

PLC Lever Arm Tester



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

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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	1
A.1 Unpacking	1
A.2 After Sale Support	1
B. Safety	2
B.1 For Owners, Operators, and Maintenance.....	2
B.2 Cautions.....	3
C. System Overview	4
C.1 Safety Label Locations.....	4
C.2 Equipment Parts	6
C.3 General Description.....	7
Product Specifications	7
D. Installation	8
D.1 Unpack and Set Up	8
D.2 Lever Arm Assembly Installation	8
E. Software Overview	10
E.1 Main Screen	10
Process Time	10
Unload Time.....	10
Start Button.....	10
View Button.....	10
End/Stop Button.....	11
Off State	11
Running State	11
Unload State	11
Test Complete State.....	12
Delay Start State.....	12
Sample Break State	12
E.2 View Screen.....	12
Test Type.....	13

Unload at End of Test.....	13
IP Address	13
Current Time	13
Start Delay	13
Done Button	13
F. Operation.....	14
F.1 Basic Operation	14
F.2 Sample Break.....	15
G. Maintenance	16
G.1 Knife Edges	16
G.2 V-Blocks	16
G.3 General Maintenance	16
Appendix A: Warranty.....	17
Appendix B: Wiring Diagram.....	18
Appendix C: Image Glossary	20

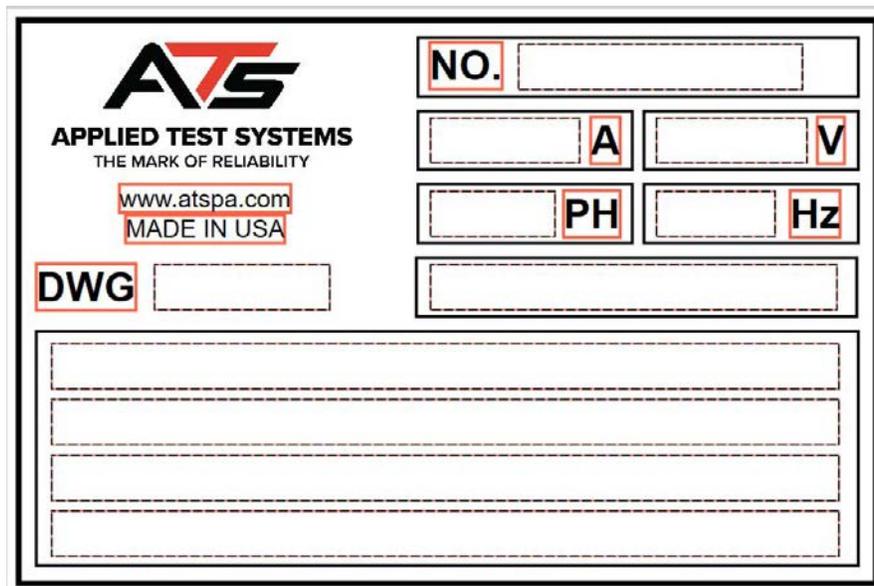
A. Introduction

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 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 or View Screen. A sample data tag is illustrated in Figure A.1, 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.



The image shows a sample data tag for Applied Test Systems (ATS). The tag is rectangular with a black border and contains the following information and fields:

- ATS Logo:** The letters "ATS" in a stylized font, with the "A" and "S" in black and the "T" in red.
- Company Name:** "APPLIED TEST SYSTEMS" in bold black text.
- Tagline:** "THE MARK OF RELIABILITY" in smaller black text.
- Website:** "www.atspa.com" in a red-bordered box.
- Origin:** "MADE IN USA" in a red-bordered box.
- NO.:** A red-bordered box for the unit number.
- A:** A red-bordered box for the software revision number.
- V:** A red-bordered box for the serial number.
- PH:** A red-bordered box for the phone number.
- Hz:** A red-bordered box for the frequency.
- DWG:** A red-bordered box for the drawing number.
- Additional Fields:** A large red-bordered box at the bottom for a detailed description of the problem, divided into four horizontal sections.

Figure A.1: ATS Sample Data Tag

B. Safety

B.1 For Owners, Operators, and Maintenance

Read and understand all instructions and safety precautions listed in this manual before installing or operating the unit. If there are any questions regarding operation of the unit or the instructions in this manual, contact the ATS service department at +1-724-283-1212.

In addition to the safety warnings listed on the equipment, warnings are posted throughout this manual. 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.

All ATS equipment is designed to be operated with the highest level of safety. To maintain the safe operation of this tester, ATS endeavors to educate the operator about safety issues surrounding certain parts of the machinery. These safety issues are addressed through the use of labeling on the equipment. The following labels may appear on your test unit:



Burn Hazard/Hot Surface



Electrical Shock/Electrocution



Protective Earth (Ground)



Hand Crush Force From Above



General Danger



No Access for Unauthorized Persons



Read Operator's Manual

Figures C.1 and C.2 show the general locations of these labels on the test equipment.

B.2 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 in order to ensure safe operation of the equipment.



