

Zero-Gravity® Radiation Protection System Preventative Maintenance Checklist

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Important Information

Read this Manual Before Starting to Work!

This information is necessary for the safe and efficient operation of the equipment. The activity provided in this document should only be performed by TIDI Products authorized personnel. 84000 User Guide provides additional information for activity to be completed prior to each time the system is used.

This document should be stored with, or in the immediate vicinity, of the unit.

Zero-Gravity Document List

- 81000 – Preventative Maintenance Checklist
- 82000 – Uncrating Guide
- 83000 – Installation Guide
- 84000 – User's Guide

Preventative Maintenance Checklist

This document is intended to provide guidance for the proper check and inspection of the Zero-Gravity systems and Lead Acrylic Shield unit. All inspection activity should be performed while the system is not in use.

Particularly helpful information is italicized.

- *For additional information contact TIDI Products service at +1.920.751.4300.*

Maintenance

The Zero-Gravity systems and Lead Acrylic Shield unit require annual preventative maintenance, inspection, and general cleaning throughout their life. Refer to the system checklist sections of this document for preventative maintenance information.



Contact a TIDI Products authorized representative or TIDI service if parts replacements are required.



Contact a TIDI Products authorized representative or TIDI service for additional information regarding preventative maintenance.

Zero-Gravity® Radiation Protection System Preventative Maintenance Checklist

Zero-Gravity® Radiation Protection System is a registered trademark of TIDI Products.

United States Patents 7,973,299; 8,207,516; 8,558,204; 8,598,554 B2; 8,925,553; 8,933,426 For U.S. and Foreign Patent information, see [//go.tidiproducts.com/patents](http://go.tidiproducts.com/patents)

Additional Patents Pending

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Pursuant to continuous product improvement, TIDI Products reserves the right to change the equipment design and technology at any time.

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Within the bounds of the legal requirements, the manufacturer is only responsible for the technical safety characteristics of this apparatus if the maintenance, repairs, and modifications to this apparatus are performed by TIDI Products or an approved TIDI Products representative.

The Zero-Gravity® Radiation Protection System can also be referred to as Zero-Gravity or Zero-Gravity System.

ZG System Information

The preventative maintenance instructions in this document refer to the Zero-Gravity® Radiation Protection System with the following identification:

- **Manufactured for:** TIDI Products, LLC
- **Product name:** Zero-Gravity® Radiation Protection System
- **Type designation:** Floor Unit (ZGM-6-5H), Hinged Swing Arm (ZGHSA), Monorail Hinged Swing Arm (ZGCM- HSA), Monorail 48 (ZGCM-48) or 66 inches (ZGCM-66)
- **Serial Number:** See Identification Tag (Figure 37, 38, 39, 40, & 41)
- **Sterile covers manufactured by:** TIDI Products
- **Authorized representatives:** See Declarations of Conformity.
- **Manufacture date:** See Identification Tag (Figure 37, 38, 39, 40, & 41)
- Conforms to Annex II, Personal Protective Equipment (EU) Regulation 2016/425 Category III, and as brought into UK law and amended.



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Milton Keynes, MK5 8PP UK

Intended Use

Zero-Gravity® Radiation Protection System

See 84000 Users Guide for **Intended Use**

Leaded Acrylic Shield

See 32577 Installation and Users Guide for **Intended Use**

Safety Liability

TIDI Products assumes no liability for the safe and reliable operation of Zero-Gravity® Radiation Protection System where:

- Installation, modifications, or repairs are not performed by TIDI Products technicians or people authorized by TIDI Products.
- Authorized TIDI Products replacement parts are not used.
- Authorized TIDI Products sterility protection accessories are not used.
- The Zero-Gravity has not been installed or setup for a procedure in accordance with the respective system Installation and User's Guide, or this document.
- The Zero-Gravity is used in a manner other than its intended use as stated above.

Safety Warning

- Repairs may only be performed by TIDI Products authorized personnel.
- The weight of Body Shield assembly suspended on the Balancer must not be altered in any way.
- A thorough inspection of equipment should be performed, after each service call, prior to releasing the equipment for use.

Safety Symbols

Important information in this document is marked with symbols and keywords. Keywords such as **WARNING**, **CAUTION**, **Material Disposition Notice**, or **ATTENTION** indicate the level of risk involved. The symbols emphasize the message visually.

	<p>WARNING! Indicates a potentially hazardous situation, which could result in a serious risk of injury or death to patient or operator and or damage to equipment or property.</p>
	<p>CAUTION! Indicates a potentially hazardous situation, which could result in a minor or moderate risk of injury to patient or operator and or damage to equipment or property.</p>
<p>ATTENTION!</p>	<p>(Without safety alert symbol) Indicates a situation that may result in damage to equipment or property.</p>
	<p>Material Disposal Notice Indicates the need to follow local regulations for the proper disposal of materials containing lead.</p>
	<p>NOTE <i>Useful additional information and tips.</i></p>

Zero-Gravity System Preventative Maintenance Checklist:

For use with ZGM-6-5H, ZGHSA, ZGCM-HSA, ZGCM-48, and ZGCM-66 systems.

Task Name	System						Frequency
	All	ZGM-6-5H	ZGHSA	ZGCM-HSA	ZGCM-48	ZGCM-66	Certified Tech Annually
Cable Inspection	x						x
Body Shield Rotation Inspection	x						x
Body Shield Vertical Travel Inspection	x						x
Body Shield Vertical Drifting Inspection	x						x
Adjusting the Body Shield Vertical Tension (AR)	x						AR
Face Shield Inspection	x						x
Hinge Inspection	x						x
Velcro Inspection	x						x
End Stop Cap Hardware Inspection	x						x
Magnetic Docking Station Inspection	x						x
Body Shield Connector Hardware Inspection	x						x
Castor Inspection		x					x
Boom Arm Mounting Hardware Inspection		x					x
Moving Parts Inspection - Floor System		x					x
Moving Parts Inspection - Ceiling Systems			x	x	x	x	x
Collision Inspection			x	x	x	x	x
Boom Arm to Drop Tube Hardware Inspection					x	x	x
Boom Arm to Drop Tube Hardware Inspection				x			x
Toe Clamp Mounting Bolt and Cover Inspection				x	x	x	x
Drop Tube Carriage Mount Hardware Inspection					x	x	x
Boom Arm Orientation Inspection					x	x	x
Drop Tube Carriage Mount Hardware Inspection				x			x
Align Friction Brake and Adjust Bearing Tension			x	x			x

*Larger version of table is available at the end of the document; copy as necessary for records

Zero-Gravity Accessory Preventative Maintenance Checklist:

For use with ZGCMRS accessories.

<i>Task Name</i>	<i>System</i>	<i>Frequency</i>
	All	Certified Tech Annually
Adjusting Ball Joint Tension	X	X
Adjusting the Arm Assembly	X	X
Leaded Acrylic Integrity Inspection	X	X
Moving Parts Inspection	X	X
Drop Tube Carriage Mount Hardware Inspection	X	X
Leaded Acrylic Hardware Inspection	X	X
Swivel Arm Hardware Inspection	X	X

*Larger version of table is available at the end of the document; copy as necessary for records

Annual Inspections

Cable Inspection (All Systems)

Cable Replacement

1. The balancer cable used to suspend the body shield should be inspected once annually by TIDI Products authorized personnel.
2. As a result of long-term use, the cable should be replaced after an extended period of time to reduce the risk of fatigue failure. The replacement interval is based on the design features of your system. Refer to the section titled **System Feature (Body Shield Balancer Swivel)** on page 54 to determine if your system is equipped with a body shield balancer swivel.
 - a. For systems that do not contain the body shield balancer swivel feature, it is recommended to replace the cable once every 4 years. Frequent use of the system and / or damage may require more frequent replacement of the cable.

Cable Inspection



WARNING! RADIATION HAZARD

The Body Shield must be handled with care to avoid damage to the Body Shield protective lead material. If the Body Shield is damaged, it must be inspected according to the Body Shield and Face Shield Fluoroscopy Inspection section of the User's Guide (TIDI Products document 84000).



WARNING! INJURY RISK-CABLE HAZARD

Excessive rotation of Body Shield may cause Balancer Cable to break. The Body Shield must be lowered and allowed to unwind after each use, in an unlocked position. Annual inspections must be performed on the cable. Cables must be replaced if there are signs of wear.

1. While the system is not in use, remove the body shield from its fixed position inside the balancer. Lower the body shield until the bottom of the shield is approximately 6 inches from the ground.
2. With the body shield lowered, use a Philips Screwdriver to remove the (8) 10-32 .50 SS 18-8 panhead screws from the balancer cover removing both cover pieces. (Figure 1)
3. Figure 2 is an example of a new cable for comparison.
4. Inspect the visible cable surfaces for any abnormalities. Abnormalities may include:
 - a. Damage to the outer coating of the cable (Figure 3) (Figure 4) (Figure 5)
 - b. Color variation from one part of the cable to the other (Figure 3)
 - c. Bulging areas (dimples and / or blisters) of the cable (visual or by running fingers along the cable) (Figure 4) (Figure 5)
 - d. Stretched areas of the cable (visual or by running fingers along the cable) (Figure 5)
5. Put the cover pieces back in place with the (8) screws after inspection.

- 6. If any abnormalities are observed, the cable should be replaced. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.

