APPLIED TEST SYSTEMS

THE MARK OF RELIABILITY

INSTRUCTION MANUAL

Series 900

Universal Testing Machine

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 FEBRUARY 2018

Information in this document is subject to change without notice and does not represent a commitment on the part of Applied Test Systems (ATS).

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

Telephone: +1-724-283-1212.

Manual Contents

A. Introduction

A.1 Unpacking

Retain all cartons and packing materials until the unit is operated and found to be in good condition. 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 the packing materials for inspection by the carrier.

A.2 Warranty Information

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

A.3 After Sale Support

If there are any questions concerning the operation of the unit or software, contact the ATS Service Department at +1-724-283-1212.

Before calling, 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.

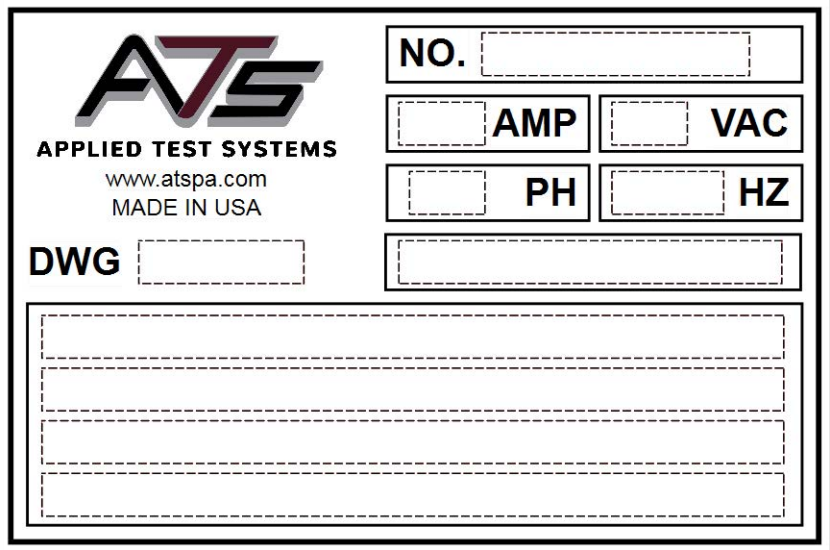

Figure A.1: ATS Sample Data Tag

B. 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 your 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 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 Safety Instructions

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 instruction manuals.

Obey all national and local electric code requirements.

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 servicing to qualified service personnel only.

B.3 Warnings

The following statements are WARNING statements. Unlike CAUTION statements, WARNING statements alert the operator to conditions that may injure personnel. Operators must be aware of these conditions in order to prevent injuries that may occur while operating this equipment.

WARNING: Keep hands and heads clear of the crossheads and load train when pressing the up or down push buttons. Personal injury may result when the loading crosshead begins moving.

WARNING: Always be certain the test area is clear of hands and heads and that the test is complete before pressing the return push button. The return button provides a rapid return.

WARNING: Before energizing the electrical power to the UTM, set all controls and/or switches to the OFF position.

WARNING: Whenever a test is in progress, the operator MUST be at the controls.

WARNING: Keep hands clear of the specimen and load train when test is in progress.

WARNING: Always use the appropriate protective equipment when operating the UTM and any accessory equipment.

B.4 Cautions

The following statements are CAUTION statements. These statements alert the operator to conditions that may damage equipment. Operators must be aware of these conditions to ensure safe operation of this equipment.

CAUTION: Set the adjustable limit switches prior to test operation. The limit switches prevent the moving crosshead from exceeding the pre-set range. Set the limit switches just above and below the range set for the moving crosshead.

CAUTION: If necessary, stop test operation in case of emergency. Use the emergency stop button on the UTM to abort test operation.

CAUTION: Do not exceed the rated capacity of the adapter, grips, or load cell.

CAUTION: Do not lift the UTM by its loading crosshead or it may damage the machine. Lift only under the housing or by the adjustable crosshead.

CAUTION: Be sure the correct load cell in use is selected in the load cell configuration menu.

CAUTION: Test capacity is determined by the smallest load cell in a load train regardless of which cell is connected. If higher capacity is needed, replace the smaller load cell with adapters.

CAUTION: The load capacity of the load train components is reduced at elevated temperatures.

CAUTION: Observe maximum temperature ratings of test components (extensometer, grips, fixtures, couplings, etc.)

CAUTION: Avoid ramming grips and fixtures together at high speeds. The load cell protection feature may not react fast enough to avoid damage to load cell.