CAUTION: Read and follow all WARNING and CAUTION statements in all related equipment manuals before attempting to operate this machine. If in any doubt about any statement or sentence, contact the ATS Service Department or your ATS Sales Engineer.



CAUTION: Installation of electrical devices must be accomplished by competent personnel and done in accordance with any current local and national codes. Equipment grounding is REQUIRED.



CAUTION: Before energizing the electrical power to the lever arm tester, turn off all power switches and place all controls in an OFF or neutral position.



CAUTION: Match serial numbers on test frames, support blocks, and lever arms when assembling multiple testers.



CAUTION: When stacking weights on test frames, alternate slots at 180° to prevent tip-over.



CAUTION: Do not place anything under weight elevator that may prevent it from lowering.

C. System Overview

C.1 Safety Label Locations

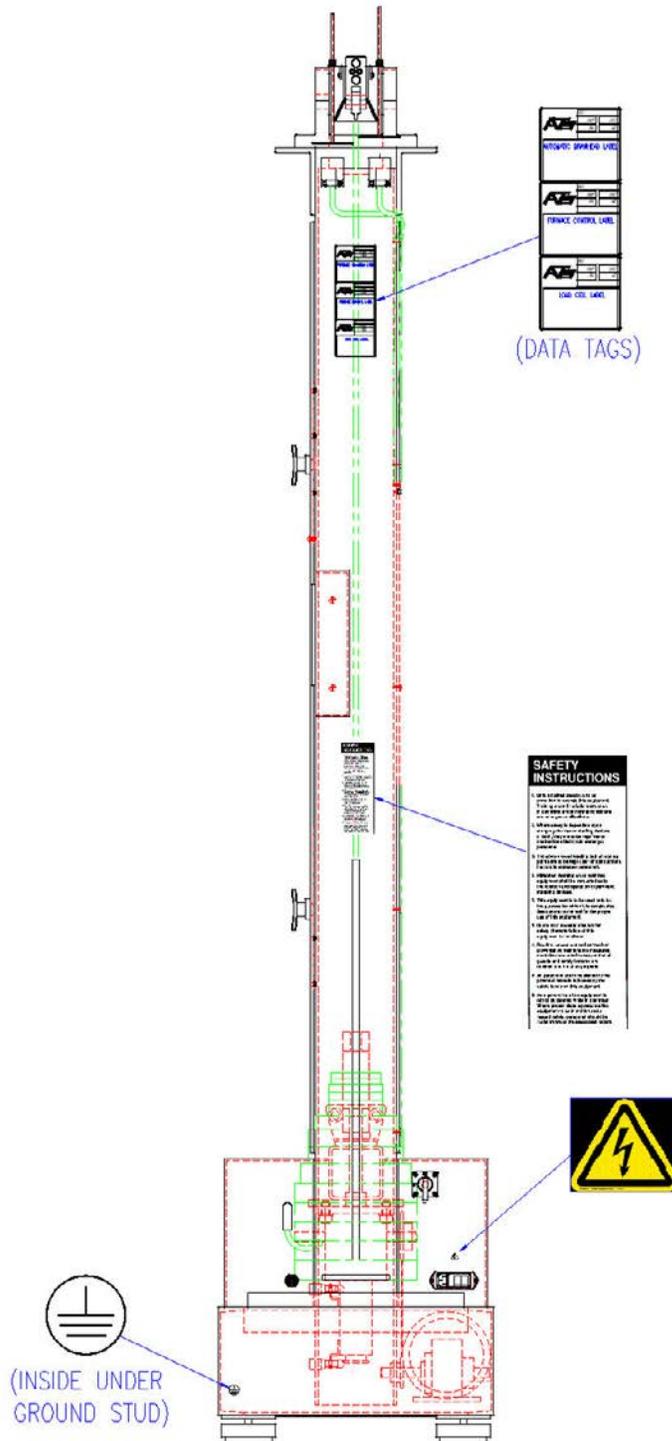


Figure C.1: Safety Label Location, Side

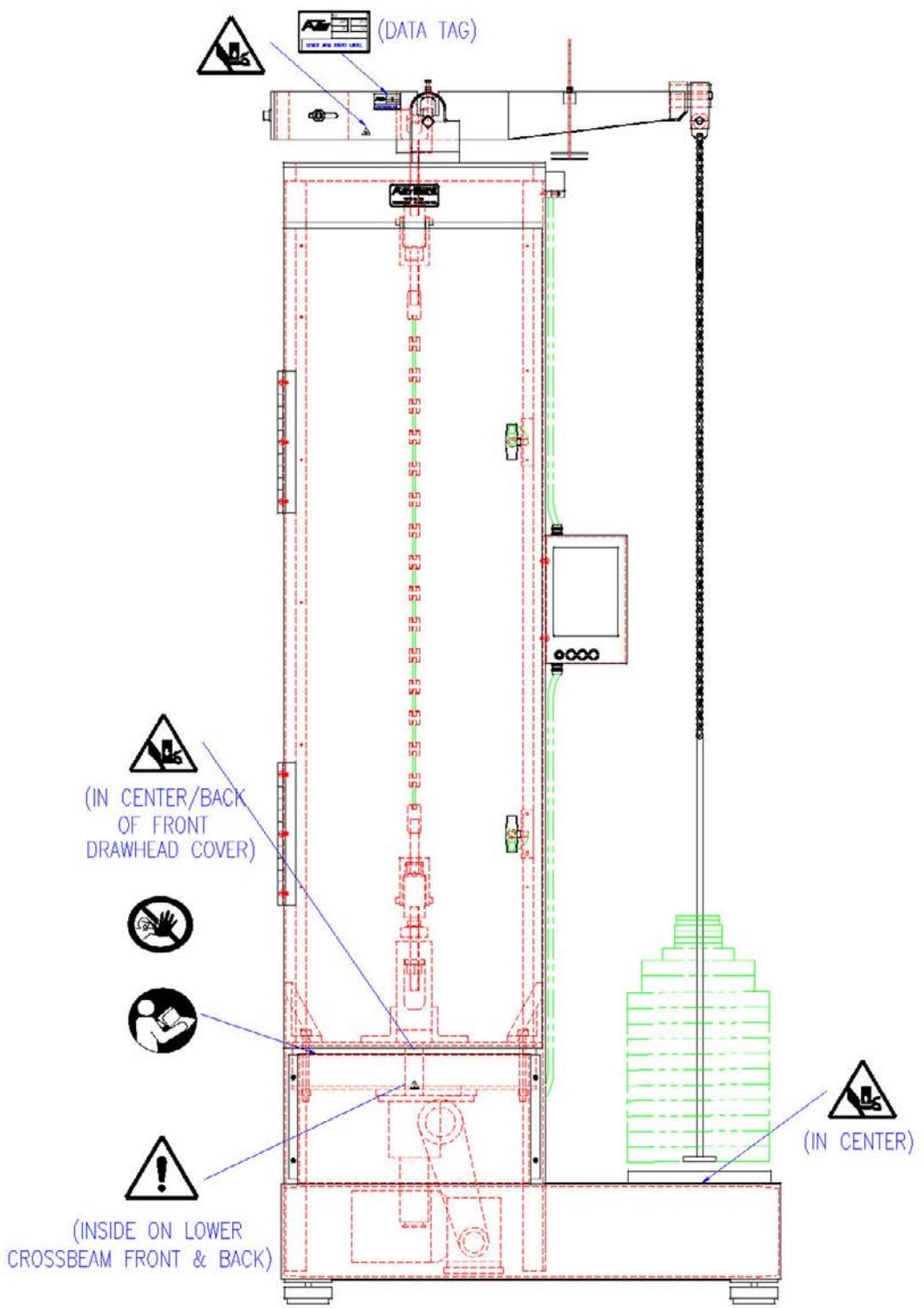


Figure C.2: Safety Label Location, Front

C.2 Equipment Parts

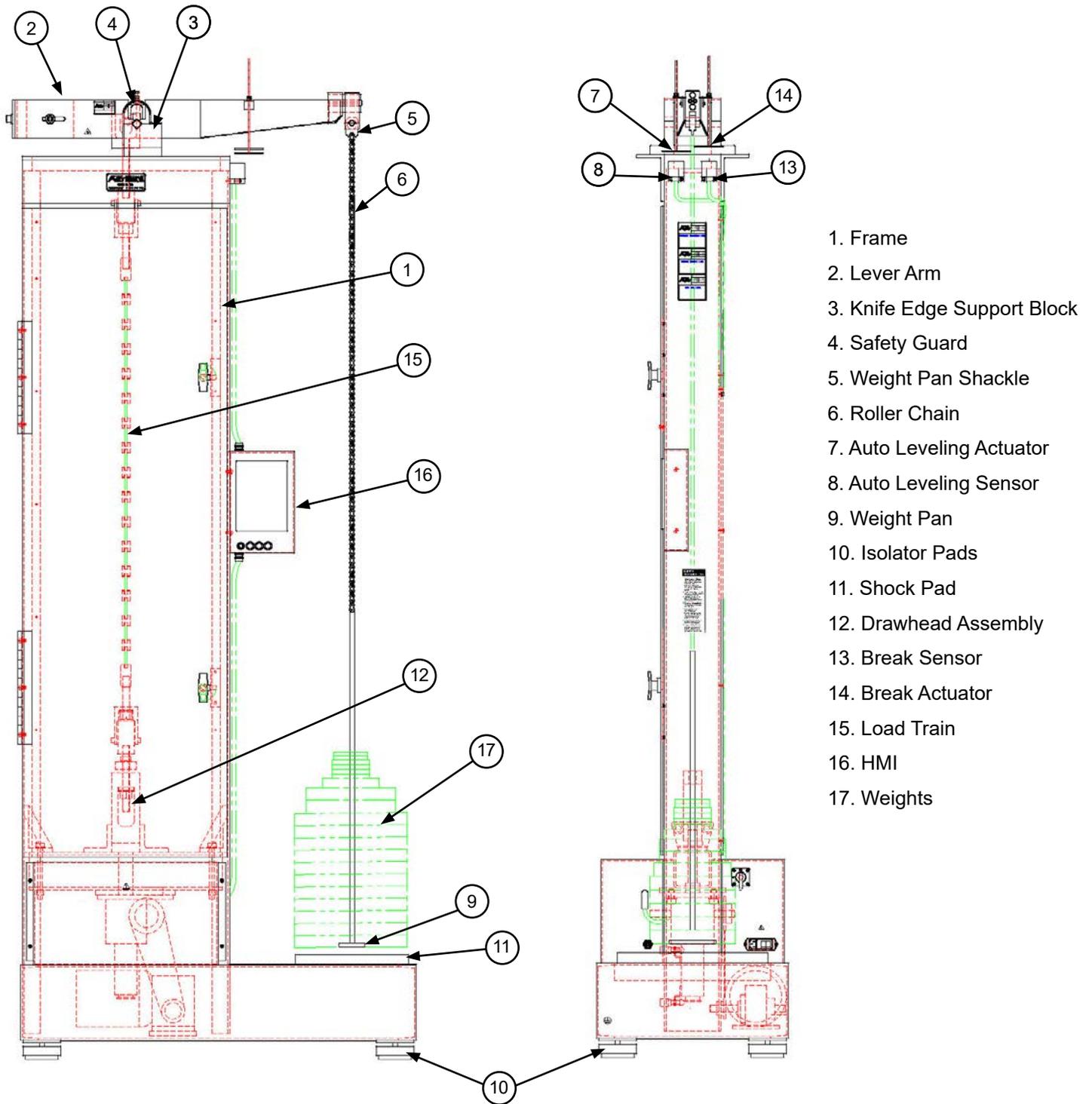


Figure C.3: Basic Lever Arm Front

C.3 General Description

The ATS lever arm testers have evolved to include the following design features:

