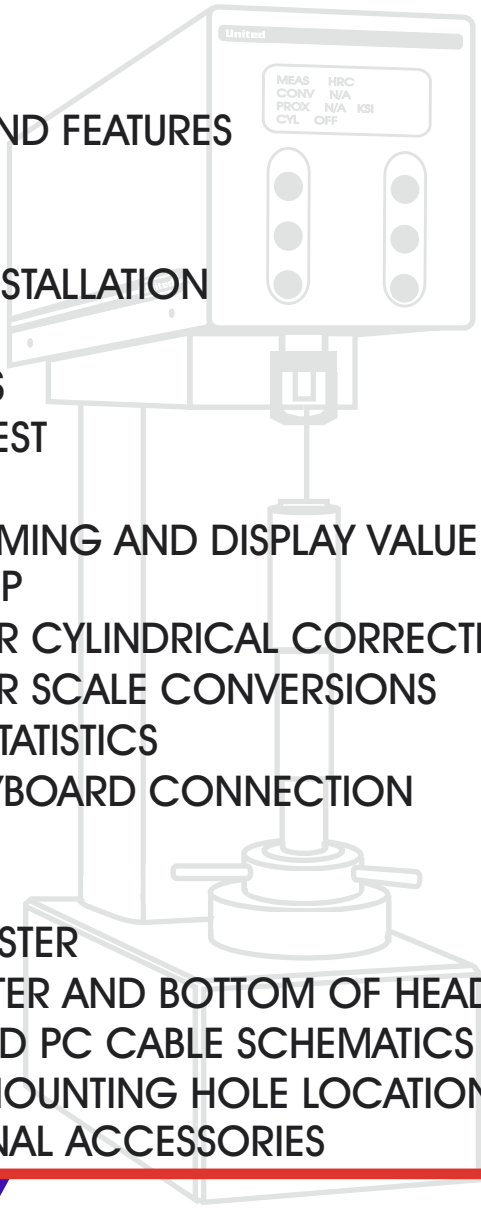
TRU-BLUE
HARDNESS TESTING SYSTEM UNIVERSAL

OPERATOR MANUAL



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Fax (905) 738-5051
E-mail: sales@utscanada.com

SPECIFICATIONS AND FEATURES:

ROCKWELL:

- Regular Scales: A, B, C, D, E, F, G, H, K, L, M, P, R, S, and V.
- Superficial Scales: 15N, 30N, 45N, 15T, 30T, 45T, 15W, 30W, 45W, 15X, 30X, 45X, 15Y, 30Y, and 45Y.
- 3-ASTM E-18 Dwell Time Settings plus NIST SRM timing.
- Plastics Dwell Time settings per ASTM D-785.
- Statistical summary including Average, Range, Standard Deviation, High, Low, and Number of Tests.
- Auto Correction hardness values for cylindrical parts.
- Built-in ASTM E-140 Conversion Charts and ASTM A-370 Tensile Strength Values.
- Parts IN/OUT of Tolerance Settings with Adjustable Audible Alert.
- PS/2 connector for an external computer keyboard.
- RS-232 interface port (9 pin).
- Parallel printer port.
- Identify test data for printer or database using a standard PC keyboard with the tester.
- Bi-directional application of testing: Via elevating unit or control panel.

BRINELL:

- Test Forces in Kg.:2, 2.5, 4, 5, 6.25, 7.8125, 10, 15.625, 20, 30, 31.25, 40, 62.5, 100, 120, 125, 150, 187.5 and 250.
- Test Dwell Settings selectable in 1 sec. increments: 5-30

VICKERS:

- Test Forces in Kg.: 3, 5, 10, 30, 50, 100, and 120.
- Test Dwell Settings selectable in 1 sec. increments: 5-30

GENERAL SPECIFICATIONS:

- Computer Controlled testing with digital closed loop control of force applications.
- Machine uncertainty excluding test block and indenter variations less than 0.1 point corresponds to 3.3 % GR&R for a 3-point tolerance.
- 4x20 Bright Vacuum Fluorescent display.
- Front panel controls with Piezo-Electric switches.
- Auto self-test and last test setup recall at startup.
- Parts Clamp, which can be used to secure irregular shaped or oversize parts.
- 20 bit analog to digital converters for force and depth measurements.
- Co-Axial mounting of Force and Depth transducers.
- Logical setup and operating menu from front panel keys.
- Manual, Hex Driver for indenters and Power Cord.
- Factory Certificate for Direct Verification of: Load, Depth, Hysterisis and Dwell Timing.
- 2-Year Factory Warranty.
- CE Certified.
- Throat depth is 5.5 inches.

. POWER REQUIREMENTS: 100- 240VAC 50/60 Hz 1 Phase 1 AMP.
. DIMENSIONS: 8"W x 20"D x 33.5"H for the 10”, 37.5”H for the 14” and 41.5” for the 18”.
. APPROX WEIGHTS: 185 lbs. (10”), 195 lbs. (14”), and 205 lbs. (18”).

