



Proper Care and Handling of TEE transducers and Endoscopes

Topics to Be Covered

- Topics to be covered are:
 - Why caring for your TEE and Endoscope matters
 - Risk factors and the Anatomy of these devices
 - Basic Rules of Care

Why Does it Matter?

- Why does proper care matter?
 - Many failures are preventable. The better you take care of your equipment the longer it will last.
 - Saves time in the long run. 
 - Saves department/ hospital money. 

Most importantly, the better condition your device is in the better the outcome and the safer it is for your patient!



Basic Rules of Care

- Don't drop the TEE / Endoscope
- Don't let the Tip bang into anything
- Don't wind up the insertion tube tightly
- Always carry in a hard-sided container
- Always use bite guards
- **Never** allow water to get into the articulation or connectors
- Don't allow the bending Rubber or Insertion Tube to be poked with anything (Needle, scalpel, scissors etc.)



Flexible Endoscope Anatomy

Flexible Endoscope Anatomy



Charged-Couple Device (CCD)

- CCD/Wire Harness/Video Connector
- CCD - The computer/video chip that allows you to see what's inside, on the video monitor.



CCD / Wire Harness / Video Connector

- Includes wire harness that travels from the distal tip of the endoscope to the video connector which plugs into the console.
- CCD is very small; 2-3 mm. Contains several components and lenses.
- Like a cell phone, it's very sensitive to moisture and impacts such as dropping.
- The entire assembly provides very defined images.

Insertion Tube

- The insertion tube should never have any cracks, dents, damage or peeling.
- Damage on the insertion tube and may indicate damage internally.
- TEE Insertion tubes are very similar



Bending Rubber

- Most vulnerable part of the flexible endoscope.
- Thin, pliable rubber sheath installed over the wire mesh which covers the length of the angulation section allowing it to easily bend
- TEE Bending rubber is very similar