- Open frame construction, aids in placement of accessory equipment to suit individual testing needs.
- Lever arm knife edges provide the contact fulcrum for the arm. Knife edges are rotatable with four edges and are easily replaceable to maintain accuracy.

A variety of optional accessories are available to complete the system to suit many creep/stress rupture test needs.

Product Specifications

Series	Load Capacity	Ratio	Accuracy	Power Requirements
2320	10,000 lb.	20:1 (std) 5:1, 10:1, 16:1 (opt)	± ½%	230 VAC, 50/60 Hz, 10A, 1 Ø or 115 VAC, 50/60 Hz, 15A, 1 Ø
2330	12,000 lb.	20:1 (std) 10:1, 5:1, 3:1 (opt)		
2410	20,000 lb.	20:1 (std)		

D. Installation

D.1 Unpack and Set Up

1. Carefully remove the shipping crate and packing materials from the tester. Do not discard the packing materials until all items on the invoice have been accounted for.
2. Use an overhead crane or forklift to remove the test frame and control console from the pallet and position it in the desired location.
3. Position the test frame and control console to allow ample room for maintenance.
4. Adjust the Isolator Pads on the test frame to approximately level and to provide even support. Verify that the frame is level by using a level front to back and side to side. Also check the upper crosshead.



CAUTION: Do not allow the isolator mount pads to slide on the floor while moving the tester. They are not designed to accept slide loading. Damage to the pads may result.



NOTE: When moving the test frame, use moving blankets between components and the material handling devices and follow accepted moving practices to avoid damage to the testing machine.

5. Provide electric power from a grounded source. This may be by use of a grounded line cord or by hard wiring the tester. Follow the National Electric Code requirements and any other local codes in effect. Be sure the voltage is correct.



CAUTION: Before energizing the electrical power to the testing machine, turn off all power switches and place all controls in an off or neutral position.

D.2 Lever Arm Assembly Installation

1. Position the knife-edge support block assembly to the top of the test frame. Align the match marks and install the locating dowels.
2. Install bolts and tighten.



CAUTION: Match the serial numbers on the test frames with the support blocks and lever arms when assembling multiple testers.

3. Remove or pivot the lever arm safety guards to the side.
4. Check that the knife-edge and V-block mating surfaces are free of dirt, corrosion, or other debris.

