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## 4D Image Acquisition of Valves Guide

### Probes

Adult Transthoracic (TTE) probes: **4V or 4Vc-D**, Paediatric Transthoracic probe: **6Vc-D**,  
Transoesophageal (TOE) probe: **6Vt-D**

For image acquisitions with **colour doppler**, apply the colour box to the 2D image and adjust position and size as required, then follow the steps described for the appropriate valve.

### Mitral Valve (TTE Study)

Suggested view apical 4 chamber view:

1. Press **4D Zoom prepare** on touch screen
2. Adjust Region of Interest (ROI) white box around the annulus and leaflets in both views **Ref plane** button on touch screen allows you to change between the 2 images for further adjustment)
3. Press **4D** on control panel or left/right tabs on the touch screen
4. 4D image will appear and the **Angle** button on control panel changes the viewpoint (yellow arrow depicts viewing position and direction).
5. Volume size can be adjusted with the far-left rotary, if required, or click on the **Update** button next to the trackball which takes you back into **4D Zoom prepare** and you can further adjust the ROI as required.
6. **OPTIONAL** Gain adjustments (2D & 4D) can be performed during acquisition or afterwards during post processing
7. Check Frame Rate (top left of screen) needs to be >12 FPS for Auto MVQ tool (Not available on 6Vc-D probe).
  - a. Either turn frame rate up or down with frame rate rotary button (far right on control panel), adjust according to balance with resolution loss. Please note you will require higher frame rates for higher heart rates, to aid accurate assessment.
  - b. Or with a more regular rhythm you can use **Multi-Beat**. Select number of cycles required on touch screen (keep to lowest number needed) ask patient to perform breath hold at point of most optimal image
8. **Image Store** when ready

### Aortic Valve (TTE Study)

Suggested view parasternal long or short axis views

1. Press **4D Zoom prepare** on touch screen
2. Adjust white box around the annulus and leaflets in both views (**ref plane** button on touch screen allows you to change between the 2 images for further adjustment)
3. Press **4D** on control panel or left/right tabs on the touch screen.
4. 4D image will appear and the **Angle** button on control panel changes the viewpoint (yellow arrow depicts viewing position and direction).



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5. Volume size can be adjusted with the far-left rotary, if required, or click on the **Update** button next to the trackball which takes you back into **4D Zoom prepare** and you can further adjust the ROI as required.
6. **OPTIONAL** Gain adjustments (2D & 4D) can be performed during acquisition or afterwards during post processing
7. Check Frame Rate (top left of screen) needs to be >12 FPS ideally.
  - a. Either turn frame rate up or down with frame rate rotary button (far right on control panel), adjust according to balance with resolution loss. Please note you will require higher frame rates for higher heart rates, to aid accurate assessment.
  - b. Or with a more regular rhythm you can use **Multi-Beat**. Select number of cycles required on touch screen (keep to lowest number needed) ask patient to perform breath hold at point of most optimal image
8. **Image Store** when ready

### **Tricuspid Valve (TTE Study)**

Suggested view apical 4 chamber view

1. Press **4D Zoom prepare** on touch screen
2. Adjust Region of Interest (ROI) white box around the annulus and leaflets in both views **Ref plane** button on touch screen allows you to change between the 2 images for further adjustment)
3. Press **4D** on control panel or left/right tabs on the touch screen
4. 4D image will appear and the **Angle** button on control panel changes the viewpoint (yellow arrow depicts viewing position and direction).
5. Volume size can be adjusted with the far-left rotary, if required, or click on the **Update** button next to the trackball which takes you back into **4D Zoom prepare** and you can further adjust the ROI as required.
6. **OPTIONAL** Gain adjustments (2D & 4D) can be performed during acquisition or afterwards during post processing
7. Check Frame Rate (top left of screen) needs to be >12 FPS for Auto TVQ tool (Not available on 6Vc-D probe).
  - a. Either turn frame rate up or down with frame rate rotary button (far right on control panel), adjust according to balance with resolution loss. Please note you will require higher frame rates for higher heart rates, to aid accurate assessment.
  - b. Or with a more regular rhythm you can use **Multi-Beat**. Select number of cycles required on touch screen (keep to lowest number needed) ask patient to perform breath hold at point of most optimal image
8. **Image Store** when ready