TB-U SETUP:

ENVIRONMENTAL REQUIREMENTS:

Indoor use only.

Altitude to 2000 M.

Temperature range 0 to 50 deg C.

Humidity - non-condensing.

Pollution degree 2.

POWER REQUIREMENTS:

100 TO 240 ~ 50/60 Hz. 1 Phase 1 Amp max.

Transient overvoltages per overvoltage category II.

NOTE: The TB-U is designed to be energized continuously, therefore there is no "ON/OFF" switch. Should it become necessary to de-energize the unit simply disconnect the power cord from the rear of the tester.

GROUNDING:

Users having outlets other than the NEMA standard used in the USA must obtain the proper IEC cord set for their local power system. Always make certain that the power outlet used is properly grounded.

FUSE:

Type T 2A, located within the power inlet assembly. Littelfuse type 218002 per IEC 127-2, rated 2A 250 Volts, or equivalent.

ACCESSORY LIGHT:

The optional HTA-280-IL work light requires a #89 lamp rated at 13.5 volts 0.58 Amps only. Replacement lamps are available from, Gilway Technical Lamps, 800 West Cummings Park, Woburn, MA 01801 USA.

MAINTENANCE:

WARNING there are no user serviceable parts or settings inside the Tru Blue U chassis. There is a potential shock and mechanical hazard internally. Do not open the True Blue U chassis under any circumstances. Contact your United representative for service.

HANDLING AND INSTALLATION:

The elevating screw must be fully raised before moving the TB-U. If the screw is not raised it will prevent the machine from sitting level on a flat surface.
Lift the machine by the base and vertical column. Do not lift the unit by the elevating screw or sheet metal covering of the head. The Tru-Blue U/10 tester weighs approximately 185 lbs. (84 Kgs), a minimum of two persons are needed to move it.

The machine must be located on a secure table or workbench. The tester should be isolated from external vibration, as it may cause the machine to read erroneously.

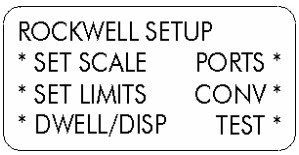
A 3-inch (75-mm) diameter hole in the supporting surface must be located under the elevating screw to allow lowering for maximum testing distance between the top of the screw and indenter.

The machine may be secured to the optional TB-U Floor Stand (part # HTA-200-FS) or other suitable workbench, using the ½-20 tapped holes in the corner gussets located under the base.

GETTING STARTED:

The TB-U was designed for simple operation. Making changes to the tester setups and options may be easily accomplished with minimal operator effort. The various Tester functions can be accessed and changed by following the display prompts. The keyboard is comprised of six individual buttons. Each keyboard button is represented by an "*" which corresponds to an associated lighted "*" on the display. (See front panel illustration on page 10)

1. Press the **MENU** button then select **ROCKWELL** to access the TB-U **ROCKWELL SETUP** menu. A list of options will appear on the display (see illustration). Changing the various options and functions of the TB-U is accomplished from this menu.

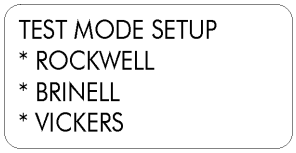


Install an anvil into the top of the elevating unit. Ensure that the top and bottom of the anvil and the top of the elevating unit is free of any rust, oil or dirt.
NOTE: Remove the "Parts Clamping Device" prior to installing an indenter.

2. To install an indenter, loosen the indenter clamp screw using the 7/64" hex driver included with the tester's accessories. Insert the indenter and tighten the screw just enough to keep the indenter from falling out. Place a test block or specimen on the anvil and press the **ENTER/START TEST** button, wait approximately 3-4 seconds, then fully tighten the penetrator clamp screw while the machine is applying the "Major Load". This will ensure that the indenter is properly seated.

SELECTING TEST MODE

Press the **MENU** button to access the TB-U **TEST MODE SETUP** menu. Select **ROCKWELL, BRINELL** or **VICKERS** to enter the set up menu for the desired type of test. (See illustration below). After selecting the desired test settings, press **TEST** to go to the "Ready for Test" screen.



CONDUCTING A TEST:

The Tru-Blue U offers the following two methods to conduct a test (for Rockwell scales only):

NOTE: Although either of the two methods may be used, Method # 1 will generally provide for more consistent results.

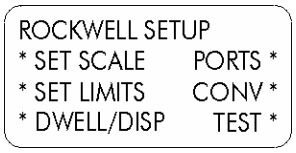
1 Place the test specimen on the anvil and leave a small gap (approximately 1 mm or 1/16 inch) between the test specimen and the indenter. Press the **ENTER/START TEST** button to activate the test cycle. When the test is finished, the penetrator will retract automatically and the tester will be ready for the next test.

NOTE: If the gap between the indenter and the test specimen is too great (3mm or more) the tester will indicate "Test Aborted".

2. Place the test specimen on the anvil. Raise the elevating unit until the test specimen makes contact with the indenter. Continue raising until a series of arrows (>>>>) appears across the display and you hear the audible tone. The test cycle will now automatically begin. When the test cycle is completed, the display will indicate "REMOVE PART" along with the hardness value. Lower the elevating screw until there is a gap between the test specimen and the indenter.

