



Vibration Isolation Systems Setup Guide

April 2007



Setup Guide

Vibration Isolation Systems

Content at a Glance

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Introduction

Safety

Pinch Points

Caution should always be used when working with pneumatic isolators. Floating a payload on pneumatic isolators may cause dangerous “pinch points”.

Though care is taken to avoid designing pinch points, certain areas should always be avoided (placing fingers in or under an inflated air piston for example).

Each final table installation is unique. Your installed, populated table may have pinch points created by your unique setup and the equipment being supported.

Compressed Air

Tables are normally floated using compressed air from an air compressor, nitrogen or air from a high-pressure cylinder. Compressed air can generate large forces and should always be handled with great care. Your compressor or cylinder may provide additional safety information.

Heavy Table Tops

TMC Table-tops can be massive. Some weigh as much as several tons. Smaller tops should be lifted by groups of individuals that are physically qualified. Do not attempt to lift a tabletop unless you are completely confident that you are able to do so safely. Larger tops require professional rigging equipment, procedures, and personnel.

System Air Supply Requirements

Vibration Isolators

Vibration Isolators require a continuous flow of compressed air or nitrogen. The flow rate becomes negligible once the isolator has been pressurized and raised to operational level.

Normally, a positive upstream air pressure to the table should be maintained. That is, it is not necessary to “shut-off” the air supply to the table when you leave the lab for the night or weekend.

Air Pressure Specifications

- Supply line pressure at maximum load operation: **90-100 psi**
- Isolator internal pressure rating for maximum load: **80 psi**
Pressure is measured in the isolator, not the air supply gauge.
- Pressure for best performance: Once installed, the supply line pressure may be reduced to **15 to 20 psi** above the gauge pressure reading on the isolator for best performance.
- Effects of supply pressure changes once isolator is up and floating.
 - a.) Do not effect isolation efficiency or the pressure in the isolators unless the supply pressure is reduced to a level below that is required to lift the load.
 - b.) Do change the isolator's speed of recovery in response to changes in the load.

Choke-flow orifices typically used in air flow control systems buffer any rapid air flow rates and prevent abrupt dropping of the payload in the event of a sudden disconnection of the air-supply.



Note Most isolator systems are only partially loaded and can operate with a supply pressure between **25 - 50 psi**. The supply pressure must be set at least **10 to 20 psi** above the isolator pressure to offset the pressure drop across the height control valves and control flow orifices.

The actual pressure in the isolator is the pressure required to lift the load.

$$(\text{lift force} = \text{air pressure} \times \text{effective area of the piston})$$

Air Supply Filtering

Isolator Air Supply The air supply should be clean and dry for best long-term results. TMC provides a combination filter/water strainer with most table designs.

Filtering is unnecessary if you are using bottled nitrogen, air or are using some other form of clean compressed air. Since the airflow rate for an installed table is very small, accumulation of debris or water in the valves or isolator is unlikely. However, a single large contaminate in the height control valve can cause leakage or other problems.

Moisture Buildup In the unlikely event of moisture buildup in the water accumulator, wastewater can be drained by occasionally releasing the pin on the underside of the accumulator.

Height Control Valves

An isolation system has three master isolators each with a height control valve attached, regardless of the total number of isolators in a system. The remaining isolators are called slave isolators and do not have height control valves.

Master Isolators The master isolators form a three-point kinematic mount for positioning the load.

A height control valve is attached to each master isolator as shown below and acts as a position tracking regulator. They fill or exhaust the air in the isolators to maintain a preset, adjustable height.

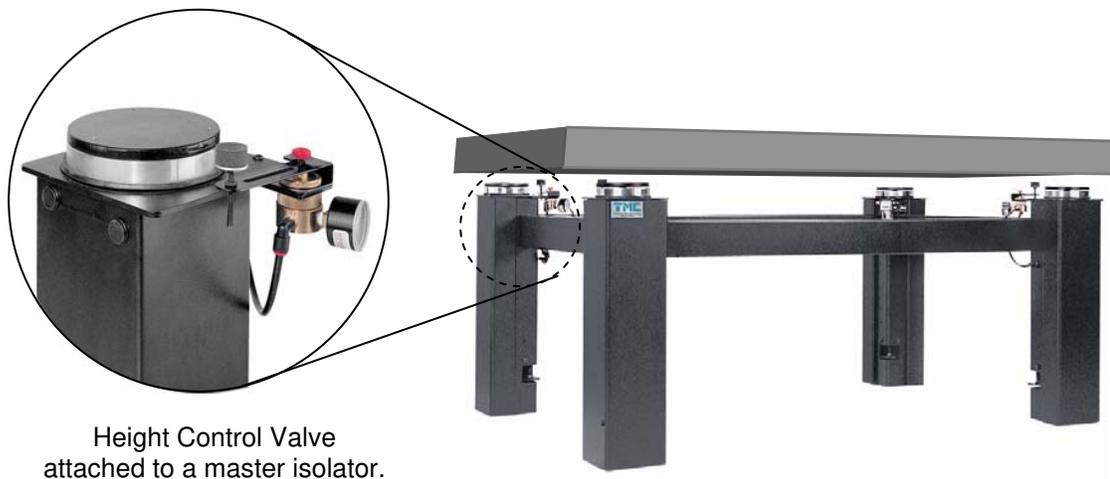


Figure 1 Typical 4 isolator table

Slave Isolator No control valve directly attached to isolator.

Air to the slave isolator(s) is controlled by an adjacent isolator's control valve. The slave isolator's height is controlled by both the master isolator valve feeding it air and by the setting of the height control valve diagonally opposite. The pressure in a slave isolator is equal to that of its' upstream master isolator.

The illustration below shows a typical valve schematic between the air supply and 4 isolators.

M = Master Isolator with Height Control Valve attached.

S = Slave Isolator (no valve).

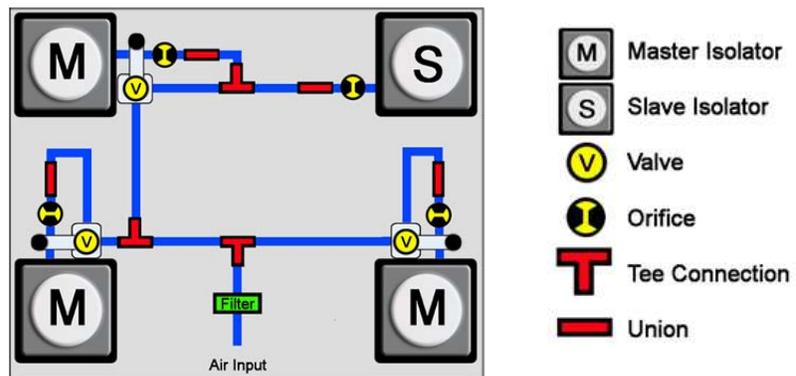


Figure 2 *Typical valve schematic for a 4- isolator system*

Precision Height Control Valves

This is an optional valve with an increased return accuracy of approximately ± 0.005 inch compared to the standard valve's ± 0.050 inch return accuracy.

The standard height control valve incorporates a “dead-band”. Similar to the “play” in a car steering wheel, this dead-band renders the valve nearly airtight for small displacements and prevents high air usage and frequent replacement of bottled air.

Gimbal Piston Isolators

Improved Isolation Performance

Most vibration isolation systems incorporate a pneumatic piston assembly to achieve vertical vibration isolation.

TMC's Gimbal Piston assemblies are inherently more stable at any height in their normal travel than other types of air mounts. They will not set to one side or develop a sideways lean due to diaphragm stresses and deformations.

They help control complex rocking modes in the isolated load by incorporating a horizontal flexure at the same plane as the principle vertical support. This ensures that horizontal isolation is virtually as efficient as vertical isolation.

Design Differences

The visible difference is the load-bearing disc (load disk) that is supported by each piston and shown in figure below. The difference internally is a coupling, below the plane of the sealing diaphragm that permits horizontal movements to be translated to a Gimbal-like rocking motion of the piston.

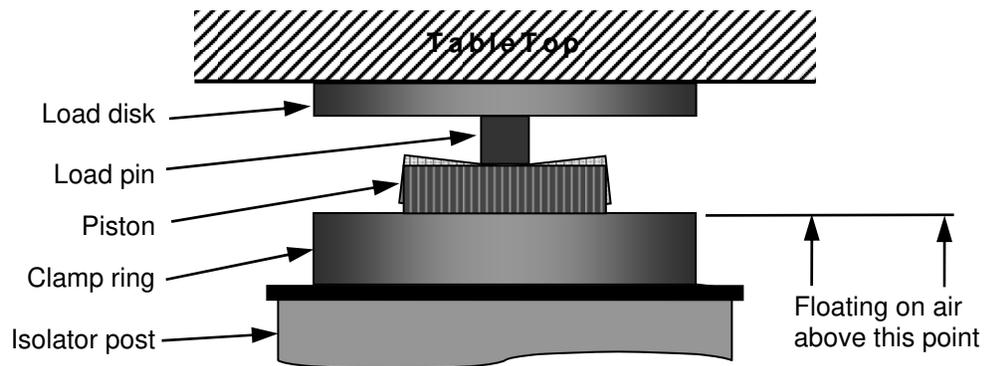


Figure 3 *Gimbal Piston Isolator*

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Optical Tops, Breadboards, and Supports

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Optical Tops & Breadboards

Introduction



Caution Optical Tops and Breadboards are heavy. TMC recommends the hiring of professional riggers or machinery movers to uncrate, move to internal destination and to assist in the following procedure.

The following procedure provides suggested steps to unload an Optical Top from a delivery truck, unpack and move to area for setup. Three people are typically required for the heavier tabletops.

Safety is very important! Ensure you have the proper equipment and understand all steps before proceeding.



Figure 1 *Typical optical top mounted on a 4 post system*

Unpacking Instructions

Remove optical top from receiving area or delivery truck.

Removing optical top will typically require a forklift.

- Remove top, sides and ends of optical top crate exposing the top on skid.
- Lift skid with a fork lift centered on long side. The skid will bow as crate is lifted.

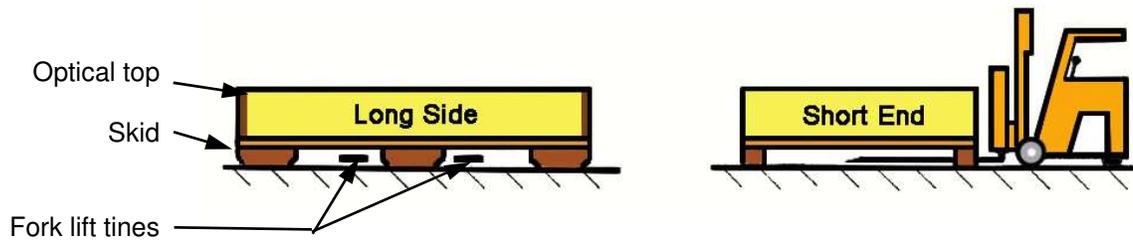


Figure 2 *Lifting crate centered on long side*

- As skid is lifted and bows, insert appropriate size shim blocks on ends of skid as shown in figure below.

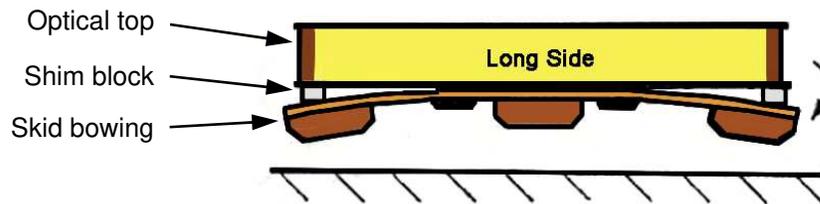


Figure 3 *Inserting shim block as skid is lifted*

- Lower skid back onto ground. Optical top is sitting on shims over skid as shown in figure below.

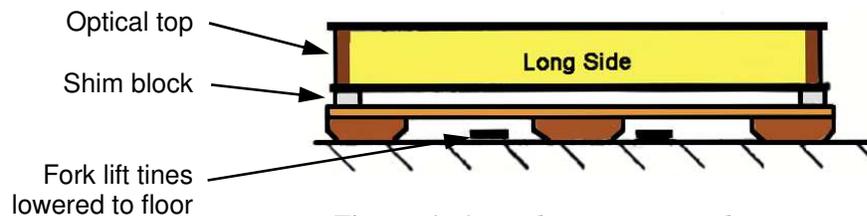


Figure 4 *Optical top sitting on shims*

- Lift optical top from skid using space between top and skid and move to destination using fork lift if possible. Otherwise use professional rigging techniques.

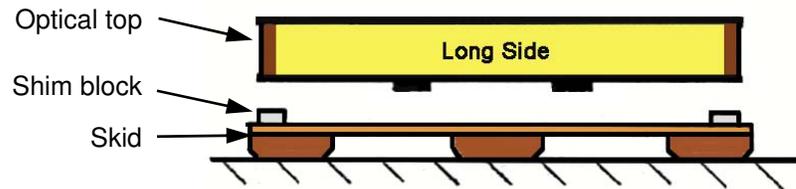


Figure 5 *Remove optical top from skid*



Note An optical top may be placed on its side. However, its load must be supported by the top and bottom skins, not by the side-walls.

Set up optical top per appropriate instructions

Proceed to install and setup optical top along with System 1 Post-Mount Supports as appropriate for your system configuration.

For Installation of STACIS 2100 isolators, refer to the STACIS "Pre-installation Manual & Checklist" and consult with TMC. A TMC trained technician is required to complete the STACIS installation.

System 1 Modular Post-Mount Support

Introduction

System 1 is a family of modular post mounted Vibration Isolators and Rigid Leveling Stands that can be configured as follows.

- 4-post or 6-post sets bolted together in a rigid corral frame.
- Individual, free standing posts with oversize baseplates.

Structural Posts: The structural posts are formed from heavy gauge **3/16** and **1/8 inch** thick steel configured with either a Rigid Support leveling jack screw or a Vibration Isolation System.

The base of each post can be left “open” or configured with either an oversized baseplate or in some systems, internal caster fixtures. The high capacity post systems do not accept casters.

Air Supply: Vibration Isolators require a continuous supply of compressed air or Nitrogen to operate properly. For a complete discussion of the air supply requirements, see System Air Supply Requirements in Introduction section.

All System 1 models are shipped with the components partially assembled (excluding the tiebars).

Gimbal Piston Isolator Upgrade Systems configured with the small and intermediate capacity posts, can be upgraded from the Rigid Supports to the Gimbal Piston Vibration Isolators.



Figure 1 *Modular Post-Mount Supports*

Installation Procedure

Tiebar Installation

(Installation steps for systems equipped with tiebars only.)

Systems are designed to optionally add a second row of tiebars, one row at the top and a second at the base for custom applications. Systems equipped with tiebars are typically supplied with one row for mounting near the top of the posts.

Tiebars longer than 40 inches: Systems requiring tiebars longer than 40 inches achieve this length by joining two short tiebars bolted end-to-end with a spacer plate.

Hardware: 3/8-16 hex head bolts and matching nuts

Tools: 9/16 inch socket wrench

Step 1 Place the posts on the floor to form either a 4-post or 6-post rectangle as appropriate and referenced in figure below.

Systems with non-isolated rigid supports All posts will be identical.

Systems with vibration isolator supports Three points determine a plane. Three isolators are equipped with a Height Control Valve (V) attached and are referenced as Master Isolators (M). The remaining isolators do not have a valve and referenced as Slave Isolators (S).

All systems have only three isolators with a Height Control Valve attached regardless of the total number of posts.

Arrange Isolator posts so that a slave isolator is located adjacent to a master isolator as typically shown in figure below.

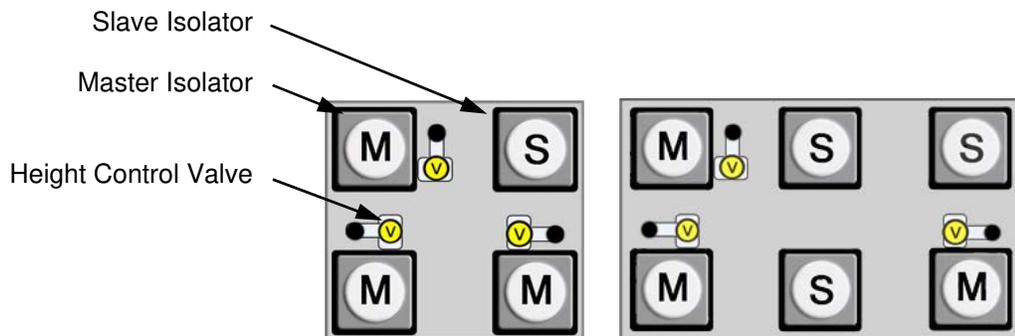


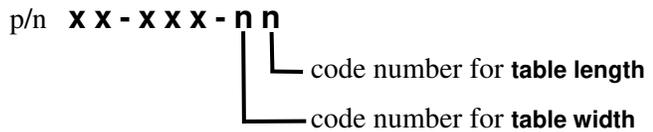
Figure 2 Typical 4 isolator and 6 isolator system layout

Step 2 Assemble posts into a rectangular frame with **3/8-16** hex head bolts & nuts and using a **9/16 inch** socket wrench.

Tiebars greater than 40 inches in length

- Tiebars having a total length greater than 40 inches first require bolting two shorter tiebars together end-to-end using an alignment spacer plate. Reference figure below.
- Identify correct combination of short tiebars for connecting together by first observing system part number and then correlate the last two digits with table below for both the table length and table width tiebars.

System 1 part number example:



Part Number Code	Total Tiebar length in inches	Short tiebar combination lengths in inches
1	15	n/a
2	20	n/a
3	30	n/a
4	40	n/a
5	50	20 + 30
6	60	30 + 30
7	70	40 + 30
8	26	n/a
9	35	n/a

Table 1 *Short Tiebar Identification*

- Attach tiebars together and then attach to posts using the pair of tapped holes located at the upper area of each post. *Refer to figure below.*

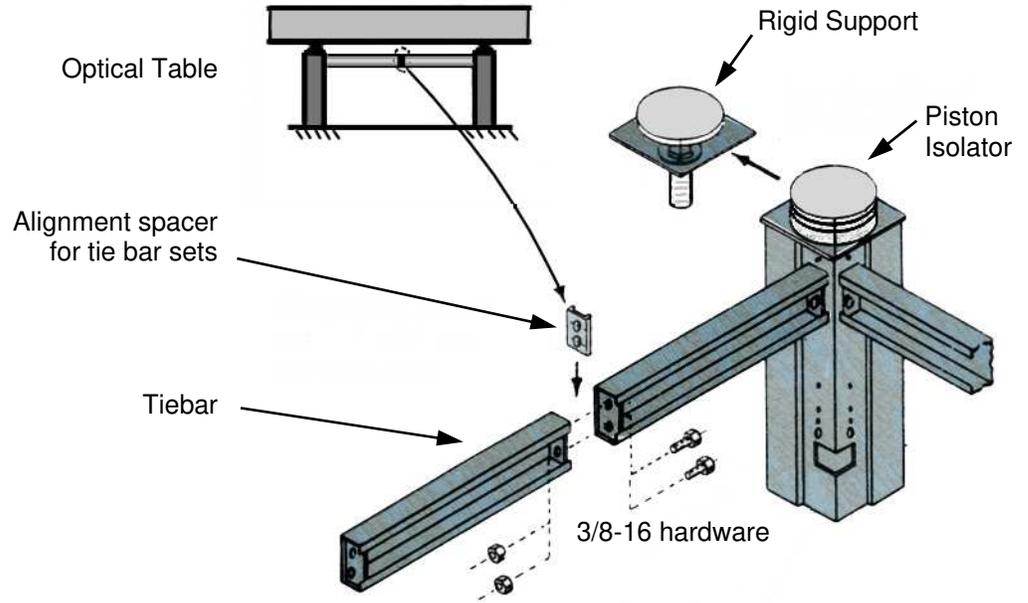


Figure 3 *Rectangular frame assembly*

Attach the tiebars to posts using the pair of tapped holes located at the top of each post.

Air Supply Plumbing, Valves and Tabletop Placement

For systems with Rigid Level Supports, skip to the end of these instruction steps to section, Systems with Rigid Leveling Supports.

Air Supply Input Connection

Step 1 Plumb tubing between air supply and system's input air filter as appropriate.

Fittings: Tubing can be connected to a 1/4 or 1/8 inch NPT female fitting as shown in figure below.

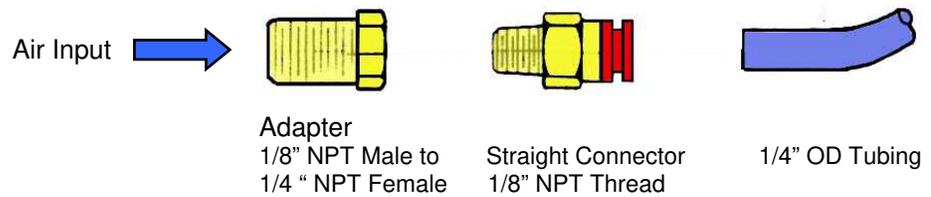


Figure 4 Air Supply Input Connection

Internal Air Supply Tubing

Step 2 Install air supply tubing between *air supply filter*, *isolators*, and *control valves* as appropriate.

M = Master Isolator with Height Control Valve (V)
S = Slave Isolator (no valve).

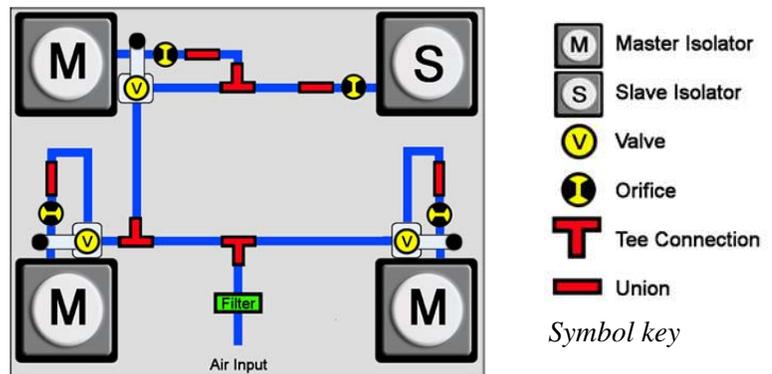


Figure 5 Typical valve schematic for a 4- isolator system

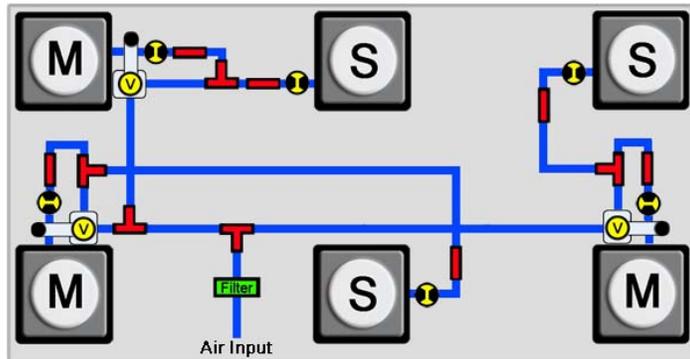


Figure 6 Typical valve schematic for a 6- isolator system

Ensure the slave isolator [S] is plumbed down-stream from its corresponding master isolator [M].

Optional self sticking “J” clips are provided for neatly attaching the air hose to the tiebars.



Note Each post is shipped with a short section of tubing with a union coupler already attached to the input elbow. This “pigtail” segment should not be tampered with. Each pigtail contains a small, flow-restricting orifice to damp table motion and stabilize the load. A small red ring around the tube marks the orifice position.

If lost or damaged, please contact TMC for replacement pigtails.

Connecting Insert the air tube firmly into the self sealing fitting as shown in figure below.

Disconnecting Push the red cylinder with your thumb and forefinger toward the center of the fitting body while pulling the tube in the opposite direction as shown in figure below.

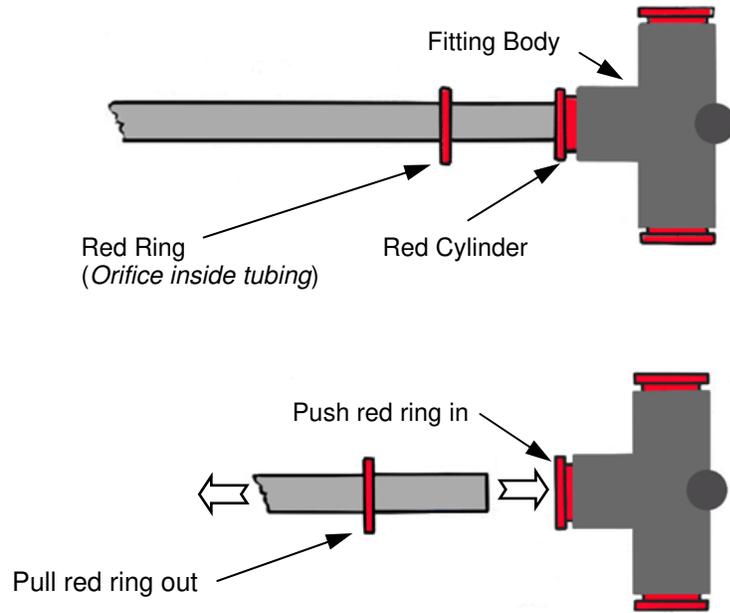


Figure 7 Air tube connections

Orifices Flow restricting orifices are critical to damping system motion. Orifices are located both inside the isolators and in the air tubing marked by a red ring as shown in figure above.



Important Do not remove or change the location of these orifices without consulting TMC.

TableTop Placement

Step 3 Check to ensure assembled isolator frame is reasonably level. Adjust with floor shims if the floor is extremely uneven.

Step 4 Place the table top down on deflated isolators as shown in figure below.

The top should be symmetric over the isolator frame.

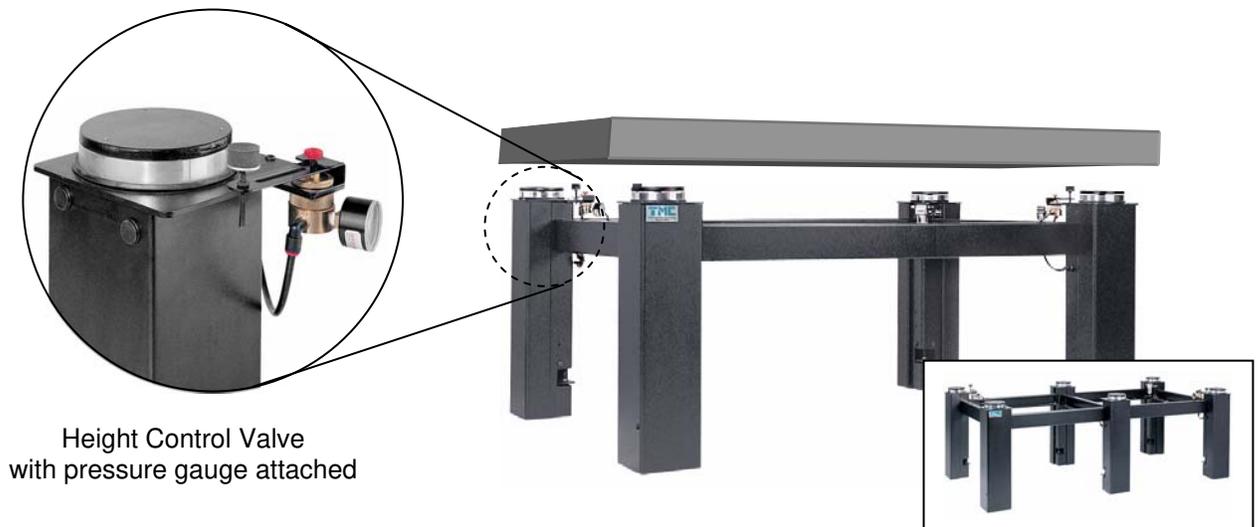


Figure 8 Typical 4 and 6 post assembled isolator frames

Attach Horizontal Lever Arms

Step 5 Locate the three *height control valves* mounted on isolators as typically shown in figure 8 above and referencing figures 5 & 6 earlier.

Step 6 Ensure the main air supply is **Off**.

Step 7 Adjust the **ISOLATOR HEIGHT ADJUST** screw CW (clockwise as viewed top down) to lower *foam pad* down to the lowest position close to the *horizontal lever arm* as referenced in figure below. Retract *locking nut* as required.

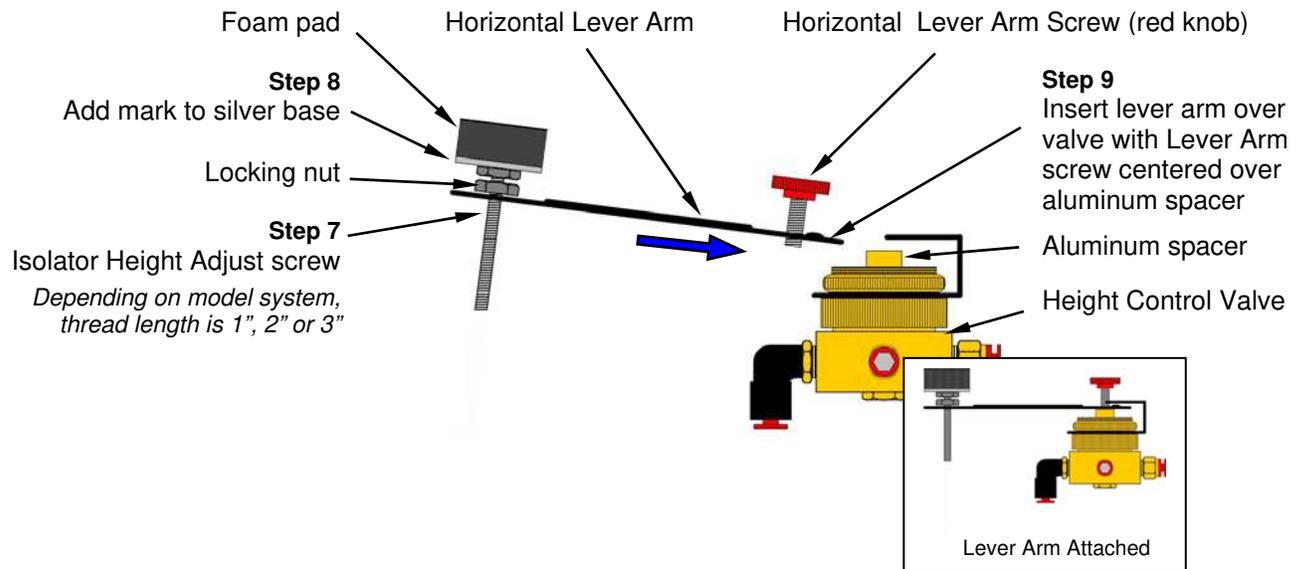


Figure 9 Attaching Horizontal Lever Arm

Step 8 Using a marking pen, mark a spot on the edge of the *foam pad's* silver colored base to later use as a rotation indicator for the **ISOLATOR HEIGHT ADJUST** referenced in figure above.

Step 9 Attach *horizontal lever arm* onto *height control valve* ensuring the end of the **HORIZONTAL LEVER ARM SCREW** fits over the center of the *aluminum spacer* as shown in figure 9 above.

Step 10 Loosely fasten *horizontal lever arm* with **HORIZONTAL LEVER ARM SCREW** (red knob) and adjust to position lever arm horizontal with valve as shown in figure 9 insert.

Step 11 Repeat above steps for attaching *horizontal lever arm* onto remaining two valves.

Isolator Height Adjustment

Step 12 Adjust the **ISOLATOR HEIGHT ADJUST** screw raising *foam pad* until it is in slight contact with the tabletop.

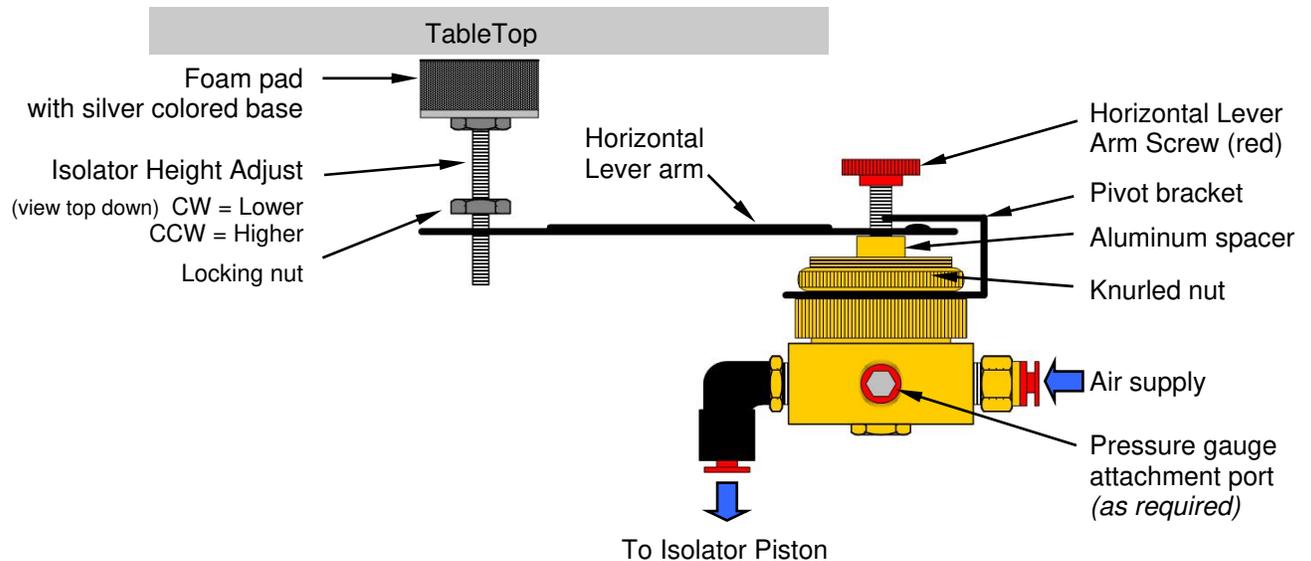


Figure 10 *Height Control Valve*

Step 13 While observing spot marked on the base of the *foam pad* earlier, continue to adjust **ISOLATOR HEIGHT ADJUST** screw another **5 turns CCW** (counter clockwise).

