IsoStation™ Vibration Isolated Workstation

INSTRUCTION MANUAL

Newport®

Warranty

Newport Corporation warrants the frame to be free from defects in material and workmanship for a period of one year from the date of shipment and isolators for a period of two years from date of shipment. In addition, the laminated honeycomb tops have a lifetime performance and delamination warranty under normal use and proper handling. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport representative or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions.

Repaired or replaced products are warranted for the balance of the original warranty period or 90 days, whichever is longer.

This warranty does not apply to defects resulting from modifications or improper use of the system or its component parts.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Newport Corporation shall not be liable for any indirect, special, or consequential damages.

Irvine, California, U.S.A.
Part No. 21413-01, Rev. UA
IN-08951 (03-00)

Table of Contents

List of Figures

Section 1
General Information

1.1 Introduction

The IsoStation Vibration Isolated Workstation provides an ideal working platform for vibration influenced devices such as interferometers, microscopes, and balances. Sensitive instruments such as these will show significant improvements in resolution and repeatability when isolated from floor motion by the IsoStation pneumatic suspension system. This versatile workstation is available in a broad range of sizes, working surfaces, isolator capability, and accessory options.

Special care was taken to ensure excellent performance in the 20-50 Hz floor vibration frequency range corresponding to dominant ambient vibration frequencies common to multi-floor buildings. The modular pneumatic isolators provide excellent protection against both vertical and horizontal floor motions.

These workstations integrate Newport's rigid, laminated honeycomb panel technology and pneumatic isolation systems to provide a mounting platform which is rigid, yet thin and lightweight. The system accommodates high-center of-gravity loads with exceptional stability. Equipped with optional casters, the system is easy to move without heavy equipment and may be safely lifted by building elevators.

It is possible to tailor the system to a wide variety of applications using the range of sizes and available working surfaces.

1.2 Getting Started

Please read and understand this instruction manual thoroughly before beginning the assembly of the IsoStation workstation. The components have been partially assembled at the factory and only require final assembly and performance adjustment tasks. A bubble level is provided to aid in leveling the system.

1.3 Unpacking and Inspection

IsoStation components have been packed in labeled boxes. Make sure the total number of delivered crates equals the total number listed on the shipping documentation. Go over the assembly orientation diagram (Figure 1.1) while unpacking and verify the presence of all ordered parts. Carefully inspect all components for any damage that may have occurred during shipping. Report any such damage to the shipping agent at once.

1.4 Safety Terms

The following safety terms are used in this manual:

The Warning term used in the text indicates dangers that could result in personal injury.

The Caution term indicates situations that may result in damage to the IsoStation components.

Support Ring with Armrests

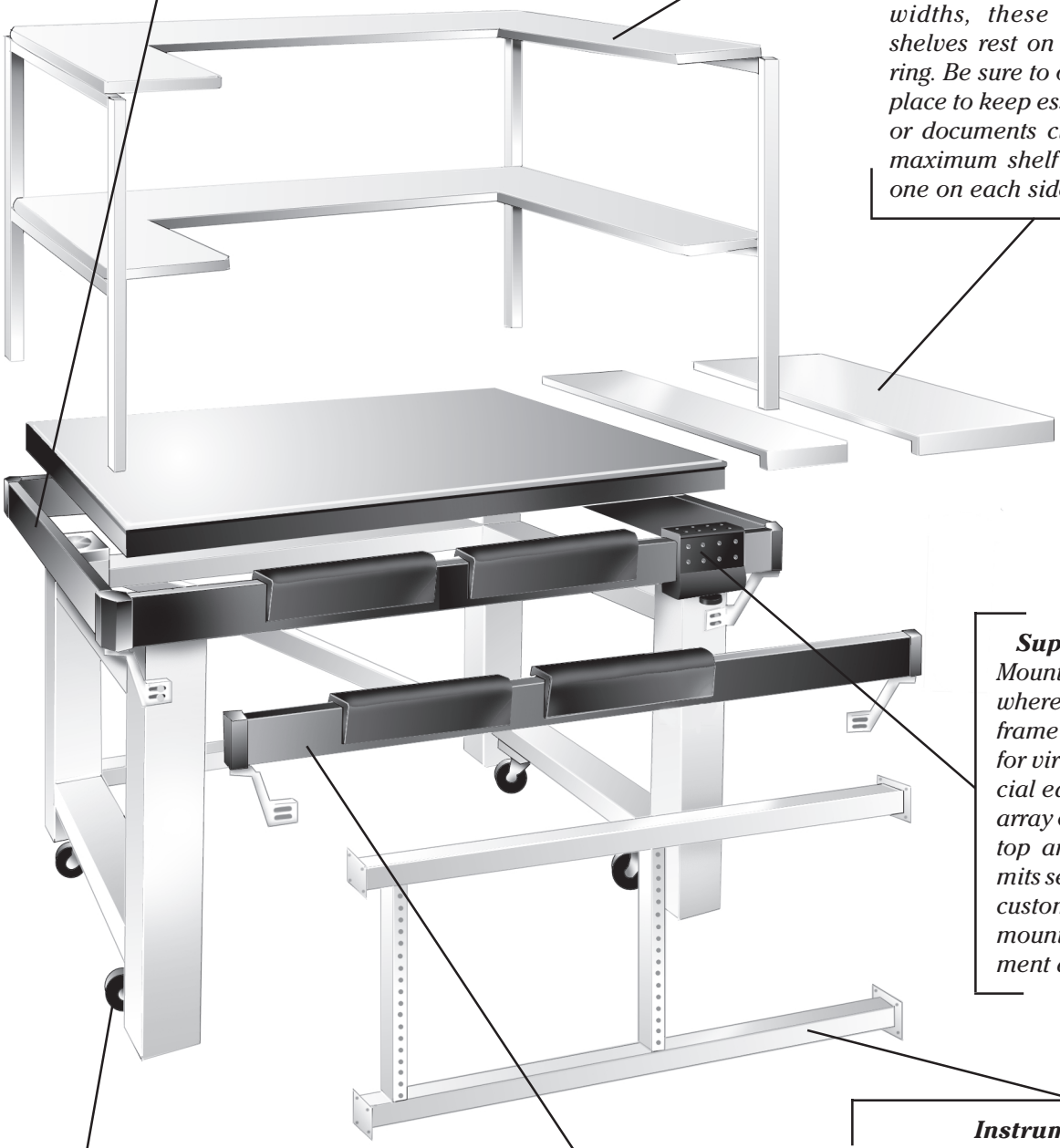
The support ring encircles the top, providing a mounting surface for shelves and support ring mounts. Two armrests are included with the support ring.

