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Smithsonian Institution &
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Dual Actuator Teststand Installation Instructions

D. Gerber

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Dual Actuator Teststand Installation Instructions

The teststand has two configurations which allow both the single and the dual actuators to be tested. To prepare the stand for calibration of the dual actuators, the teststand will need to be set up as follows:

Figure 1

Figure 1 shows the set of tools that will be necessary for installation, adjustment, and removal of the dual actuator adapter:

- 3/16" Hex head nut driver to remove/adjust connector jack screws
- 3/16" Allen driver / T driver to remove/adjust transducer bracket to cylinder
- 5/16" Allen wrench to install actuator bolts to teststand
- 7/16" open end wrenches to adjust/remove air hoses
- Small flat head screwdriver to remove/install connectors
- 5/16" ball end with locking ring Allen driver for easy placement of bottom mounting bolts
- 10" Extension
- 3/8" Drive ratchet
- 2" Extension
- 5/16"Allen socket (straight)
- 5/16" Allen socket (ball)

Figure 2

Figure 2 shows the teststand without either (single/dual) adapter attached. The Trantorque fitting plate is bolted on and must be removed to accommodate the dual actuator spacer.

Figure 3

Figure 3 shows one of two dual actuator spacers needed to mount the actuator. This spacer is one solid piece that attaches to the teststand frame via guide pins. The second spacer as shown in Figure 4 goes on top and is fastened by two long bolts. It is clearly marked on the surface which direction the adapter faces and where it should lay on the frame.

Figure 4

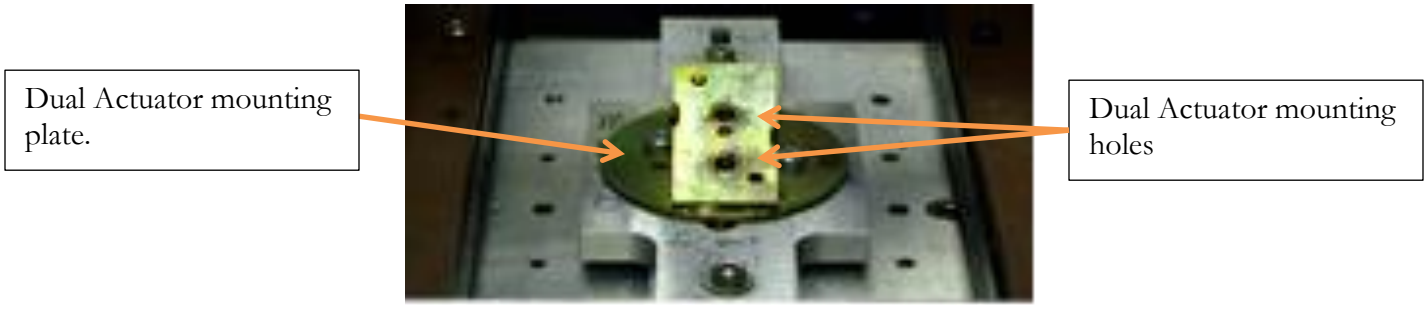

Figure 5

Figure 5 shows the adaptor plate to which the bottom of the dual actuator will be attached. Two mounting bolts are needed to attach the bottom plate of the actuator to the teststand. Once the spacers and plates are fastened securely, mount the dual actuator adapter onto the teststand. The direction of the mounting plate and placement of the bolts is written on the adapter to facilitate the mounting process.

-Mount dual actuator adapter; you will need four bolts.

- Install a dual actuator on the teststand. The actuators have a permanent bolt attached to them (it cannot be removed) which does not fasten to the teststand. Therefore, you will need to have three long bolts to mount the actuator to the teststand. The actuator will be held down by those three bolts.

-There are four screws that attach the electronics card to the actuator. Loosen the screws and pull up the electronics card.

(Note: Removing the electronics card allows access to the bottom of the actuator to fasten and unfasten the bolts.)

-Using the holes, line up the bottom of the actuator to the circular plate.

-Fasten the two bolts with the 5/16" Allen socket wrench (ball) and extension. Tighten the screws with the straight Allen socket. In the cell, these bolts are torqued to a maximum of 15 ft-lbs. Do not over-tighten these bolts.