C. System Overview

C.1 Equipment Parts

Front of Unit

1. Adjustable Crosshead
2. Load Cell
3. Touchscreen
4. Fixed Limit Switches
5. USB Port
6. Moving/Loading Crosshead
7. Jackscrew
8. E-Stop
9. User Adjustable Limit Switches
10. Adjustable Leveling Feet

Figure C.1: Series 900 UTM

Back of Unit

1. Optional DB 9 Connector
2. Optional Second Load Cell Connector
3. Load Cell Connector
4. Ethernet Port
5. Power Switch
6. Line Cord Connector

Figure C.2: Series 900 UTM (Rear View)

C.2 General Product Description

The ATS Series 900 Universal Testing Machine (UTM) is a benchtop model capable of performing tension, compression, shear, and flexure tests. The Series 905 has a 5,000 lb. capacity (22.2 kN), while the Series 910 has a capacity of 10,000 lb. (44.4 kN). Loading is accomplished by the lower crosshead being driven by a single screw jack powered by an electronically controlled servo drive motor. Hard chrome plated columns maintain alignment of the crossheads.

Operation of the Series 900 UTM is controlled by the touch screen HMI. A variety of accessories are available to provide added capability and flexibility. These include furnaces, ovens, data acquisition, fixtures, and grips. For additional information on our full line of UTM accessories, please contact your ATS sales representative by calling +1-724-283-1212.

C.3 Product Specifications

Capacity	Series 905: 5,000 lb. (22.2 kN) Series 910: 10,000 lb. (44.4 kN)
Clearance	Horizontal: 16 inches between columns Vertical: 36 inches between crossheads (excluding grips or fixtures)
Crosshead Travel	24 inches standard, longer or shorter travel available
Upper Crosshead	Adjustable from zero to 36 inches from loading crosshead
Speed Range	0.02 - 20 inches per minute
Weight	Series 905: Approximately 500 lb. Series 910: Approximately 500 lb.
Power Requirements	230 VAC, 1 Ph, 50/60 Hz, 15 A
Overall Machine Dimensions	61.0625” high, 31.50” wide, 36.125” deep (depending on HMI location)
Base Footprint Dimensions	31.50” wide, 24” deep

D. Installation

D.1 General Installation

1. Remove the shipping crate and packing material from the UTM, leaving the UTM on its pallet. Inspect the machine for any signs of damage incurred during shipment.

2. Lift the UTM from the shipping pallet by lifting under either the base or the upper crosshead. Do not lift the UTM by the loading (lower) crosshead. If using a fork lift, make sure the forks are fully supporting the front and back of the base otherwise damage may occur to components under the base or the unit might tip.

3. Install the screw protector tube over the jack screw. Tighten the tube hand-tight.

NOTE: The surface on which the UTM is to be installed must have a 3 inch (minimum) diameter hole under the machine to allow the protector tube to extend below the mounting surface.

CAUTION: Before lifting the UTM by the adjustable (upper) crosshead, make sure that the upper crosshead locking bolts are tightened to 1,000 inch-pounds. Refer to Figure D.4 on page 10 for crosshead locking bolts and the use of the spreading jack screws.