The foam pad material will compress against tabletop.

Step 14 Repeat above steps for **ISOLATOR HEIGHT ADJUST** on remaining two isolators with a valve attached.

Gimbal Piston Adjustment

Step 15 Turn on the main air supply and set to **60-80 psi max.**

After a short delay, all the load disks should lift away from the clamp rings and the tabletop will then be floating.

Step 16 Check to see that the top of the piston and the top surface of the *clamp ring* are parallel as shown in figure below.

Sliding or tapping *load disk* towards the low spot of the piston will correct any tilt.

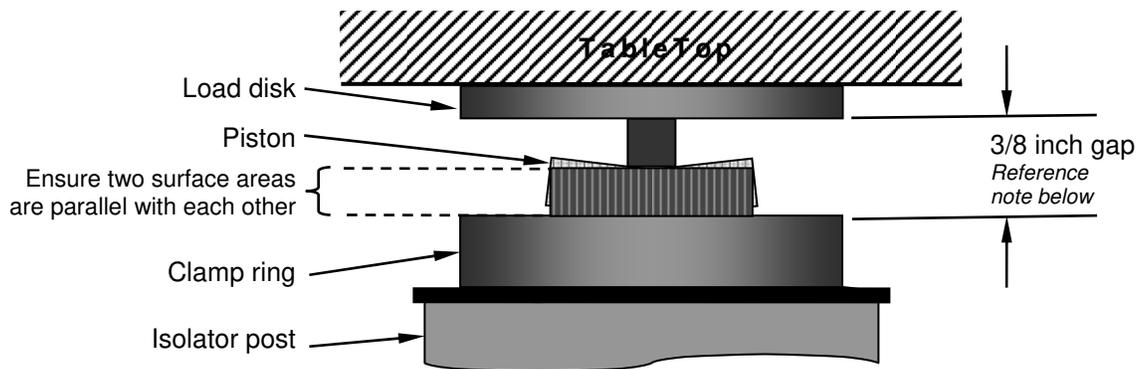


Figure 11 *Gimbal Piston*



Note Centering the Gimbal piston mechanism is important to achieve best horizontal isolation properties.

The mid-point of the vertical range should be determined by the gap between bottom surface of *load disk* and top surface of *clamp ring*.

Gap distance is as follows and referenced in figure above.

4 x 4 inch cross section: **3/8 inch** gap

6 x 6 or **8 x 8 inch** cross section: **1/2 inch** gap.

Some deviation from these heights may be necessary for proper leveling.

The table top should be free to move both vertically and horizontally. Any further leveling should only be done with the **ISOLATOR HEIGHT ADJUST** screw.

Step 17 Tighten *locking nut* on **ISOLATOR HEIGHT ADJUST** for all three valves as shown in figure 10, *Height Control Valve*.



Note There will be some slight settling and improvement in the valve's height sensitivity within the first few days of operation. Again adjust **ISOLATOR HEIGHT ADJUST** if required.

Adjust Air Pressure

Step 18 Adjust the regulated air pressure down to **15–20 psi** above the highest pressure reading of the three pressure gauges. This will optimize damping control of coarse disturbances.



Note Reducing the supply pressure differential will minimize the prolonged disturbance effects of sudden payload forces.

The valves must maintain a positive supply differential or air will be exhausted and the system will deflate.

Air flow through the valves is buffered with controls built into the isolators.

Systems with Rigid Leveling Supports only

(non-isolated tabletop systems)

The rigid leveling support option provides a rigid, non-resonant leg stand for optical tables with a height adjustment. The top of each post has an adjustable jack-screw mechanism with **3 inches** of vertical travel.

Step 1 Place the tabletop down on *rigid supports*, symmetrically over frame as shown in figure below.

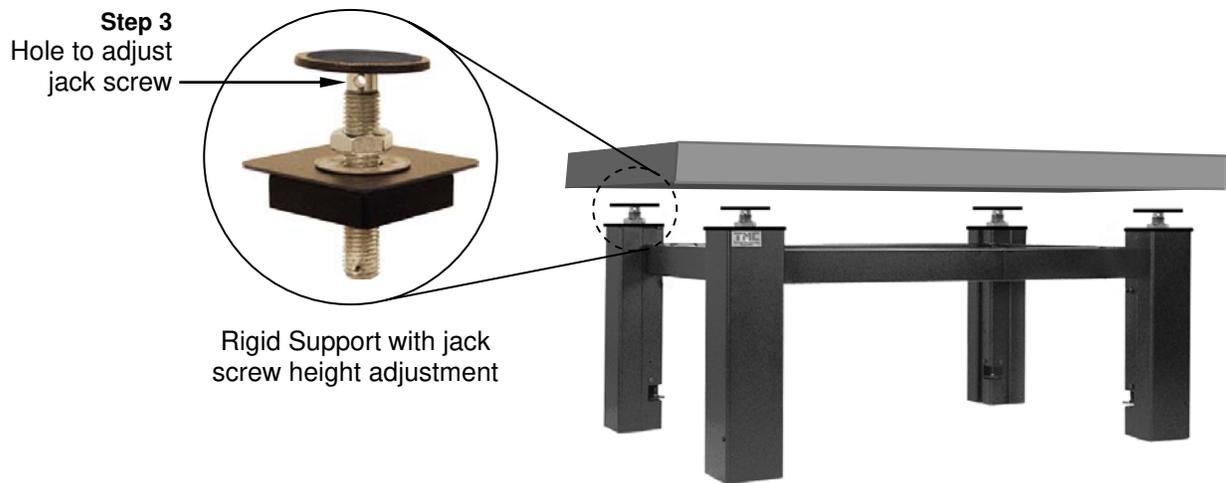


Figure 12 Typical 4 post assembled frame

Step 2 Adjust each support point to ensure that the tabletop is supported at each post and level as required.

Step 3 Adjust *rigid support* height by inserting a screwdriver or other type of bar into threaded-rod hole and rotate jack screw. Reference figure 12 above.

Baseplates Installation

System 1 frames can be configured with freestanding posts as an alternative to having tiebars. This requires an external baseplate on each post. Some model system configurations may already have baseplates installed as shown in figure 1 earlier in this section.

For systems that require baseplate installation proceed with either of the following procedures as appropriate.



Figure 13 *Post with base plate installed*

Systems with 6 x 6 inch legs

- Step 1** Invert post so that the open end is facing up.
- Step 2** Install the four “clips” in their corresponding window and then rotate in position as shown in figure below.

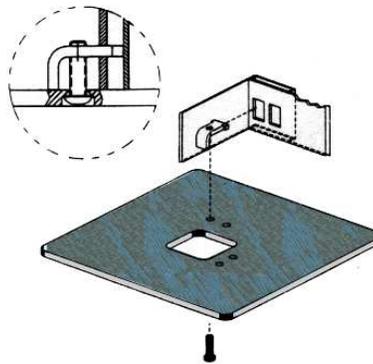


Figure 14 *Baseplate clips*

- Step 3** Position baseplate over post and screw button head cap-screws through baseplate into clips.
Ensure the counter-bored side of plate faces the floor.

Systems with 8 x 8 inch legs

- Step 1** Invert post so that the open end is facing up.
- Step 2** Place the baseplate over the leg and attach using the hardware provided.
Ensure the counter-bored side of plate faces the floor.

Caster Attachment Instructions

An optional set of retractable casters are typically shipped on systems with tiebars already installed. They cannot be used on systems without tiebars.

They are engaged with the floor by turning the caster drive screw using a wrench.

The casters should always remain disengaged when not in use for maximum stability and isolation.

- *Lighter Capacity Systems:* Use **4 x 4 inch** square posts. The retractable casters are attached outside of the post.
- *Intermediate Capacity Systems:* Use **6 x 6 inch** square posts. The retractable casters are attached inside of the cross-section post.

Caster attachment to 4 x 4 inch posts

Step 1 Retract wheel position setting.

Using a wrench rotate caster **HEIGHT ADJUSTMENT** screw shown in figure below.

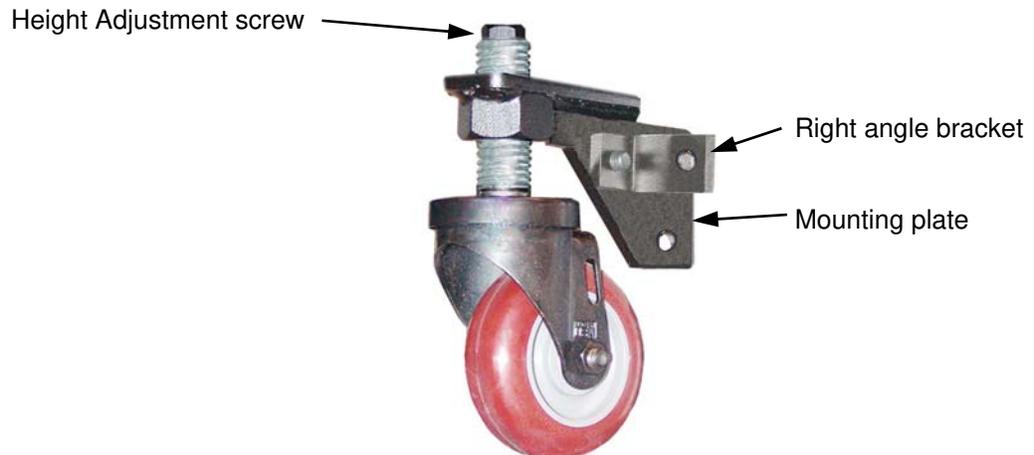


Figure 15 *Lighter System Caster Assembly*

Step 2 Fasten right angle bracket to caster's mounting plate as shown in figure above.

Step 3 Fasten caster mounting plate to the base of post as shown in figure below.

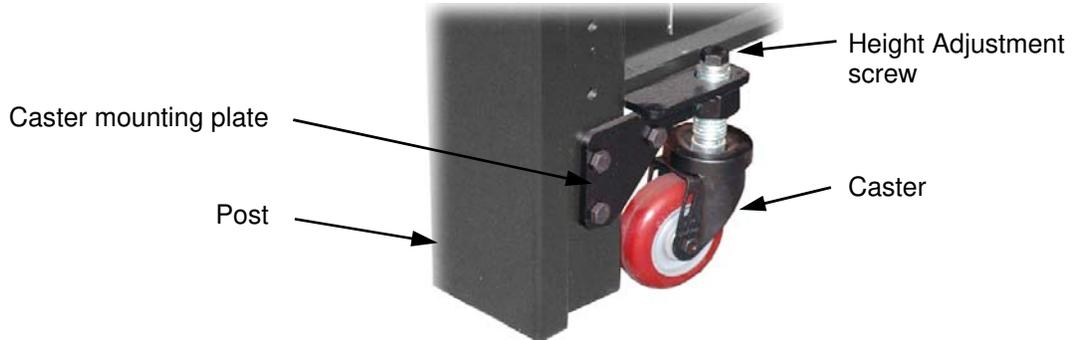


Figure 16 *Attaching caster to post*

Step 4 Fasten right angle bracket to post.

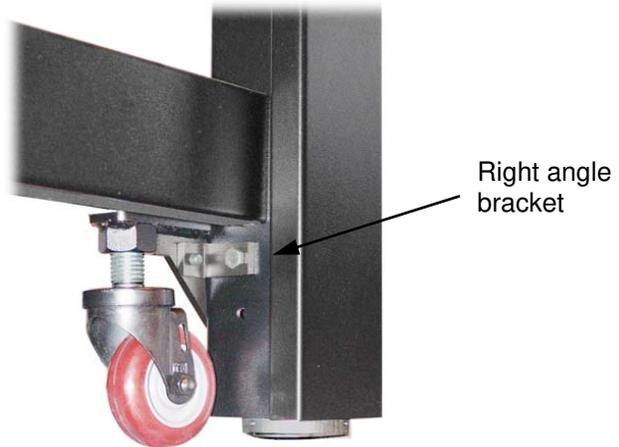


Figure 17 *Right angle bracket to post*

Step 5 Adjust caster **HEIGHT ADJUSTMENT** screw to engage caster with the floor. Reference figure 15 & 16 above.



Important Retract the casters after use or vibration isolation performance will be compromised if the casters are left engaged with the floor.

Caster attachment to 6 x 6 inch posts

Step 1 Invert post so that the open end is facing up as shown in figure below.

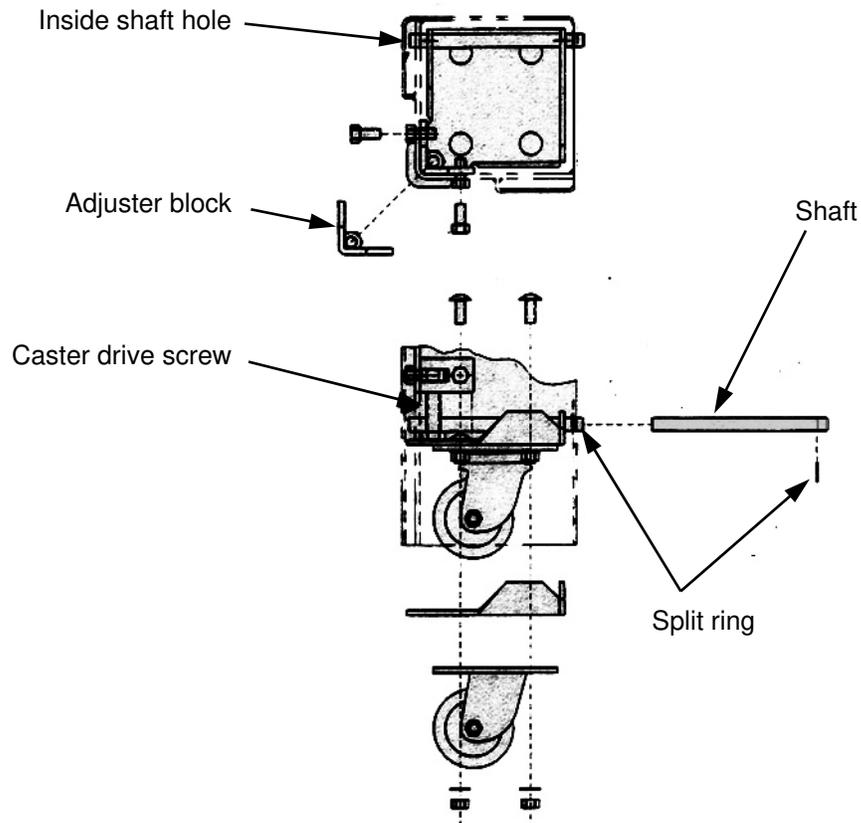


Figure 18 *Heavy System Caster Assembly*

Step 2 Attach adjuster block to inside of post by inserting caster drive screw (1/2-13 x 2-1/4 inch hex head bolt) into adjuster block with bolt head facing to the bottom end of the post.

Step 3 Insert caster plate assembly by aligning shaft with shaft holes and then placing shaft through the inside shaft hole first with grooved end of shaft out.

Step 4 Fasten shaft with split ring and secure using a flat end screwdriver.

Step 5 Invert post back into the upright position.

Step 6 Engage or disengage caster as required using the caster drive screw.

Rigid Supports to Vibration Isolator Upgrade

Introduction

Both the *Rigid Support* module and *Vibration Isolation* module drop into the top of the support post and hang from their top bulkhead. Set screws from the two adjacent inside plates hold the module insert securely in place.



Figure 19 *Support Post*

Vibration Isolator Support Modules Three isolator modules have a Height Control Valve (V) attached and are identified as a Master Isolator (M). The remaining isolator modules do not have a valve and are identified as a Slave Isolator (S).

Three points determine a level plane. All systems have only three support modules with Height Control Valves regardless of the total number of support modules.

Upgrade Instructions

- Step 1** Configure support post upgrade layout so that a slave isolator module is located adjacent to a master isolator module as typically shown in figure below.

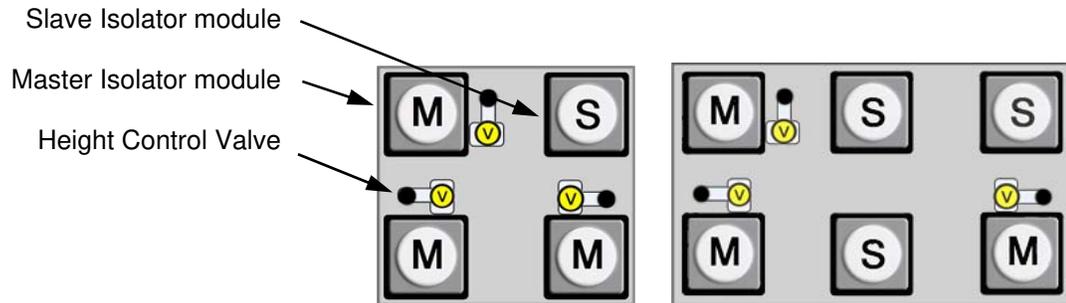


Figure 20 Typical 4 post and 6 post support module layout

- Step 2** Loosen the set screws from inside plate and lift out *Rigid Support* module. Reference figure 19.
- Step 3** Insert the *Isolation* module and re-tighten the set screws.
- Step 4** Upgrade remaining posts as appropriate.
- Step 5** Connect the appropriate air fitting to each module through a small port in the outer post.
- Step 6** Follow instructions for [Air Supply Plumbing, Valves and Tabletop Placement](#) earlier in this section.

Accessories

Coupled Optical Tops

Introduction

TableTops can be coupled end-to-end or joined in **L** or **T** shape configurations. They also can be configured with two working heights by coupling tables with different thickness.



Figure 1 *Typical coupled optical top*



Caution Moving and coupling optical tops together should be performed by professional riggers. The following instructions are to assist professional machinery movers.

Safety

- If you are uncertain of your ability to safely accomplish any aspect of any work requirement **Stop Work and Seek Assistance**.
- Plan your moving and assembly of equipment ahead of time. Conduct a practice walk through prior to beginning any work.
- Ensure all safety procedures for the proper use of hand tools and power lifting equipment are used.
- Never place anyone under a suspended load.
- Contact the appropriate site safety authority for project approval prior to commencing all work. If possible have a safety supervisor present during work
- Determine the number of people necessary to accomplish this task safely; typically a minimum of three people.

Suggested Tools and Equipment

- Gantry crane
(rated capacity greater than gross load)
- Chain hoist and Gantry dolly
(rated capacity greater than gross load)
- Assortment of cargo straps and attachment shackles
(recommend 2 each of 6 foot, 8 foot, 10 foot and 12 foot lengths)
- Lifting hoist
(as required to assemble the Gantry crane at work site)
- 2 ratchet style 2 inch wide cargo straps 20 feet long
- Assorted hand tools
(Snips, 24 inch Pry Bar, 3/8 inch Drive Ratchet and Socket Set, Allen Wrench Set, Adjustable Wrench with 1-1/2 inch opening, #2 Phillips Screwdriver, #2 Slot Screwdriver)
- Assorted blocking and shimming materials
(include 2 x 4's, 4 x 4's etc.)
- 3 hydraulic lift table carts (or suitable substitute)
(Confirm gross load requirements are met.) Carts used to position tables for assembly. They must be able to provide up/down, left/right and tilt adjustments necessary to align the tables for assembly.
- 2 Johnson Bars or Dollies (or other suitable equipment)
To move tables from unloading site to assembly area.
- TMC provided assembly wrench, minimum 1, best 2
- TMC provided slotted 0.030 inch thick x 2 inch wide x 7 inch long backing shim
- 4 foot (minimum) level. 4 foot long (minimum) straight edge
- 7/16–20 tap and die
- 1-20 tap and die
- Anti-seize compound (tube) and Q-tips
- Lock-tight (tube)

Preparation

Unloading and uncrating optical tables and support posts.

- When the equipment arrives the optical tops and associated crates will require a staging area (loading dock) or other area in which to unload the truck. This will often require a forklift.
- The crates will most likely arrive laying flat on the truck. To safely unload them, it will be necessary to lift them from the bottom using a fork lift or similar device (pallet jack – dock mules).
- Uncrate the optical tops and support posts in accordance with the un-packaging instructions on the crate.
- Uncrate all isolator/post assemblies as required. Place in a safe location with all other related parts packaged for later use.
Discard all unnecessary crating materials from the work area.
- Lift and move the optical top to the installation location. It may be necessary to lift and rotate the optical table to its side position using a Gantry and hoist.

Assembly and setup

- Step 1** Mark the floor with masking tape to outline the exact placement for each optical table.

Identify table number 1 placement; the first and primary reference table that the others will be aligned with.

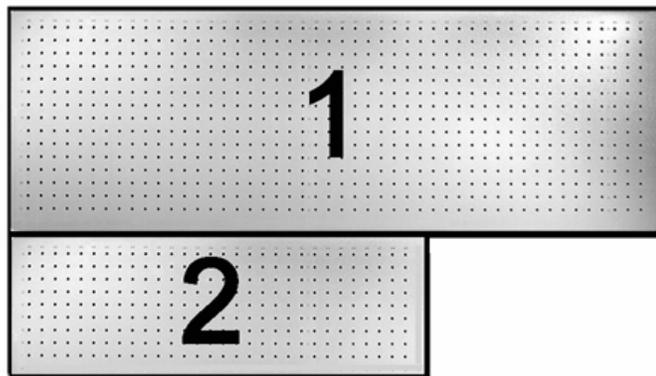


Figure 2 *Sample coupled table layout*

- Step 2** Assemble the isolators or posts in accordance with the instructions provided for your model system.
- Step 3** Place isolators/posts in the marked location for the installing the primary optical top.
If multiple tops are being joined together, indented numeric codes for the joining order are provided and must be complied to.
- Step 4** Lift the optical top and place it on the isolators/posts using care to evenly balance the top on the Gantry crane.
- Step 5** Carefully level and adjust the height position.
This optical top will become the reference to which all the other optical tops will be positioned and joined.
- Step 6** Apply a small amount of anti-seize compound to all the female joiner plate **1-20** threads.
- Step 7** Position the isolators/posts for the next optical top to be joined to the reference top in its respective position but low enough as to not interfere with the alignment of the top to be joined.
- Step 8** Lift and move the second top and position it just above the isolators/posts as shown in figure 3 below using the Gantry.
- Step 9** Position the second top so that it is within a few inches from touching the “reference” optical top.
- Step 10** Place the second top on the adjustable support stands or jacks and align the dowels with the dowel holes in the face of the joiner plates such that when appropriate pressure is exerted to the second top towards the “reference” top, the dowel pins will easily mate with the female dowel holes referenced in figure 4 insert below.
This can be facilitated by placing a straight edge across the two top surfaces as shown in figure 3 below.

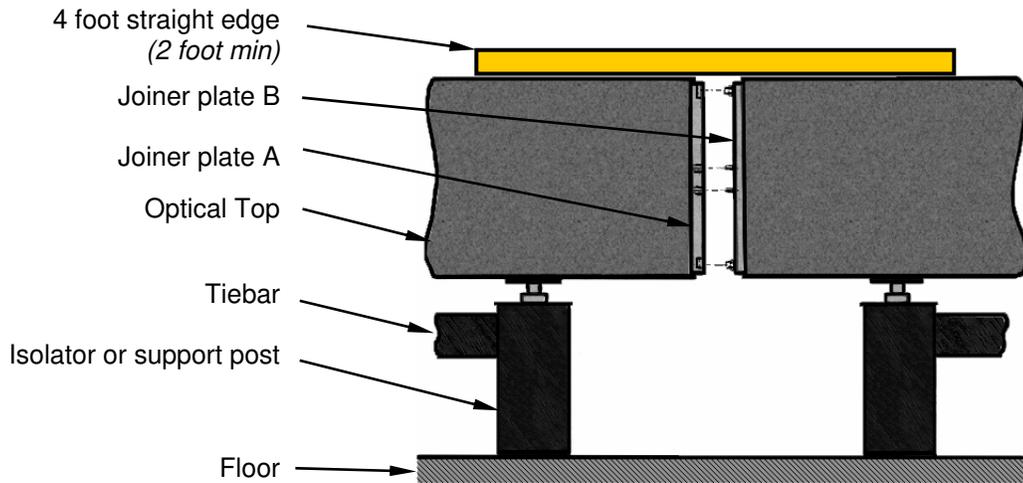


Figure 3 Joiner plates

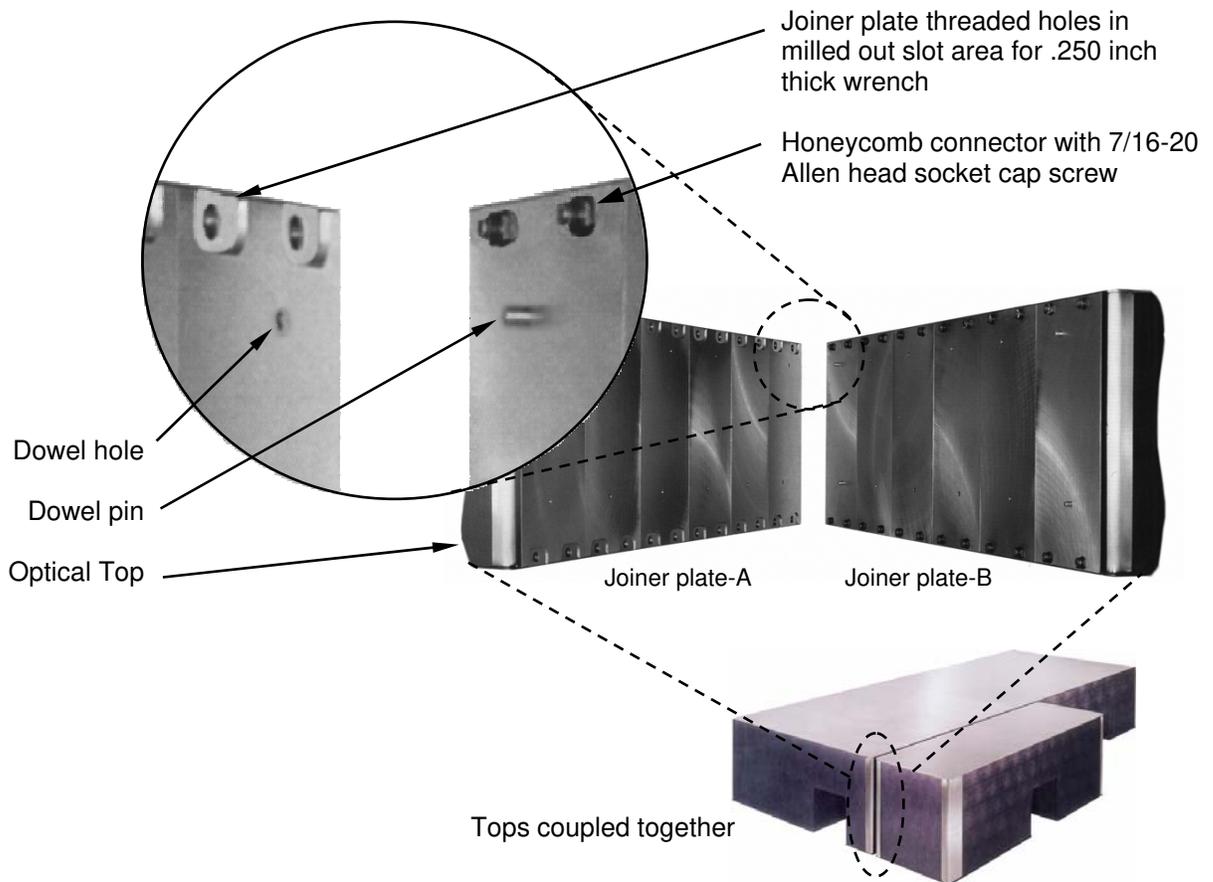


Figure 4 Attaching Joiner plates together

The second top must be level and co-planar with respect to the “reference” top to facilitate proper joining. Continuously check and adjust as required.

You can continue using the Gantry crane and straps for this procedure with the optical top suspended in the air, but it will be more difficult to maintain top alignment during leveling and co-planar adjust necessary to engage the dowel pins.

Step 11 Place a ratchet strap of appropriate length around the girth of the two optical tops to be joined.

Step 12 Slowly ratchet the two tops together while ensuring that the tops remain co-planar and level with respect to one another as referenced in figure 3 above.

The dowel pins and holes referenced in figure 4 insert will mate as tops come together.

Ensure that the honeycomb connectors (nuts) do not jam against the corresponding joiner plate threaded holes.

Step 13 Ensure you can freely turn ALL honeycomb connectors with your fingers. Then engage the first thread into the threaded hole in joiner plate-A as reference in figure below.



Note Once you have verified that all honeycomb connectors are free to turn, it is recommended that you use the supplied **0.030 inch** shim tool and wrench referenced in figure 5 & 6 below to start the first thread of each honeycomb connector. Using the shim will insure that all connectors start straight.

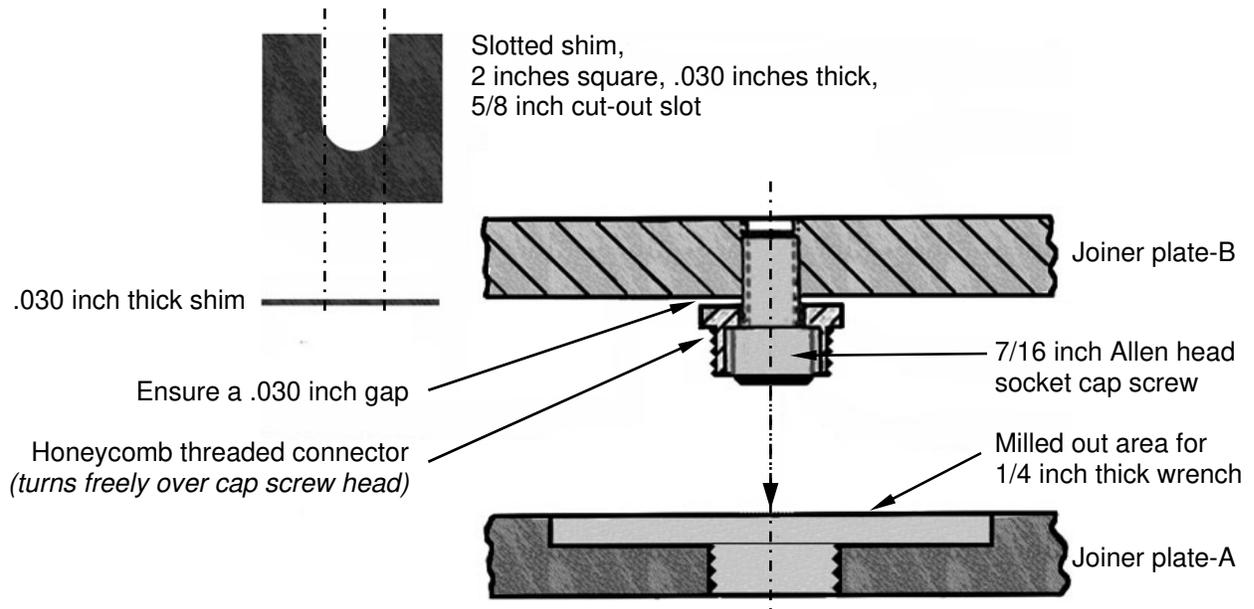


Figure 5 *Honeycomb Connectors*

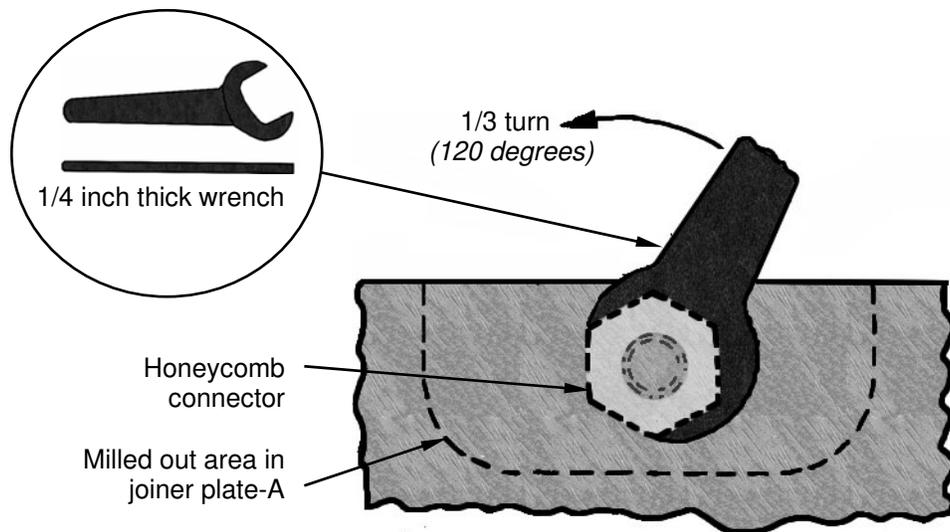


Figure 6 *Wrench tightening honeycomb connector*

Step 14 Once all honeycomb connectors are engaged into joiner plate-B increase the pressure on the ratchet strap as required to facilitate tightening the honeycomb connectors.

- Step 15** Using the shim tool and wrench shown in figure above, start from the left side of the optical top and turn each honeycomb connector in consecutive order only **1/3** turn or **2** flats at a time, moving in a clockwise direction completely around the top.



Important If one or more of the honeycomb connectors becomes jammed, then stop and loosen all connectors and start over.

If at any time a connector is damaged, then all connectors must be loosened, the two tops pulled apart and the damaged components replaced.

See troubleshooting instructions at the end of this procedure.

- Step 16** Torque each honeycomb connector to approximately **20 foot-pounds**.

This equates to approximately **40 pounds** of force applied to a **6 inch** wrench handle.

- Step 17** Raise the isolators/posts such that they provide a coplanar support across the second optical top.

Rigid support posts: If non-isolating posts were installed adjust the top support foot on each post until the both tops are level. This requires a #2 Phillips screw driver and adjustable wrench.

Isolator posts: If isolation posts were installed complete their installation using the TMC instruction sheets provided.