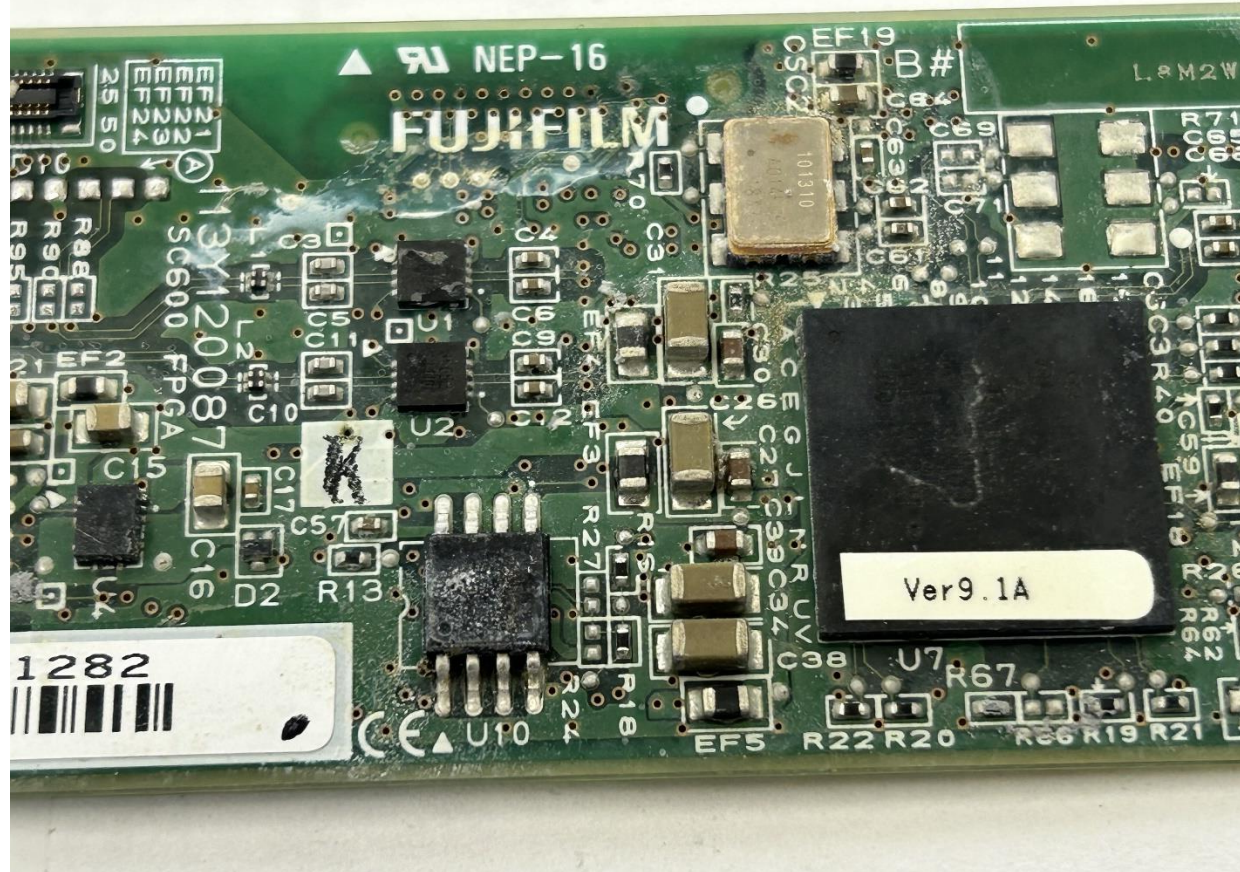
Biopsy Channels

- Made of Teflon™ so that instruments travel unobstructed and can be cleaned effectively through reprocessing.
- Collapsed / Kinked / Scored Channels – If a channel is kinked or scored from an instrument, the channel can impede a proper reprocessing of the flexible scope.



Biopsy Channels Failure

- Circuit board in a flexible colonoscope damaged due to leak in biopsy channel.



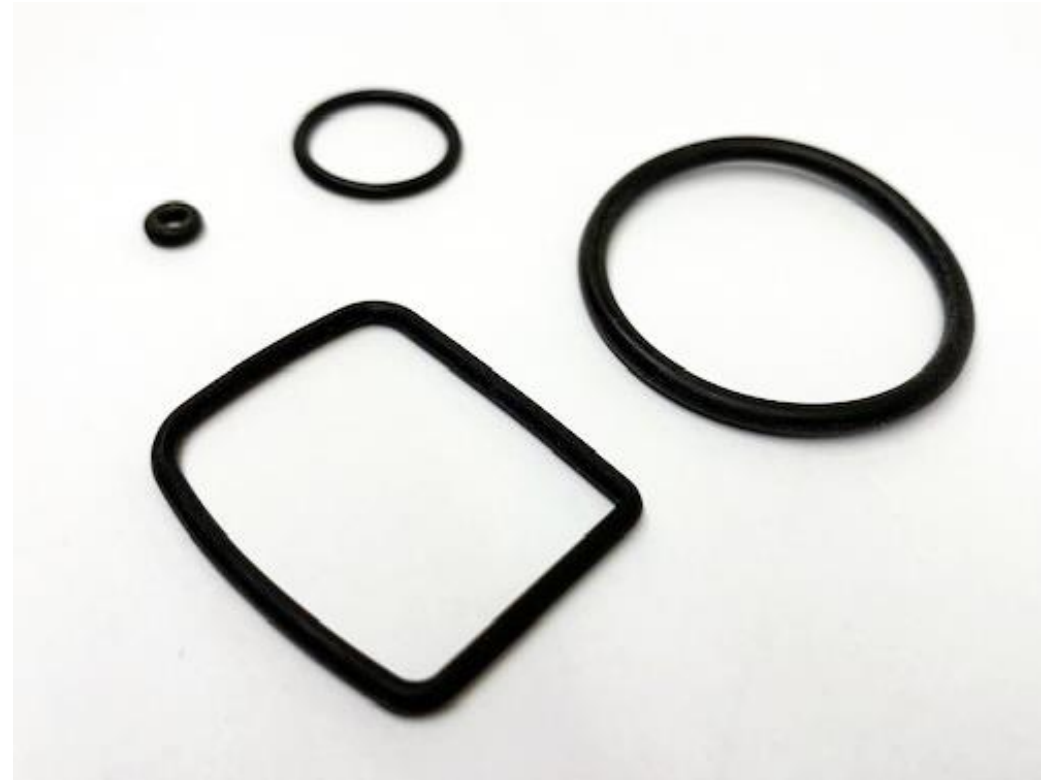
Soaking Caps

- Soaking caps cover the Endoscope connectors
 - Soaking caps must be submersed when performing a leak test.
 - There should never be any fluid inside the soaking cap.
 - Seals inside the soaking cap should be lubricated with silicone oil once a week.