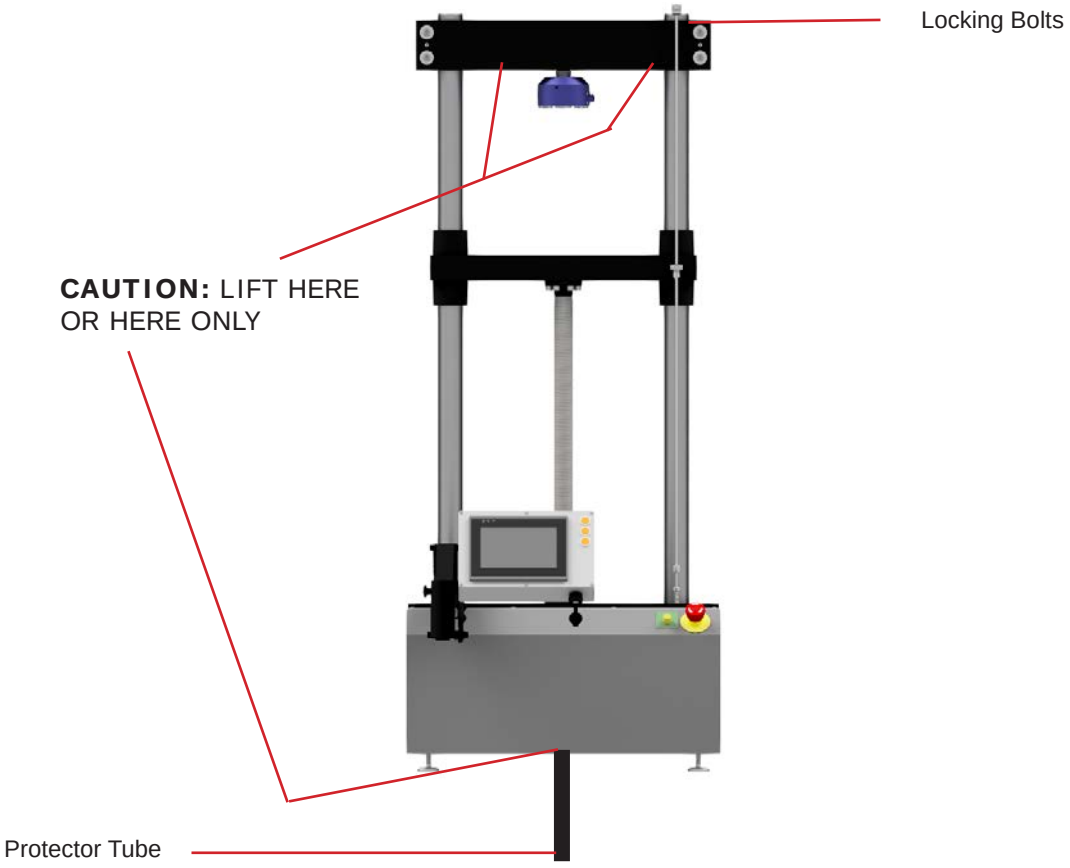

Figure D.1: Series 900 UTM Assembly (Front)

4. Position the UTM with a fork lift or crane. Lift the UTM under the housing or by the adjustable (upper) crosshead.

CAUTION: Do not lift the UTM by its loading crosshead or damage to the machine may result.

5. Install the interconnecting cable between the load cell and the connector on the back of the unit (see Figure D.2). The unit will not function without the load cell connected.

Figure D.2: Load Cell Connection

6. Connect the line cord to the connector provided on the rear of the UTM (Figure D.3). Make sure all controls are set to the OFF position. Check the main power switch/circuit breaker above the connector to make sure it is in the OFF position.

7. Connect the UTM to a grounded source of 230 VAC, 1 Ph, 50/60 Hz, 15 A.

8. The adjustable (upper) crosshead is held in place by the clamping force of the locking bolts. To position the

Figure D.3: Line Cord Connection

adjustable crosshead to test requirements, obtain several pieces of soft wood to use as “blocking” to support the crosshead. To slide the crosshead up or down on the columns it is necessary to loosen the locking bolts. Spreading “jack” set screws are provided and found between the locking bolts. These may be used if necessary to make the crosshead slide more freely. To use them, first loosen the locking bolts then tighten the jack screws until the crosshead moves easily. The crosshead may be positioned by hand or by using the loading crosshead to lift it into position.

NOTE: Before re-tightening the lock bolts, the jack screws must be backed away from the inner surface of the slot as shown in Figure D.4.

9. After positioning the crosshead, tighten and torque the locking bolts to 1,000 inch - pounds. Make sure the spreading jack screws are backed away from the inner surface of the slot in the crosshead before tightening the locking bolts or they will prevent proper clamping.

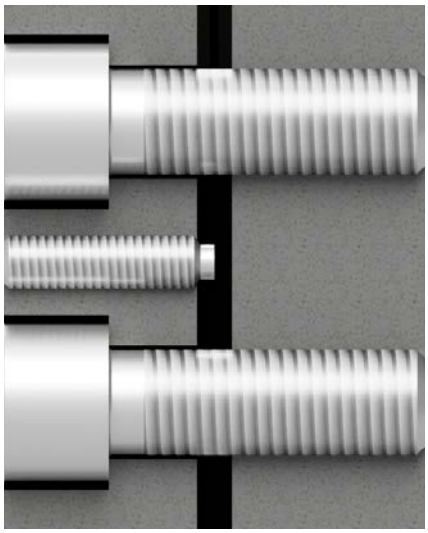

Figure D.4: Section View Through End of Upper Crosshead

E. Software Overview

E.1 Software Map

Figure E.1 illustrates the proper navigation of the Series 900 UTM's software screens.

