

Application News



Tissue Synchronisation Imaging

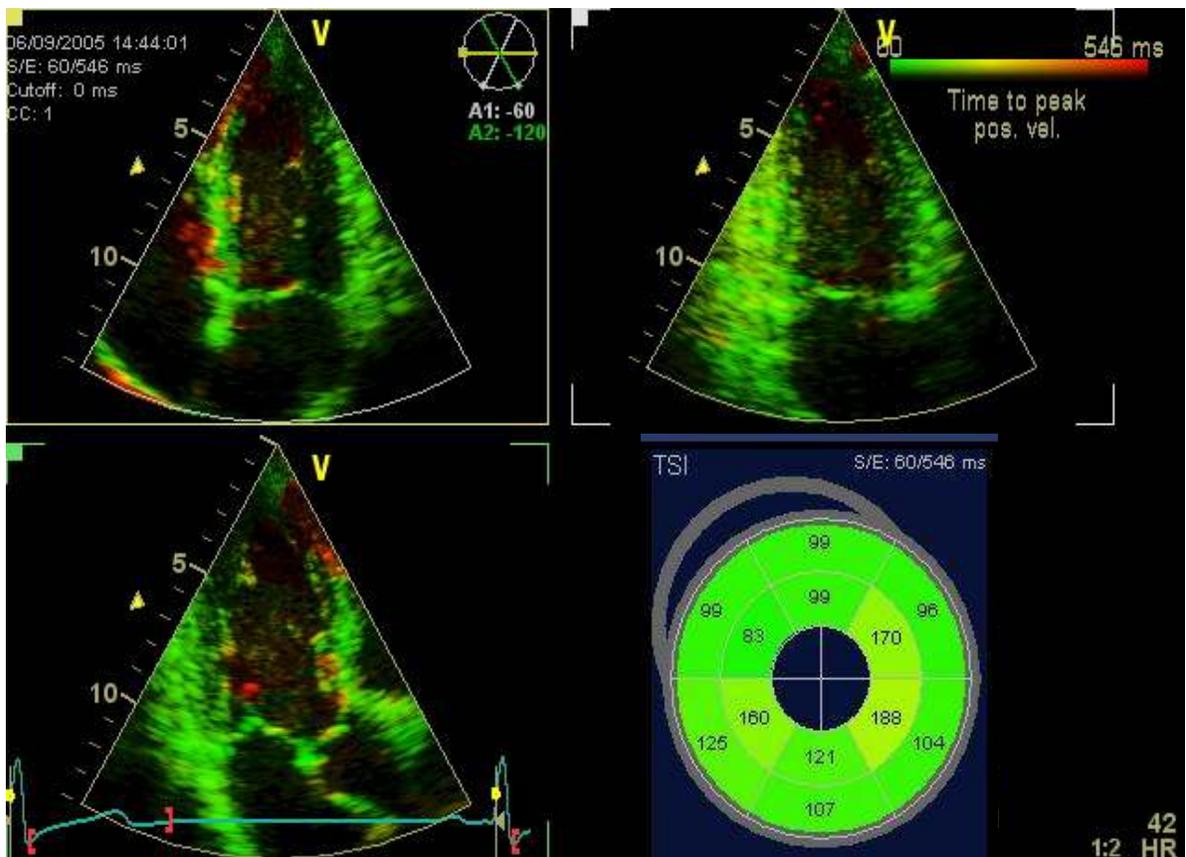
TSI

Vivid 7

Vivid S6

EchoPAC

Data acquisition and analysis



Content

HOW TO PERFORM THE TSI MEASUREMENTS.....	4
Preparing the system.....	4
Getting started.....	5
Parametric imaging.....	6
Triplane TSI.....	7
Measurements.....	8
The Bull's eye plot.....	9

NOTE

This hand out is additional training material.
For more information please refer to the user manual and/or reference manual.

How to perform the TSI measurements

TSI = **T**issue **S**ynchronisation **I**maging

The tool detects in a specific time range (marked with two red markers on the ECG) the maximum peak positive velocity.

The default timing is set up as followed.

Start: Begin of R-Wave + 60 ms

The 60 ms should avoid having the IVCT as the peak in the measurement.

End: Default (ES + 200ms)

The time of end systole (ES) in milliseconds is calculated from the heart rate (HR) in beats per minute as: $t=a \cdot b \cdot HR$, where $a=400$ and $b=1.25$.

