. Select weight A from the gauge kit and place it on the weight pan. Wait five seconds and press the “Next” button.
g. Select weight B from the gauge kit and place it on top of weight A. Wait five seconds and select the “Next” button.
h. Select weight C from the gauge kit and place it on top of weight B. Wait five seconds and select the “Next” button.
i. Select weight D from the gauge kit and place it on top of weight C. Wait five seconds and select the “Next” button.
j. Press “Finish” to record the calibration constant.

NOTE: The calibration constant should be ≤ 2.5 mN and repeatable within 10 % from one calibration to another. If it is not, contact Applied Test Systems at *+1.724.283.1212*.

3. Calibrating Deflection (LVDT)

a. Press the “Deflection” button on the Calibration Screen.
b. With the load frame in the bath, remove any beams from the supports and any weights from the BBR3S.

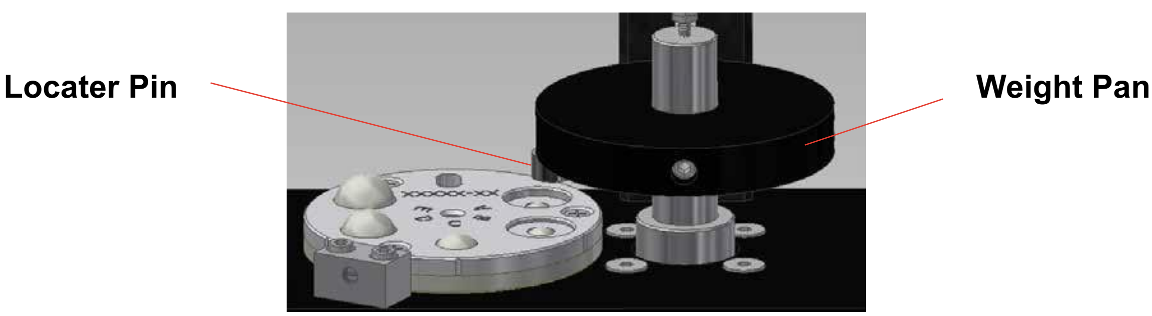


Figure E.6.3 ***- Step Disk Positioned Under Locater Pin***

c. Adjust the zero regulator to raise the load nose to its highest position.
d. Remove the step disk from the gauge kit and place it on the load frame.
e. Gently rotate the step disk so the locater pin is above the 0 step.
f. Using the zero regulator, gently lower the load nose until the pin rests lightly on the 0 step.
g. Place a 100g weight on the weight pan, wait five seconds and press “Next”.

h. Manually raise the load nose by lifting the weight pan and gently rotate the step disk to the “B” position. Gently lower the load nose until the pin rests lightly on the “A” step. Wait five seconds and press “Next”.
i. Manually raise the load nose again and gently rotate the step disk to the “B” position. Gently lower the load nose until the pin rests lightly on the ‘B” step. Wait five seconds and press “Next”.
j. Manually raise the load nose again and gently rotate the step disk to the “C” position. Gently lower the load nose until the pin rests lightly on the “C” step. Wait five seconds and press “Next”.
k. Manually raise the load nose again and gently rotate the step disk to the “D” position. Gently lower the load nose until the pin rests lightly on the “D” step. Wait five seconds and press “Next”.
l. Press “Finish” to record calibration.

NOTE: The calibration constant should be ≤ 2.5 μm and repeatable within 10 % from one calibration to another. If it is not, contact Applied Test Systems at *+1.724.283.1212*.

4. Calibrating the Compliance

a. Press the “Compliance” button on the Calibration Screen.
b. With the load frame mounted in the bath, place the non-compliant beam into test position.
c. Slowly adjust the zero regulator to the lower loading nose until it gently makes contact with the beam (20 mN ± 10 mN). Press the “Next” button.
d. Select weight A from the gauge kit and place it on the weight pan. Wait five seconds and press the “Next” button.
e. Select weight B from the gauge kit and place it on top of weight A. Wait five seconds and press the “Next” button.
f. Select weight C from the gauge kit and place it on top of weight B. Wait five seconds and press the “Next” button.
g. Select weight D from the gauge kit and place it on top of weight C. Wait five seconds and select the “Next” button.
h. Select “Finish” to record the calibration constant.