Seams and Seals

- During a leak test all seams should be checked for leaks.
- Behind every seam is an O-ring, which over time can wear out causing a failure during leak test.

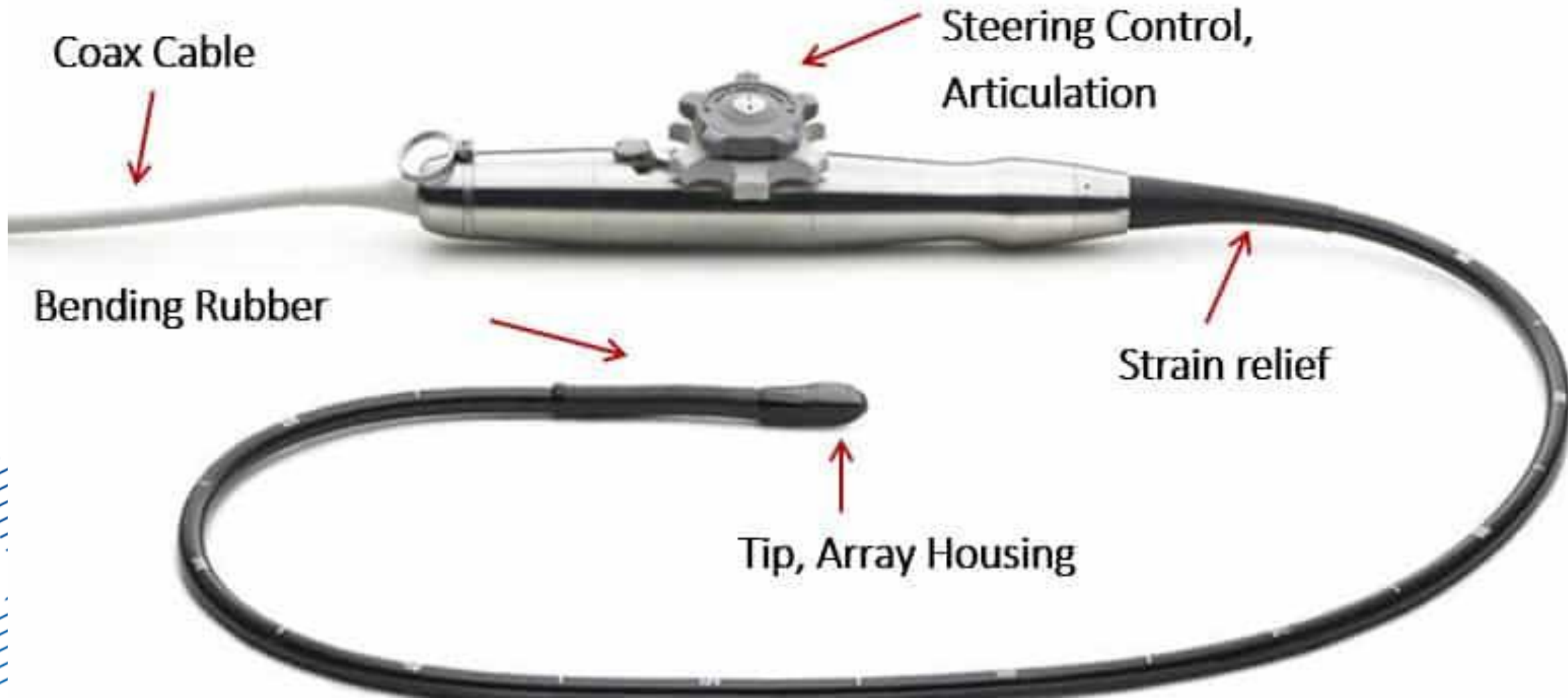


Inspecting Endoscopes

- Endoscopes should be inspected consistently.