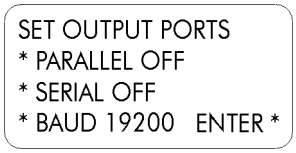
PRINTER SET UP

Press the **MENU** button then select **ROCKWELL** to access the TB-U **ROCKWELL SETUP** menu.



Note: Ensure you have connected the proper cable and printer to the tester's serial or parallel port before setting the port options to the ON position.

To set up a printer output, press the **PORTS** button. **SET OUTPUT PORTS** will appear on the display. Use the buttons to select the available settings for the desired configuration.

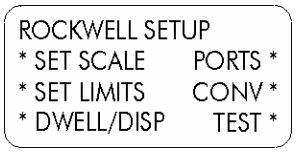


Press the **ENTER** button to return to the **ROCKWELL SETUP** menu.

CHANGE DWELL TIMING/ ROCKWELL VALUE RESOLUTION:

NOTE: Dwell times may be changed as required for the material being tested or user specific test requirements. The TB-U is shipped with the dwell timing set at STANDARD.

Press the **MENU** button then select **ROCKWELL** to access the TB-U **ROCKWELL SETUP** menu.



Press the **DWELL/ DISPLAY** button. **SET DWELL/DISPLAY** will appear on the display.

To change the Dwell timing press the **TIMING** button continue pressing until the desired dwell time setting is reached.

Press the **DISPLAY** button to change the resolution of the Rockwell value displayed after making a test. The resolution can be changed from ### (points) to ##.# (tenths), or ##.## (hundred's).

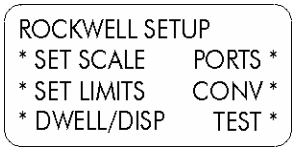
Press the **BRIGHT** button to change the intensity of the display characters, continue pressing until the desired brightness is displayed.

Press the ENTER button to return to the **ROCKWELL SETUP** menu.

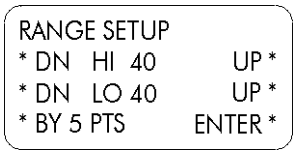
LIMITS ALARM SETUP

The **LIMITS** option enables the user to establish hardness tolerances of parts being tested. The tester will sound an audible alert, and flash a visual warning "**OUT OF LIMITS**" when the displayed hardness value is above or below preset limits.

Press the **MENU** button then select **ROCKWELL** to access the TB-U **ROCKWELL SETUP** menu.



Press the **SET LIMITS** button.

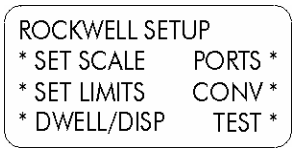


Press the **DN** buttons to lower the HI and LO Limits. Press the **UP** buttons to raise the limits. Press the **ENTER** button to return to the **ROCKWELL SETUP** menu. Press the "**BY 5 PTS**" button simultaneously with an "**UP** or **DN**" button to advance numeric selection in 5 point increments.

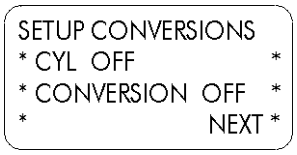
HOW TO SET UP FOR CYLINDRICAL CORRECTION.

NOTE: It may be necessary to correct the Rockwell value obtained when checking convex curved parts. Using the following setup the TB-U will automatically calculate the cylindrical correction using the calculations per ASTM E-18:

Press the **MENU** button to access the TB-U **ROCKWELL SETUP** menu.



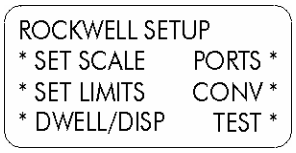
Press the **CONV** button and continue pressing until the desired size is displayed.



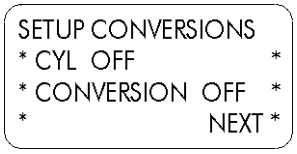
Press the **NEXT** button to return to the **ROCKWELL SETUP** menu.

HOW TO SET UP FOR SCALE CONVERSIONS

Press the **MENU** button then select **ROCKWELL** to access the TB-U **ROCKWELL SETUP** menu.



Press the **CONVERSION** button and continue pressing to scroll to the desired material conversion table. Press the **NEXT** button to enter the selection and continue to the next setup menu, which will be **CONVERT TO.**



Press the **CONVERSION** button and continue pressing to scroll to the desired material conversion. Press the **NEXT** button **CONVERT TO** will appear on the display. Push the **STR CONV** button and continue pressing until the desired unit selection for strain is reached.

Press the **NEXT** button **CONVERT TO SCALE** will appear on the display. Press the **SELECT** button until the desired scale is displayed. Press the **NEXT** button to return to the **ROCKWELL SETUP** menu.

HOW TO RECALL STATISTICS:

The tester will automatically calculate statistics for any number of tests.

