UMMS

United Medical Maintenance Services

Engineering Publications

MRi Plane Orientations

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This publication was developed to help the engineer understand what he/she is seeing when they are viewing MRi images on General Electric system.

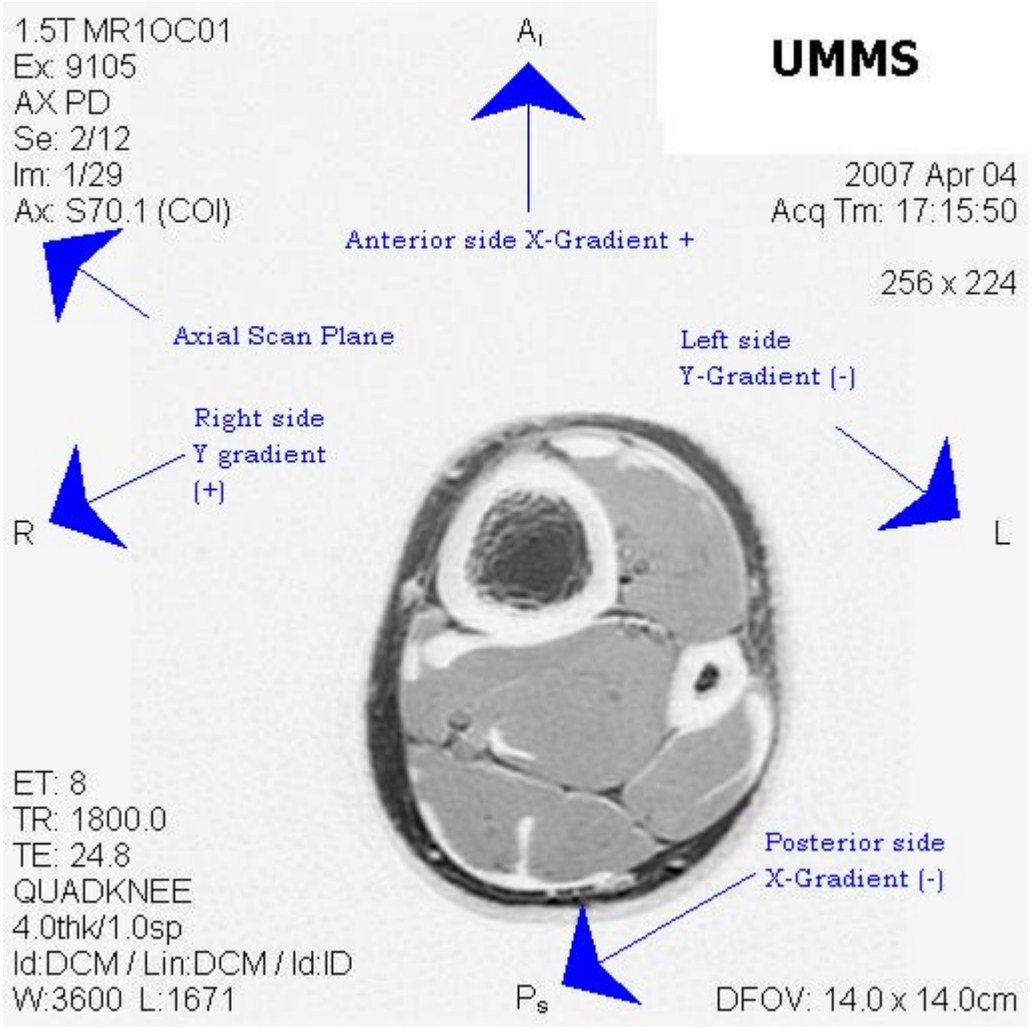
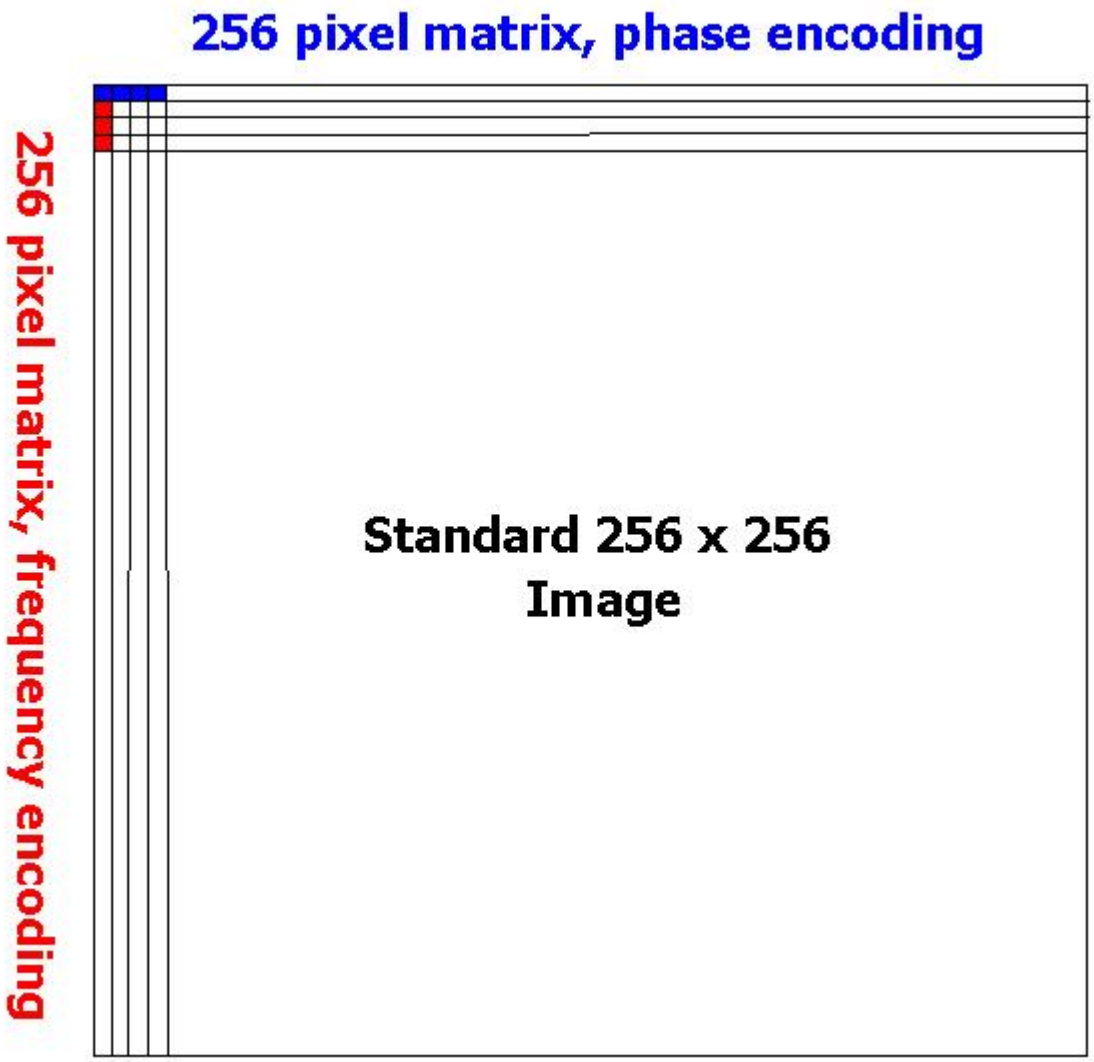


