

XX04 ISOLATION ASSEMBLY REFIT PROCEDURE

Approval:

Approving Authority	Signature	Date
Manager Engineering	(on file)	10-09-08
Sales Manager	(on file)	10-10-08
Service Manager	(on file)	10-14-08
Mechanical Engineer	Steven Lindholm	10-09-08

Revision History

Revision	ECO No	Description of Change	Date	Approval
X1	N/A	Initial release.	10-09-08	
A	N/A	Release for Production	10-14-08	

1.0 Purpose/Scope

This procedure outlines the steps required to access, secure, remove and replace the rubber isolators in Sea Tel 3004, 4004 or 5004 antenna installations. This procedure may be carried out while the antenna is on the installed platform.

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2.0 Background

The Sea Tel XX04 product line includes antenna pedestal assemblies which utilize rubber vibration isolators under the base spindle sub-assembly. The initial design specifies Sorbothane (a rubber with high damping coefficient) as the isolator material.

In some instances, these rubber isolators have failed. The cause of failure has been traced to material over-heating, where the temperature of the rubber has exceeded the maximum working temperature.

As a fix, Sea Tel has tested Silicone rubber isolators under controlled vibration and found this material provides acceptable damping and vibration isolation.

A retrofit kit (Sea Tel Part Number 127818-1) has been developed to replace the Sorbothane isolators with Silicone rubber isolators. Sea Tel should be contacted for the XX04 models for which this retrofit kit is applicable.

3.0 Tools Required

The following tools will be required to disassemble the isolation assembly and replace the isolators:

- Quantity (1) ratcheting socket drive handle, 3/8" square drive.
- Quantity (1) pivoting socket drive handle, 3/8" square drive.
- Quantity (2) 6" (300 mm) long drive extensions, 3/8" square drive.
- Quantity (1) 7/16" shallow socket, 3/8" square drive.
- Quantity (1) 5/32" hex drive socket, 3/8" square drive.
- Quantity (1) 7/16" open end or combination wrench.
- Quantity (1) 9/16" open end or combination wrench.
- Quantity (1) 5/8" open end or combination wrench.
- Quantity (1) 1/2" 75° offset open end wrench (1/2" open end ignition wrench)
- Quantity (1) 5/32" hex allen wrench.
- Quantity (1) measuring tape or machinist's scale.
- Quantity (2) 1/4-20 x 1 inch (25 mm) long hex head cap screws.
- Quantity (1) Shipping Support, Cross-Level, XX04, Sea Tel P/N 123950-1
Consisting of:
 - P/N123952 – (1) Bar, Shipping Support, XX04
 - P/N 117645-2 – (2) Isolator Stops, 1 in
 - P/N 114592-552 – (2) Studs, 1/4-20 x 2-1/2 long
 - P/N 114582-029 – (4) Nut, Hex, 1/4-20, S.S.

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- Quantity (1) Tool, Jacking, Isolation Assy Refit, Sea Tel P/N 129146-1
Consisting of:
 - P/N 129147-1 – (1) Plate, Jacking
 - P/N 129148-25 – (3) Mount, Swivel Leveling
 - P/N 114622-553 – (3) Screw, Hex, 1/4-20 x 2.75 long
- Quantity (1) Tool, Rod End Retaining, Sea Tel P/N 129028-1
- A set of SAE (inch) feeler gauges in increments of thousandths of an inch.

NOTE: The Rod End Retaining Tool (P/N 128028-1) and the Isolation Assy Refit Jacking Tool (P/N 129146-1) are not included in the retrofit kit (P/N 127818-1) and should be ordered separately from Sea Tel.

The following additional tools may be required to facilitate disassembly:

- Hammer, plastic non-marring.
- Knife, fixed or locking blade.
- Wrench, Vise-Grip™ or equivalent locking jaw.
- Pliers, adjustable (spanner).
- Extension, socket wrench handle
- Drift, 1/4 inch or 7 mm

4.0 Procedure

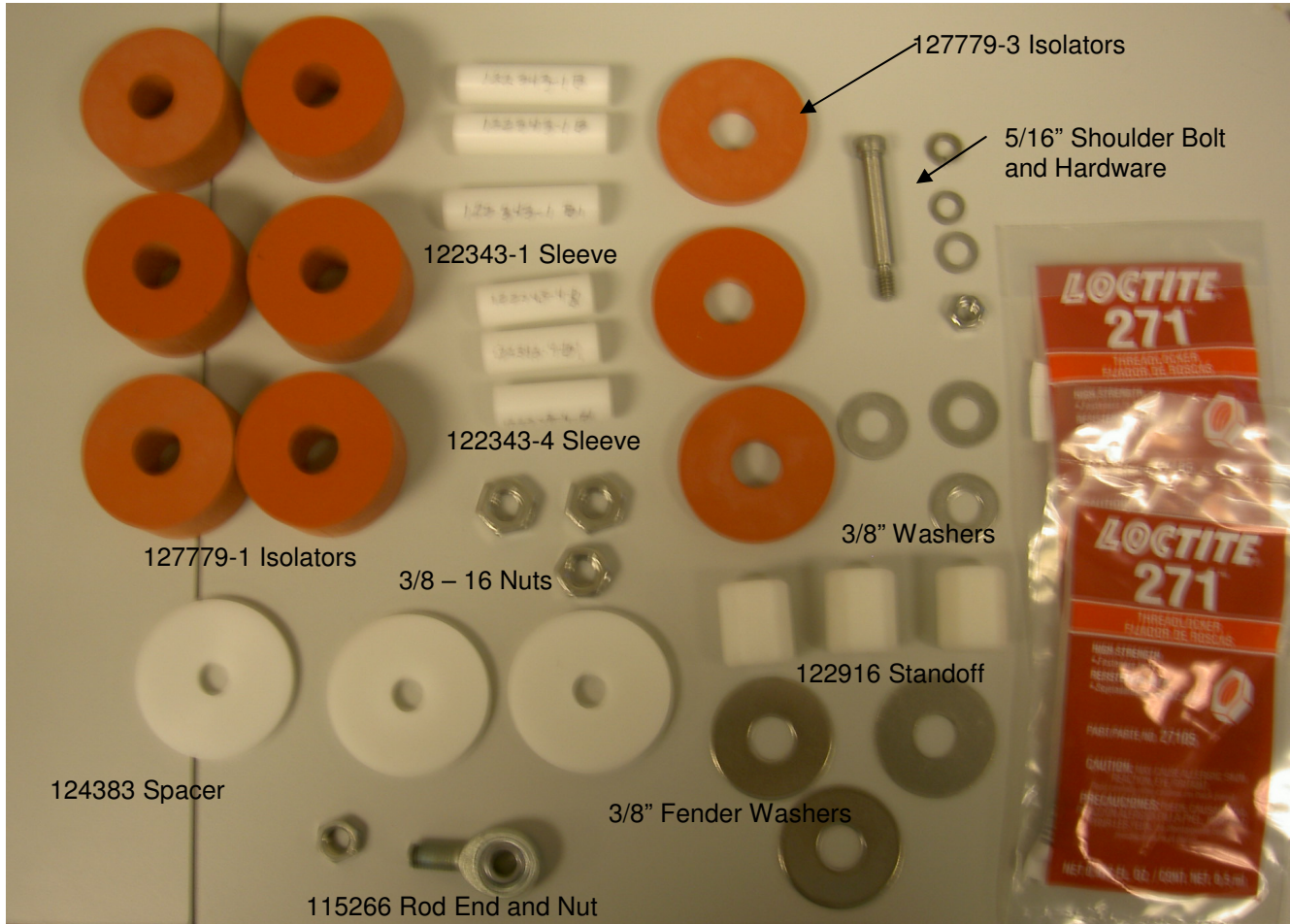
- 4.1. Upon receipt of the retrofit kit (P/N 127818-1), the kit should be opened and the components verified. The kit should contain the following parts:

Part Number	Description	Quantity
114582-031	Nut, Hex Jam, 3/8-16, S.S.	3
114582-130	Nut, Hex Jam, 5/16-24, S.S.	1
122343-1	Sleeve, .28 ID x .58 OD x 1.97 in, Delrin	3
122343-4	Sleeve, 0.28 ID x .58 OD x 1.44 in, Delrin, 5004	3
114625-116	Washer, Fender, 3/8 in, 18-8 S.S. (2 in OD x 13/32 in ID)	3
115266	Rod End Mod, .313 Bore, High Strength	1
119895-587	Bolt, Socket Head Shoulder, 5/16 Dia. x 1-1/2 in Long, S.S.	1
114583-029	Nut, Hex, 1/4-20, S.S.	1
114580-027	Washer, Flat, 1/4 in, Small Pattern, S.S.	1
114581-029	Washer, Lock, 1/4 in, S.S.	1
114581-039	Washer, Flat, 5/16 in, Small Pattern, S.S.	1
122916	Standoff, Hex, F/F, 3/8-16 x .75 OD x 1, Delrin	3
114580-038	Washer, Flat, 3/8, S.S.	3

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124383	Spacer, .41 ID x 2.0 OD x .180, Delrin	3
127779-3	Isolator, 1.95 in OD x .30 Thick	3
127779-1	Isolator, 1.95 in OD x 1.00 Thick	6
117319-10	Loctite™ 271 Threadlocker, 0.5 ml	2
129149	XX04 Isolation Assembly Refit Procedure	

A photograph of the kit components as shipped is provided below for reference.