NOTE: The calibration constant should be less than or equal to 5 µm/N and repeatable within 10 % from one calibration to another. If it is not, contact Applied Test Systems at +*1.724.283.1212*.

E.7 Verification Process

Please refer to www.atspa.com for further explanation of the Verification Process (To access video, Downloads – Instruction Manuals – Asphalt / Bitumen Testing).

Verification of most BBR3S components will need to occur every 24 hours – this is usually done at the beginning of a day of testing. You will need a BBR3S gauge kit and a calibrated thermometer (see RTD) to perform a verification.

The BBR3S's system status lights, located at the bottom left of the screen, indicate whether or not a component requires verification.

- Red = the component requires calibration
- Yellow = the component requires verification
- Green = the component is ready for testing

Figure E.7.1 ***- Verification Screen***

1. To begin, select ‘Verification” from the Main Screen. The screen shown in Figure E.7.1 will display.
2. Verify the information entered in the Confidence Beam Serial # section matches the information on the certification of conformance form that was shipped with the BBR3S. Make corrections if necessary.
3. Press the verification button to begin the verification sequence.
4. Verify the load bearing.

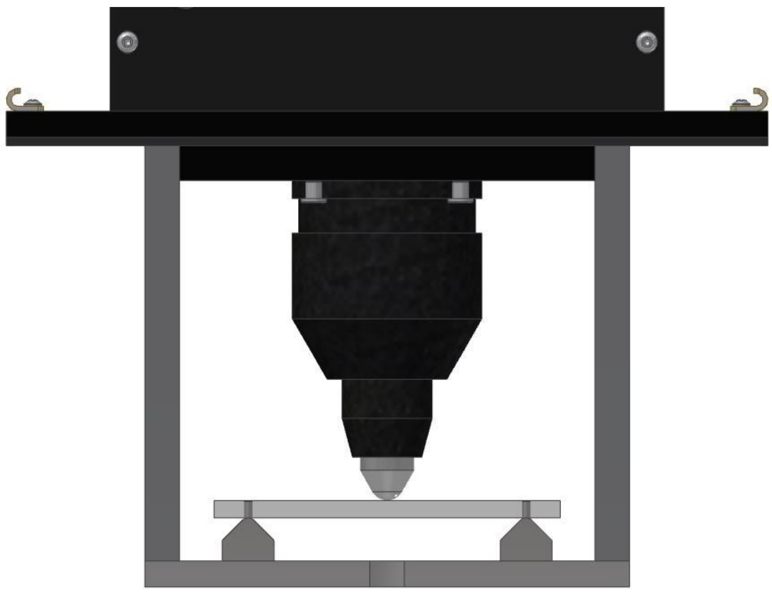


Figure E.7.2 ***- Confidence Beam in Place During Verification***

   a. Place the thin steel beam on the sample supports, and apply a 35 mN load to the beam by turning the zero load regulator.
   b. Observe the reading of the LVDT. Gently grasp the shaft and lift it upwards approximately 5 mm by observing the reading of the LVDT.
   c. When the shaft is released, it should immediately float downward and gently make contact with the beam.
   d. Remove any beams from the supports.
   e. Use the zero load regulator arrows to adjust the loading shaft so that it is free floating at the approximate midpoint of its vertical travel.
   f. Gently add a 2g mass to the loading shelf.
   g. The shaft will slowly drop down under the weight of the added mass. If everything works as the prompts require, press ‘Verification Complete” and then press “Next”.
   h. If the results are not in acceptable range, press “Calibration Required” and then press “Next”.

5. Verify the LVDT
    a. With the loading frame mounted in the bath at the test temperature, remove all beams from the supports.
    b. Place the step gauge disk in any position and apply the provided 100g mass to the weight pan.
    c. Compare the measured displacement to the known gauge disk location. This information can be found on the Certification of Conformance form, as well as on the main Verification screen.
    d. If the known dimensions differ from the measurements by more than ± 5 µm, calibration is required. Press the “Calibration Required” button and then press the “Next” button.
    e. If the measurements are within ± 5 µm, press the “Verification Complete” button and then press the “Next” button to move to the next question.