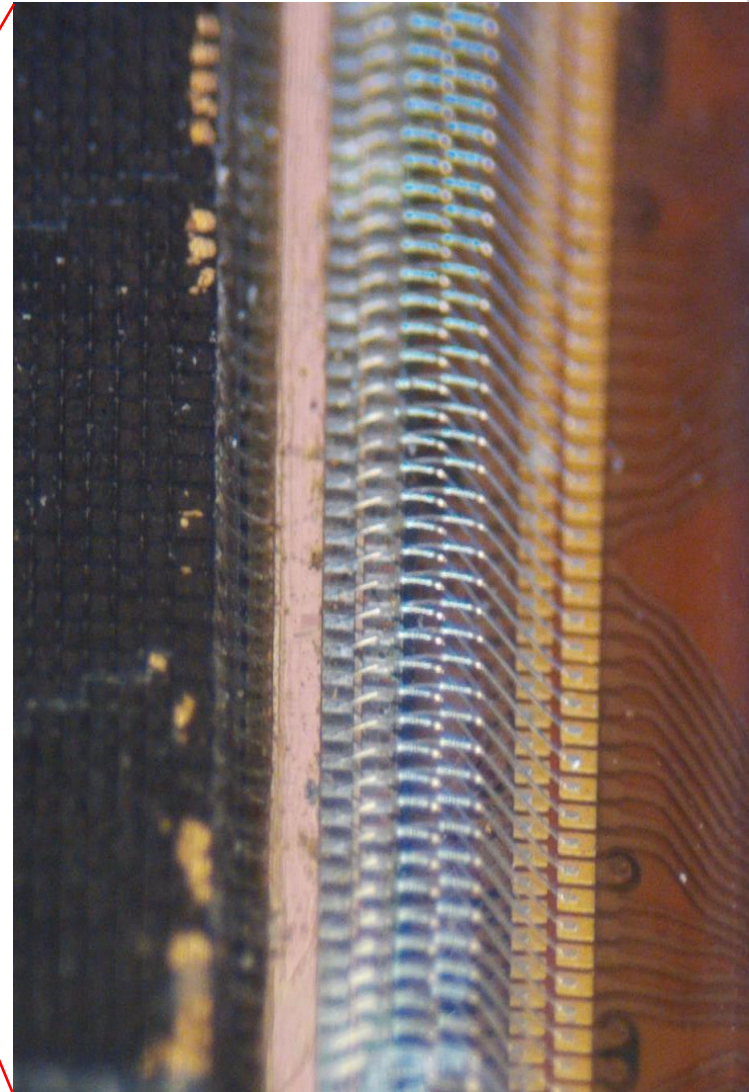
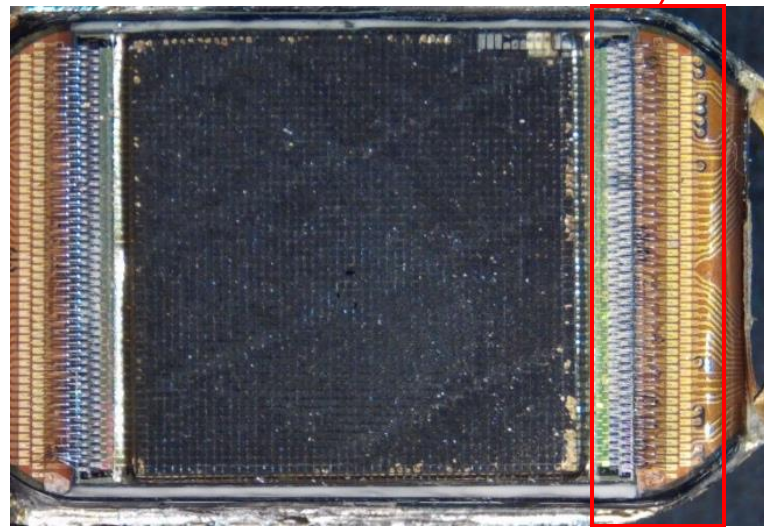
TEE Anatomy



Matrix Array



- Philips X7 array, nearly identical to the X8 array.
- Most TEE transducers today have Matrix Arrays.
 - This array is about the size of a dime.
- The zoomed image to the right, are the wires from the array to the ASIC chip.
 - **These wires are not covered or insulated.**
 - **Even breathing on them can cause them to lay down, which is not repairable.**
 - **One drop of water or Cidex is all it takes to kill the array.**
 - **Only 2 of those tiny wires need to touch to ruin the entire TEE.**



Articulation Control

- TEE and Endoscope probes have a dial or two that allow you to manipulate the tip to get a better image.
 - This Philips probe also has two buttons that allow for steering of the ultrasound scan in order to obtain a better image.