Equipment Shelves

One or two equipment shelves attach to the optional support ring, providing extra storage space without transmitting vibrations to the work surface.

Sliding Shelves

Available in 6, 10, 14 and 21-inch widths, these durable laminated shelves rest on the optional support ring. Be sure to order one for a handy place to keep essential tools, samples or documents close at hand. Or, for maximum shelf space, order two — one on each side of your system.



Support Ring Mounts

Mounts may be moved anywhere around the support frame for secure attachment for virtually any type of special equipment. A generous array of tapped holes on the top and side surfaces permits secure mounting. Many customers order an extra mount for last-minute equipment additions.

Instrument Rack

Standard 19-inch rack-mounted electronics modules can be integrated into the workstation with the instrument rack accessory. The rack is constructed of welded heavy-gauge steel for stability and ruggedness. For additional isolation from vibrations transmitted through control, signal and power cables, the Cable Manager accessory is recommended.

Front Support Bar

Includes two armrests for comfortable all-day operation of equipment. Also allows attachment of movable support ring mount. [Note: Back support bar without armrests also available.]

Casters

With these heavy-duty casters, a workstation can be quickly and easily moved by one person. IsoStation is also compact enough to fit in most elevators.

Figure 1.1 — Assembly Orientation

1.5 Workstation Placement

To ensure optimal performance carefully consider placement of your workstation. Try to locate the unit on as level a surface as possible. Placement on an uneven floor may make proper frame leveling more difficult. If the unit will be located on floors other than the ground floor, attempt to place it near primary vertical building structures such as exterior walls or support columns. This will minimize the possibility of lower frequency floor motion affecting the isolation performance. It is also advisable to avoid locations adjacent to major sources of floor vibration such as operating machinery.

WARNING

If installation site is susceptible to earthquakes it is recommended that the legs be securely fastened to either the floor or an adjacent wall. A support ring or support bars are also required to provide earthquake table top restraint.

1.6 Warranty Information

Warranty information may be found on page ii. Should it be necessary to exercise the warranty, contact your Newport representative to determine the correct course of action. Newport Corporation maintains offices in the United States and worldwide. Check the back cover of this manual for the addresses and phone numbers of these offices.

Section 2
Assembly

2.1 Loose Assembly of IsoStation Frame and Air System

2.1.1 Frame Assembly

A. Typically, all IsoStation frames are fully assembled and tested at the factory. If this is true in your case please disregard Sections 2.1.1 and 2.1.2. In some instances, overseas shipping will result in a partially unassembled frame. In this case you should follow the procedures outlined below.

B. Adjust the leveling pads on the bottoms of the legs (Figure 2.1). Rotate the pads until the bottom of the pad extends 2 inches from the bottom of the frame.

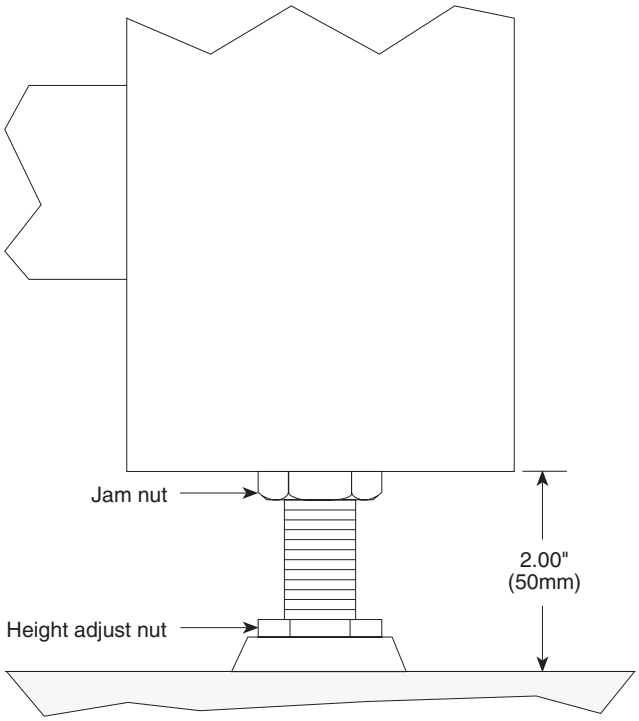


Figure 2.1 — Leveling Pad Adjustment

C. If casters have been ordered, fasten them to the frame assemblies at the pre-drilled and tapped locations on the lower cross members (Figure 2.2), placing the 1 1/2 inch spacers between the caster and the frame. Transferring the load to the casters is accomplished by simply retracting the leveling pads into the legs once assembly is completed. After the workstation has been moved to the desired location, re-extend the leveling pads to lift the casters off the floor. Do not use the IsoStation with the casters in contact with the floor.