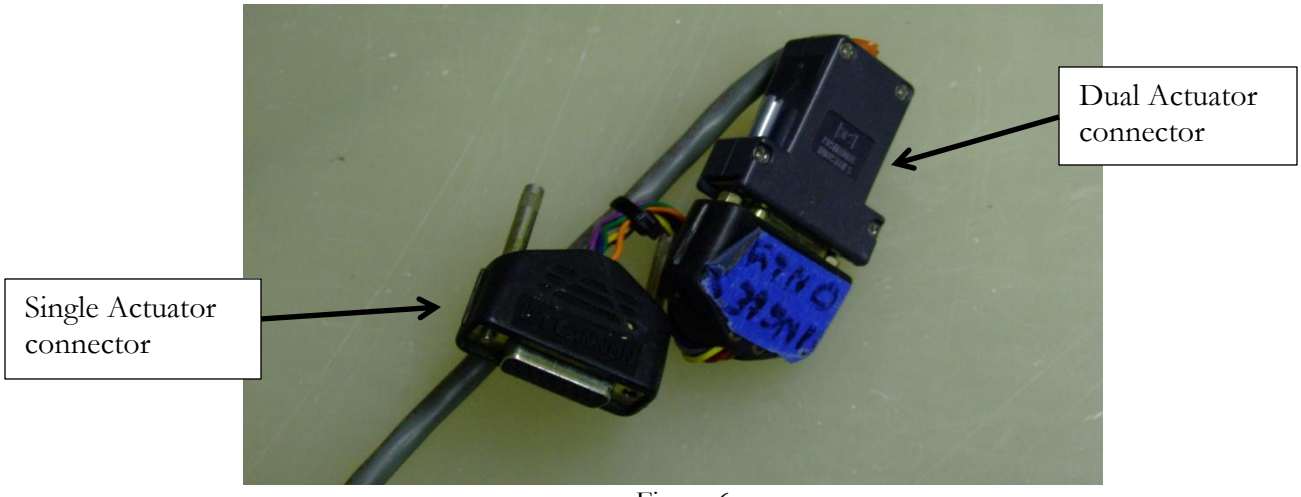

Figure 6

Figure 6 shows the connector that must be attached to the actuator in order to talk to the computer. The connector has two sections: one is for testing and calibration of the single actuators and the other is for testing and calibration of the dual actuators. There is a jumper assembly attached to the dual connector which is necessary for communication with the single actuators. Remove the jumper to the dual actuator connector and attach to the actuator.

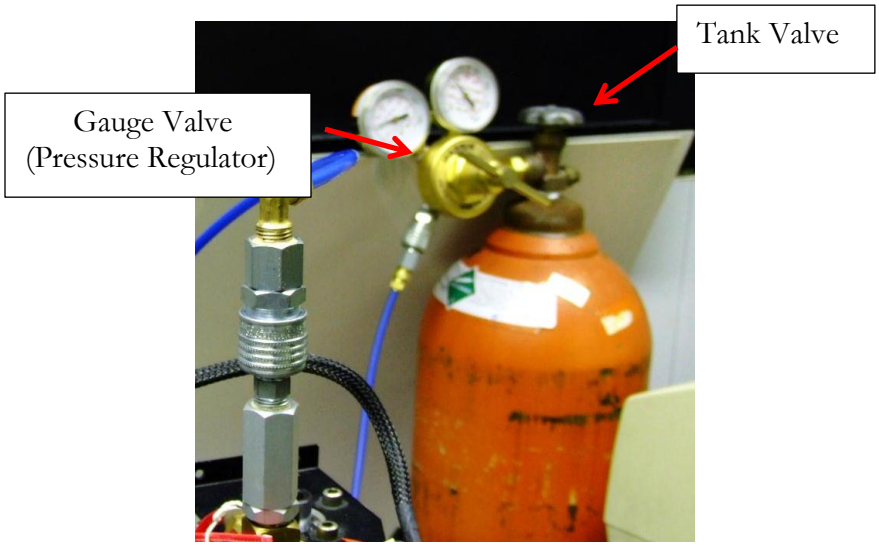

Figure 7

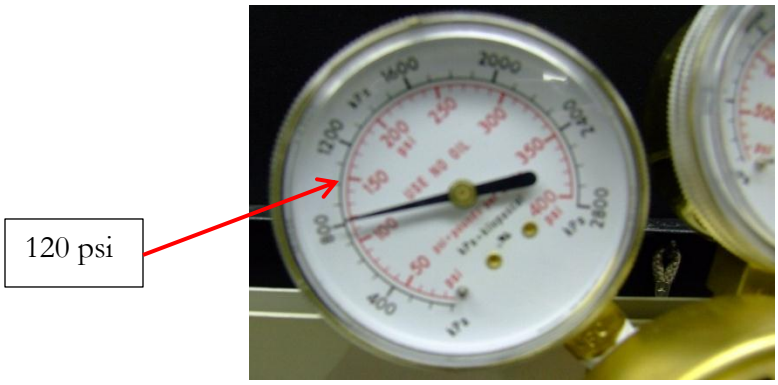

Figure 8

The last step to set up the dual actuator on the teststand before powering it up is preparing the necessary air. The nitrogen tank should have a precise, calibrated pressure regulator attached to it (see Figure 7). The pressure valve of the tank should be closed tight and the gauge valve of the pressure regulator should be opened or loose.

