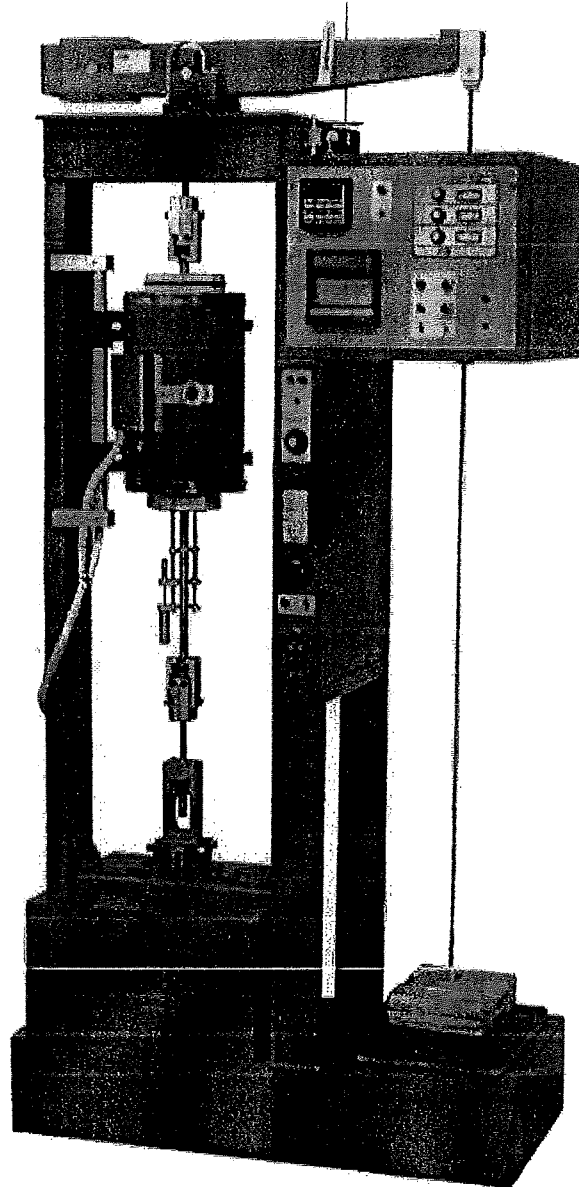
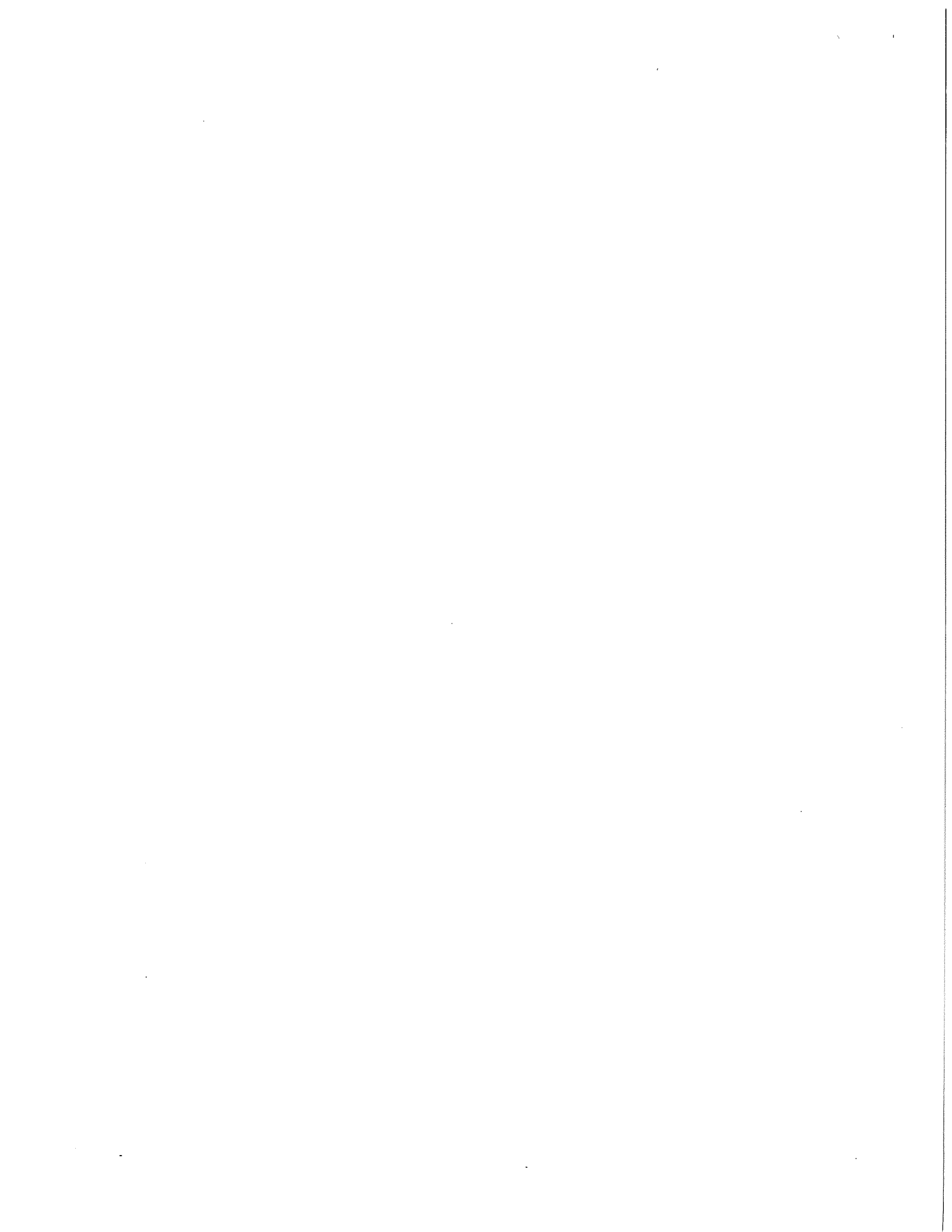


