Double Electrically Isolated (DEI) Enclosure

Standard Construction

Assembly and Maintenance Guide

ETS-LINDGREN™
An ESCO Technologies Company

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Revision Record
MANUAL,DEI STD RM ASSY&MAINT INSTRUCTIONS
Part #206934, Rev. B

Revision	Description	Date
A	Initial Release	February, 2003
B	Rebrand	October, 2013

Table of Contents

Notes, Cautions, and Warnings

	**Note:** Denotes helpful information intended to provide tips for better use of the product.
CAUTION	**Caution**: Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.
WARNING	**Warning**: Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.

See the ETS-Lindgren *Product Information Bulletin* for safety, regulatory, and other product marking information.

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1.0 Introduction

CAUTION

Take care when assembling the DEI enclosure to avoid causing an RF leak; an RF leak can be created by simply tightening a bolt improperly.

An RF leak can cause a large loss in attenuation. At final RF attenuation testing, a low reading would indicate a leak, or many leaks, in the shielding.

Each **ETS-Lindgren Double Electrically Isolated (DEI) Enclosure** is tested at the factory to verify that it provides the proper shielding.

ETS-Lindgren Product Information Bulletin

See the ETS-Lindgren *Product Information Bulletin* included with your shipment for the following:

- Warranty information
- Safety, regulatory, and other product marking information
- Steps to receive your shipment
- Steps to return a component for service
- ETS-Lindgren calibration service
- ETS-Lindgren contact information

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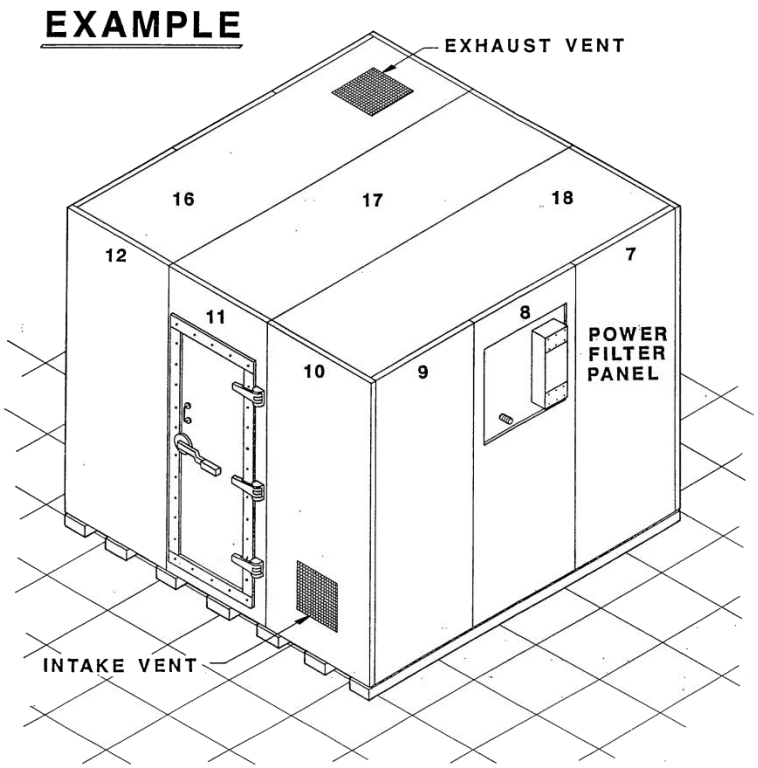
2.0 Parts and Components

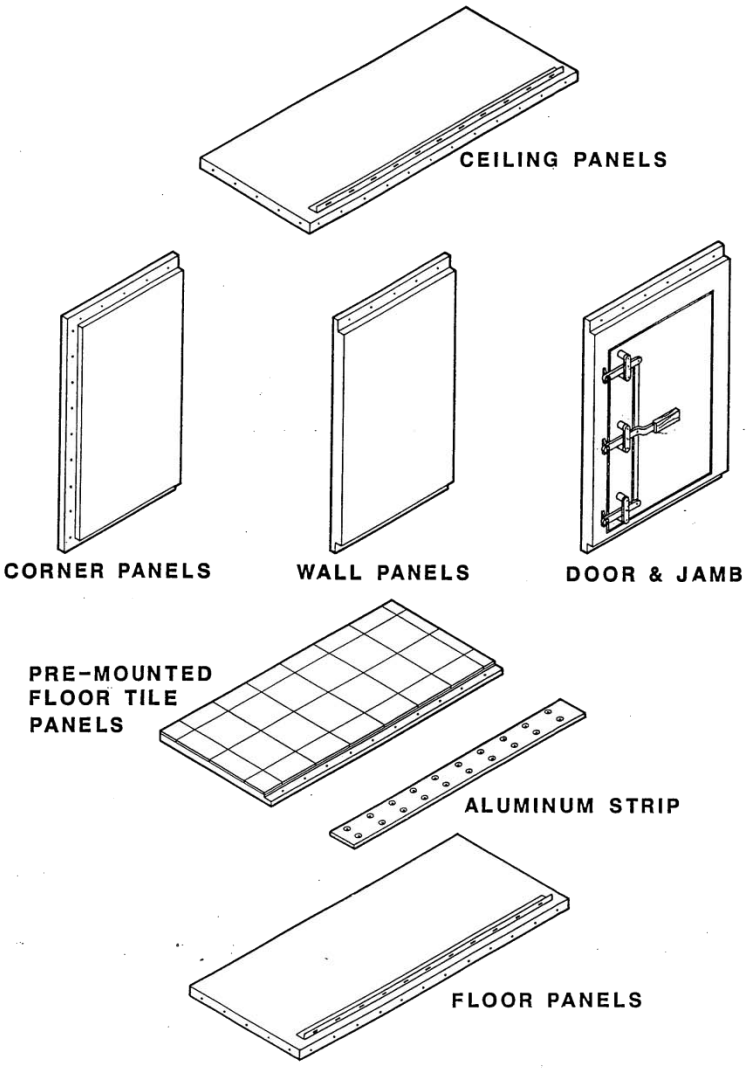
Completed Enclosure (Example)

MODEL NO. _____

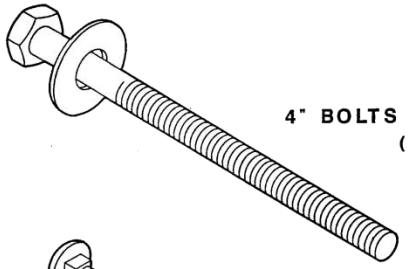
SHIELD MATERIAL(S) _____



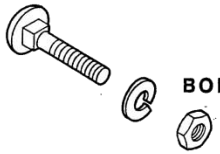
Panels


CEILING PANELS
CORNER PANELS
WALL PANELS
DOOR & JAMB
PRE-MOUNTED
FLOOR TILE
PANELS
ALUMINUM STRIP
FLOOR PANELS

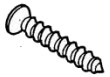
Hardware



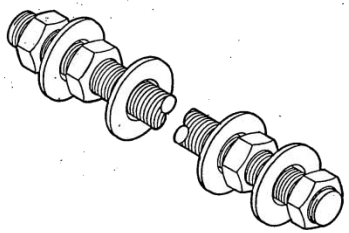
4" BOLTS with 1" FLAT WASHERS
(WALL BOLTS)



BOLTS with LOCKWASHERS and NUTS
(ALL SEAM JOINTS)



3/4" LAG SCREW (ALUM. STRIPS)



GROUND STUD
(1 per ROOM)

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3.0 Before You Begin Assembly

CAUTION

Before assembling any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

Inspect Contact Edges

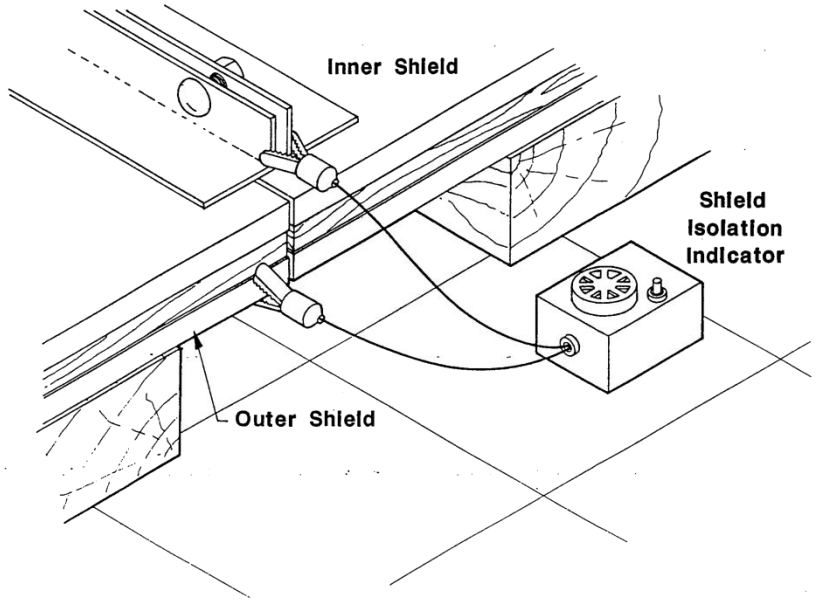
For information on cleaning contact surfaces, see page 41.