Press the **READ STATISTICS** button once and the tester will display AVERAGE (AVG), STANDARD DEVIATION (STD), HIGHEST READING (HIGH), LOWEST READING (LOW), and the RANGE. Press **READ STATISTICS** button to resume testing.

To remove test results from the statistics memory, press the **CLEAR STATISTICS** button once the display will read "REMOVED FROM STATS" "CLEAR STATISTICS TO CLEAR ALL" or "TEST TO CONT. To remove only the last reading and resume testing press the **ENTER/START TEST** button. The display will return to the previous test setup and is now reading to resume testing. To clear all statistical data press the **CLEAR STATISTICS** button. This will remove all data from the last set of tests. The display will indicate **READY FOR TEST # 1**

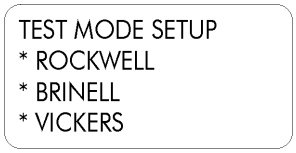
PS2 EXTERNAL KEYBOARD CONNECTION

The True Blue U comes equipped with a PS-2 port for use with a PS-2 external keyboard. To use this option, simply attach a PS-2 keyboard to the connector located at the rear of the machine (see fig.2). You may enter a maximum of 20 alphanumerical characters and spaces that will be stored in the tester's memory. The text will be displayed at the bottom of the True Blue display. This text (i.e. customer name, part # lot # or batch #) is sent to the RS 232 port automatically for printing with the associated hardness data after each test. Use the backspace key to erase last entry or ESC to clear all. This feature is compatible for use with United's optional SPC software.

SETUP FOR DIRECT READING OF BRINELL OR VICKERS INDENTATIONS

Note: *The tester can only be calibrated to one hardness range at a time.*

1. Press the **MENU** button, then select Brinell or Vickers. Connect a PS-2 keyboard to the tester.



2. Select the desired load and dwell times. Simultaneously press the **MENU** and **TEST** buttons to activate the calibration program.

NOTICE

The Tru-Blue U was designed to meet the pending revisions to ASTM E-18. The new NIST standard reference blocks are used for traceability on the scales currently available, for this reason, readings may not be exactly the same as the original **United** Tru-Blue Hardness Testers.
Tru-Blue machines are verified using NIST traceable Force and Length standards. The Rockwell's reading accuracy is dependent upon the following variables:

1. Applied forces.

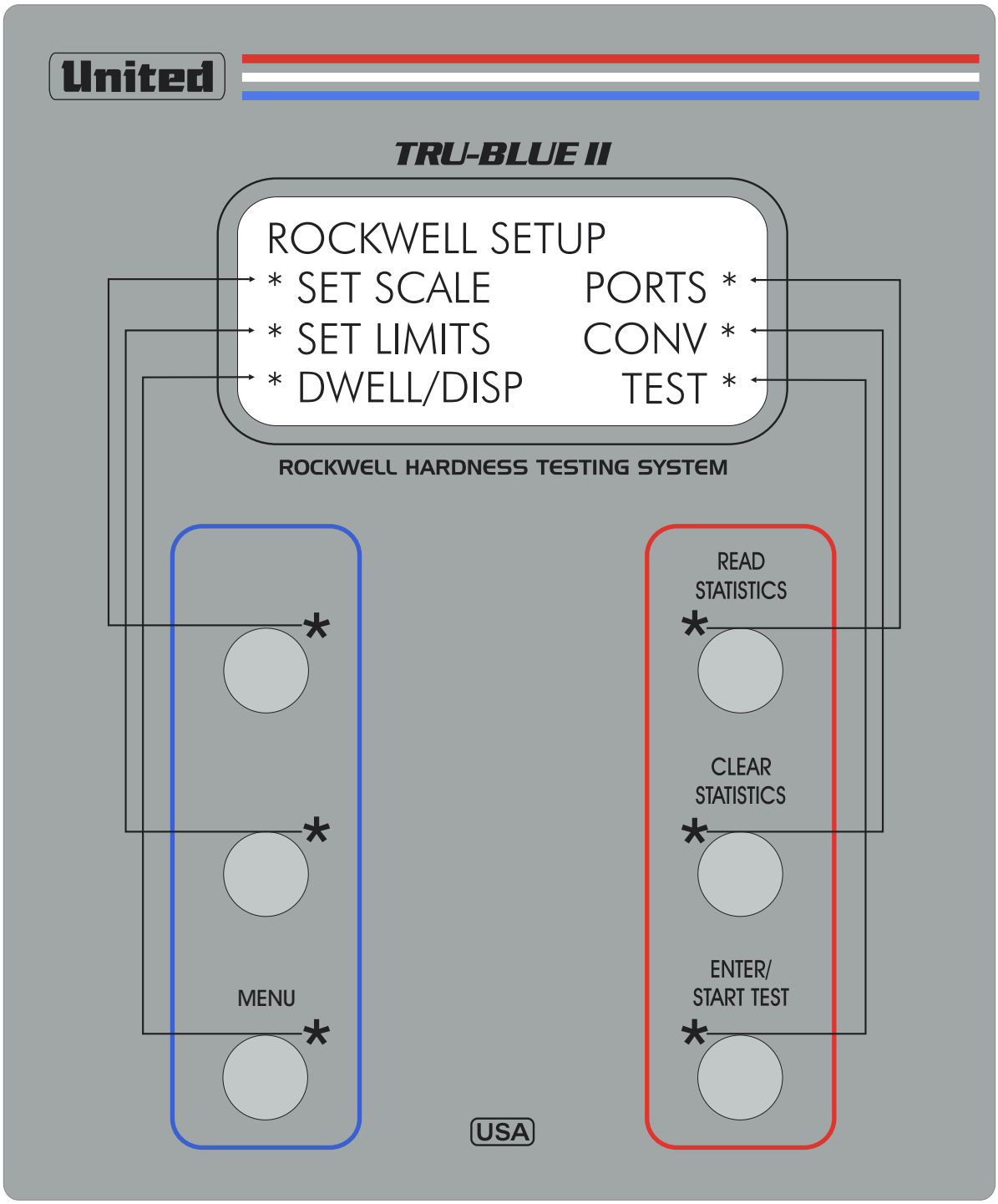
2. Dwell time of force application.