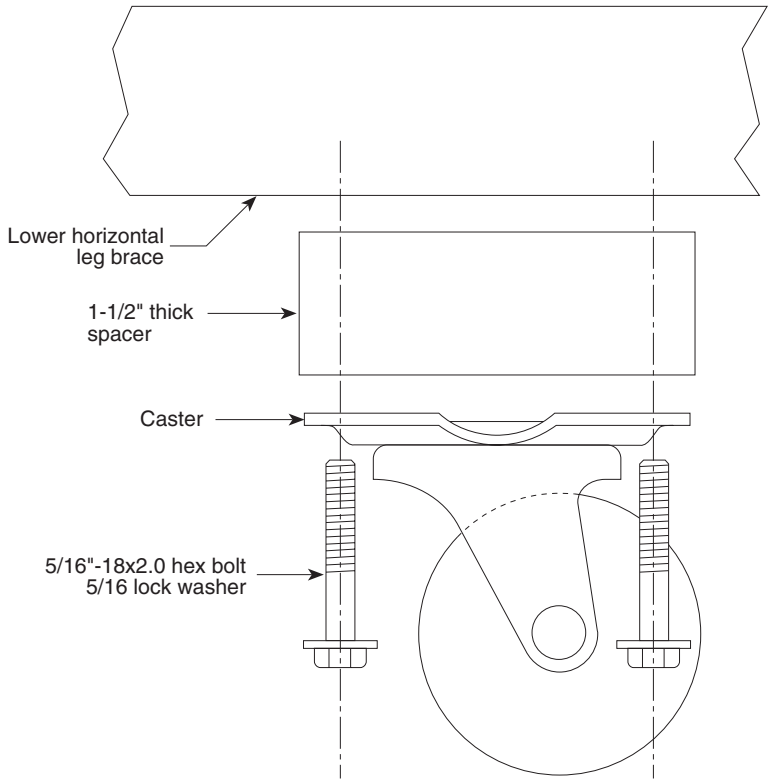


Figure 2.2 — Caster Installation

D. Layout the right and left leg assemblies along with the rear brace as shown in Figure 1.1.

E. Assemble the leg units to the rear brace leaving the bolts slightly loose. If armrest support bars are included, install them to the leg assemblies. Make sure to consider the desired working height of the armrest and/or shelf with respect to the table top surface and position the support bars accordingly, also leaving the bolts slightly loose.

2.1.2 Air System Assembly

The IsoStation workstation is shipped with the air regulator/filter (ARF), Figure 2.3, and leveling valves installed on the leg assemblies.

A. Using the white tubing provided connect the inlet fitting on the right leg assembly valve (single valve) to the “T” fitting on the left leg assembly (see Figure 2.4). To connect the tubing to the fittings, insert and firmly press the tubing into the fitting. (Warning: Do not attempt to disconnect the tubing once the system is pressurized.) Route the tubing along the rear brace and secure it in position using the stick-on tubing clips.

B. Turn the ARF control knob counterclockwise all the way to the “OFF” position.

C. Use the translucent tubing provided to connect the ARF inlet to the air supply.

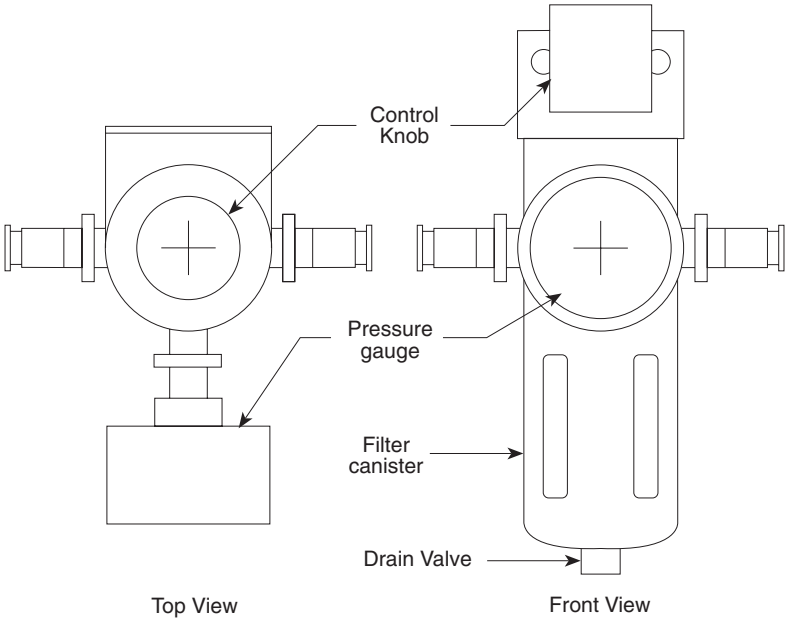


Figure 2.3 — ARF

2.1.3 Installing the Table Top

Lift the table top and carefully set it on the frame. Use a ruler to ensure that the top is approximately centered on the frame.

WARNING

The table top can weigh as much as 250 lb (114 kg). It is important to ensure that adequate personnel is available when installing the table top or employ the use of a forklift or hoist.

2.2 Squaring and Leveling the Frame

For optimum performance the IsoStation frame must be assembled so that the tops of the four legs are coplanar. If not, isolator travel may be limited.

A. Adjust the four leveling pads (Figure 2.1) until the table top contacts evenly on all four of the legs and does not rock when pressed down on at any of the four corners.

B. Tighten all frame and armrest support bolts.

C. Level the table top using the standard bubble level provided, or equivalent, making any necessary further adjustments to the four leveling pads.

D. Recheck that neither the frame nor the top can be rocked.

After the table top has been installed, but before the isolators have been pressurized, remove the two Philips-head screws located on the sides of each isolator.

Whenever the table top is removed, for example when the workstation is transported to another location, reinstall the screws. Moving the workstation with the table top installed does not require reinstallation of the screws.