- Step 18** Repeat above steps to join additional optical tops as appropriate.

Step 19 Once tops have been coupled together, apply provided stainless steel strip of tape down on the joiner plate areas between the joined optical tops.

First peel away the backing tape and apply sticky side down. This provides a finished surface across the joined optical tops.

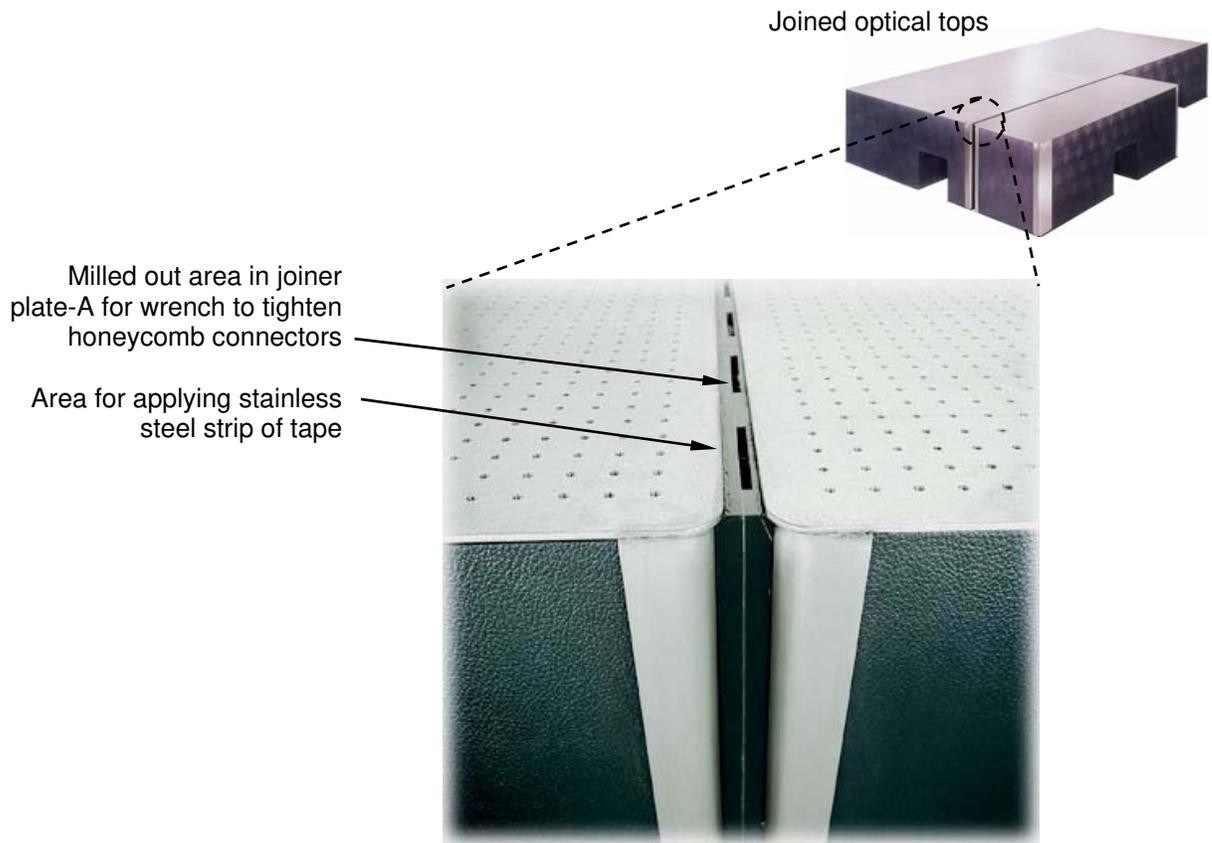


Figure 7 Joiner plate area between optical tops

Troubleshooting

If a connector becomes jammed during the installation process, then proceed as follows.

- Back off all connectors in the opposite direction from installation using the same procedure.
- Once the optical tops are separated, remove and discard the damaged **7/16–20** cap screws.
Discard any honeycomb connectors that have been deformed.
- Re-tap the **7/16 inch** and **1-20** holes as necessary.
- Apply lock-tight to the **7/16 inch** cap screws.
- Install the new screws and honeycomb connectors.
- Ensure that a **0.030 inch** clearance is provided between the joiner plate and **1-20** screw shoulder. Compare to an existing non-damaged honeycomb connector if in doubt.
- Once repair is completed, begin installation procedure again.

Accessory

Overhead Shelves

The overhead shelf is a free standing storage rack that spans the long axis of the optical table for equipment and instrumentation.

The shelf is adjustable in height. The 6 foot shelf includes an electrical strip with (2) eight grounded outlet strips and the 8 & 10 foot shelves include (4) eight grounded outlets

Optional accessories include a second tier or a hanging monitor shelf. Each shelf includes 2 rows of holes with 2 inch spacing to facilitate mounting of fixtures

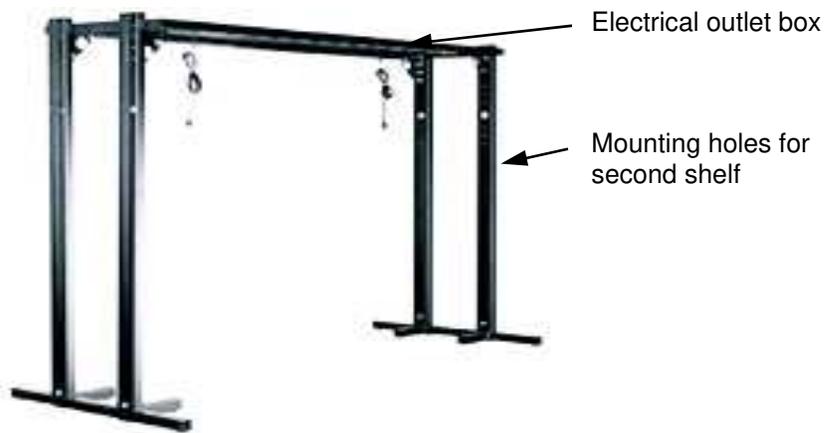


Figure 8 *Overhead Shelf*

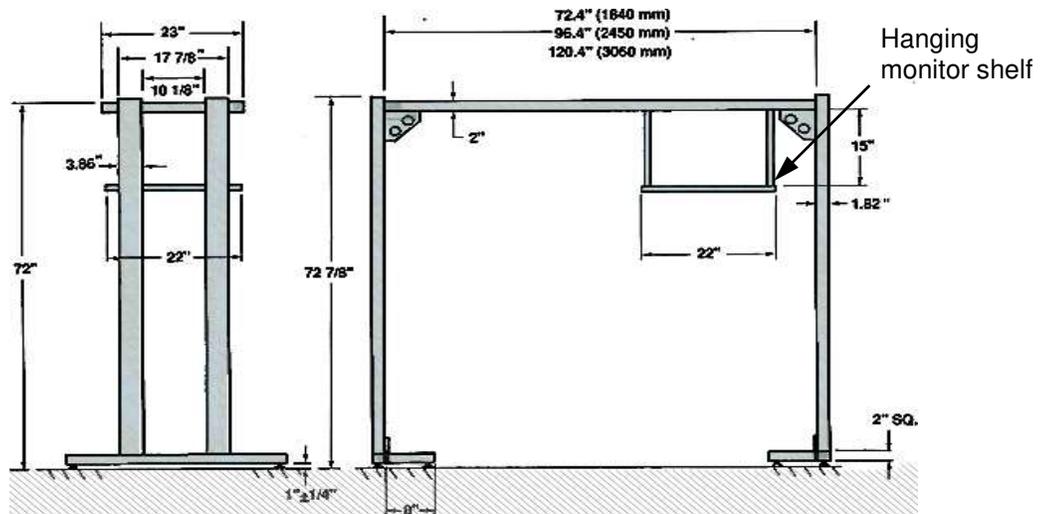


Figure 9 *Overhead Shelf Drawing*

Accessory

Breadboard Levelers

Levelers can be applied to **2 inch** thick breadboards with **1/8** or **3/16 inch** skins.

The leveler consists of a threaded sleeve bonded onto the top, a bushing leveler, and a locknut. An **M6** or **1/4-20** bolt may be used to fasten the breadboard to another top. The lever is adjusted and locked with an Allen wrench.

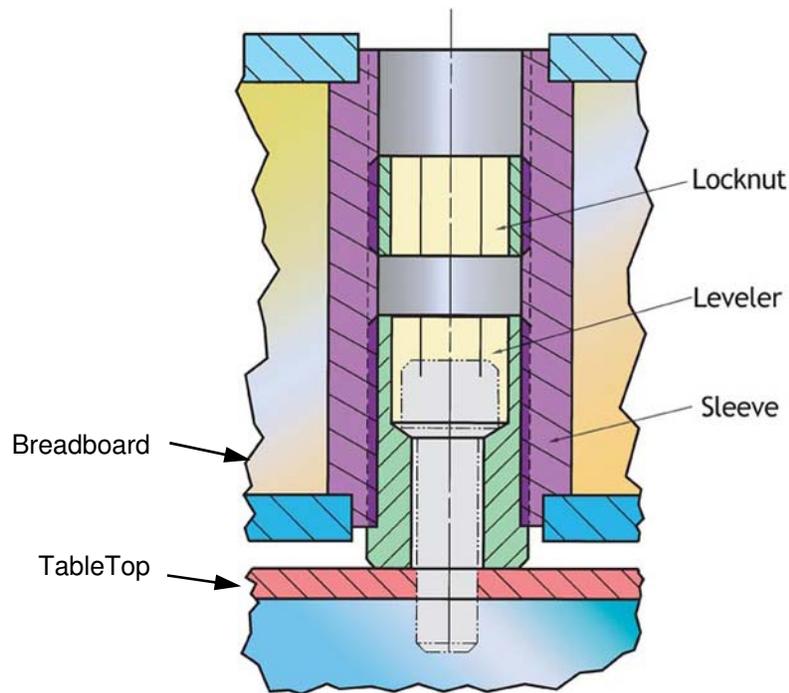


Figure 10 *Breadboard Leveler*

Accessory

Earthquake Restraints

Top Restraint Bracket - Bracket attaches to the underside of tabletop encircling upper tiebar as shown in figure below. On new table orders, the top can be supplied with mounting holes. To retrofit tables without mounting holes, contact TMC for recommendations.

Floor Restraint Bracket - Bracket encircles the lower tiebar close to the support posts and bolts to the floor as shown in figure below.

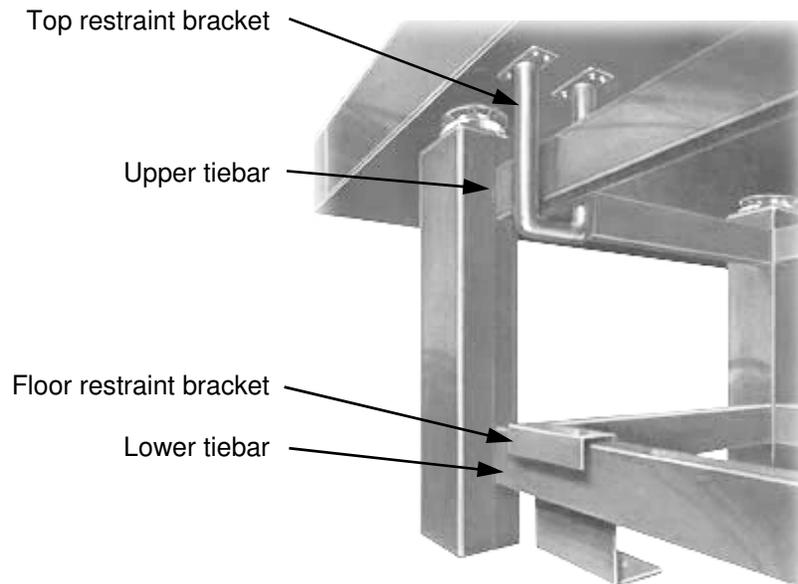


Figure 11 *Earthquake restraints*

Accessory

Laser Shelf

The laser shelf can be fitted to tables larger than **36 x 72 inches** and supported at least **18 inches** above the floor.

The shelf consists of an additional un-drilled **2 inch** thick breadboard attached to the bottom plate of the table.

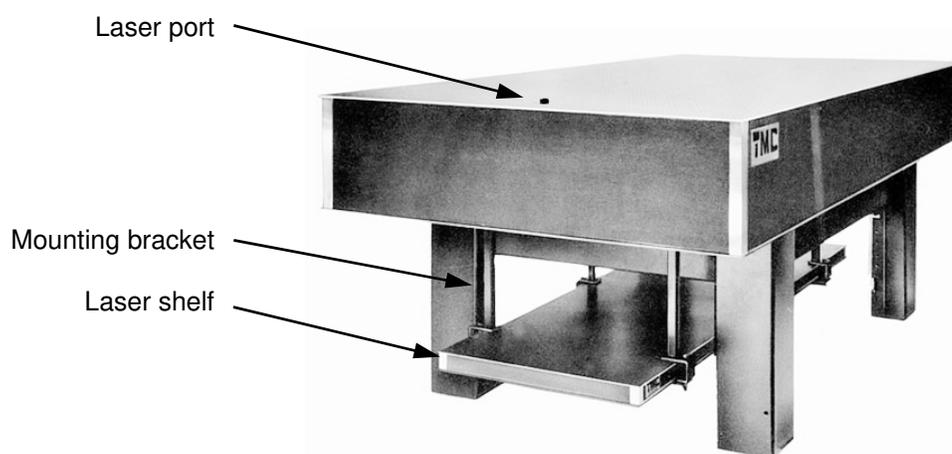


Figure 12 *Laser Shelf*

3

Laboratory Tables and TableTop Platforms

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Laboratory Tables

63-500 Series High-Performance Lab Tables



Figure 1 63-500 Series High-Performance Lab Table

Introduction

The 63-500 Series Laboratory Tables employ Gimbal Piston Isolators that require a continuous supply of compressed air or nitrogen to operate properly. For a complete discussion of the air supply requirements, see [System Air Supply Requirements](#) in introduction section of this document.

Tools Required

- Leveling wrench (provided)
- **5/16 inch** Allen wrench for accessories (provided)
- Utility Knife
- **3/4 inch** wrench (for casters)

Air Supply Plumbing and Valve Setup Instructions

Air Supply Input Connection

Step 1 Plumb tubing between air supply and system's input air filter as appropriate.

Fittings Tubing can be connected to a 1/4 or 1/8 inch NPT female fitting as shown in figure below.

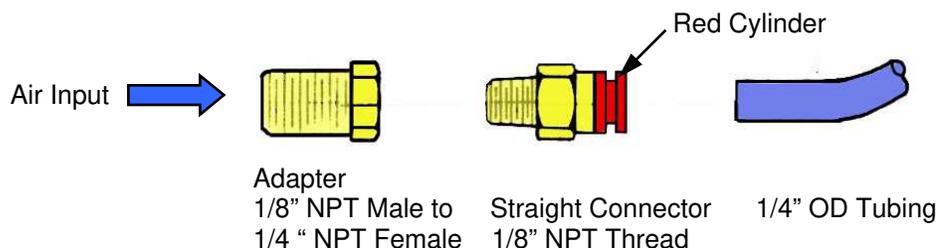


Figure 2 Air Supply Input Connection

Connecting Insert the air tube firmly into the self sealing fitting.

Disconnecting Push the *red cylinder* with your thumb and forefinger toward the center of the fitting body while pulling the tube in the opposite direction.

Internal Air Supply Tubing

Systems are internally plumbed at the factory as shown in figure below.

M = Master Isolator with Height Control Valve (V)
S = Slave Isolator (no valve)

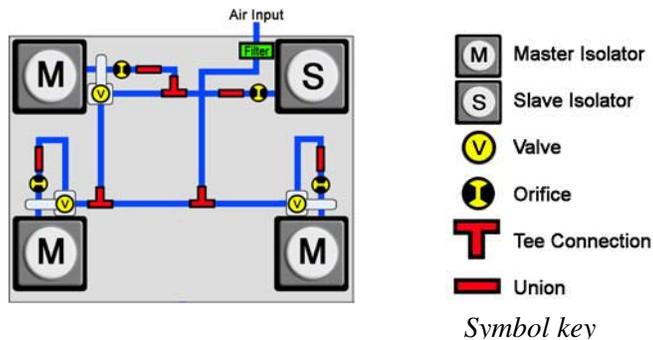


Figure 3 Valve schematic for a 4-isolator system



Note Each post is shipped with a short section of tubing with a union coupler already attached to the input elbow. This “pigtail” segment should not be tampered with. Each pigtail contains a small, flow-restricting orifice to damp table motion and stabilize the load.

Important Do not remove or change the location of these orifices. If lost or damaged, please contact TMC for replacement pigtails.

Installing and Leveling TableTop

Step 2 Ensure the main air supply is **Off**.

Step 3 Using the leveling wrench provided, adjust leveling feet as shown in figure below to ensure all four legs are in solid contact with floor.

Level frame by referencing the top surface of the horizontal tiebars.

Carpenter accuracy leveling is more than adequate.

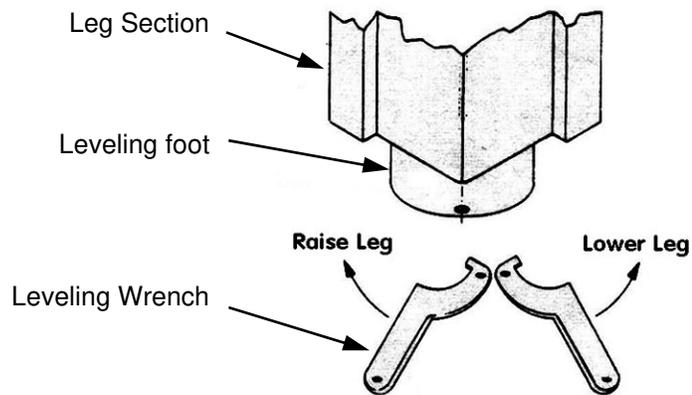


Figure 4 *Adjusting leveling feet*



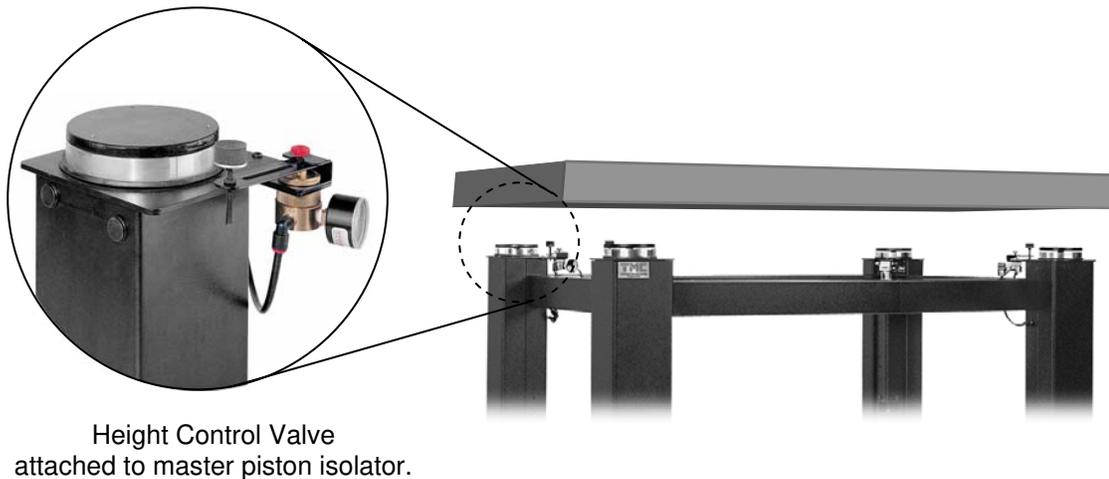
Note Skipping the above step may compromise vibration isolation performance.

Step 4 Place tabletop slowly down symmetrically on deflated isolators to avoid any damage to isolators as shown in figure below.

The top should be symmetric over the isolator frame. If the floor is uneven, one of the 4 isolators may not contact the payload. This gap should be closed by further lowering the leveling foot on the corresponding post.



Caution The tabletops weigh approximately **275-300 pounds**. Take proper precautions.



Height Control Valve
attached to master piston isolator.

Figure 5 Table top placed symmetrically over 4 legs

Attach Horizontal Lever Arms

Step 5 Locate the three *height control valves* mounted on *isolators* as typically shown in figure above and referencing figures 3 earlier.

Step 6 Ensure the main air supply is **Off**.

Step 7 Adjust the **ISOLATOR HEIGHT ADJUST** screw CW (clockwise as viewed top down) to lower *foam pad* down to the lowest position close to the *horizontal lever arm* as referenced in figure below. Retract *locking nut* as required.

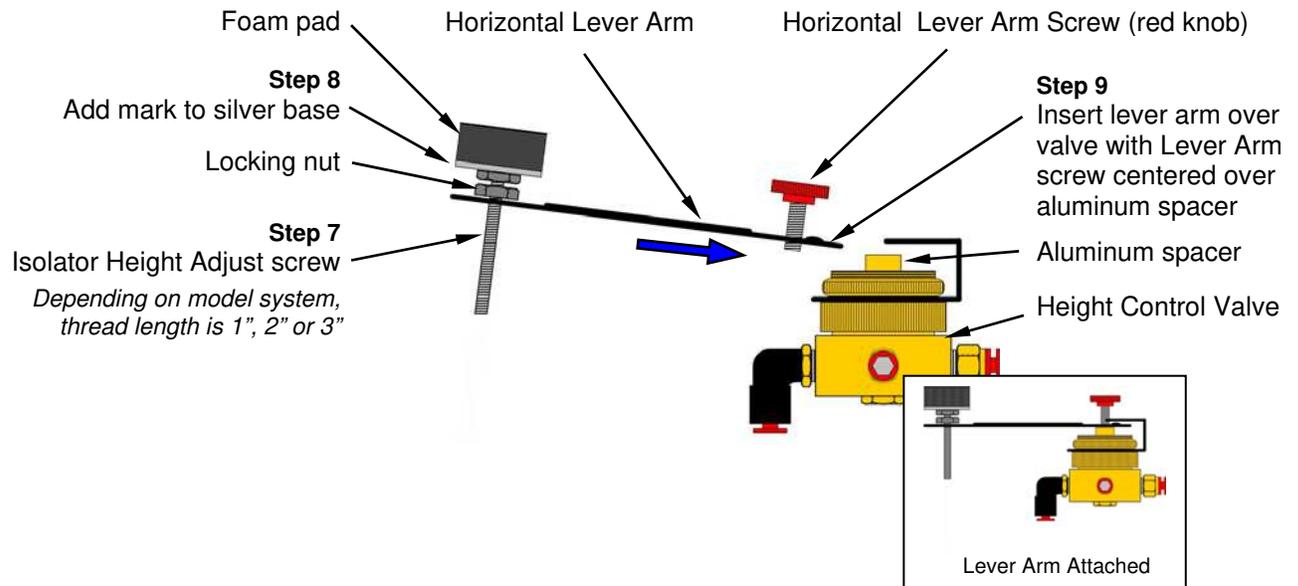


Figure 6 Attaching Horizontal Lever Arm

Step 8 Using a marking pen, mark a spot on the edge of the *foam pad*'s silver colored base to later use as a rotation indicator for **ISOLATOR HEIGHT ADJUST**.

Step 9 Insert *horizontal lever arm* onto *height control valve* ensuring the end of the **HORIZONTAL LEVER ARM SCREW** fits over the center of the *aluminum spacer* located on the top of the valve as shown in figure 6 above.

Step 10 Loosely fasten *horizontal lever arm* with **HORIZONTAL LEVER ARM SCREW** (red knob) and adjust to position arm horizontal with valve.

Step 11 Repeat above steps for attaching *horizontal lever arm* onto remaining two valves.

Isolator Height Adjustment

Step 12 Adjust the **ISOLATOR HEIGHT ADJUST** screw to raise *foam pad* until it is in slight contact with the tabletop.

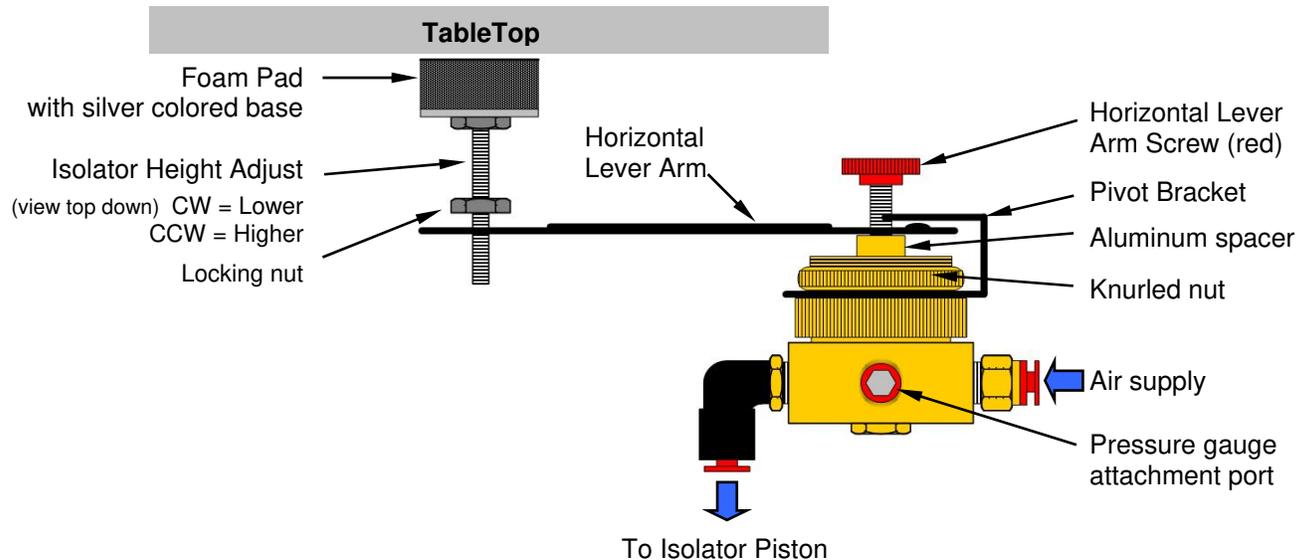


Figure 7 Height Control Valve

Step 13 While observing spot marked on the base of the *foam pad* earlier, continue to adjust **ISOLATOR HEIGHT ADJUST** screw another **5 turns CCW**, or more depending on model system being applied to.

The foam pad material will compress against tabletop.

Step 14 Repeat above steps for **ISOLATOR HEIGHT ADJUST** on remaining two isolators with a valve attached.

Gimbal Piston Adjustment

Step 15 Turn on the main air supply and set to **60-80 psi max.**

After a short delay, all the load disks should lift away from the clamp rings and the tabletop will then be floating.

Step 16 On systems with Gimbal Pistons, check to see that the top of the *piston* and the top surface of the *clamp ring* are parallel as shown in figure below.

Sliding or tapping *load disk* towards the low spot of the piston will correct a tilt of the Gimbal Piston.

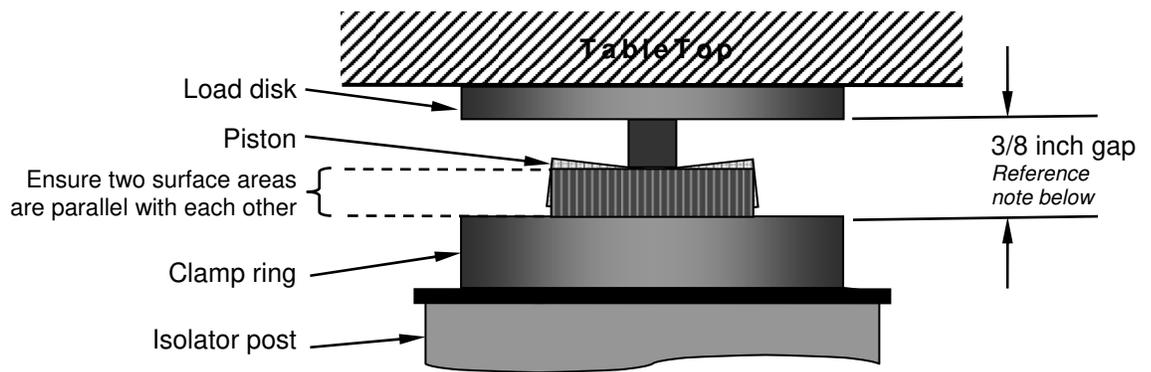


Figure 8 *Gimbal Piston*



Note Centering the Gimbal Piston mechanism is important to achieve best horizontal isolation properties.

The mid-point of the vertical range should be determined by the gap between bottom surface of *load disk* and top surface of *clamp ring*.

Gap distance is as follows and referenced in figure above.

4 x 4 inch cross section: **3/8 inch** gap

6 x 6 or 8 x 8 inch cross section: **1/2 inch** gap.

Some deviation from these heights may be necessary for proper leveling.

The table top should be free to move both vertically and horizontally. Any further leveling should only be done with the **ISOLATOR HEIGHT ADJUST** screw.

Step 17 Tighten *locking nut* on **ISOLATOR HEIGHT ADJUST** for all three valves as shown in figure 7 above, *Height Control Valve*.



Note There will be some slight settling and improvement in the valve's height sensitivity within the first few days of operation. Again adjust **ISOLATOR HEIGHT ADJUST** if required

Adjust Air Pressure

Step 18 Adjust the regulated air pressure down to **15–20 psi** above single gauge pressure reading. This will optimize damping control of coarse disturbances.



Note Reducing the supply pressure differential will minimize the prolonged disturbance effects of sudden payload forces.

The valves must maintain a positive supply differential or air will be exhausted and the system will deflate.

Air flow through the valves is buffered with controls built into the isolators.

Troubleshooting Tips

Table Not Floating Properly

If slave piston is too high or too low, adjust **HEIGHT ADJUSTMENT** screw for master valve controlling it to raise the piston.

Also, for piston diagonally opposite, slightly adjust the **HEIGHT ADJUSTMENT** screw in the opposite direction.

Instability

If table oscillates uncontrollably, turn off air supply and contact TMC. This problem is due to a combination of high mass and high center of gravity and can be corrected.

Poor Isolation

To optimize isolation, ensure that tabletop is free to move vertically and horizontally. Check section [Installing and Leveling TableTop](#) earlier in this procedure.

Pistons Completely Down

If isolators do not rise from the down position, then the leveling valves are not adjusted correctly or the air supply pressure is insufficient.

Pistons Completely Up

If an isolator cannot be lowered from the up position, the leveling valves are not adjusted correctly or the system is not plumbed correctly.

Reference air supply diagram at the beginning of this procedure, [Air Supply Plumbing and Valve Setup Instructions](#).

Accessories

Faraday Cages

Introduction

The Faraday Cage is available in two types of configurations.

- **Type II Faraday Cage**
Cage for mounting to a full perimeter enclosure on 63-500 series tables.
- **BenchTop Faraday Cage**
Cage with a base plate for use on a bench top.



Figure 1 Type II Faraday Cage and BenchTop model (insert)

Assembly Instructions



Caution Use gloves or take care when handling front panel aluminum edges to avoid cutting your hands.

Tools Required:

- Philips screw driver (provided)
- **3/8 inch** wrench

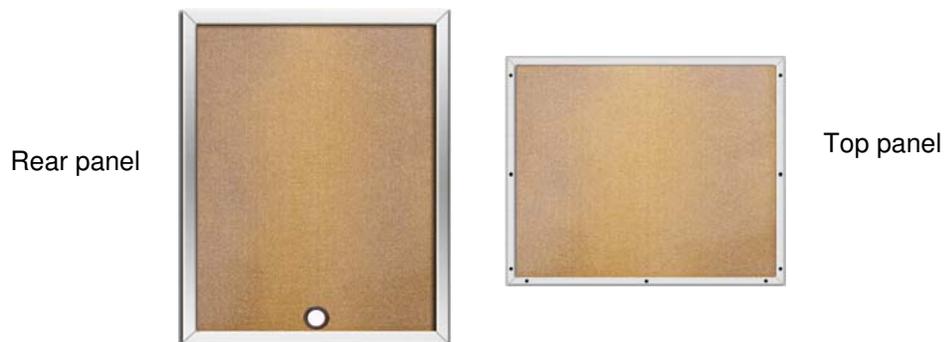
Hardware Provided

- Front panel (1)
- Side panels (2)
- Rear panel (1)
- Top panel (1)
- **10-32 x 1-1/4 inch** screws & hex nuts (6)
- **6 x 1 inch** self drilling screws (15)
- Holding clip, large (2)
- Holding clip, small (4)



L&R Side panels

Front panel



Rear panel

Top panel

Figure 2 *Faraday cage panels*

Step 1 Ensure front panel assembly window shade is in the open (retracted) position for ease in cage assembly.

Open shade as required by lifting brass shade release lever as shown below.

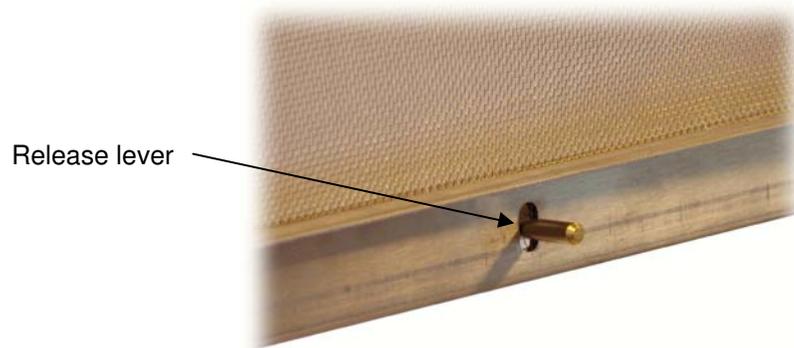


Figure 3 *Front shade release lever*

Step 2 Place base of assembled front panel on rectangular perimeter enclosure frame's front surface or bench top base plate as appropriate.

Center base of front panel on enclosure frame and fit panel's bottom lip into open center area as shown in figure below.