6. Verify the Load Cell
    a. Verify the Contact Load
        i. Place the Non-Compliant Beam on the sample supports and apply a 20 mN ± 10 mN load using the zero load regulator. Add a 2g mass to the weight pan.
        ii. Verify the increased measured load is 20 mN ± mN. Add the second 2g weight to the weight pan. Verify the increased measured load is 20 mN ± 5 mN.
        iii. If the measurements do not fall within these ranges, calibration is required. Press the “Calibration Required” button and press “Next” to move to the next section.
    b. Verify the Test Load
        i. Place the non-compliant beam on the sample supports.
        ii. Apply 20 mN ± 10 mN load using the zero load regulator.
        iii. Add 100g mass to the weight pan.
        iv. If the increase being measured load falls within 981 mN ± 5 mN press the “Verification Complete” button and then press the “Next” button to move to the next section.
        v. If the increase in measure does not fall within 981 mN ± 5 mN press the “Calibration Required” button and then “Next”.

7. Verify the System

Figure E.7.3 ***- System Verification***

a. Ensure the load frame is in the bath.
b. Place Confidence Beam on the sample supports.
c. Apply 100g mass to the weight pan.
d. Press “Record”
e. Apply the second 100g to the weight pan and press “Record”.
f. The modules reported should be within 10 % of the modulus of the Confidence Beam, as listed on the verification conformance form.
g. If the measurement is within 10 % press “OK” then the “Verification Complete” button.
h. If the measurement is more than 10 % press “OK” and then the “Calibration Required” button.
i. Press the “Next” button to move on to the next section.

8. Verifying the RTD
   a. You will need a partial submersion calibrated reference thermometer suitable to ASTM 133C.
   b. With the load frame in the bath, immerse the calibrated reference thermometer into the bath close to the RTD.
   c. Compare the measured system temperature to the reference thermometer.
   d. If the temperatures differ more than ± 0.1°C press the “Verification Complete” button and then press “Next”.

9. Verifying the Load Shaft Alignment

NOTE: This only needs done every six months. To skip this step, press the FINISH button without pressing any of the radio buttons.

   a. For this process you will need a strip of white paper 12.7 mm X approximately 25 mm long, and a strip of carbon paper of the same or similar dimensions.
   b. Place the white paper strip on the non-compliant beam and secure with tape.
   c. Remove the load frame from the liquid bath and set it in an upright position on a flat surface.

WARNING: Do not lay the load frame flat with the load nose attached. This will damage the load cell.

d. Place the non-complaint beam on the sample supports, with the white paper facing up.
e. Place a small section of carbon paper over the white paper with the dark side facing the white paper.
f. With the air pressure applied to the air bearing, gently press the shaft downward causing the load nose to make an imprint through the carbon paper onto the white paper.
g. Remove the carbon paper and measure the distance from the center of the carbon imprint to each sample support using vernier calipers.
h. If the difference between the two measurements is 1.0 mm or less, press the “Verification” button followed by the “Finish” button.
i. If the difference between the two measurements is more than 1.0 mm, press “Calibration Required” and contact the Applied Test Systems Service Department at *+1.724.283.1212*.

E.8 Test Setup

Test setup is used to define a BBR3S test specification as well as the type of report it will generate. When you press the “Setup Test” button, the screen shown in Figure E.8.1 will display.