Figure 1

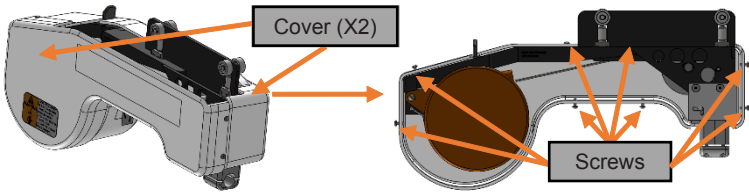


Figure 2: New Cable

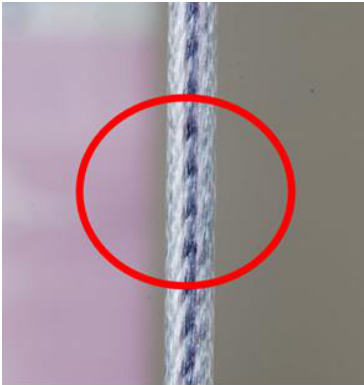


Figure 3: Damaged Cable

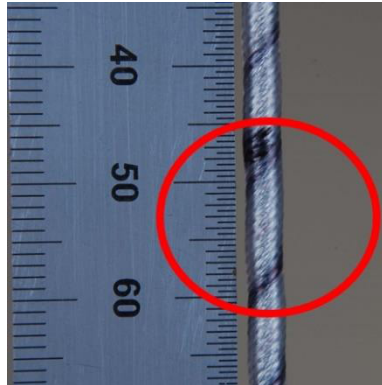


Figure 4: Damaged Cable (Dimple & Blister)

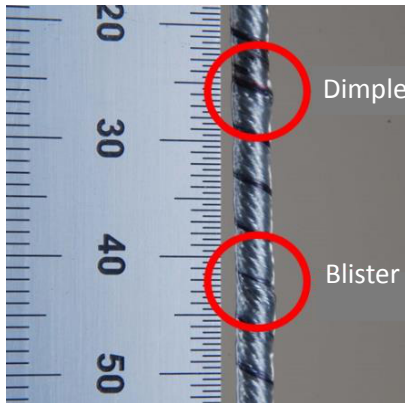
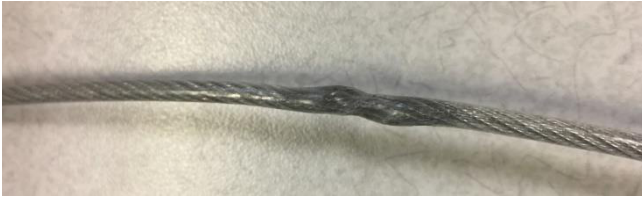


Figure 5: Damaged Cable



(Body Shield Balancer Swivel) Body Shield Rotation Inspection (All Systems)

Body Shield Balancer Swivel Replacement

1. The body shield balancer swivel component used to connect the body shield to the balancer cable should be inspected once annually.
2. Not all systems are equipped with a body shield balancer swivel. Refer to the section titled **System Feature (Body Shield Balancer Swivel)** on page 54 to determine if your system is equipped with a body shield balancer swivel.
3. As a result of long-term use, the body shield balancer swivel may require replacement after an extended period of time. Complete inspection to determine if replacement of this component is required.

Body Shield Balancer Swivel Inspection

WARNING! RADIATION HAZARD



The Body Shield must be handled with care to avoid damage to the Body Shield protective lead material. If the Body Shield is damaged, it must be inspected according to the Body Shield and Face Shield Fluoroscopy Inspection section of the User's Guide (TIDI Products document 84000).

WARNING! INJURY RISK-CABLE HAZARD



Excessive rotation of Body Shield may cause Balancer Cable to break. The Body Shield must be lowered and allowed to unwind after each use, in an unlocked position. Annual inspections must be performed on the cable. Cables must be replaced if there are signs of wear.

WARNING! INJURY RISK-CABLE DAMAGE



Body Shield Balancer Swivel Inspection may only be completed on units containing the body shield balancer swivel assembly. Performing this inspection on a system without the body shield swivel assembly could cause irreparable damage to the balancer cable. Ensure your system contains the body shield balancer swivel prior to executing this inspection. Refer to the section titled **System Feature (Body Shield Balancer Swivel)** on page 54 to determine if your system is equipped with a body shield balancer swivel.

1. This inspection is to be performed only on units with a body shield connected to a swivel assembly. Performing this inspection on a system without the body shield swivel assembly could cause irreparable damage to the balancer cable. Ensure your system contains the body shield balancer swivel prior to executing this inspection.
2. While the system is not in use, remove the body shield from its fixed position inside the balancer. Lower the body shield until it is in a position where it is easily maneuvered.
3. Rotate the body shield clockwise and counterclockwise for a minimum of three (3) complete 360° rotations in each direction.
4. The body shield should rotate smoothly with minimal resistance. A single point of resistance through a full 360° rotation is considered acceptable as long as the resistance does not prevent full rotation. Replace the body shield balancer connector assembly if any additional motion issues are detected. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
5. Through each rotation, observe the cable to ensure the cable stays in a fixed position and does not rotate with the body shield. A mark or a piece of tape can be placed on the cable to improve the visual observation indicating if the cable is rotating with the body shield or remaining stationary.
6. If the balancer cable is observed rotating with the body shield, the cable should be inspected for damage and the body shield connector fixed / replaced by authorized personnel. Replace the body shield balancer connector assembly if the cable is rotating with the body shield. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.

Body Shield Vertical Travel Inspection (All Systems)

1. While the system is not in use, remove the body shield from its fixed position inside the balancer. Lower and raise the body shield to inspect for motion issues. The body shield should move freely up and down.
2. Adjustments to the balancer cable tension may be necessary to address any issues. Refer to **Adjusting the Body Shield Vertical Tension** on page 14 for guidance on addressing the drifting of a body shield.
3. If additional support is needed, contact TIDI Technical Service using the provided contact information.



WARNING! RADIATION HAZARD

The Body Shield must be handled with care to avoid damage to the Body Shield protective lead material. If the Body Shield is damaged, it must be inspected according to the Body Shield and Face Shield Fluoroscopy Inspection section of the User's Guide (TIDI Products document 84000).

Body Shield Vertical Drifting Inspection (All Systems)

1. While the system is not in use, remove the body shield from its fixed position inside the balancer. Lower the body shield to the standard operating position and release. Observe the body shield for any abnormal drifting up or down.
2. Refer to **Adjusting the Body Shield Vertical Tension** on page 14 for guidance on addressing the drifting of a body shield.
3. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Adjusting the Body Shield Vertical Tension (All Systems)

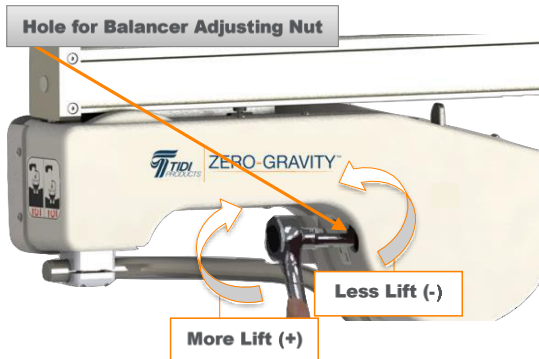


CAUTION! EQUIPMENT DAMAGE RISK

Attempting to adjust the Balancer assembly while the cable locking screw is locked will cause permanent internal damage to the Balancer and inability to balance the Body Shield.

1. With body shield secured to balancer cable, pull shield down 6-8 inches (15 – 20 centimeters) and release. If shield stays in position, no further action is required.
2. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
3. With 17 millimeters socket, adjust balancer by turning nut clockwise (+) for more lift and counterclockwise (-) for less lift (Figure 6).
4. Move Body Shield up and down several times allowing Balancer spring to adjust to new settings.
5. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 6



Face Shield Inspection (All Systems)

1. While the system is not in use, remove the body shield from its fixed position inside the balancer. Lower the body shield until the face shield is low enough for visual inspection with the leaded apron off the ground. Use caution when lowering the body shield to prevent damage to the leaded apron. A ladder may be required for inspection to prevent risk of damage to the leaded apron.
2. Visually inspect each individual face shield panel for cracks, scratches, or other surface imperfections that would cause loss of visibility or functionality of the shields.
3. Visually inspect the interface between each of the shields to inspect for gaps.
4. Ensure the brackets holding the face shield panels together are in place and secured. Ensure each of the 8-32 X .50 18-8 SS screws are in place and secured.
5. Replace the leaded acrylic face shield panels if any of the abnormalities are observed. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
6. If additional support is needed, contact TIDI Technical Service using the provided contact information.



Material Disposal Notice: Lead

Follow local regulations on proper lead disposal.

Hinge Inspection (All Systems)

Hinge Replacement

1. The Zero-Gravity system body shield contains hinges allowing for the proper positioning of the leaded apron around the user. (Figure 7)
2. As a result of long-term use, the hinges may require replacement after an extended period of time to ensure the system functions as intended. Complete inspection to determine if replacement of either of the hinges is required.

Hinge Inspection

1. While the system is not in use, locate the hinges carefully exposing the hinges for inspection. (Figure 7)
2. Inspect each hinge and its components for any damage such as cracking or broken components / hardware.
3. Rotate the components back and forth about the hinge axis to inspect for motion obstructions or for damage. (Figure 8)
4. Replace the hinge if any damage or motion abnormalities are observed. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
5. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 7

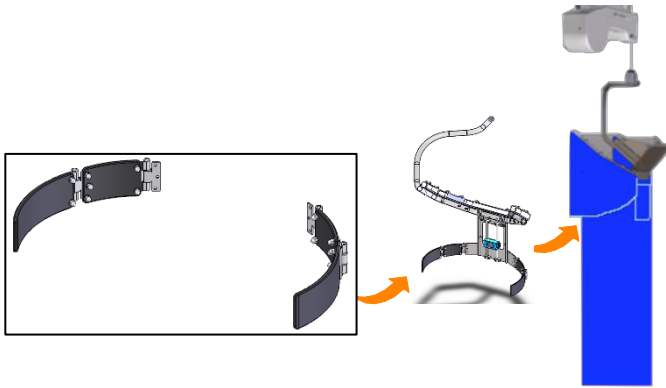
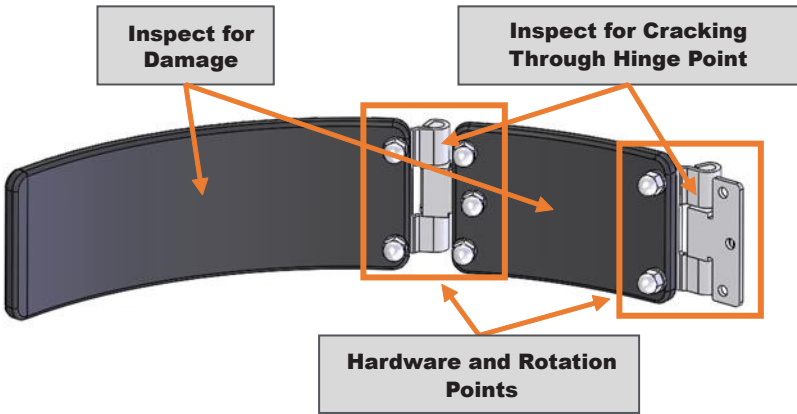


Figure 8



Velcro Inspection (All Systems)

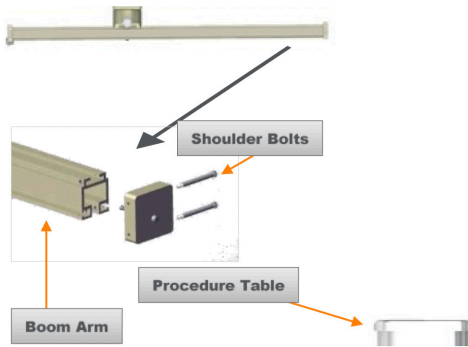
1. While the system is not in use, remove the body shield from its fixed position inside the balancer. Lower the body shield until the top of the leaded apron is low enough for visual inspection with the leaded apron off the ground. Use caution when lowering the body shield to prevent damage to the leaded apron. A ladder may be required for inspection to prevent risk of damage to the leaded apron.
2. Inspect each section of Velcro for damage, cleanliness, functionality, and adherence to the body shield frame.
3. Replace any section of Velcro if abnormalities are observed following the instructions provided within the Velcro replacement kit.
4. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.