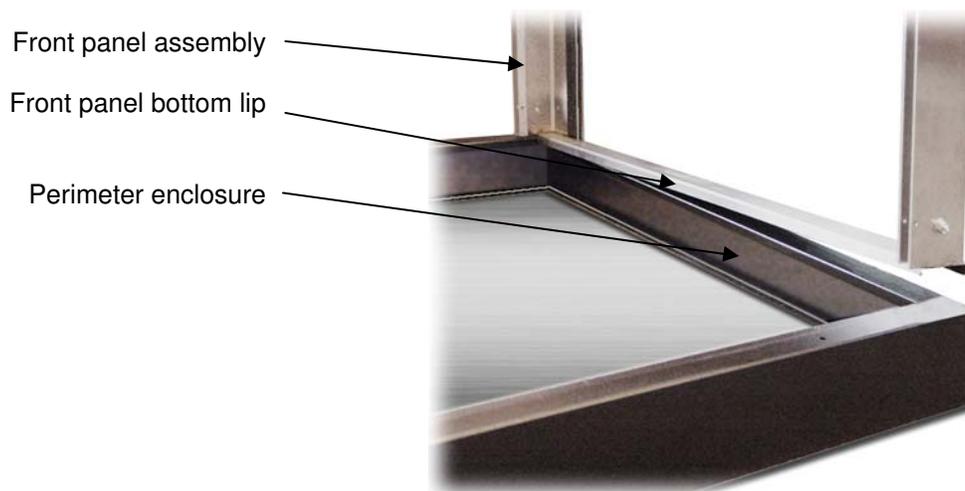


Figure 4 *Mounting front panel to perimeter enclosure*

Step 3 Insert first side panel vertical edge into the front panel vertical side cavity as shown below.

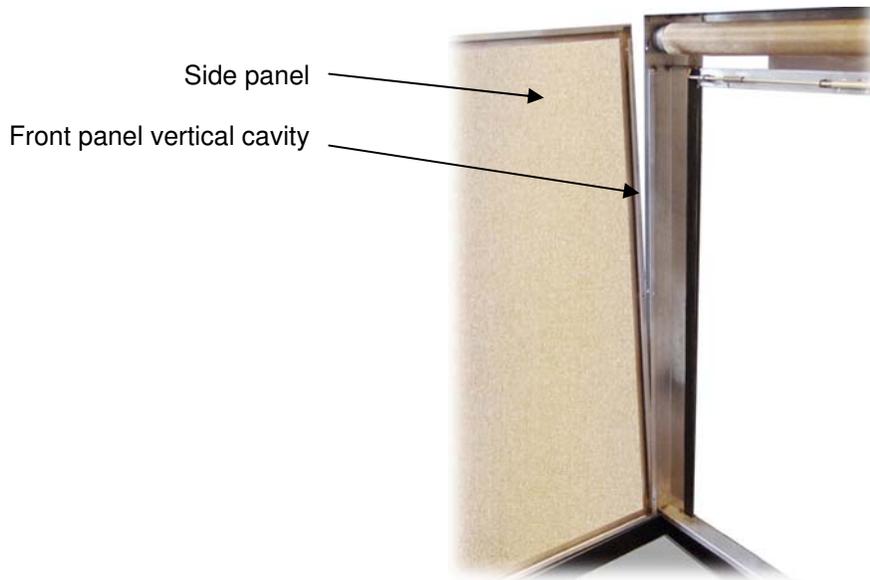


Figure 5 *Attach side panel to front panel*

Step 4 Press side panel against front panel vertical cavity and fasten using a **10-32 x 1 inch** Philips head screw and hex nut in side panel top hole location.

Loosely tighten screw using Philips head screw driver.



Note As panels are first assembled, loosely fasten with a single screw along each edge until all panels are attached and properly aligned together.

Step 5 Snap a hold-down clip between the lower edge of the side panel and perimeter enclosure frame.

Use a large clip if the perimeter enclosure frame is **5.75 inches** tall or a small clip if the enclosure is **3.75 inches** tall.

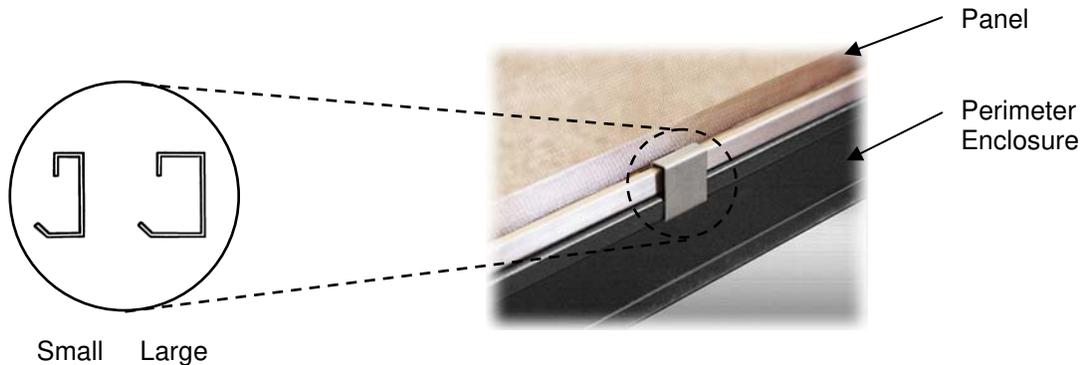


Figure 6 *Hold down clip*

Step 6 Attach second side panel in the same way as the first, hold panel in position and loosely fasten with a **10-32 x 1 inch** screw in side panel top hole location only.

Step 7 Snap a hold-down clip between the lower edge of the side panel and perimeter enclosure frame.

Use a large clip if the perimeter enclosure frame is **5.75 inches** tall or a small clip if the enclosure is **3.75 inches** tall.

Step 8 Place the rear panel between the two side panels. Loosely fasten rear vertical edge of each side panel against rear panel with one **6 x 1 inch** screw.

Step 9 Snap two small size hold down clips evenly spaced along the bottom of rear panel the same as shown in figure 6 above for side panels.

In this step only the smaller clips are used regardless of the size of the perimeter enclosure.

- Step 10** Place the top panel over the two side panels and slide panel into the top front panel cavity area and evenly align edges with side panels.

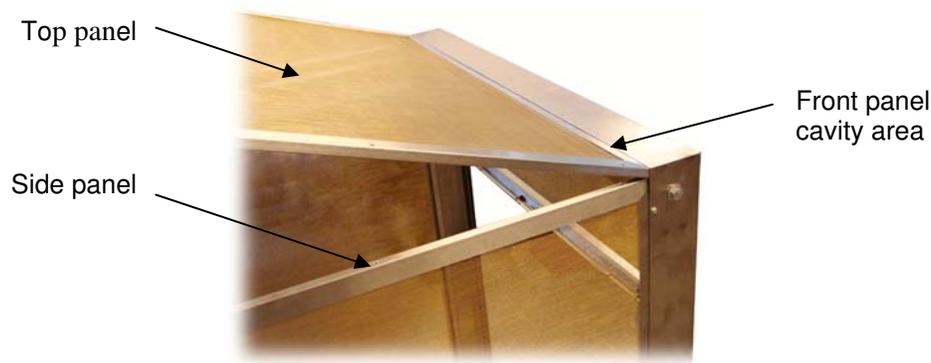


Figure 7 Attach top panel

- Step 11** Fasten top panel to side and rear panels using one **6 x 1 inch** screw along each edge.
- Step 12** Align side, rear, and top panels evenly together.
- Step 13** Fasten (4) remaining **10-32 x 1-1/4 inch** screws and hex nuts along front edge of each side panel to front panel and tighten securely.
- Step 14** Fasten remaining **6 x 1 inch** screws to side, rear and top panels and then tighten all screws securely.

Faraday Cage

Hanging Shelf Option

Tools Required: Philips screwdriver, 3/8 inch wrench

Hardware

- **10-32 x 1 inch** screws (4)
- **10-32** hex nuts (4)

Shelf Assembly Instructions

Step 1 Place three piece shelf face down on a flat surface and layout configuration as shown in figure below.

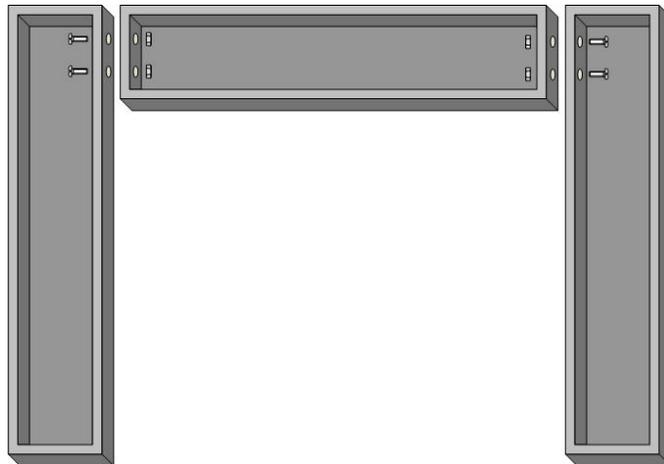


Figure 8 *Shelf assembly*

Step 2 Attach three shelf pieces together using (4) **10-32 x 1 inch** screws and matching hex nuts.

Attaching Shelf to Faraday Cage

Shelf may be installed with either finished side facing up or facing down providing a recessed shelf area for containing small items as shown below.

First attach suspension brackets around outside edge of assembled shelf. Insert completed assembly through front opening in cage and then hook top bracket ends around top panel frame inside cage as detailed in the follows.

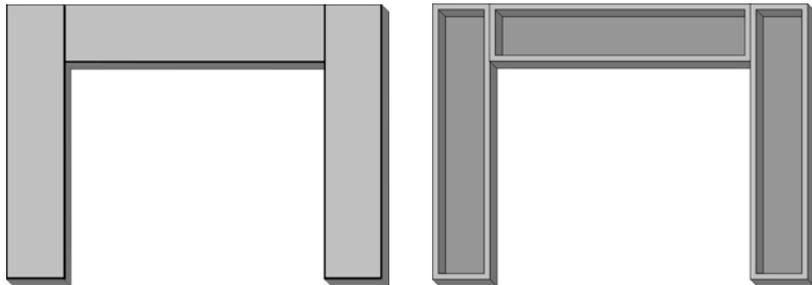


Figure 9 *Top surface shelf Orientation*

- Step 1** Place shelf, with top surface orientated in either direction as shown in figure above, on a surface that allows suspension brackets to hang to the side without interference while being attached (i.e. top surface of Faraday Cage as shown below).

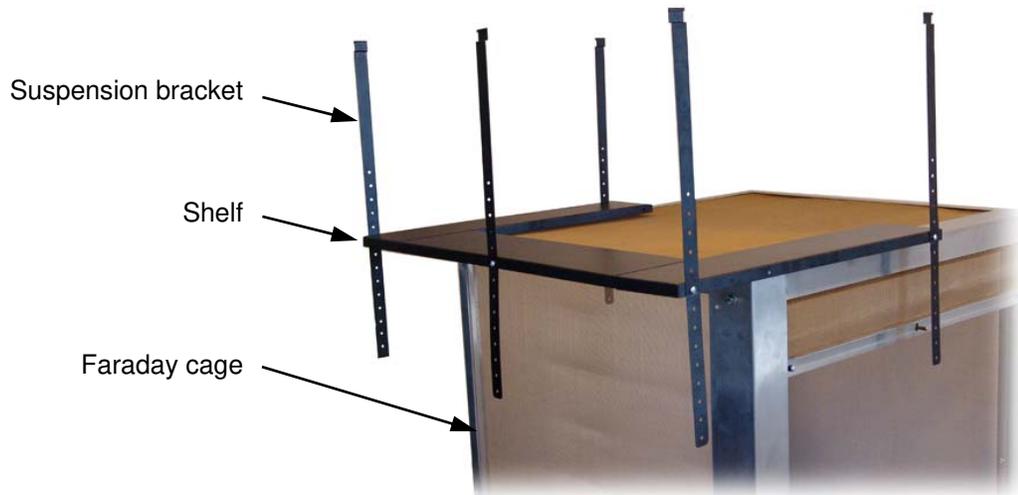


Figure 10 *Attaching suspension brackets*

- Step 2** Determine location for suspending shelf and then identify appropriate mounting hole in brackets for attaching shelf.
- Step 3** Attached all (5) suspension brackets with **10-32 x 1 inch** screws and matching hex nuts. Place screws with attaching hex nut facing outside of shelf toward panel screen area.
- Step 4** Hold shelf assembly and rotate shelves **90 degrees** with attached brackets oriented horizontally and rear shelf facing the rear of cage. Insert through cage front panel opening, taking care not to allow suspension brackets to puncture side panel screens.
- Step 5** Inside cage, rotate shelf assembly back **90 degrees** so shelves are horizontal and bracket ends with attachment hooks are vertical, pointing up.
- Step 6** Lifting shelf assembly up into position and hook the top of each suspension bracket around the inner edge of top panel as shown in panel cut-away illustration below.

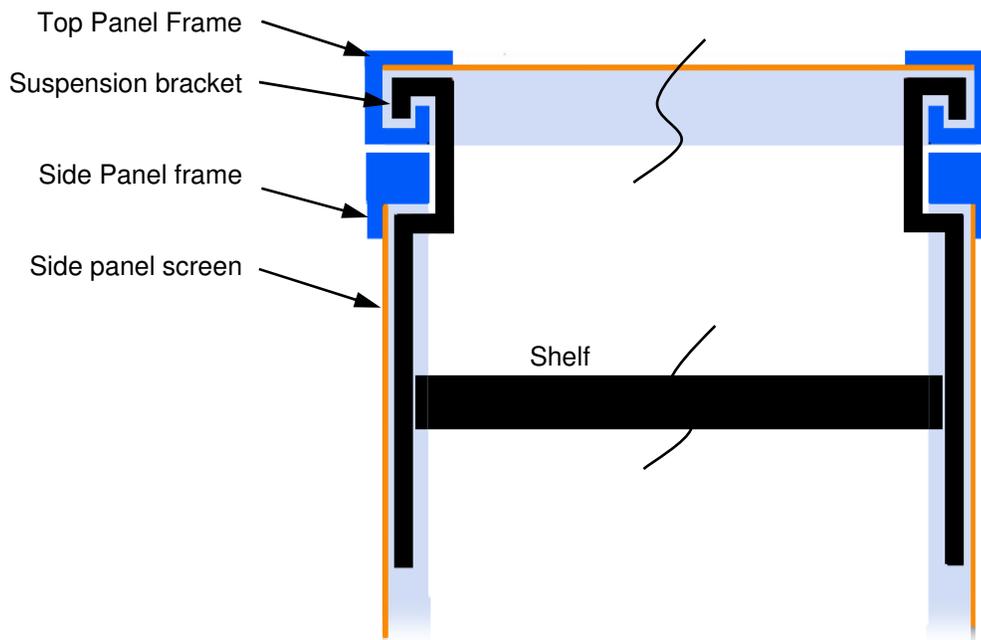


Figure 11 Attaching Suspension Brackets

Accessory SpaceSaver™ Overhead Rack

Introduction

These assembly instructions provide directions for the installation of the SpaceSaver Overhead Rack System and Accessories on a TMC 63-500 Series Vibration Isolation Table.

The 63-500 table should be completely set up with the table properly aligned prior to installation. The isolator should be de-pressurized and air supply shut off prior to installation to avoid possibility of pinching during assembly.

It is recommended that the overhead rack system be installed by two people.



Figure 12 *SpaceSaver™ Overhead Rack System*

Assembly Instructions

Basic System

Step 1 Install one *Post Wrap Clamp-1* and one *Post Wrap Clamp-2* on each isolator leg using the following hardware.

- **3/8-16 x 1/2 inch** socket head cap screws (4)
- **1/4-20 x 7/8 inch** button head cap screws (2)
- **1/4-20** hex nuts (2)

Installation of the **1/4-20** screws will be easier if the **3/8-16** screws are left initially loose. Then tightened after the **1/4-20** screws and nuts are tightened.



Note If the optional Perimeter Enclosure Kit (Catalog No. 81-345-01) is being installed, Perimeter Enclosure Clips should be installed using the same **1/4-20** screws and nuts described above at this time.

Each set of *Post Wrap Clamps* must be oriented such as to provide **4** attachment holes for the *upright angles* at the outboard corners of the table.

Reference figure 13 and figure 14 below for detail of *Perimeter Enclosure Clip* and **1/4-20** screw installation.



Figure 13 *Post Wrap Clamp Installation (Typical)*

Step 2 Install an *upright angle* and lower *horizontal side rail* at each leg using the following hardware.

- **1/4-20 x 7/8 inch** button head cap screws (4)
- **1/4-20** hex nuts (4)



Note The figure below shows the installation of the *upright angles* at their lowermost mounting holes.

The uniform hole pattern in these angles allows them to be installed at a range of heights. This adjustability may be useful if headroom is limited.

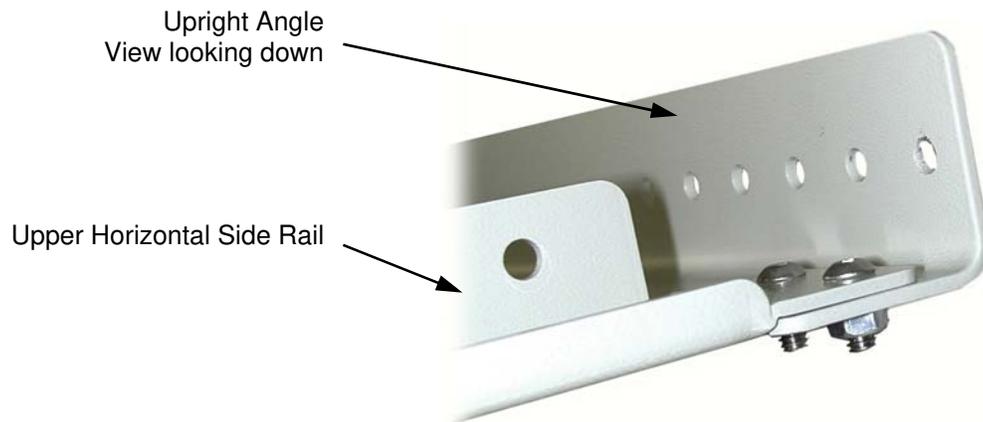


Figure 14 *Upright Angle and Horizontal Side Rail Installation*

Step 3 Install an upper *horizontal side rail* spanning the front and rear *upright angles* of the table using the following hardware on each corner.

- **1/4-20 x 5/8 inch** button head cap screws (2)
- **1/4-20** hex nuts (2)

Screws should be inserted with their heads inboard, nuts on the outside of the frame to prevent subsequent interference with the top shelf. Reference figure below.

Figure 15 *Upper horizontal side rail*

Step 4 Install upper rear *horizontal rail* spanning the two rear *upright angles* using the following hardware on each corner.

- 1/4-20 x 5/8 inch button head cap screws (3)
- 1/4-20 hex nuts (3)

Screws should be inserted with their heads inboard, nuts on the outside of the frame to prevent subsequent interference with the top shelf.

Figure 16 *Upper Rear Horizontal Rail*

Step 5 Install top shelf by sliding its rear edge into position from the front of the SpaceSaver frame, then lowering the front edges onto the support flanges of the upper side *horizontal rails* once they clear the front *upright angles*.

Line up the holes in the top shelf with the holes in the support flanges of the upper side *horizontal rails*.

Secure the top shelf using the following hardware.

- **1/4-20 x 1-1/4 inch** button head cap screws (4)
- **1/4-20** hex nuts (4)



Figure 17 *Top Shelf Installation*



Important If the optional Power Strip Kit (Catalog No. 81-344-01) is being installed, the Power Strip should be mounted on the lower rear *horizontal rail* prior to installation of the lower rear *horizontal rail* detailed in the following step.

Step 6 Install lower rear *horizontal rail* spanning the two rear *upright angles* using the following hardware at each corner.

- 1/4-20 x 5/8 inch button head cap screws (3)
- 1/4-20 hex nuts (3)

Screws should be inserted with their heads inboard. nuts on the outside of the frame. Reference figure below and note orientation of lower rear *horizontal rail* with lip up.



Note When determining the proper height of the lower rear *horizontal rail*, consideration should be given to the desired mounting height of optional accessories (Monitor Arm, Rear Support Bar, Sliding Shelf) to avoid subsequent interference.

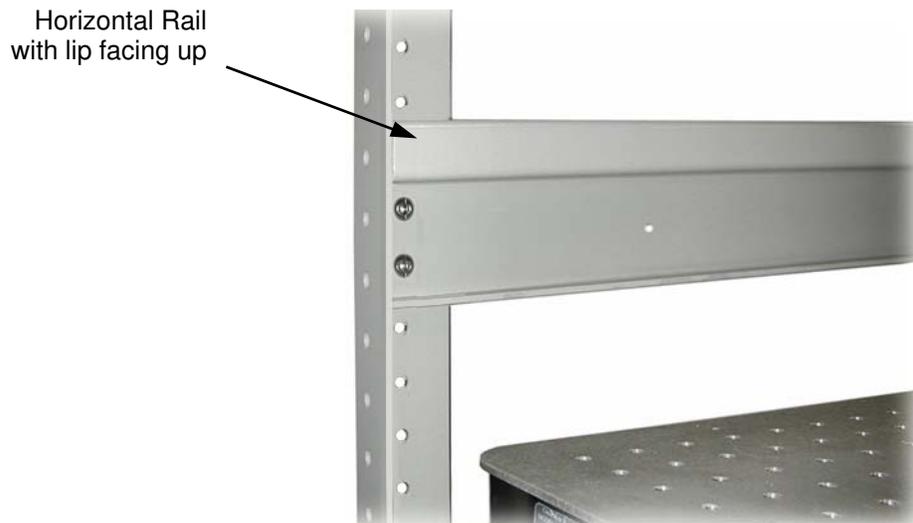


Figure 18 *Lower Rear Horizontal Rail without Power Strip*

SpaceSaver Overhead Rack

Front Support Bar

Requires Support Bar Kit (Catalog No. 81-346-01)

Some parts included in the *Front Support Bar Kit* are not used with the SpaceSaver system. See the parts list located at the end of these instructions to identify unused items.

Step 1 Install a *support bar clip* on each of the front *upright angles* at the desired height using the following hardware on each front *upright angle*.

- 1/4-20 x 7/8 inch button head cap screws (2)
- 1/4-20 hex nuts (2)

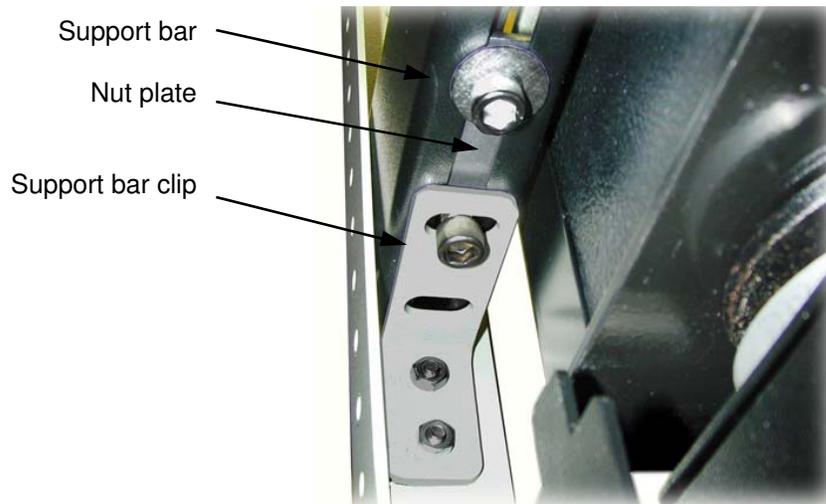


Figure 19 *Front Support Bar installed on Support Bar Clips (View from below.)*



Note If the optional *Rear Support Bar Kit* will be installed, the rear *support bar clips* should be installed at the same height as the front *support bar clips*.

Step 2 Insert a *nut plate* through the slot on the underside of the *front support bar* and slide all the way to the end of the bar. Reference figure below.

Loosely secure the *nut plate* in position using the following hardware. Then repeat at the opposite end of the bar.

- **3/8-16 x 1/2 inch** socket head cap screw
- **3/8 inch** SAE flat washer threaded into the inboard tapped hole in the *nut plate*

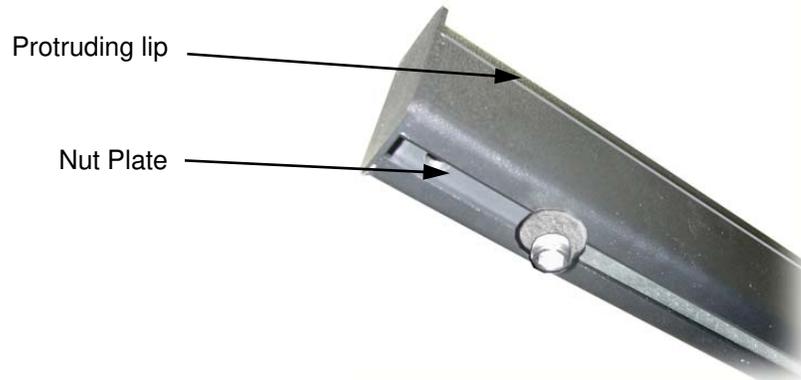


Figure 20 *Nut Plate in Front Support Bar (View from below)*



Note It is easiest to insert the *nut plates* into the slot in the bottom of the *front support bar* from underneath, with the *bar* resting in its normal orientation.

Systems with front support bar nut plates pre-installed

Loosen the **3/8–16 x 1/2 inch** cap screws and then slide the *nut plates* to the ends of the *front support bar*.

Step 3 Position the *front support bar* on the *support bar clips* installed in **Step 1**, with the protruding lip facing inboard, toward the rear of the table. Reference figure below.

Fasten using the following hardware.

- **3/8–16 x 1/2 inch** socket head cap screw threaded into the outboard tapped hole in the *nut plate*.

Step 4 Tighten the **3/8-16 x 1/2 inch** cap screws that were installed in **Step 2** above.

SpaceSaver Overhead Rack

Rear Support Bar

Requires Support Bar Kit (Catalog No. 81-346-01)

Some parts included in the *Rear Support Bar Kit* are not used with the SpaceSaver system. See the parts list located at the end of these instructions to identify unused items.

The rear *support bar clips* should be installed at the same height as the front *support bar clips*.

Assembly of the *rear support bar* is accomplished by following a procedure similar to that outlined above for the *front support bar*. Take note that the *rear support bar* does not possess a protruding lip.

SpaceSaver Overhead Rack

Keyboard Shelf (Requires Front Support Bar)

- Step 1** Insert (2) *nut plates* in the slot on the underside of the *front support bar*. Position the *nut plates* such that one tapped hole in each *nut plate* aligns with one hole in the *keyboard shelf*.
- Step 2** Insert a **3/8-16 x 3/4 inch** socket head cap screw with **3/8 inch** SAE flat washer through each hole in the *keyboard shelf* and thread into the *nut plate*. without tightening.
- Step 3** Slide the *keyboard shelf* to the desired position on the *front support bar* and tighten the two **3/8-16 x 3/4 inch** socket head cap screws. Reference figure below.

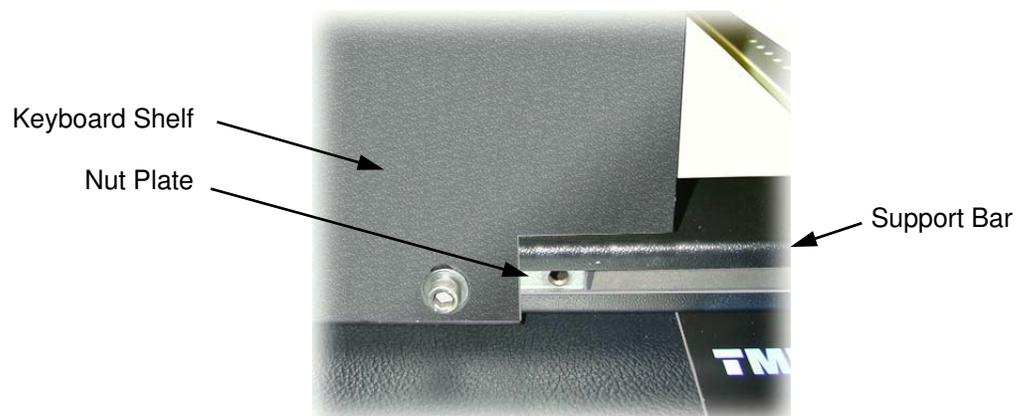
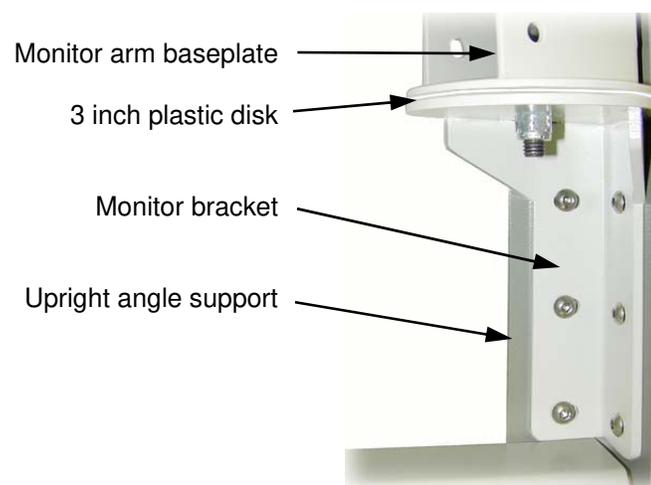


Figure 21 Keyboard Shelf installation (View from below)

*SpaceSaver Overhead Rack***Monitor Support Kit**

- Step 1** Open the *monitor arm* package, remove and discard the table top clamp assembly from the circular base plate.
- Keep the self-locking nut, metal washer, plastic washer, and **3 inch** diameter plastic disk.
- Step 2** Install the *monitor bracket* on the desired *upright angle*, at the desired height using the following hardware.
- **1/4-20 x 5/8 inch** button head cap screws (6)
 - **1/4-20** hex nuts (6)
- Step 3** Place the *monitor arm* circular base plate on the *monitor bracket*. with the **3 inch** plastic disk sandwiched between.
- Step 4** Place the metal and plastic washers over the **3/8-16 x 1 inch** cap screw.
- Insert the screw through the hole in the center of the base plate and *monitor bracket*, and secure with the self-locking nut.
- Step 5** Complete the assembly of the *monitor arm* by following the instructions included in its package. Reference figure below.

Figure 22 *Monitor Arm Mounting*

SpaceSaver Overhead Rack

Power Strip Kit

The *power strip* should be mounted on the lower Rear Horizontal Rail prior to Rail installation.

- Step 1** Insert (1) **6-32 x 1/2** inch pan head screw through the hole in each of the two clips supplied with the *power strip*.
- Step 2** Insert the screws with clips through the desired set of holes in the rear *horizontal rail* and fasten with **6-32** hex nuts.
- Step 3** Align the *power strip* mounting slots on the end of the *power strip* opposite the power cord end with the clips installed in **Step 1**.
- Step 4** Slide the *power strip* along until both clips are engaged with the slots on the *power strip* as shown in figure below.



Figure 23 *Power Strip Installation*

- Step 5** Install lower rear *horizontal rail* spanning the two rear *upright angles* using the following hardware at each corner.
- **1/4-20 x 5/8** inch button head cap screws (3)
 - **1/4-20** hex nuts (3)

Screws should be inserted with their heads inboard. nuts on the outside of the frame. Reference figure below and note orientation of lower rear *horizontal rail* with lip up.



Note When determining the proper height of the lower rear *horizontal rail*, consideration should be given to the desired mounting height of optional accessories (Monitor Arm, Rear Support Bar, Sliding Shelf) to avoid subsequent interference.



Figure 24 *Lower Rear Horizontal Rail*

SpaceSaver Overhead Rack

Perimeter Enclosure Kit

This kit only includes the attachment hardware for the *Perimeter Enclosure*. The *Perimeter Enclosure* is sold separately.

For installation, the *Perimeter Enclosure* is installed as part of **Step 1** of the **Assembly Instructions** for the **Basic System**.

SpaceSaver Overhead Rack

Armrest Pad (Requires Front Support Bar)

The *armrest pad* is installed by clipping onto the top edge of the *front support bar* as shown in figure below.