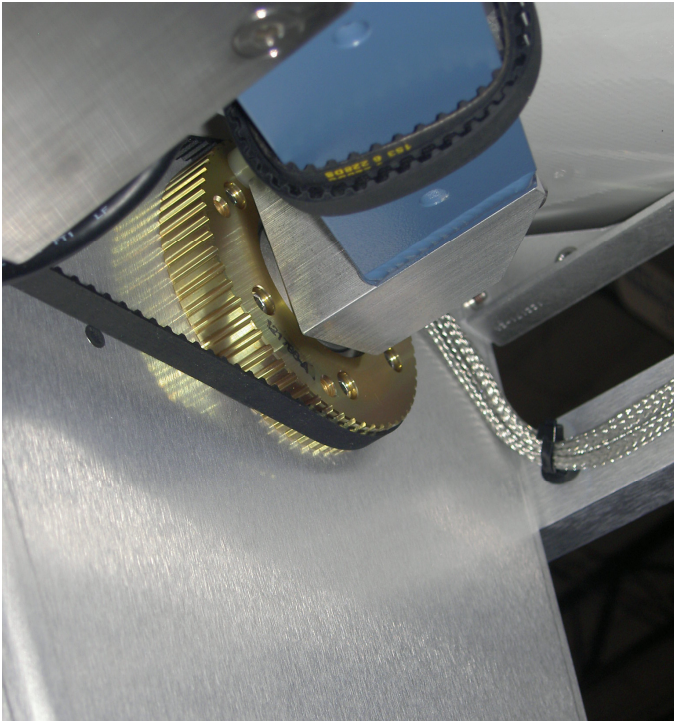
Photograph 1 - Retrofit Kit 127818-1 Contents

- 4.2. Before attempting this retrofit, the installer shall ensure all power is secured (turned off) to the antenna and communications have been terminated. This retrofit should only be attempted while the vessel is tightly moored alongside a quay and in a sheltered location. This retrofit should not be attempted in high winds or in any swell.

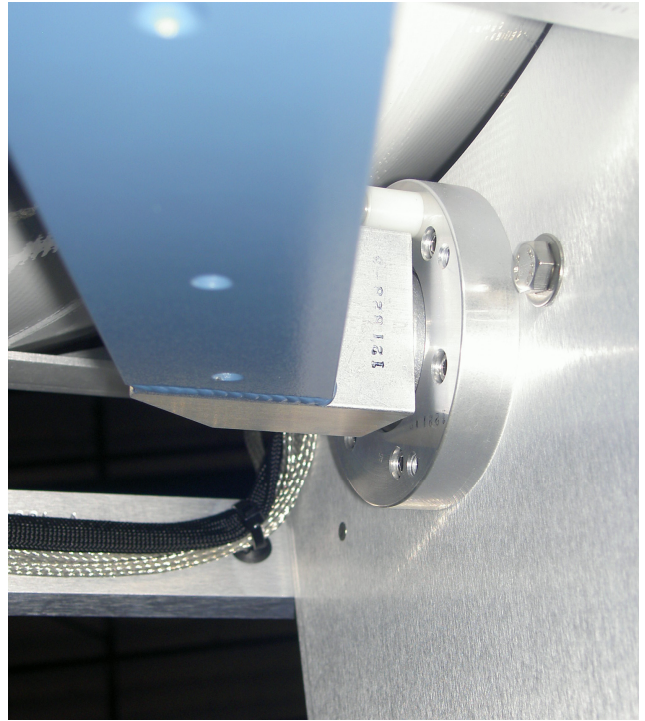
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- 4.3. The installer shall bring the kit and required tools to the location of the 3004/4004/5004 antenna radome. The access hatch to the radome shall be opened by turning the seven (7) latch fasteners 180 degrees counter-clockwise with a 5/32" hex allen wrench. The access hatch can then be lowered away from the radome base and either stowed on deck/mast platform or in the base of the radome (preferred).
- 4.4. The installer shall enter the radome and gently rotate the antenna reflector past the 90 degree elevation position (perpendicular to the azimuth post) onto the high elevation stop (see photographs 2 and 3). Thread in two (2) 1/4"-20 x 1 inch (25 mm) long bolts into the lower threaded holes below the elevation pivot bearings (see photographs 4 and 5).
- 4.5. Assemble the Cross Level Shipping Support (P/N 123950-1) by the following steps:
- Thread by hand the (2) isolator stops (P/N 117645-2) onto the two (2) 1/4 -20 x 2-1/2 inch long studs.
 - Thread by hand two (2) 1/4 -20 hex nut onto each 1/4 -20 x 2-1/2 inch long stud. Ensure the nuts are close to the isolator stops.
 - Pass the two (2) 1/4 -20 x 2-1/2 inch long studs through the shipping support bar (P/N 123952) at each provided hole until the hex nuts are touching the shipping support bar.
 - Thread by hand one (1) 1/4 -20 hex nut until the nut contacts the isolator stop on each 1/4-20 x 2-1/2 long stud.
- 4.6. Install the Cross Level Shipping Support as follows:
- Slide the shipping support bar along the underside of the cross level beam and through the cross level yoke. Adjust the location of the shipping support so that an even amount of the support is visible on each side of the yoke.
 - Extend the 1/4 -20 x2-1/2 inch long studs so each isolator stop touches the cross level beam and the support bar is resting in the cross level yoke by adjusting the lower 1/4-20 nut downward on the stud.
 - Thread the upper 1/4 -20 hex nuts up to touch the isolator stops.
 - With a 7/16 inch open wrench, tighten the lower 1/4 -20 hex nuts while preventing the 1/4 -20 x 2-1/2 inch stud from turning until the isolator stops are snug on the bottom of the cross level beam. Using the 7/16 inch open end wrench, tighten the lower 1/4 -20 hex nuts firmly against the shipping support bar.

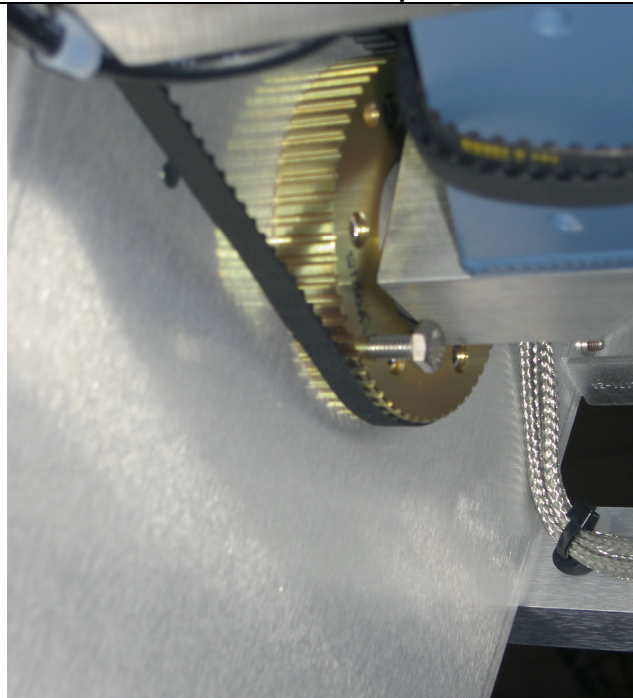
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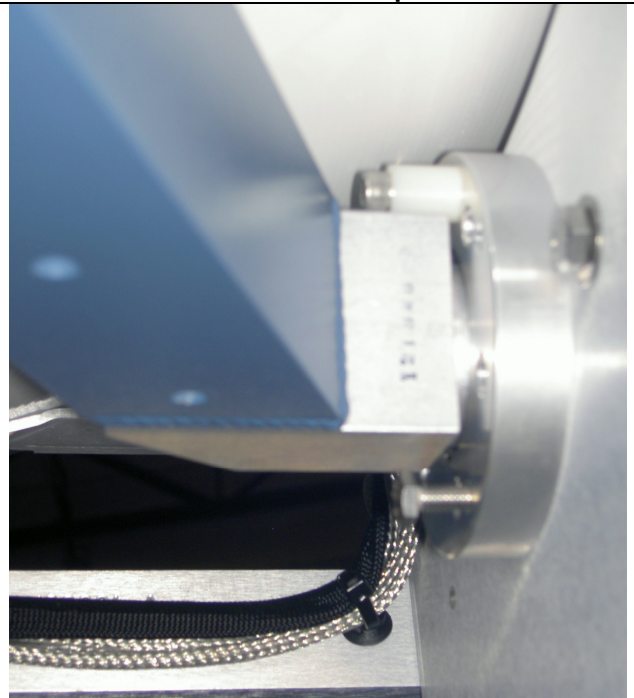
Photograph 2 - Left Elevation Bearing on High Elevation Stop