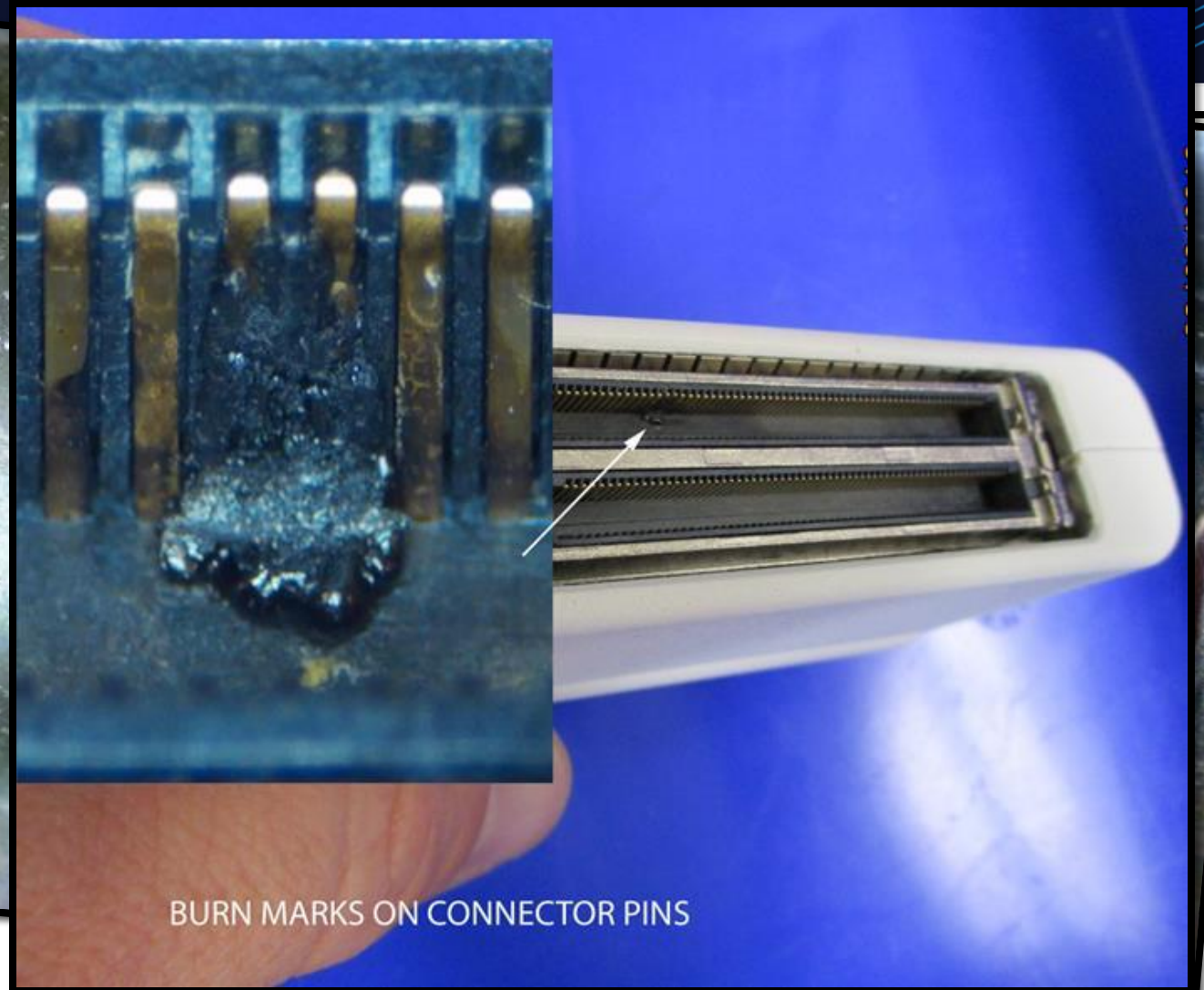
Glue Beads

- On TEE probes there are glue beads at both ends of the bending rubber, these can break or chip off.



Inspecting the TEE

- The TEE needs to be inspected from tip to connector looking for these issues:
 - Any crack, chip, cut or hole in the tip, bending rubber or insertion tube
 - Any cracks in the control housing
 - Bent or misplaced pins on the connector, gel or other material in the connector.



BURN MARKS ON CONNECTOR PINS

TEE and Water – What is Safe?