Figure 25 *Armrest Pad*

Parts List

Description	Qty
Basic System (Cat. No. 81-340-03, 81-340-04, 81-340-06)	
Upright Angle	4
Horizontal Side Rail	2
Horizontal Rear Rail	2
Post Wrap Clamp-1	4
Post Wrap Clamp-2	4
Top Shelf With Cutout	1
Hardware Kit	
1/4-20 x 5/8 inch Button Head Cap Screws	20
1/4-20 x 7/8 inch Button Head Cap Screws	24
1/4-20 x 1-1/4 inch Button Head Cap Screws	4
3/8-16 x 1/2 inch Socket Head Cap Screws	16
1/4-20 Hex Nuts	48
Front Support Bar (Cat. No. 81-301-01, 81-301-02)*	
Front Support Bar	4
Support Bar Bracket Kit	
3/8-16 x 1/2 inch Socket Head Cap Screws	4
3/8 inch SAE Flat Washer	2
5/16 inch Hex Key	1
Support Bar Posts, 1 inch Lg.**	6
Left Bracket**	1
Right Bracket**	1
3/8-16 x 4 inch Socket Head Cap Screws**	2
* Requires Support Bar Kit (Cat. No. 81-346-01) when used with SpaceSaver™ Overhead Rack System ** These items not used with SpaceSaver™ Overhead Rack System	
Rear Support Bar (Cat. No. 81-302-01, 81-302-02)*	
Rear Support Bar	4
Support Bar Bracket Kit	
3/8-16 x 1/2 inch Socket Head Cap Screws	4
3/8 inch SAE Flat Washer	2
5/16 inch Hex Key	1
Support Bar Posts, 1 inch Lg.**	6
Left Bracket**	1
Right Bracket**	1
3/8 inch-16 x 4 inch Socket Head Cap Screws**	2
* Requires Support Bar Kit (Cat. No. 81-346-01) when used with SpaceSaver™ Overhead Rack System ** These items not used with SpaceSaver™ Overhead Rack System	

Support Bar Kit (Catalog # 81-346-01)*	
Support Bar Clip	2
3/8-16 x 1/2 inch Socket Head Cap Screws	2
1/4-20 x 7/8 inch Button Head Cap Screws	4
1/4-20 Hex Nuts	4
* A Support Bar Kit is required for each support bar (one for the front, one for the rear) when used with SpaceSaver Overhead Rack System	
Keyboard Shelf (Catalog # 81-343-01)*	
Keyboard Shelf	1
Hardware Kit	
3/8-16 x 3/4 inch Socket Head Cap Screws	2
3/8 inch SAE Flat Washer	2
Nut Plate	2
* Requires Front Support Bar (Cat. No. 81-301-01, 81-301-02)	
Monitor Support Kit (Catalog # 81-342-01)	
Monitor Arm	1
Monitor Bracket	1
Hardware Kit	
1/4-20 x 5/8 inch Button Head Cap Screws	4
1/4 -20 Hex Nuts	4
3/8-16 x 1-1/4 inch Socket Head Cap Screw	1
Power Strip Kit (Catalog # 81-344-01)	
Outlet Strip, 2 Foot	1
Hardware Kit	
6-32 x 1/2 inch Pan Head Screws	2
6-32 Hex Nuts	2
6-32 x 3/4 inch Pan Head Screws*	2
#6 Flat Washers*	6
* These parts may not be required. The power strip is factory installed on the rear horizontal rail if it is ordered with SpaceSaver™. When ordered separately, required mounting hardware is supplied.	
Perimeter Enclosure Kit (Catalog # 81-345-01)*	
Perimeter Enclosure Clip-1	2
Perimeter Enclosure Clip-2	2
1/4-20 x 5/8 inch Button Head Cap Screws	8
1/4-20 Hex Nuts	8
* Perimeter Enclosure sold separately	

*Accessory***Support Bars**

Attach support bar brackets loosely to the support bar as shown in figure below and also referenced in figure 12 earlier.

- **4 inches thick TableTops:** require all three support bar spacers above the bracket.
- **2 inches thick TableTops:** require one support bar spacer above and two inside the bracket.

Attach the support bar brackets to the top inside face of the isolator posts and then tighten all bolts.

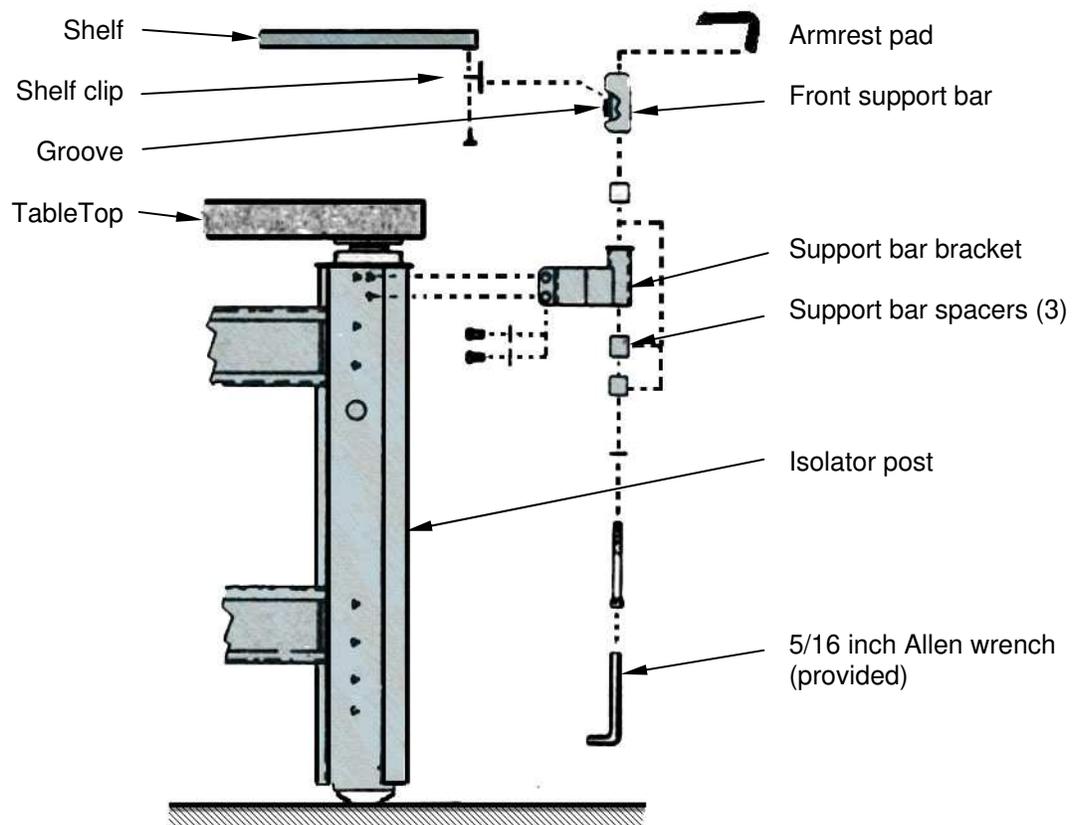


Figure 26 Support bars, sliding shelves, and arm rest pads

Accessory

Sliding Shelves

Shelves are mounted by attaching shelf clip as shown in figure 26 above. The clip rests in a groove in the front bar. The rear end of the shelf rests on the rear support bar.

Accessory

Perimeter Enclosure

- Attach *perimeter enclosure* brackets to the top inside face of the isolator posts.
- Tighten all bolts as referenced in figure below.
- Lower *perimeter enclosure* over the table top onto the attached brackets.
- Bracket "tongues" should fit in "slots" on under-side of enclosure.

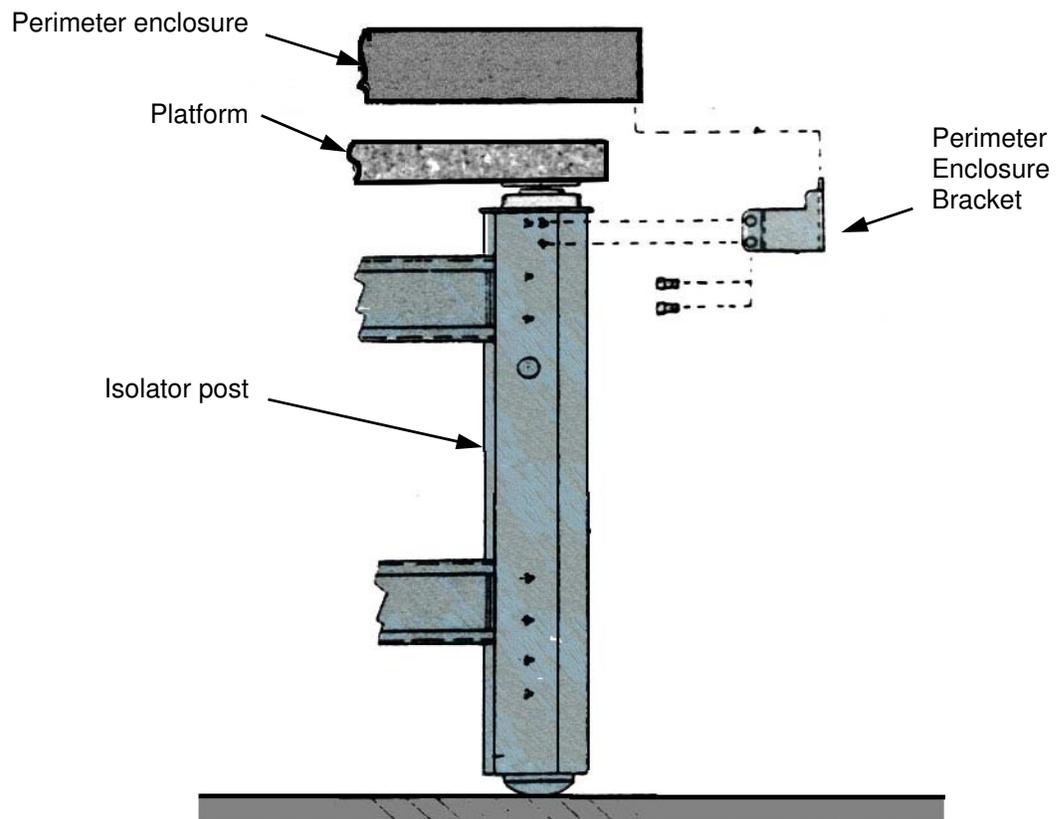


Figure 27 *Perimeter enclosure*

Accessory Casters

Casters are shipped attached to the base of the isolator legs.

To engage or disengage the *caster*, simply rotate the **HEIGHT ADJUST** screw with a **3/4 inch** wrench as referenced in figure below.

When not in use, the *caster* should be retracted for optimum isolation performance.

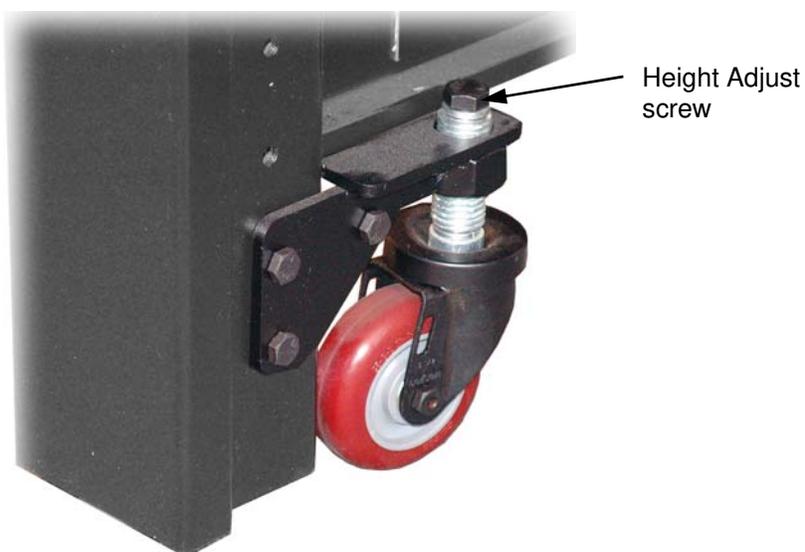


Figure 28 *Caster attached to post*

63-600 Series ClassOne Workstations

Introduction

The model 63-600 series table setup instructions are the same as the model 63-500 series except for the following points.

- Casters
- Height control valves have slight physical differences but operate and are adjusted the same as valves in 63-500 series tables.
- Includes a standard front support bar that is different from 63-500 series table
- Includes an optional rear support bar and sliding shelf.



Figure 1 63-600 Series Laboratory Table

68-500 Series High-Capacity Lab Tables

Introduction

The 68-500 Series of laboratory table setup instructions are the same as the 63-500 series with the following exceptions.

- TableTop is much heavier.
- The legs have a larger cross section and capacity.
- The casters are the same type used on System 1 posts (6 x 6 inch posts).



Figure 1 68-500 Series Laboratory Table

20 Series Active Vibration Isolation Tables

Introduction

Active Vibration Isolation Tables feature a Compact Sub-Hertz Pendulum (CSP™), the Precision Electronic Positioning System (PEPS®) and the PEPS-VX® Vibration Cancellation System add-on to PEPS.

The Active Vibration Isolation Table has been setup and adjusted at the factory prior to shipment. Leveling of the CSP inserts and tuning of the PEPS/PEPS-VX controller have been made at the factory and should provide satisfactory performance for a typical installation.

Should conditions require that adjustments be made to the system, please refer to the CSP, PEPS and PEPS-VX manuals provided with the system.

Complete the setup of the system described below prior to installing the tabletop on to the frame for ease of assembly.



Figure 1 20 Series Active Vibration Isolation Table

Tools Required

- Phillips screwdriver
- 5/32 inch Allen key wrench

Unpacking

- Step 1** Place the table frame in the desired location. Install the sub-shelf by placing it on the tie bars at the back of the frame.
- Step 2** Carefully remove tape and foam packing material from the following; taking care not to pull or cut the cables.
- Precision air regulator and three proximity sensors located in the mounting brackets
 - Three velocity sensors wrapped in foam packing and taped to the tie bars of the table frame adjacent to their respective mounting locations on the frame and bottom surface of the table.

Regulator & Sensor Mounting

- Step 1** Install the air regulator on the top plate of the left rear table post using three Phillips head machine screws provided.
Do not connect the air supply at this time.
- Step 2** Attach the three proximity sensors brackets to the inside corner of the top plate of the table posts using the Phillips head machine screws provided.

The brackets are mounted on the bottom of the top plates, with the screws fastened from the top.

The mechanical gap between the proximity sensor head and the bottom of the table top has been pre-set at the factory and should not require adjustment.
- Step 3** Mount velocity sensors to the bottom of the tabletop. They will not be needed at this time.

Controller Setup

The PEPS/PEPS-VX Controller is packaged separately from the table frame. Proceed to unpack and set up controller as follows.

- Step 1** Unpack the controller and place it in the lower left corner of the sub-shelf.

- Step 2** Connect controller to the velocity and proximity sensor cables and the **1/4 inch** OD tubing for the pneumatic system that have been already installed in the frame at the factory.

For ease of assembly, the ends of the pneumatic tubing and velocity sensor cables (BNC) are identified with labels that correspond to the appropriate connection found on the front of the PEPS and PEPS-VX Controllers.

- Step 3** Plug proximity sensors six pin Phoenix connector into the receptacle on the front of the PEPS Controller.

- Step 4** Ensure PEPS-VX Controller ribbon cable interconnect are firmly seated in the Controller.

- Step 5** Ensure that the power switch is in the OFF position prior to connecting the AC line cord to the PEPS Controller.

Isolator Setup

The isolation system is shipped with the top piston assembly removed from the CSP pendulum contained in each leg of the table frame.

The piston assembly is the round black cylinder with the machined aluminum bottom. It contains the piston and the rolling rubber diaphragm which provide the vertical isolation of the system.

The CSP pendulum extends through the top plate of the leg tube, and consists of a **1.5 inch** tube with a **3 inch** disk welded to it.

- Step 1** Install the piston assemblies on the CSP inserts by first connecting the **1/4 inch** OD tubing protruding from the top of the pendulum tube to the male connector on the bottom of the piston.

The piston should then be placed over the disk and rest on the top plate of the leg tube.



Important Use care not to kink, or sharply bend any of the system's air lines.

- Step 2** Center the piston assemblies on top of the legs.

There are three small holes on the top plate spaced every 120 degrees. Center the piston assembly on the top plate so that the edges of these three holes just line up with the outside circumference of the aluminum piston ring.

Do this for each isolator on the system.

- Step 3** Carefully lower the table onto the frame without disturbing the centering of the piston assemblies and taking care that the top is equally centered between the four isolators.

- Step 4** Each velocity sensor comes with a **1/4-20** stud on its bottom. This stud is designed to screw into one of the four tapped holes on the bottom of the table top.

To eliminate twisting disconnect the BNC cable prior to mounting the sensors to the bottom of the table top.

- Step 5** Connect the air supply to the air regulator.
- Step 6** Set the regulator pressure to **45 psi**.
- Step 7** Switch the PEPS/PEPS-VX Controller to the **ON** position and observe that the isolators inflate and level the tabletop.
- Step 8** Fine center the tabletop. Since this depends on the levelness of your floor, see instructions below for Leveling the Isolators.



Note Active system is now ready for operation. Should conditions require that adjustments be made to the system, please refer to the CSP, PEPS, and PEPS-VX manuals provided for in-depth instructions.

Leveling the Isolators

The CSP system can be adjusted to have a **0.3Hz** resonant frequency. This is equivalent to a pendulum over **100 inches** long! As a result, a small tilt in the system will cause the payload to move off center.

Each isolator top plate has two leveling screws and three centering holes as shown in figure below.

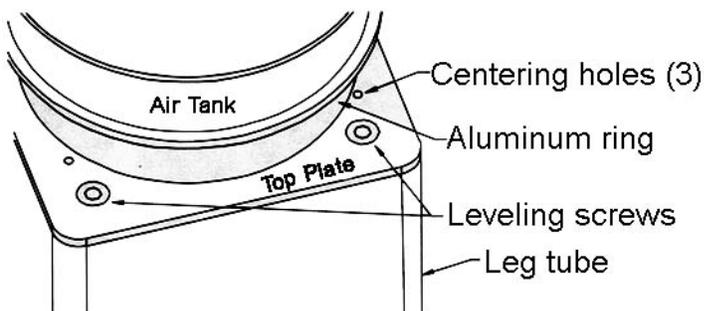


Figure 2 *Isolator top plate adjustments*

Step 1 Float the payload by connecting air to the system.

Step 2 Adjust the proximity sensors so the bottom of the aluminum ring is floating about **3/8 inch** above the square top plate.

The center of the vertical isolators travel is when the edge of the piston is roughly flush with the bottom of the piston chamber's aluminum ring when viewed from the side. Reference figure 2 above.

Step 3 Remove the tape over the level compensation screws.

Each pendulum has two "level compensation screws" located near the corners of the square top plates. These are countersunk socket head screws which accept a **5/32 inch** Allen wrench. They should have tape over them to aid in maintaining the factory adjustment during shipping.

Step 4 Adjust the "level compensation screws" as little as possible any one time to get the piston assemblies centered over the legs.

- Clockwise (cw) turn of a screw makes the piston assembly move away from the screw you are adjusting.
- Counter-clockwise (ccw) turn moves the tank towards the screw.

If the pendulum is against its travel limit, turning the screw may not cause the pendulum to move, but it will reduce the force pushing the pendulum to its limit. If this is the case, you can test the system by pulling on the payload by hand. It should become easier to pull the payload off the travel limits after you adjusted the screw. If it becomes harder, you have turned the screw the wrong way.

The level compensation screws on an isolator can be adjusted together to cause the payload to move either parallel or perpendicular to the edge of the isolator near the screws.

To move the payload parallel to the screws, adjust the screws equal amounts in opposite directions. To move the payload perpendicular to the line between the screws, adjust them in the same direction.



Note It is important to be conservative during the adjustment of the level compensation screws. The level compensation screws should not be turned more than a few turns at most.

The goal is to adjust the screws as little as possible to get the piston assemblies centered over the legs. Judge the center using the three centering holes you used when you first set up the isolators.

The problem in this procedure is that there are eight screws in a four leg system but only three degrees of freedom to adjust the X & Y translation, and the payload's twist or yaw. This means, for example, it is possible to cancel an adjustment you make on one corner by making an opposing adjustment on the leg next to it. It is even possible to run the adjustments to their stops and still not have a leveled system!

Use conservative adjustments - even mark the screws to make it easy to return to the start if you find yourself lost.

Viewing the isolator from the side in figure below allows a very sensitive adjustment of the pendulum's level. The tube in this figure is tilted by only **2.5 degrees**. In this case, *leveling screw-A* should be adjusted a few turns clockwise, and *leveling screw-B* a few turns counter-clockwise.

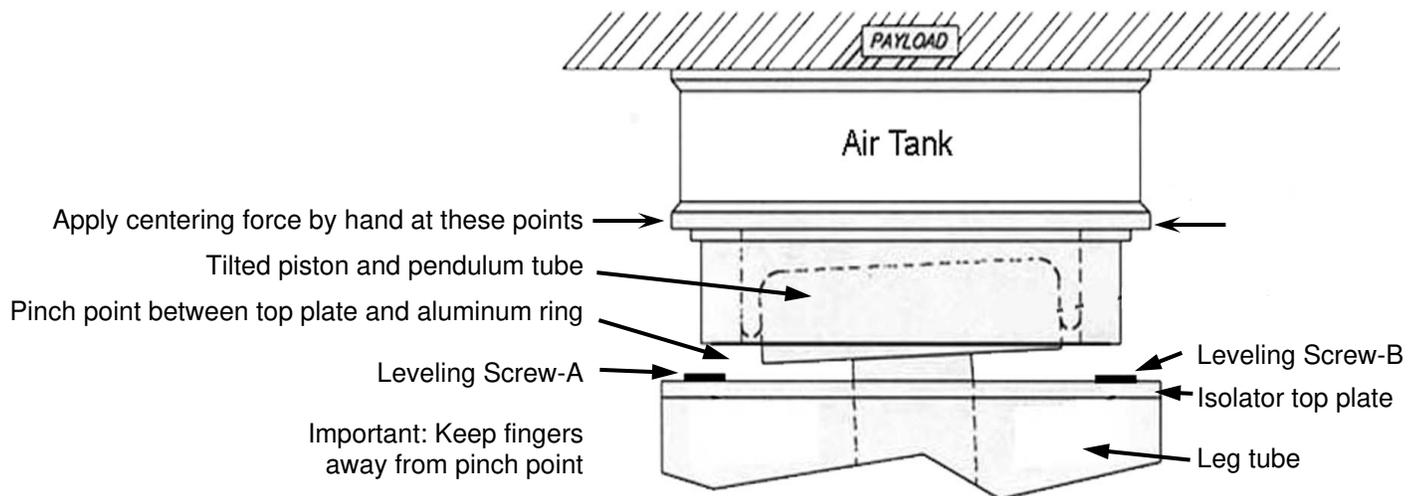


Figure 3 *Isolator side view*

TableTop Platforms

64 Series TableTop Platforms

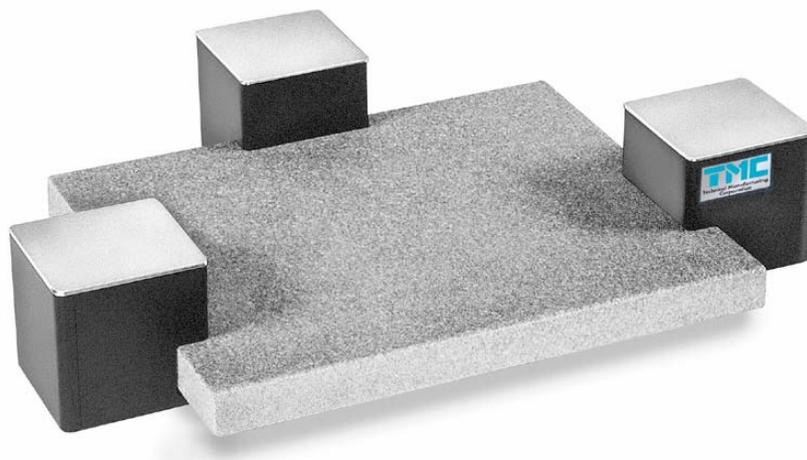


Figure 1 64 Series TableTop Platform

Introduction

The 64 Series TableTop Platforms employ Gimbal Piston Isolators and require a continuous supply of compressed air or nitrogen to operate properly. For a complete discussion of the air supply requirements, see [System Air Supply Requirements](#) in introduction section of this document.

Setup Instructions

Tools Required

- Utility knife
- Flat screwdriver
- **1/2 inch** wrench

Step 1 Unpack *tabletop* and *isolators*.



Note Do not discard the wood spacer blocks.

Step 2 Place *tabletop* on sturdy lab bench with spacer blocks positioned directly under the top away from expected isolator locations.



Caution This may require several people as the tops are relatively heavy. Granite and honey-comb tops weigh **105 to 155 lbs.** The stainless steel laminate tops weigh **250 to 280 lbs.**

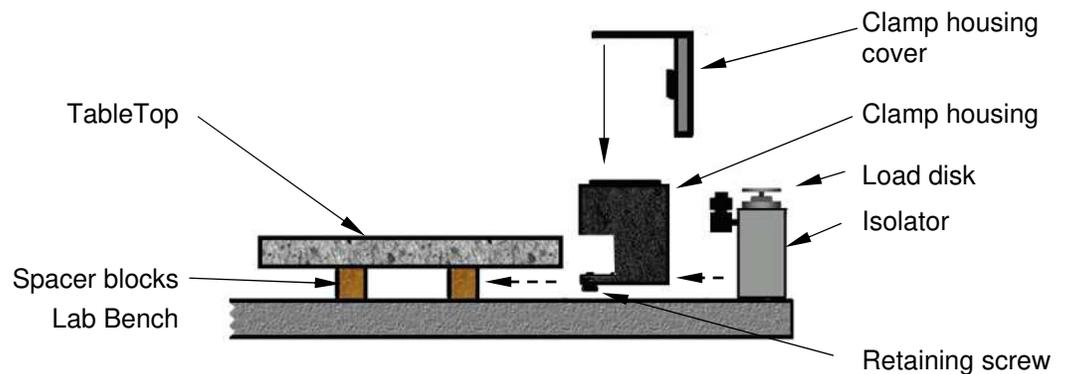


Figure 2 *TableTop Assembly*

Step 3 Fasten *clamp housings* to *tabletop* in desired locations by tightening the retaining screws securely.

Reference typical positioning of *clamp housings* to *tabletop* in figure 1 earlier in this section.



Note Best performance is realized when *isolator* housings are spaced as far apart as possible.

Step 4 Place the *isolators* near their respective *clamp housings*.

Air Supply Input Connection

Step 5 Plumb tubing between *air supply* and system’s input *air filter* as appropriate.

Internal Air Supply Tubing

Step 6 Install air supply tubing between *air supply filter*, *isolators*, and *height control valves* as appropriate.

M = Master Isolator with Height Control Valve (V)
S = Slave Isolator (no valve)

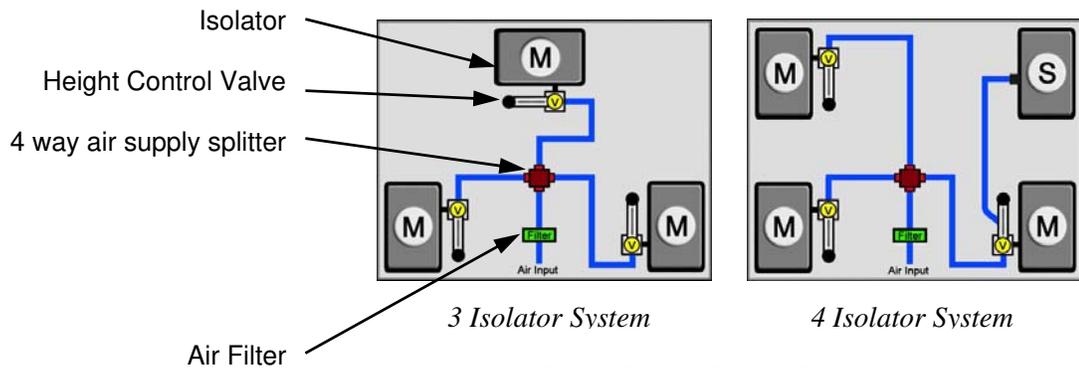


Figure 3 Air Supply Diagram

Ensure the slave isolator [S] is plumbed down-stream from its corresponding master isolator [M] as shown in figure above for the 4 isolator system .

Attach Horizontal Lever Arms

- Step 7** Locate the three *height control valves* mounted on an isolator as typically shown in figure above.
- Step 8** Ensure the main air supply is **Off**.
- Step 9** Insert *horizontal lever arm* onto *height control valve* ensuring the end of the **HEIGHT ADJUST SCREW** fits over the center of the *aluminum spacer* as shown in figure below.

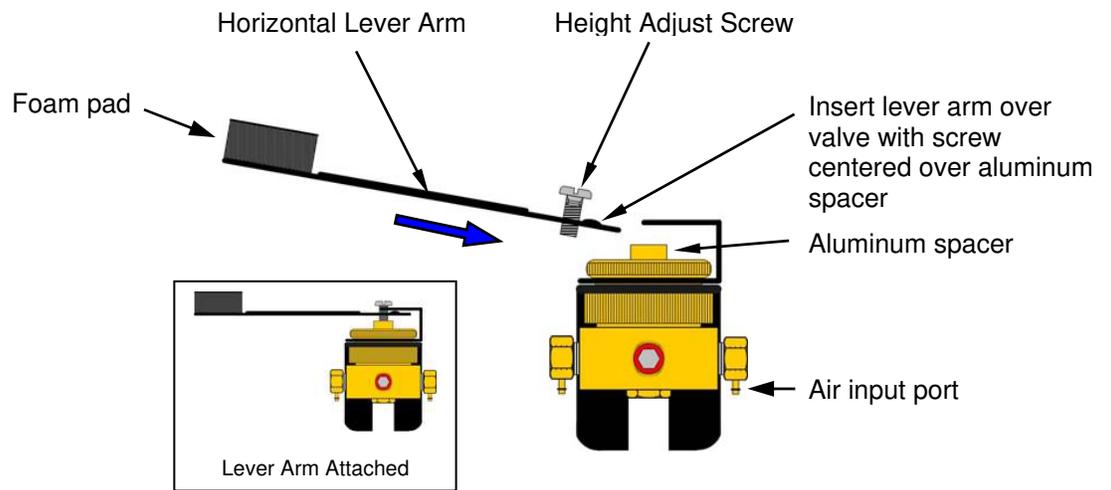


Figure 4 *Height Control Valve*

- Step 10** Loosely fasten *horizontal lever arm* with **HEIGHT ADJUST SCREW** using a flat head screw driver and adjust to position arm horizontally with valve as shown in above figure insert.
- Step 11** Repeat above steps for attaching *horizontal lever arm* onto two remaining valves.

Positioning Isolator Beneath Clamp Housing

Step 12 Slide *isolator* beneath *clamp housing* and align center of the *load disk* scribe mark with the *load disk* alignment hole.

The **HEIGHT ADJUST SCREW** and *foam pad* should line up beneath their respective holes. Reference figure below.

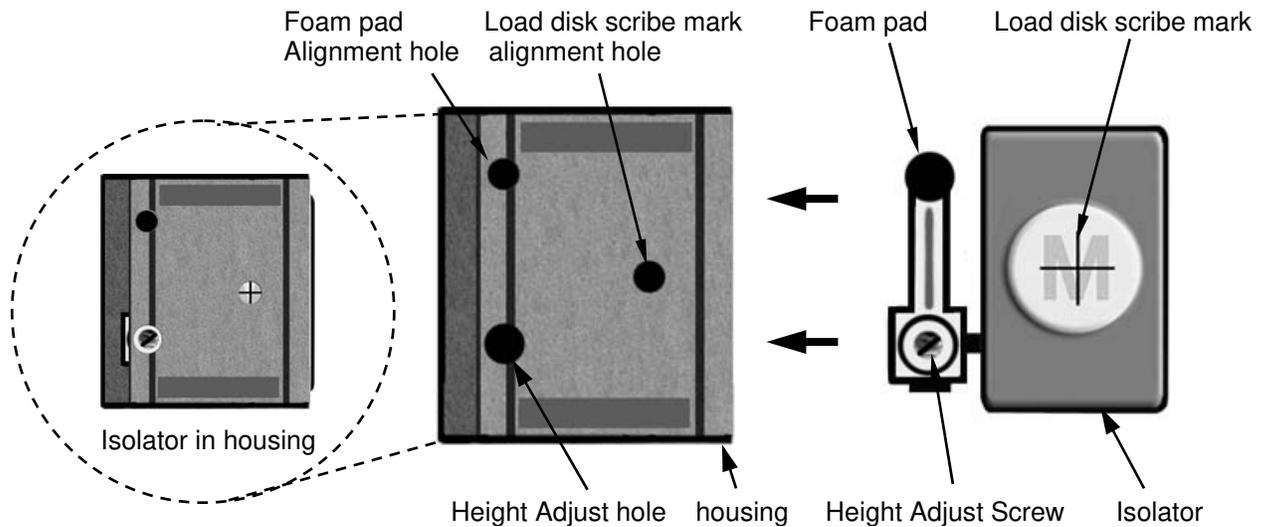


Figure 5 *Clamp housing*

Step 13 Connect compressed air to filter.

Step 14 Set air supply pressure to **50 psi**.

Wait about **1 minute** for isolators to fill with air.

Step 15 If *isolators* have not lifted the *tabletop* off the spacer blocks, adjust **HEIGHT ADJUST SCREW** CW (clockwise) as follows until spacers can be removed.

- Adjust **HEIGHT ADJUST SCREW** in increments of **1/4 turn** each.
- Wait **5-10 seconds** between each **1/4 turn** adjustment for tabletop to settle.

Step 16 Remove spacer blocks.

Gimbal Piston Adjustment

Step 17 Adjust *isolators* height again until the gap between *load disk* and *clamp ring* is approximately **3/8 inch** as follows and referenced in figure below.

- Adjust **HEIGHT ADJUST SCREW** in increments of **1/4 turn** each.
- Wait **5 seconds** between each **1/4 turn** adjustment for *tabletop* to settle.

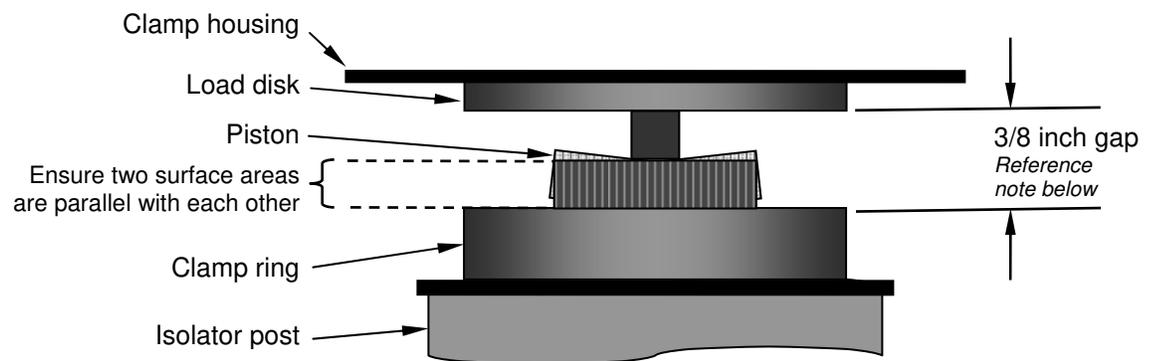


Figure 6 Gimbal Piston



Note Centering the Gimbal piston mechanism over the *clamp ring* is important to achieve best horizontal isolation properties.

