Toshiba Site
Yearly Performance Evaluation
Toshiba Vantage 1.5T
24-Feb-08

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MRI Equipment Evaluation Summary & Signature Page

Site Name: Toshiba Site **MRAP #**

Address: **Survey Date:** 2/24/08

City, State, Zip **Report Date:** 4/6/08

MRI Mfg: Toshiba **Model:** Vantage **Field:** 1.5T

MRI Scientist: Moriel NessAiver, Ph.D. **Signature:** Moriel NessAiver, Ph.D.

Equipment Evaluation Tests	Pass	Fail *	N/A
1. Magnetic field homogeneity:	☒	☐	☐
2. Slice position accuracy:	☒	☐	☐
3. Table positioning reproducibility:	☒	☐	☐
4. Slice thickness accuracy:	☒	☐	☐
5. RF coils' performance:			
a. Volume QD Coils	☒	☐	☐
b. Phase Array Coils	☒	☐	☐
c. Surface Coils	☒	☐	☐
6. Inter-slice RF interference (Crosstalk):	☒	☐	☐
7. Soft Copy Display	☒	☐	☐

Evaluation of Site's Technologist QC Program	Pass	Fail *	N/A
1. Set up and positioning accuracy: (daily)	☐	☐	☒
2. Center frequency: (daily)	☐	☐	☒
3. Transmitter attenuation or gain: (daily)	☐	☐	☒
4. Geometric accuracy measurments: (daily)	☐	☐	☒
5. Spatial resolution measurements: (daily)	☐	☐	☒
6. Low contrast detectability: (daily)	☐	☐	☒
7. Head Coil SNR (daily)	☐	☐	☒
8. Body Coil SNR (weekly)	☐	☐	☒
9. Fast Spin Echo (FSE/TSE) ghosting levels: (daily)	☐	☐	☒
10. Film quality control: (weekly)	☐	☐	☒
11. Visual checklist: (weekly)	☐	☐	☒

*See comments page for description of any failures.

Specific Comments and Recommendations

1. Magnet homogeneity is 'fair' but sub-optimal. The magnet 'sweet spot' should be at iso-center but instead is located roughly 5-6 cm towards the head. Overall homogeneity is reasonable but I think it could be better.
2. The LCD display is good. There is a slight divergence in the film response curve and the display response curve. This may make it difficult to obtain 'wysiwyg' on the films.
3. There are two coil ports, labeled L1 and L2. I tested both ports using the GP Flex coil and the wrist coil. With both coils, port L2 had roughly 50% better SNR! This is VERY unusual.
4. The wrist coil has two areas of very low signal in the lower/outer regions. This coil should always be used with adequate padding to keep the patient's wrist away from the surface of the coil.
5. All other coils appear to be working properly.
6.
7.
8.
9.
10.
11.
12.
13.

NOTE: Please be sure to read appendix D for an explanation of the format of this document.

MRI Equipment Performance Evaluation Data Form

Site Name: Toshiba Site

Contact	Title	Phone	Fax	eMail

Equipment Information

MRI Manufacturer: Toshiba Model: Vantage SN: V5818 Software: 8.01 R242

Camera Manufacturer: Agfa Model: Drystar 5500 SN: Software:

PACS Manufacturer: Model: SN: Software:

ACR Phantom Number used: J6959

1. Table Positioning Reproducibility: **Pass**

	IsoCenter	Out/In	Out/In	Out/In
Measured Phantom Center	-0.2	0.1	0	0.1

Comment:

2. Magnetic Field Homogeneity See appendix A for field plots. **PASS**

Last Year CF: **N/A** This Year CF: **63852172** CF Change: **NA**

FE fc TR: 600, TE: 10 & 15 Flip Angle: 45, FOV: 40

5 mm skip 5 mm, 19 slices, BW: 15.6 KHz, 256x128, 2nex

	15 cm	20 cm	25 cm
Axial:	**0.3**	**0.6**	**0.9**
Coronal:	**0.1**	**0.2**	**0.3**
Sagittal:	**0.3**	**0.5**	**0.9**

Comments: The magnet shim is fair. By examining page 2 of appendix A, you can see that there is significant assymetry in the magnet shim, the sweet spot' is 5 cm towards the head of the theoretical 'isocenter'.