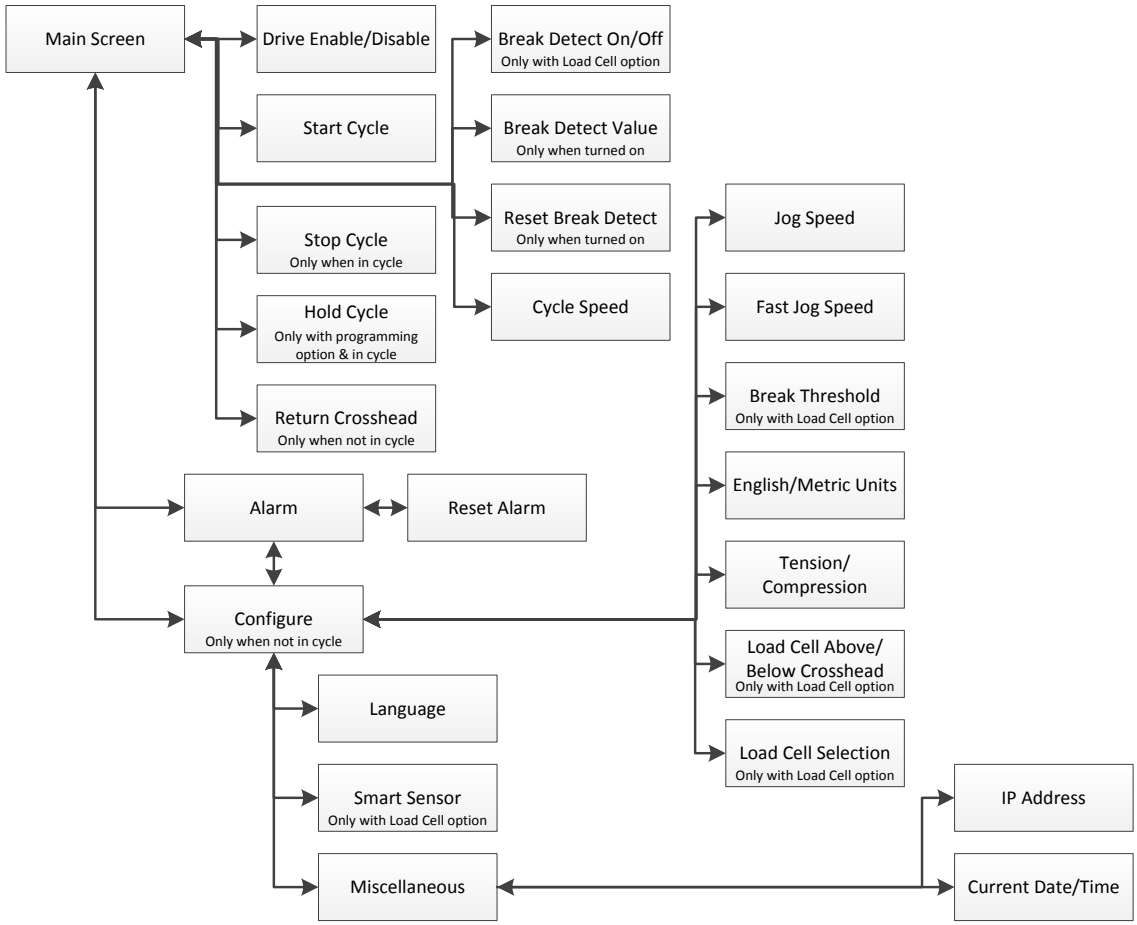

Figure E.1 - Series 900 UTM Software Map

E.2 Main Screen

Figure E.2 illustrates the Main Screen that is shown when the machine is started. It displays the controls needed to set up and run tests.

The Main Screen displays values for the machine Load, Displacement, and Speed. It also has several controls to set up and run the machine. The peak value for load and displacement are shown, and below each there is a

RESET button to reset the peak value to zero. These buttons will be hidden when a test is running.

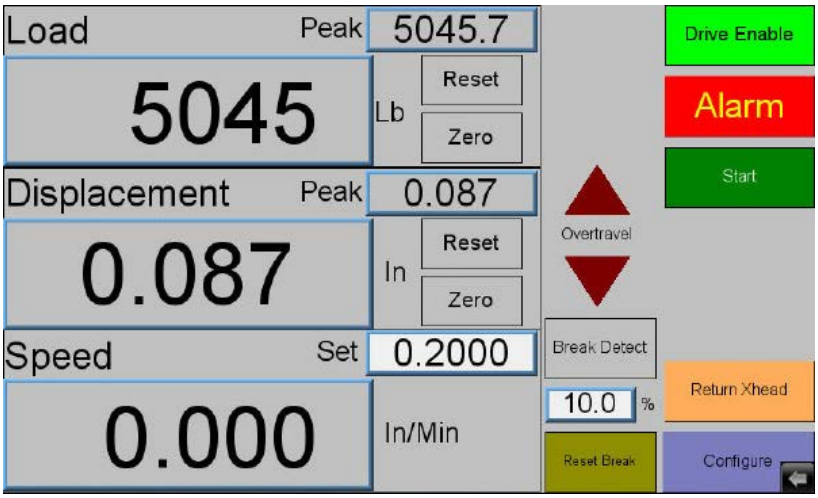

Figure E.2: Main Screen

To the right of both the load and displacement values there is a ZERO button to zero out their values. These buttons will be hidden when a test is running.

