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FACILITY OPERATING PROCEDURE

GENERAL OPERATING PROCEDURES FOR THE GILMORE TENSILE TEST MACHINE

QUASI-STATIC TEST BRANCH
STRUCTURAL TEST DIVISION
STRUCTURES AND DYNAMICS LABORATORY

APPROVING AUTHORITY

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1.0 INTRODUCTION

1.1 Scope. This document provides general instructions required to activate, operate, and secure the Gilmore Tensile Test Machine. The procedures can be adapted to a specific test control operating procedure.

1.2 Purpose. The procedures in this document define the requirements to use the Gilmore Tensile Test Machine to support structural loads testing of space flight hardware components.

1.3 Applicability. The procedures in this document are applicable to all users of the Gilmore Tensile Test Machine within the aforestated scope and purpose.

1.4 System Description. The Gilmore Tensile Test Machine, located in Bldg 4619, Rm. 129, can electromechanically apply tension and compression axial forces up to 4000K lbsf. The maximum test opening is 300 inches in height and 120 inches in width.

1.5 General. More detailed operational and hardware installation information is available in the “Instruction and Service Manual S.O. 2161”.

Note: Step-by-step detailed procedures for setting-up and conducting tests utilizing the various servo control configurations are described in the instruction manual. The following instructions are written as a guideline for setting-up a test and operating the machine in the manual set point, servo control mode. It is recommended that the manual set point configuration be used for normal specimen testing. If specific test requirements require the use of servo control configurations, consult the instruction manual for detailed setup and operating procedures.

2.0 REFERENCE DOCUMENTS

Instruction and Service Manual S.O. 2161.

3.0 SAFETY

For safety critical test -- specific safety requirements and hazard control procedures will be specified in the relevant Test and Checkout Procedure.

4.0 CALIBRATION

4.1 Check Gilmore Tensile Test Machine for valid calibration dates. An out of date calibration will require recalibration or waiver to calibration before use. Contact the MSFC Calibration Facility if calibration dates are invalid. Proceed if calibration is valid.

4.2 Power **ON** the Gilmore machine by depressing the **Power ON** push button on the **Control Console Power** panel. (See Figure 1)

Figure 1. Control Console Power & Ram Hydraulic System panel.

4.3 Press the **ENGR. UNITS** switch on the front panel of the MTS 464 Data Display, depicted in Figure 2, to activate this function. Press **1, 2** or **3** (Feedback A Bridge, Feedback B Bridge, Stroke) for the **INPUT** number and then the **UPPER/LOWER SELECT** switch to cause the desired input channel data to be presented in the displays. The existing channel name and units designation can be observed in the displays at this time.