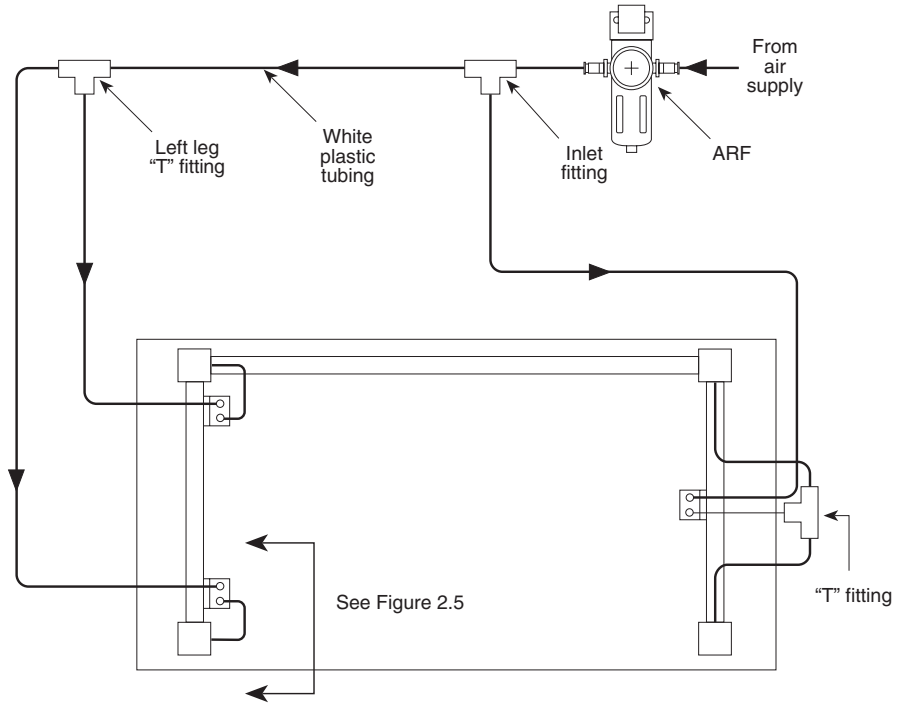


Figure 2.4 — Air System Diagram

2.3 Isolating the Table Top

A. Position the pads on each of the three leveling valve arms so that they contact the underside surface of the table top (Figure 2.5).

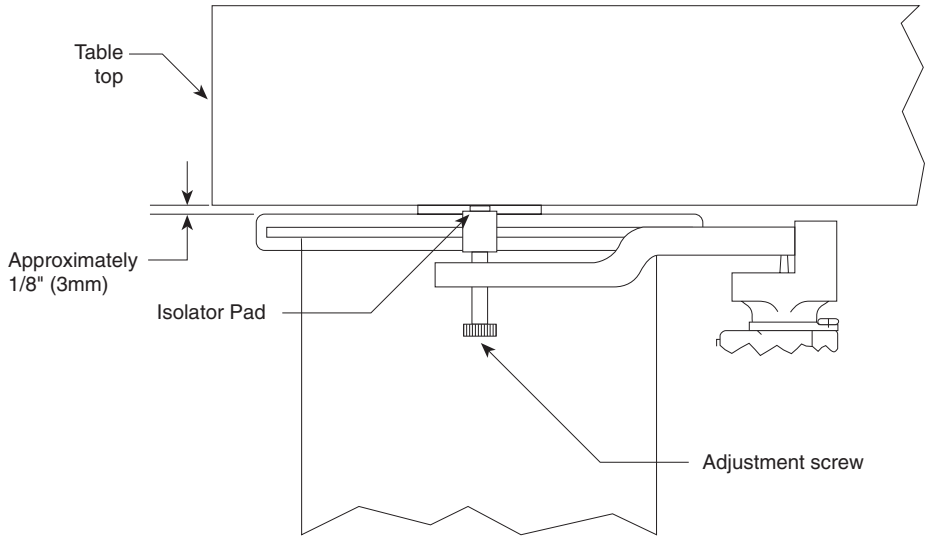


Figure 2.5 — Leveling Arm Orientation

B. Fully close (turn clockwise) the needle valves located on the leveling valves (Figure 2.6). Then open each needle valve approximately 1/8 turn for each isolator the valve supplies, i.e. the single valve at the right side of the IsoStation controls the two right side isolators and must be opened 1/4 turn.

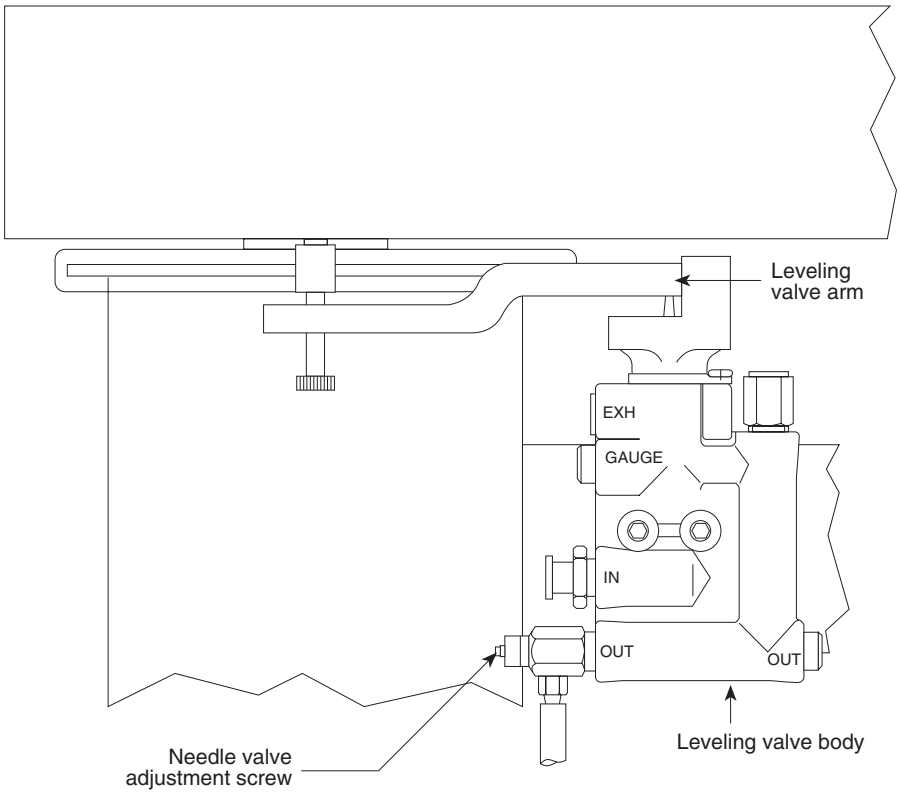


Figure 2.6 — Leveling Valve

C. Turn up the air pressure with the ARF to approximately 50 psi. Adjust the valve arm pad height until the table top is raised up (or floated) above the flange of the isolator module by 0.175 inch (4.4 mm). Use a No. 16 drill for a height reference.

CAUTION

Do not exceed the maximum allowable system pressure of 90 psi (6.3 kg/cm2).

D. If the table top rocks back and forth (or hunts) on its own, reduce the air pressure until the system is stable or close the needle valves slightly.