To the right of the Speed field there is a SET field that is used to set the test speed. This field is only shown if the system does not have programming option.

Overtravel Indicators

Turns on if the system goes into over travel going up or down.

Break Detect Button

Turns the break detection on and off. When break detect is enabled, a percentage field indicator will be displayed.

Break Detect Percentage Field

Sets the amount that the load has to drop off from the peak for the system to determine that a break has occurred. This value works with the Break Threshold on the Configure Screen.

Reset Break Button

Lights up if the system has stopped a test due to break detection. When it is on, pressing the button will reset the break detection and allow the next test to start.

Drive Enable Button

Used to enable (Green) and disable (Red) the drive system. The drive must be enabled to jog or run a test. As a safety you should ALWAYS disable the drive when you are loading or unloading parts.

Alarm Button

Only shows up on the Main Screen if there is an alarm or warning. If this button appears on your screen, press it to identify which problem the system is alerting you to.

Start Button

Starts a test if the drive system is enabled.

Return XHead Button

If the drive system is enabled, pressing this button will send the crosshead back to the zero displacement position at the current jog speed. Please note that if you press the RETURN XHEAD button and the system is moving to the zero position, pressing it again will stop it.

Configure Button

Used to access all other screens in the system for set-up and standardization. When the system is running a test this button is hidden so that changes cannot be made.

Figure E.3 below illustrates what the Main Screen looks like when the system is running a test. Note that several buttons disappear and the STOP button appears.

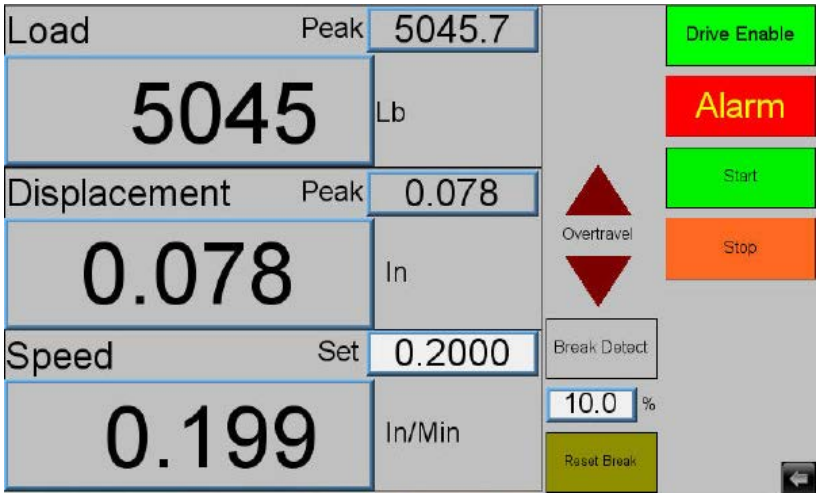

Figure E.3: Main Screen, Test Running

Stop Button

Stops a running test at any time - it does not have to wait for a break detection.

Hold Button

Puts program execution on hold until pressed again. This button is only displayed if the system has the programming option and the program is running.

E.3 Alarm Screen

Figure E.4 illustrates the Alarm Screen. It is shown anytime the ALARM button is pressed on the Configure or Main Screen, and displays the current alarm(s) or warning(s) that has triggered the button's appearance.