Photograph 3 - Right Elevation Bearing on High Elevation Stop



Photograph 4 - 1/4 - 20 Screw Inserted into Left Elevation Bearing

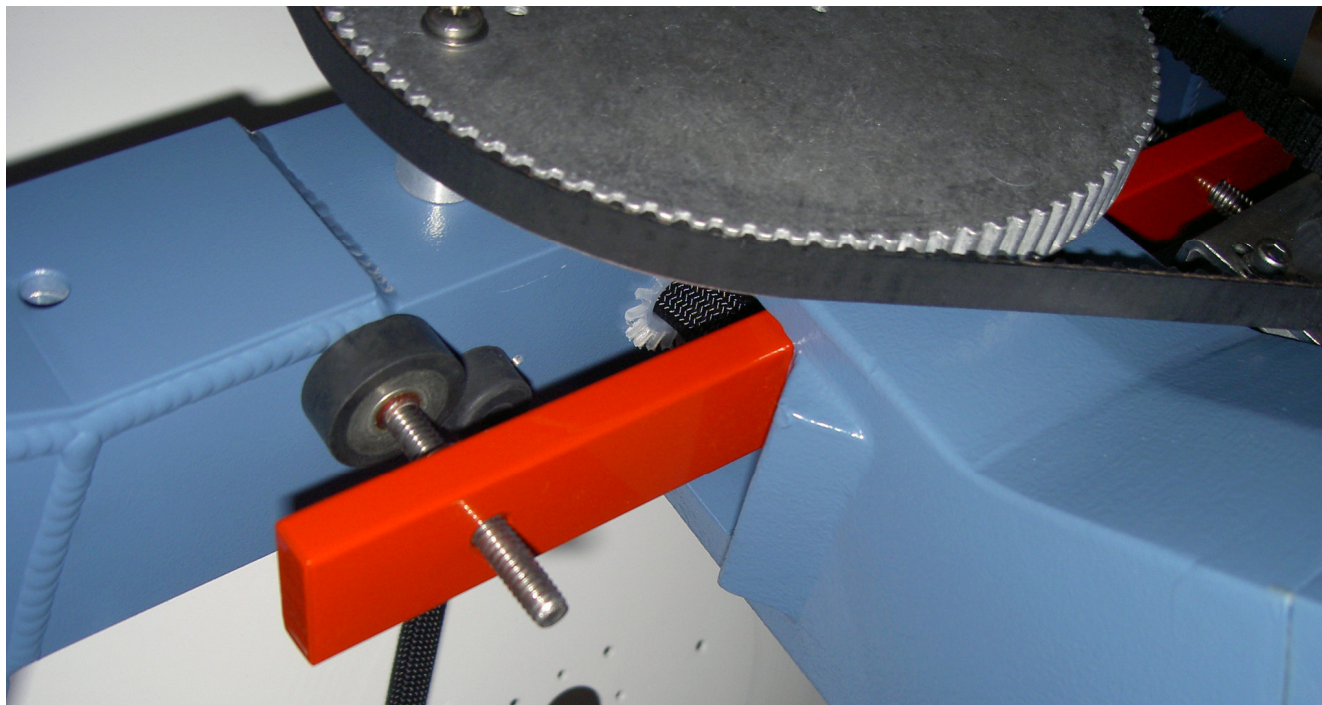


Photograph 5 - 1/4 - 20 Screw Inserted into Right Elevation Bearing

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Reference Sea Tel Drawing 123950 (at the end of this procedure) and see photographs 6 and 7 for the proper appearance after installation.

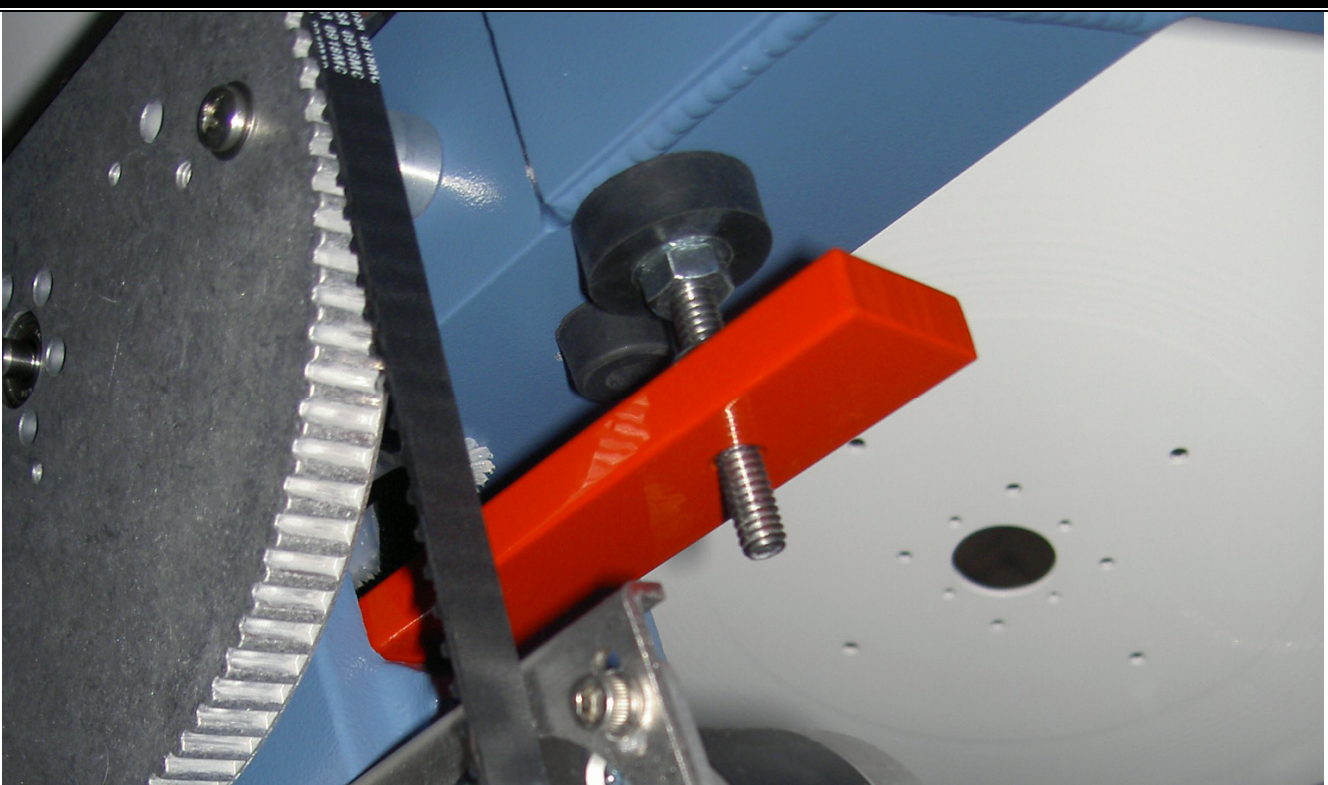
During installation of the Cross-Level Shipping Support, take care not to pinch or crimp the wiring harness extending through the cross-level in way of the yoke.



Photograph 6 - Cross-Level Shipping Support, Left Side View

- 4.7. Loosen the 5/16-18 nut on the rod end retaining bolt by engaging the Rod End Removal Tool (P/N 129028-1) at the end of a 6 inch (300 mm) socket extension on the retaining bolt nut. Engage the 75° offset head of the 1/2" offset open end wrench on the head of the 5/16-18 rod end retaining bolt. Loosen the nut by applying force to a ratcheting socket drive on the extension while holding the bolt head from rotating by use of the offset wrench. Remove the nut and discard. Reference Sea Tel drawing 122286 (at the end of this procedure) for the exploded view of the Isolation Assembly and the relative position of the rod end retaining hardware.

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Photograph 7 - Cross-Level Shipping Support, Right Side View

Note: Sea Tel commonly uses Loctite™ brand thread locking compounds to prevent threaded fasteners from becoming loose under vibration. Higher torque may be necessary to loosen fasteners secured using Loctite™ thread locking additive. Fasteners to which Loctite™ thread locking compounds have been applied should not be reused and should be discarded.

- 4.8. Partly assemble the Isolation Assembly Refit Jacking Tool (P/N 129146-1) as follows:
- Thread one (1) ¼ -20 x 2.75 inch long hex head screw (P/N 114622-553) through the nut at the wide section of the jacking plate (P/N 129147-1) as shown in photograph 8.
 - Thread one (1) swivel leveling mount (P/N 129148-25) onto the protruding end of the screw. Tighten the swivel leveling mount onto the screw end using a 7/16 inch open end wrench.
 - Turn the ¼ -20 x 2.75 inch long screw until the jacking plate rests on the swivel leveling mount.