ATS



2300/2400/2500 LEVER ARM TESTER

ATS701 11/03





INSTRUCTION MANUAL ATS701 11/03

SERIES 2300/2400/2500 BASIC LEVER ARM TESTER

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Information you supply may be used by ATS without obligation. Necessary changes will be made in future editions of this manual.

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SECTION 1. INTRODUCTION

ATS Series 2300/2400/2500 Lever Arm Testers

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

- ❑ Open frame construction, which aids in placement of accessory equipment to suit individual testing needs.
- ❑ Lever arm knife edges which provide the contact fulcrum for the arm. These arms are rotatable with four edges and are easily replaceable to provide continuing accuracy.
- ❑ The knife edge support block assembly can be relocated on dual ratio machines and still maintain the central position of the load train within the load frame.
- ❑ A manual reset automatic shutdown switch interrupts tester power and shuts off the time meter in the event of specimen failure.

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



SECTION 1. SAFETY

- CAUTION:** Read and follow all Warning and Caution statements in all related equipment manuals before attempting to operate this machine. If in doubt about any statement or sequence, call ATS Service Engineering 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 a MUST.
- 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.



SECTION 1. SPECIFICATIONS

Series	Load Capacity	Ratio	Accuracy
2320	10,000 lb.	10:1 (std) 5:1, 15:1 (opt)	$\pm \frac{1}{2} \%$
2330	12,000 lb.	20:1 (std) 16:1, 10:1, 5:1, 3:1 (opt)	$\pm \frac{1}{2} \%$
2410	20,000 lb.	20:1 (std) 20:1/3:1 dual:1 (opt)	$\pm \frac{1}{2} \%$
2430	30,000 lb.	30:1 (std) 30:1/3:1 dual (opt)	$\pm \frac{1}{2} \%$
2450	20,000 lb.	20:1 (std) 20:1/3:1 dual (opt)	$\pm \frac{1}{2} \%$
2510	50,000 lb.	50:1 (std) 50:1/5:1 dual (opt)	$\pm \frac{1}{2} \%$

Time meter range – all models, 0 – 9,999.9 Hrs.