200ms are added to the systole in order not to lose information in post systole.

The user has to check these settings and adjust them to his needs !!

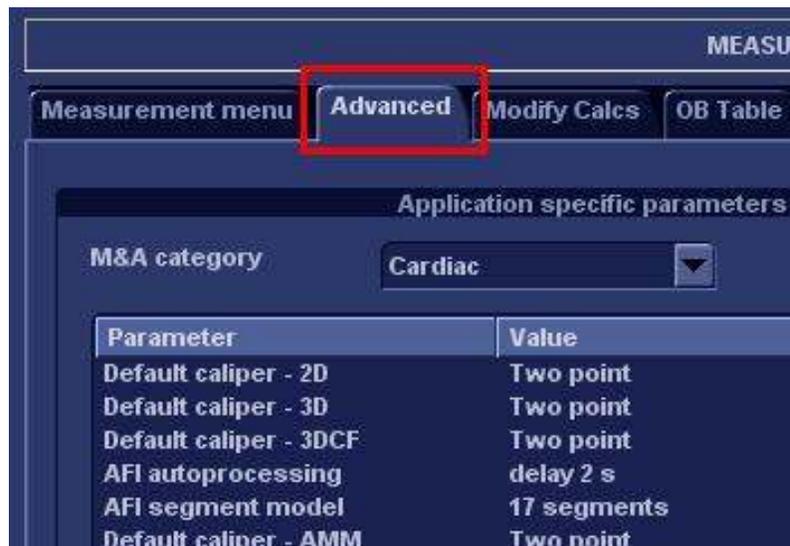
Preparing the system

This has to be set up once on the scanner and/or workstations.

Enter the **Config (F2)**.

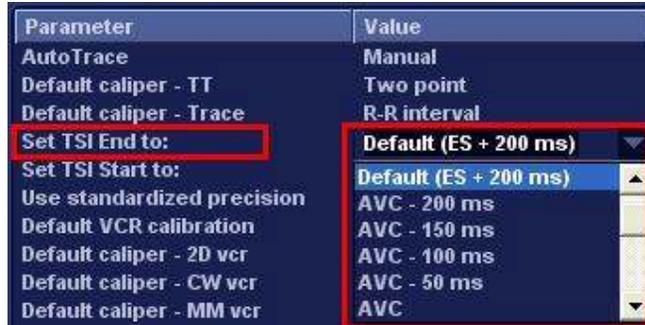
Select the **Meas/Text**

Take the **Advanced** tab

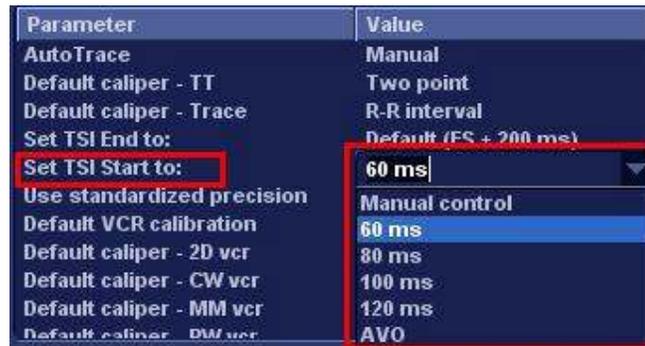


Scroll down until you find the TSI settings.

Change TSI end by clicking on the arrow and select your favourite from the list.



The same can be done for the start marker.



Leave the Configuration by pressing the **Config** button again.

The new settings are now active and will be used in TSI.

Getting started

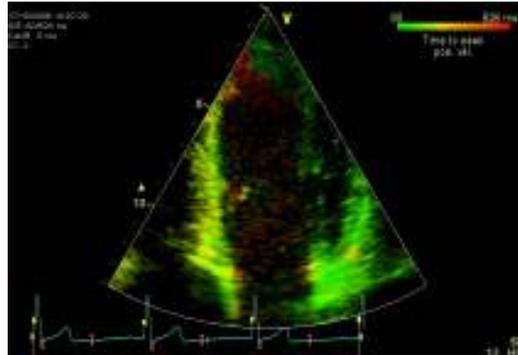
Since the start and end marker are detected on the ECG or taken from the **Event Timing** (ECG dependent) we must have a proper ECG signal !