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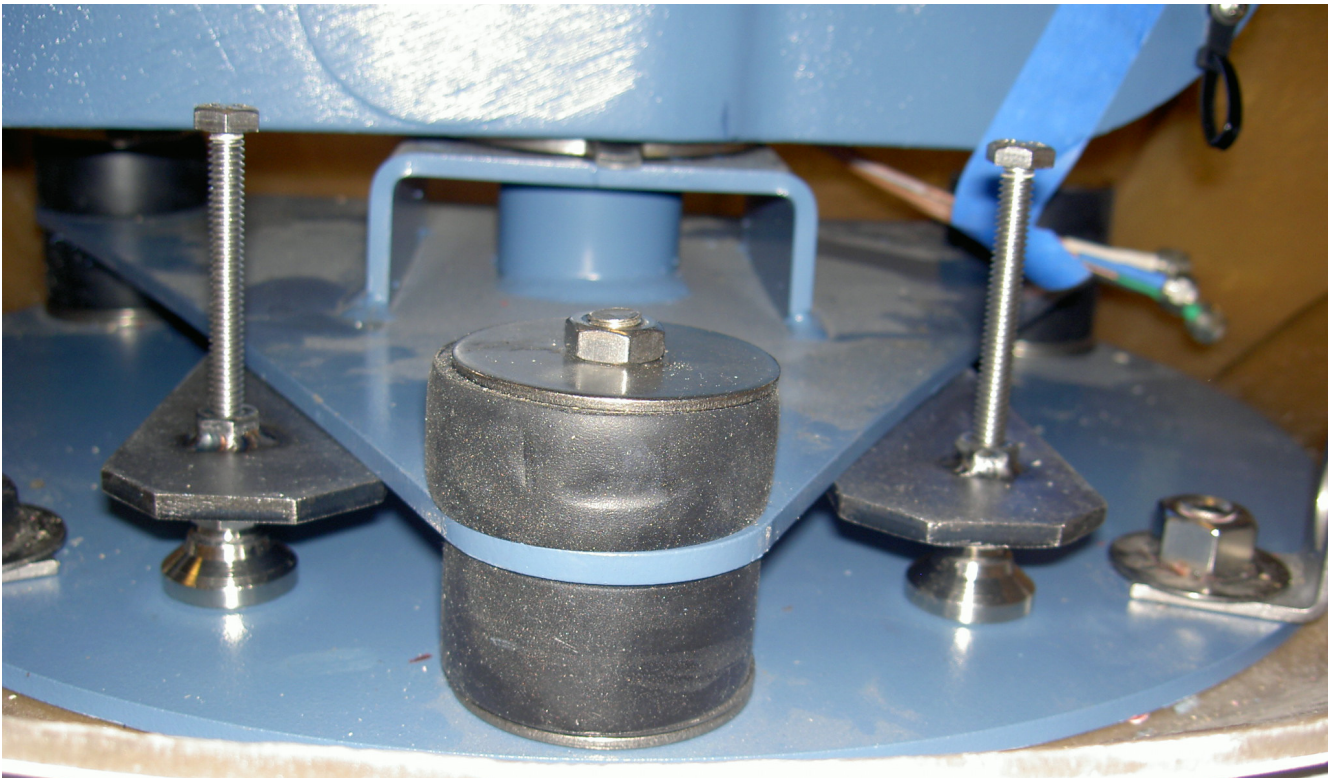


Photograph 8 - Partly Assembled Jacking Tool

- 4.9. Pass the partly assembled Isolation Assembly Refit Jacking Tool around the far side of the base plate from the access hatch and under the cables. Slide the forks of the jacking plate under the triangular spindle base plate weldment until the two (2) nuts on the forks are clear of the weldment.
- 4.10. Finish assembling the Isolation Assembly Refit Jacking Tool as follows:
- Lift the jacking plate so the upper plate surface touches the underside of the triangular spindle base plate weldment.
 - Slide two (2) swivel leveling mounts under the jacking plate approximately in-line with the nuts on the forks. Lower the jacking plate onto the swivel leveling mounts.
 - Thread two (2) $\frac{1}{4}$ -20 x 2.75 long hex head screws into the nuts in the forks of the jacking plate until the threads appear below the underside of the jacking plate.
 - Thread the two (2) swivel leveling mounts onto the two (2) $\frac{1}{4}$ -20 x 2.75 long hex screws. Extend the screws and continue to tighten the mounts until the screw bottoms in the mounts. Finish tightening with the $\frac{7}{16}$ inch open end wrench.

See photograph 9 for the finished tool in position.

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Photograph 9 - Jacking Tool in Position

- 4.11. Center the Isolation Assembly Refit Jacking Tool under the triangular spindle base plate weldment as evenly as possible. Turn each $\frac{1}{4}$ -20 x 2.75 long hex screw until the upper surface of the jacking plate is in full contact with the underside of the triangular weldment with a $\frac{7}{16}$ inch socket attached to a ratcheting socket wrench handle. Ensure no noticeable gaps may be observed above the jacking plate and each screw has a relatively similar amount of tension.
- 4.12. Loosen and remove the three (3) $\frac{3}{8}$ -16 hex jam nuts above the three (3) rubber isolators using the $\frac{9}{16}$ inch open end wrench. Remove the three (3) $\frac{3}{8}$ inch fender washers and the upper three (3) rubber isolators. Note the size of the rubber isolators – there are two configurations.
 - Configuration -1 has three (3) 1.0 inch high rubber isolators on the top and a 1.97 inch long Delrin sleeve over the $\frac{3}{8}$ -16 x 2.63 inch long stud.
 - Configuration -2 has three (3) 0.30 inch high rubber isolators on the top and a 1.44 inch long Delrin sleeve over the $\frac{3}{8}$ -16 x 2.63 inch long stud.

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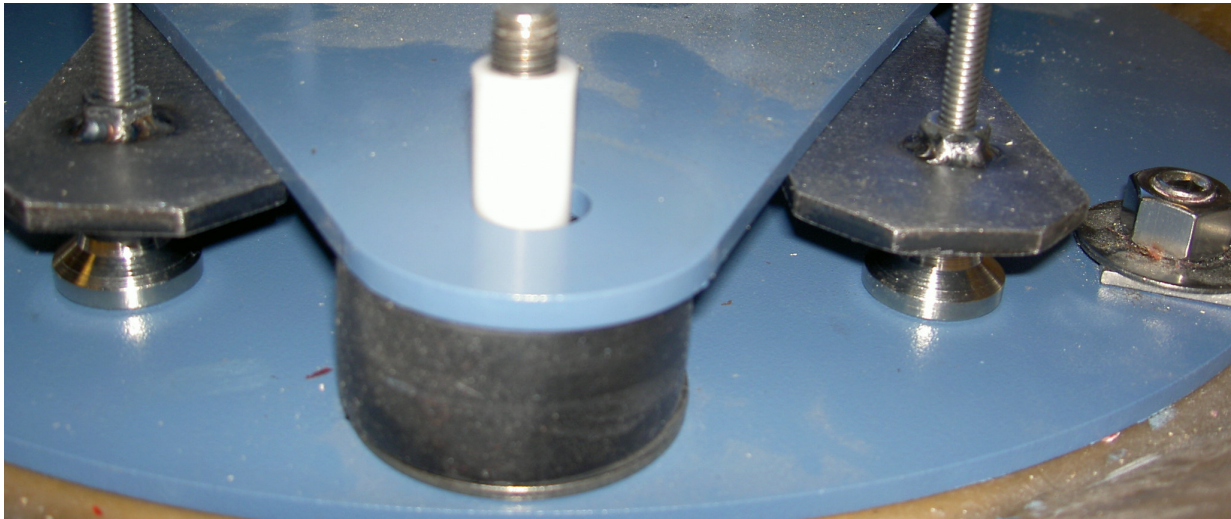
Note the installed configuration for proper part retrofit. If the isolators have deteriorated beyond identification, the configuration can be determined from the length of the Delrin sleeve.

Circle the correct configuration:

-1 (1.0 isolator/1.97 sleeve)

-2 (0.30 isolator/1.44 sleeve)

Remove the three (3) Delrin sleeves from the 3/8 – 16 studs. Retain these sleeves for identification of the proper parts in the retrofit kit.