The most critical parts of each frame are the surfaces that connect the panels, the two contact surfaces along the edges.

- Keep the contact edges clean at all times.
- As the room is being assembled, visually inspect all of the contact surfaces. This inspection is especially important on an all-metal enclosure (not a screen room).
- The contact surfaces should be free of any paint, grease, dirt, and corrosion. If the panels were stored in a damp environment, the edges may be slightly corroded.

Correct Erroneous Contact

Separation of the inner and outer shields is crucial for peak performance of the Double Electrically Isolated (DEI) Enclosure. Some of the most common causes of contact between the shields are metal filings, a strand of screen wire, or an errant screw. Locate and correct erroneous contact prior to assembly to save time later.



- The Shield Isolation Indicator (with the ground stud removed) can detect a short as soon as it occurs. If contact is made between the inner and outer shields, the buzzer will sound.
- Many causes can be located visually without disassembling the panels, but if the cause is not obvious, take the panels down one by one until the warning buzzer stops. Inspect the last panel removed to determine the cause of the short.

4.0 Assembly and Installation

CAUTION

Before assembling any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

CAUTION

To accommodate a site with limited access space, the DEI enclosure can be pre-assembled and moved into position. When moving a pre-assembled enclosure, take care to avoid contact with all metal objects (such as ductwork).

Review all steps prior to starting to assemble the DEI enclosure.

Overview of Assembly Steps

1. Clean the area to be used for construction of the room.
2. Mark out the space on the floor where the room will be built.
3. To prevent damage to panels, remove panels from the crates or cartons only as they are needed.
4. Locate, position, and bolt together the floor panels as shown in the illustrations.
5. After the main floor panels are assembled, place the interior floor panels (with floor tile) on top of them.
6. Attach the 4-in wide aluminum strips between each of the interior panels and secure with the wood screws.

   Wall and ceiling panels should be assembled as shown in the illustrations.

7. Be sure to securely bolt the wall panel seams before inserting and tightening the 4-in bolts into the floor panels.
8. Check alignment of the panels as they go together to avoid having to disassemble and re-adjust them later.
9. To ease insertion of the ceiling panels, loosen some of the 4-in bolts to allow for some movement of the wall panels.
10. When inserting and tightening the 4-in bolts into the ceiling panels, maintain solid contact along all of the seams.

Assembly Steps

STEP 1—CLEAN AREA

Remove all debris and clean the area where the enclosure is to be installed.

STEP 2—MARK LOCATION

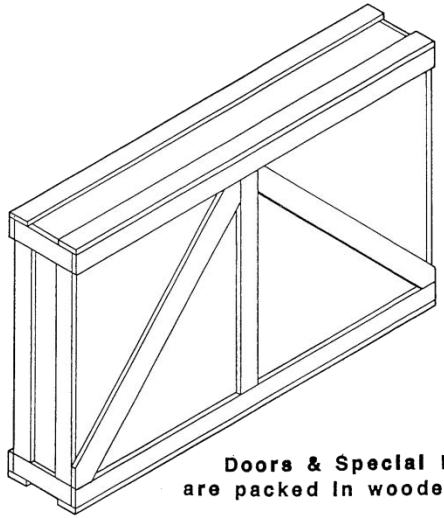
Use the illustrations in this manual to determine the area required for the enclosure. Mark the location on the floor.

STEP 3—OPEN CRATE

CAUTION

To remove a panel, loosen the crate lumber or disassemble the crate. Do not force the panel from the crate if it becomes jammed.

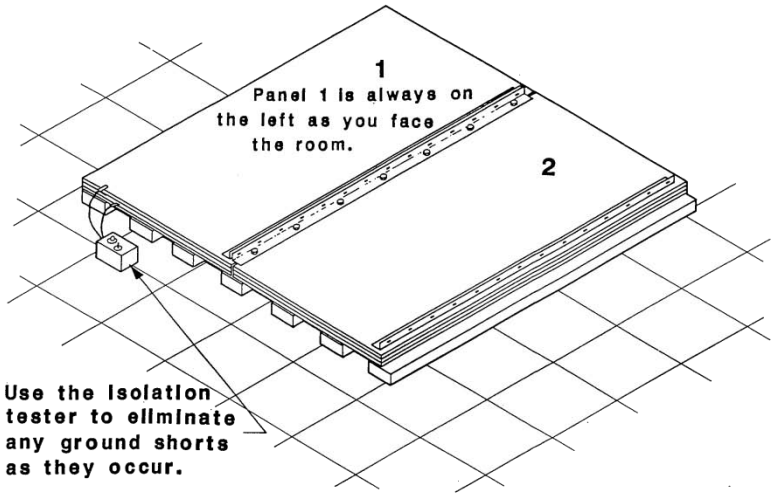
Open all crates and cartons in the numbered sequence, which indicates the order of panel construction. To prevent damage to panels, remove panels from the crates or cartons only as they are needed.

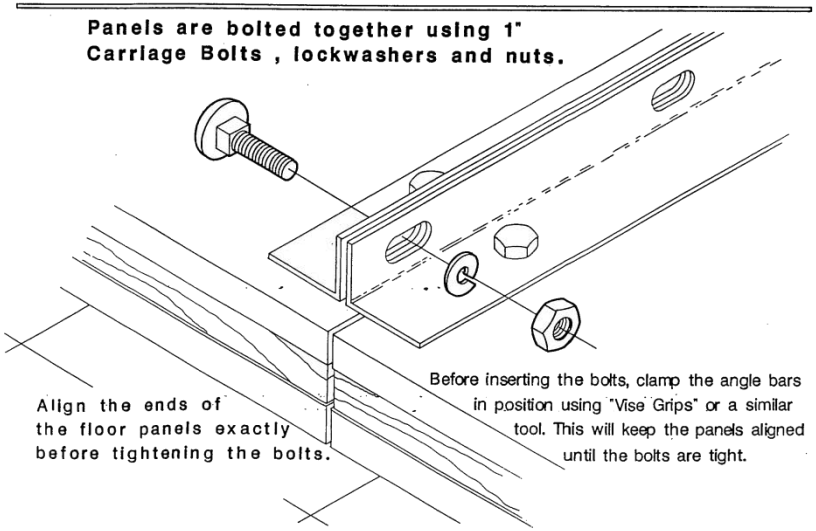


Doors & Special Panels are packed in wooden crates.

STEP 4—ASSEMBLE MAIN FLOOR PANELS

In numbered order, place the main floor panels on the marks made in step 2.