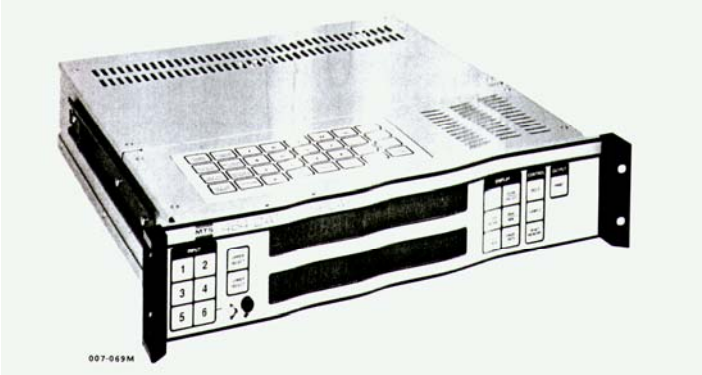

Figure 2. MTS 464 Data Display

4.4 On the MTS Ramp Generator, set the **Feedback Selector** to **1**(Feedback A Bridge).

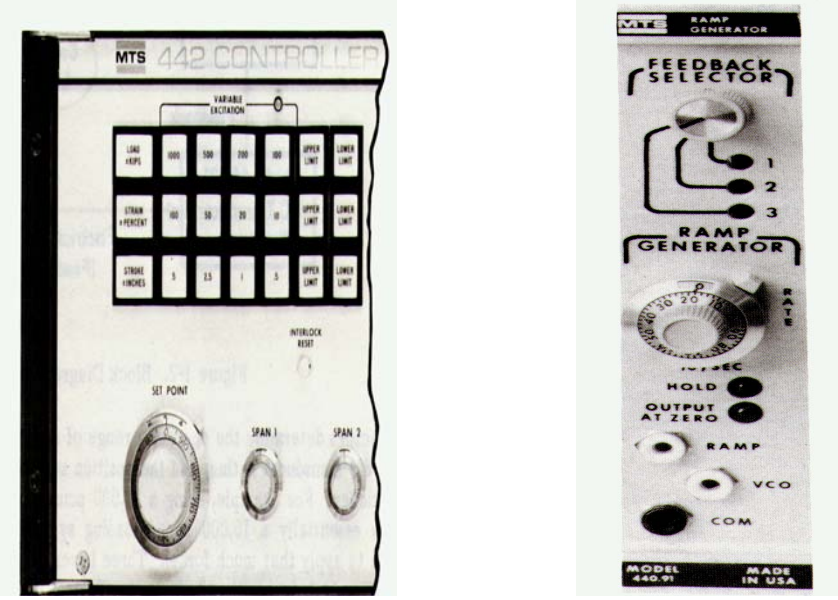

Figure 3. MTS 442 Controller / Ramp Generator

4.5 On the A-Bridge MTS D.C. Conditioner, select the lowest usable range to allow test conduct. Adjust **ZERO** pot to obtain a zero reading on the MTS 464 Data Display. (See Figure 4)

4.6 Press the **CAL** button on the D.C. Conditioner and verify the shunt value with the values given below using the appropriate ranges:

RANGE	A-BRIDGE
1(4M)	500K
2(2M)	247K
3(800K)	100K
4(400K)	50K

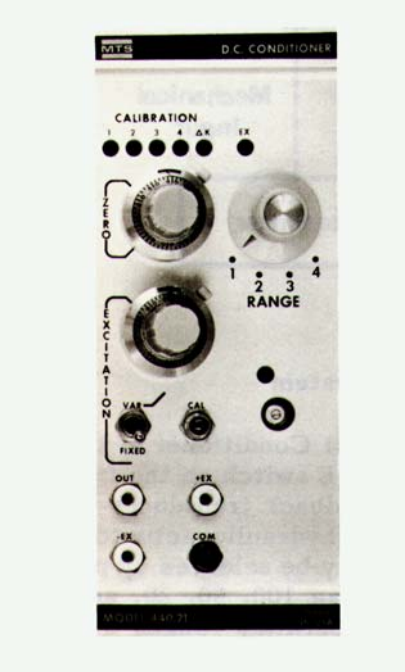

Figure 4. MTS D.C. Conditioner

5.0 POSITIONING CROSSHEAD

The Gilmore has a test article opening of 300 inches in height. The crosshead can be positioned up or down to allow the machine to receive the test specimen. The manual controls that regulate the movement of the loading crosshead are located at the console.

CAUTION

Maintain extreme caution while positioning the crosshead using either the crosshead screw drive or hydraulic ram. Inadvertent contact of the crosshead with the test article or other test fixturing while the crosshead is in motion could result in damage to the test hardware, test fixturing, or the test machine mechanisms.

5.1 Initial startup - general operation

5.1.1 Turn on the Control Console Power by pressing the **POWER ON** push button.

5.1.2 Turn on Ram Hydraulic System by pressing the **PUMP ON** push button.

5.1.3 Selector switches on the console allow the operator to switch control of the crosshead, platform motors and ram to either the console, the control station on the platform or to an off position. Each position of the switch has an illuminated legend. Both motors can be stopped at either location regardless of selector switch position. Set each of these switches to **CONSOLE**.