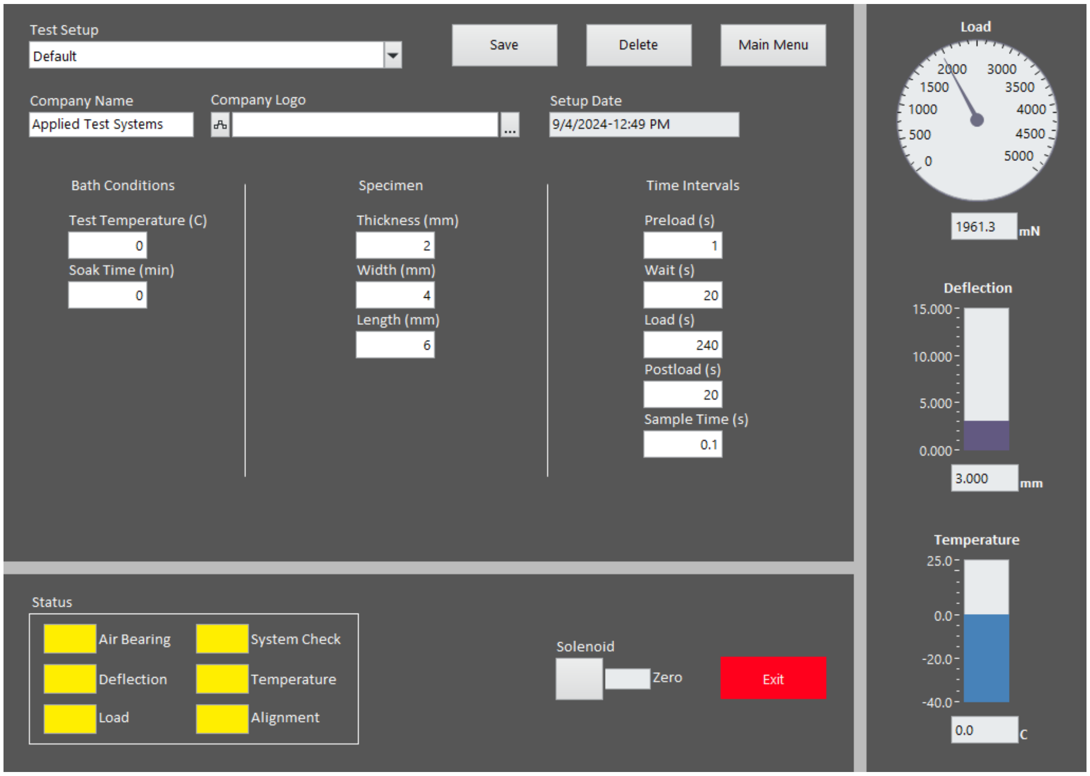


Figure E.8.1 ***- Test Setup Screen***

Test Setup Name

The name of the currently selected test specification. The only limit to the number of tests that can be stored is the size of the disk drive in the BBR3S. Since a test specification takes about 1K of storage space, it would be nearly impossible to run out of space on the drive. You can use the “Test Setup” drop-down box to select different test specifications already saved. Just press the down arrow button to get a list.

Test Date

Shows the last time that the currently selected test was saved.

Saving Test Parameters

The “Save” button will save all the current screen data to the currently selected test specification.

This should be done any time you change anything that you want to keep. **If you exit this screen without pressing SAVE, you will lose any and all changes you have made.**

Creating a New Test

Typing in the “Test Setup” field and pressing “Save” will create a new test using default test specification values.

Deleting a Test

The “Delete” button will delete a saved test. Once pressed, a pop up will require you to verify that you want to delete the test. If you answer YES, the test cannot be recovered.

Adding a Test Company

The “Test Company” is any text you wish to enter. It is stored with the test specification and printed on the report that this test will generate.

Standard Report

The “Standard Report” check box lets you select a standard report or a data report. The data report is most often used to chart in Excel, or another similar program, to generate additional calculations or graphs

APPLIED TEST SYSTEMS
THE MARK OF RELIABILITY

Test Summary Report

Test Identification		Test Conditions		
Report Name:	Default.html	Specimen Dimensions:	102.000(mm) X 12.700(mm) X 6.350(mm)	
Test Name:	Default.cfg	Elapsed time in bath:	60.000 min	
Test Date&Time:	2/8/2017 at 8:50 AM	Most recent checks:	Date:	Result:
Operator Name:	Default	Deflection:	17-Mar-2017	0.092 µm/(ADC count)
Specimen Name:	Default	Load:	17-Mar-2017	0.058 mN/(ADC count)
Testing Company:	Applied Test Systems	Compliance:	17-Mar-2017	0.000 µm/N
		Confidence Check	17-Mar-2017	0.000 Mpa
		Temperature:	17-Mar-2017	