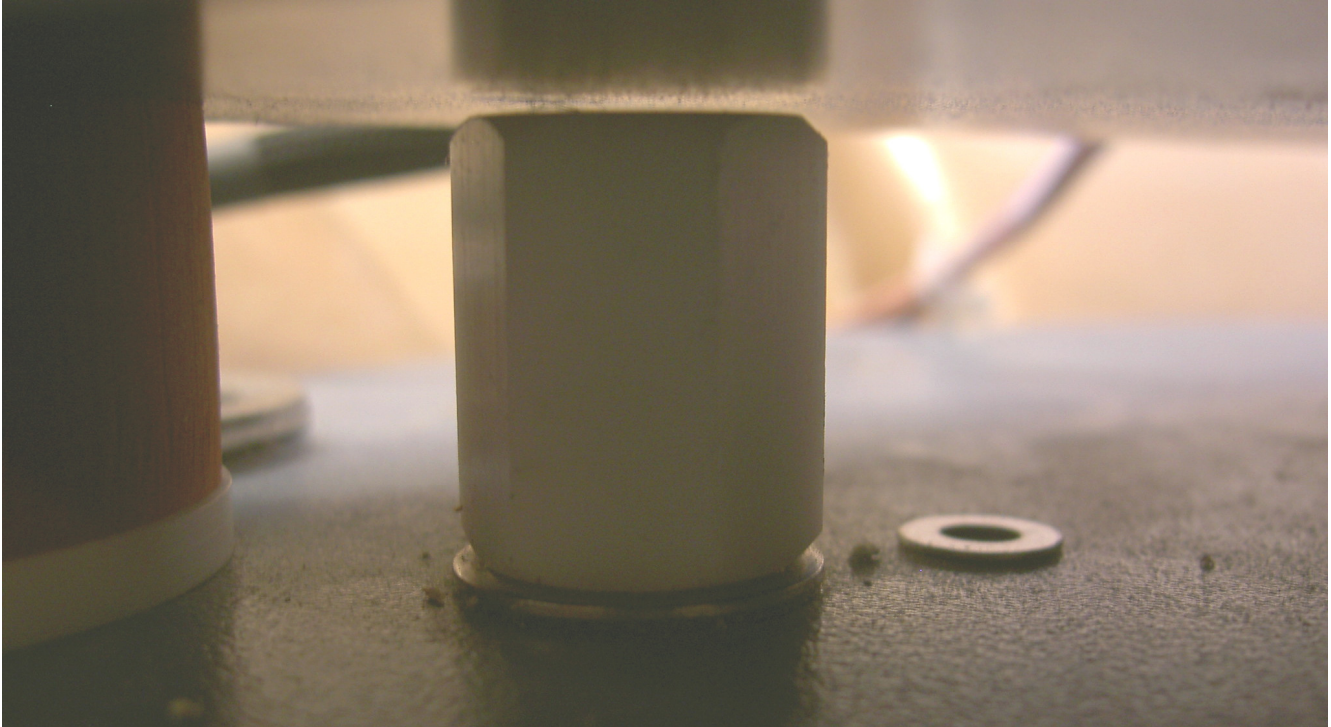


Photograph 10 - Upper Isolator Removed (-1 Sleeve on Stud)

- 4.13. Tighten each 1/4 -20 x 2.75 long hex screw about 1-1/2 turns. Each screw must be turned a similar amount in relation to the other screws. Reach under the jacking tool and remove the rod end retaining bolt. Turn each 1/4 -20 x 2.75 long hex screw an additional 1/2 turn in sequence until the rod end retaining bolt can be removed easily. Do not exceed 2-1/2 turns before removing the retaining bolt. If necessary, use a 1/4" (or 7 mm) drift and a non-marring hammer to ease the retaining bolt from the rod end clevis.
- 4.14. After removal of the rod end retaining bolt, continue jacking the pedestal upwards in 2 turn steps – turning each 1/4 -20 x 2.75 inch long hex screw in sequence a similar amount – until the underside of the jacking tool is approximately 2-1/2 inches (64 centimeters) above the top of the base plate. Confirm this height is not exceeded with a measuring tape or machinist's scale. It may be necessary to steady the pedestal with one hand and rotate the pedestal on the azimuth drive to continually access the jacking bolts.

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- 4.15. Inspect the condition of the $\frac{3}{4}$ inch OD x 1 inch long Delrin hex standoffs (see Photograph 11). Remove and replace with new washers (P/N 114580-038) and standoffs (P/N 122916) as provided in the kit if damaged, discolored or distorted.



Photograph 11 - Hex Standoff in Position

- 4.16. Inspect the condition of the Rod End (See Photograph 12). Remove and replace with a new rod end (P/N 115266) and 5/16 -24 jam nut (P/N 114582-130) as provided in the kit if the threads appear 'necked' (thinned), the clevis is out-of-round (oval or stretched) or if the nut is slack. **Please contact Sea Tel for additional advice on the procedure to remove and replace the Rod End.**
- 4.17. Remove and discard the three (3) lower rubber isolators. Remove and discard the three (3) Delrin spacers under the lower rubber isolators.

Circle Configuration: -1 (long sleeve)

 -2 (short sleeve)

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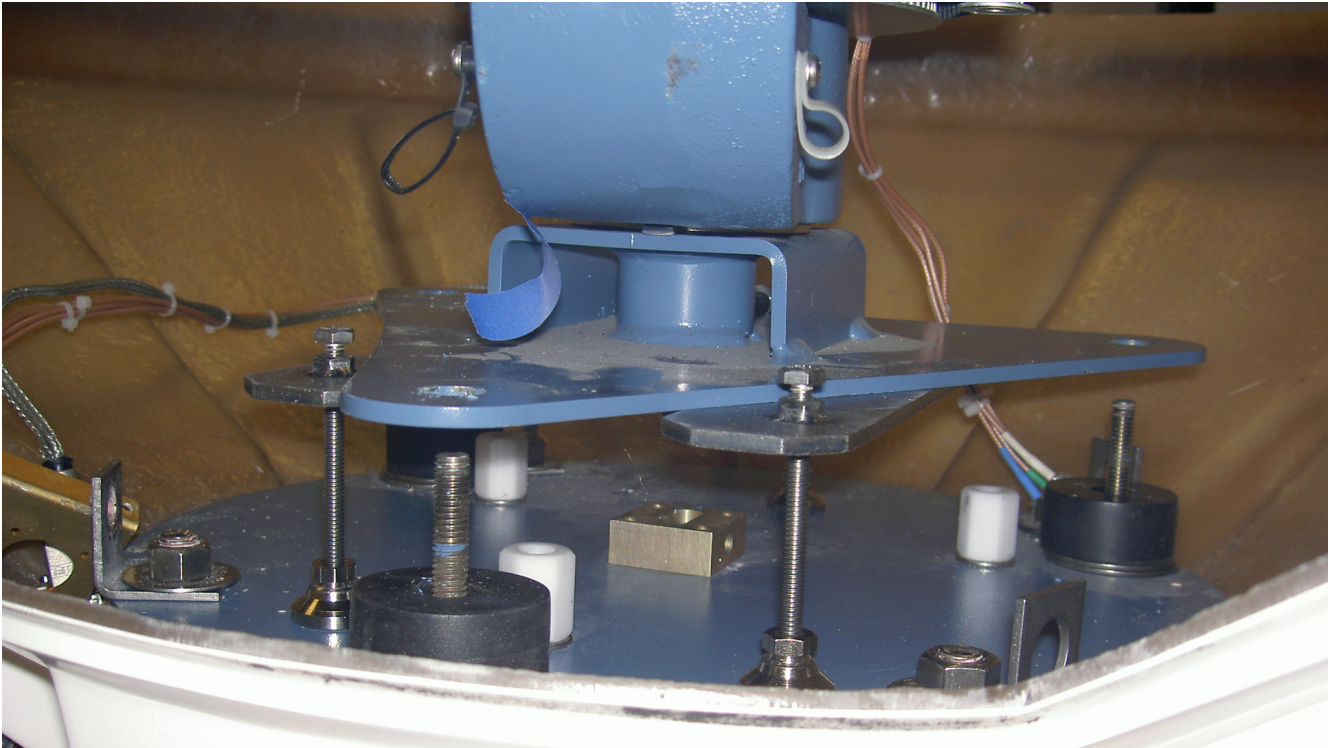