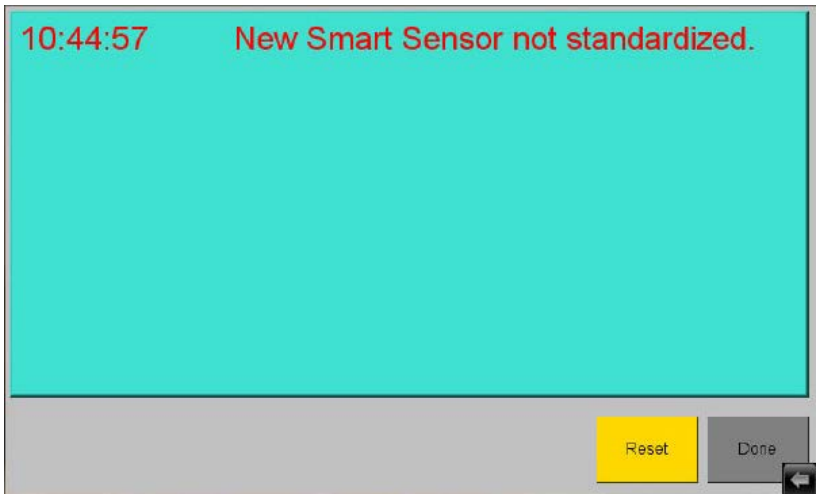

Figure E.4: Alarm Screen

The Alarm Screen will show all current alarms (in Red) and warnings (in Yellow). You can try to reset these with the RESET button. Some alarms will go away automatically when the alarm condition goes away.

The DONE button will return you to the previous screen.

E.4 Configure Screen

Figure E.5 illustrates the Configure Screen. It is shown anytime the CONFIGURE button is pressed on the Main Screen, and allows access to the rest of the screens in the system. If the system is in cycle the CONFIGURE button on the Main Screen will not be visible and you will not be able to access this screen and make changes.

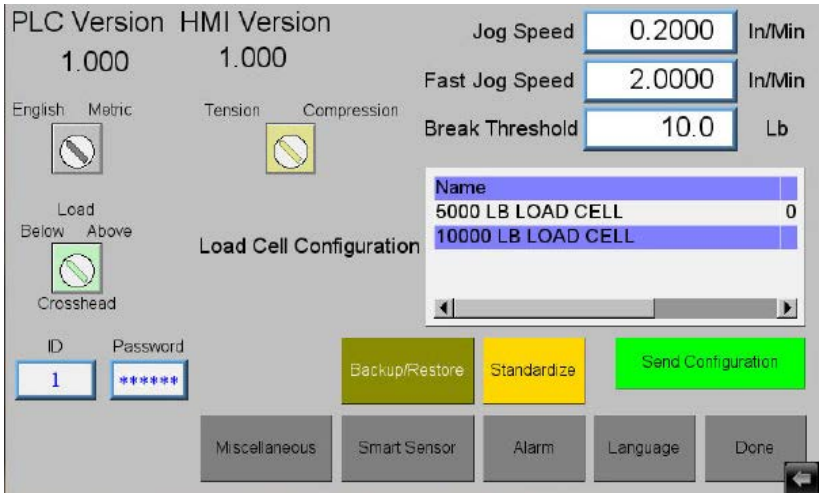

Figure E.5: Configure Screen

The Configure Screen will show the current version of the software in the PLC and HMI. This is very important information, and is frequently requested by the ATS Service department when customers call in for troubleshooting and technical support.

English/Metric Selector

Allows the user to change the machine's units to either English or Metric. The machine's native units are English.

Tension/Compression Selector

Used to determine the direction of movement for the test. This is only available without the programming option.

Load Selector

Tells the machine if the load cell is mounted above or below the crosshead. This will change the TENSION/COMPRESSION selector, which determines the direction of movement.

NOTE: This should always be set to ABOVE for Series 900 UTMs.

Jog Speed Field

Indicates the speed that the system will travel for normal jog, when the JOG buttons or the RETURN XHEAD button are pressed.

Fast Jog Speed Field

Indicates the speed that the system will travel for fast jog, when the jog buttons or the RETURN XHEAD button is pressed.

NOTE: The fast jog speed is used instead of the normal speed if the HIGH SPEED button has been pressed. If the system is in fast jog the HIGH SPEED button will light up. You can turn off fast jog by pressing the button again, or fast jog will time out and return to normal jog after 15 seconds if the system is not moving. If the system is moving (JOG or RETURN XHEAD) then after 15 seconds and the system stops the jog speed will return to normal.

Break Threshold

The load value after which the system will start to check for a break detect if enabled.

Load Cell Configuration

Allows the operator to select which load cell is being used for a test. To perform a valid test, this must be the load cell that is mounted on the machine.

Once you have selected the correct load cell configuration you MUST press the SEND CONFIGURATION button to load the data into the system.

ID Field

The current user identification. At this time, it should always be set to 1. Other values may be used in the future.

Password Field

Associated with the User ID and used to get access to the Standardize and Backup/Restore Screens. When the correct ID and Password are entered these buttons are displayed.

Backup/Restore Button

This button will not be displayed until the correct ID and Password have been entered. Once it is displayed, pressing it will allow access to the Backup/Restore Screen.