Test Results

Time (s)	Load (mN)	Deflection (mm)	Measured Stiffness (Mpa)	Estimated Stiffness (Mpa)	Difference (%)	m-value
0.0	35.0	0.000	-	-	-	-
0.5	980.0	0.001	-	-	-	-
8.0	980.0	0.016	4997.142	4997.142	0.00	1.000
15.0	980.0	0.030	2665.143	2665.143	0.00	1.000
30.0	980.0	0.060	1332.571	1332.571	0.00	1.000
60.0	**980.0**	**0.120**	**666.286**	**666.286**	**0.00**	**1.000**
120.0	980.0	0.240	333.143	333.143	0.00	1.000
240.0	980.0	0.480	166.571	166.571	0.00	1.000
250.0	35.0	0.000	-	-	-	-

Calculated Parameters

Regression Coefficients:	A= 4.601812, B=-1.000000, C=-0.000000
Correlation Coefficients:	R^2= 1.000000
Min & Max Temperature:	-20.0 (°C), 0.0 (°C)
Min & Max Load From 0.5 to 5s:	980.000 (mN), 980.000 (mN)
Min & Max Load From 5 to 240s:	980.000 (mN), 980.000 (mN)
Average Load From 0.5 to 240s:	980.000 (mN)
Max Load Deviation From 0.5 to 5s:	0.000 (mN)
Max Load Deviation From 5 to 240s:	0.000 (mN)

Operator Notes

Testing was complete on Applied Test Systems
BBR Series 3 SN#12-34567-8 Software Version 1.0.0.0

Figure E.8.2 ***- Standard Report***

Bath Condition Values

The BATH values set the current Temperature and Stir Speed and are saved with the test specification to set the values when it is run.

Specimen Values

The SPECIMEN values are used in the calculations and printed on the report that this test specification generates.

Time Intervals

The Time Intervals are what set the sequence and sample rate the system uses when running this test specification.

NOTE: Each stored data point is a running average of four data points.

Once you have entered your desired test parameters, press “save” and then “exit”.

E.9 Run New Test

Test setup will need to be done before you run a test. See Section E.7 and E.8 for more details if you have not already verified and set up your test. When you press the 'Run New Test" button the run screen shown in Figure E.9.1 will display.

Figure E.9.1 ***- Run New Test Screen***

The BBR3S's system status lights, located at the bottom right of the screen, indicate whether or not a component is ready for testing.

- Red = the component requires calibration
- Yellow = the component requires verification
- Green = the component is ready for testing

The SPECIMEN NAME is any text you wish to make it. It is stored with the test data and printed on the report. This allows you to keep track of which test data or report you are looking at. Be sure you set this BEFORE you run a test for it to be included in the report.

The OPERATOR NOTES button will bring up a dialog to allow you to enter any note you wish to keep with this test. They are stored with the test data and printed with the report. Be sure you write these BEFORE you run a test for them to be included on the report.

If the BBR3S was sitting idle and the loading shaft was free hanging for more than one hour, place the non-compliant beam on the specimen support, then manually exercise the load cell. To do this, place 100 gram of weight on the weight pan and remove it, allowing three or four seconds between loading and unloading. Repeat this at least four times, allowing three or four seconds between each time.

Load Setup

1. Load the non-compliant beam on the specimen supports.
2. The load control switch is located on the Run Test main screen, to the right of the BBR3S's system status lights. Using the touchscreen, move the switch to the zero position (Figure E.9.2).

Figure E.9.2 ***- Load Control Switch in the Zero Position***

3. Adjust the zero regulator (see Figure E.9.3) until the loading shaft contacts the non-compliant beam with a minimal force of 35 ± 10 mN.

Figure E.9.3 ***- Zero Regulator & Load Regulator***

4. Use the touchscreen to move the load control switch to the load position.
5. Adjust the load regulator until the display reading is 980 ± 50 mN.
6. Use the touchscreen to move the load control switch between zero (contact load) and load (test load) several times to recheck the specimen load and verify that the values are stable.