3. Measurement of penetration depth

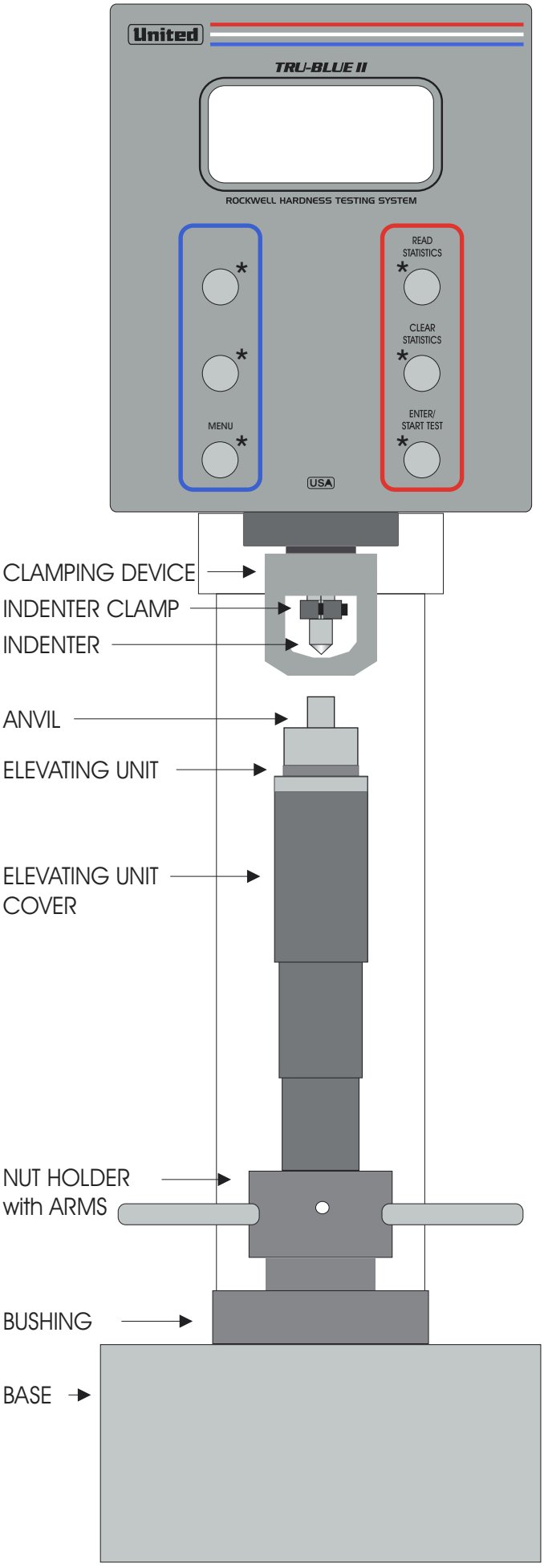
4. The precise geometric shape of the diamond or ball indenter.