Figure 1

Figure 1, is a MRI scan of the ankle in the Axial plane. We know that MR uses 3 gradient amplifiers, X, Y and Z. Each amplifier has a specific function, depending the plane of scanning selected.

- Slice selection
- Phase encoding matrix
- Frequency encoding matrix



In figure 2, MR collects data based on the matrix. Example, 256 x 256. This is broken down to 256 pixels for the phase encoding and 256 pixels for the frequency encoding. This encoding information is fed to the respective gradient amplifiers based on the plane selected. The remaining axis, called slice encoding, is also loaded with encoding data based on the slice thickness selected in the protocol.

As each pulse of gradients and RF system results in action of the phase encoding amplifier that is used to readout the data during an acquisition. As each pulse occur, the phase encoding amplifier pulse with the phase encoding matrix. If the matrix is 256 pixels then the gradient will generate it pulse creating 256 sampling per every frequency-encoded pulse. Thereafter the frequency-encoding amplifier changes power for its next step in the matrix.

Axial encoding		
Gradient Amplifier	**Encoding**	**Viewed on Figure 1**
X	Frequency	Anterior to Posterior on image
Y	Phase	Left to Right on image
Z	Slice	Slice thickness on image

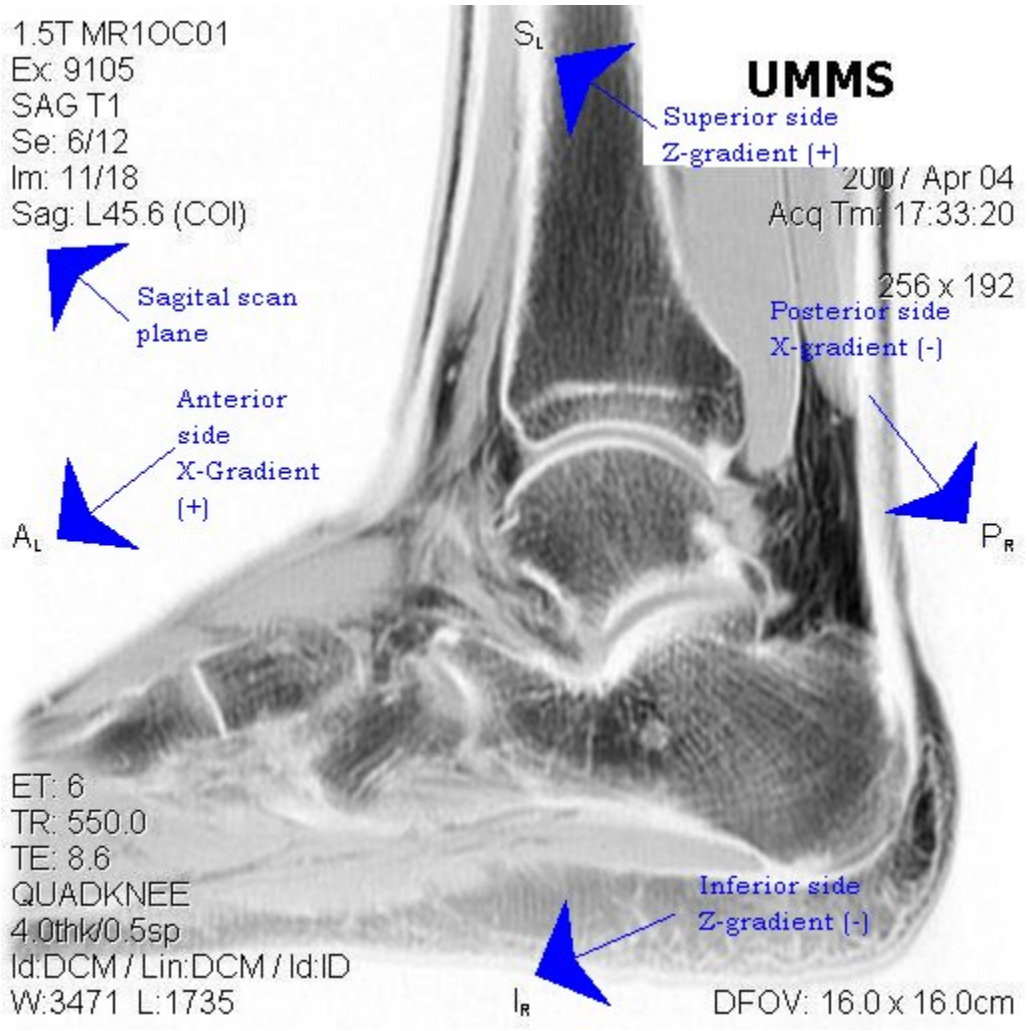


Figure 3

Figure 3, is a MRI scan of the ankle in the Sagital plane. Again each amplifier has a specific function depending the plane of scanning selected.