Standardize Button

This button will not be displayed until the correct ID and Password have been entered. Once it is displayed, pressing it will allow access to the Standardize Screen.

Program Button

Takes you to the Program Edit Screen. This is only available with the programming option.

Smart Sensor Button

Takes you to the Smart Sensor Screen, described in section E.6.

Alarm, Language, and Miscellaneous Buttons

Each button takes you to the corresponding screen when pressed. These screens are further explained in Sections E.3, E.5, and E.7.

Done Button

Returns you to the Main Screen.

E.5 Language Screen

Figure E.6 illustrates the Language Screen. It is shown anytime the LANGUAGE button is pressed on the Configure Screen.

To change the language the system is using, simply press the flag of the language you wish to use.

Pressing the DONE button will return you to the Configure Screen.

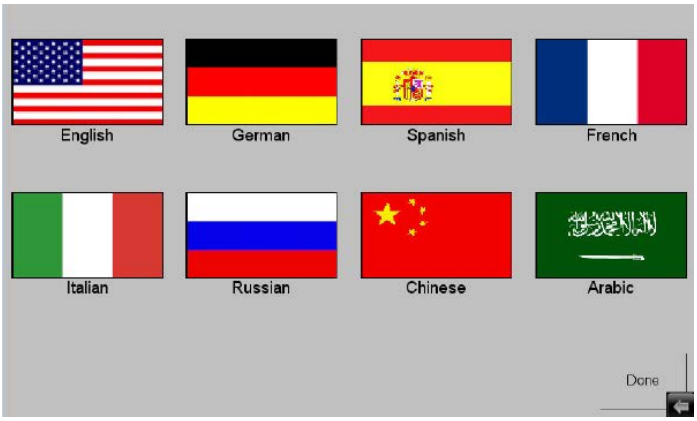

Figure E.6: Language Screen

E.6 Smart Sensor Screen

The Smart Sensor Screen is shown in Figure E.7. It is displayed anytime the SMART SENSOR button is pressed on the Configuration Screen. Its main purpose is to display the data from a smart sensor to verify that the correct load cell is currently attached.

You can get “Smart Sensors” from ATS. They have a memory chip in the connector that tells the system information about the load cell. If a smart

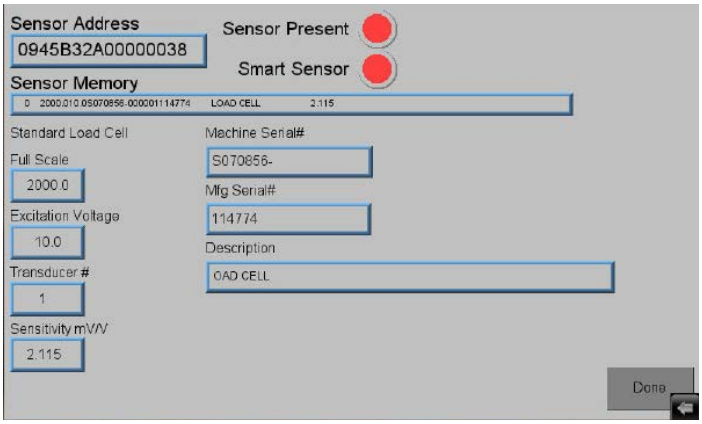

Figure E.7: Smart Sensor Screen

sensor is attached to the system and has already been standardized the system will automatically load the correct configuration data. If it has not been standardized the system will give an alarm that it needs to be standardized.

WARNING: If the cable is disconnected from the load cell, you MUST verify by serial number that the correct cable is attached to it when you connect it to the machine or the wrong configuration data will be loaded into the system causing the tests run with it to be invalid. It may also cause damage to the load cell and machine.

Pressing the DONE button will return you to the Configure Screen.

E.7 Miscellaneous Screen

Figure E.8 illustrates the Miscellaneous Screen. It is shown anytime the MISCELLANEOUS button is pressed on the Configure Screen.