Photograph 12 - Rod End In Position

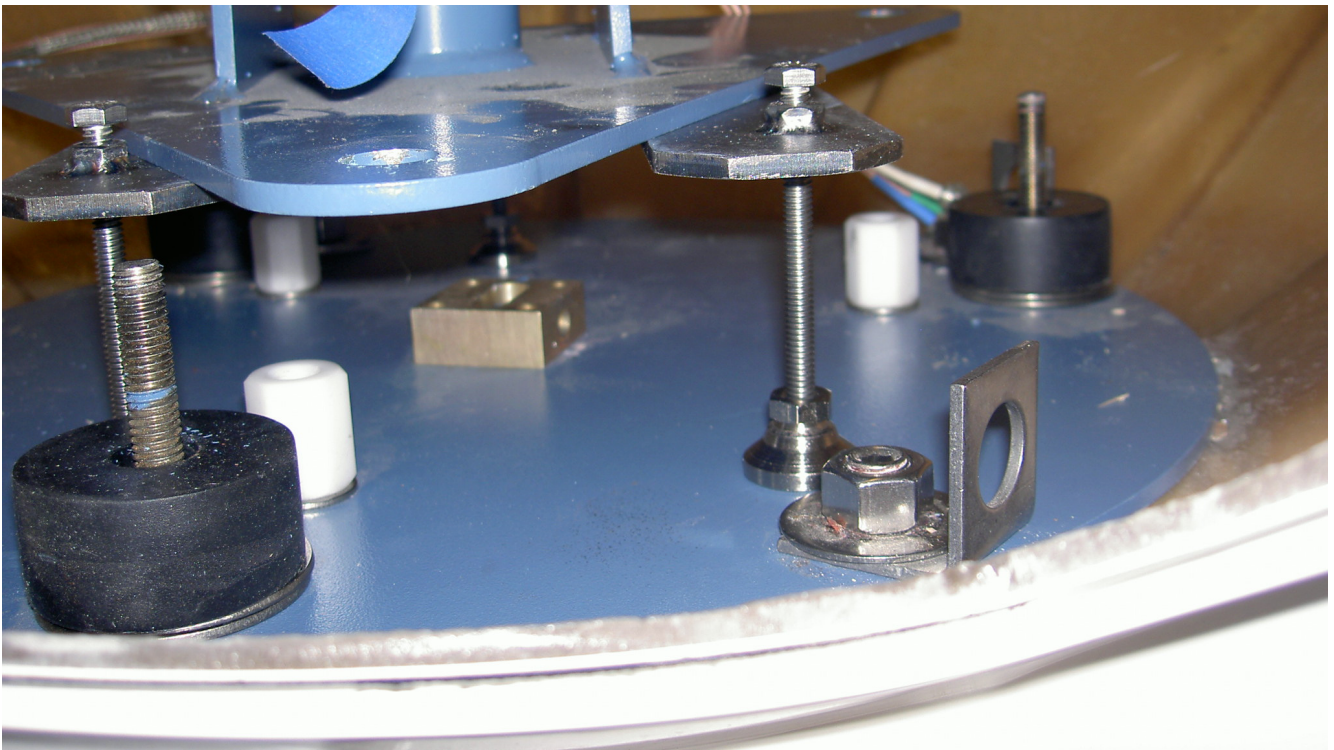
In order to remove the three (3) rubber isolators and Delrin spacers, the spindle base plate weldment may need to be rotated relative to the lower plate. This should be done carefully, as the mass of the pedestal is supported now on the jacking tool. Rotate the spindle base plate weldment in conjunction with the jacking tool just enough to allow the 3/8 – 16 isolator studs and rubber isolators to be clear of the spindle base plate weldment plate – see photographs 13 and 14.

- 4.18. Insert three (3) new Delrin spacers (P/N 124383) onto the 3/8 -16 isolator studs.
- 4.19. Insert three (3) new 1.0 inch high silicone rubber isolators (P/N 127779-1 – salmon colored) over the Delrin sleeves – see photograph 15.

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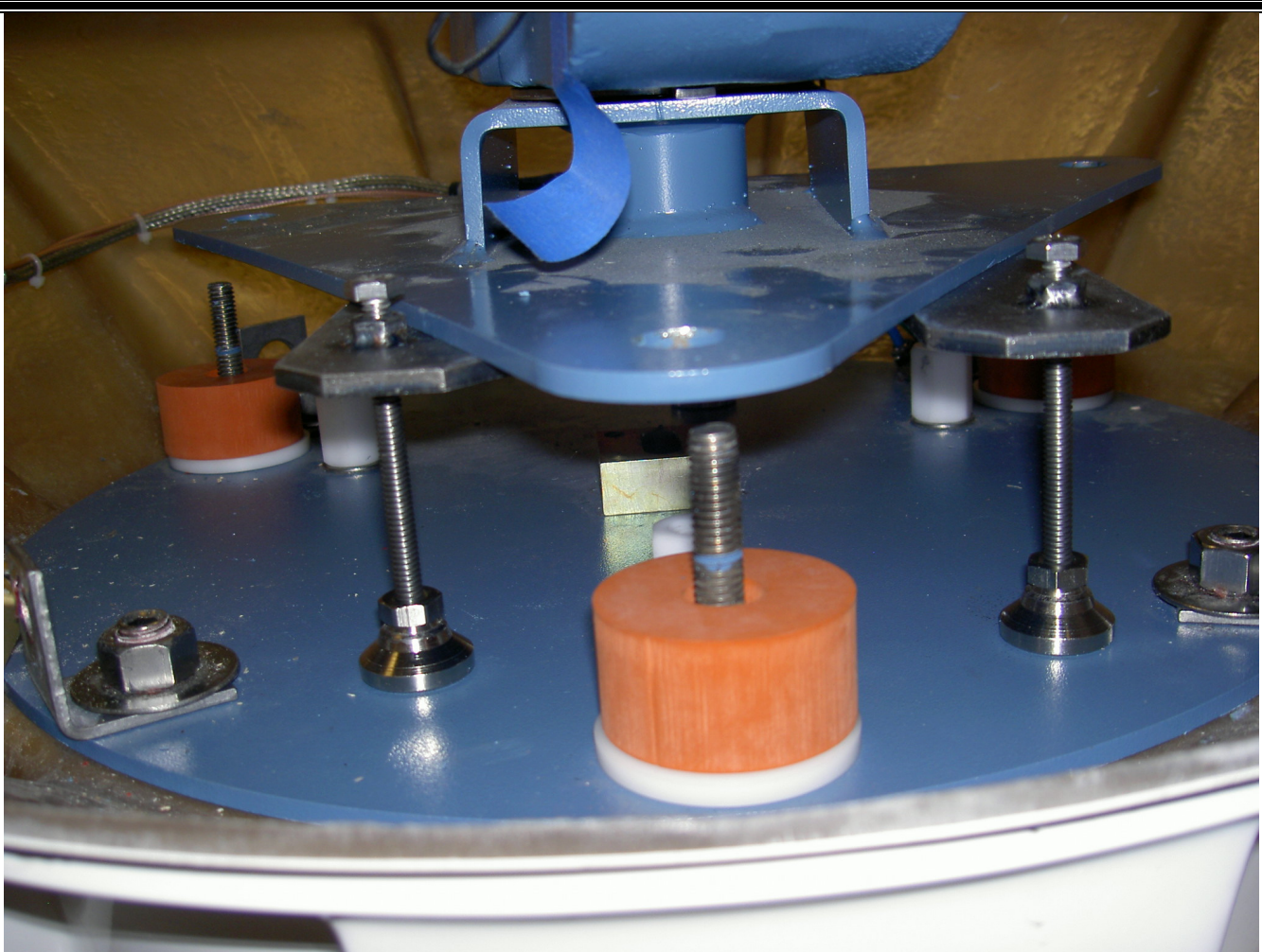


Photograph 13 - Spindle Base Weldment in the Raised Position



Photograph 14 - Spindle Base Weldment Rotated to Clear Isolators

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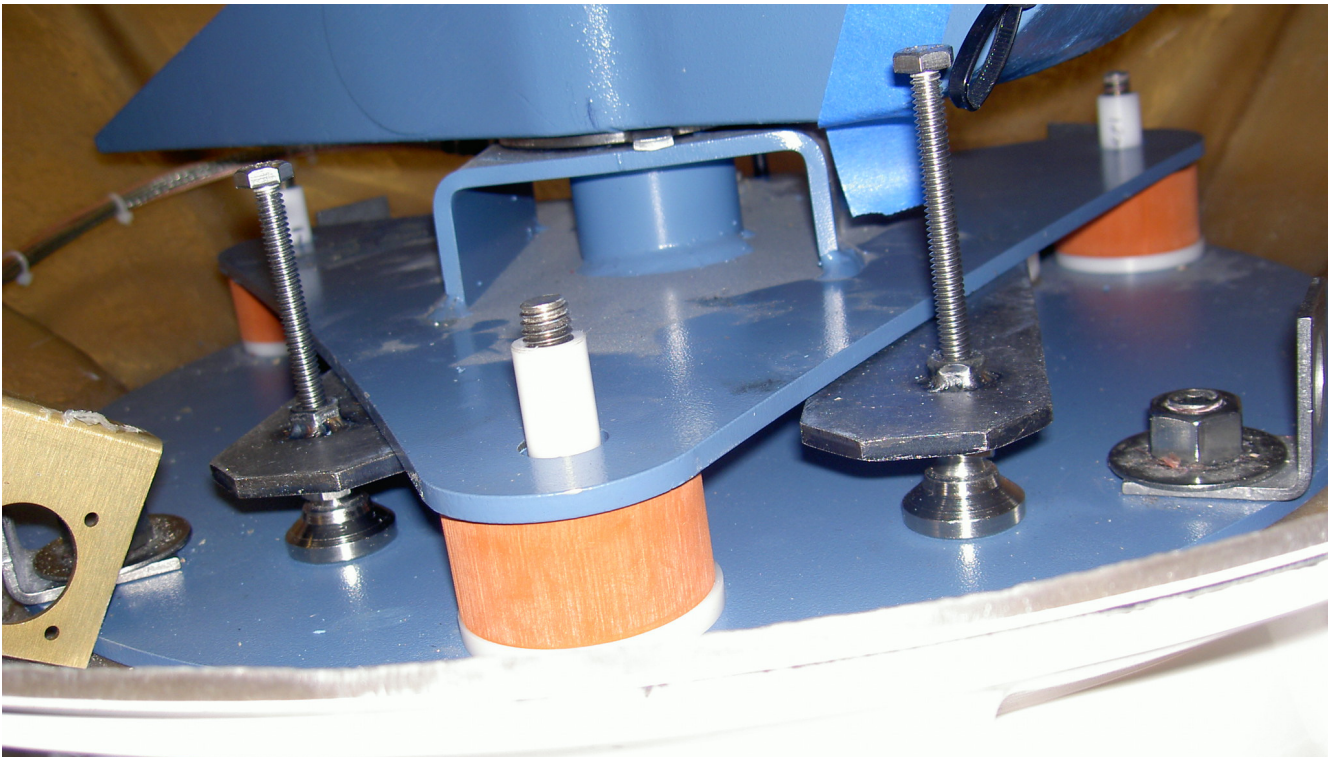