NOTE: Allow the specimen to stabilize in the cooling fluid bath at the required test temperature according to the specifications.

Start Test

1. Raise the loading shaft. Remove the non-compliant beam and place the specimen in the test position.
2. Gently lower the loading shaft, so it contacts the specimen. Make sure the load display is 35 ± 10 mN. If it is not, adjust the zero regulator.
3. Press the “Start” button.
4. The horizontal graph allows the operator to monitor test progress. Current deflection and load values are displayed on the graph.
5. To abort the test, press the “Stop” button.
6. When the test is complete, the system will automatically generate a report and display it.
7. If you have connected a printer to your BBR3S, you can print the test summary report from this screen. To do so, select file and then print.

Run Crack Sealant Test – Optional

1. Before running this test, you will need to remove the (2) anvil adapters from the Anvil. This is performed by lifting each adapter STRAIGHT UP off of the guide pins. See Figure E.9.4.

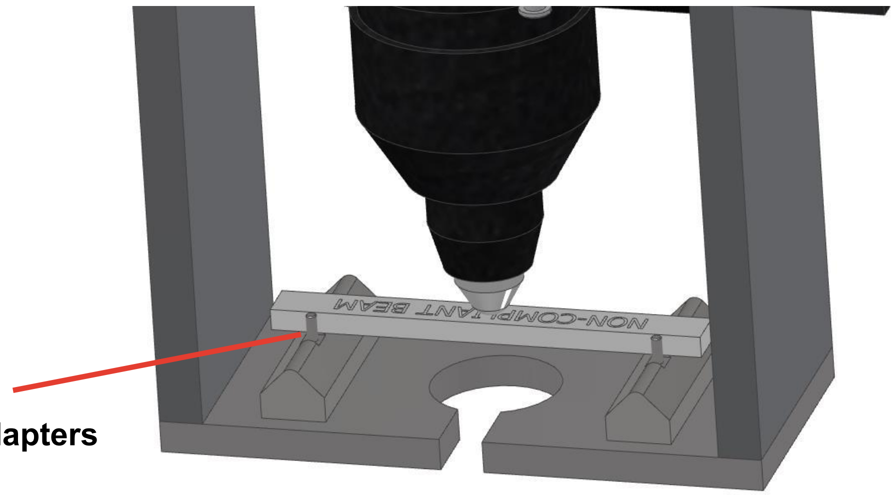


Figure E.9.4 ***- BBR3S Anvil Adapters***

WARNING: Load frame should be removed from the bath and allowed to warm to room temperature before removing the anvil adapters.

2. Raise the loading shaft. Remove the non-compliant beam and place the specimen in the test position. Gently lower the loading shaft, so it contacts the specimen. Make sure the load display is 35 ± 10 mN. If it is not, adjust the zero regulator.
3. Press the “Start” button.
4. The horizontal graph allows the operator to monitor test progress. Current deflection and load values are displayed on the graph.
5. To abort the test, press the “Stop” button.
6. When the test is complete, the system will automatically generate a report and display it.

View Old Test

View Old Test is used to look at test data for tests that have already been completed and saved. When you press the “View Old Test” button the screen shown in Figure E.9.5 will display.

The VIEW OLD TEST section allows users to select different tests that have been saved. Press the down arrow button to show a list. Once a data set has been selected, the data is displayed in the graph.

Press the “Show Data” button to open a dialog that shows a table of the data values for the selected test.

The “Show Report” button will open the report that was generated for the selected test.