5. If additional support is needed, contact TIDI Technical Service using the provided contact information.

End Stop Cap Hardware Inspection (All Systems)

1. Check each of the (2) 5/16-18 x 2-3/4 inches long End Stop Cap shoulder bolts for each End Stop Cap equipped on your system to ensure they are installed and tight. (Figure 9)
2. For ceiling mounted systems, the End Stop Caps are located at both ends of the boom arm. The floor system contains only one End Stop Cap.
3. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
4. If additional support is needed, contact TIDI Technical Service using the provided contact information.

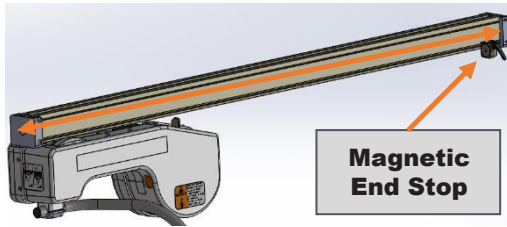
Figure 9



Magnetic Docking Station Inspection (All Systems)

1. While the system is not in use, move the balancer along the boom away from the magnetic docking station. (Figure 10)
2. Unlock the docking station. (Figure 10)
3. Move the docking station along the boom, lock the docking station at several positions to ensure the component is functioning as intended.
4. Move the docking station back to its original position locking it in place. Move the body shield back to the docking station ensuring the balancer remains in place against the docking station.
5. Prior to each use, move the docking station to the desired location and lock in place inspecting for issues with the locking mechanism.
6. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
7. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 10



Body Shield Connector Hardware Inspection (All Systems)

1. While the system is not in use, check each of the (4) body shield connector screws to ensure they are secured and torqued to 55 inch-pounds (4.5 foot-pounds) (6.2 Newton- meters). (Figure 11)
2. Inspect the body shield to ensure the body shield is still hanging vertically and not at an angle (tilted – Figure 12). To adjust the body shield positioning if tilted, loosen the (4) body shield connector screws to adjust the body shield frame positioning. While making adjustments, make sure the body shield is secured to prevent detachment from the body shield connector. Torque to 55 inch-pounds (4.5 foot-pounds) (6.2 Newton- meters).
3. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
4. If additional support is needed, contact TIDI Technical Service using the provided contact information.



Tighten screws in opposite corners (one rotation each) until tight.

ATTENTION!

Ensure Body Shield assembly is tightly secured in balancer connector and Body Shield is hanging vertically (not tilted).

Figure 11

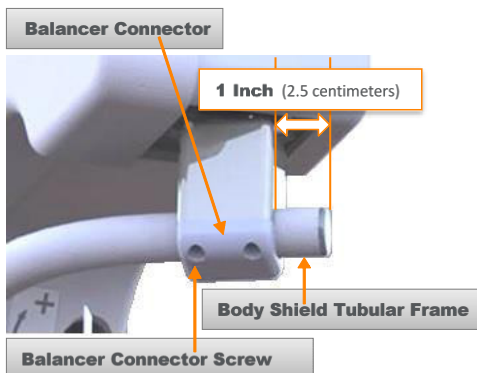


Figure 12



System Specific Inspections

Caster Inspection (ZGM-6-5H)

Caster Replacement

1. The Zero-Gravity floor system contains several casters (wheels) allowing for the proper positioning of your system for use. The casters are also equipped with brakes to lock the casters in place.
2. As a result of long-term use, the casters may require replacement after an extended period of time to ensure the system functions as intended. Complete inspection to determine if replacement of any of the casters is required.

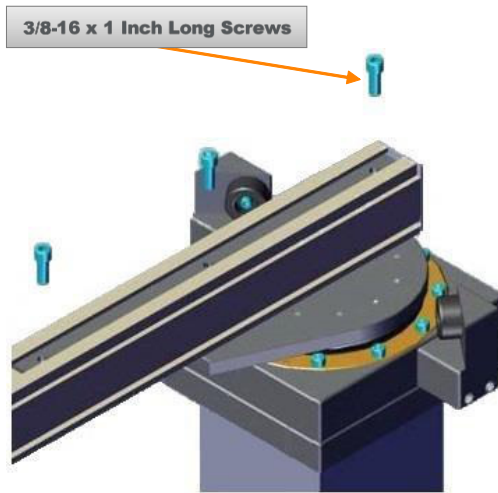
Caster Inspection

1. While the system is not in use, move the system to an open space where there is ample room to manipulate the base of the system without risk of colliding with other equipment.
2. Move the system in each direction to ensure the casters are functioning as intended and rolling smoothly across a smooth surface.
3. Apply the lock for each caster equipped on the Zero-Gravity floor system.
4. With the brakes engaged, inspect each caster for debris.
5. Apply force to the ZG system in an attempt to move the system. Apply minimal force to move the system in an effort to prevent unintended damage to the casters and brakes.
6. Casters exhibiting issues with rolling or braking should be replaced.
7. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
8. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Boom Arm Mounting Hardware Inspection (ZGM-6-5H)

1. While the system is not in use, use a ladder to access the top of the Zero-Gravity floor system directly above the vertical column.
2. Check each of the (3) 3/8-16 x 1-inch long screws connecting the boom arm to the boom arm mount to ensure they are in place and tight. (Figure 13)
3. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
4. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 13



ATTENTION! Ensure screws are tightened securely.

Moving Parts Inspection (ZGM-6-5H)

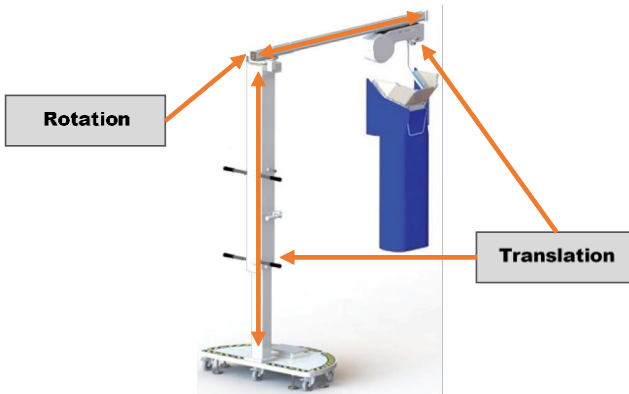
Rotational / Translational Motion Parts Replacement

1. The Zero-Gravity systems contain several components allowing for the movement (rotational and translational motion) of other components.
2. As a result of long-term use, these components may require replacement after an extended period of time to ensure the system functions as intended. Complete inspection to determine if replacement of any of the components is required.

Rotational / Translational Motion Parts Inspection

1. While the system is not in use, move the balancer along the boom to inspect for motion issues. The balancer should move freely with minimal interruption.
2. Reference the figure below for identification of applicable translational and rotational components for your system. (Figure 14: ZGM-6-5H)
3. Rotate the boom arm about the vertical column to inspect for motion issues. The boom arm should rotate freely with minimal interruption.
4. Unlock the upper column and move the upper column both up and down to inspect for motion issues. The upper column should move freely with minimal interruption.
5. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
6. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 14: ZGM-6-5H



Moving Parts Inspection (ZGHSA | ZGCM-HSA | ZGCM-48 | ZGCM-66)

Rotational / Translational Motion Parts Replacement

1. The Zero-Gravity systems contain several components allowing for the movement (rotational and translational motion) of other components.
2. As a result of long-term use, these components may require replacement after an extended period of time to ensure the system functions as intended. Complete inspection to determine if replacement of any of the components is required.

Rotational / Translational Motion Parts Inspection

1. While the system is not in use, move the balancer along the boom to inspect for motion issues. The balancer should move freely with minimal interruption.
2. Reference the figures below for identification of applicable translational and rotational components for your system. (*Figure 15: ZGCM-48 & ZGCM-66*) (*Figure 16: ZGHSA*) (*Figure 17: ZGCM-HSA*)
3. Rotate the boom arm about the drop tube to inspect for motion issues. The boom arm should rotate freely with minimal interruption.
4. Move the system along the monorail to inspect for motion issues, if applicable. The system should move freely with minimal interruption.
5. Unlock the boom and slide the boom back and forth to inspect for motion issues. The boom should move freely with minimal interruption.
6. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
7. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 15: ZGCM-48 & ZGCM-66