Optimising the image

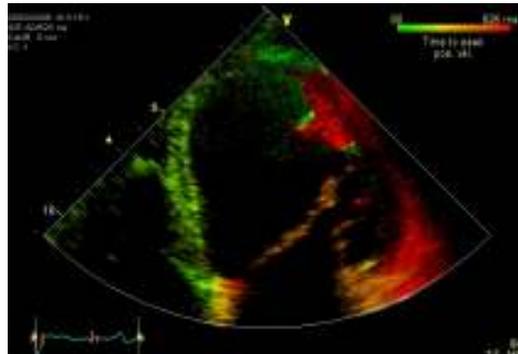
- Sector width (as narrow as possible without losing the LV walls)
- Press TVI
- Adjust frame rate
- Check for aliasing (otherwise the aliasing can be detected as peak!)
 - Take PW in basal segment to check highest velocities
 - Then adjust your TVI scale
- Press TSI

Parametric imaging

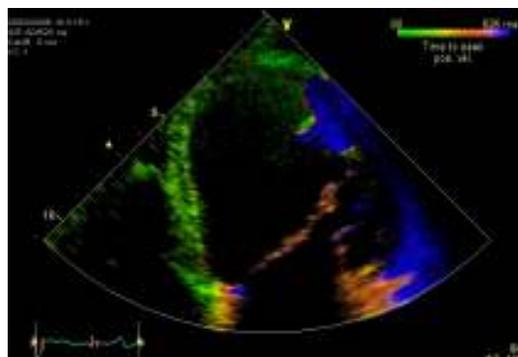
The TSI image is colorized from green – yellow – orange – to red.
Green colour means the detected peak is in the beginning of the chosen time interval.



The later the peak is detected the colour is changing from yellow, orange to red.



Tip: For those who are colour blind there is another colour map. In the row of the assignable buttons the right one stands for the **Colour map** Press the button and select from the list on the screen TSI blue map. Instead of the red there is now blue colour for the late peak.



If you use the standard echo probe the procedure can be repeated in the 2CH and APLAX view as well to get an overall impression.

Note:

If you have the Triplane mode this has to be preferred for this measurements.

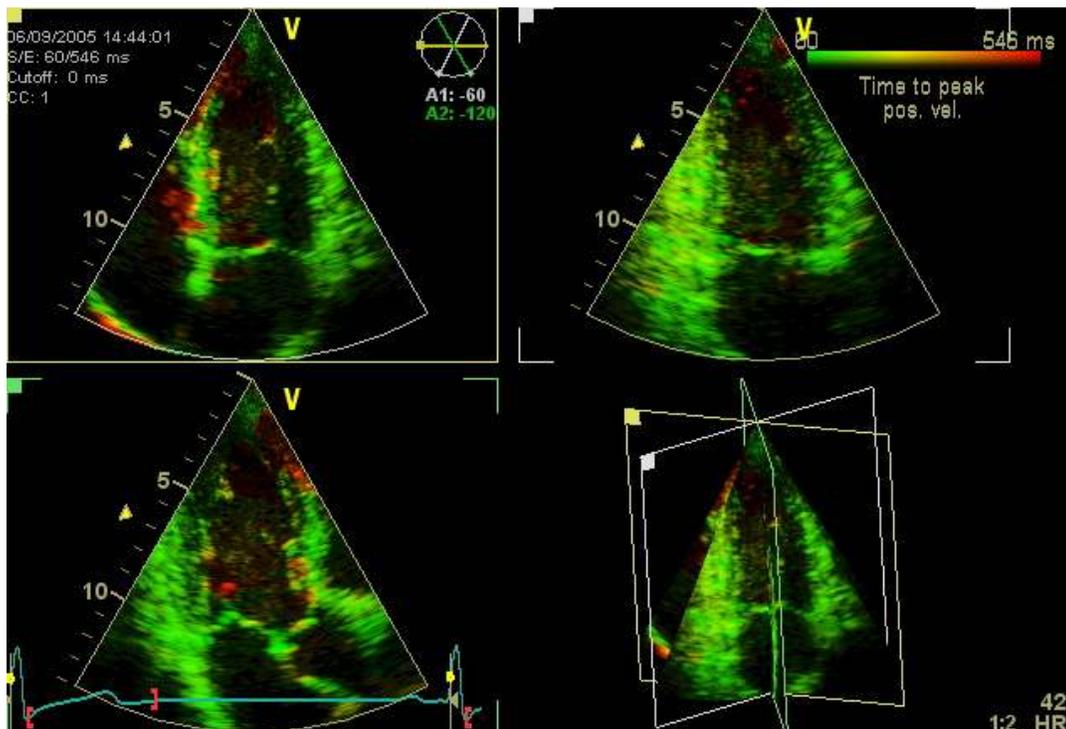
The images are all from the same heartbeat so there is no variation in heart rate between the 3 views.