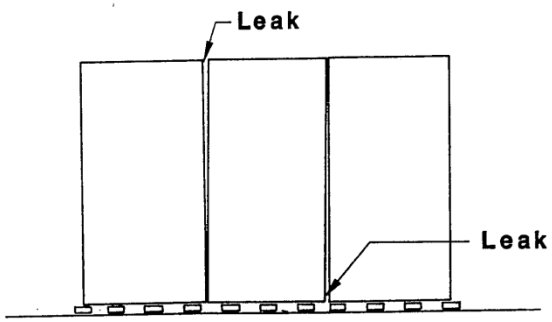




STEP 5—PLACE INTERIOR FLOOR PANELS

CAUTION **Verify that the floor is level before assembling the DEI enclosure or leaks will occur.**

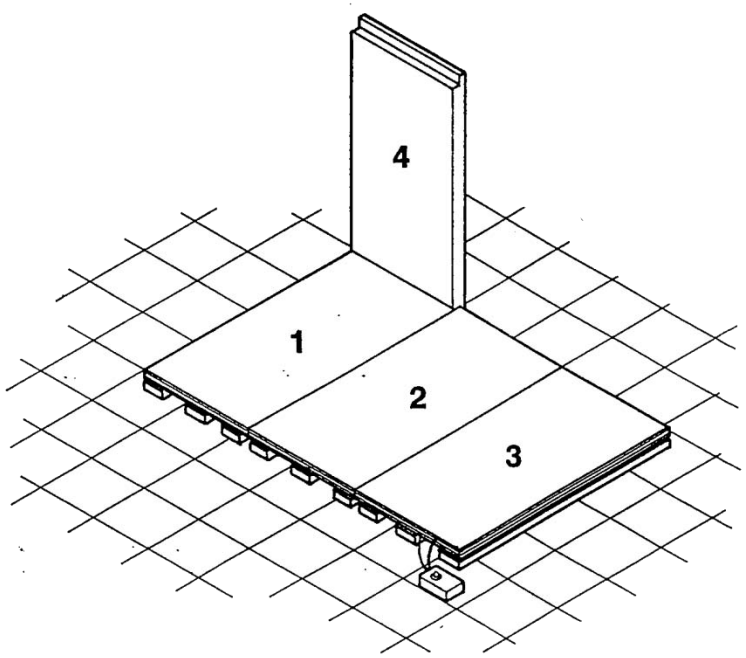
Place the interior floor panels (with floor tile) on top of the assembled main floor panels.



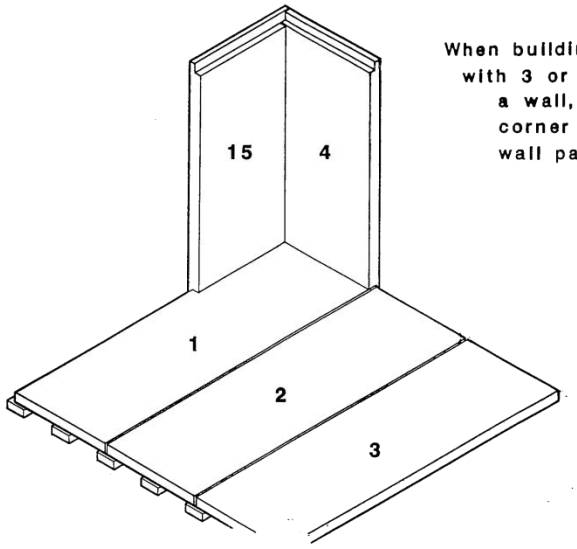
If room is not properly leveled, leaks will occur in the shielding.

STEP 6—ERECT WALL PANELS

- Begin construction of the wall panels at the end of floor panel #1 and moving in a clockwise, numerical fashion.
- Attach the 4-in wide aluminum strips between each of the interior panels and secure with the wood screws.



STEP 6, CONTINUED—FOR LARGE ROOMS

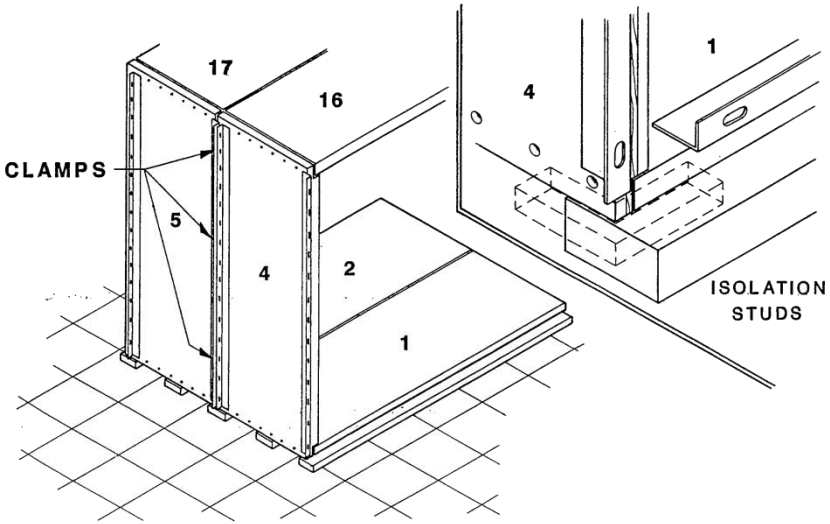


When building an enclosure with 3 or more panels to a wall, construct a corner using the final wall panel as shown.

STEP 7—BOLT WALL PANELS

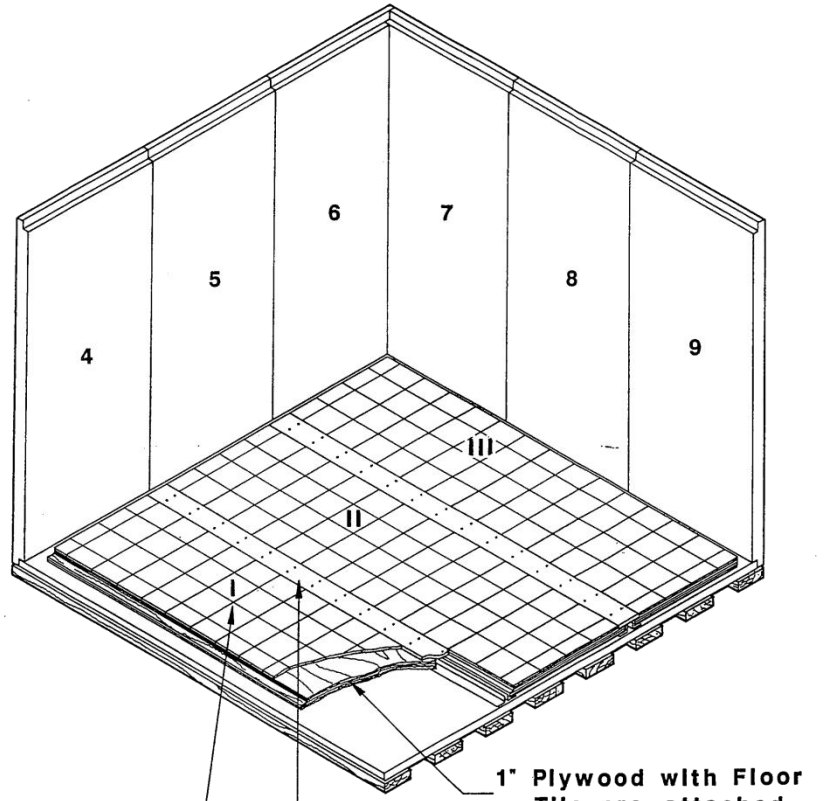
CAUTION **Never use a hammer directly on the shielding material.**

- Tighten clamps and align all panels before inserting and tightening the 4-in bolts.
- Panels can form leaks, especially where floor and wall panels are joined. Before aligning the panels, loosen all bolts on a seam to ensure a consistent panel fit. The edges of the wall and ceiling panels or wall and floor panels must align perfectly.
- For more information on correcting leaks, see page 31.