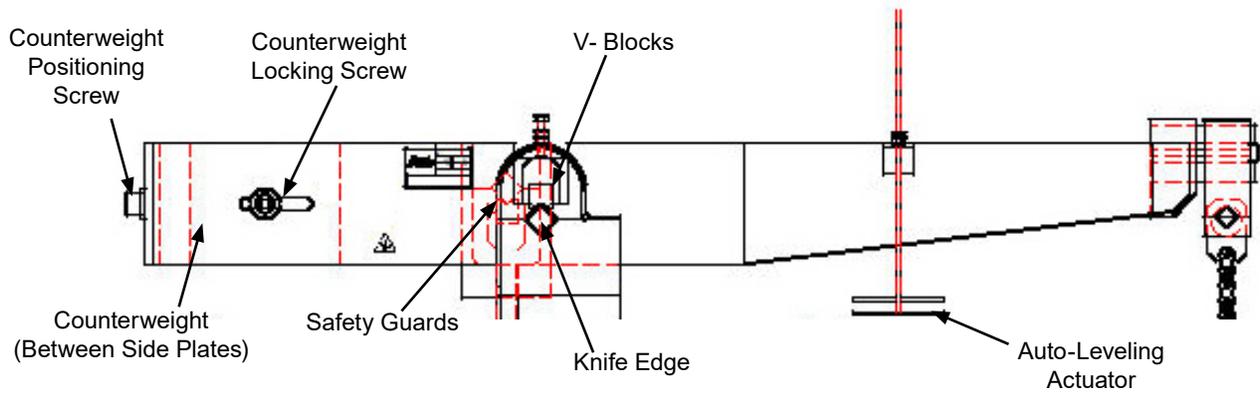


Figure D.1: Lever Arm Assembly (Dual Ratio Shown)

5. Install the lever arm onto the tester with the V-blocks mated to the knife-edges. Be careful not to damage knife-edges or v-blocks.

6. Check the lever arm mid-positioning, side by side, by comparing the knife-edges and V-blocks. The lever arm should pivot freely.

7. Install the safety guards and tighten bolts.

- a. Adjust the bolt to allow the arm to freely move. Check through the full movement range.
- b. Tighten the jam nut to lock the bolt in place.
- c. Re-check step "a".

8. Check position and operation of shutdown actuator.

- a. Install shutdown floating actuator in lever arm above proximity switch.
- b. Adjust nuts to provide 0" clearance over the switch with the weight pan side of the lever arm down all the way.

9. On testers equipped with drawheads for automatic beam leveling:

- a. Install automatic beam level floating actuator in lever arm above proximity switch.
- b. Adjust nuts to provide 0.5-inch clearance over the switch with the lever arm level.

E. Software Overview

E.1 Main Screen

Figure E.1 below shows the Main Screen. This is shown when the PLC Lever Arm is started. It allows you to setup and run machine cycles.

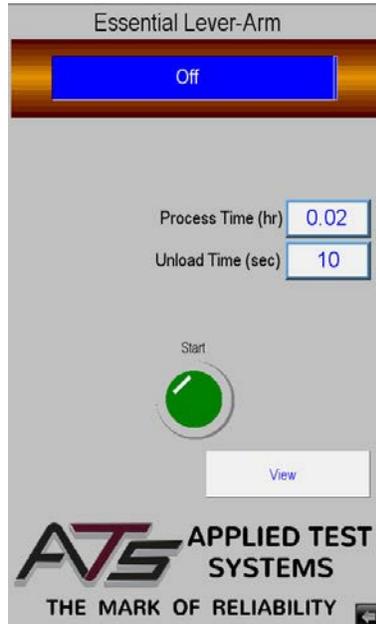


Figure E.1: Main Screen



Figure E.2: Main Screen, Cycle State

Process Time

Will only be displayed if a timed test type is selected. It is the amount of time that the system will run the test.

Unload Time

Will only be displayed if "Unload at end of test" is selected. It is the amount of time that the system will unload the specimen at the end of a test.

Start Button

Used to tell the system that parts are loaded, to start the machine cycle.

View Button

Used to get to additional Set-up for the system.

Figure E.2 shows what the Main Screen looks like when the system is in Run Cycle State. Note the

“Remaining Time” being displayed. This will show up for the “Running”, “Unload”, and “Delay Start” states and will display the time remaining for that part of the cycle. If an indefinite test is selected, “Elapsed Time” will be displayed.

End/Stop Button

Used to tell the system to finish the cycle. It can also be used anytime the machine is in cycle to stop the cycle. If pressed while in cycle to stop a cycle a confirmation screen is displayed to ask if you are sure that you wish to abort the cycle.



NOTE: When the machine is in cycle the “Process Time” and “Unload Time” are grayed out, this means that they can not be changed at this point.

Near the top of the display is a status bar that will show the current state of the machine cycle. Below are the different states in the order that they usually run.



Figure E.3: Off State Status Bar



Figure E.4: Running State Status Bar

Off State

Displays when the system is sitting idle. No cycle is running. The system will sit here until the “Start” button is pressed. Then it will move into the “Running” state.

Running State

Displays when the machine cycle is running. The system will stay here until the “Process Time” has expired. Then it will move into the “Unload” state.

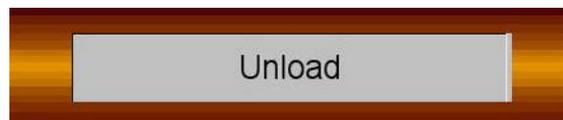


Figure E.5: Unload State Status Bar

Unload State

Displays when the system is in this state it will unload the weight from the load train. The system will stay here until the “Unload Time” has expired. Then it will go into the “Test Complete” state.