5. The actual hardness of the test block.

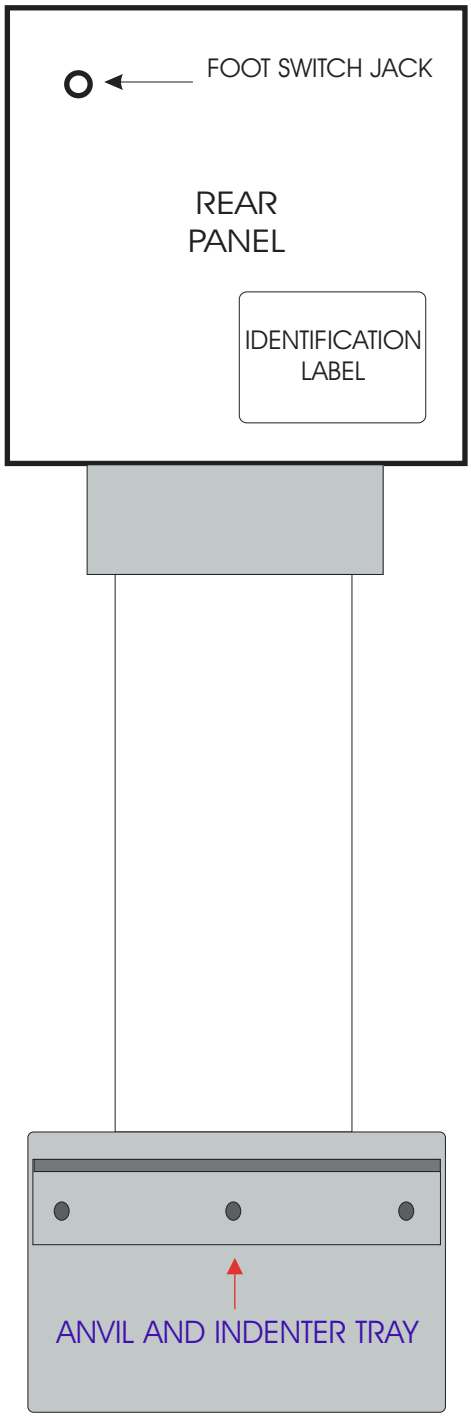
NIST traceable standards have been used to control items 1, 2, and 3 very precisely. Every effort is being made to maintain consistency in our diamonds and blocks.
Changes in standards are the result of ongoing procedural changes being recommended by NIST. United is committed to stay abreast of all changes to standards and practices as defined by NIST.

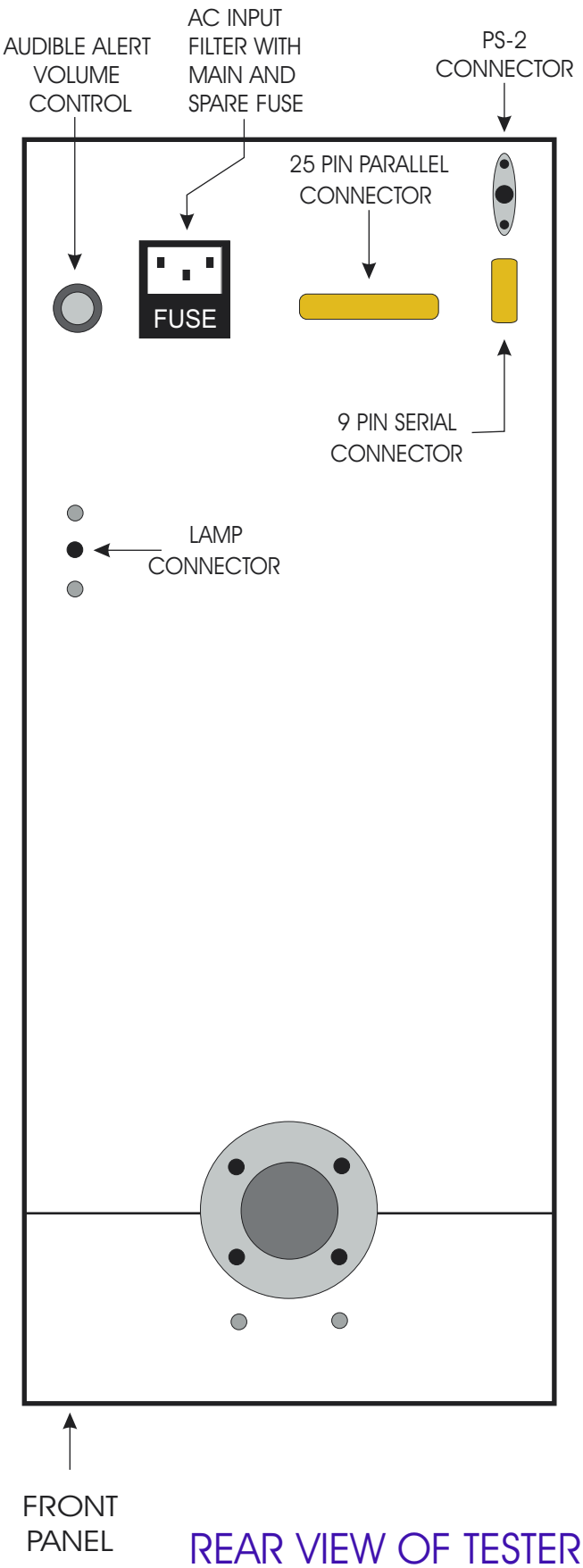

United
TRU-BLUE II
ROCKWELL SETUP
* SET SCALE
* SET LIMITS
* DWELL/DISP
PORTS *
CONV *
TEST *
ROCKWELL HARDNESS TESTING SYSTEM
READ STATISTICS
CLEAR STATISTICS
ENTER/ START TEST
MENU
USA