- In this picture only the part of the TEE that is black can be in water.
 - From the Tip to the Strain relief.
 - Water should never reach the strain relief.
- Water should never be splashed or washed over the articulation controls, cable or connector.
 - Water getting into these areas will result in serious damage or total loss.



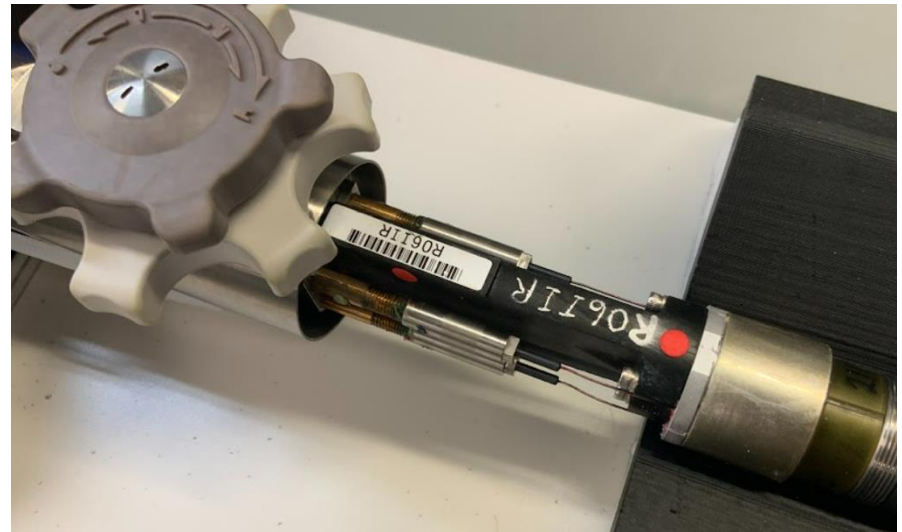
“High and Dry”

- The articulation and control housing must never touch running water or be submerged.
- Even the slightest bit of water can destroy the TEE if it gets inside.



Water Problems!

- TEE or Endoscopes water intrusion into the device is a recipe for damage
- Water in Control Housing
 - Any water that get into the control housing has a pathway straight to the tip of the TEE Probe.
 - If we work on a TEE probe, we put water activated stickers in the probe in several locations. This RED color is a sign that water was present.



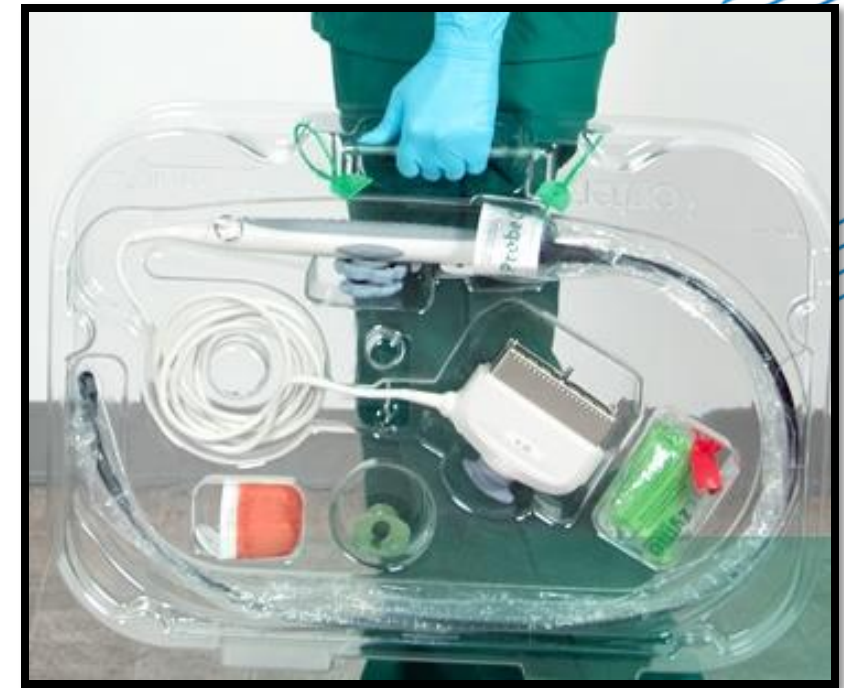
A Few Drops of Water

- This picture is not really all that impressive, which is why it's important!
- It appears that a relatively small amount of water got into the connector
- Everything that looks like dust is corrosion, and that is all it takes to destroy the entire electronic assembly