Step 18 Rock the *tabletop* surface to ensure that *tabletop* is free to move in each of the three axes.

Step 19 Place *clamp housing covers* over *isolator housings*, against *magnetic strips* and *clamps*.

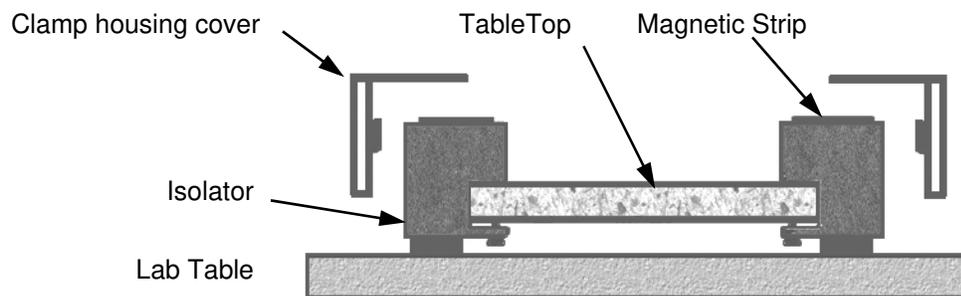


Figure 7 Attaching clamp housing covers

An instrument can now be placed on the isolated surface area. Very high loads may require slightly higher air pressure.

66 Series TableTop CSP



Figure 1 66 Series TableTop CSP

Introduction

The 66 Series TableTops require a continuous supply of compressed air or Nitrogen to operate properly. For a complete discussion of the air supply requirements, see [System Air Supply Requirements](#) in introduction section of this document.

Setup Instructions

Tools Required: Utility knife, 6 inch scale

Step 1 Carefully remove isolator from the inner carton and plastic bag.



Note Save the carton for future transport. The inner carton contains four carefully positioned rigid foam pads and brackets which lock out the isolator when the carton is closed.

Step 2 Place the isolator on a firm level surface.

Step 3 Connect the air supply to the rear air inlet.

- Step 4** Set air supply pressure to **20 psi**.
Wait approximately **2 minutes** for the top plate to float.
- Step 5** Place the instrument to be isolated on the top surface.
Wait about **1 minute** for top plate to settle.
- Step 6** Level the plate at a height of **3/8 inch** by turning each of three thumb wheels located on three sides as shown in figure below to adjust internal height adjusting valves.
The plate travel range is from **3/16 inch to 9/16 inch**.

Figure 2 *Height adjustments*

Increase Height: Move wheel to the right in a counter clockwise direction looking down.

Decrease Height: Move wheel to the left in a clockwise direction looking down.



Note If the plate is not floating, increase the air supply pressure a few pounds.

The isolator is designed to recover its level position quickly when disturbed by normal adjustments made to the isolated equipment.

If plate is subjected to major load changes, the isolator will take a minute or two to regain level.

4

Floor Platforms

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65 Series Floor Platforms

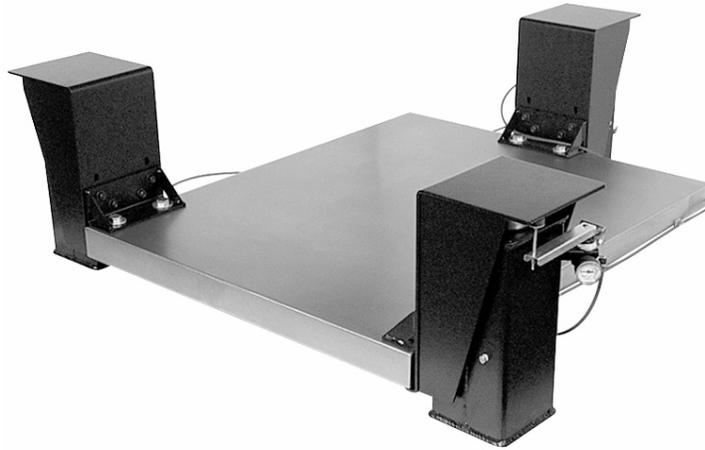


Figure 1 65 Series Floor Platform

Introduction

65 Series Floor Platforms provide extremely efficient vibration isolation of low frequency vertical and horizontal floor vibration.

Most floor platforms employ Gimbal Piston Isolators that require a continuous supply of compressed air or nitrogen to operate properly. For a complete discussion of the air supply requirements, see [System Air Supply Requirements](#) in introduction section of this document.

For Floor Platforms with STACIS 2100, consult with TMC and refer to the STACIS "Pre-installation Manual & Checklist". A TMC trained technician is required to complete the STACIS installation. The platform should be set up as described in steps 1-3 on the following page.

Tools Required

- 15/16 inch open end wrench
- Utility Knife
- 15/16 inch socket wrench
- 9/16 inch wrench or socket

Platform Installation

Step 1 Locate the three **2 inch** thick wooden spacer blocks and place on floor in desired final location of platform.

For installation of STACIS 2100 isolators, the platform will need to be supported approximately 2.25" off the floor. It is recommended to use three 2" wedgemounts instead of wood blocks, or a combination of 2.25" high wood blocks and a wedgemount. If wedgemounts are not available, wood blocks and a bottle jack can be used.

Step 2 Place platform on the spacer blocks.

Ensure that blocks do not interfere with holes in platform.



Note Platform typically weight **800-2000 pounds**. Moving of the platforms requires professional riggers and rigging equipment.

Step 3 Rig the instrument requiring isolation onto the platform.

Step 4 Fasten *lifthoods* to platform using the hardware and *lifthood attachment bracket* provided.

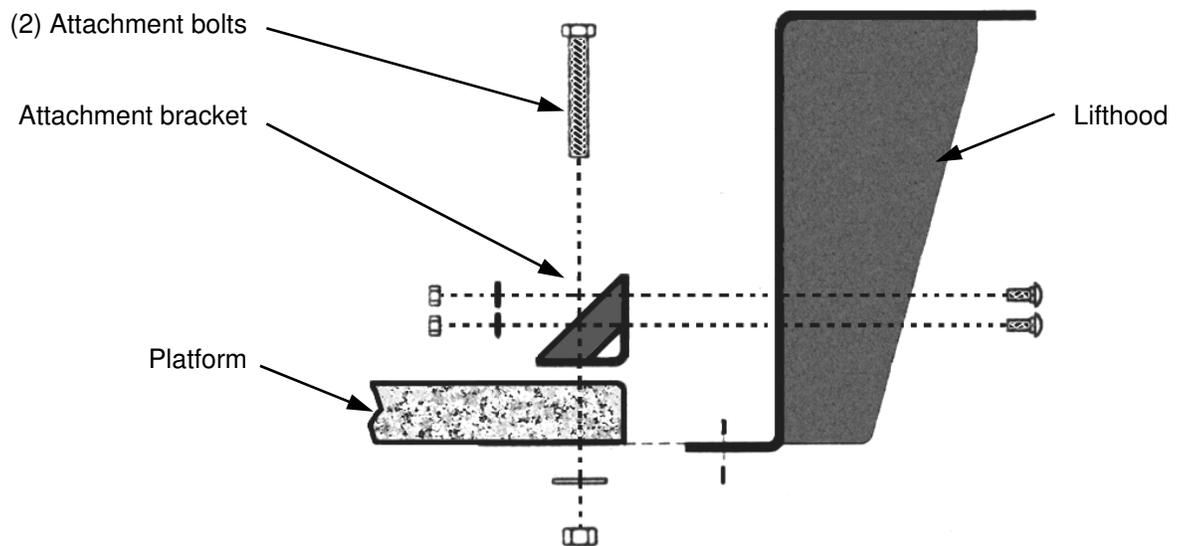


Figure 2 *Lifthoods*

Step 5 Place isolator posts under the lifthoods with *height control valve* facing away from platform and ensuring each post is centered under it's corresponding lifthood with adequate clearance on each side. Reference figures 3 and 4.

Any rubbing will dramatically reduce vibration isolation.

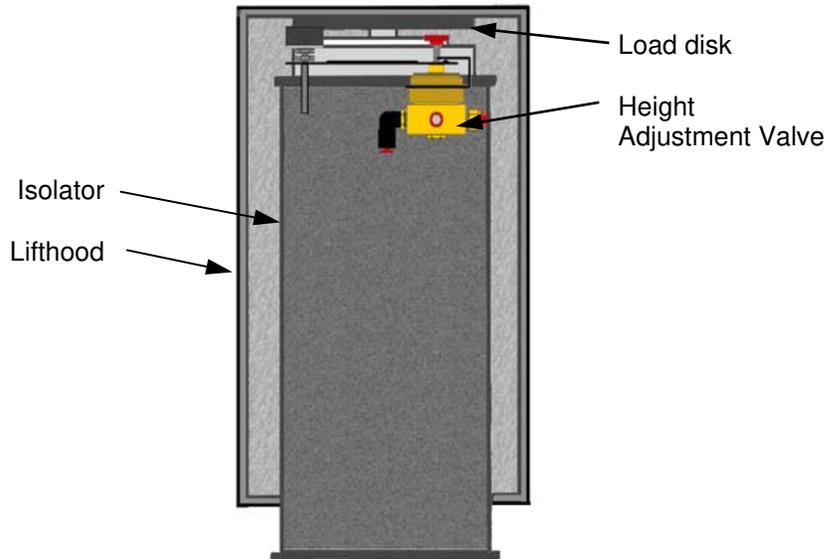


Figure 3 Isolator place under lifthood

Step 6 Center the *load disk* on top of the *clamp ring*. Reference figure below.

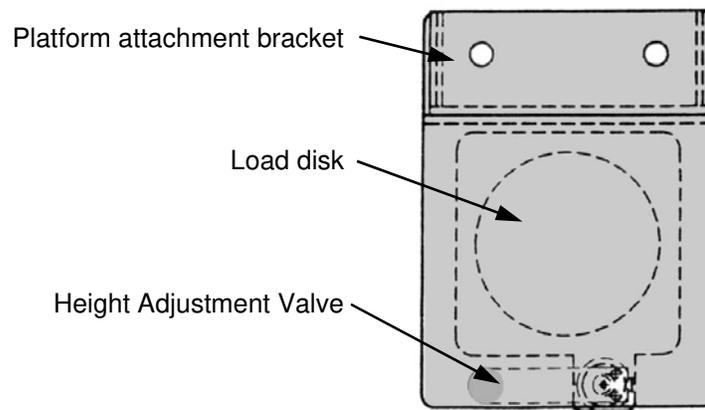


Figure 4 Load disk centered on top of clamp ring

Air Supply Input Connection

Step 7 Plumb tubing between air supply and system's input air filter as appropriate.

Fittings Tubing can be connected to a 1/4 or 1/8 inch NPT female fitting as shown in figure below.

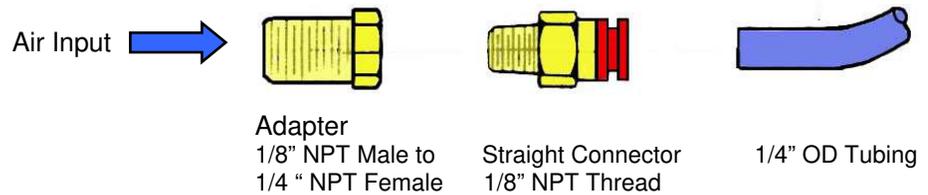


Figure 5 Air Supply Input Connection

Internal Air Supply Tubing

Step 8 Install air supply tubing between *air supply filter*, *isolators*, and *control valves* as appropriate.

M = Master Isolator with Height Control Valve (V)

S = Slave Isolator (no valve)

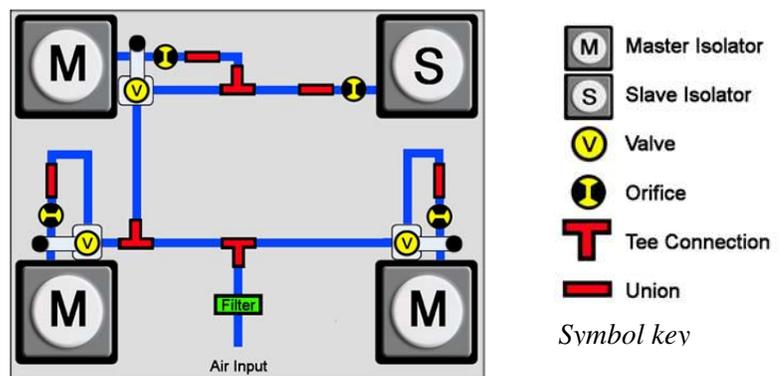


Figure 6 Typical valve schematic for a 4-isolator system

Ensure the slave isolator [S] is plumbed down-stream from its corresponding master isolator [M].

Optional self sticking “J” clips are provided for neatly attaching the air hose to the tiebars.



Note Each post is shipped with a short section of tubing with a union coupler already attached to the input elbow. This “pigtail” segment should not be tampered with. Each pigtail contains a small, flow-restricting orifice to damp table motion and stabilize the load. A small red ring around the tube marks the orifice position.

If lost or damaged, please contact TMC for replacement pigtails.

Connecting Insert the air tube firmly into the self sealing fitting as shown in figure below.

Disconnecting Push the red cylinder with your thumb and forefinger toward the center of the fitting body while pulling the tube in the opposite direction as shown in figure below.

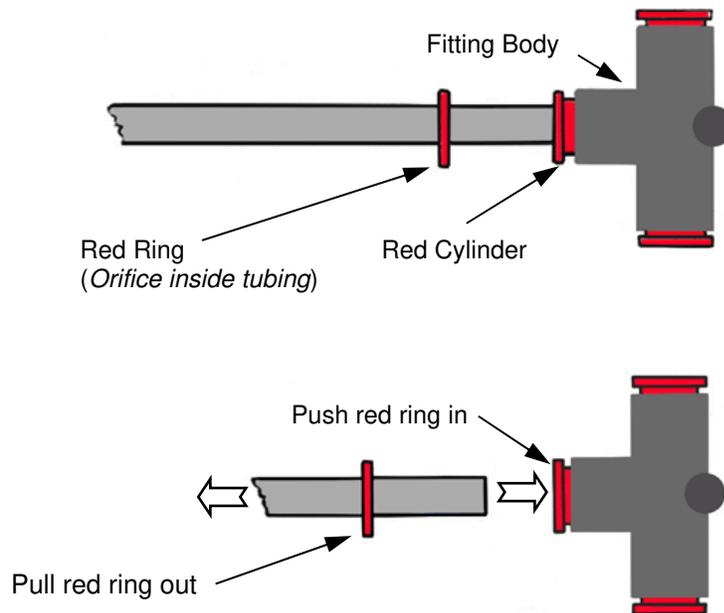


Figure 7 Air tube connections

Orifices Flow restricting orifices are critical to damping system motion. Orifices are located both inside the isolators and in the air tubing and marked by a red ring as shown in figure above.



Important Do not remove or change the location of these orifices without first contacting TMC.

Attach Horizontal Lever Arms

Step 9 Locate the three *height control valves* mounted on isolator posts as typically shown in figure 6, *Typical valve schematic for a 4-isolator system*.

Step 10 Ensure the main air supply is **Off**.

Step 11 Adjust the **ISOLATOR HEIGHT ADJUST** screw CW (clockwise as viewed top down) to lower *foam pad* down to the lowest position close to the *horizontal lever arm* as referenced in figure below. Retract *locking nut* as required.

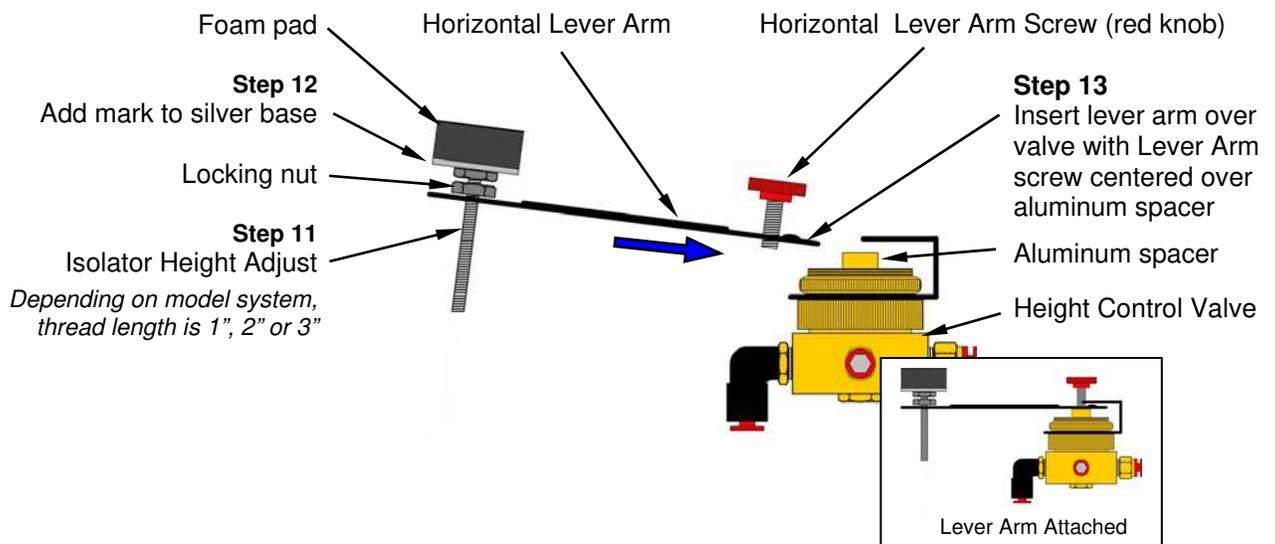


Figure 8 Attaching Horizontal Lever Arm

- Step 12** Using a marking pen, mark a spot on the edge of the *foam pad's* silver colored base to later use as a rotation indicator.
- Step 13** Insert *horizontal lever arm* onto *height control valve* ensuring the end of the **HORIZONTAL LEVER ARM SCREW** fits over the center of the *aluminum spacer*.
- Step 14** Loosely fasten *horizontal lever arm* with **HORIZONTAL LEVER ARM SCREW** (red knob) and adjust to position arm horizontal with valve.
- Step 15** Repeat above steps for attaching *horizontal lever arm* onto remaining two valves.

Isolator Height Adjustment

- Step 16** Adjust the **ISOLATOR HEIGHT ADJUST** screw raising *foam pad* until it is in slight contact with the *lifthead*.

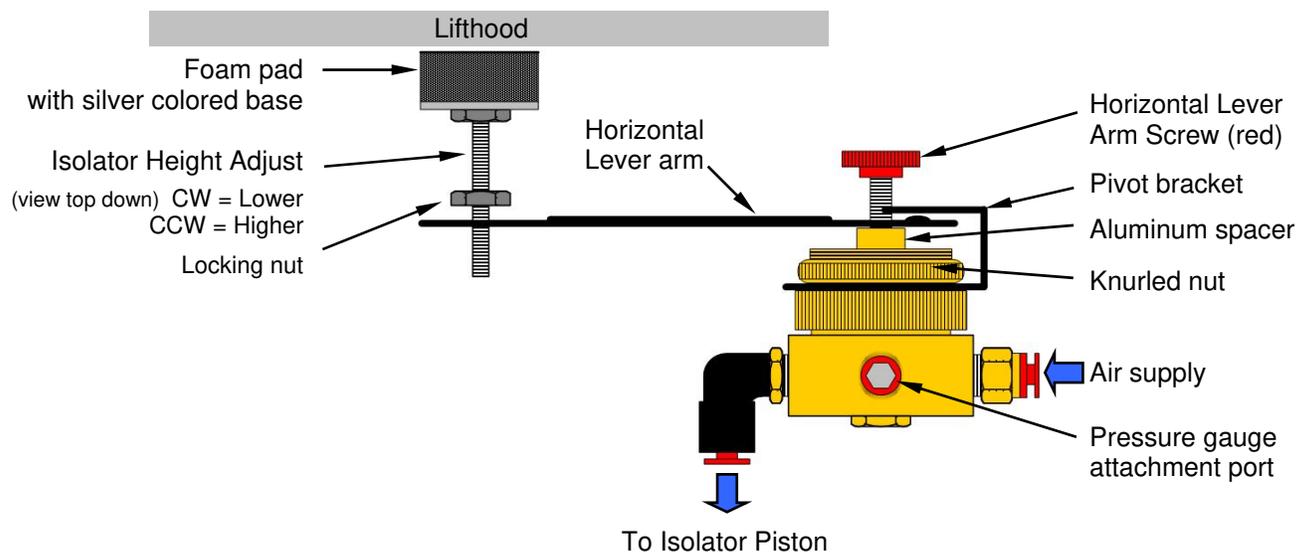


Figure 9 Height Control Valve

- Step 17** While observing spot marked on the base of the *foam pad* earlier, continue to adjust **ISOLATOR HEIGHT ADJUST** screw another **10 turns CCW**.

The foam pad material will compress against lifthood.

- Step 18** Repeat above steps for **ISOLATOR HEIGHT ADJUST** on remaining two isolators with a valve attached.

Gimbal Piston Adjustment

- Step 19** Turn on the main air supply and set to **60-80 psi max**.

After a short delay, all the load disks should lift away from the clamp rings and the platform will float. The spacer blocks should be free to remove.

If spacer blocks are not free, continue to adjust each **ISOLATOR HEIGHT ADJUST** screw CCW an equal number of turns until spacer blocks can be removed.

- Step 20** Remove spacer blocks.

Once space blocks have been removed, and if **ISOLATOR HEIGHT ADJUST** screw was further adjusted so as to remove spacer blocks, then reduce height back down so that gap spacing is about **1/2 inch** as referenced in figure 10 below.

- Step 21** Check to see that the top of the *piston* and the top surface of the *clamp ring* are parallel as shown below.

Sliding or tapping *load disk* towards the low spot of the *piston* will correct any tilt of the *piston*.

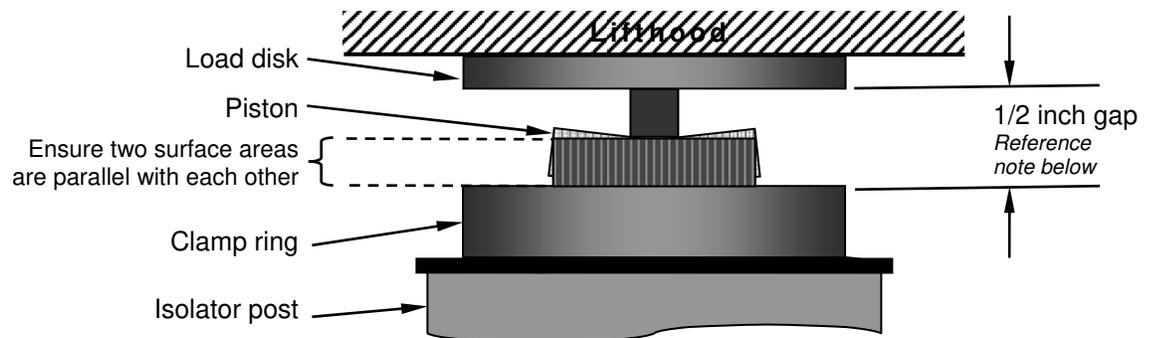


Figure 10 Gimbal Piston



Note Centering the Gimbal piston mechanism is important to achieve best horizontal isolation properties.

The mid-point of the vertical range should be determined by the gap between bottom surface of *load disk* and top surface of *clamp ring*.

The gap distance is **1/2 inch** as referenced in figure above. Some deviation from these heights may be necessary for proper leveling.

The platform should be free to move both vertically and horizontally. Any further leveling should only be done with the **ISOLATOR HEIGHT ADJUST** screw.

Step 22 Tighten *locking nut* on **ISOLATOR HEIGHT ADJUST** on all three valves as shown in figure 9, *Height Control Valve*.



Note There will be some slight settling and improvement in the valve's height sensitivity within the first few days of operation. Again adjust **ISOLATOR HEIGHT ADJUST** if required

Adjust Air Pressure

Step 23 Adjust the regulated air pressure down to **15–20 psi** above the highest pressure reading of the three pressure gauges. This will optimize damping control of course disturbances.



Note Reducing the supply pressure differential will minimize the prolonged disturbance effects of sudden payload forces.

The valves must maintain a positive supply differential or air will be exhausted and the system will deflate.

Air flow through the valves is buffered with controls built into the isolators. If the main air supply pressure is not regulated, the detrimental effects may not be too severe.

Step 24 Move platform up and down gently to ensure unrestricted vertical travel (**$\pm 3/8$ inch**).

Step 25 Move platform in each of the two horizontal planes by pushing gently back and forth to ensure unrestricted travel (**$\pm 3/16$ inch**).

Quiet Island

Quiet Island: Rigid-Damped Tripods

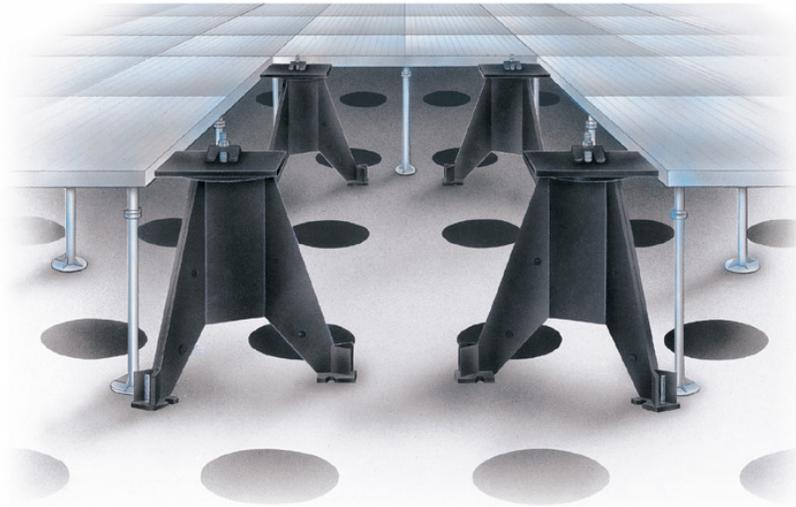


Figure 1 *Rigid Damped Tripods*

Introduction

The rigid-damped tripod is designed to bridge the space from a cleanroom sub-floor to a tool foot at the height of the raised floor with a rigid, non-resonant, damped structure. Provisions are designed in to allow for sub-floor attachment, tool attachment and clearance of sub-floor holes as well as utilities.

Setup Procedure

- Step 1** Place the tripod on the sub-floor with its centerline coaxial with the tool-foot to be supported.

The tripod may be rotated about its axis to clear holes (“pop-outs”) in the sub-floor, conduits, cables, etc.



Note If the pop-outs in the sub-floor cannot be avoided, a plate to bridge the pop-outs may be required to support the base of the tripod. Contact TMC for design assistance.

Step 2 Adjust the **5/8-11 x 3 inch** socket set screws at the three feet of the tripod to bring the top, square surface of the tripod flush with the raised floor.

The tripod has a ± 1 inch vertical travel range using an Allen key.

Step 3 Loosen the **5/8-11 x 1 inch** flat head socket cap screw on the square top plate of the tripod.

Rotate the top plate so that it is square with the raised floor, then re-tighten the screw.

Step 4 Rigidly attach tripod to the sub-floor using one or both of the following methods.



Figure 2 *Rigid Damped Tripod*

Anchor bolts Two slots **0.63 inch** are provided in each of the three tripod base-plates. After hard-shimming between the tripod base-plates and sub-floor, insert **1/2 inch** anchor bolts in the sub-floor to align with the base-plate slots and fasten with a **1/2 inch** nut.

Grouting Whether or not anchor bolts are used, the tripod feet may be “grouted” to the sub-floor.

Using a form approximately **2 inches** tall, grout the feet to the sub-floor using “Rockite,” “Sikadur” or an equivalent compound.

Step 5 Three **3/8-16** tapped holes are provided in the tripod top plate. Tool feet may be anchored to the tripod using this tapped hole pattern and an appropriate fixture (depending on the size and shape of the equipment tool foot).

Individual Rigid Stands

Rigid Support Post

- Floor heights: **6 inches to 24 inches**
- Post heights: Variable

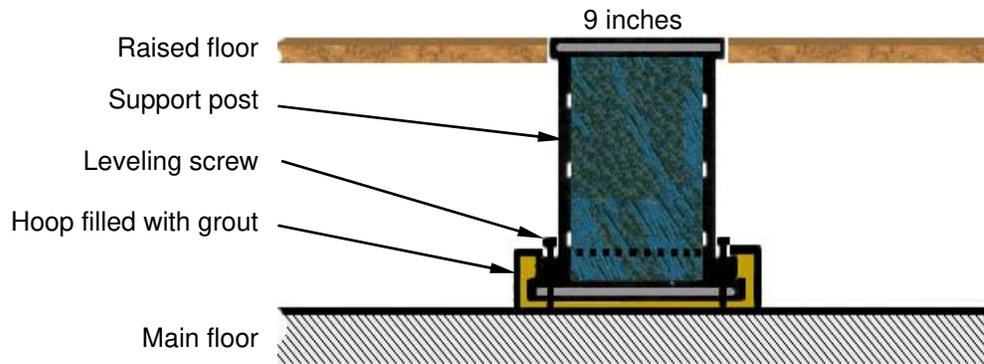


Figure 3 Rigid support post, short floors

Rigid Support Post

- Floor heights: **18 inches to 24 inches**
- Post heights: Variable

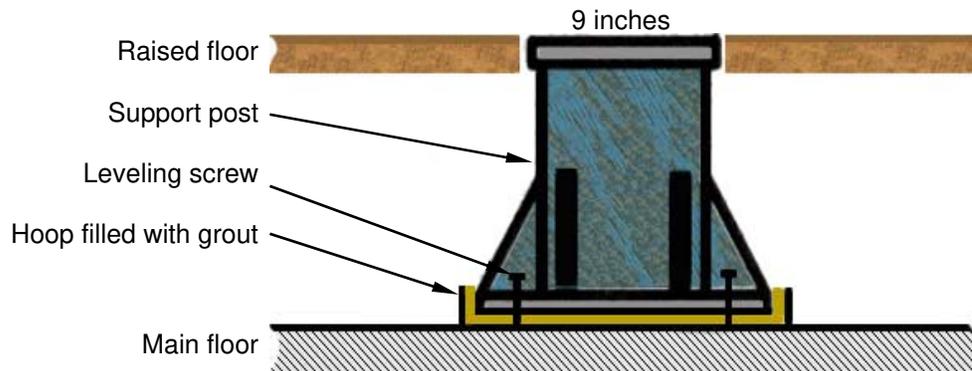


Figure 4 Rigid support post

Rigid Damped Tripod

- Raised floor heights: **18 inches to 24 inches**
- Tripod heights: **11 inches, 17 inches & 23 inches**

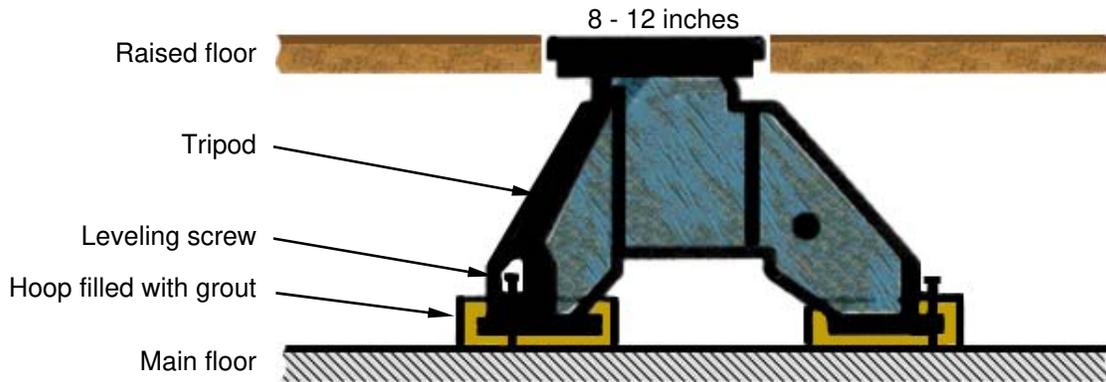


Figure 5 *Rigid damped tripod*

Rigid Damped Tripod

- Raised floor heights: **36 inches, 1 meter, 48 inches**
- Tripod heights: **35 1/4 inches, 38 5/8 inches, 47 1/4 inches**

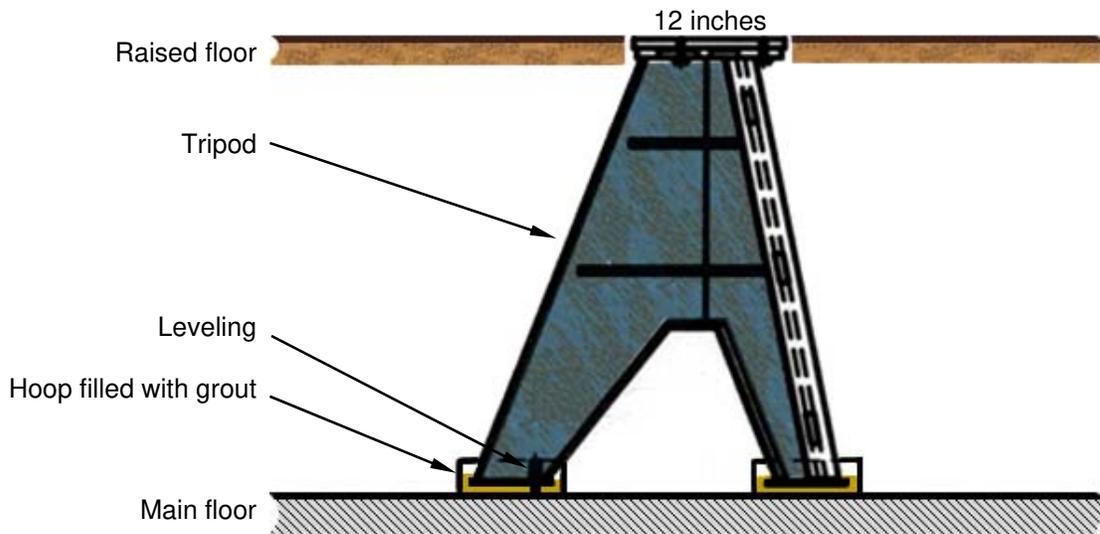


Figure 6 *Flat top rigid tripod*

Quiet Island: Sub-floor Platform & Stands

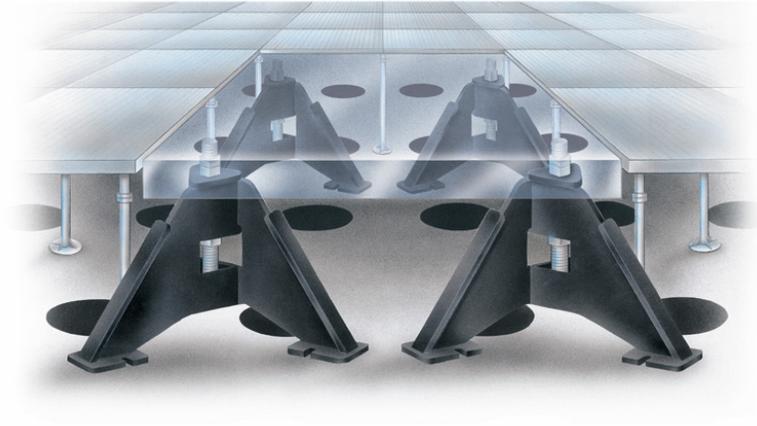


Figure 1 *Quiet Island Sub-floor Platform & Stands*

Introduction

Support platforms

Platform is made in a wide range of sizes to suit most equipment that is best mounted on solid "tool pedestals" rather than on the raised cleanroom floor.