Photograph 15 - New Silicone Isolators in Place

- 4.20. Rotate the spindle base plate weldment back into alignment with the 3/8-16 isolator studs. Carefully lower the pedestal by loosening the three (3) 1/4 -20 x 2.75 inch long hex screws of the jacking tool. Each screw should be loosened not more than 2 turns per step, with each screw being turned sequentially. While lowering the pedestal onto the new isolators, ensure the isolator studs pass easily through the matching holes in the triangular spindle bolt weldment and the rod end is aligned with the rod end block slot. Note the rod end spherical bearing may need to be re-aligned in the rod end in order to fit smoothly back into the rod end block.

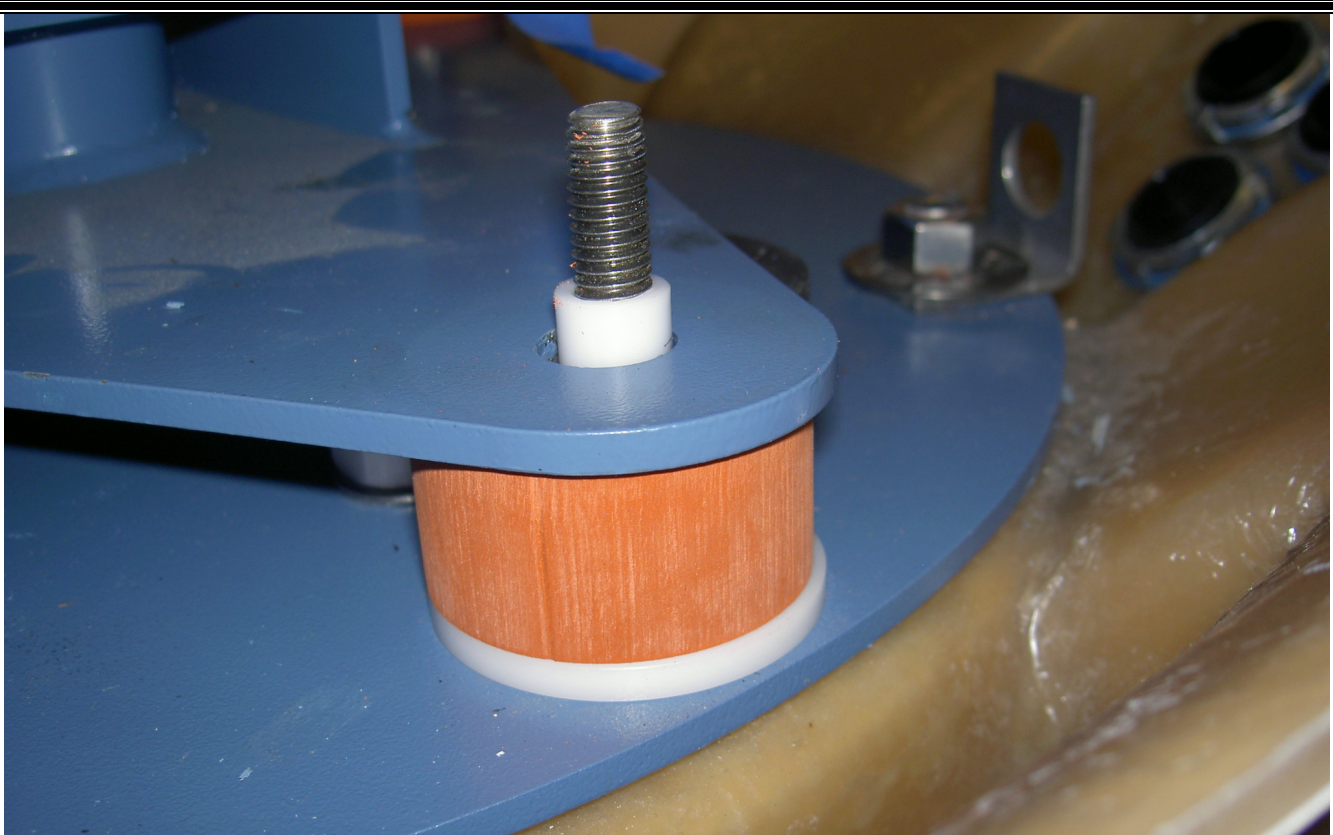
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- 4.21. When the spindle bolt plate weldment has been lowered far enough that the 3/8-16 isolator studs are visible above the weldment plate, insert three (3) new Delrin sleeves onto the 3/8 -16 isolator studs. For configuration -1, use 1.97 inch long sleeves (P/N 122343-1) – see Photograph 16 for appearance. For configuration -2, use 1.44 inch long sleeves (P/N 122343-4) – see Photograph 17 for appearance. Lower the pedestal until the triangular weldment rests evenly on the new silicone isolators. **Note all 5004 antennas should be retrofit to the -2 configuration regardless of the 'as-built' configuration.**
- 4.22. Insert the 5/16 x 1.50 inch long socket head shoulder bolt (P/N 119895-587) with the 5/16 inch flat washer (P/N 114581-030) into the rod end block and through the rod end clevis. Place the ¼ inch flat washer (P/N 114581-027) and ¼ inch spring lock washer (P/N 114580-029) onto the threaded end of the shoulder bolt. Apply a few drops of 271 threadlocker (P/N 117319-10) onto the ¼ -20 hex nut (P/N 114583-029) and thread the hex nut onto the shoulder bolt. Restrain the shoulder bolt with the 5/32 inch hex drive socket and tighten the hex nut with a 7/16 inch socket until the spring lock washer is fully compressed against the flat washer and the head of the shoulder bolt is firmly seated against the flat washer.



Photograph 16 - Sleeves in Place (-1 Configuration)

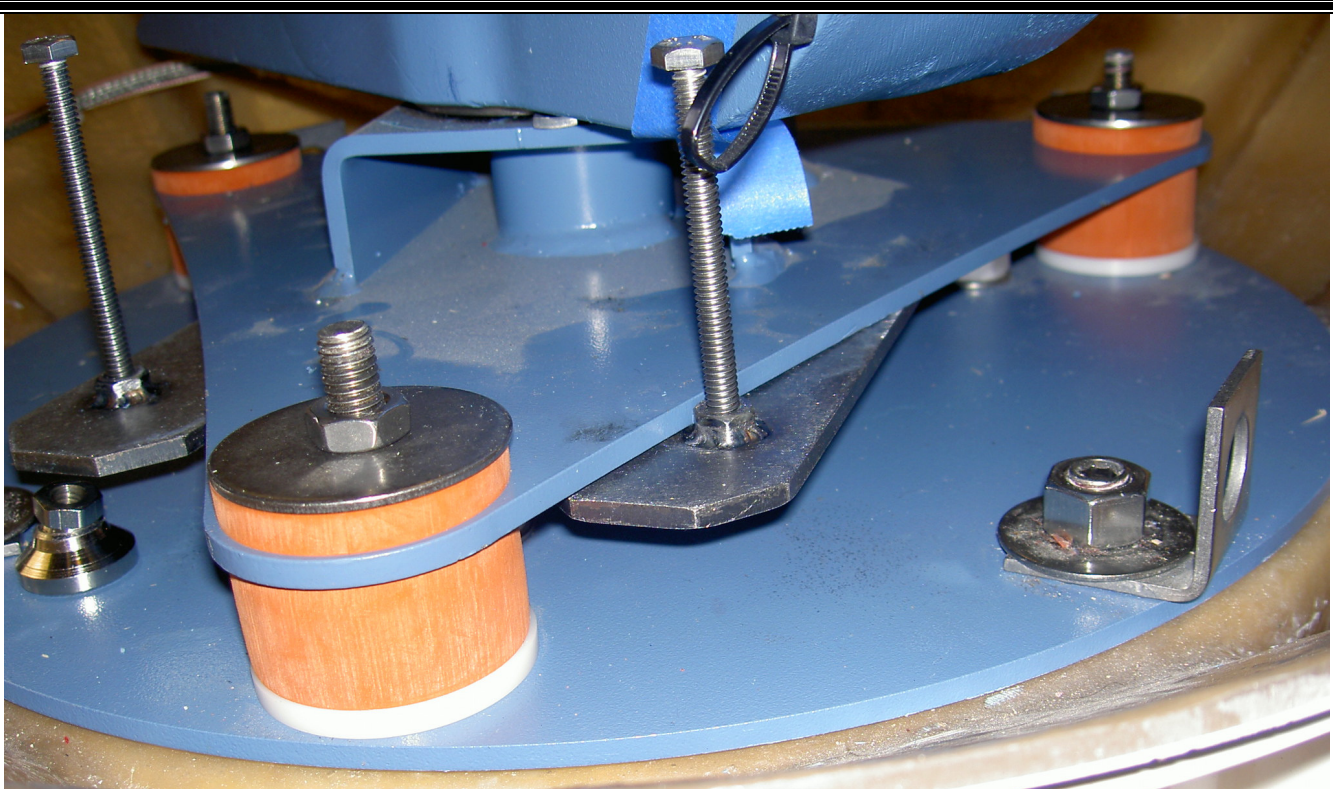
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Photograph 17 - Sleeve Installed (-2 Configuration)