SECTION 2. DESCRIPTION

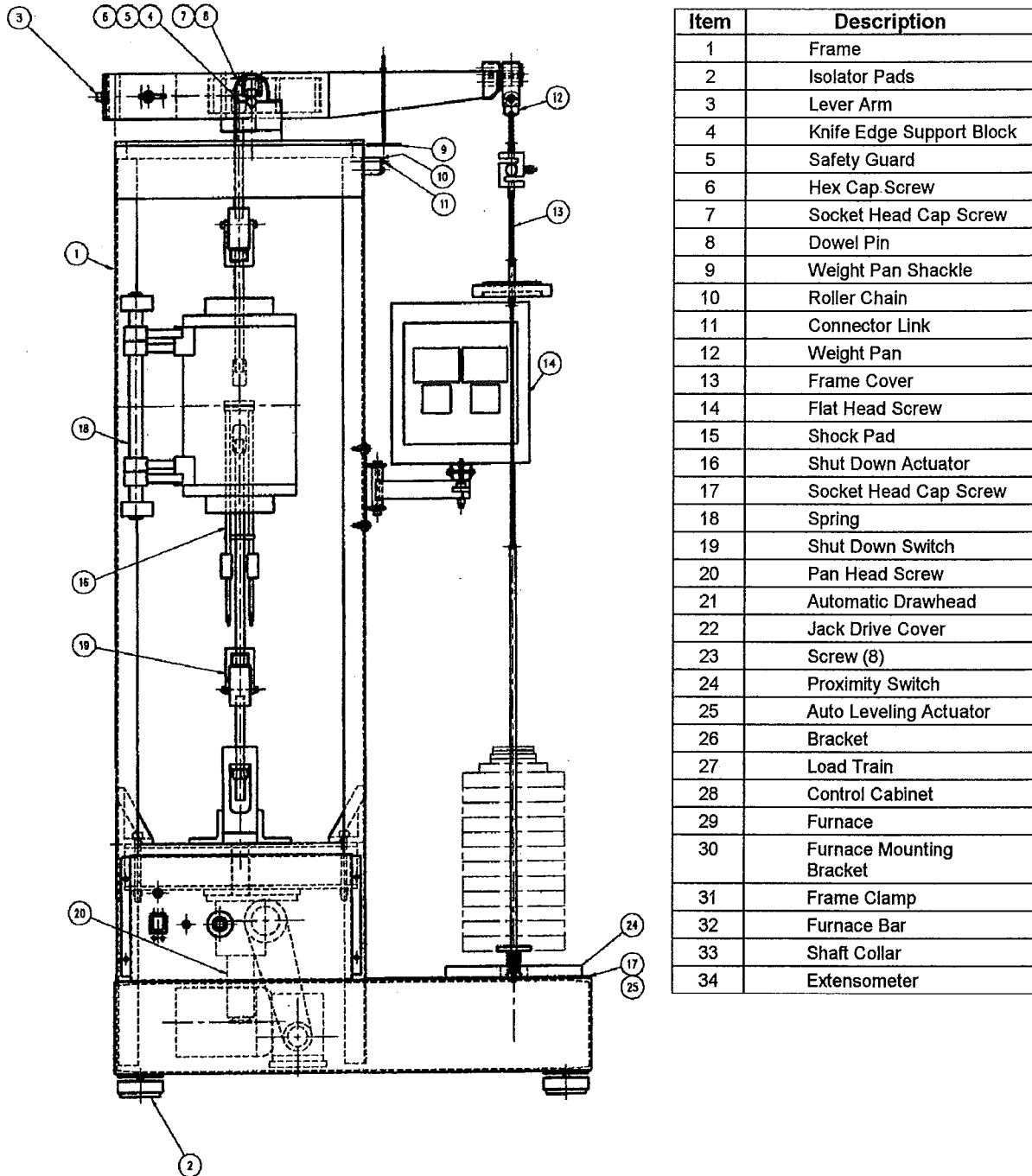


Figure 1: Series 2330 Lever Arm Tester (Front)



SECTION 3. INSTALLATION

A. 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.
Some models have a separate load frame and control console. Follow the installation instructions that apply to the configuration of your equipment.
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. If casters are supplied with the control console, install the casters in the cabinet base when it is lifted off the pallet.
4. Adjust the isolator mounts on the test frame to approximately level and to provide even support.