Platforms might be used for vibration control or load support reasons.

Common platform thicknesses:

- **4 inch** - larger or more sensitive tools
- **2-1/2 inch** - less sensitive or special height applications.

Jack Stands

A range of robust, adjustable jack stands are made to suit various raised floor heights. Most stands are **8 inches** square post type with baseplates for shorter floor heights, or tripod type with greater lateral stability for higher floors.

These instructions cover the general case of most simple platform setups with a regular array of support stands.

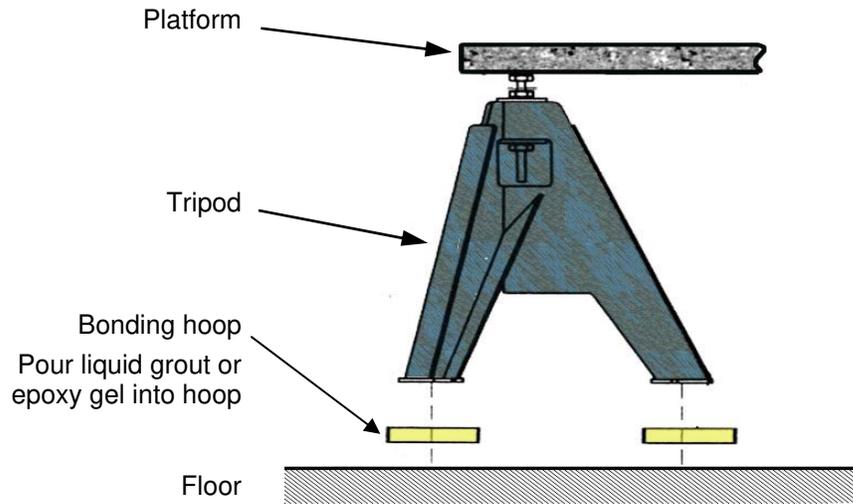


Figure 2 Tripod leveling floor stand

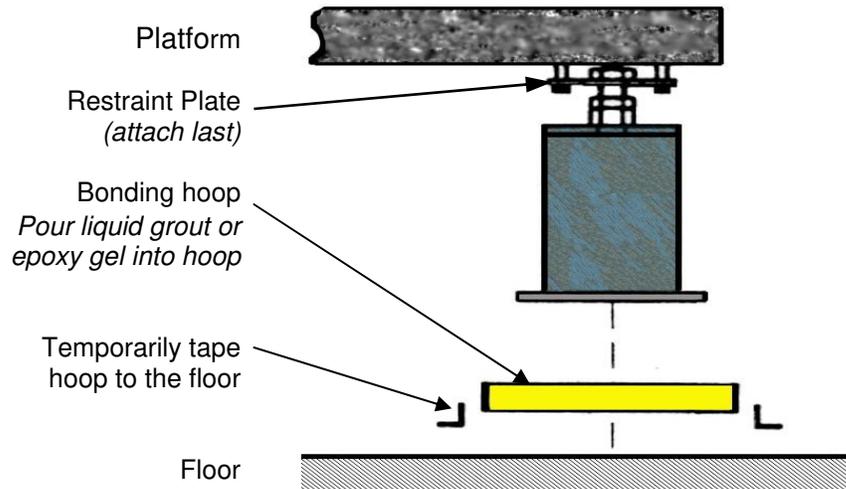


Figure 3 8 x 8 Post leveling floor stand



Note Special arrangements of support stands may be documented with special instructions or drawings. Contact TMC if in doubt about the setup of your platform system.

Stability

Best overall stability of the support system, and least amplification of vibration and structural modes, depends on a solid contact to the sub-floor under any baseplates or tripod feet.

It is recommended for all sensitive equipment installations, that a hard-setting grout be used under the baseplates of all support stands. A liquid type of grout may be poured into bonding hoops that surround each baseplate; or a thicker, gel type of epoxy grout may be put on the floor and the stand set on it.

Grout is only used for void filling and to give uniformity of support under the base. Anchoring the stands to the floor with bolts is more for security than for vibration control if the stands are grouted in places. When grout is used it should be allowed to cure undisturbed before tightening the anchor bolts.

Tools Required

Excluding rigging equipment or anchor bolts.

- Long carpenters level
- **2-1/2 inch** adjustable or open-ended wrench, qty 2
- **15/16 inch** combination or adjustable wrench
- Epoxy type grout. water-mixed anchor-setting cement or other approved grout as required.

Sub-floor Inspection and Preparation

- Check the surface of the concrete to make sure there are no breaks or irregularities in the areas where the stands will be seated.
- If the sub-floor is covered and sealed with a solid vinyl or similar floor covering, it may be left in place if it is solidly in contact with the concrete at each of the support feet.
- Again, inspect the surface and tap around in the area of contact to make sure there are no hidden voids or lumps under the floor covering.

Local areas should be cut away if there is a sub-surface problem.

Floor Stand Positioning Instructions

Tripod or Post Type

Step 1 Place the tripod or post type floor stands in each of the general designated locations.

Step 2 Place optional restraint plates on the jack screws of any floor supports that will be fastened to the platform.

Step 3 Check the floor surface at each post location area and correct the surface as needed.

Most often a tripod can be rotated or repositioned slightly to avoid small local irregularities.

Step 4 Place a mark on the floor for each floor stand bottom footplate location.

Step 5 Place the appropriate size bonding hoop down on each marked floor location under each footplate.

Step 6 Position each hoop so that the footplate is centered within the hoop with uniform clearance.



Note Supports at the platform restraint points must be within **1 inch** of the nominal locations in order to mate with tapped holes in the underside of the platform.

Step 7 Place anchor bolts into the floor for attaching the floor stands.

You may also wait until the floor stand locations have been grouted before placing anchor bolts in the floor.

Step 8 Add grout into the center of the hoop at each of the floor stand footplate locations as follows.

- Pick each of the floor stands up and move it out of position.
- Place a large blob of epoxy grout in the center of each footplate location or pour about **1/4 inch** of liquid cement grout into each hoop.
- Place the floor stand back into location, positioning each footplate over the grout.
- Allow the grout to cure before tightening the anchor bolts or placing the platform on top.

Step 9 Tighten anchor bolts around each floor stand.

Rigid Platform and Stand Systems

Leveling Post and Rigid Post

- Raised floor heights: 6 inches to 24 inches
- Post heights: Variable

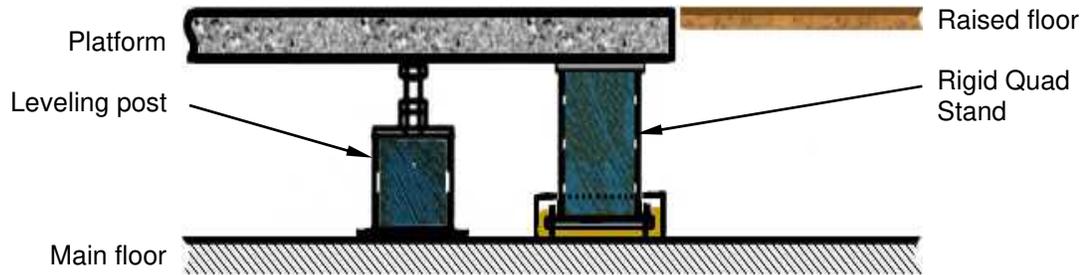


Figure 4 *Leveling Post and Rigid Post*

Tripod Leveling Stand and Rigid Quad. Stand and Leveling Post and Rigid Tripod Stand

- Raised floor heights: 18 inches to 24 inches
- Tripod Leveling Stand heights: 14 inches, 20 inches
- Rigid Quad Stand heights: 13 1/2 inches, 19 1/8 inches
- Leveling Post heights: Various
- Rigid Tripod Stand heights: 19 1/8 inches

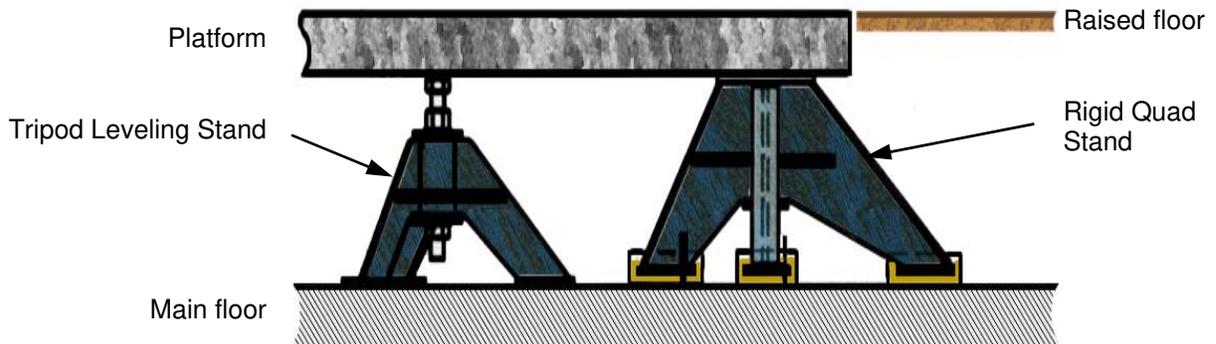


Figure 5 *Tripod Leveling Stand and Rigid Quad Stand*

Rigid Quad Stand and Tripod Leveling Stand Rigid Tripod Stand and Leveling Post

- Raised floor heights
36 inches, 1 meter, 1.2 meter, 48 inches
- Rigid Quad Stand heights
31-1/8 inches, 34-1/2 inches, 42 inches, 43 inches
- Rigid Tripod Stand heights
43 inches
- Tripod Leveling Stand heights
32 inches, 35-1/2 inches, 43 inches, 44 inches
- Leveling Post height: Various

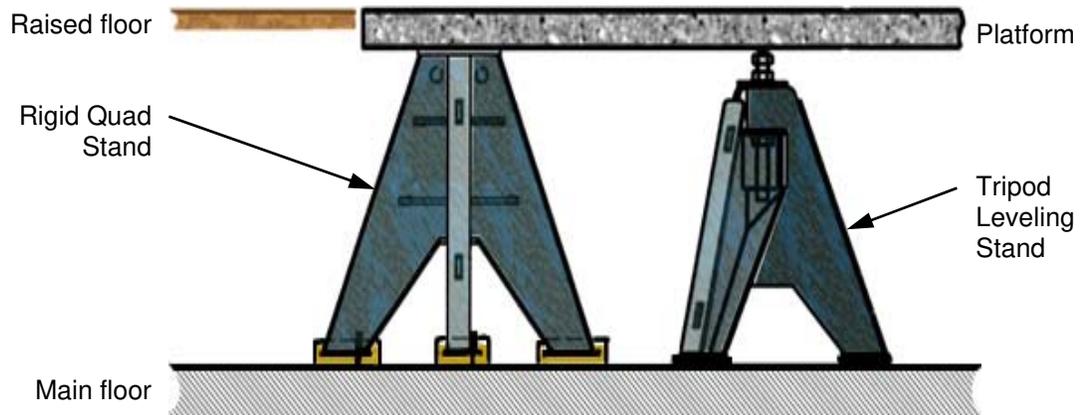


Figure 6 *Rigid Quad Stand and Tripod Leveling Stand*

Platform Placement Instructions

- Step 1** Ensure that all anchor bolts used to secure floor stands to the floor are tightened securely.
- Step 2** Ensure that floor stands that will be secured to the platform have their restraint plates on the jack screws
- Step 3** Ensure that any floor stands located in the center of the platform or in the middle of the sides that will not be primary leveling points are turned down below the nominally correct height.
- Step 4** Lower the platform onto the floor stands.
If the platform has to be repositioned a little, it is better to push it on rigging jacks then to slide it on the jack screws, which might damage threads or upset the stands if they are only grouted in position.

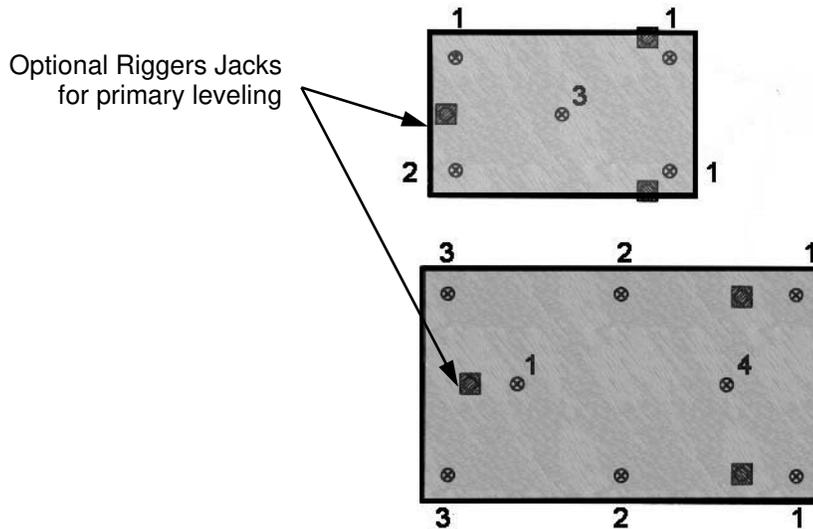
Adjusting Floor Stands

The adjustment process is fundamentally one of changing from a 3-point support to a multi-point support with reasonably uniform loading.

The adjustment process minimizes bending distortions in the platform, thereby raising its modal frequency responses (and resultant stiffness) to maximum loads for the given stand locations.

Keep in mind that, even with the standard **1-1/2 - 6 UNC** threads of the jack stands, **1/16** turn is only about **.010 inch** change in height. The platform is stiff enough that over-driving the correct height position of any stand will start to lift the platform off nearby stands.

Using simple techniques, the stands will be adjusted to a high degree of accuracy.

Figure 7 *Leveling Adjustment Sequence*

Small Platform Floor Stand Adjustments

Platforms using 4-5 Floor Stand Supports

- Step 1** Turn down the jack screw of any floor stand support near the center of the platform so that it will not interfere with primary leveling.
- Step 2** Adjust the 4 corner stands to level the platform as needed relative to the surrounding floor and according to a carpenter's level.
- Step 3** Lock adjustment hard on 3 of the 4 corner floor stands as soon as a level position is found.
- Step 4** Fine adjust the 4th stand and any center stands according to the Fine Adjustment Steps listed in **Checking Floor Stand Adjustments** below.

Large Platform Floor Stand Adjustments

Platforms using 6 or more Floor Stand Supports

It is best to start with a 3-point support for primary leveling, and easiest to do it if one support can be close to the centerline of the platform near one end, while two mounts at the corners of the opposite end complete the triangle.

- Step 1** Adjust the jack screws on the 3 primary floor stands for a level position and then lock position in place with jam nuts.

- Step 2** If there are 3 or more floor stands along the long sides of the platform, then adjust the jack screws up on those stands at the midpoint or closer to the single support end of the primary triangle.

Tighten the jack screws with a fairly light torque against the platform initially, but don't lock the position with the jam nuts.

- Step 3** Adjust the jack screws up at the remaining corners to bring in firm contact with the platform

- Step 4** Adjust any remaining jack screws accordingly.

Checking Floor Stand Adjustments

The objective is to have all of the floor stands bearing a uniform weight.

- The platform tops are stiff enough that once the floor stands are uniformly adjusted, any one of the stands can be released rather easily and abruptly.

This should be done as a test of adjustment, preferably for all of the floor stands that were not the first primary 3 stands adjusted.

As a floor stand is rechecked by the release-and-re-tighten method it may be locked securely.

- Another simple method to confirm best adjustment with a recheck is to thump firmly with a fist on the platform near the stand being adjusted.

As the best adjustment point is reached, the platform will sound "deader" and more tightly clamped.

- A more sophisticated method of monitoring the adjustments is to use a vibration analyzer (preferably 2 channel) with suitably sensitive accelerometers.
- Check to see that all of the lock nuts are secure.
- Bolt any restraint plates used on the underside of the platform. Keep the plates level against the underside of the screw drive nut while turning the **5/8 inch** bolts.

Quiet Island: 67 Series with Gimbal Pistons

Introduction

Raised Platform Isolators are generally used in raised floor environments, such as clean-rooms or computer floor labs, to isolate sensitive equipment from building vibrations.

They are built to the appropriate operating height to suit the floor height, and with a top platform size and shape suitable for the equipment to be isolated.

Stability Consideration is also given to stability. The platform may not be as small as the equipment footprint itself, if the vibration isolation mounts must be spread apart further to stabilize the payload. Often a heavy counterweight is used, bolted to and hanging from the underside of the platform top, to help to lower the center-of-gravity (c.g.) of the total payload.

Isolator mounts, platform top and counterweight, if required, are shipped as separate parts.

Refer to the drawing of the specific system to be installed for layout details.



Caution Ensure that the raised floor is rated for the load of the platform top and counter weight as they are transported to the site.

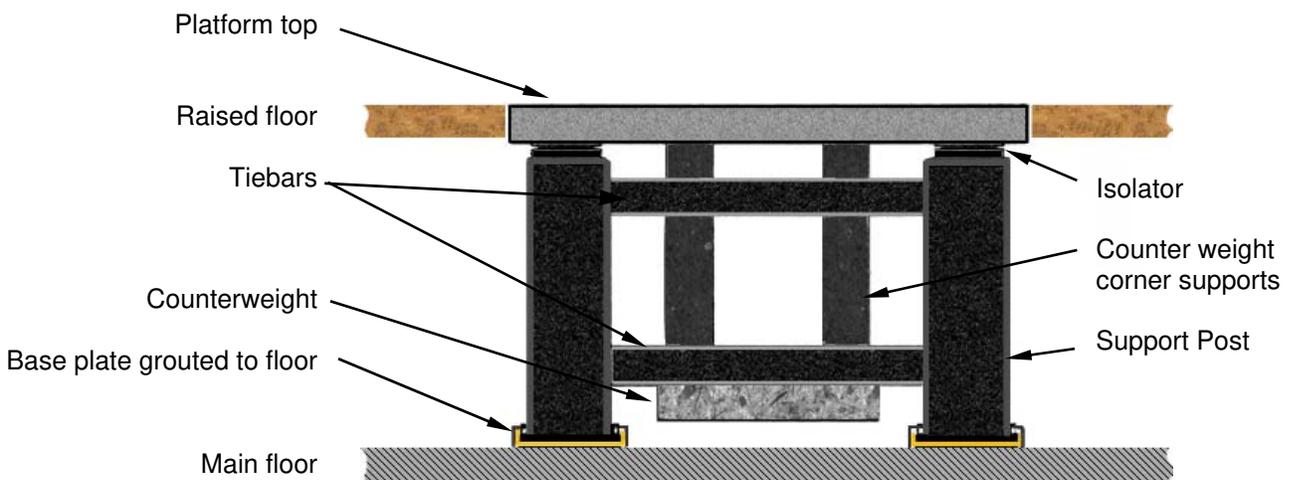


Figure 1 Isolator platform side view layout

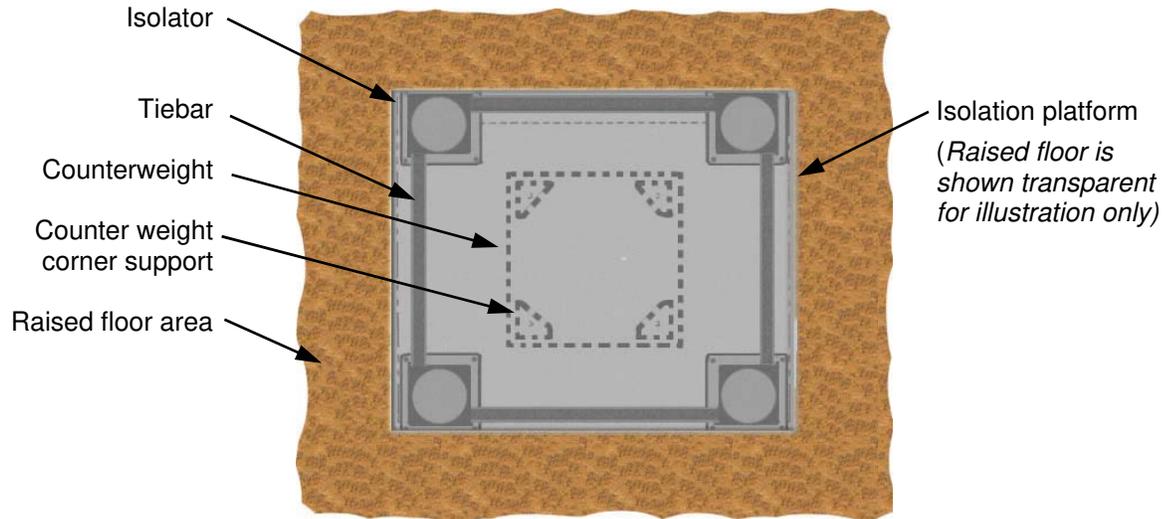


Figure 2 Top view of Isolation platform

Floor Layout

Follow the system drawing and place the isolator frame or individual mounts in position in the floor, taking care to note locations of control valves if indicated.

The counterweight may be pre-assembled to the platform if it is not too large to handle, or it may be placed in the floor on spacer blocks and the platform lowered onto it.

Take note of any special orientations of the platform top and counterweight, as the counterweight may be off-set from center if it is also used to counter a significantly offset equipment payload.

Isolator Assembly and Setup

- Step 1** Assemble tiebars to the isolators if supplied.
Take note of the tiebars lengths relative to the orientation of the top.
- Step 2** If the isolators were supplied with leveling baseplates, place the **2 x 2 inch** steel plates on the floor under the base plate leveling screws
- Step 3** Turn down the screws just enough to engage the dimple in each plate.

Air Supply Input Connection

Step 4 Plumb tubing between air supply and system's input air filter as appropriate.

Fittings Tubing can be connected to a 1/4 or 1/8 inch NPT female fitting as shown in figure below.

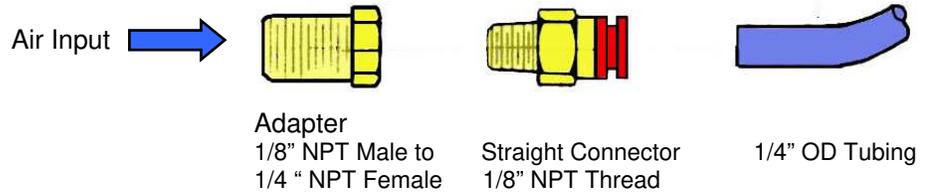


Figure 3 Air Supply Input Connection

Internal Air Supply Tubing

Step 5 Install air supply tubing between *air supply filter*, *isolators*, and *control valves* as appropriate.

M = Master Isolator with Height Control Valve (V)

S = Slave Isolator (no valve)

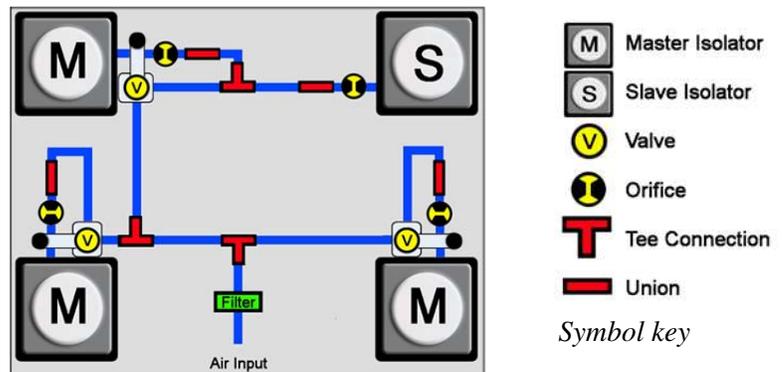


Figure 4 Typical valve schematic for a 4- isolator system

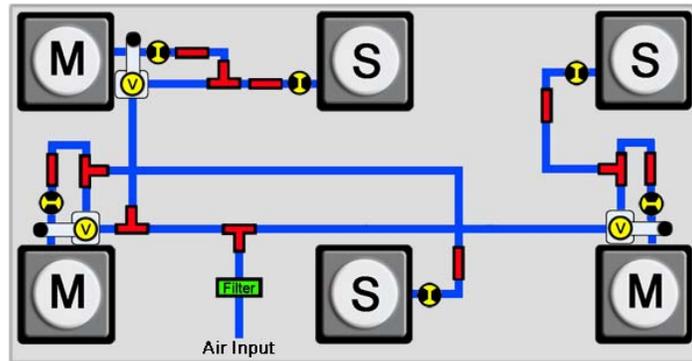


Figure 5 Typical valve schematic for a 6- isolator system

Ensure the slave isolator [S] is plumbed down-stream from its corresponding master isolator [M].

Optional self sticking “J” clips are provided for neatly attaching the air hose to the tiebars.



Note Each post is shipped with a short section of tubing with a union coupler already attached to the input elbow.

This “pigtail” segment should not be tampered with. Each pigtail contains a small, flow-restricting orifice to damp table motion and stabilize the load. A small red ring around the tube marks the orifice position.

If lost or damaged, please contact TMC for replacement pigtails.

Connecting Insert the air tube firmly into the self sealing fitting as shown in figure below.

Disconnecting Push the red cylinder with your thumb and forefinger toward the center of the fitting body while pulling the tube in the opposite direction as shown in figure below.

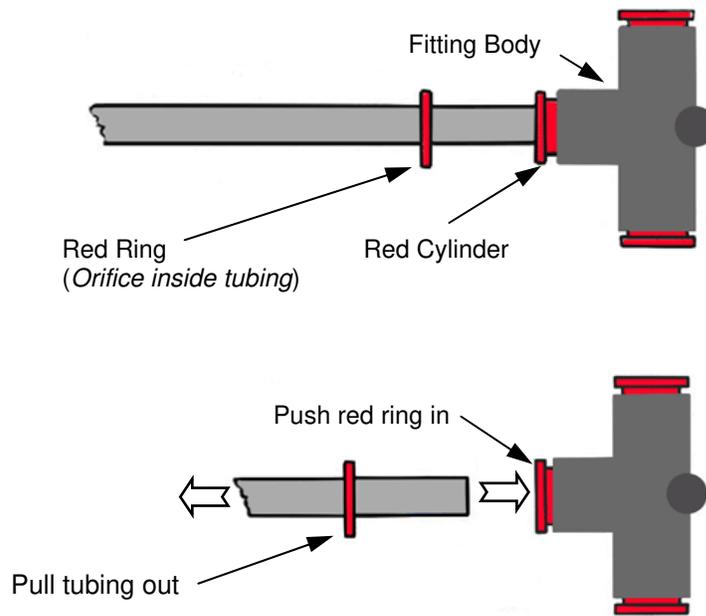


Figure 6 Air tube connections

Orifices Flow restricting orifices are critical to damping system motion. Orifices are located both inside the isolators and in the air tubing and marked by a red ring as shown in figure above.



Important Do not remove or change the location of these orifices without first contacting TMC.

Platform Top and Counterweight Attachment

Step 6 Place the counterweight down on the main floor on spacer blocks.

It can also be pre-assembled to the top and lower the two together.

Step 7 Place the counterweight in its correct position on blocks with its hanger bars just level or slightly above the tops of the isolators.

Leave the lower bolts on the hangers loose.

Step 8 Lower the top into place

Keep most of the weight of the platform and counterweight supported by the rigging equipment until final positioning is complete.

Step 9 Align the top bolt holes in the hangers to the holes in the top and loosely assemble them with the **5/8-11** bolt hardware supplied.

Step 10 Tighten all of the counterweight bolts securely.

Step 11 Center the platform top and counterweight assembly on the isolators and squared up to the floor tile pattern.

This operation may also require sliding the isolator mounts or complete frame around a little to keep the correct position.



Note Check whether special dimensions are given on the drawing.

Step 12 Center the top piston plates.

Step 13 Level up the whole isolation system to the raised floor height and check it with a carpenter's level.

Adjust all of the baseplate leveling screws to support the load equally — equal torque 'by feel' is adequate.

Attach Horizontal Lever Arms

Step 14 Locate the three height control valves mounted on isolators as typically shown in figure 4 & 5 earlier.

Step 15 Ensure the main air supply is **Off**.

Step 16 Adjust the **ISOLATOR HEIGHT ADJUST** screw CW (clockwise as viewed top down) to lower *foam pad* down to the lowest position close to the *horizontal lever arm* as referenced in figure below. Retract *locking nut* as required.

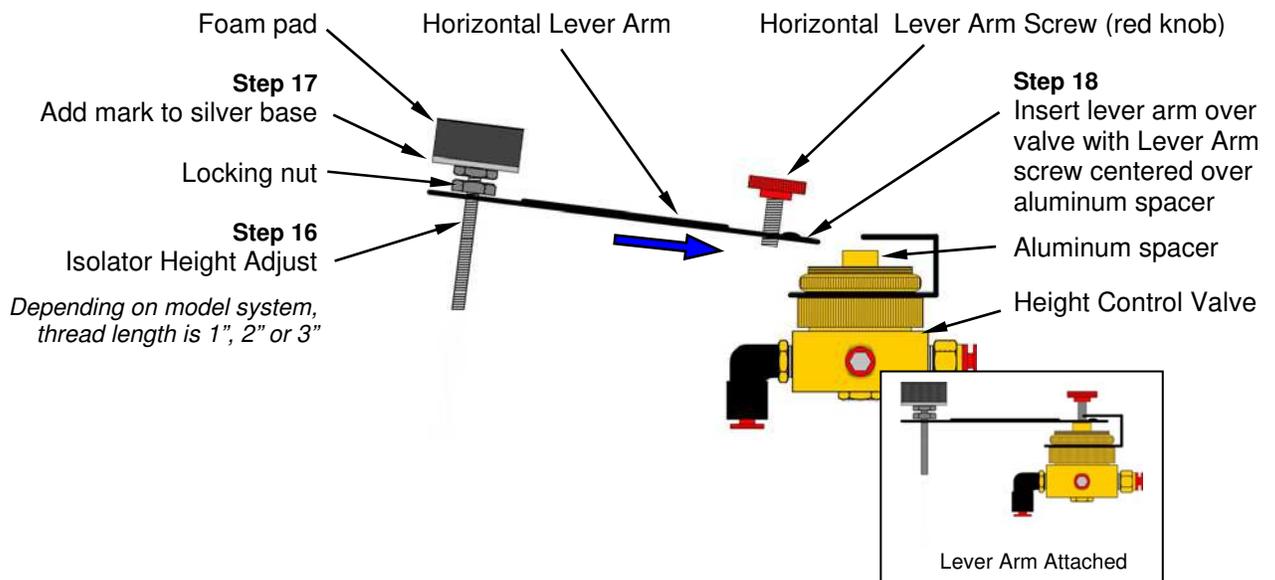


Figure 7 Attaching Horizontal Lever Arm

- Step 17** Using a marking pen, mark a spot on the edge of the *foam pad*'s silver colored base to later use as a rotation indicator for **ISOLATOR HEIGHT ADJUST**.
- Step 18** Insert *horizontal lever arm* onto *height control valve* ensuring the end of the **HORIZONTAL LEVER ARM SCREW** fits over the center of the *aluminum spacer*.
- Step 19** Loosely fasten *horizontal lever arm* with **HORIZONTAL LEVER ARM SCREW** (red knob) and adjust to position arm horizontally with valve.
- Step 20** Repeat above steps for attaching *horizontal lever arm* onto remaining two valves.

Isolator Height Adjustment

- Step 21** Adjust the **ISOLATOR HEIGHT ADJUST** screw raising *foam pad* until it is in slight contact with the platform.