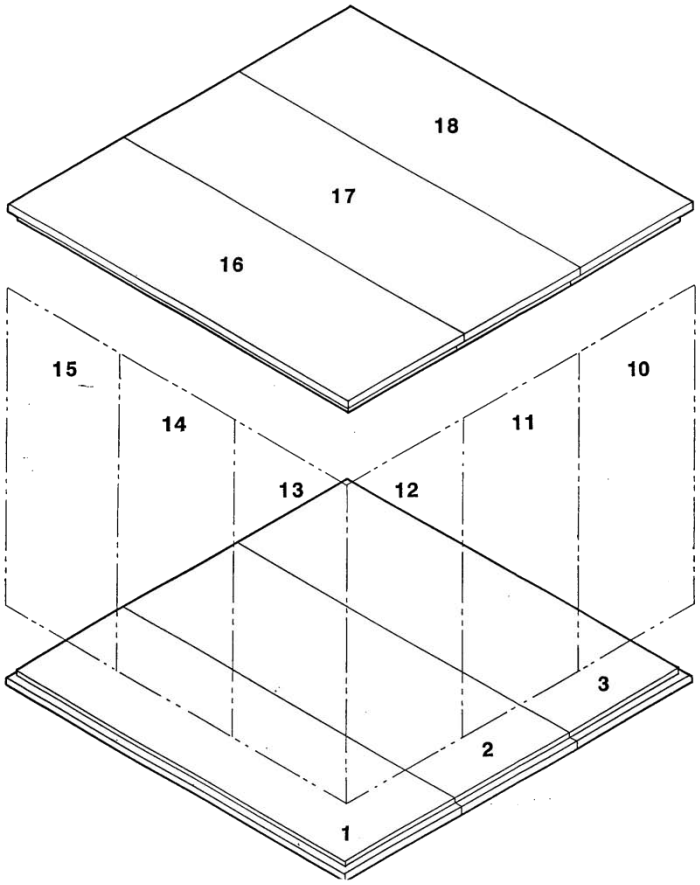
STEP 8—INSTALL FINISHED FLOOR

Check alignment of the panels as they go together to avoid having to disassemble and re-adjust them later.

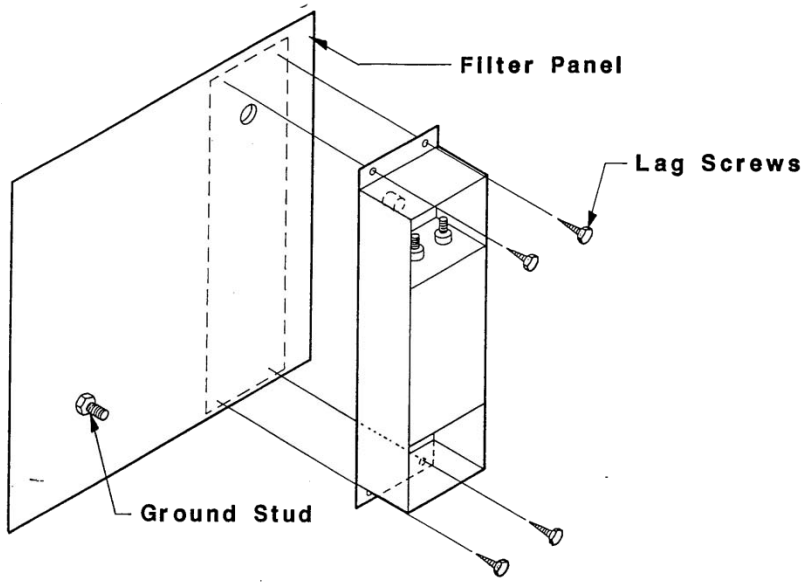


STEP 9—PLACE CEILING PANELS

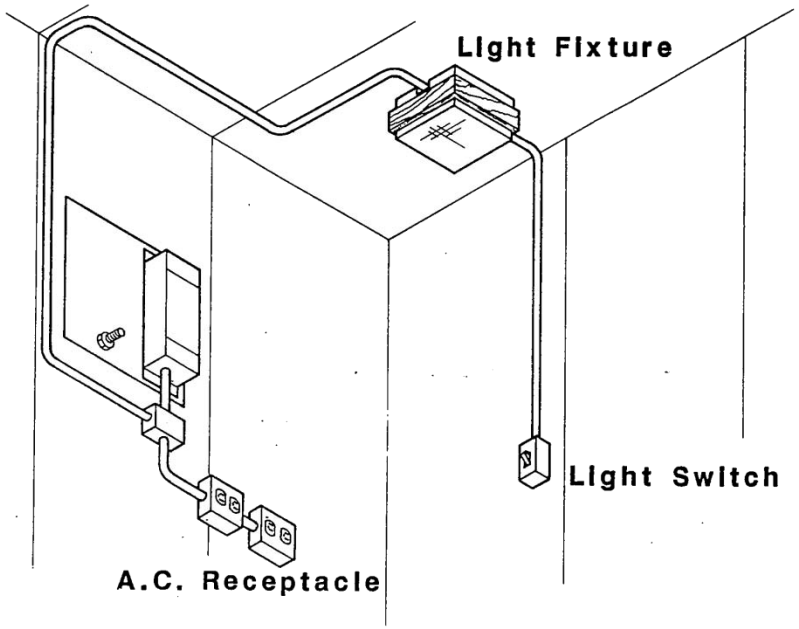
- To ease insertion of the ceiling panels, loosen some of the 4-in bolts to allow for some movement of the wall panels.
- Begin ceiling panel assembly by positioning the lowest numbered panel directly over floor panel #1.
- Place all panels in the direction shown in the illustration.
- When inserting and tightening the 4-in bolts into the ceiling panels, maintain solid contact along all of the seams.