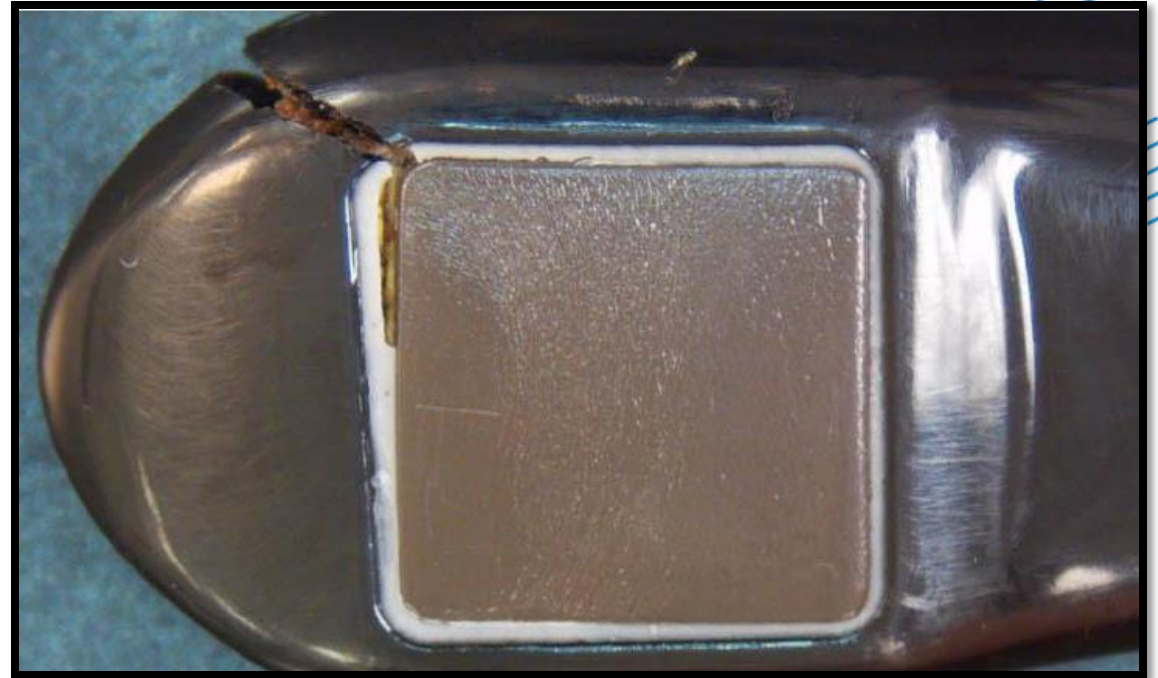
Transportation

- All TEE transducers need to be transported in hard sided containers.
 - These can be specially made transport containers or simple plastic storage boxes
 - Need both clean and dirty containers
 - Don't curl the insertion tube too small or damage can result



Transport Damage

- These are from the tip of a TEE getting caught in a door jam.
- This happened at the same hospital on the same door twice within 30 days – because they did not use a container.



Prevention of Problems

- What Preventative Measures Can I take?
 - Inspect the TEE / Endoscope before and after each use and after reprocessing
 - Follow the recommendations for use and cleaning as per the OEM
 - *ALWAYS use a bite guard for oral insertions*
 - Always have TEE / Endoscope in a protective case when transporting
 - Have the TEE / Endoscope tested if a problem is suspected or even considered
 - Keep TEE transducer cables off the floor and never pinched
 - Never let water get higher than the insertion tube on a TEE.

Resolving Problems

- What to do when a problem is found
 - Don't wait, react immediately
 - Smaller problems can often be fixed easier, cheaper
 - Inform Engineering
 - If a hole is found after a procedure, don't soak the TEE. Wait until you have a plan.

Questions?

I am hopeful this information
helps you in your day-to-day support of your facility.

Hobie Sears

Director of Technical Training – Ultrasound

RSM Midwest Region

Good care of your TEE Transducers and Endoscopes can extend the life of the transducer!

I am hopeful this information helps you in your day-to-day support of your facility.

Hobie Sears
Director of Technical Training Ultrasound /
RSM Midwest Region