E. Lift and press down each corner of the table top to ensure that the approximate ±1/8 inch (±3 mm) of desired vertical travel exists. Push the top horizontally in each axis to verify that there is approximately ±1/8 inch (±3 mm) of lateral travel.

F. Once the table top is loaded to the expected working load the system air pressure should be adjusted to a level high enough so the top floats in a stable manner, relevels quickly, and maintains the 0.175 inch (4.4 mm) clearance from the leg tops.

For assistance on any of the assembly operations please contact the Newport applications staff or your nearest Newport representative at the phone numbers listed on the back of this manual.

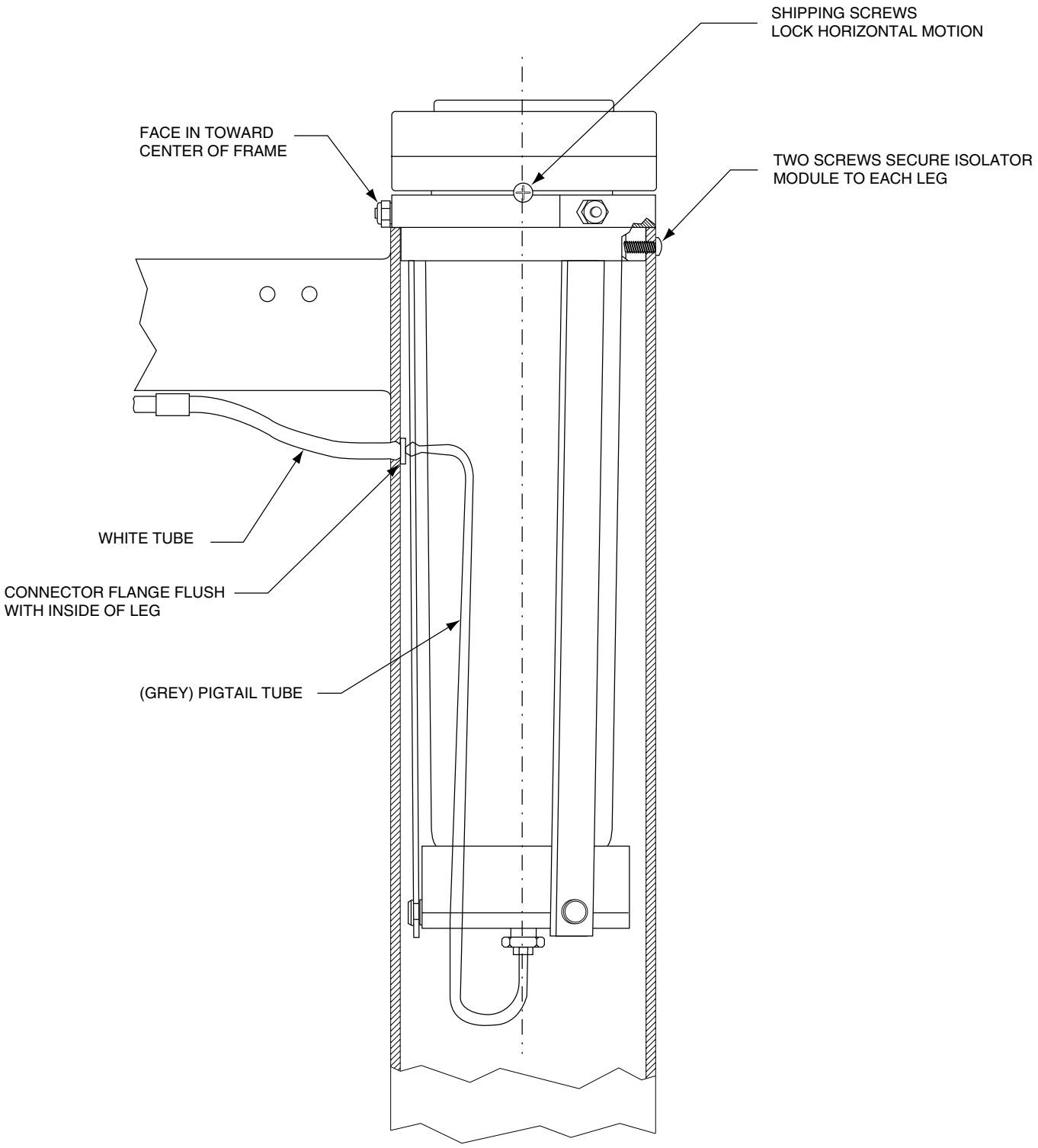


Figure 2.7 — Installing Isolator Modules

2.4 Installing Accessories

These additional assembly steps are necessary for optional items you may have ordered for your workstation.

Support Ring

WARNING

Install the support ring only after installing the table top (see Section 2.1.3).

Place the four support ring tubes (P/N 20306) in a rectangle with the holes in the ends facing up and to the inside of the rectangle. Slide into the ends of the support tubes the support arm corners (P/N 20305), making sure that the three through-holes in the ends of the tubes and the threaded holes in the corners are aligned. Install six 1/2-inch long button-head screws (P/N 3664-BA-244) in each corner.

Install the four support arm brackets (P/N 20308) , which connect the IsoStation's frame to the support ring assembly. Each bracket is mounted to the frame with two 1-inch long hex-head screws (P/N 17054). A set of five threaded holes in the frame enables the support ring to be mounted at the level of 1", 2" or 4" thick work surfaces. Use the following list to determine which of the five threaded holes to use:

4" thick work surface	Install the bolts finger-tight in the first and second holes, counting from the top
2" thick work surface	Install the bolts finger-tight in the third and fourth holes, counting from the top
1" thick work surface	Install the bolts finger-tight in the fourth and fifth holes, counting from the top

WARNING

Two people are required to install the support ring safely. Damage or personal injury may result from attempting to install the support ring alone.

Turn the support ring assembly over so that the button head screw in each corner faces down (see Figure 2.8), position each support arm corner over a bracket, and install a 1-inch long 5/16-18 hex bolt (P/N 3751-AF-248) through the bracket and into the support arm corner.

Tighten the eight bolts that connect the support brackets and the IsoStation frame. Place armrests (P/N 20012) on top of support ring.