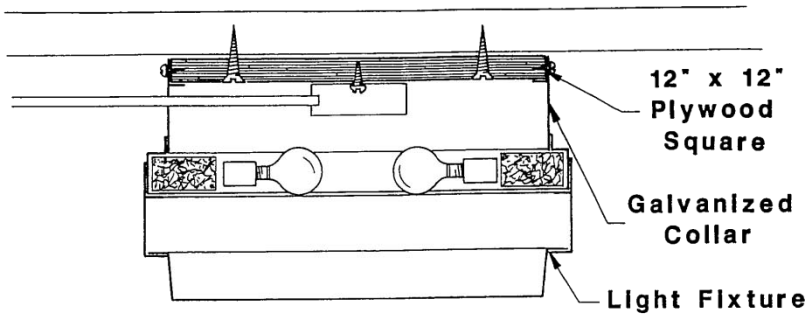
Electrical Components



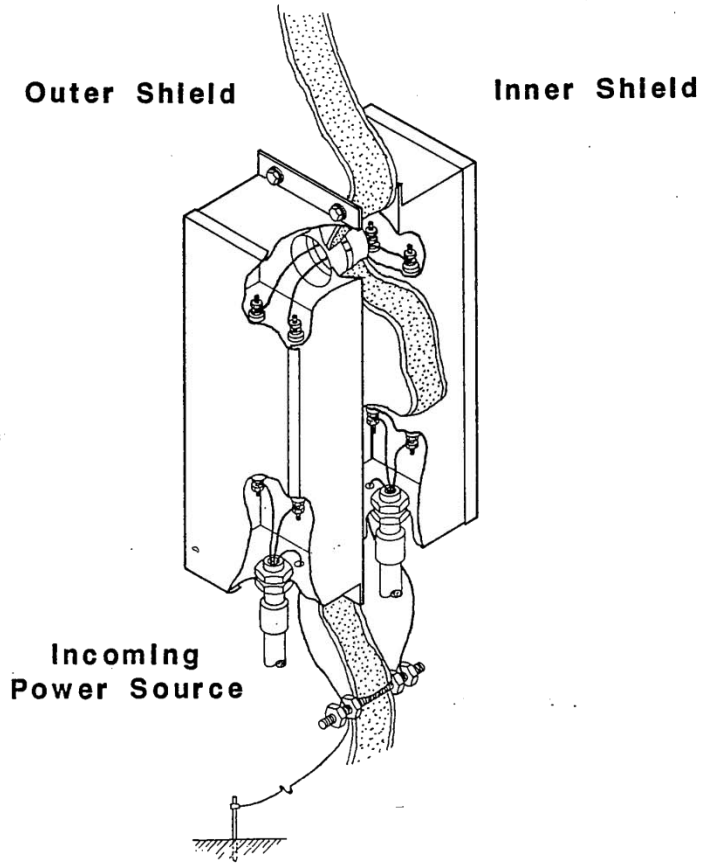
Interior Components

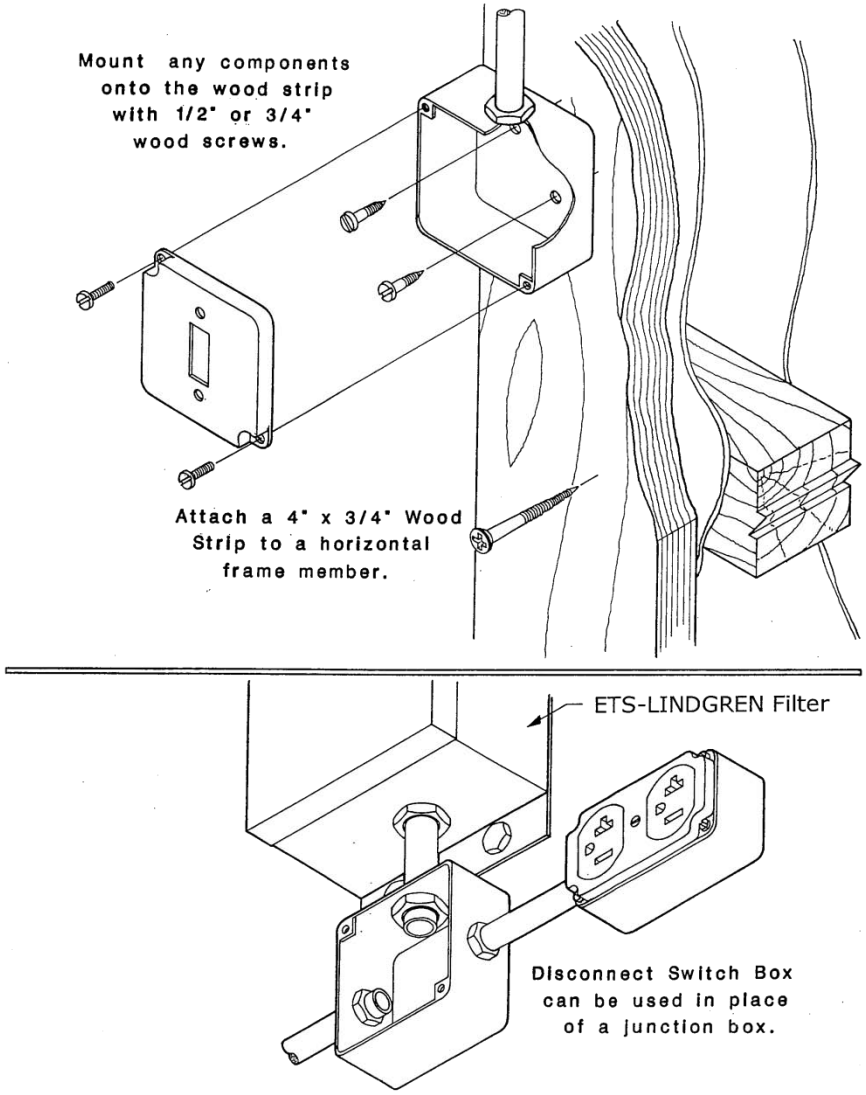


Light Fixture Mounting

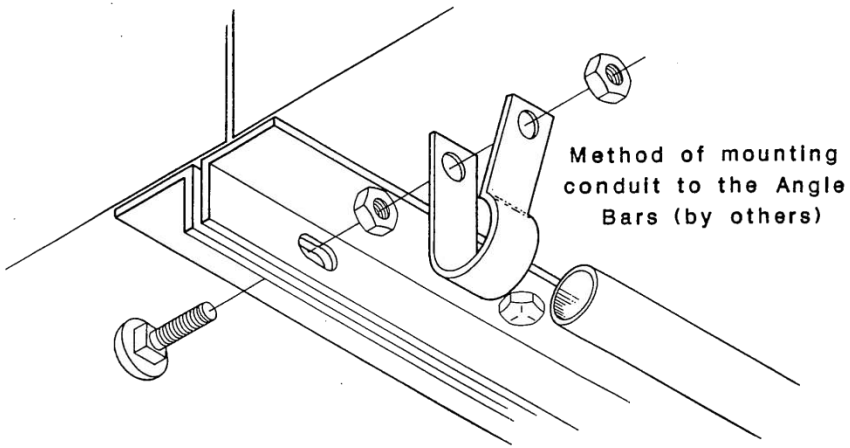


Filter Mounting Detail

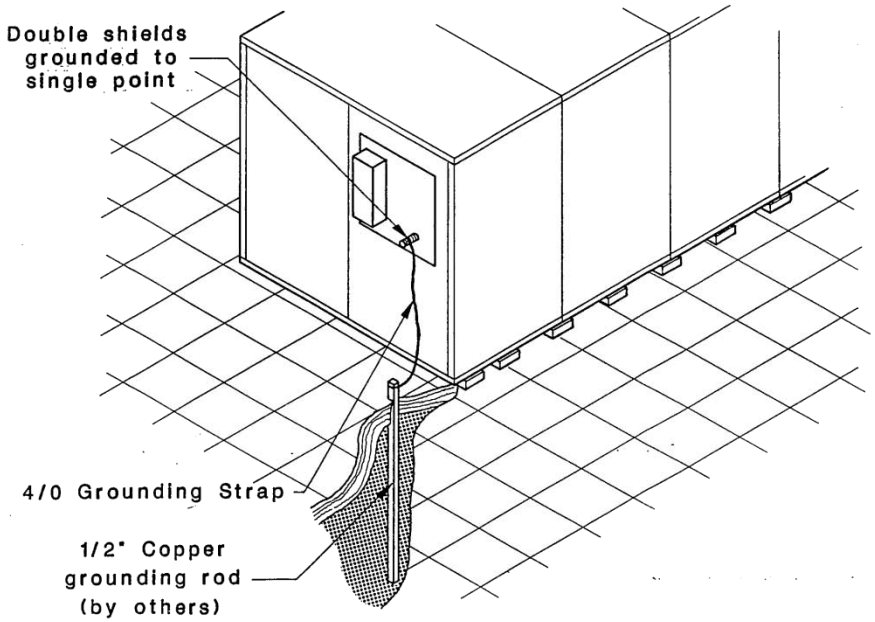



Mount any components onto the wood strip with 1/2" or 3/4" wood screws.
Attach a 4" x 3/4" Wood Strip to a horizontal frame member.
ETS-LINDGREN Filter
Disconnect Switch Box can be used in place of a junction box.

Mounting Conduit to Angle Bars



Grounding



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5.0 About Maintenance and Repair

CAUTION

Before performing any maintenance, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

Maintenance of the DEI enclosure is limited to the procedures described in this guide.

Warranty may be void if the instructions in this maintenance guide are not followed.

If you have any questions concerning maintenance, contact ETS-Lindgren Customer Service.

Door Maintenance Program

Parts damaged due to abuse or to failure to follow recommended maintenance procedures are not included in the door maintenance program.

ETS-Lindgren offers a door maintenance program that includes:

- Door inspection to assess the condition.
- Door and jamb cleaning.
- Repair of mechanism and fingers, if necessary.
- Hinge inspection and adjustment, if necessary.
- Defective or worn parts that cannot be repaired will be replaced.

Contact ETS-Lindgren for more information on the door maintenance program.

Service Procedures

For the steps to return a system or system component to ETS-Lindgren for service, see the *Product Information Bulletin* included with your shipment.