When you are ready to open the air valves and turn the air on, follow these instructions:

- Make sure the 'gauge valve' is opened.

- Turn the valve of the tank on by one full turn (make sure your face is NOT directly in front of the valve as a precaution).

- Open the valve at the gauge by turning in a clockwise direction until the gauge reads 120 psi (the red-numbered section, see Figure 8).

To begin testing and calibrating the actuator, turn on the computer and run the vxworks program.

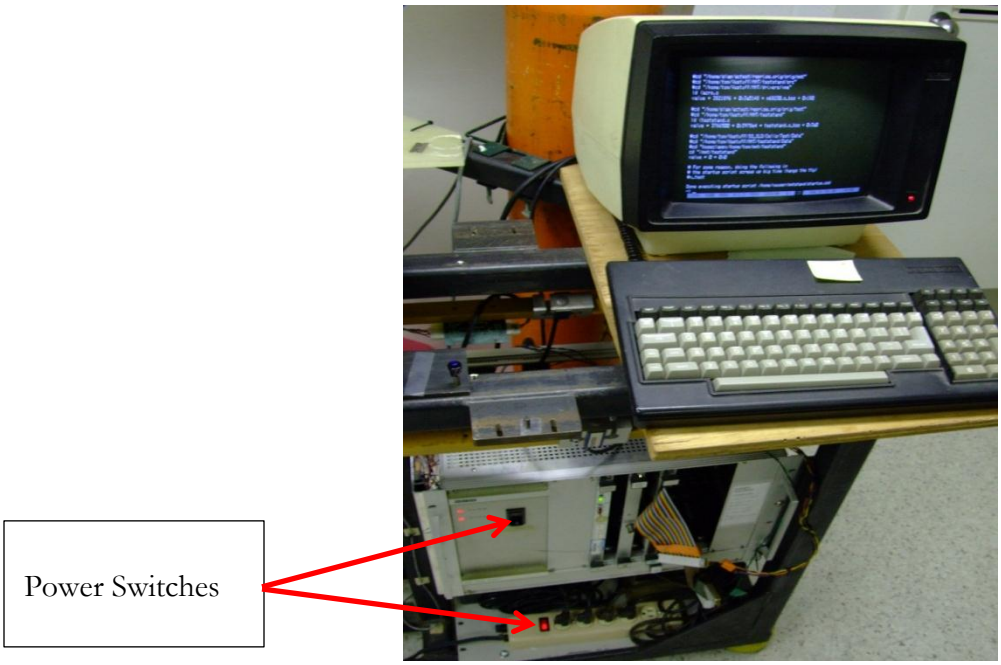

Figure 9

First Set of Tests to be Conducted

-Turn the power on to the power strip and the computer.

-When the program finishes the loading process, type "v_test" and press RETURN.

-The screen will change and be in the actuator test program.

-"Dual Actuator" will now appear on screen (dual actuator is the default). Type "z" and press RETURN. This will zero out any previous readings.

-To begin calibrating the actuator, type "c" and press RETURN.

-The program will now require some information about the actuator that is to be calibrated.

Example:

File Name: The filename should look like this: mmddyy-act# (example: 062512-101)

Actuator #: 101

Electronic Card #: 101

Main Cylinder #: 106A

Main Push #: 101c2 (Bottom actuator)

Main Pull #: 101c1 (Top Actuator)

Aux Cylinder #:

Aux Push #:

Aux Pull #:

Press RETURN

Serial #: The serial number should be a starting number or number which will be easy to record

Max Press: 600

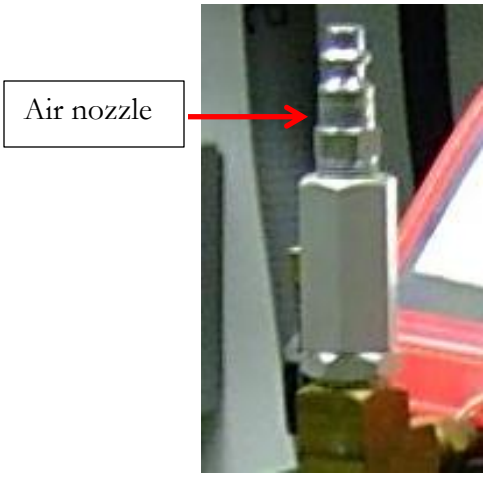

Figure 10

- When directed, apply the air hose to the actuator.