1. P/N 20387 Front uprights
2. P/N 20385 Mount brackets
3. P/N 21252 Brace
4. P/N 20657 H-shaped rear frame
5. P/N 20380 Shelf assembly
6. P/N 20305 Support arm corners
7. P/N 20306 Support ring tubes
8. P/N 3847-BA-252 Cup pt. set screw
9. P/N 20389-01 Washer, neoprene
10. P/N 3664-BA-244 Screw, button HD
11. P/N 20308 Support arm bracket
12. P/N 3941-JO-0905-060 Flat washer
13. P/N 3751-AF-248 Hex head screw
14. P/N 3941-0829-048 Flat washer
15. P/N 17054-03 Screw, hex head (thread cutting)

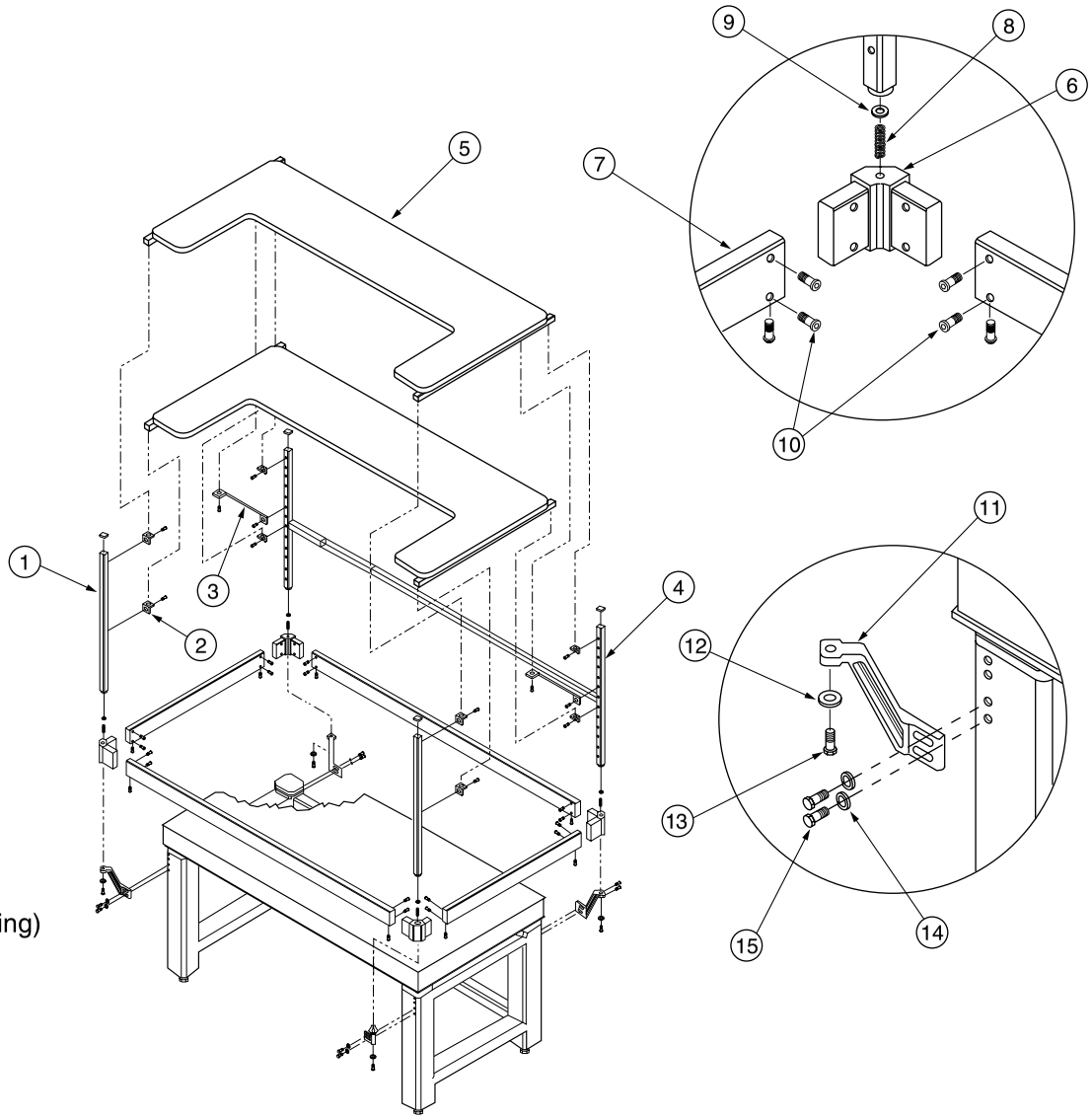


Figure 2.8 — Workstation Diagram

Support Rail

WARNING

Install the support rail only after installing the table top (see Section 2.1.3).

Place the rail (P/N 20306) with the holes in the ends facing up. Slide the support arm endpieces (P/Ns 20948 and 20949) into ends of the support ring tubes, making sure the three through-holes in each end of the tube and the threaded holes on each endpiece are aligned. Install three 1/2-inch long button-head screws (P/N 3664-BA-244) in each endpiece.

Install the two support arm brackets (P/N 20308) , which connect the support rail and the front of the IsoStation frame. Each bracket is mounted to the frame with two 1" hex-head screws (P/N 17054). A set of five threaded holes enables the support rail to be mounted at the level of 1", 2" or 4" thick work surfaces. Use the following list to determine which of the five threaded holes to use:

4" thick work surface	Install the bolts finger-tight in the first and second holes, counting from the top
2" thick work surface	Install the bolts finger-tight in the third and fourth holes, counting from the top
1" thick work surface	Install the bolts finger-tight in the fourth and fifth holes, counting from the top

Position the rail assembly over the support arm brackets with the threaded holes facing down, and install a 1-inch long hex bolt (P/N 3751-AF-248) through the bracket and into each endpiece.

Tighten the four bolts that connect the bracket and the IsoStation frame. Place armrests (P/N 20012) on top of support rail.

Casters

Casters are installed before initial frame assembly as described in 2.1.1.C. If casters are being added to an existing assembled workstation it will have pre-drilled and tapped holes on the lower leg assembly crossbraces.