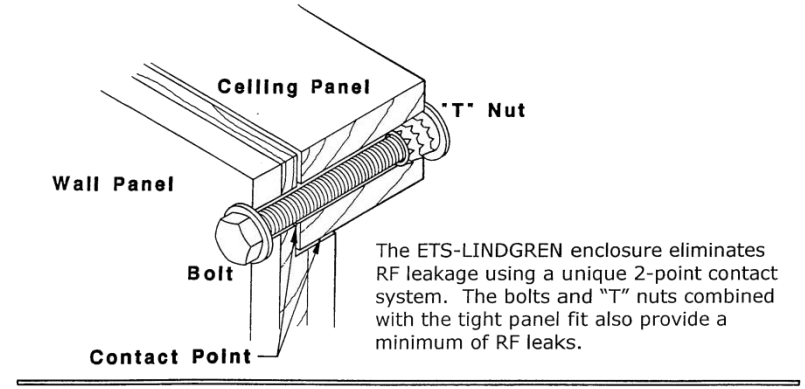
6.0 Correcting Leaks

CAUTION

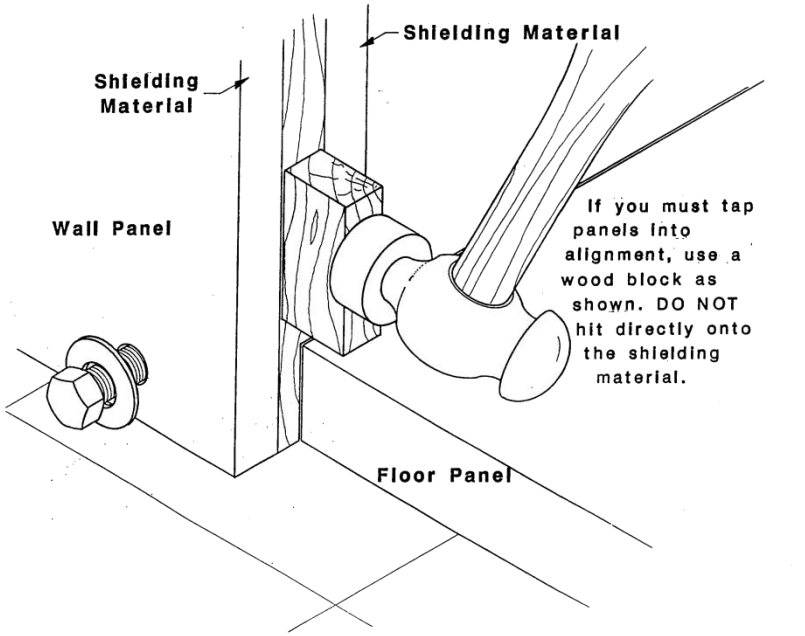
Before performing any maintenance, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

Aligning Panels

CAUTION **Never use a hammer directly on the shielding material.**



The ETS-LINDGREN enclosure eliminates RF leakage using a unique 2-point contact system. The bolts and "T" nuts combined with the tight panel fit also provide a minimum of RF leaks.

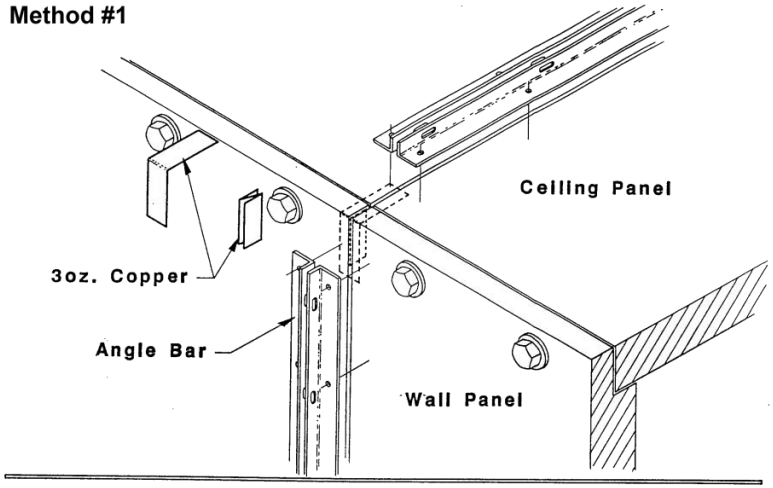


In Top and Side Panels

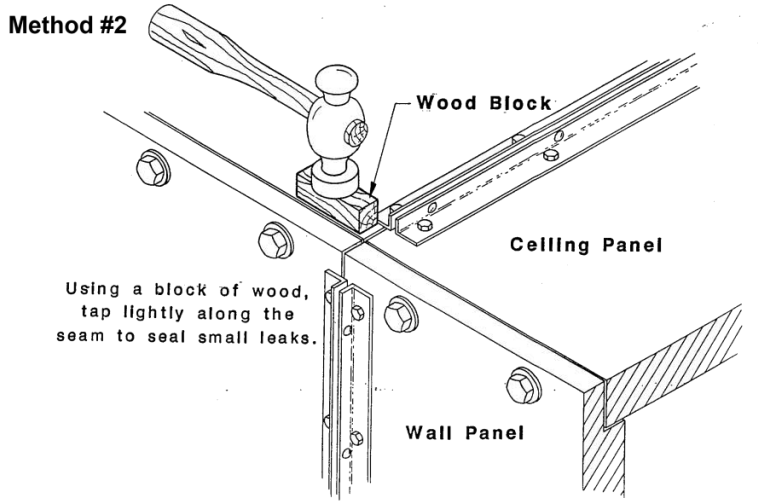
CAUTION **Do not fill the space between panels with any material other than what is specified here.**

Leaks can develop between the corners of two parallel top panels where they meet two parallel side panels. Following are two methods to correct these leaks.

Method #1

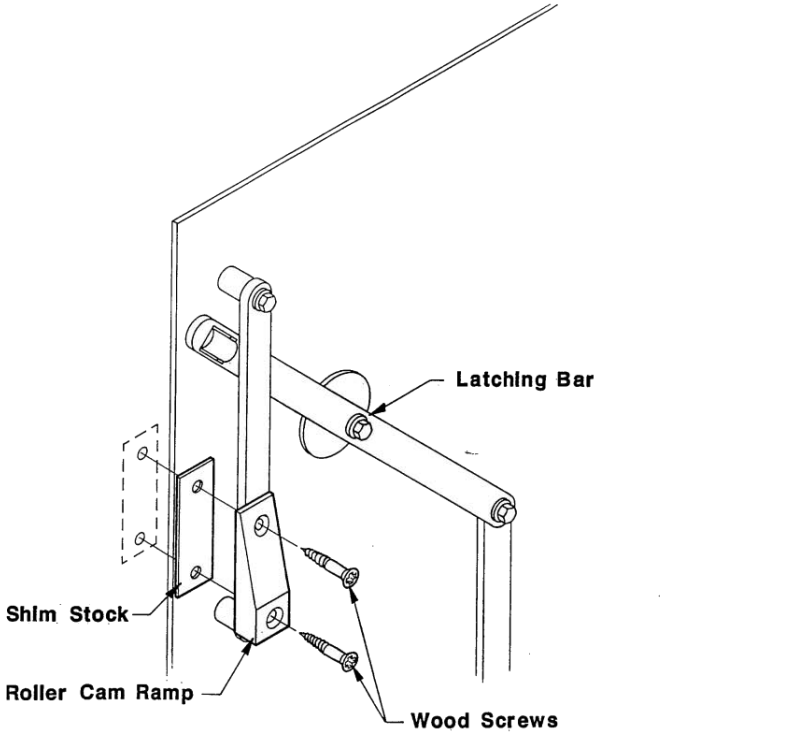


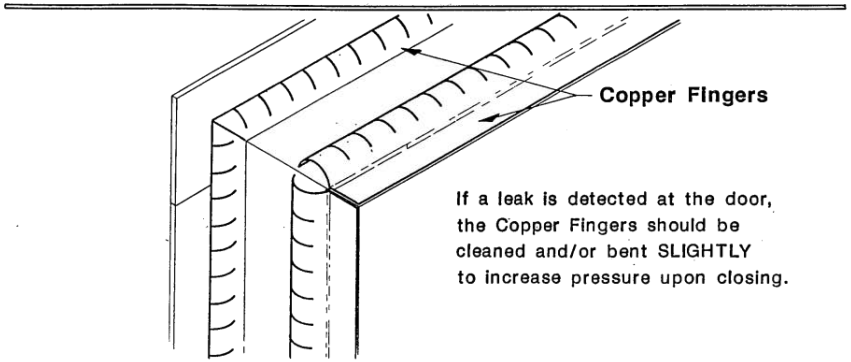
Method #2



- **Method #1—**If the RF leak is small, the space can be filled with folded 3 oz copper and covered with a second strip. Remove the angle bars, place the ends of the outer strip of copper beneath the bars, and then re-bolt them into place.
- **Method #2—**Tap along the seam with a block of wood and a hammer. There is no need to loosen any bolts or remove any hardware for this method. This method is also effective on 24 gauge or 26 gauge steel or 24 oz copper enclosures.

Around the Door





If a leak is detected at the door, the Copper Fingers should be cleaned and/or bent SLIGHTLY to increase pressure upon closing.