FRONT PANEL

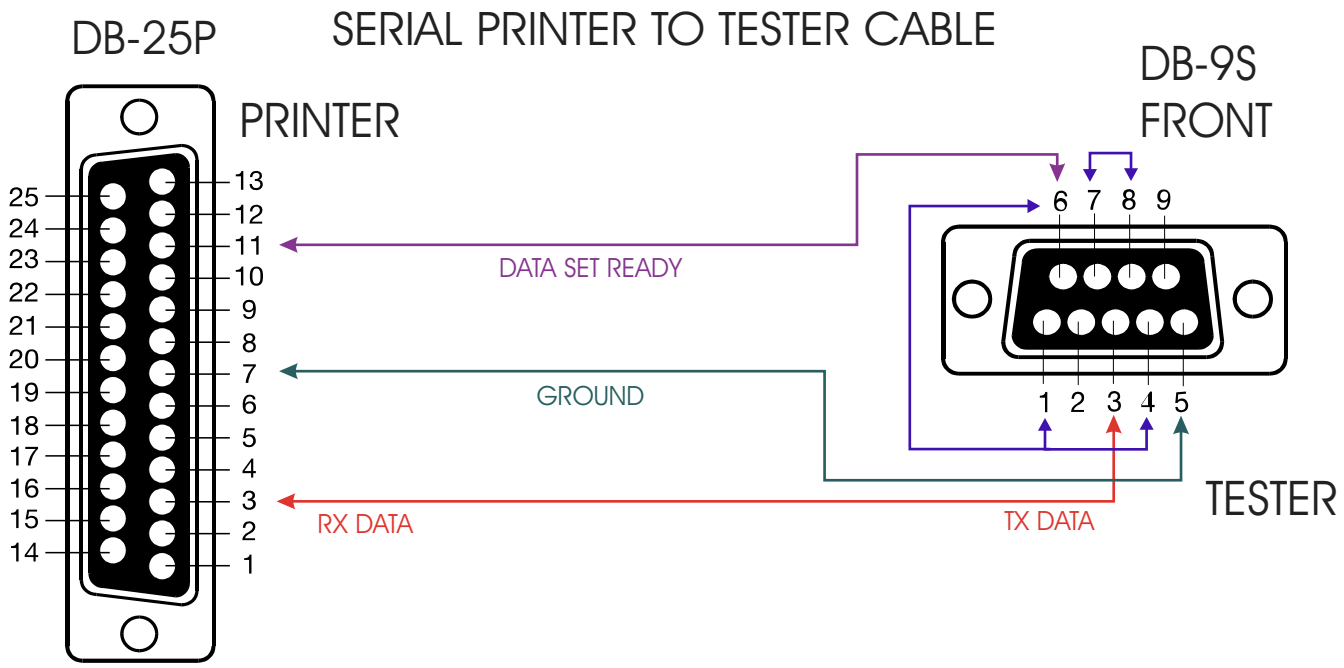


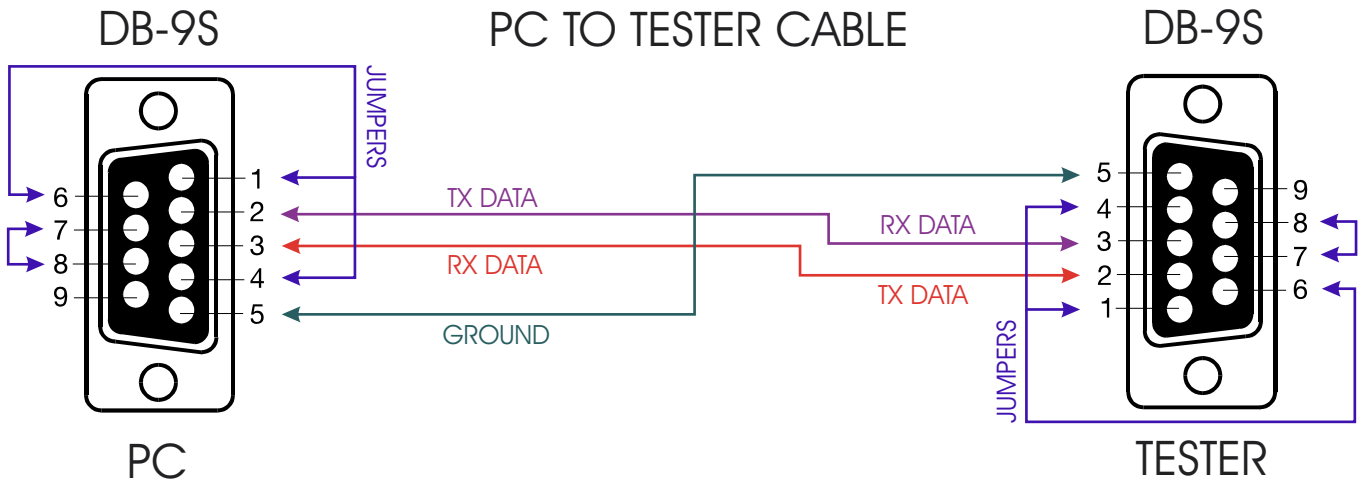
FRONT VIEW OF TESTER





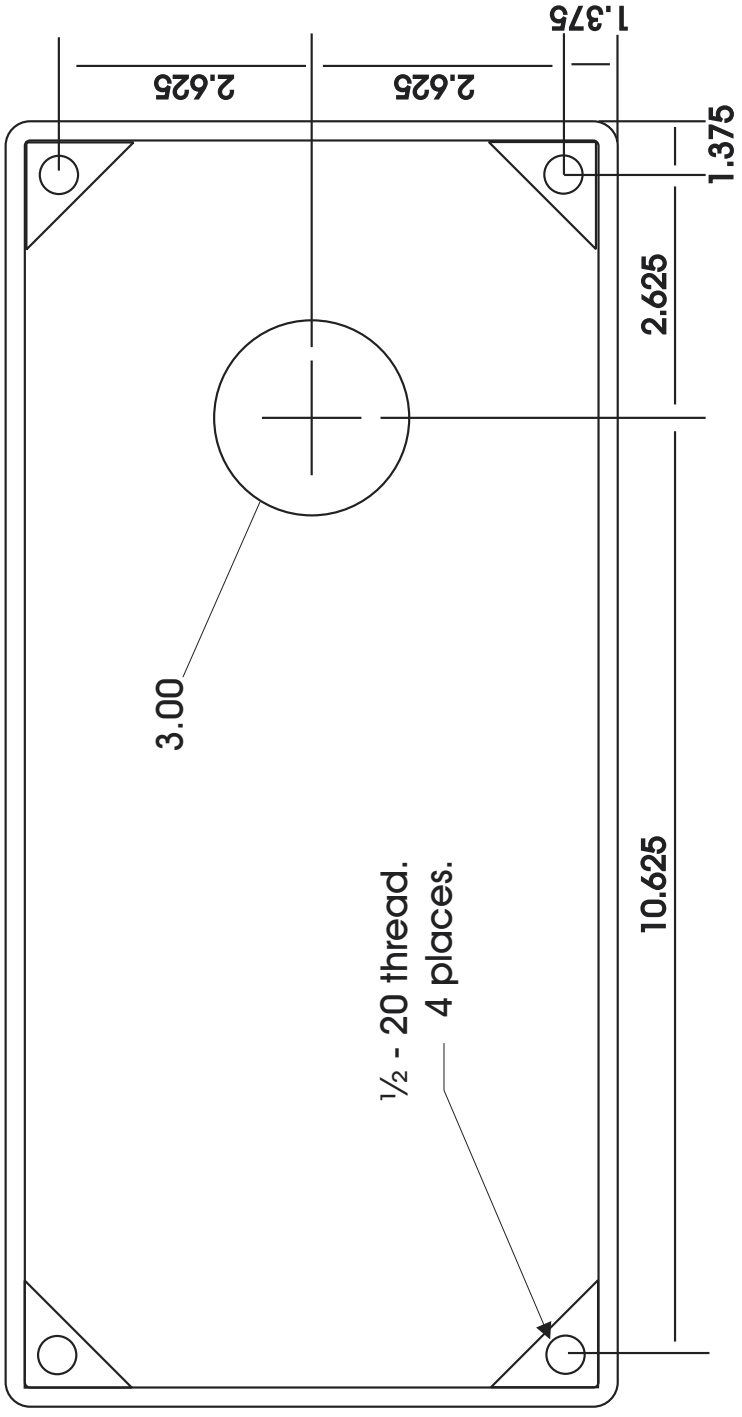
REAR VIEW OF TESTER
AND
BOTTOM OF HEAD





PRINTER AND PC CABLE WIRING SCHEMATICS

FRONT



Dimensions are in Inches

Tru-Blue U base mounting hole location

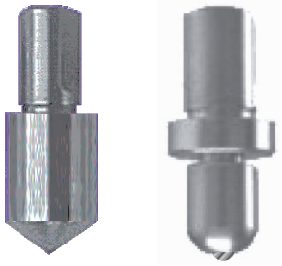
TRU-BLUE U OPTIONAL ACCESSORIES

Floor Stand with out casters HTA-200-FS
Floor Stand with casters HTA-204-FSCA

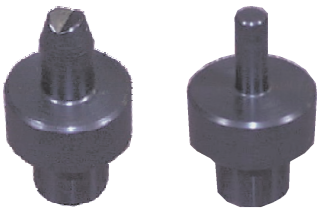
Small serial or parallel printer model HTA-036-SP

Rockwell Test Blocks HTA-270-HTB.
When ordering, specify the scale
and range of each block.

Foot Switch for activation
of the test cycle HTA-290-FS



Rockwell Indenters
"A" Diamond HTA-240-AD
"C" Diamond HTA-220-CD
"N" Diamond HTA-230-ND
Ball indenters 1/16, 1/8, ¼ , ½ sizes.
Steel or Carbide spare balls.



Wide variety of Anvils are available.
2-½ inch Flat HTA-070-FA
¼ Spot HTA-080-SA
1-½ inch "V" HTA-090-VA
Raised "V" HTA-100-RVA