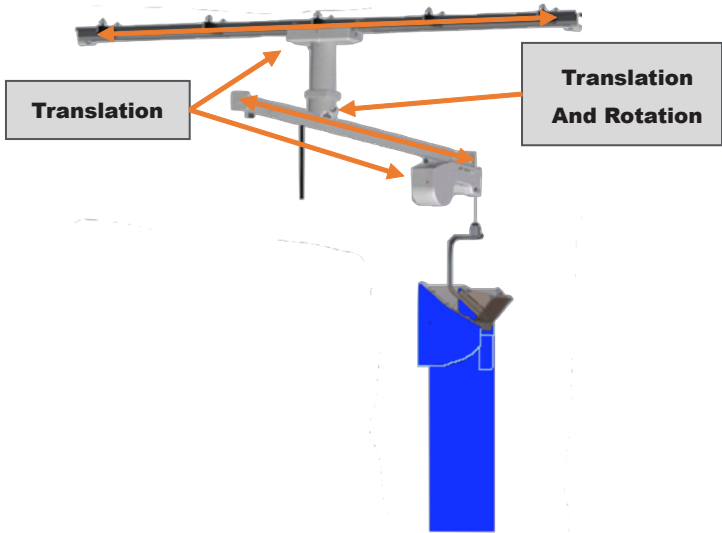


Figure 16: ZGHSA

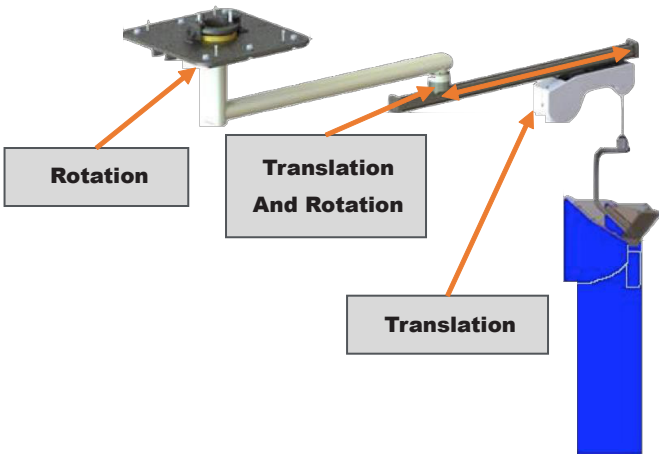
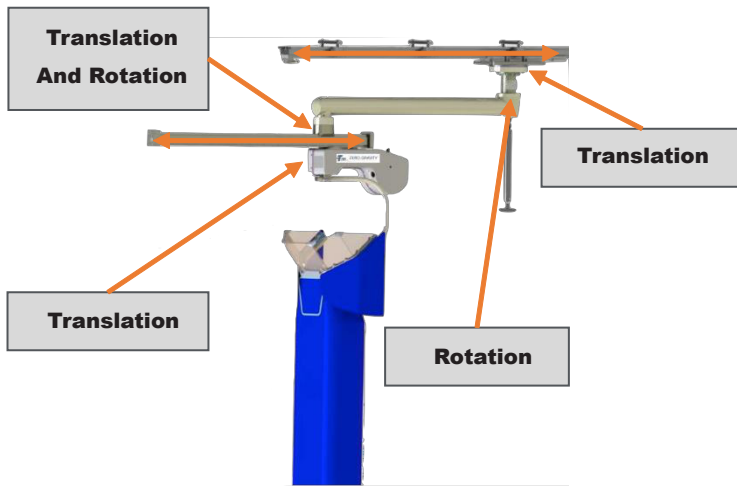


Figure 17: ZGCM-HSA



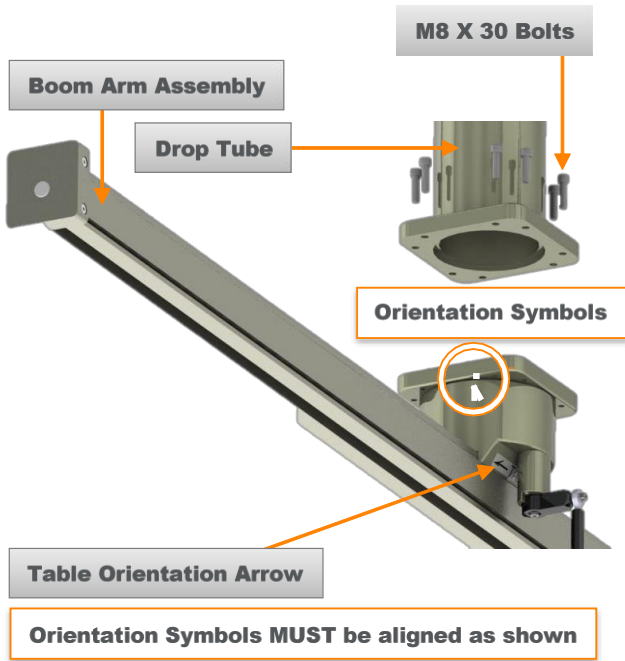
Collision Inspection (ZGHSA | ZGCM-HSA | ZGCM-48 | ZGCM-66)

1. While the system is not in use, slowly move the system along the monorail observing the air space required for the system. Inspect for any obstructions with other equipment to identify collision hazards. (Figure 15: ZGCM-48 & ZGCM-66) (Figure 16: ZGHSA) (Figure 17: ZGCM-HSA)
2. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Boom Arm to Drop Tube Hardware Inspection (ZGCM-48 | ZGCM-66)

1. While the system is not in use, check each of the (8) M8 X 30 millimeter screws attaching the Boom Arm to the drop Tube to ensure they are in place and torqued to 350 inch-pounds (29 foot-pounds) (39 Newton-meters) using a calibrated inspection tool. (Figure 18)
2. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
3. If additional support is needed, contact TIDI Technical Service using the provided contact information.

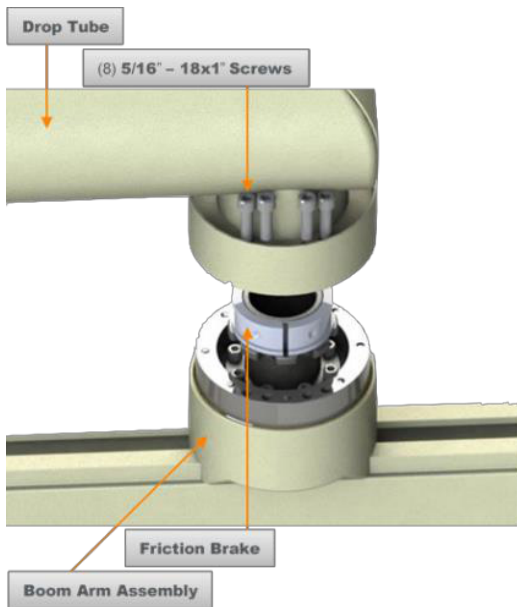
Figure 18



Boom Arm to Drop Tube Hardware Inspection (ZGCM-HSA)

1. While the system is not in use, check each of the (8) 5/16-18 X 1-inch long screws attaching the Boom Arm to the drop Tube to ensure they are in place and torqued to 425 inch-pounds (35 foot-pounds) (48 Newton-meters) using a calibrated inspection tool. (Figure 19)
2. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
3. If additional support is needed, contact TIDI Technical Service using the provided contact information.

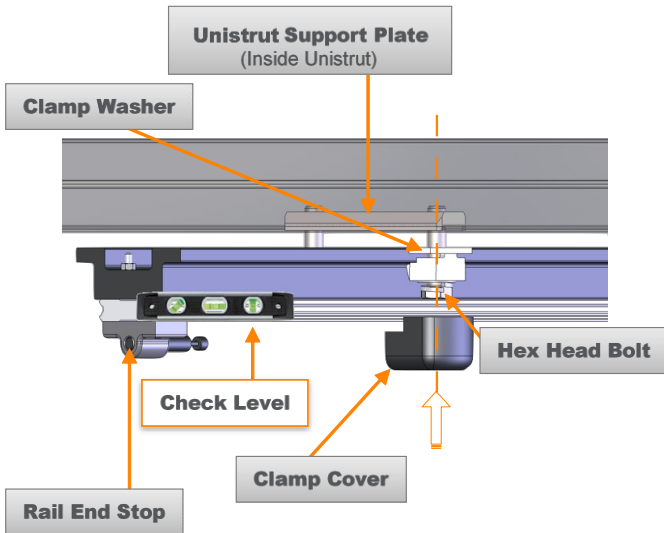
Figure 19



Toe Clamp Mounting Bolt and Cover Inspection (ZGCM-48 | ZGCM-66 | ZGCM-HSA)

1. While the system is not in use, remove the toe clamp covers.
2. Check each toe clamp mounting bolt to ensure it is in place and torqued to 100 foot-pounds (135 Newton-meters) using a calibrated inspection tool. (Figure 20)
3. Replace any missing to clamp mounting bolts and tightening all to 100 foot-pounds (135 Newton-meters). Ensure bolts are tightened to 100 foot-pounds (135 Newton-meters) using a calibrated inspection tool. (Figure 20)
4. Put the toe clamp covers back into place ensuring they are securely snapped in.
5. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
6. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 20



Drop Tube Carriage Mount Hardware Inspection (ZGCM-48 | ZGCM-66)

1. While the system is not in use, remove the (6) 10-32 X ½-inch-long button head screws from the carriage cover removing the carriage cover with the screws. (Figure 22)
2. Check each of the (12) M8 X 20-millimeter bolts connecting the drop tube to the Carriage(s) to ensure they are in place and torqued to 269 inch-pounds (22.4 foot-pounds) (30 Newton-meters) using a calibrated inspection tool. (Figure 21)
3. Once complete, attach the Carriage Cover using (6) 10-32 X ½-inch-long button head screws. Check each of the (6) 10-32 X 1/2-inch-long panhead Phillips screws to ensure they are in place and secured. If the optional bumper was installed during or after installation, ensure it is secured in place on the side of the drop tube that faces the Monitor Bridge. (Figure 22)
4. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 21

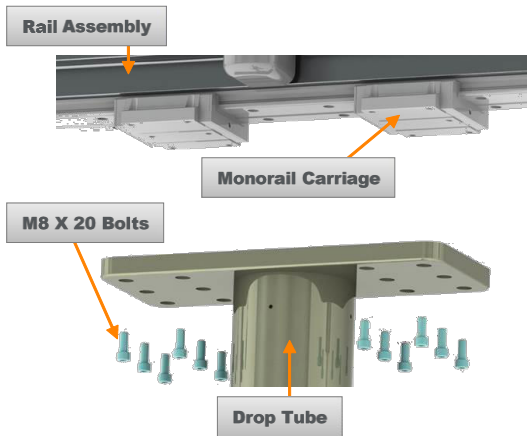
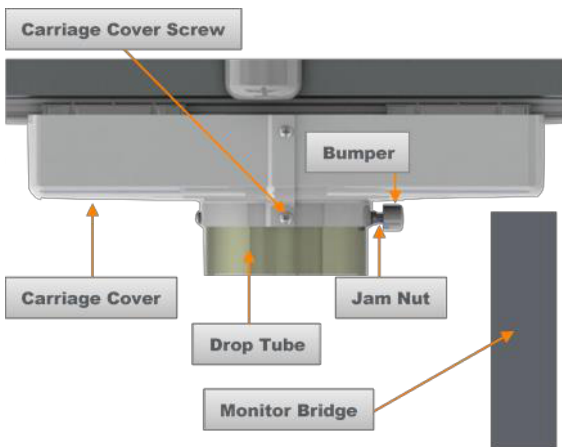


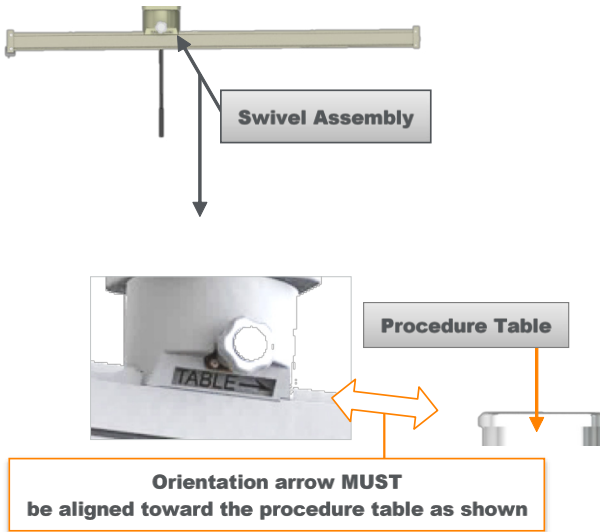
Figure 22



Boom Arm Orientation Inspection (ZGCM-48 | ZGCM-66)

1. While positioning the system for use, inspect the orientation of the 'Table' label above the boom to ensure the arrow is pointing towards the surgical table. While locked in position, the boom should not be parallel to the surgical table. (Figure 23)
2. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
3. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 23



Drop Tube Carriage Mount Hardware Inspection (ZGCM-HSA)

1. While the system is not in use, remove the (4) 10-32 X 1/2-inch-long panhead Phillips screws from the carriage cover removing the carriage cover with the screws. (Figure 25)
2. Check each of the (12) M8 X 30-millimeter bolts connecting the drop tube to the Carriage plate to ensure they are in place and torqued to 350 inch-pounds (29 foot-pounds) (39 Newton-meters) using a calibrated inspection tool. (Figure 24)
3. Once complete, attach the Carriage Cover using (4) 10-32 X 1/2-inch-long panhead Phillips screws. Check each of the (4) 10-32 X 1/2-inch-long panhead Phillips screws to ensure they are in place and secured. (Figure 25)
4. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
5. If additional support is needed, contact TIDI Technical Service using the provided contact information.