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 and/or console, use moving blankets between components and the material handling devices and follow accepted moving practices to avoid damage to the testing machine.

5. Connect the interconnecting cables between the load frame and control console if applicable.

NOTE: The distance between the control console and load frame is limited by the control cables. If a longer distance is required, use a matching set of extension cables to increase the length to 20 feet. If longer cables are required, contact the ATS factory.

6. Provide electric power from a grounded source. This may be by use of a grounded line cord or by hard wiring the tester to the terminal block labeled **CUSTOMER POWER** inside the control cabinet. 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.

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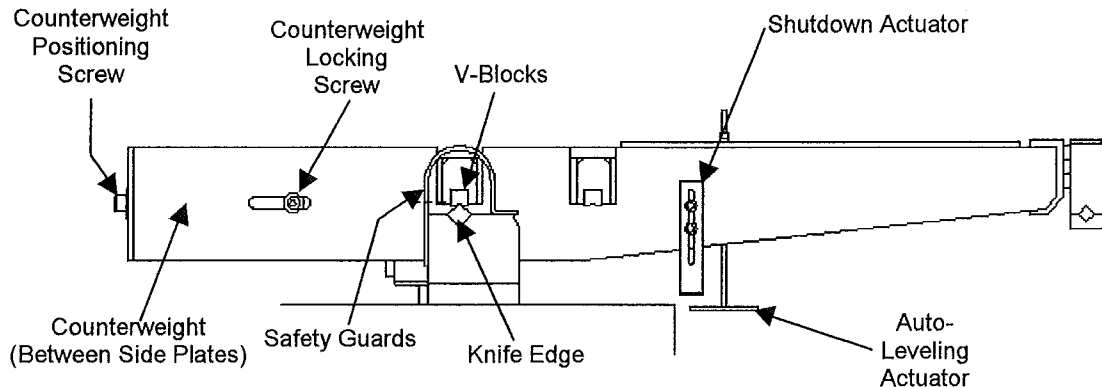


Figure 2: Lever Arm Assembly (Dual Ratio Shown)

B. 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.

NOTE: On testers with dual ratio lever arms, align the marks for the ratio being used.

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 or rust.
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 shutdown switch.
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.
8. Check position and operation of shutdown switch actuator. Shutdown switch must be extended for tester to operate.
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.

C. Install Lever Arm Clevis Assembly

See Figure 5

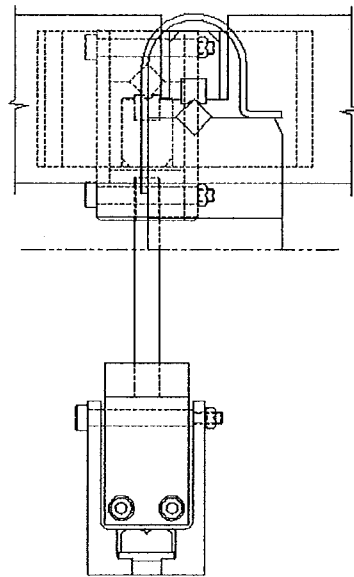


Figure 3: Lever Arm Clevis Assembly

1. Remove bolts and knife edge block assembly from clevis.
2. Place a wooden block under the lever arm counterweight to support arm in a level position.
3. Place the knife edge block assembly onto the lever arm V-block, aligned with centering pin (if equipped).
4. Position the clevis from under the lever arm with the knife edge block assembly. Install fasteners.

D. Install Lever Arm Clevis/Alignment Coupling Assembly

1. Loosen top clevis side plate bolts.
2. Remove bottom clevis bolts.
3. Strip clevis apart.
4. Place a wooden block under the lever arm counterweight to support the arm in a level position.
5. Place the upper knife-edge and side plate assemblies onto the lever arm V-block, aligned with the centering pin (if equipped).
6. Position the remaining clevis assembly under the lever arm, and install the bolts and nuts.
7. Check knife-edge placement and free movement and tighten bolts.