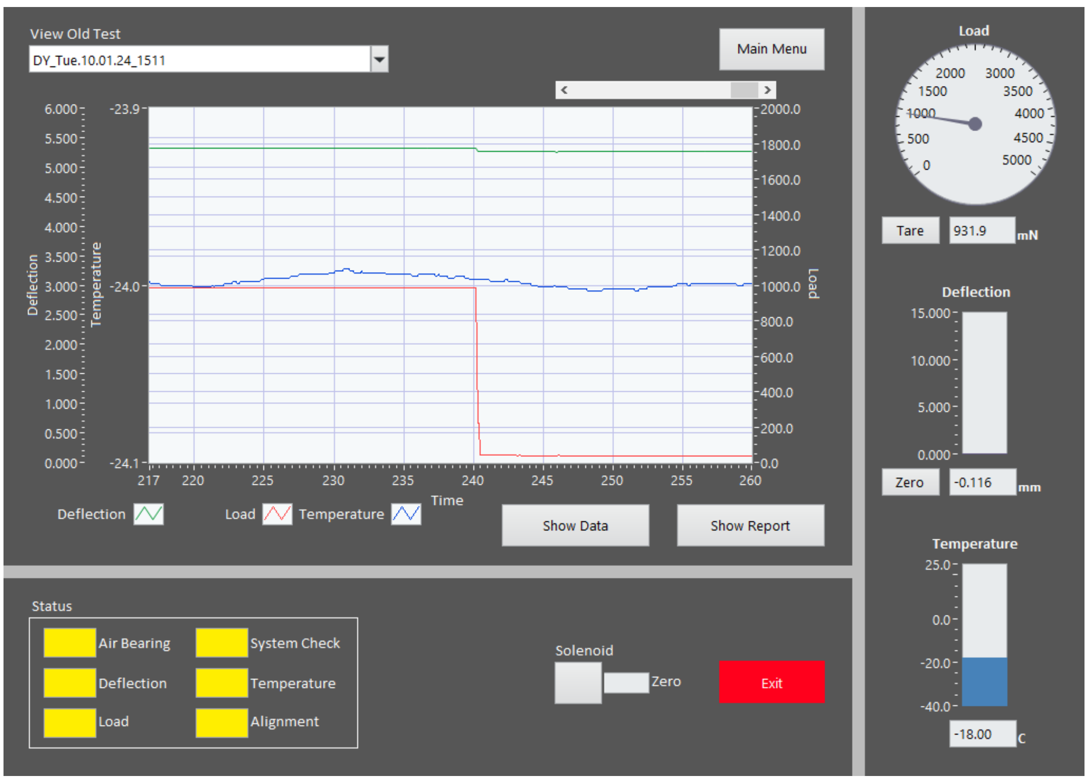


Figure E.9.5 ***- View Old Test Screen***

Troubleshooting

F.1 Preface

Listed within this section are the most common troubleshooting errors that operators may encounter when using the BBR3S. Users may follow the steps provided to work through these basic errors.

Any additional issues or system errors should be brought to the attention of the Applied Test Systems Service Department immediately by calling *+1.724.283.1212* or emailing *service@atspa.com*.

DO NOT attempt to independently fix any other system errors. Any additional errors fixed independent of technical support at Applied Test Systems could result in damage to the equipment, or injury on the part of the operator.

WARNING: To prevent electrical shock, use extreme caution when removing covers or panels. Follow your company's electrical safety procedures thoroughly.

F.2 Load Shaft Stuck or Stalled During Verification or Calibration

When the load shaft seems to be stuck or stalled during verification and calibration procedures, the most likely cause is a misaligned LVDT. To fix this issue, perform the following steps:

SYMPTOM

During load cell Verification and Calibration results are out of range.

VERIFY LVDT ALIGNMENT

Perform LVDT alignment check procedure.

ADDITIONAL ERROR

Contact ATS Service Department.

ALIGN LVDT

Perform LVDT alignment procedure.

1. In order to determine if the LVDT is misaligned, the LVDT must be viewed from above.
    - Remove the front cover on the load frame assembly.
    - Shine a flashlight at the lower end of the LVDT shaft. This light reflects up the shaft, so the LVDT can be viewed from above. See Figure F.2.1.