You can also take single acquisitions of the three apical views. But then it is crucial to have them all with the same heart rate! The time differences are small, so you can create a dyssynchrony but in fact this is only a variation in heart rate. Be aware of this and look very carefully on your data.

Triplane TSI

- Select 3V probe
- Press the **Multiplane** button
- Press **Triplane**
- Adjust your image that you have proper views of 4CH, 2CH and APLAX.
- Enter TVI (optimise your image)
- Press TSI
- Image store

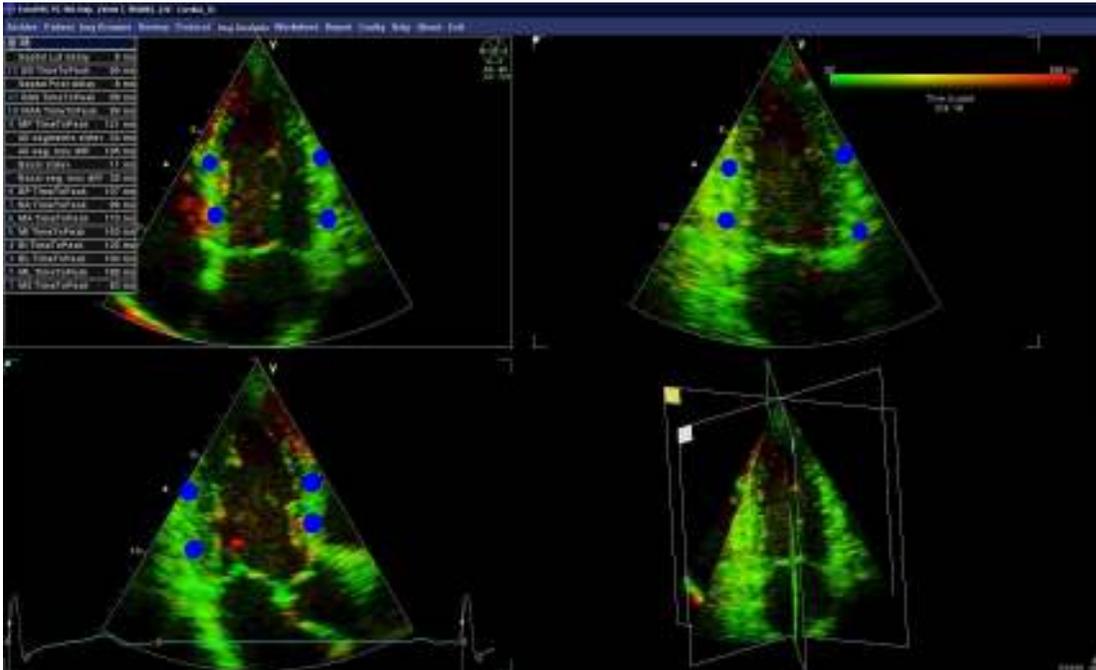
Within one heart cycle you get all information at the same time from the same heartbeat!



Measurements

To get real numbers there is special measurement folder for the TSI measurements.

- Take your image from the clipboard
- Enter the **Measurement** package
- Open the folder for **TSI time**.
 - There are 12 segments displayed, that needs to be measured.
 - Only the basal and mid segments will be measured.
- Measure all 12 segments



You see the list of all parameters and indices.

The Bull's eye plot

To get a nice overview move the mouse to the measurement list and click on the last point in the list for TSI measurements called **TSI Bull's-eye report**.

This gives an overview of the dyssynchrony.

The Bull's eye plot shows the measured time to peak values and the corresponding colour.



The indexes show you automatically all calculations.

TSI calculated indexes	
Septal Lat delay	5 ms
Septal Post delay	8 ms
Basal max delay	29 ms
Basal stdev	11 ms
All seg. max delay	105 ms
All segments stdev	34 ms