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## **Mitral Valve (TOE Study)**

Suggested view Mid Oesophageal 2 chamber view or mitral commissural view

1. Press **4D Zoom prepare** on touch screen
2. Adjust white box around the annulus and leaflets in both views (**Ref plane** button on touch screen allows you to change between the 2 images for further adjustment). Try and include some of the AV into the white box also to help with orientation.
3. Press **Mitral valve** tab on touch screen. This puts the image with AV at top of the screen for orientation in Surgeon's View.
4. Volume size can be adjusted with the far-left rotary, if required, or click on the **Update** button next to the trackball which takes you back into **4D Zoom prepare** and you can further adjust the ROI as required.
5. **OPTIONAL** Gain adjustments (2D & 4D) can be performed during acquisition or afterwards during post processing
6. Check Frame Rate (top left of screen) needs to be >12 FPS for Auto MVQ Tool
  - a. Either turn frame rate up or down with frame rate rotary button (far right on control panel), adjust with balance of resolution loss. Please note you will require higher frame rates for higher heart rates, to aid accurate assessment.
  - b. Or with a more regular rhythm can use **Multi-Beat**. Select number of cycles required on touch screen (keep to lowest number needed) ask patient to perform breath hold at point of most optimal image
7. **Image store** when ready.

## **Aortic Valve (TOE Study)**

Suggested view Mid Oesophageal Long Axis view of Aortic valve or Short Axis view

1. Press **4D Zoom prepare** on touch screen
2. Adjust white box around the annulus and leaflets in both views (**Ref plane** button on touch screen allows you to change between the two images for further adjustment)
3. Press **4D** on the control panel or press either **Left** or **Right** buttons on the touch screen to either display the 4D rendered view of the long axis or short axis, according to whether they are on the left or right of the biplane screen.
4. **OPTIONAL** Press 'angle' button on control panel if you wish to change the angle viewed i.e. from long axis to short axis.
5. Volume size can be adjusted with the far-left rotary, if required, or you can return to **4D Zoom prepare** and adjust the region of interest box from here
6. **OPTIONAL** Gain adjustments (2D & 4D) can be performed during acquisition or afterwards during post processing
7. Check Frame Rate (top left of screen) needs to be >12 FPS for Auto AVQ Tool.



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- a. Either turn frame rate up or down with frame rate rotary button (far right on control panel), adjust with balance of resolution loss. Please note you will require higher frame rates for higher heart rates, to aid accurate assessment.
  - b. Or with a more regular rhythm can use **Multi-Beat**. Select number of cycles required on touch screen (keep to lowest number needed) ask patient to perform breath hold at point of most optimal image
8. **Image store** when ready.

### **Tricuspid Valve (TOE Study)**

Suggested view Mid oesophageal 4ch view

1. Press **4D Zoom prepare** on touch screen
2. Adjust white box around the annulus and leaflets in both views (**Ref plane** button on touch screen allows you to change between the two images for further adjustment)
3. Press 4D on the control panel or press either **Left** or **Right** on the touch screen to either display the 4D rendered view of the long axis or short axis, according to whether they are on the left or right of the biplane screen.
4. **OPTIONAL** Press 'angle' button on control panel if you wish to change the angle viewed i.e. from long axis to short axis.
5. Volume size can be adjusted with the far-left rotary, if required, or you can return to **4D Zoom prepare** and adjust the region of interest box from here
6. **OPTIONAL** Gain adjustments (2D & 4D) can be performed during acquisition or afterwards during post processing
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  - a. Either turn frame rate up or down with frame rate rotary button (far right on control panel), adjust with balance of resolution loss.
  - b. Or with a more regular rhythm can use **Multi-Beat**. Select number of cycles required on touch screen (keep to lowest number needed) ask patient to perform breath hold at point of most optimal image
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