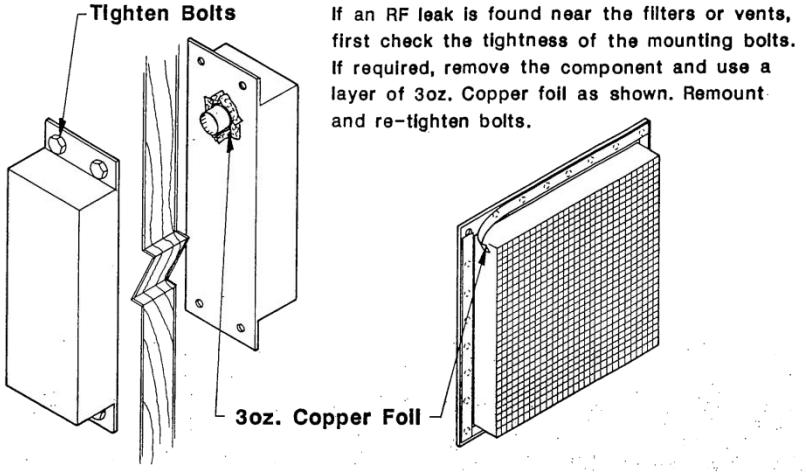
The door and jamb are crucial to the integrity of the Double Electrically Isolated (DEI) Enclosure. The following must be properly set up for the door assembly to be effective:

- The inner and outer shields must be separated electrically.
- The pressure of the three latching bars on the roller cam ramps must be firm and equal. Adjust the ramps as required; adding shim stock under the ramps can increase the pressure on the latching bar.
- The threshold of the doorjamb must be level. If necessary, use wood shims to level the threshold.

Around the Filters

WARNING

Only a certified technician should perform this procedure. Once the filters have been powered up, the charge stored inside is hazardous.



If a leak is detected at the filter location:

- Tighten the lag bolts that hold the filter to the panel.
- If a leak still exists, remove the filter and place 3 oz. copper around the feedthrough pipe and then re-mount the filter. Tighten the lag screws before re-testing.

These steps will also seal a leak on a bolt in a waveguide air vent (newer vents are soldered into place).

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7.0 Cleaning Contact Surfaces

CAUTION

Before performing any maintenance, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

Recommended Tools and Supplies

- Shield Isolation Indicator
- Small hand tools
- Abrasive pads
- Rubbing alcohol
- Clean rags
- Shim stock
- Stepladder
- Hammer
- Wood blocks
- 3 oz copper strips
- Wire brush
- Vacuum cleaner
- Power screw gun (optional)
- Ohmmeter (optional)

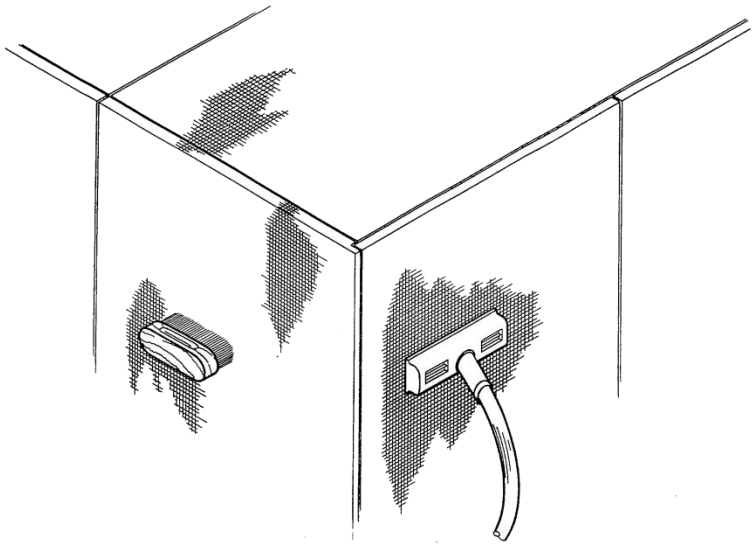
All Metal

- Due to the sensitive surface, use caution when cleaning a panel covered in 3 oz copper.
- Once cleaned, do not touch the edges with bare hands; the oil from bare hands can reduce contact between panels.

1. Use an abrasive pad to scrub the contact surfaces of each panel.
2. Use a clean rag dampened with rubbing alcohol or similar fluid to wipe any remaining particulate from the edges.

Screen Room

- It is recommended that the surface of a screen enclosure be cleaned every three months.
- Dust and dirt on a screen room will not affect RF integrity. However, visibility through the screen will be affected if build-up is severe.

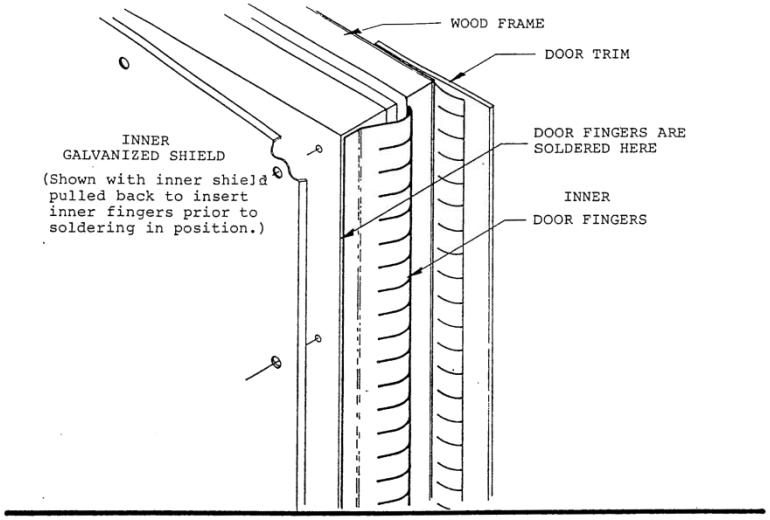


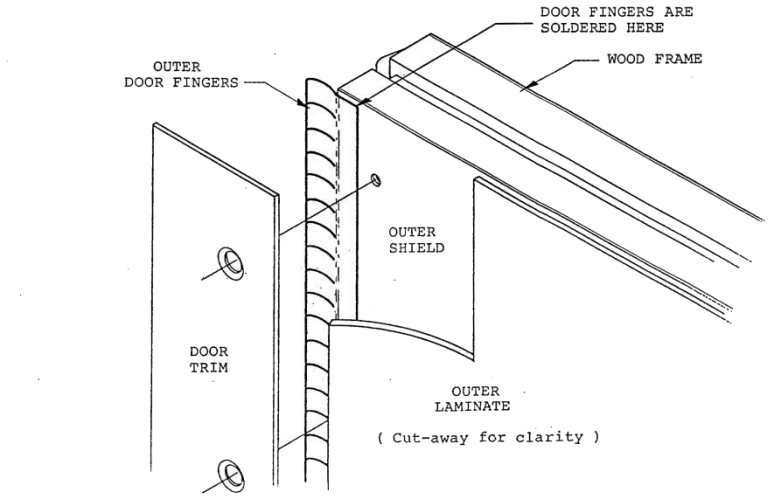
1. To clean the edges of a screen-covered panel, use a light steel brush to remove excess dirt before bolting panels into position.
2. Use a heavy-duty vacuum after brushing to remove any loose dirt from the contact surface.

8.0 Door Finger Replacement

CAUTION

Before performing any maintenance, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.





Recommended Tools and Supplies

- 500 W Soldering Iron
- New Finger Stock
- Flux
- 60/40 Solder
- Scraping Tool
- Denatured Alcohol

Outer Finger Replacement

(If included on the door) Take care to avoid damaging the backing foam and microwave absorber.

1. Take out all of the screws and remove the door trim.
2. Pull away only enough of the outer laminate to expose the damaged finger stock.
3. Using a soldering iron, heat the solder to remove the damaged finger stock.
4. Scrape the area to remove any old solder.
5. Before attaching the new finger stock, wipe down the area with denatured alcohol.
6. Apply flux to the new finger stock and the area to be soldered.
7. Align the new section of finger stock with the existing fingers and solder in place.
8. Scrape away excess solder.
9. Replace the laminate and door trim.

Inner Finger Replacement

(If included on the door) Take care to avoid damaging the backing foam and microwave absorber.