Equipment Shelves

Attach the supplied mount brackets (P/N 20385) to the two front uprights (P/N 20387) and the H-shaped rear frame (P/N 20657) at the desired shelf height. Place the shelves in the uprights and attach to the mount brackets. Attach the corner braces (P/N 21252) between the rear uprights and the top shelf, using the Phillips-head screw already installed on the underside of the shelf to attach the corner brace (see Figure 2.8). Install the plastic covers in the top of each of the uprights.

WARNING

Two people are required to install equipment shelves safely. Damage or personal injury may result from attempting to install shelves alone.

Install the 5/16-inch threaded studs in the corners of the support ring, then place a rubber washer over each. Place the equipment shelf so that the uprights cover the studs and rest on the rubber washers on the tops of the support rail corners.

Instrument Rack

The instrument rack installs between the front legs of the frame and is reversible so that the operator can sit on the right or left side of the workstation. Before installing the instrument rack, check the mounting holes on the inside of the frame legs for plastic covers. Remove the covers as required.

Position the instrument rack between the front legs. Attach the instrument rack to the frame with the provided one-inch long 1/4-20 bolts. (It may be necessary to loosen the bolts on 2 braces at the rear of the frame).

Monitor Arm and Base Clamp

The monitor arm includes a base clamp to attach it to the workstation support rail or ring. To install a base clamp on the support ring, loosen the hex screw on the front face and remove the bar and knob by sliding it to the side. To reinstall the clamp, place it over the rail, center the slide bar and reinstall the hex screw. Position the clamp on the rail and then tighten the knob to lock it in place.

Cable Manager

To minimize the vibrations transmitted by electrical and supply cables to isolated equipment, mount the cable manager on the support rail or ring using a base clamp. Place cables and supply lines between the jaws of the cable manager, maintaining as much slack as possible on both sides of the Cable Manager.

Retrofit Isolators To Non-Isolated Frame (see Figure 2.7)

Remove the two screws securing the molded insert on the top of each leg and remove and discard the inserts. Save the screws to secure the isolators.

Feed the white tubing located between the control valve and the isolator through the hole in the leg and up over the edge of the leg. Insert the fitting on the 1/8 inch pigtail tube on the bottom of the isolator into the end of the 1/4 inch white tube. Back out the white tube until the flange on the connector fitting is flush with the inside of the leg.

Insert the isolators into the top of each leg, ensuring that the single nut on the side of the isolator faces toward the center of the frame. Secure the isolator using the two screws removed from the insert.

Install the leveling valves and ARF as shown in Figures 2.3, and 2.6. Plumb the air system with the tubing provided per Figure 2.4. Secure the tubing in place along the IsoStation frame using the stick-on tubing clips provided. Clean the frame with alcohol before attaching clips.

Check the system for leaks by connecting the air supply to the ARF and adjusting the pressure to 80 psi. Ensure that all leveling valve needle adjustments have been set open at least 1/8 turn. Open each leveling valve in turn by holding the leveling arms down. After 15 seconds shut off the air supply to the ARF. If the air pressure on the ARF gauge falls steadily this indicates a leak in the branch of the system controlled by the leveling valve held open. Leaks may be found by applying soapy water to all connections and checking for bubbles. Tubing-to-fitting leaks are generally caused by uneven or non-square ends on the tubing. Careful cutting of the tubing ends should remedy this problem.

Turn off the air supply at the ARF and allow the isolator pistons time to settle. Proceed to install the table top as directed in Section 2.1.3 and

continue with the instructions given in Section 2.3 for isolating the table top. For help in identifying any isolation problems see Section 4, Troubleshooting.

Static Dissipative Table Tops

Figure 2.9 indicates how to attach the special ground strap hardware to your IsoStation if it has come with the static dissipative table top.

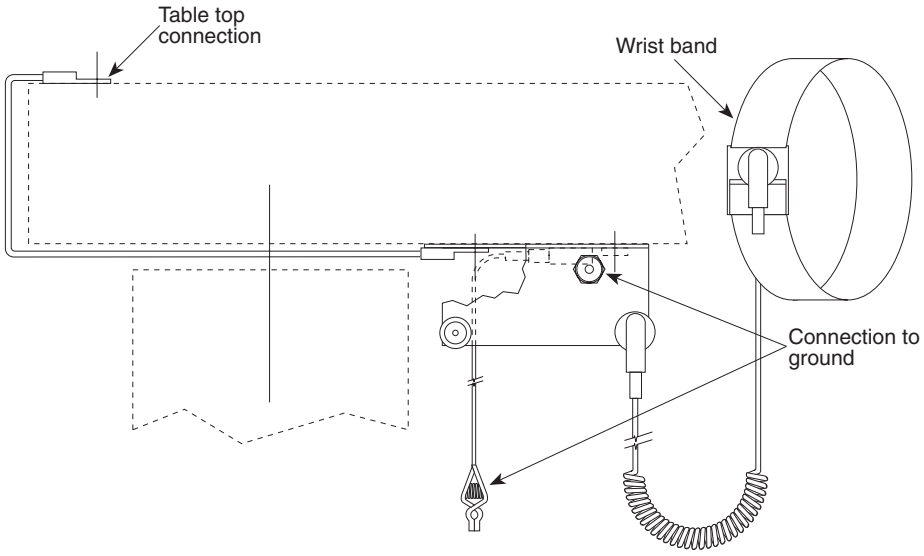


Figure 2.9 — Ground Strap Attachment

Section 3
Operation

3.1 Principles of Operation

The IsoStation pneumatic isolators are one of the best methods of vibration isolation for critical applications. They are designed and constructed to provide very effective isolation of vibrations at frequencies above 5 Hz by exhibiting the “fast roll-off” characteristics of the simple harmonic oscillator. In addition, they provide the low amplification at resonance (1.5 to 2 Hz) that is associated with the classic damped harmonic oscillator.

The basic design for a Newport pneumatic isolator with laminar flow damping is depicted in Figure 3.1. The isolated mass (for example, an optical table, or precision instrument such as a microscope) is supported by pistons which rests on a flexible rolling diaphragm. The diaphragm separates the piston from an air chamber called the “compliance chamber”. Air flowing through the laminar flow restrictor dissipates energy, reducing the amplification of the isolator at resonance.