- Once the air hose is attached, gently turn the tank valve on and set the pressure on the gauge valve to 120 psi.

- Press RETURN on the computer when the air set-up is on and complete.

-The calibration process will now begin.

-Upon completion of the test, remove the air pressure, close the air valve and turn off the power strip.

NOTE: If any problems occur during the dual actuator calibration process, just turn the power off to the computer to stop the process.

Second set of tests (Optional)

- Turn on the power to the power strip and the computer.
- Connect the air hose to the actuator.
- Once the air hose is attached, gently turn the tank valve on and then set the pressure to 120 psi on the gauge valve.
- When the program finishes the loading process, type "v_test" and press RETURN.
- The screen will indicate Dual Actuator test program. Or you may type "ad" for dual actuator.
- Type "k and press RETURN. This is to disable the integrator.
- Type "z" and press RETURN. This will zero out any numbers that were previously recorded.
- Check teststand forces. Mx, My and Mz must be less than 100 in-lbs. Fx and Fy must be less than 5lbs and Fz must be -100 to +100 lbs. Record the data.
- Type "J" to enable the integrator (close the force loop). Check the forces; they should be close to zero.
- Perform bump tests in both directions (push/pull). For example, to check +300 and -300 on forces in the Z direction, type "s1 300", and record Fz and Fy values. To check -300, type "s1 -300", and check Fz and Fy values. Fz should closely match the forces induced.
- To check +300 and -300 on forces in the Y direction, type "s2 300", and record Fz and Fy values. To check -300, type "s2 -300" and check Fz and Fy values. Fz should closely match the forces induced.
- Check Forces at 0, 200, 300, 400, 500, 600, 400, 200, 0, -200, -300, -400, -500, -600, -400, -200, 0.

For force checks in the Z direction:

S1	Force of Teststand in Z	Force Teststand in Y	Force Indicated in Z	Force indicated in Y
400	350 to 450	-5 to 5	395 to 405	-5 to 5
0	-5 to 5	-5 to 5	-5 to 5	-5 to 5
-400	-450 to -350	-5 to 5	-405 to -395	-5 to 5

For force checks in the Y direction:

S1	Force of Teststand in Z	Force Teststand in Y	Force Indicated in Z	Force indicated in Y
400	-5 to 5	395 to 450	-5 to 5	395 to 450
0	-5 to 5	-5 to 5	-5 to 5	-5 to 5
-400	-5 to 5	-405 to -395	-5 to 5	-405 to -395

- Type "c" to perform an initial auto calibration test. Type in filename and serial number.
- Type "w" to perform a wave test (z direction).
- When prompted for wave test direction, enter Z.
- Name your file.
- Type "w" to perform a wave test (y direction).
- When prompted for wave test direction, enter Y.
- Name your file.
- Burn-in and adjustment (at least 8 minutes of operation including adjustment time). Note that at least 2 minutes of the required 10 minute burn-in are taken up by the wave test.

If any complications arise causing the actuator tests to fail, the computer will indicate that the test failed. Turn the power off and do a thorough inspection of the attachments to the stand. If the actuator is not bolted down properly or has a chance to move at all, the tests will fail.

If the Air cylinder needs adjustment:

- Apply a 400 lb axial load using s1 400.

- Adjust the tilt of the axial air cylinder to reduce Fx and Fy to less than 0.5 lbs (-0.5 to 0.5).

- Apply a -100 lb axial load using s1 -100.

- Verify the magnitude of Fx and Fy are less than 0.75 lbs.

- Zero out the axial load (type s1 = 0) and verify that Fx and Fy are less than 0.5lbs.

- Adjust until the magnitudes of Fx and Fy are less than +/- 0.5lbs and less than +/- 0.75lbs for +/- 400lbs axial. If not, change the actuator.

- Zero out the axial force in Z (s1 = 0) and apply a -400lb in Y. (s2 = -400 or s2 = 400).

- Adjust the tilt of the diagonal (lateral) air cylinder to reduce Fx and Fz to less than 0.5 lbs (-.05 to +0.5).

- Zero out the lateral load (s2 = 0) and verify that Fx and Fz are less than 0.5 lbs.

- If not, adjust until the magnitudes of Fx and Fz are less than +/- 0.5lbs and less than +/- 1.5 for +/- 400lbs lateral. If not, change the actuator.

- Check Mx,My, Mz at -400, -100, 0, 400. None of these forces can be permitted to exceed +/- 70 in-lbs. Reject the actuator if this condition is not satisfied.

Note: When changing from axial to lateral loading (or vice versa), zero out the initial load before applying the new load. For example, to go from an axial load of 600 lbs to a lateral load of 400 lbs, type s1 = 0 then s2 = 400.