1. Remove the necessary screws to loosen the galvanized shield in the area of the damaged fingers.
2. Using a soldering iron, heat the solder to remove the damaged finger stock.
3. Scrape the area to remove old solder and wipe down with denatured alcohol.
4. Apply flux to the new finger stock and the area to be soldered.
5. Align the new section of finger stock with the existing fingers and solder in place.
6. Scrape away excess solder.
7. Replace the galvanized shield.

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9.0 3-Point Cam Latch Door Maintenance

CAUTION

Before performing any maintenance, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

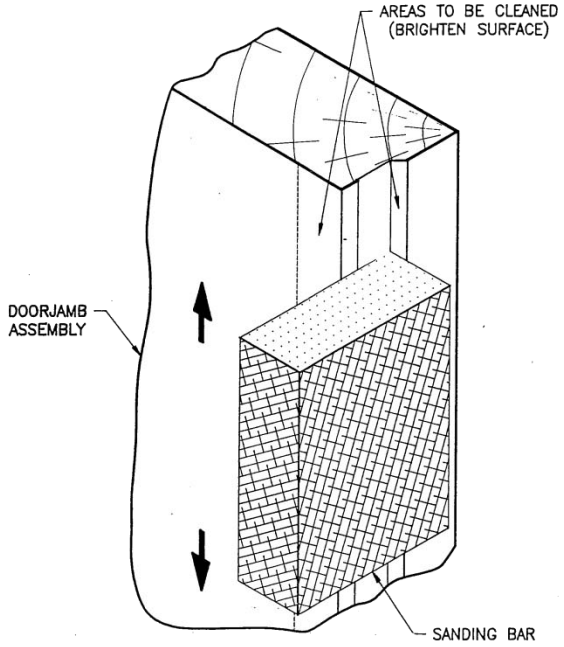
The door and jamb assembly on the Double Electrically Isolated (DEI) Enclosure is one of the most important components of the shielded enclosure, and was manufactured for maximum shielding effectiveness. The following careful and regular maintenance is required to maintain this high level of shielding.

Weekly

- Inspect door and jamb contact surfaces for signs of corrosion or contact finger damage.
- Wipe down fingers and sealing surfaces with a clean cloth dampened with denatured alcohol.

CLEAN DOORJAMB

Clean the brass (or galvanized steel) doorjamb using the provided sanding bar.

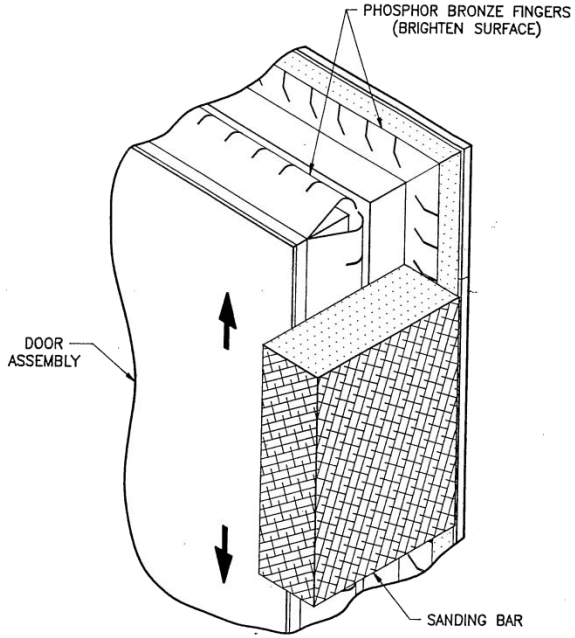


CLEAN CONTACT FINGERS

- To avoid damaging the contact fingers, move the sanding bar only in the direction shown.
- Do not clean these surfaces using an abrasive other than the provided sanding bar. Do not use power sanders to clean the contact surfaces.
- Avoid touching these surfaces after they have been cleaned; oils from skin will speed corrosion and reduce contact between the surfaces.
- Do not polish brass contact surfaces with brass polish. This will cause a severe reduction in shielding effectiveness.
- Do not oil the door hinges or mechanism; these components are permanently lubricated.

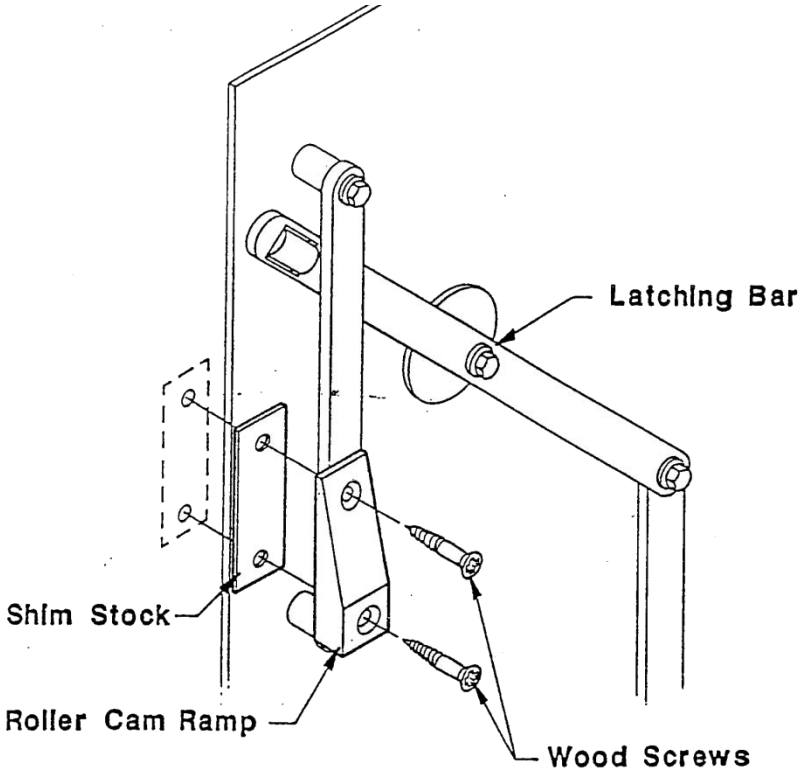
Clean the door contact fingers by brightening the contact surfaces.

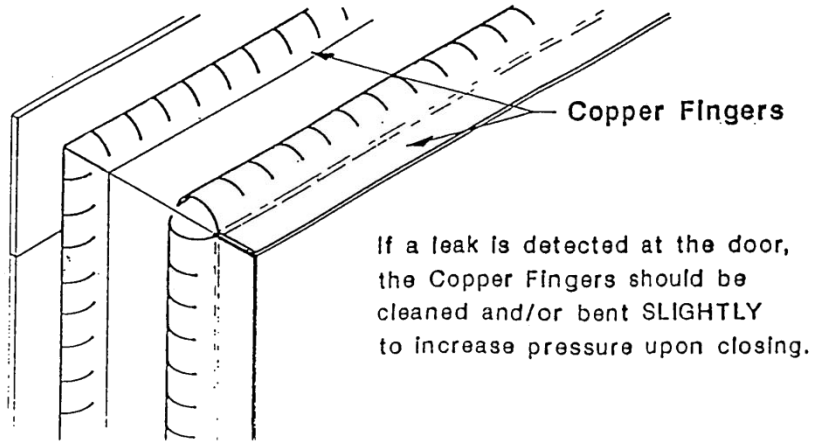
After brightening the contact fingers and doorjamb, wipe these surfaces clean using a cloth dampened with denatured alcohol.



Annually

- Inspect the door mechanism for wear. Contact ETS-Lindgren if any parts require replacement.
- For damage to the door contact fingers, see *Door Finger Replacement* on page 43.
- To seal properly, the door must close and seat evenly at all points. The three roller cam ramps and rollers hold the door tightly in place. If adjustment is required, add a thin piece of shim stock behind the ramp and replace it. This will increase the pressure on the roller and cause the door to sit tighter in the jamb at that point.





- If additional contact pressure is required, gently pull the phosphor bronze contact fingers.

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Appendix A: Warranty

See the *Product Information Bulletin* included with your shipment for the complete ETS-Lindgren warranty for your DEI enclosure.

DURATION OF WARRANTIES FOR DEI ENCLOSURE

All product warranties, except the warranty of title, and all remedies for warranty failures are limited to one year.

Door contact fingers are not included in the warranty.

Product Warranted	Duration of Warranty Period
Double Electrically Isolated (DEI) Enclosure	1 Year