CAUTION! PINCH POINT HAZARD

Use care when moving the Carriage along the Rail Assembly. Fingers or hands can be pinched between the moving Carriage and the Rail End Stops.

Figure 24

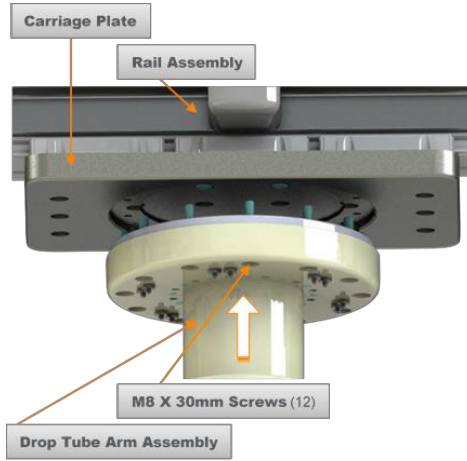
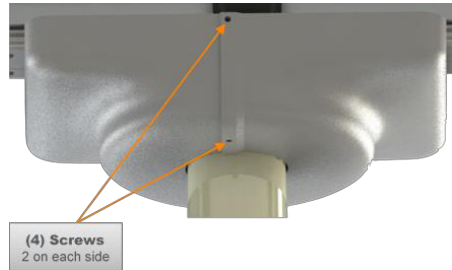


Figure 25

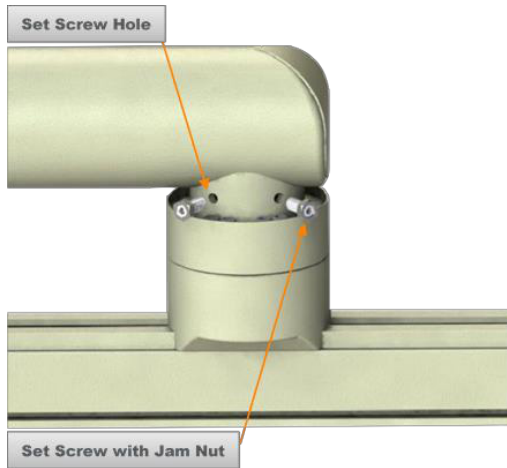


Align Friction Brake & Adjust Bearing Tension (ZGHS A | ZGCM-HSA)

Align Friction Brake Set Screws with Friction Brake (Figure 26)

1. Rotate Boom Arm until red dots are visible in all three Set Screw holes (third hole located on backside).
2. Thread Set Screws into holes until contact to Friction Brake is made.
3. Thread Jam Nuts onto Set Screws. (Do Not Tighten at This Time)

Figure 26



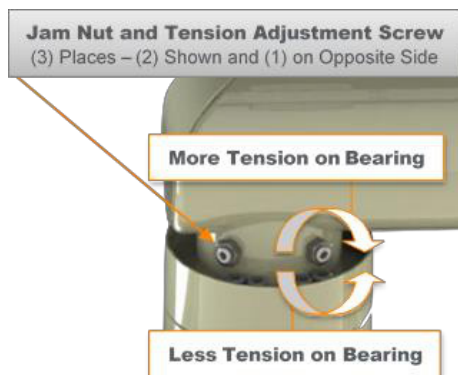
Adjust Bearing Tension (Figure 27)

1. To add more tension on the bearing, use a crescent wrench to loosen (turn counterclockwise) the jam nut and rotate the adjustment screw clockwise (to the right).
2. To reduce tension on the bearing, use a crescent wrench to loosen (turn counterclockwise) the jam nut and rotate the adjustment screw counterclockwise (to the left).
3. Retighten the jam nut.



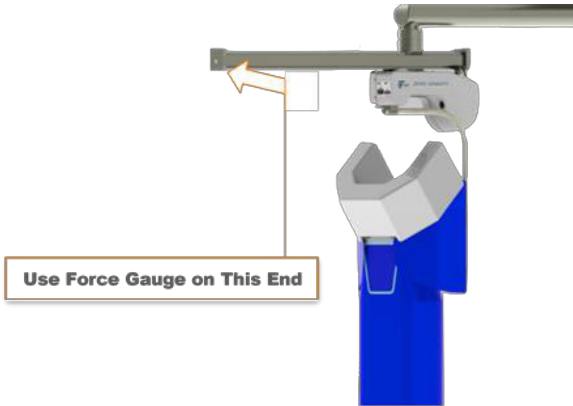
Adjustment Screws should be tightened evenly. Small incremental turns should be made on each screw.

Figure 27



4. Apply Boom Assembly push force test at the end stop cap furthest from the swivel. Force should be between 3 and 4 pounds (1.4 and 1.8 kilograms) of resistance (Figure 28).

Figure 28



(Ensure Body Shield is directly under Swivel as shown to perform force test.)

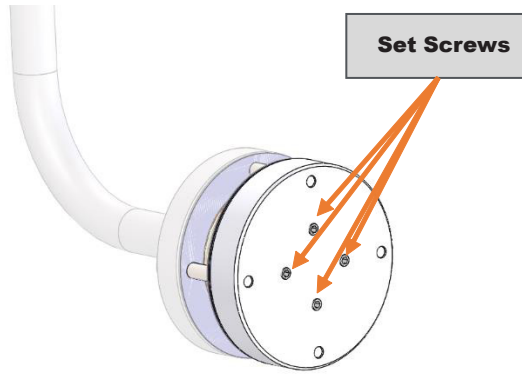
Inspection Instructions for Leaded Acrylic Shield (ZGCMRS)

Adjusting Ball Joint Tension

1. The ball joint on the center of the shield is intended to allow for proper positioning (angle) of the shield. Through repeated use, it may be necessary to make adjustments to the ball joint tension to ensure the shield stays in position once set up.
2. While the system is not in use, lower and rotate the shield so that the ball joint is facing away from you. (Figure 29: ZGCMRS Shield Attachment Point)
3. To reduce the mobility of the shield on the ball joint, tighten (turn clockwise) all four (4) set screws. Tighten each set screw only (1) one to two (2) full rotations at a time ensuring the same number of rotations is completed for all four (4) set screws. Periodically check the tension of the shield to determine if the desired mobility was reached.
4. To increase the mobility of the shield on the ball joint, loosen (turn counterclockwise) all four (4) set screws. Loosen each set screw only (1) one to two (2) full rotations at a time ensuring the same number of rotations is completed for all four (4) set screws. Periodically check the tension of the shield to determine if the desired mobility was reached.
5. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.

6. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 29: ZGCMRS Shield Attachment Point



Drop Tube Carriage Mount Hardware Inspection (ZGCM-HSA)

1. While the system is not in use, remove the (4) 10-32 X 1/2-inch-long panhead Phillips screws from the carriage cover removing the carriage cover with the screws. (Figure 30: Carriage Cover)
2. Check each of the (6) M8-1.25X 30MM long screws connecting the drop tube support plate to the carriage to ensure they are in place and torqued to 269 inch-pounds (30 Newton-meters) using a calibrated inspection tool. (Figure 31: Drop Tube, Plate, and Carriage)
3. Once complete, attach the Carriage Cover using (4) 10-32 X 1/2-inch-long panhead Phillips screws. Check each of the (4) 10-32 X 1/2-inch-long panhead Phillips screws to ensure they are in place and secured. (Figure 30: Carriage Cover)
4. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
5. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 30: Carriage Cover

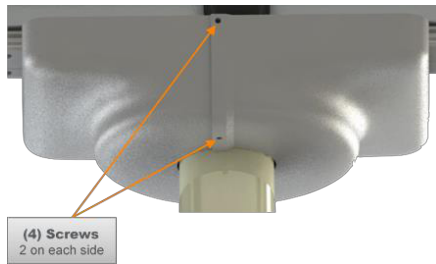
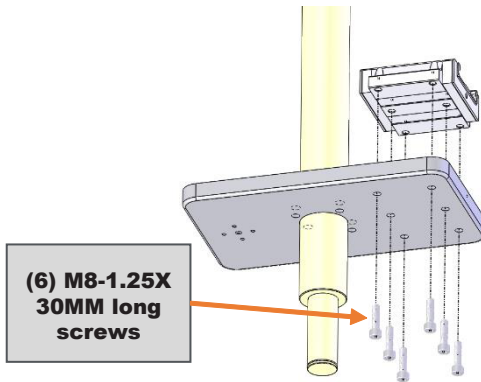


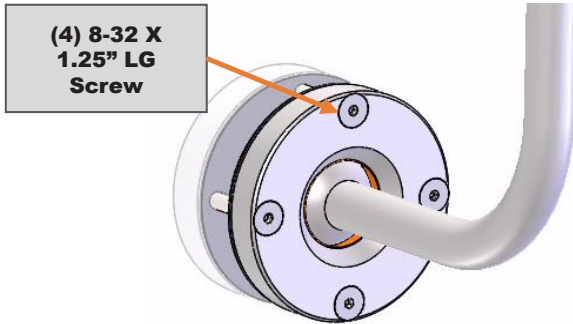
Figure 31: Drop Tube, Plate, and Carriage