Figure E.6: Test Complete State Status Bar

Test Complete State

Displays when the machine cycle has finished. The system will stay here until the “End/Stop” button is pressed. Once the button is pressed the system will return to the “Off” state.

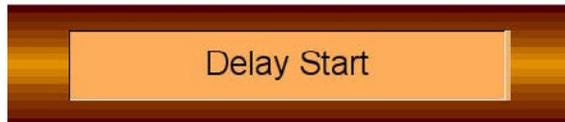


Figure E.7: Delay State Status Bar

Delay Start State

Only shown if the machine is set-up for a cycle delayed start. This is done on the “View” screen. The system will stay here until the “Delay Time” has expired. Then it will start a cycle just as if the operator pressed the “Start” button.

Sample Break State

Figure E.8 illustrates the screen that is shown if the test type is “Timed” and if a sample has broken. The “Sample Break” state may not be seen. It only shows up if the lever-arm drops all the way down indicating that a sample has broken.

If a sample breaks, you have two choices. You can remove the broken sample, use the jog buttons to reconnect the load train and level the lever-arm, then press the “Restart” button to continue the test. Or you can press the “End/Stop” button to abort the current test. Note, once a sample breaks, the process timer stops until you either restart or abort the test.



Figure E.8: Main Screen, Sample Break

E.2 View Screen

Figure E.9 illustrates the View Screen. It is shown anytime the “View” button is pressed on the main screen. It allows access to the rest of the system parameters.

The screen will show the current version of the software in the PLC and HMI. This is very important information, and is most often ask for when calling into ATS service.



Figure E.9: View Screen

Test Type

Used to select what type of test to run. The “Timed Test” will run until a time period is finished. The “Indefinite Test” will run until the specimen breaks or the operator stops the test.

Unload at End of Test

This checkbox tells the system to unload the sample at the end of a test.

IP Address

Used to allow someone at a remote location to monitor the system using a VNC viewer program.

Current Time

Allows the operator to set the current time of the system. This time is used in any log files.

Start Delay

Used to allow the system to be set up to start the cycle automatically after a time delay. You can think of it like a “coffee timer”. Just enter the Hours and Minutes you wish to wait before start and press the yellow button. The button will light to show that a delay has been set. The delay button is a toggle switch, so to turn off a delay that has been started just press the button again. Note the status of the system will show “Delay Start” when it is active and the remaining time before start is shown.

Done Button

Will return you to the Main Screen.

F. Operation

F.1 Basic Operation

1. Adjust Level Sensor Actuator so sensor is just off when the arm is level.
2. Adjust the Break Sensor Pan so that the sensor is just on when the weights are sitting on the weight pad.
3. Install all upper load train components (hot coupling, hot stud, cold coupling, etc.) and specimen per test requirements.
4. With the lever arm in the horizontal position, check balance and adjust as necessary. Loosen screws on each side of the lever arm counterweight and adjust positioning screw on the counterweight for best lever arm balance. Tighten position locking screws and check balance.
5. Install lower load train.
6. Adjust lower take-up stud to level the lever arm when the load is applied.
7. Using the jog buttons, adjust the weight pan so that any weights loaded will sit on the weight pad. Weight pan loading is determined as follows:

$$W = (S \times A) \div R$$

W = Amount of weight to be placed on weight pan

S = Specimen stress required (weight per cross-sectional area)

A = Specimen cross-sectional area

R = Lever arm ratio

NOTE: Any extra tare weight used to provide lever arm balance for the lower ratio on a dual ratio lever arm is not to be included in the weight pan calculation.

8. Apply weights to the weight pan.
9. Set the "Unload Time" so that the weights sit down on the weight pad and there is enough slack to take off the samples and load train.
10. Set the "Process Time" for the specification you are testing to.
11. Press the "Start" button.
12. At completion of test, the system will unload the weights.

F.2 Sample Break

If during the test cycle a sample breaks you have two options.

1. Press the “End/Stop” to abort the test where it is.
2. Continue the test:
 - a) Take the broken sample out of the load train.
 - b) Reconnect the load train.
 - c) Use the jog buttons to reattach all load train components and level the lever-arm.
 - d) Press the “Restart” button.

G. Maintenance

G.1 Knife Edges

Check quarterly or after heavy loading. If damaged, rotate to a new edge. Replace when all four edges have been used. Lever arm must be recalibrated once knife edge is rotated or replaced.

G.2 V-Blocks

Reground or replace if damaged. Lever arm must be recalibrated once the V-blocks have been removed, replaced, or reworked.

G.3 General Maintenance

1. Check machine for level annually with bubble level.
2. For storage, coat the knife-edges and V-blocks on arms and couplings with a thin coat of oil to prevent corrosion. Avoid excessive lubrication because lubricants attract dust to the equipment.
3. Refer to manufacturers' literature for additional maintenance instructions.



CAUTION: Do not overload the machine. Observe rated capacity on data tag.