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8. Install the weight pan assembly to the lever arm. Chain length should allow full lever arm travel without lifting the lever arm from the knife edges with the weight train at the lowest point of travel.
9. Attach a plumb bob cord to the center of the lever arm clevis, with the cone point positioned over the hole in the lower crossbeam.
10. Adjust levelers on the isolator mounts to bring the plumb bob concentric with the hole in the lower crossbeam.
11. Check centering of lever arm on support block before making adjustments. All four levelers must support the tester evenly.
12. Install accessories as required.



SECTION 4. OPERATION

NOTE: The shutdown switch must be in its extended position for the tester-controlled accessories to operate.

1. Balance the lever arm with the upper load train installed completely to the specimen. The load weights should be removed from the weight pan at this time.

NOTE: An extra tare weight is provided for use with the lower ratio on the dual ratio lever arm. This tare weight is used to provide lever arm balance and is not to be included in the weight pan loading calculation.

2. Install all upper load train components (hot coupling, hot stud, cold coupling, etc.) and specimen per test requirements.
3. If an extensometer is used, install the upper crosshead and gauging platform assembly (as equipped) to the specimen.
4. If equipped with a weight elevator, lower elevator so that the weight train is supported by the lever arm only.
5. With the lever arm in the horizontal position, check balance and adjust as necessary.
 - a. Loosen screws on each side of the lever arm counterweight and adjust positioning screw on the counterweight for best lever arm balance.
 - b. Tighten position locking screws and check balance.
6. Install lower load train and extensometer (if used).
7. Adjust lower take-up stud to level the lever arm when the load is applied.
8. 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: The 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 loading calculation.

9. Set up and check all accessory equipment (furnace temperature controls, recorder, extensometer, LVC, signal conditioner, etc.)

NOTE: Refer to the instruction manual supplements and manufacturers' literature as required for operation of accessory equipment.

10. Apply load specimen.

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11. Adjust lever arm to level, if necessary.
12. Choose loading method by test requirements and equipment being used.
13. Start accessory equipment per test requirements.
14. Adjust position of shutdown switch actuator as desired and activate the time meter.
15. Record data until test is complete.
16. At completion of test, remove load from specimen and loosen lower take-up stud to prevent lever arm from bottoming out as specimen cools and contracts.
17. Shut down furnace and other accessories.

A. Operation of Manual Drawhead

See Figure 6.

1. Crank drawhead up as required, to allow connection of the jack coupling and load train.
2. Connect load train to jack coupling.
3. Place required weights on weight pan.
4. Crank drawhead down (load) applying load to specimen until lever arm is level.
5. Adjust drawhead again after heating specimen to keep lever arm level.
6. Adjust as required during test to maintain level.
7. To unload specimen after test, crank drawhead up (unload) until load train is free.

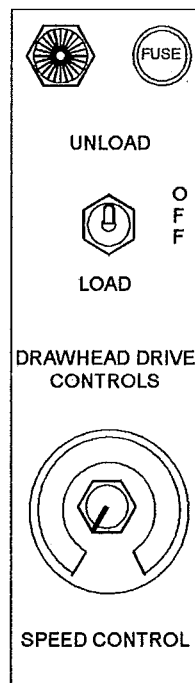


Figure 4: Drawhead Drive Controls

B. Operation of Automatic Drawhead

1. Main power must be on for drawhead to operate.
2. Make sure automatic shutdown switch is extended.
3. Check position of auto-leveling actuator on lever arm (See Figure 7). The actuator should clear the proximity switch by 0.5 inches when arm is level. The drawhead will not operate unless metal is present in the switching area of switch.
4. Set desired speed on the speed control. The speed range available depends on:
 - gear reduction,
 - jack ratio,
 - sprocket ratio,
 - and motor torque available.

The normal selection provides a speed range of 0.1 to 1.2 inches per minute. A speed setting of 30 – 35 should produce a steady rate under load without “cogging”.