Leaded Acrylic Hardware Inspection

1. While the system is not in use, inspect all hardware on the leaded acrylic shield to ensure they are in place and fastened tightly.
2. Check each of the (4) 8-32 X 1.25" long screws connecting the shield to the ball joint sub-assembly to ensure they are in place and torqued to 16.8 inch-pounds using a calibrated inspection tool. (Figure 32: ZGCMRS Shield Attachment Point)
3. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
4. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 32: ZGCMRS Shield Attachment Point



Swivel Arm Hardware Inspection

1. While the system is not in use, inspect all hardware on the swivel arm to ensure they are in place and fastened tightly.
2. Remove the cover on the upper arm to ensure correct hardware is in place. (Figure 34)
3. Ensure the Phillips head screw, lock screw, and key are in place and secure where the shield arm is inserted into the lower arm. (Figure 35)
4. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
5. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 33

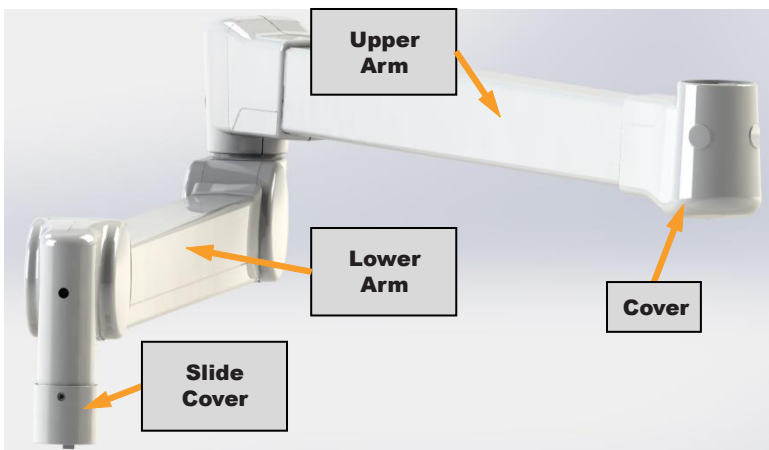


Figure 34

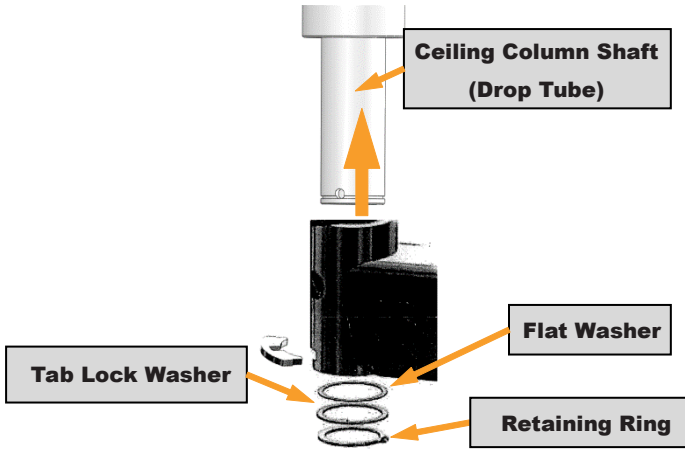
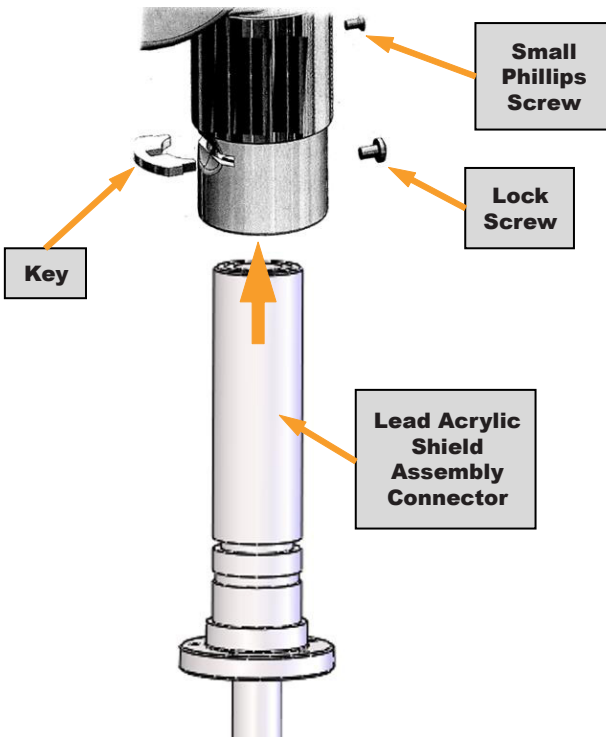


Figure 35



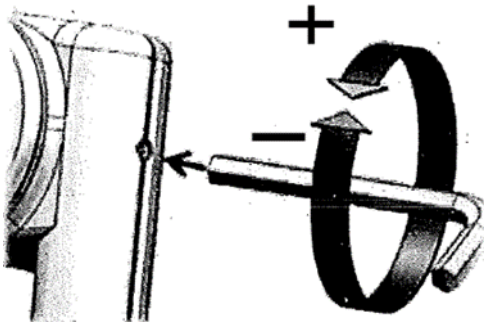
Adjusting the Arm Assembly

1. While the system is not in use, position the ZGCMRS into a space where it can be maneuvered without the risk of colliding with other equipment.
2. To adjust the arm for the weight of the leaded acrylic shield assembly, use a hex key wrench on the lower arm assembly (Figure 33) to adjust for weight on the arm. (Figure 36)
3. To adjust the angle of the arm assembly, use a hex key wrench on the upper arm assembly (Figure 33) to adjust the arm angle between 0° and 45°. (Figure 37)

Figure 36



Figure 37



Leaded Acrylic Integrity Inspection

1. While the system is not in use, lower the shield until it is low enough for visual inspection. A ladder may be required for inspection.
2. Visually inspect the shield panel for cracks, scratches, or other surface imperfections that would cause loss of visibility or functionality of the shields.
3. Complete fluoroscopy inspection of the leaded acrylic shield per the facility requirements / procedure to inspect for any gaps in coverage.

4. Replace the leaded acrylic shield if any of the abnormalities are observed. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
5. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Moving Parts Inspection (ZGCMRS)

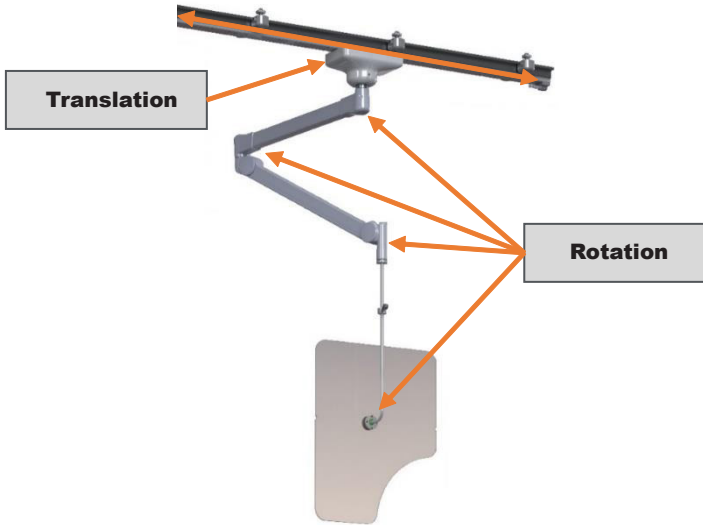
Rotational / Translational Motion Parts Replacement

1. The ZGCMRS contains several components allowing for the movement (rotational and translational motion) of other components.
2. As a result of long-term use, these components may require replacement after an extended period of time to ensure the system functions as intended. Complete inspection to determine if replacement of any of the components is required.

Rotational / Translational Motion Parts Inspection

1. While the system is not in use, slide the system along the usable space of the monorail to inspect for motion issues. The system should move freely along the monorail with minimal interruption. Other components may need to be moved in order to test the full range of the monorail.
2. Rotate each of the components at the rotation points both clockwise and counterclockwise. (Figure 38) The components should rotate freely with minimal interruption. *Note that some of the rotation points have specific stop points preventing over rotation.*
3. Move the arm of the system up and down to inspect for motion issues. The arm should move freely with minimal interruption.
4. Contact a TIDI Products authorized representative or TIDI Products service for repairs and / or replacement of components. Replacement and repairs may only be completed by TIDI Products authorized personnel.
5. If additional support is needed, contact TIDI Technical Service using the provided contact information.

Figure 38



System Description

Zero-Gravity Floor Unit (ZGM-6-5H)

Features: Mobile unit with heavy base with casters and locks, variable-height mast, 48" pivoting boom.



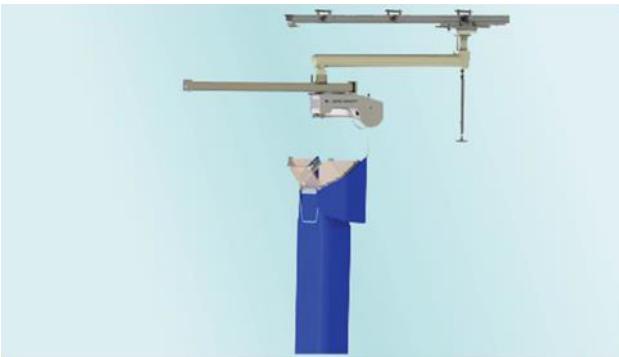
Zero-Gravity Hinged Swing Arm Unit (ZGHSA)

Features: Ceiling mounted central pivot-plate, swinging rigid arm, 48" lower track.



Zero-Gravity Monorail Hinged Swing Arm Unit (ZGCM-HSA)

Features: Ceiling mounted upper track, central pivot on upper trolley with 48" lower track.



Zero-Gravity Monorail Unit (ZGCM-48 or ZGCM-66)

Features: Ceiling mounted upper track, (ZGCM-48) 48" lower track or (ZGCM-66) 66" lower track.