- Slice selection
- Phase encoding matrix
- Frequency encoding matrix

Sagital encoding		
Gradient Amplifier	**Encoding**	**Viewed on Figure 3**
X	Phase	Anterior to Posterior on image
Y	Slice	Slice thickness on image
Z	Frequency	Superior to Inferior on image

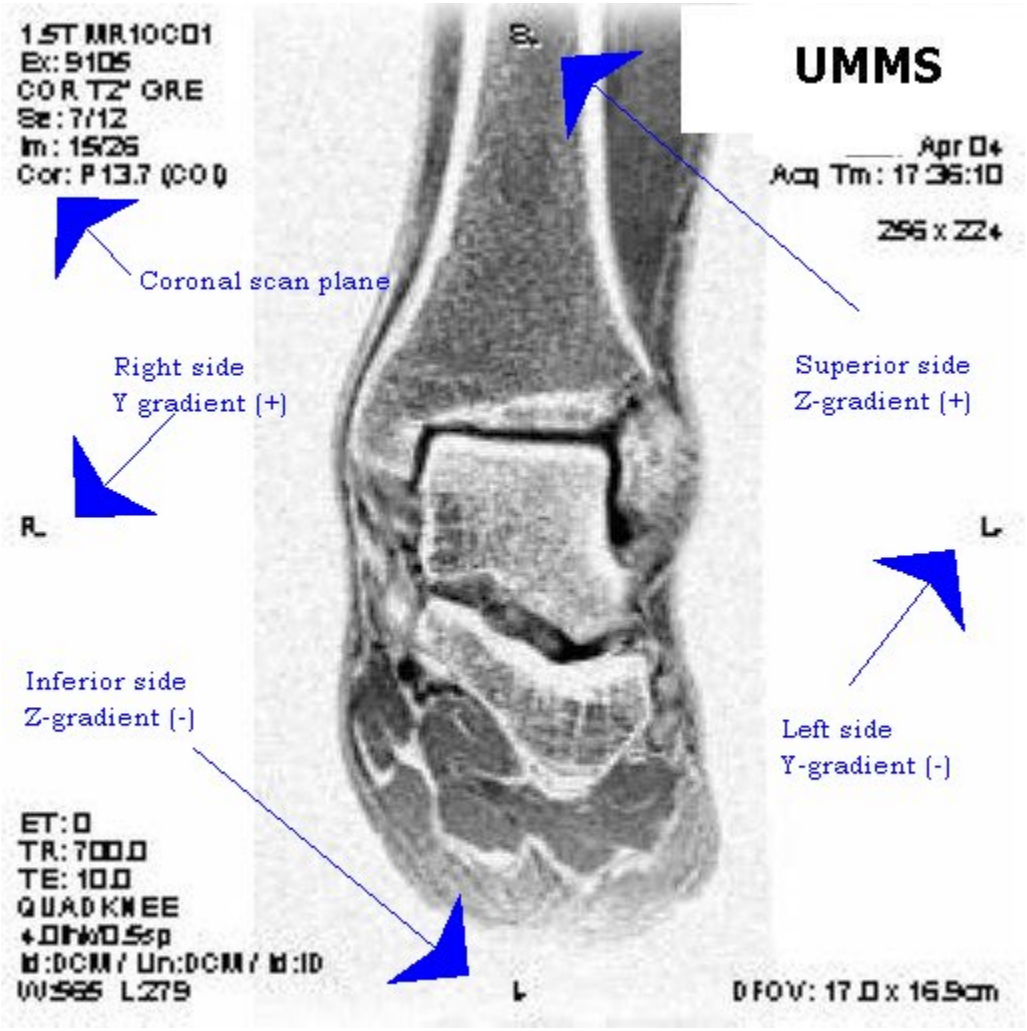


Figure 4

Figure 4, is a MRI scan of the ankle in the Coronal plane. Again each amplifier has a specific function depending the plane of scanning selected.

- Slice selection
- Phase encoding matrix
- Frequency encoding matrix

Coronal encoding		
Gradient Amplifier	**Encoding**	**Viewed on Figure 4**
X	Slice	Slice thickness on image
Y	Phase	Right to Left on image
Z	Frequency	Superior to Inferior on image