CAUTION: Do not overload load train components. Elevated temperatures lower their capabilities. A load train is no stronger than its weakest element.



CAUTION: Provide snubbers and/or stop nuts on elements of load train, where necessary, to prevent damage to accessory equipment in the event of a specimen failure.



CAUTION: Stack weights on weight pan with slots alternating to prevent tipping.



CAUTION: Do not jam threads to bottom on load train components. Back off one half turn to prevent misalignment. Thread engagement should be $1 \frac{1}{4}$ times the diameter of the thread.



CAUTION: Check the testing machine daily for any signs of problems with tests or test equipment.



CAUTION: Match serial numbers on test frames, support blocks, and lever arms when assembling multiple testers.

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:

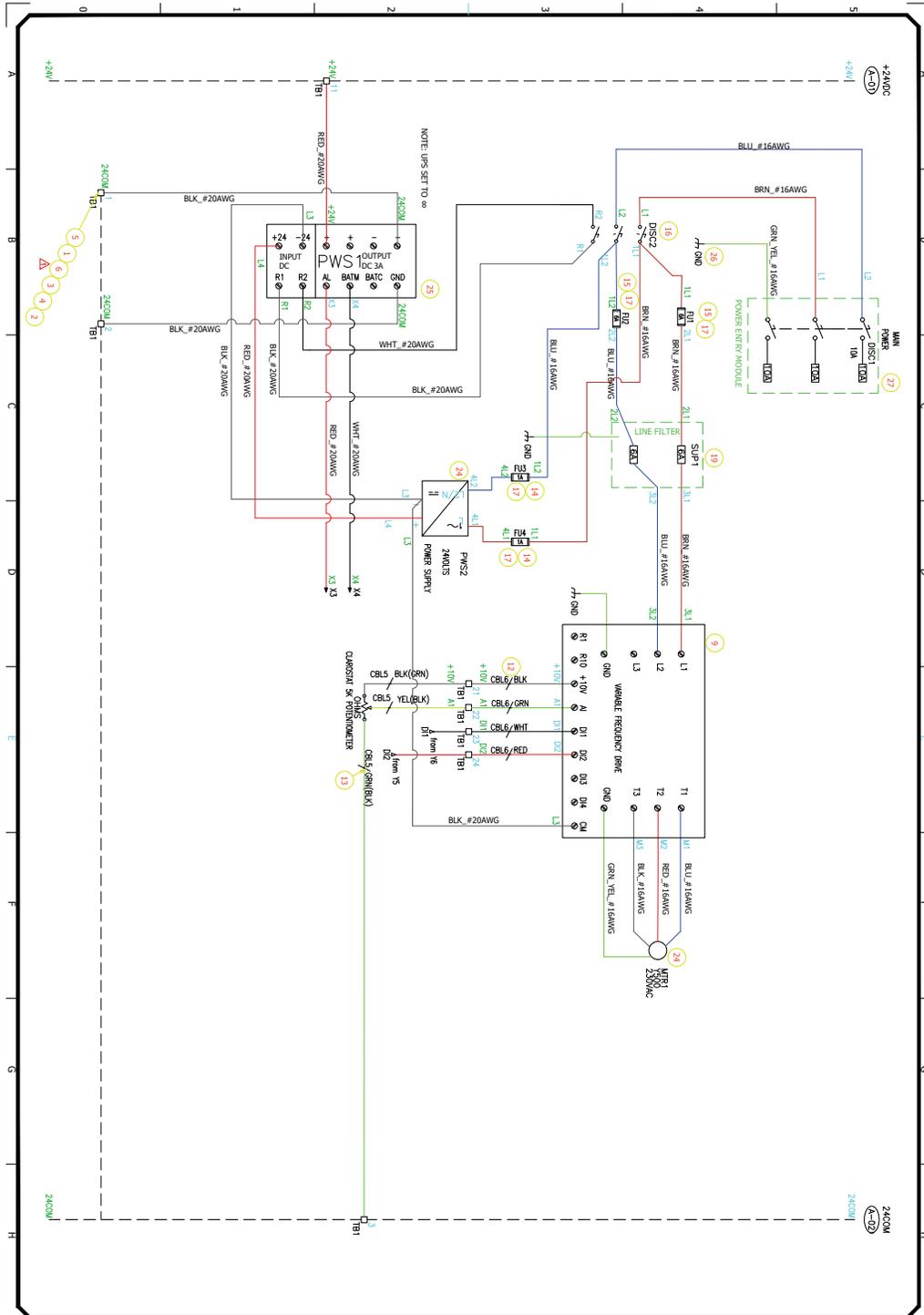
1. Applied Test Systems must be promptly notified in writing of the defect.
2. Upon receipt of written authorization, said defective equipment is returned as directed, with transportation charges prepaid by the buyer and –
3. Applied Test Systems examination of such equipment discloses to its satisfaction 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: Wiring Diagram