Body Shield Overview

Figure 39

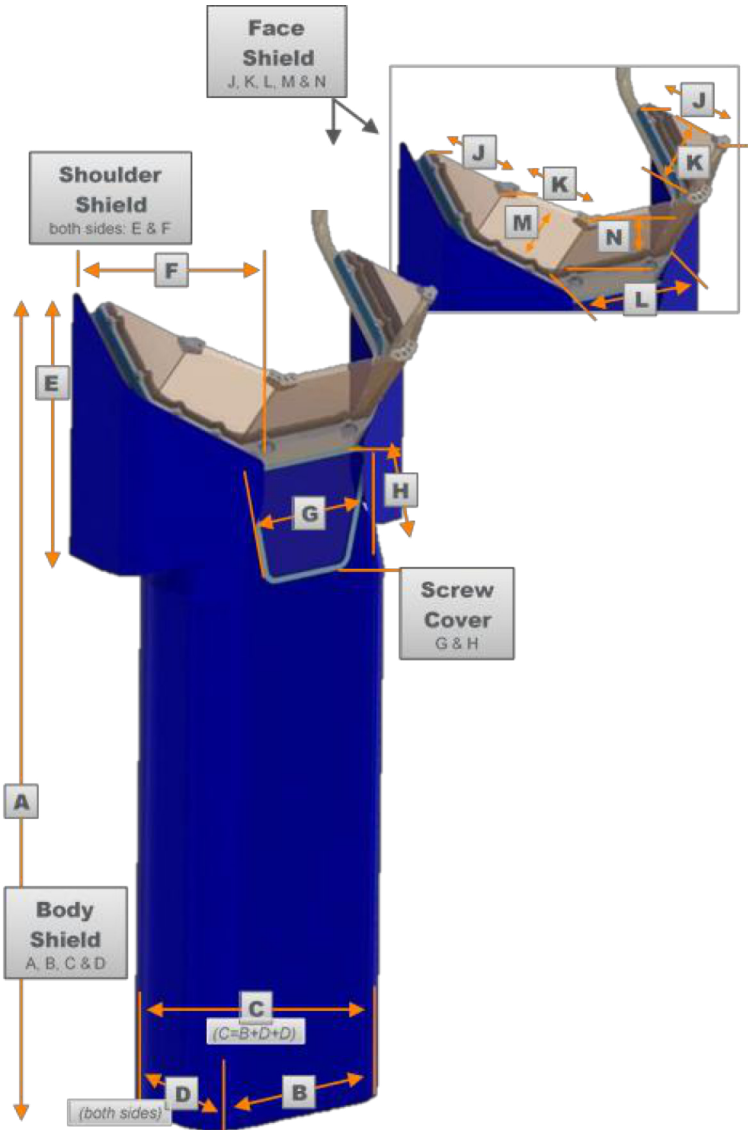


Figure 39 Chart

Item	Part
A*	Body Shield
B*	Body Shield
C*	Body Shield
D	Body Shield
E (Both Sides)	Shoulder Shield
F (Both Sides)	Shoulder Shield
G	Screw Cover
H	Screw Cover
J	Face Shield
K	
L	
M	
N	

System Overview

Figure 40 (ZGM-6-5H)

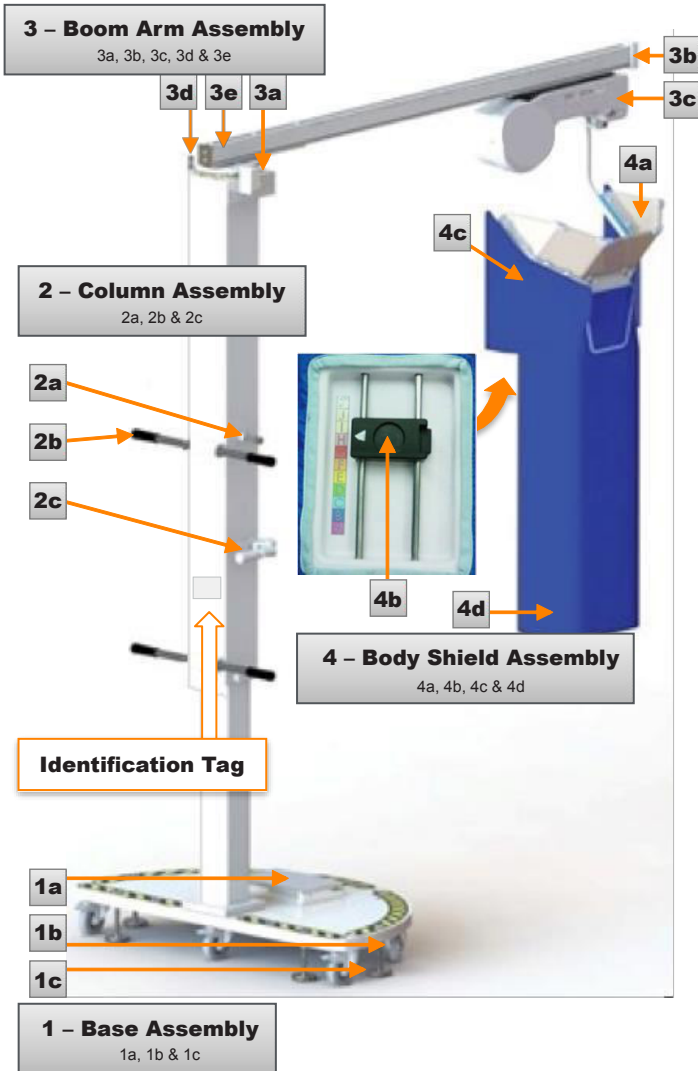


Figure 40 Chart (ZGM-6-5H)

Item	Part
1	Base Assembly
1a	Toolbox
1b	Locking Casters
1c	Leveling Feet
2	Column Assembly
2a	Locking Pin
2b	Lift Handles
2c	Snubber Handle
3	Boom Arm Assembly
3a	Turntable Bearing
3b	End Stop Cap
3c	Balancer
3d	Bearing Rotational Lock
3e	Docking Station

Figure 40 Chart (ZGM-6-5H)

Item	Part
4	Body Shield Assembly (ZGBFS)
4a	Face Shield
4b	Connector
4c	Shoulder Shields, Right (ZGSS-R) and Left (ZGSS-L)
4d	Body Shield



CAUTION! INJURY RISK

Failure to maintain control of column, when raising or lowering, can result in personal injury or property damage.



CAUTION! INJURY RISK

Do not attempt to relocate Floor Unit during a procedure. Incorrect system positioning or adjustment may cause personal injury or equipment damage.

Figure 41 (ZGHSA)

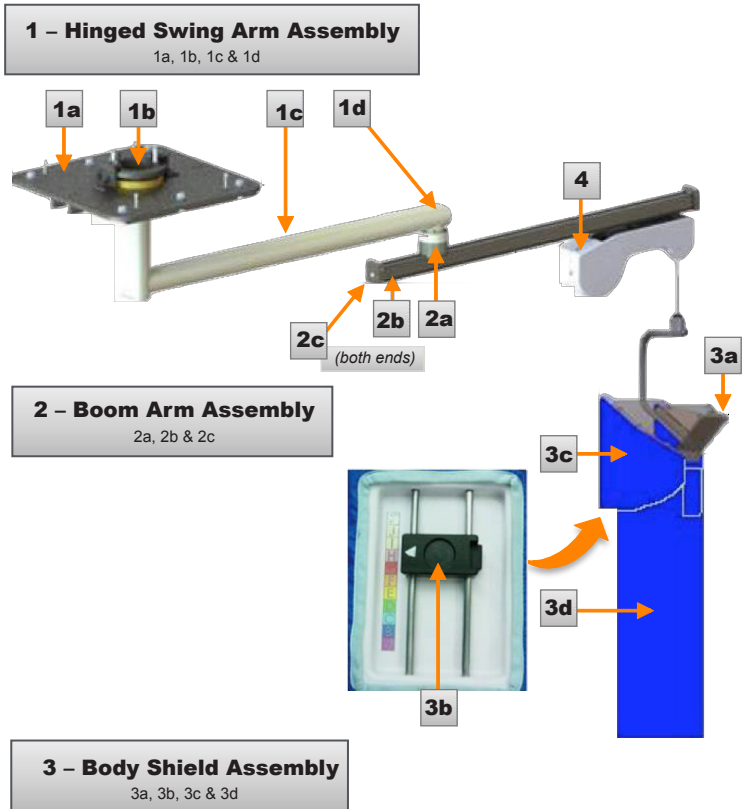


Figure 41 Chart (ZGHSA)

Item	Part
1	Hinged Swing Arm Assembly
1a	Support Plate Assembly
1b	Ceiling Swivel
1c	Drop Tube
1d	Identification Tag
2	Boom Arm Assembly
2a	Swivel Support
2b	Docking Station
2c	End Stop Cap
3	Body Shield Assembly (ZGBFS)
3a	Face shield
3b	Connector
3c	Shoulder Shields, Right (ZGSS-R) and Left (ZGSS-L)
3d	Body shield
4	Balancer

Figure 42 (ZGCM-48 | ZGCM-66)

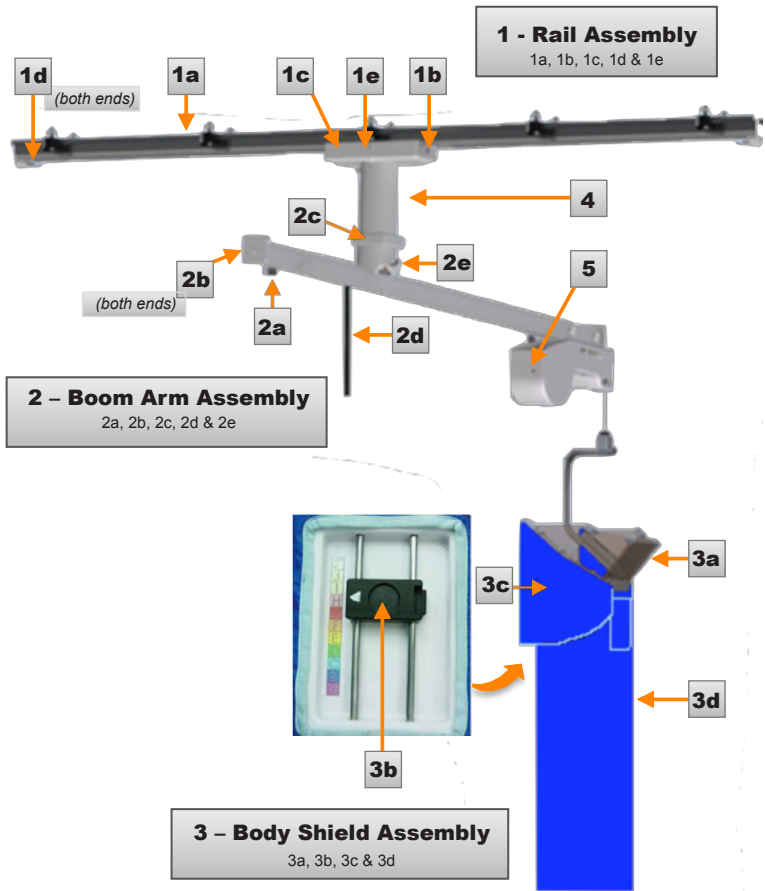


Figure 42 Chart (ZGCM-48 | ZGCM-66)