- 4.23. Continue lowering the pedestal by loosening the three (3) $\frac{1}{4}$ -20 x 2.75 inch long hex screws in equal proportions until the jacking tool is loose under the pedestal.
- 4.24. Place the new upper silicone isolators onto the isolator studs. For configuration -1, place three (3) 1.0 inch silicon isolators (P/N 127779-1) onto the isolator studs. For configuration -2, place three (3) 0.30 inch silicon isolators (P/N 127779-3) onto the isolator studs. Top the silicon isolators with three (3) new $\frac{3}{8}$ inch fender washers (P/N 114625-116).
- 4.25. Apply a few drops of 271 threadlocker onto the thread of three (3) new $\frac{3}{8}$ -16 hex jam nuts (P/N 114582-031). Thread the three (3) $\frac{3}{8}$ -16 hex jam nuts onto the $\frac{3}{8}$ -16 isolator studs and run the hex jam nuts down onto the fender washers. Tighten the $\frac{3}{8}$ - 16 hex jam nuts onto the sleeves using a $\frac{5}{8}$ inch open end wrench. Verify clearance above the Delrin hex standoffs is 0.060 inch using the appropriate feeler gauge(s). Continue to tighten the $\frac{3}{8}$ -16 hex jam nuts until the clearance is 0.060 inches above the Delrin hex standoffs.

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Photograph 18 - Completed Retrofit (-2 Configuration Shown)

- 4.26. Loosen the $\frac{1}{4}$ -20 x 2.75 inch long hex screws of the jacking tool until the jacking plate rests on the swivel leveling mounts. Partly disassemble the jacking tool as follows:
- Using the $\frac{7}{16}$ inch open end wrench, loosen and remove the two (2) swivel leveling mounts under the forks of the jacking plate.
 - Unthread and remove the two (2) $\frac{1}{4}$ -20 x 2.75 inch hex screws from the forks of the jacking plate.
- 4.27. Remove the jacking tool from under the spindle base plate weldment.
- 4.28. Remove the Cross-Level Shipping Support by loosening the $\frac{1}{4}$ - 20 nuts holding the $\frac{1}{4}$ - 20 studs tight to the bar and allowing the stops to become slack. Withdraw the shipping support.

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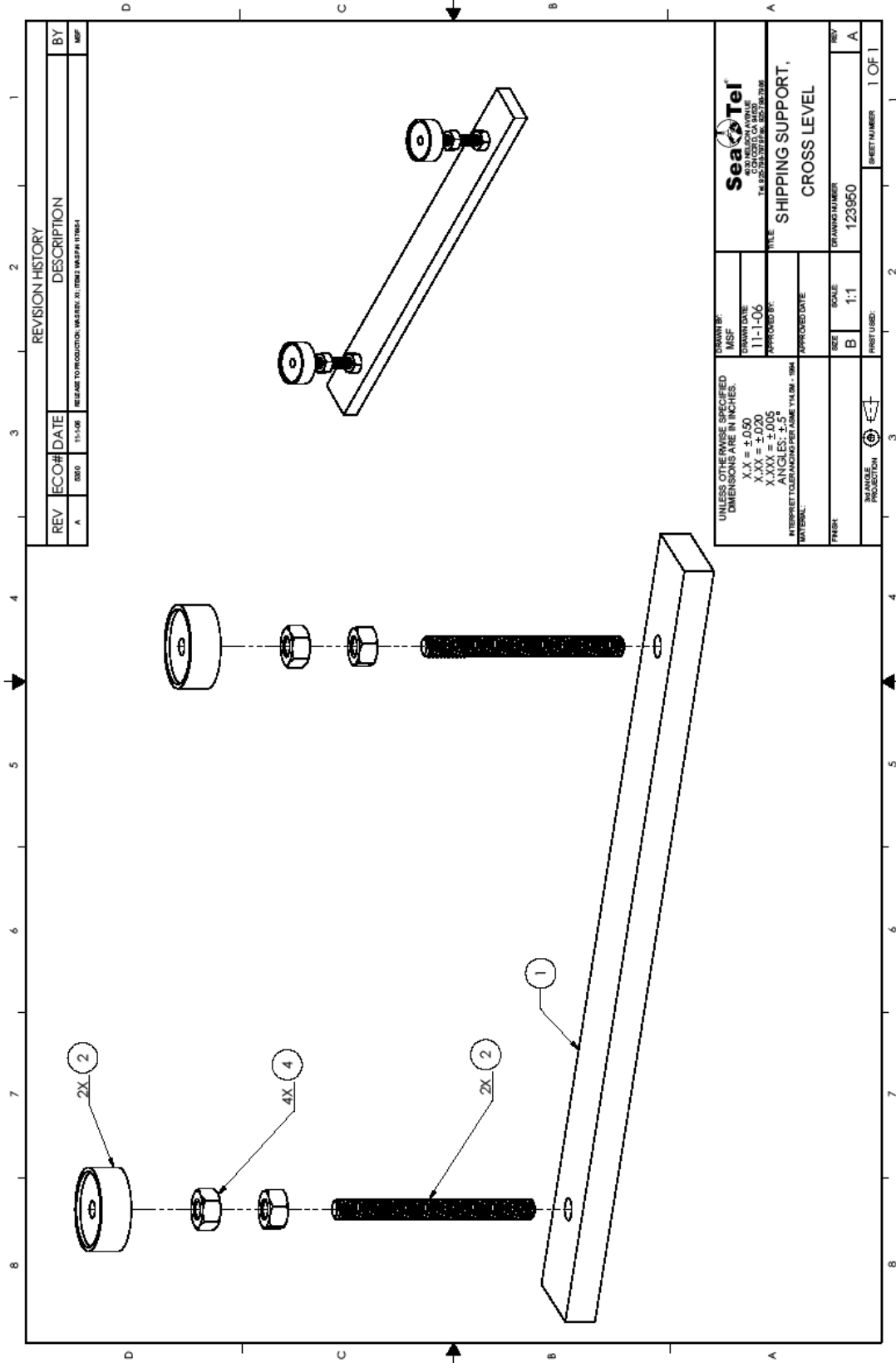
- 4.29. Remove the ¼ - 20 x 1 inch (25 mm) long hex screws from the threaded holes beneath the elevation bearings. The reflector may need to be rocked back onto the high elevation stops to remove the screws. Allow the reflector to return to the position found before the retrofit modification was started.
- 4.30. Remove and store the tools and spare parts from the retrofit kit. Dispose of all old parts. Replace the radome access hatch and tighten the latches with a 5/32" allen wrench in a 180 degree clockwise rotation.

5.0 REFERENCES

The following documents have been referenced to develop this procedure:

- Sea Tel Drawing 120211, Rev. B – Base Plate, Upper.
- Sea Tel Drawing 120218, Rev. A – Base Plate, Lower.
- Sea Tel Drawing 120324, Rev. B – Spindle Base Weldment, Triangular.
- Sea Tel Drawing 122286, Rev. F – Isolation Assembly, 3 Point.
- Sea Tel Drawing 122969, Rev. G – Radome Assembly, 60 inch, GA Install.
- Sea Tel Drawing 123950, Rev. A – Shipping Support, Cross-Level.
- Sea Tel Drawing 126982, Rev. B – Radome Base Fab, 60 inch, Duro.
- Sea Tel Specification 121730, Rev. D – Loctite™ Applications Procedure.

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REVISION HISTORY	
REV	DESCRIPTION
A	RELEASE TO PRODUCTION. WA REV. XI ITEM2 WAS FIN ITMESH
MSF	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±0.050 X.XX = ±0.020 X.XXX = ±0.005 ANGLES: ±5° INTERPRET TOLERANCING PER ASME Y14.5M - 1994	DRAWN BY: MSF DRAWN DATE: 11-1-06 APPROVED BY: APPROVED DATE:
FINISH:	SCALE: 1:1 DRAWING NUMBER: 123950
TITLE: SHIPPING SUPPORT, CROSS LEVEL	SHEET NUMBER: 1 OF 1

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