5.2 Coarse positioning:

5.2.1 Operation of the crosshead Screw Drive - The crosshead screw drive is used to adjust the height of the crosshead above the base, to suit the existing test set up. The screw drive can be operated only when the crosshead locks are in the fully unlocked position. If the screw drive should ever stop for no apparent reason, check to see if the red light at the "CROSSHEAD LOCK" push button has come on; if it has, it will be necessary to operate the hydraulic pump long enough to open the locks fully again.

The controls for the crosshead screw drive are situated in the left hand panels of the console as depicted in Figure 5. The remaining screw drive controls at the console are situated in the right side of the left hand desk panel. The "UP", and "DOWN" push buttons light up when pushed and are self explanatory.

Figure 5. Crosshead & Platform Panel.

When the "RUN"/, "JOG" switch is in "RUN" position, the screw drive will continue to operate after the "UP" or "DOWN" buttons have been pushed and released. With the switch in this position, it will be necessary to push the mushroom head "STOP" button in order to halt the screw drive.

When this switch is in the “JOG” position, the screw drive will operate only as long as the “UP” or “DOWN” push buttons are held down. When the employed push button is released, the crosshead will stop.

The speed control knob when rotated fully counter-clockwise(SLOW) will cause the screw drive to run the crosshead at approximately eight inches per minute. When rotated fully clockwise(FAST), this knob will cause a crosshead speed of approximately twenty four inches per minute. Set knob to a little less than mid position.

5.3 Fine Positioning:

5.3.1 Operation of the ram - The ram is used for finite crosshead positioning and pinning of the test article. The Hydraulic Pressure must be activated in order to use the ram. **NOTE:** The crosshead locks must be fully locked in order to move the ram.

5.3.2 On the Ram Control panel, place the ram control switch to the manual position and press the green **HPS PRESSURE ON** push button; indicator will light and hydraulic system will be energized. (See Bottom of Figure 6.)

5.3.4 To operate the ram, press the **UP** or **DOWN** Manual Load push buttons. The button will light and pressure will be applied to raise or lower the ram.

5.3.5 Position the ram to the desired point of travel to pin test specimen. Maximum ram travel is approximately 36 inches. It is advisable to set the initial ram position so that the ram will be well clear of its end of travel for the maximum expected specimen deflection.

Figure 6. Multi-Control Panel.

5.3.6 Press **STOP** push button**.**

6.0 TEST SETUP

6.1 Adjust ZERO pot on D.C. Conditioner to get a final zero reading on Data Display.

6.2 Set limit detectors slightly above expected test conduct load.

6.3 On ram control panel, set ram control to **SERVO**.

6.4 On 442 Controller adjust set point pot to 5.00(midpoint). Verify the D.C. Error is approximately zero.

7.0 TEST CONDUCT

Note: The procedures in this section stipulate that all necessary test fixturing is installed, the test specimen is loaded properly in the test fixturing, and test setup is in a "loose pin" configuration.

7.1 On Ram Hydraulic System panel, depress **PUMP ON** push button.

7.2 On Ram Control panel, depress green **HPS PRESSURE ON** push button. Verify hydraulic pressure on gage reads approximately 2300psi.

7.3 On 442 Controller, turn setpoint pot to obtain test conduct load. See table below:

9.99	5.00	0.00
Selected Fullscale Range(Tension)	Zero	Selected Fullscale Range(Compression)

7.4 After test conduct is completed, place setpoint pot at 5.00(Zero) and depress **STOP** button on Ram Control panel.

8.0 EMERGENCY SHUTDOWN

8.1 If during test conduct, the test load exceeds the limit detect interlocks the HPS Pressure STOP push button will automatically be initiated. The interlock settings must be increased to continue test conduct.

8.2 If during test conduct the operator is unsure of the Test Machine status, i.e., rate of hydraulic ram movement or actual load that is being applied to the test specimen press HPS Pressure **STOP** push button on the Ram Control panel immediately.