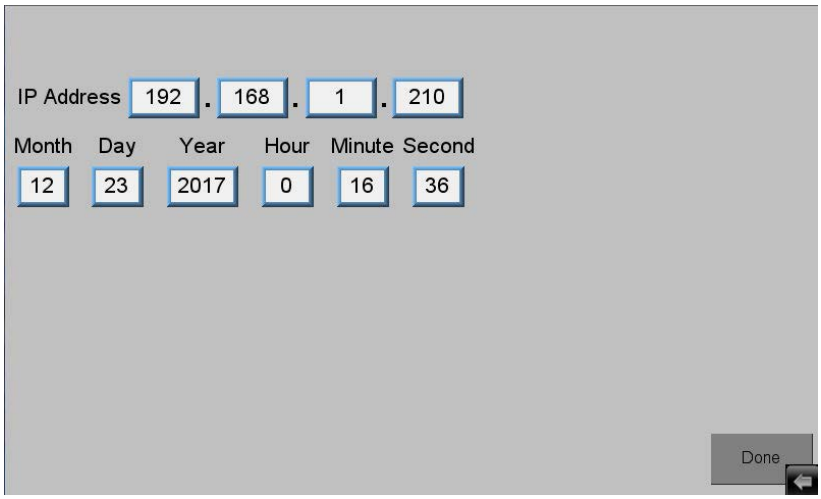

Figure E.8: Miscellaneous Screen

The IP Address field is programmed by the ATS Service department before your system is shipped out, and is only used when connecting to additional software.

The remaining fields are used to set the current date and time of the machine. This is used to notify the operators that it is time to verify and or standardize the load cell that is attached. If the calibration time is up, the system will not stop tests from running but will give a warning and if the load cell is out of specification the test will not be valid.

The DONE button will return you to the Configure Screen.

F. Operation

F.1 Test Frame

The test frame is constructed with a single screw driven by an electronically controlled servo motor driving the loading crosshead. Fixed stops on the limit switch actuator rod are set at the factory to protect the test frame by limiting crosshead movement. Do not readjust these stops. Adjustable limit stops provided with thumbscrews allow the user to limit crosshead movement during testing.

F.2 Test Setup

1. Turn the main power on. Allow twenty minutes for warm-up and stabilization before you run a test. You can do the rest of the pre-test set-up while the system is warming up.

2. Adjust the upper crosshead if necessary. If the upper crosshead needs repositioned see the Installation section (p. 9-10, Step 8) for the proper procedure.

3. Set the run speed, and break detect value if used.

4. Go to the Configure Screen.

5. Set the “Units” for the system.

6. Set the Load Cell location (Above or Below the crosshead).

7. Set the test type (Tension or Compression).

8. Set Jog Speed. This should be a slow speed to allow you to fine tune the position when placing the sample.

9. Set Fast Jog Speed. This may be a fast speed so that you can rapidly move the crosshead close to its needed position.

10. Set the Break Threshold if break detect is going to be used.

11. Make sure the correct load cell is selected and press the SEND CONFIGURATION button.

12. Return to the Main Screen.

NOTE: Always be sure to properly set the adjustable limit switches before every test to prevent injury and damage to the UTM.

F.3 Running a Test

1. Use the jog buttons to position and load your sample into the test fixture.

2. Zero the load and reset the peak.

3. Zero the displacement and reset the peak.

4. With no alarms showing and the drive enabled, press the START button.

If you wish to stop the test before a break is detected press the STOP button.

G. Maintenance

G.1 General Maintenance

The series 900 Universal Testing Machine is relatively maintenance free. However, some basic procedures should be followed to keep your system running trouble-free. Information for specific components of the system is contained within the manufacturers literature included with this manual. This includes information concerning the mechanical elements of the UTM, specifically the translating ball screw actuator, right angle gear head, and the motor drive.

Under normal operation, lubricate the translating ball screw actuator once a month. For severe service conditions, the actuator should be lubricated more frequently (daily to weekly depending on conditions). Use grease recommended in manufacturer’s literature.

The gear head is factory filled with lubricant and requires no lubrication service throughout the life of the unit.

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: Glossary

ADAPTER - A threaded coupling device: mounts one load cell to another or mounts load train components to each other or to a load cell. May be of a variety of types machined to a specific test requirement.

BREAK DETECT - A decrease in load equal to a specified percentage of the peak load.

CAPACITY - The maximum rated load that may be safely applied to the specimen, test frame, load train, and load cell without damage.

DISPLACEMENT - The measured distance traveled by the crosshead.

LOAD - A tensile or compressive force applied to a specimen.

LOAD CELL - A load measuring device that works only in conjunction with the Load Module.

LOAD TRAIN - The assembly of grips and adapters that allow a specimen to be connected between the load cell and loading crosshead.

PEAK DISPLACEMENT - The highest displacement value measured during a test.

PEAK LOAD - The highest load value applied to a specimen during a test.

STRAIN - The change in length of a specimen parallel to the applied load. Measured in inches or millimeters.

TARE WEIGHT - The total weight of the load train and specimen.

Appendix C: Image Glossary