2. If the LVDT shaft appears to be centered in the LVDT, re-secure the cover and contact ATS for assistance.

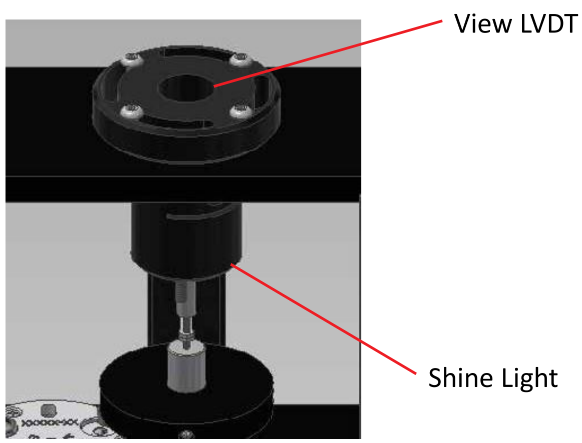


Figure F.2.1 ***- LVDT Shaft***

3. If you determine that the shaft is misaligned, attempt to center it by performing the steps below.
    - Loosen the four retainer screws using a 3/32 – inch Allen wrench.
    - Continue to shine the flashlight on the lower end of the LVDT shaft, while carefully adjusting the housing with the other hand. Position the LVDT housing so the shaft is in the center of the LVDT housing.

CAUTION: Never attempt to adjust the LVDT shaft. If the shaft becomes damaged, the load frame will not produce accurate results.

CAUTION: The load cell can be easily damaged, especially from side loading and excessive torque. DO NOT place Load Frame on its side when the Load Cell is in place. Doing so will result in damage to the Load Cell.

Maintenance

G.1 Cleaning the BBR3S

1. When cleaning the surface of the BBR3S, first disconnect all power sources and place all controls in an OFF position.
2. Use a very mild cleaning agent to wipe down the outside of the unit.

NOTE: When cleaning, be careful not to allow cleaning agent to enter and contaminate the fluid bath.

G.2 Changing the BBR3S Fluid Bath

1. Verify that the BBR3S has reached room temperature before attempting to change the bath fluid.
2. Connect the provided hose to the drain in the underside of the bath. Place the other end of the hose in a bucket large enough to hold the amount of fluid within the unit.
3. Carefully remove the load frame. Do not place the load frame on its side when the load cell is in place, as it can be easily damaged.
4. Use Personal Protective Gear (PPG) to reach into the room temperature bath and pull up on the lever attached to the BBR3S plug. Once the plug is loose enough, pull it out.
5. Once the plug has been removed, the fluid will drain through the hose into the bucket. After the bath has completely drained, remove the hose and discard the bath fluid per fluid manufacturer's instructions.

APPENDIX A: Warranty

Your Applied Test Systems product has been manufactured and inspected by experienced craftsmen. Applied Test Systems warrants, for the original purchaser, each product to be free from defects in material and workmanship for a period of thirteen (13) months from date of shipment or twelve (12) months from date of installation – whichever comes first. This warranty does not apply to failures caused by normal usage, misuse, or repair or service by unauthorized personnel, nor does it cover limited life electrical components which deteriorate with age such as tubes, lamps, fuses, and heaters. Load cells are covered for manufactured defects only – incidents of over load or other customer misuse are not covered under warranty. The warranty does not extend to products not manufactured or assembled by Applied Test Systems.

This warranty is expressly limited to the repair, replacement, or adjustment of the product at Applied Test Systems' option. The product must be returned to the Applied Test Systems factory or an authorized repair center. Applied Test Systems shall not be liable for any labor, transportation, or installation costs that may arise in connection with the product or return.

To obtain warranty service:

1. Applied Test Systems must be promptly notified in writing of the defect.
2. Upon receipt of written authorization, said defective equipment is returned as directed, with transportation charges prepaid by the buyer and –
3. Applied Test Systems examination of such equipment discloses to its satisfaction that the defect exists and was not caused by negligence, misuse, improper installation, accident, or unauthorized repair or alteration.

This warranty is in lieu of all other warranties, expressed or implied, including the implied warranty of merchantability or fitness for particular purpose. In no event shall Applied Test Systems be liable for direct, indirect, special, incidental, collateral, or consequential damages.

The aforementioned provisions do not extend the original warranty period of any article that has been either repaired or replaced by Applied Test Systems.

Applied Test Systems reserves the right to change published specifications.

APPENDIX B: Declaration of Conformity

APPENDIX C: Image Glossary