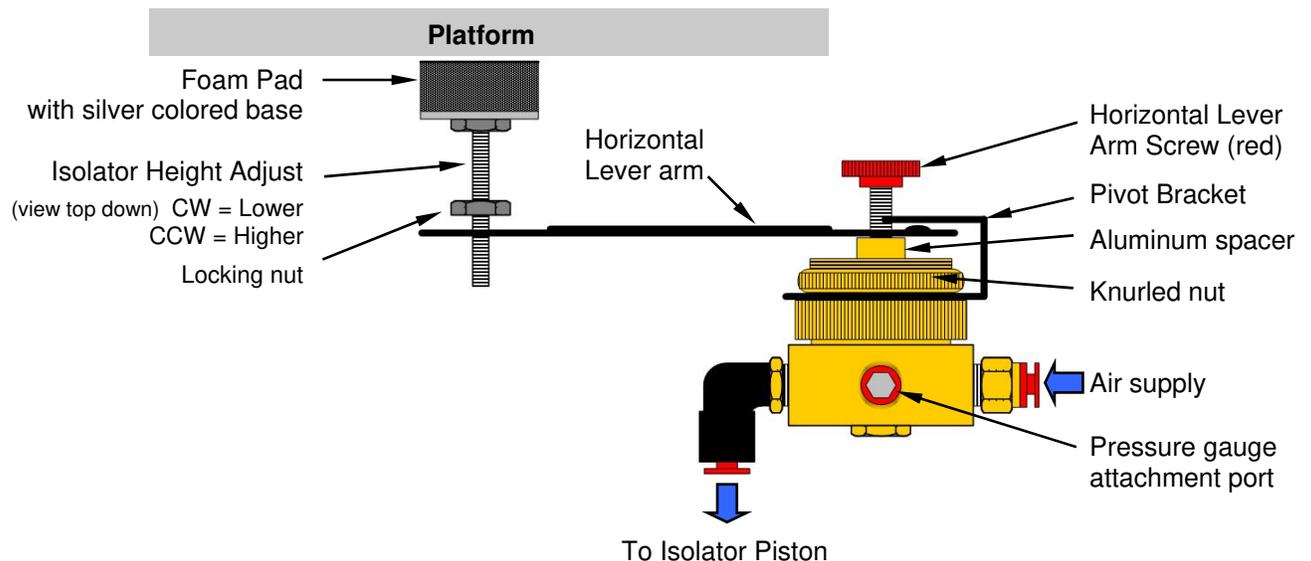


Figure 8 Height Control Valve

- Step 22** While observing spot marked on the base of the *foam pad* earlier, continue to adjust **ISOLATOR HEIGHT ADJUST** screw another **5 turns CCW**, or more depending on model system being applied to.

The foam pad material will compress against tabletop.

- Step 23** Repeat above steps for **ISOLATOR HEIGHT ADJUST** on remaining two isolators with a valve attached.

Gimbal Piston Adjustment

- Step 24** Turn on the main air supply and set to **60-80 psi max.**

After a short delay, all the load disks should lift away from the clamp rings and the tabletop will then be floating.

- Step 25** Check to see that the top of the *piston* and the top surface of the *clamp ring* are parallel as shown in figure below.

Sliding or tapping load disk towards the low spot of the piston will correct any tilt.

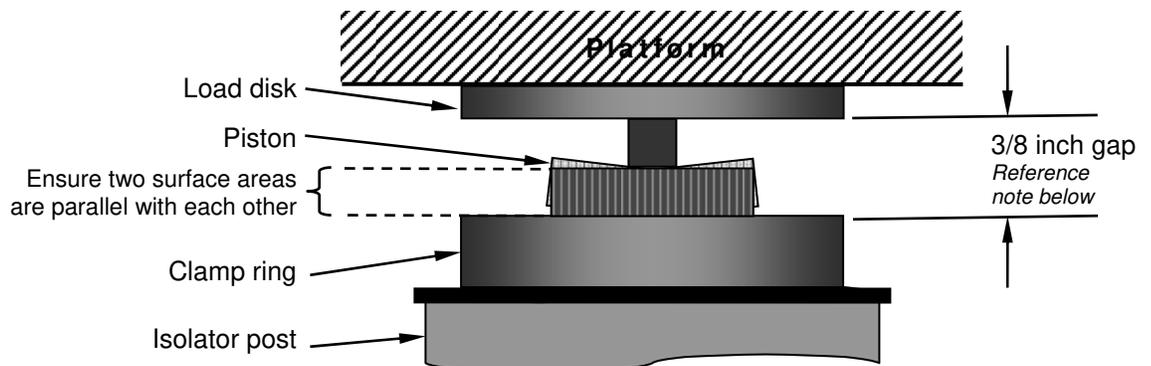


Figure 9 Gimbal Piston



Note Centering the Gimbal piston mechanism is important to achieve best horizontal isolation properties.

The mid-point of the vertical range should be determined by the gap between bottom surface of *load disk* and top surface of *clamp ring*.

Gap distance is as follows and referenced in figure above.

4 x 4 inch cross section: **3/8 inch** gap

6 x 6 or **8 x 8 inch** cross section: **1/2 inch** gap

Some deviation from these heights may be necessary for proper leveling.

The platform should be free to move both vertically and horizontally. Any further leveling should only be done with the **ISOLATOR HEIGHT ADJUST** screw.

Step 26 Tighten *locking nut* on all three **ISOLATOR HEIGHT ADJUSTS** as shown in figure 8 above, *Height Control Valve*.



Note There will be some slight settling and improvement in the valve's height sensitivity within the first few days of operation. Again adjust **ISOLATOR HEIGHT ADJUST** if required.

Adjust Air Pressure

Step 27 Adjust the regulated air pressure down to **15–20 psi** above the highest pressure reading of the three pressure gauges. This will optimize damping control of coarse disturbances.



Note Reducing the supply pressure differential will minimize the prolonged disturbance effects of sudden payload forces.

The valves must maintain a positive supply differential or air will be exhausted and the system will deflate.

Air flow through the valves is buffered with controls built into the isolators. If the main air supply pressure is not regulated, the detrimental effects may not be too severe.

Final Stabilization

- Check system and ensure the top platform is positioned as it should be with respect to the tile floor.
- Ensure the isolators are leveled so that they support the top without rocking with the air off.
- Add additional stability and better overall isolation performance by grouting footplates with a liquid cement grout.

TMC can provide 'Bonding Hoops' for placing around the footplates (square containment dams) for this purpose.

5

Service

Contents at a Glance

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Gimbal Piston Assembly Replacement	145

Valve Replacement

Replacement Instructions

- Step 1** Disconnect air supply to table.
- Step 2** Drain remaining air by slowly loosening any air tube fitting on the table.
- Step 3** Remove knurled nut and disconnect air tubing to allow valve removal.

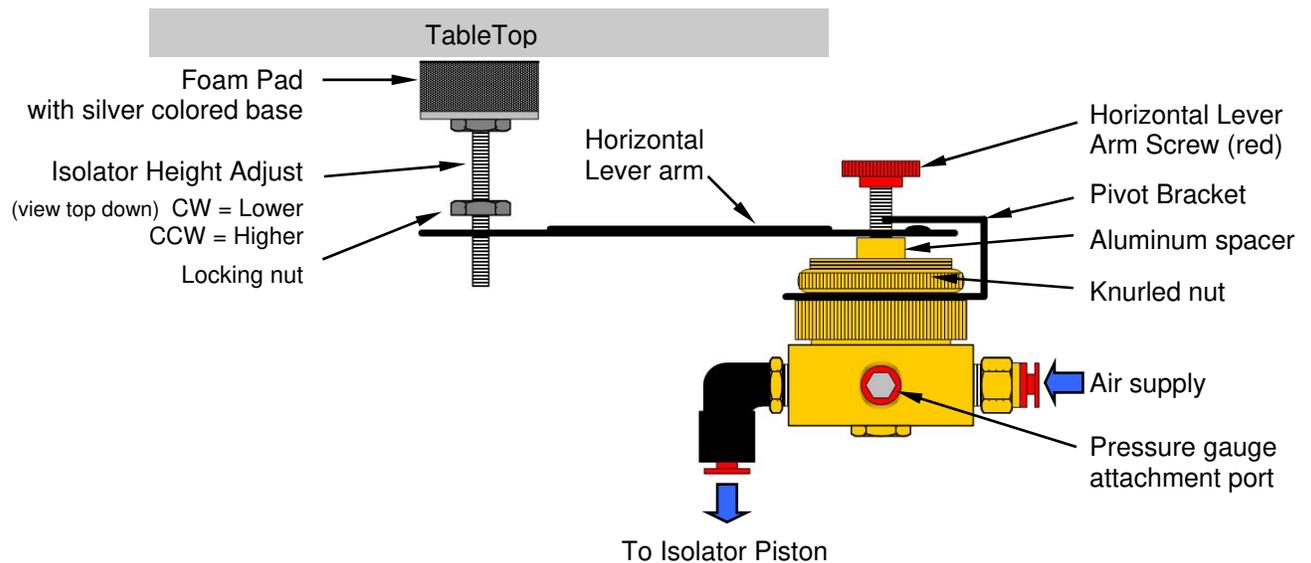
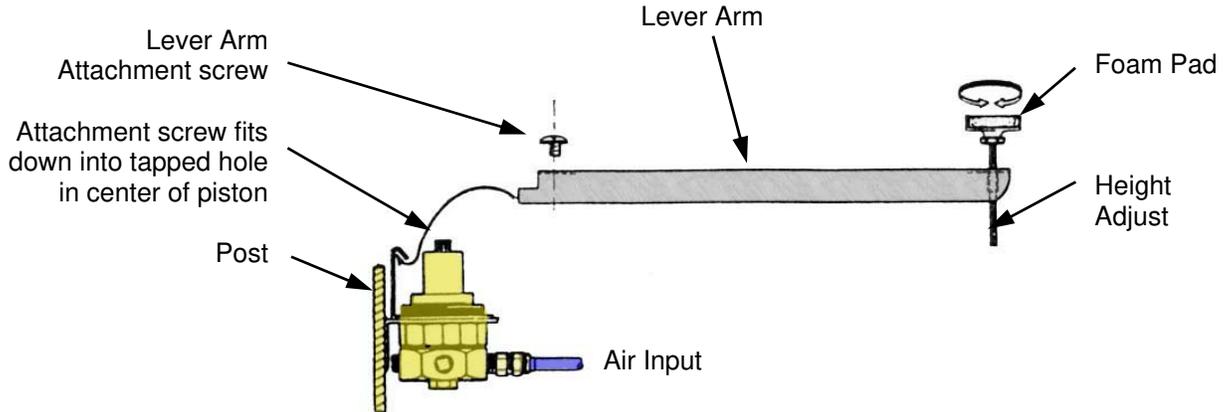


Figure 1 *Height Control Valve*

Figure 2 *Old style valve*

- Step 4** Remove any additional valves to be replaced as per **Step 3** above.
- Step 5** Duplicate defective valve connector configuration with replacement valve noting the air input side of the valve. This is designated either by "in" or the tail of a scribed arrow.
- Step 6** Install replacement valve and tighten knurled nut, again referencing figure 1 above.
- Step 7** Install any additional replacement valves as per **Steps 5 & 6**.

Tables with old style (pre-1990) connector fittings

- For tables with old style compression nut connectors, remove all air fittings from the installed valve.
- If sufficient slack exists in the air tubing, cut off and discard the last 1/2 inch tubing with compression nuts attached. The new valve can be installed with new push lock fittings in the same configuration.
- If not enough slack exists, do not cut the tubing, TMC recommends replacing all the fittings and tubing.

TMC Tubing & Fitting Kit, p/n 86-24195-01

Internal Air Supply Tubing

TMC recommends that consideration should be given to replace all air tubing. *TMC Tubing & Fitting Kit, p/n 86-24195-01*

If tubing is not being replaced then skip ahead to next step, section to [Attach Horizontal Lever Arm\(s\)](#).

Step 8 Install replacement air supply tubing between *air supply filter, isolators, and control valves* as required.

M = Master Isolator with Height Control Valve (V).

S = Slave Isolator (no valve).

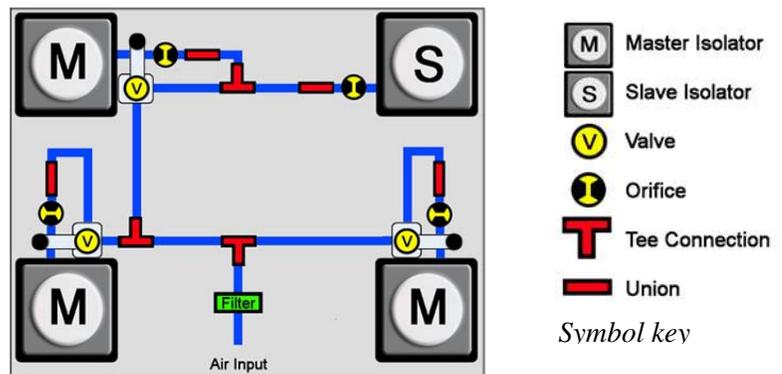


Figure 3 Typical valve schematic for a 4- isolator system

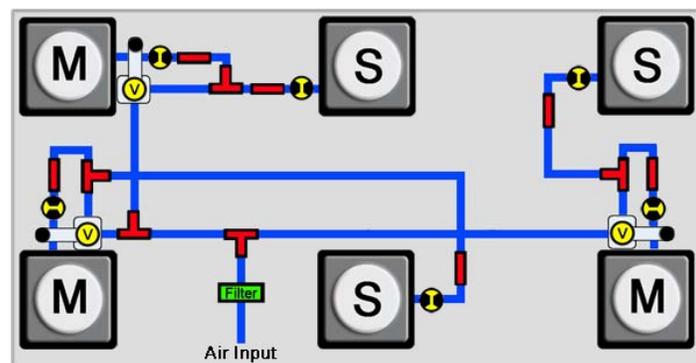


Figure 4 Typical valve schematic for a 6- isolator system

Ensure the slave isolator [S] is plumbed down-stream from its corresponding master isolator [M].



Note Each post is shipped with a short section of tubing with a union coupler already attached to the input elbow.

This “pigtail” segment should not be tampered with. Each pigtail contains a small, flow-restricting orifice to damp table motion and stabilize the load. A small red ring around the tube marks the orifice position.

If lost or damaged, please contact TMC for replacement pigtails.

Connecting Insert the air tube firmly into the self sealing fitting as shown in figure below.

Disconnecting Push the red cylinder with your thumb and forefinger toward the center of the fitting body while pulling the tube in the opposite direction as shown in figure below.

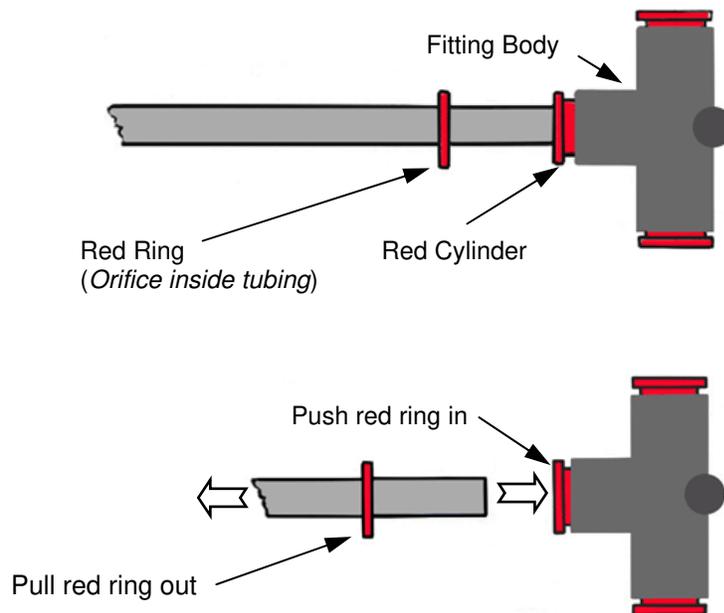


Figure 5 Air tube connections

Orifices Flow restricting orifices are critical to damping system motion. Orifices are located both inside the isolators and in the air tubing and marked by a red ring as shown in figure above.



Important Do not remove or change the location of these orifices.

Attach Horizontal Lever Arm(s)

Step 9 Locate *height control valve* (s) mounted on isolator as referenced figures 3 & 4 above.

Step 10 Ensure the main air supply is **Off**.

Step 11 Adjust the **ISOLATOR HEIGHT ADJUST** screw CW (clockwise as viewed top down) to lower *foam pad* down to the lowest position close to the *horizontal lever arm* as referenced in figure below. Retract *locking nut* as required.

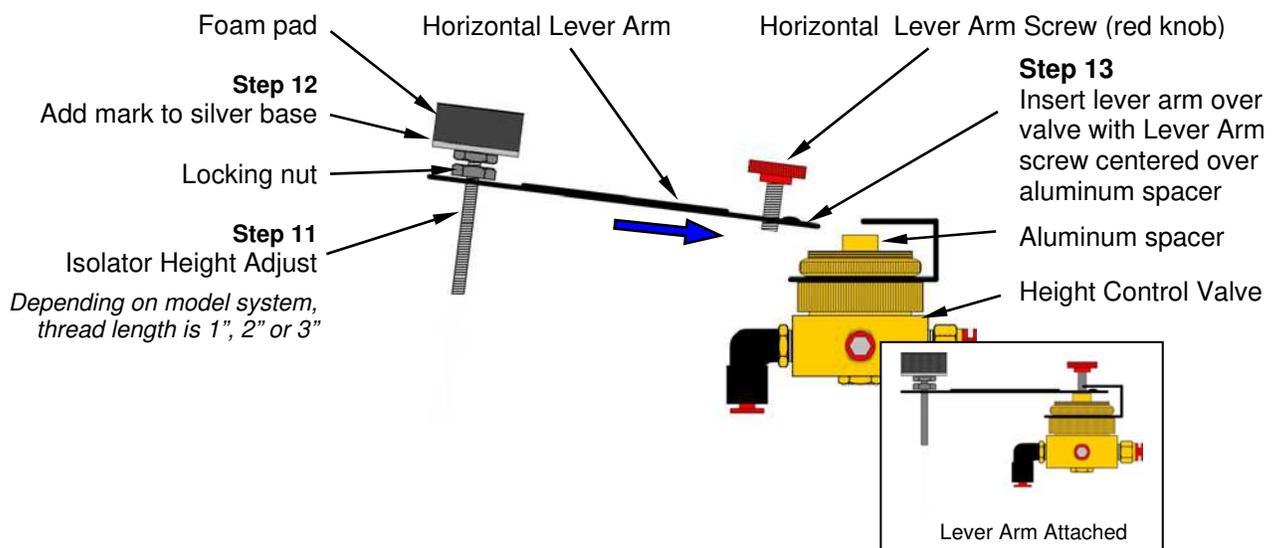


Figure 6 Attaching Horizontal Lever Arm

- Step 12** Using a marking pen, mark a spot on the edge of the *foam pad's* silver colored base to later use as a rotation indicator for **ISOLATOR HEIGHT ADJUST**.
- Step 13** Attach *horizontal lever arm* onto *height control valve* ensuring the end of the **HORIZONTAL LEVER ARM SCREW** fits over the center of the *aluminum spacer*.
- Step 14** Loosely fasten *horizontal lever arm* with **HORIZONTAL LEVER ARM SCREW** (red knob) and adjust to position arm horizontally with valve as referenced in figure 6 insert.
- Step 15** Repeat above steps for attaching *horizontal lever arm* onto any remaining replacement valves.

Isolator Height Adjustment

- Step 16** Adjust the **ISOLATOR HEIGHT ADJUST** screw raising *foam pad* until it is in slight contact with the tabletop.

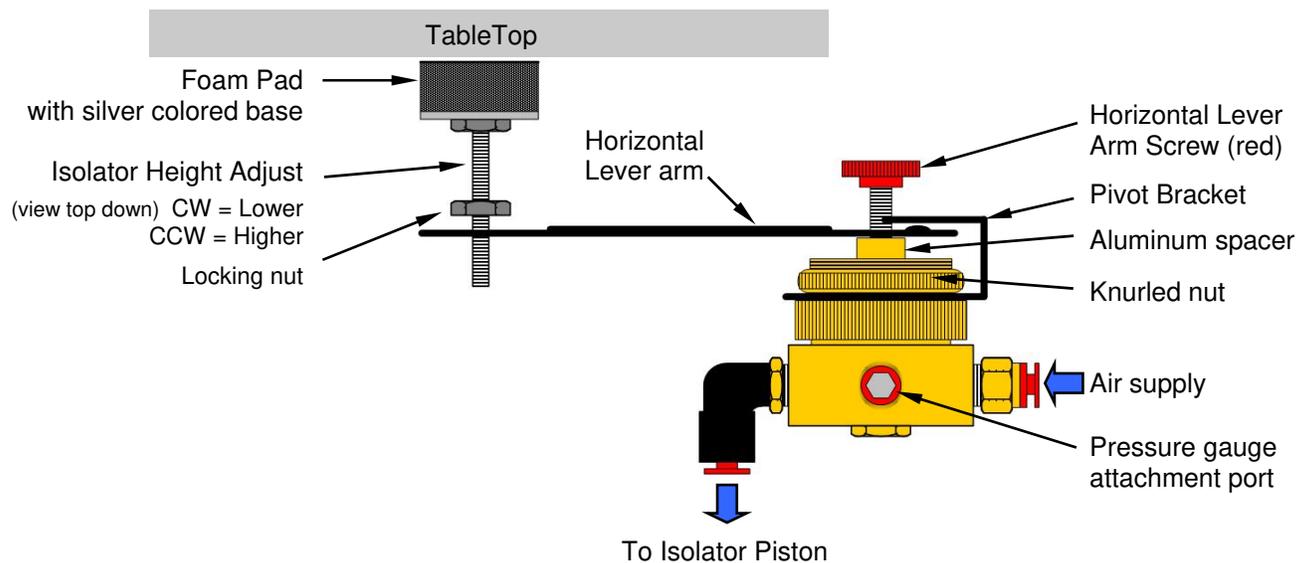


Figure 7 Height Control Valve

- Step 17** While observing spot marked on the base of the *foam pad* earlier, continue to adjust **ISOLATOR HEIGHT ADJUST** screw another **5 turns CCW**.

The foam pad material will compress against tabletop.

- Step 18** Repeat above steps for **ISOLATOR HEIGHT ADJUSTMENT** on remaining isolators with replacement valves attached.

Gimbal Piston Adjustment

- Step 19** Turn on the main air supply and set to **60-80 psi max**.

After a short delay, all the load disks should lift away from the clamp rings and the tabletop will then be floating.

- Step 20** Check to ensure that the top of the *piston* and the top surface of the *clamp ring* are parallel as shown in figure below.

Sliding or tapping load disk towards the low spot of the piston will correct any tilt of the piston.

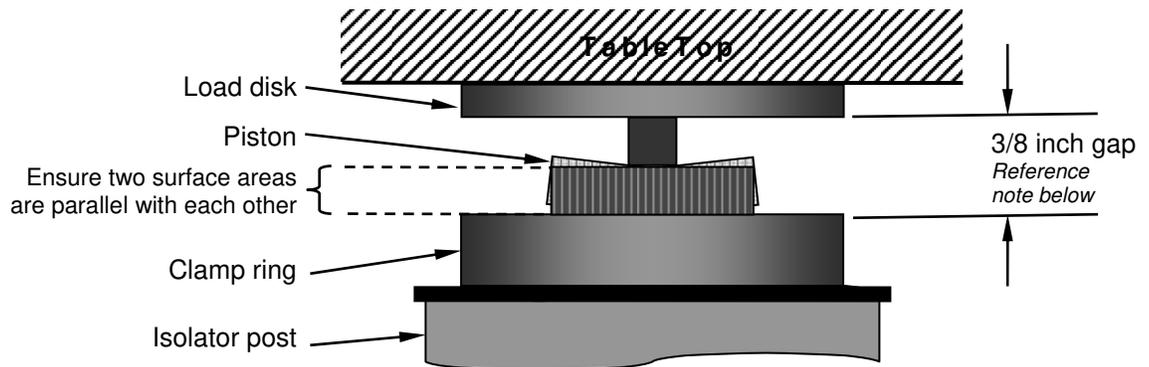


Figure 8 Gimbal Piston



Note Centering the Gimbal piston mechanism is important to achieve best horizontal isolation properties.

The mid-point of the vertical range should be within the gap between bottom surface of *load disk* and top surface of *clamp ring*.

Gap distance is as follows and referenced in figure above.

4 x 4 inch cross section: **3/8 inch** gap

6 x 6 or 8 x 8 inch cross section: **1/2 inch** gap.

Some deviation from these heights may be necessary for proper leveling.

The table top should be free to move both vertically and horizontally. Any further leveling should only be done with the **ISOLATOR HEIGHT ADJUST** screw.

Step 21 Tighten *locking nut* on all **ISOLATOR HEIGHT ADJUSTS** as shown in figure 7 earlier, *Height Control Valve*.



Note There will be some slight settling and improvement in the valve's height sensitivity within the first few days of operation. Again adjust **ISOLATOR HEIGHT ADJUST** if required.

Adjust Air Pressure

Step 22 Adjust the regulated air pressure down to **15–20 psi** above the highest pressure reading of the three pressure gauges. This will optimize damping control of course disturbances.

Model 63-500 systems: Adjust regulated air pressure down to **15–20 psi** above single gauge pressure reading.



Note Reducing the supply pressure differential will minimize the prolonged disturbance effects of sudden payload forces.

The valves must maintain a positive supply differential or air will be exhausted and the system will deflate.

Air flow through the valves is buffered with controls built into the isolators. If the main air supply pressure is not regulated, the detrimental effects may not be too severe.

Gimbal Piston Assembly Replacement

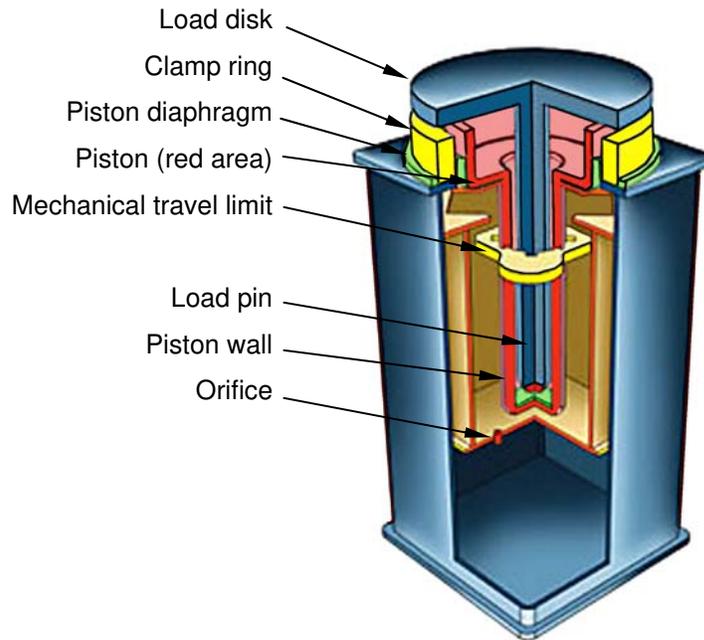


Figure 1 *Gimbal Piston Cut-away*

Replacement Instructions

Tool Required: 9/64 Allen-wrench

Step 1 Remove *load disk*.

Disk easily pulls right out.

Step 2 Remove damaged piston assembly by first removing clamp ring attachment screws using **9/64** Allen wrench. Reference figure below.

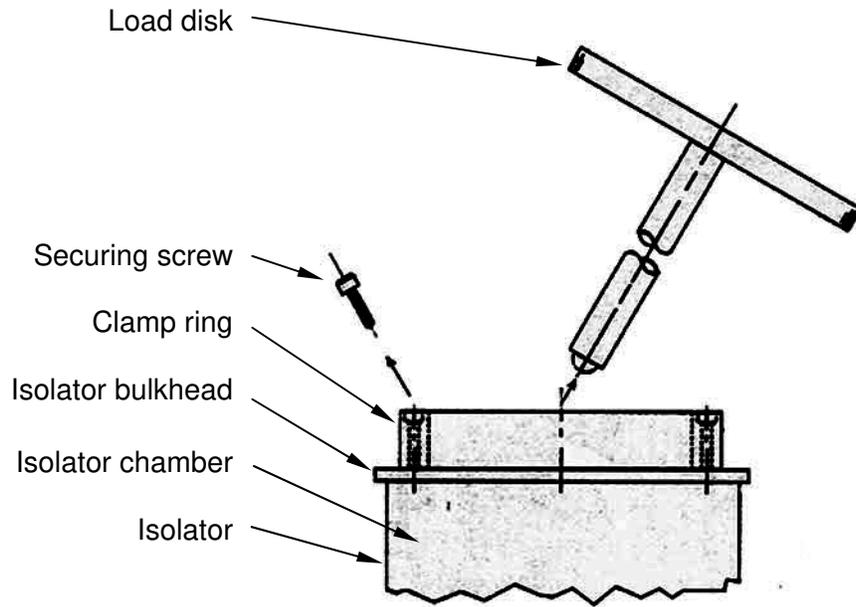


Figure 2 Removing damaged piston assembly

Step 3 Peel off remaining silicon adhesive on the isolator bulkhead.

Step 4 Place the new Gimbal Piston Assembly inside the isolator chamber by aligning the restraint bracket with the keyway hole in the isolator as shown in figure below.

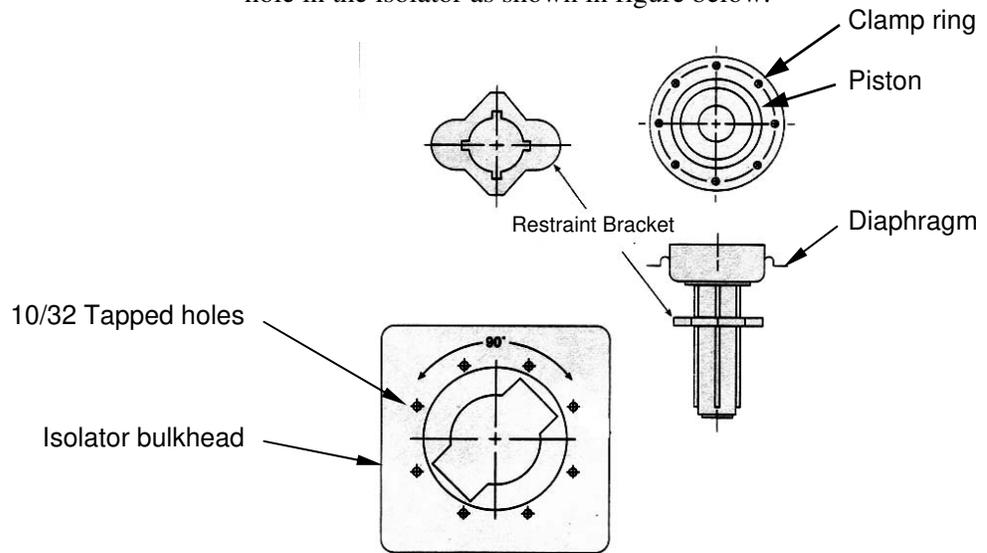


Figure 3 Align restraint bracket with keyway hole

- Step 5** Rotate the Gimbal Piston Assembly approximately 90 degrees.

This will enable over-travel restraint.

Axis of keyway and restraint bracket should be perpendicular as shown in figure 3 above.



Caution All Isolators have an over-travel limit provision. Failure to rotate piston will prevent function of this safety feature.

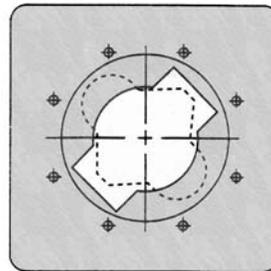


Figure 4 Rotate piston assembly 90 degrees

- Step 6** Line up the nearest matching holes in the diaphragm with those on the isolator bulkhead.

All holes should be registered.

- Step 7** Place the ring over the diaphragm again, registering the hole pattern as shown in figure below.

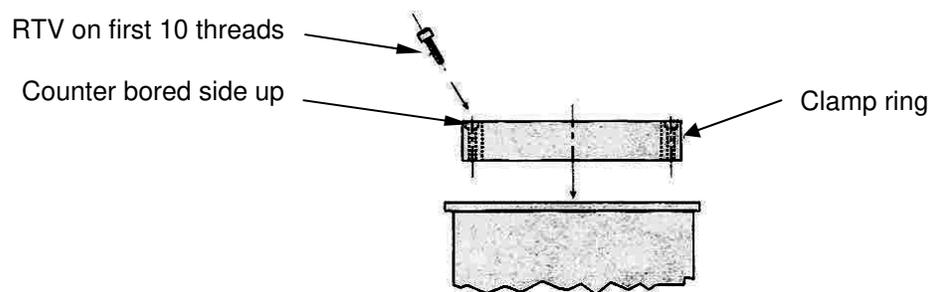


Figure 5 Placing ring over diaphragm



Caution Never use pointed tools that may prick the diaphragm and cause an air leak.

- Step 8** Apply the supplied RTV sealant to the first ten threads of the securing screws as shown in figure above.
- Step 9** Begin by turning first two screws on opposite sides of the ring to locate and hold the diaphragm. Do not tighten.
- Step 10** Start the remaining screws in a similar, alternating fashion.
- Step 11** Tighten the ring progressively going around the ring in a star pattern as shown in figure below.

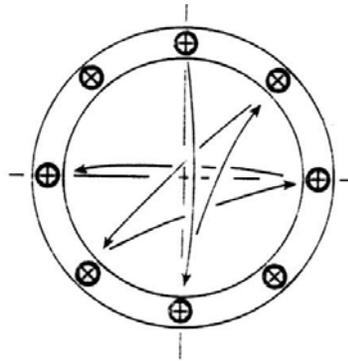


Figure 6 *Bolting ring*

- Step 12** Ensure piston is properly positioned with freedom to move by "wobbling" it while supporting by hand.
- The piston should be able to wobble freely in all directions about the same amount before striking the inner walls of the chamber as shown in figure below.

Step 13 Pressurize chamber to check that the diaphragm is properly sealed (max. **20 psi** suggested).

A liquid soap or commercial leak detector may be used in the screw holes and around the ring to test for any leaks.

Using silicon sealer on the screws should eliminate air leaks of any significance.

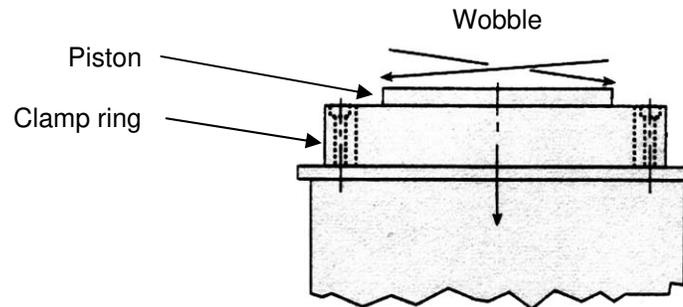


Figure 7 *Piston wobbles freely*

Step 14 Replace *Load Disk*.

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