To achieve high performance horizontal isolation the IsoStation design has incorporated a three point support pendulum system for each of the isolator units. This approach renders horizontal isolation performance that is comparable to that in the vertical direction and results in a work platform that will provide the highest level of isolation from unwanted vibrations in any direction.

3.2 Performance Adjustments

Once the system is assembled and the table top is floating it is possible to make minor performance adjustments to the isolation system to suit the individual users needs. This involves adjustments to the system air pressure, leveling arms, and needle valves.

A. Stabilizing high center-of-mass loads: Working loads on the table which have a relatively high center-of-mass (approximately 1/2 times the shortest table dimension above the working surface) may make the system more difficult to stabilize. Operating at a lower system pressure will improve stability and tend to reduce the rocking or hunting.

B. Improving leveling response times: If the system is stable, it is possible to improve the releveling response time by increasing the system pressure. This is desirable if moving components are regularly disturbing the working surface.

C. Fine tuning the leveling valves: Further performance adjustments can be made by using the needle valve on each leveling valve (discussed in Section 2.3.B). If faster releveling is desired open all the needle valves in 1/8 turn increments (counter-clockwise) until the required releveling time is achieved. All needle valves should always be opened the same for each isolator they control. See Section 2.3.B. If instability is more of a concern and it is desirable to reduce the potential for the top to oscillate or hunt it is necessary to close the needle valves as much as possible, without closing them completely.

   Experimentation will help determine the best settings for the needle valves, the optimal ARF pressure, and the correct leveling arm position to best serve each particular application.

3.3 Maintenance

3.3.1 Cleaning

To clean any of the optional work surfaces (either 400 series stainless steel or high pressure laminate) spray household cleaner, such as “409” or “Fantastic”, on a clean cloth and wipe down. Avoid using abrasive cleaners since they will foul the mounting holes and also damage the laminate tops.

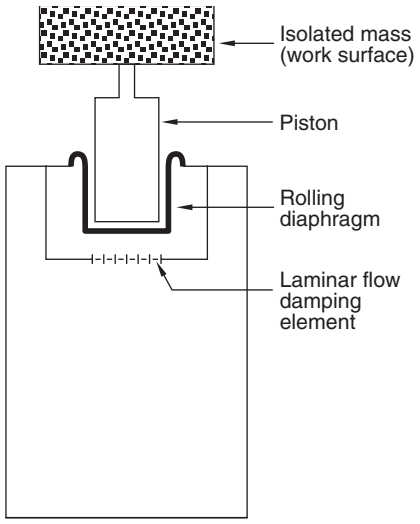


Figure 3.1 — Newport Laminar Flow Damping Isolator Design

Section 4
Troubleshooting

4.1 Poor Isolation Performance

4.1.1 Table Top Does Not Lift Up (not Floating)

A. The supply pressure from the ARF valve may be insufficient for the working load level on the table. Increase the external supply or the ARF setting until the table floats. If the ARF valve reads 75 psi and the table still has not raised off the legs check to see if the maximum load rating has been exceeded. Large off-center loads will require higher than normal pressure to float the table. If one corner continues to be difficult to float, attempt to reposition the loads on the table to achieve a more uniform distribution as near the center as possible.

B. Another possible cause for one side, or one corner, not becoming elevated might be “over-adjustment” on the opposite side or corner. To remedy this, simply adjust the leveling arms on the corners that are floating to bring the table top down in these locations. This should then allow the opposite side to be raised up through further leveling arm and system pressure adjustments.

C. Check to see if all the air lines are connected properly and there are no air leaks.

D. Make sure the needle valves are not completely closed on the leveling valves. Turn them counterclockwise 1/8 turn if they appear to be closed.

4.1.2 Other Causes of Poor Isolation

A. Vibration may be transmitted to the table due to direct physical contact of equipment mounted on the top with external vibration sources.

B. Equipment mounted to the table may be vibrating at a resonant frequency which is disturbing other components that may be sensitive to these frequencies. Improving the rigidity of the attachment mechanism used for the components may help this situation. Otherwise, consider removing the vibration source from the table top.

4.2 Oscillations or “Hunting”

This is a high center-of-mass stability problem and can be improved by reducing the ARF pressure and/or slightly closing the three leveling valve needle adjustments (see Section 3.2.D).

4.3 Releveling the System

If the workstation has been moved to a new location it may be necessary to relevel the frame to ensure proper performance. Obtain a standard bubble level if the original one provided cannot be located. Follow the instructions in Section 2.2 to level the frame.

4.4 Water in the Air Supply

Most compressed air systems contain some water vapor. Water may then build up in the ARF filter and prevent proper air supply to the IsoStation. Accumulated water may be removed by turning the stem at the bottom of the filter.

Section 5
Factory Service

5.1 Obtaining Service

To obtain information concerning factory service, contact Newport Corporation or your Newport representative. Please have the following information available.

1. Model number.
2. Purchase order number.
3. Complete description of the problem.

If components are to be returned to Newport Corporation, you will be given a Return Number, which you should reference in your shipping documents.

Please fill out the service form on the next page and have the information ready when contacting Newport Corporation. Include the completed service form with any parts or components that are returned.

5.2 Service Form

Newport Corporation
U.S.A. Office: 949/863-3144
FAX: 949/253-1800

Name _____ RETURN AUTHORIZATION # _____

Company _____ (Please obtain prior to return of item)

Address _____

Country _____ Date _____

P.O. Number _____ Phone Number _____

Item(s) Being Returned:

Model # _____ Serial # _____

Description _____

Reason for return of goods (please list any specific problems) _____

Please complete the below, as appropriate.

Describe problem _____

(Attach additional sheets as necessary).

Newport Corporation

Worldwide Headquarters

1791 Deere Avenue

Irvine, CA 92606

(In U.S.): 800-222-6440

Tel: 949-863-3144

Fax: 949-253-1680

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Visit Newport Online at: **www.newport.com**

Certificate No.: FM 27207

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P/N 21413-01, Rev. UA
IN-08951 (03-00)
Printed in the USA