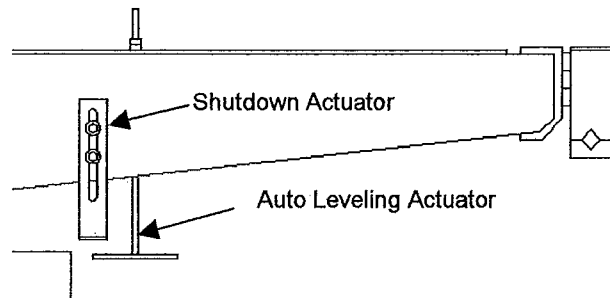


Figure 5: Drawhead Actuators

5. Position the Drawhead Control toggle switch to Manual Unload to raise the drawhead.
6. Connect the load train to the jack coupling and stack the required weights on the weight pan.
7. Position the Drawhead Control toggle switch to Automatic Load position. Drawhead will not lower if the floating auto-leveling actuator is not over the proximity switch.
8. Reduce the speed control setting as the load is applied.
9. As the specimen length changes during testing, the drawhead automatically maintains the lever arm level until power is shut off.

C. Dual Limit Automatic Drawhead

The dual limit automatic drawhead is operated in the same way as the standard automatic drawhead except for setup. The dual limit feature provides automatic level control in both loading and unloading directions. This feature is useful when using a high ratio lever arm,

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or whenever temperature changes require the drawhead to unload to maintain level. Dual limit operation is controlled by two proximity switches and a dual actuator.

Follow instructions for automatic drawhead except:

1. Floating actuator must be supported by a spring to prevent damage to the lower proximity switch.
2. Adjust actuator rod to operate drawhead in the unload direction first (lower proximity switch).
3. Adjust the upper actuator disk to operate the drawhead in the load direction.

NOTE: An interlock relay prevents drawhead operation should both proximity switches be activated at the same time. If actuator disks are adjusted too closely, the drawhead will cycle, or not operate at all. Actuator disks should clear the proximity switches by approximately 0.625 inch when starting to make adjustments with the lever arm level.

D. Manual Weight Elevator

1. Crank the elevator up (unloaded position) to support the weight pan.
2. Assemble and connect the load train.
3. Load the required weights on the weight pan. Alternate slots to prevent tip-over.
4. Crank the elevator down (load position) to apply load to the specimen.
5. Check the elevator position daily. Adjust as necessary during specimen elongation to keep weight platen $\frac{1}{2}$ to one inch below the weights.
6. To unload the specimen after testing, crank the elevator up (unload) until the load train is free.

E. Motorized Weight Elevator

See Figure 8.

1. Position the control switch to MANUAL UNLOAD. The elevator will move upward.
2. Stop the elevator by positioning the switch to OFF when the weight pan is supported.
3. Assemble and connect the load train.
4. Load the required weights on the weight pan. Alternate slots to prevent tip-over.
5. Set the control switch to AUTOMATIC LOAD. The elevator will move down.
6. Stop the elevator one inch below the weights, if not equipped with automatic position control.
7. Adjust the load train as required to place the lever arm in a level position.
8. On manually controlled elevators, check the elevator position daily. Re-position as necessary during specimen elongation to keep weight in platen $\frac{1}{2}$ to one inch below the weights.

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NOTE: When using the automatic load position to lower the weight platen, the elevator will not move unless metal is present over the proximity switch in the platen. This is to provide automatic positioning of the platen during test.

9. To unload the specimen after testing, set the controls to MANUAL UNLOAD (up) until the load train is free.

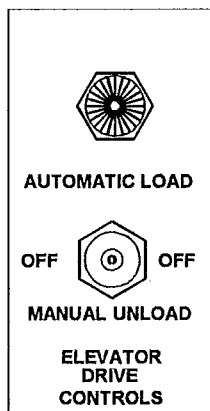


Figure 6: Elevator Drive Controls



SECTION 5. MAINTENANCE

A. Knife Edges

- Check quarterly or after heavy loading. If damaged, rotate to a new edge. Replace when all four edges have been used.

B. V-Blocks

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

C. Check machine for level annually with plumb bob. Refer to Section 3,D,10 (installation section) for procedure.

D. Before placing components, such as pull rods and couplings, under continually high temperatures, use a high temperature lubricant on the threads. Examples of such compounds are Never-Seize (anti-seize) or Philips Milk of Magnesia. Remember to avoid excessive lubrication.

E. 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.

F. 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.