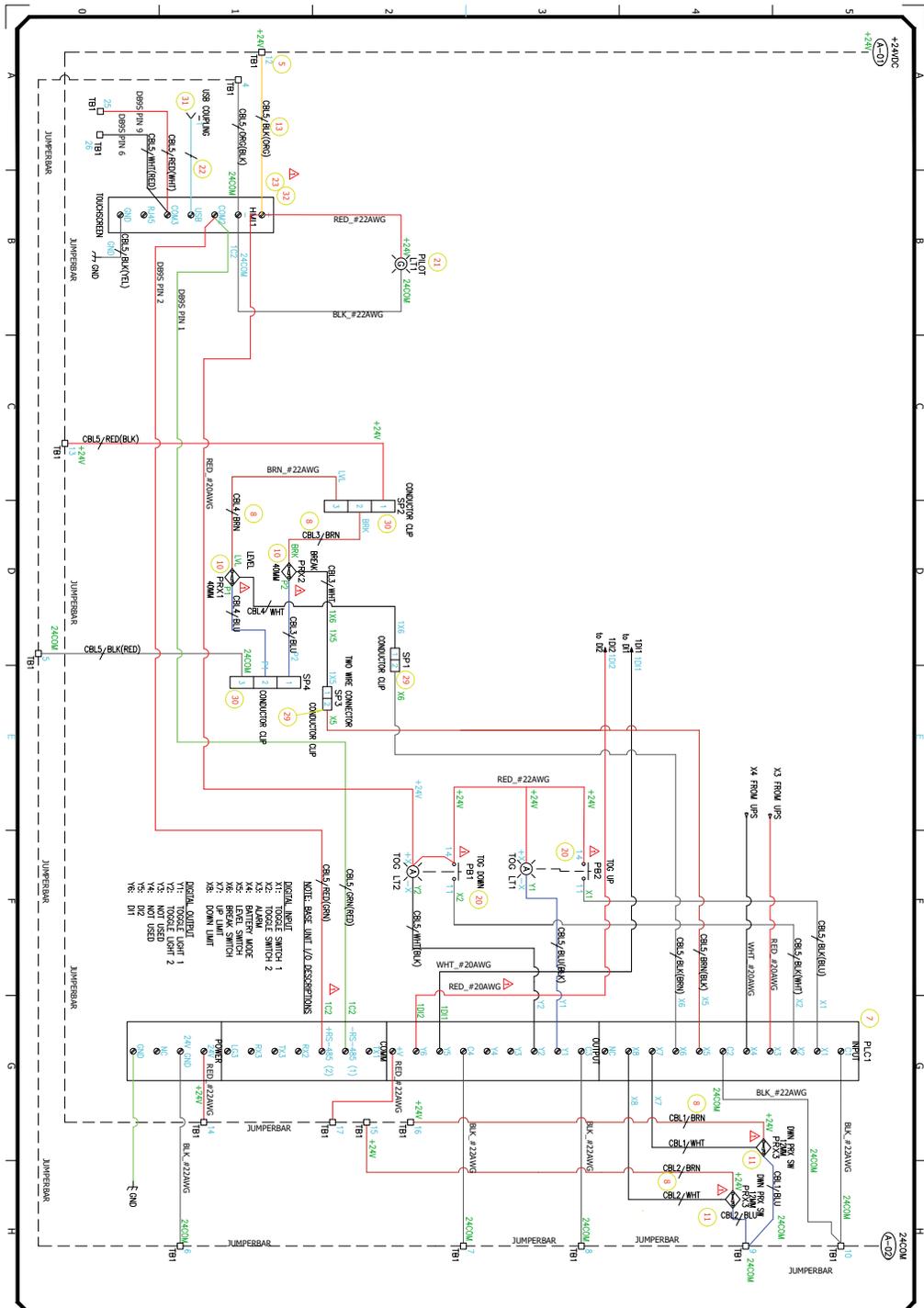
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R1	11/30/2018				

ENGINEER	M/M	CHECKED BY	
JOB NO	18-17892	DRAWN BY	M/M
REV	1	DATE	11-07-2018
DWG NO	2-9546		
SHEET NO	1 OF 6		



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CHECKED BY	MM
DESIGN NO	18417892
DWG NO	2-9546
DATE	11-07-2018
SHEET NO	2 OF 6



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Appendix C: Image Glossary

Figure A.1: ATS Sample Data Tag.....	1
Figure C.1: Safety Label Location, Side	4
Figure C.2: Safety Label Location, Front	5
Figure C.3: Basic Lever Arm Front.....	6
Figure D.1: Lever Arm Assembly (Dual Ratio Shown).....	9
Figure E.1: Main Screen	10
Figure E.2: Main Screen, Cycle State	10
Figure E.3: Off State Status Bar.....	11
Figure E.4: Running State Status Bar	11
Figure E.5: Unload State Status Bar	11
Figure E.6: Test Complete State Status Bar	12
Figure E.7: Delay State Status Bar.....	12
Figure E.8: Main Screen, Sample Break.....	12
Figure E.9: View Screen	13