Item	Part
1	Rail Assembly
1a	Rail
1b	Carriage
1c	Carriage Covers
1d	End Stop
1e	Identification Tag
2	Boom Arm Assembly
2a	Docking Station
2b	End Stop Cap
2c	Swivel Assembly
2d	Lock Pin
2e	Boom Arm Adjustment Knob
3	Body Shield Assembly (ZGBFS)
3a	Face shield
3b	Connector
3c	Shoulder Shields Right (ZGSS-R) and Left (ZGSS-L)
3d	Body Shield
4	Drop Tube
5	Balancer

Figure 43 (ZGCM-HSA)

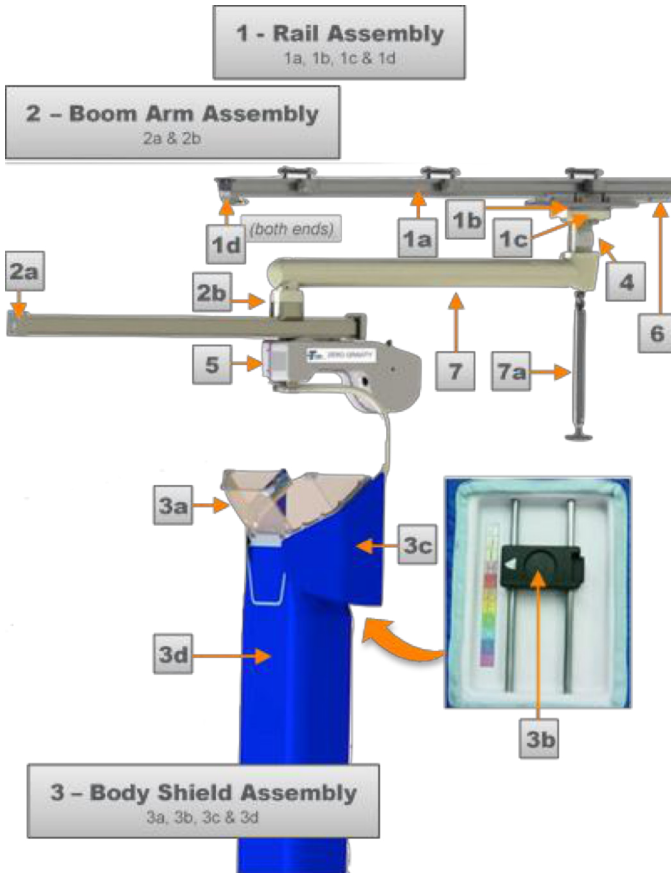


Figure 43 Chart (ZGCM-HSA)

Item	Part
1	Rail Assembly
1a	Rail
1b	Carriage
1c	Carriage Covers
1d	End Stop
2	Boom Arm Assembly
2a	End Stop Cap
2b	Swivel Support
3	Body Shield Assembly (ZGBFS)
3a	Face shield
3b	Connector
3c	Shoulder Shields, Right (ZGSS-R) and Left (ZGSS-L)
3d	Body Shield
4	Drop Tube
5	Balancer
6	Identification Tag
7	Swivel Boom Assembly
7a	Handle

Figure 44 (ZGCMRS)

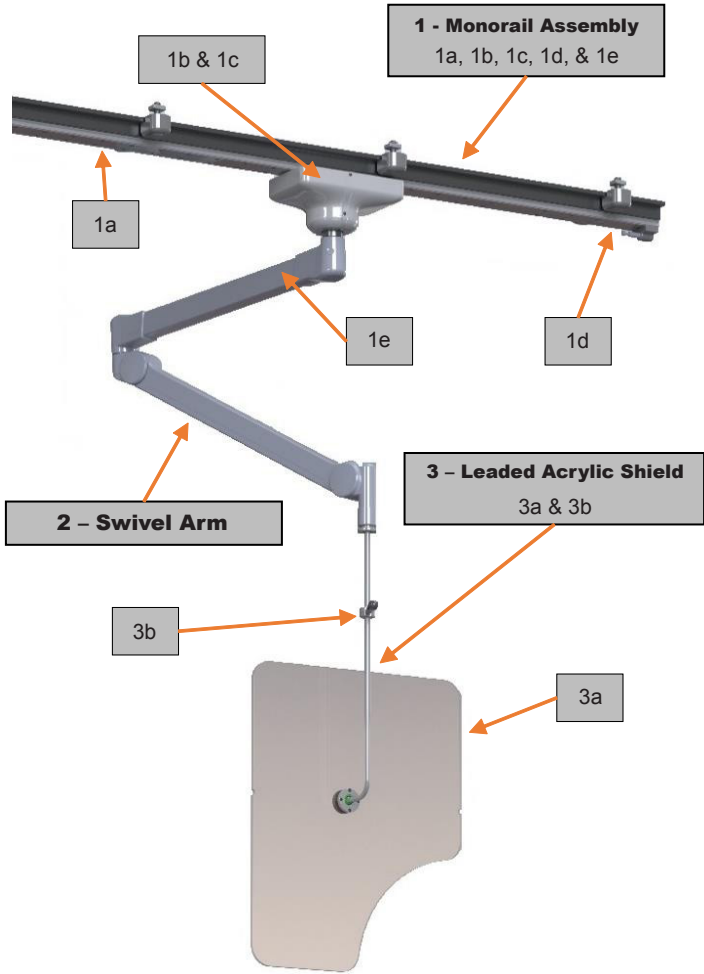


Figure 44 Chart (ZGCMRS)

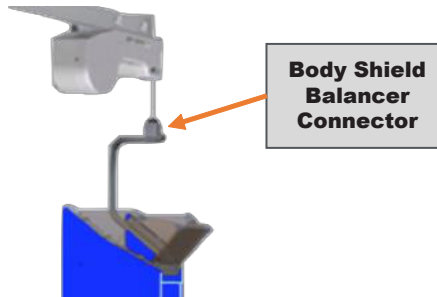
Item	Part
1	Monorail Assembly
1a	Rail
1b	Carriage
1c	Carriage Side Covers
1d	End Stop
1e	Identification Tag
2	Swivel Arm Assembly
3	Leaded Acrylic Shield Assembly
3a	Leaded Acrylic Shield
3b	Leaded Acrylic Shield Handle

System Feature (Body Shield Balancer Connector)

Body Shield Balancer Swivel Identification

Each main system is equipped with a balancer connector used to connect the balancer cable to the body shield frame. Use the descriptions and images below to determine whether your system contains the body shield balancer connector without the swivel feature or the body shield balancer connector with the swivel feature.

Figure 45



Body Shield Connector without the Swivel (Figure 46: Without Swivel):

- Contains four (4) pegs along the top edge used to hold the body shield inside the trolley housing
- Contains a black bumper (washer) on top

Body Shield Connector with the Swivel (Figure 47: With Swivel):

- Contains two (2) pegs along the top edge used to hold the body shield inside the trolley housing
- Contains a white (washer) bumper on top

Figure 46: Without Swivel

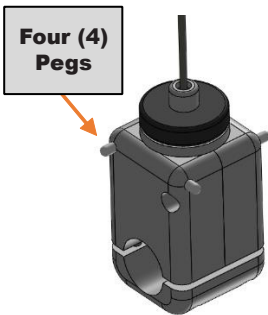
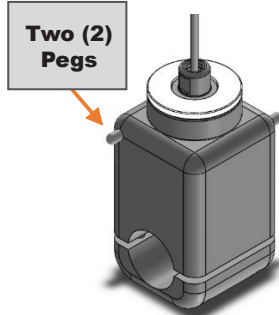


Figure 47: With Swivel



Limited Warranty

TIDI Products warrants to Customer that this product, manufactured for TIDI Products and sold to customer, will be free from defects in materials and workmanship for a period of one (1) year after delivery to Customer. This warranty shall not apply to any products, which have been subjected to misuse, improper installation or repair, alteration, neglect, accident, abnormal conditions of operation, or use under conditions other than those for which the products were designed.

EXCEPT FOR THE FOREGOING LIMITED WARRANTY, SELLER MAKES NO OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR OF MERCHANTABILITY.

Declarations of Conformity

The Zero-Gravity® Radiation Protection System Declarations of Conformity can be found at www.tidiproducts.com, and for additional information contact TIDI Products at 1.800.521.1314 or +1.920.751.4300.

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Zero-Gravity® Radiation Protection System Preventative Maintenance Checklist

Task Name	System						Frequency
	All	ZGM-6-5H	ZGHSA	ZGCM-HSA	ZGCM-48	ZGCM-66	
Cable Inspection	x						x
Body Shield Rotation Inspection	x						x
Body Shield Vertical Travel Inspection	x						x
Body Shield Vertical Drifting Inspection	x						x
Adjusting the Body Shield Vertical Tension (AR)	x						AR
Face Shield Inspection	x						x
Hinge Inspection	x						x
Velcro Inspection	x						x
End Stop Cap Hardware Inspection	x						x
Magnetic Docking Station Inspection	x						x
Body Shield Connector Hardware Inspection	x						x
Castor Inspection		x					x
Boom Arm Mounting Hardware Inspection		x					x
Moving Parts Inspection - Floor System		x					x
Moving Parts Inspection - Ceiling Systems			x	x	x	x	x
Collision Inspection			x	x	x	x	x
Boom Arm to Drop Tube Hardware Inspection					x	x	x
Boom Arm to Drop Tube Hardware Inspection				x			x
Toe Clamp Mounting Bolt and Cover Inspection				x	x	x	x
Drop Tube Carriage Mount Hardware Inspection					x	x	x
Boom Arm Orientation Inspection					x	x	x
Drop Tube Carriage Mount Hardware Inspection				x			x
Align Friction Brake and Adjust Bearing Tension			x	x			x

<i>Task Name</i>	<i>System</i>		<i>Frequency</i>
		All	Certified Tech Annually
Adjusting Ball Joint Tension	x		x
Adjusting the Arm Assembly	x		x
Leaded Acrylic Integrity Inspection	x		x
Moving Parts Inspection	x		x
Drop Tube Carriage Mount Hardware Inspection	x		x
Leaded Acrylic Hardware Inspection	x		x
Swivel Arm Hardware Inspection	x		x

Manufactured for:



Made in the
United States of America

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United States Patents
7,973,299; 8,207,516;
8,558,204; 8,598,554 B2;
8,925,553; 8,933,426
For U.S. and Foreign Patent
information, see
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Additional Patents Pending