3. Slice Thickness Accuracy

FOV: 250mm Matrix: 256x256 (Slice #1 from ACR Phantom) All values in mm

Sequence	TR	TE	Flip	NSA	Calc	Target	% Error
SE (ACR)	500	20	90	1	4.95	5	-1.0%
SE (Site T1)	500	12	90	1	4.98	5	-0.4%
SE (20/80)	2000	20	90	1	4.62	5	-7.6%
SE (20/80)	2000	80	90	1	4.42	5	-11.6%
FSE(20)	4000	100	90	2	4.86	5	-2.8%

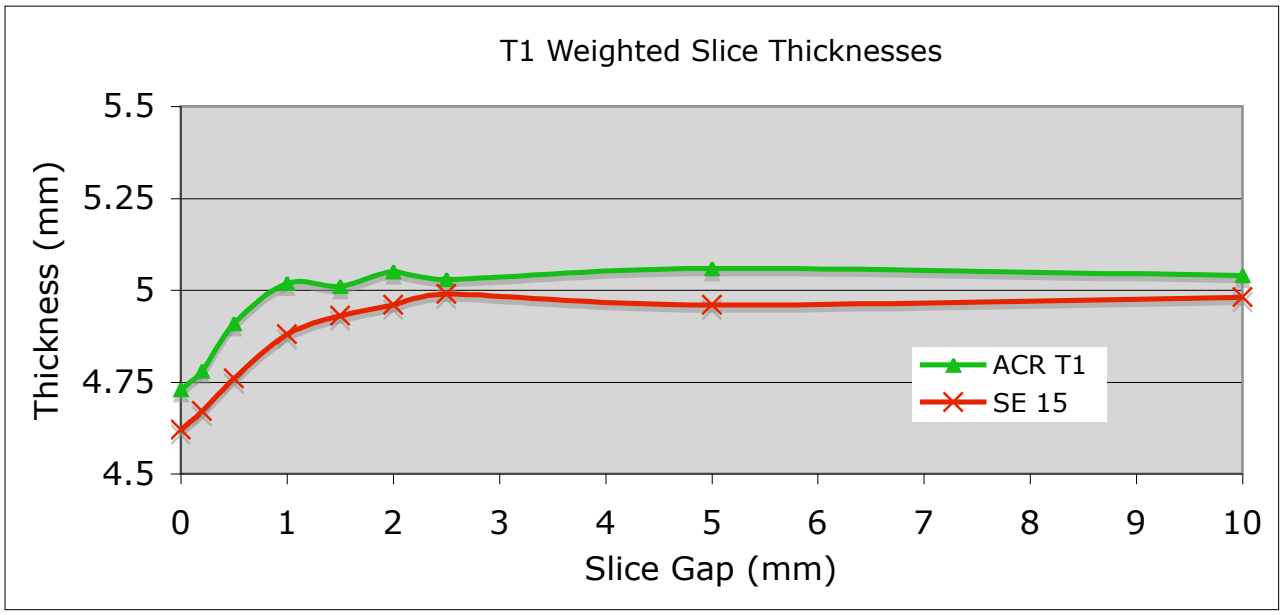
Comments:

4. Slice Crosstalk (RF interference)

The following data were obtained using the ACR phantom slice thickness wedges to measure the slice profile of a two common T1 weighted sequences when the slice gap varies from 200% down to 0% (contiguous) As the slices get closer together it is expected that the edges of the slices will overlap causing a deterioration of the slice profile. The data shown below clearly demonstrates this effect. Once the slice gap reaches 40% (SE 15) or 20% (ACR) of the slice thickness, the measured slice profile begins to drop. As the echo time drops, most systems trade off slice profile for echo time. This behaviour is common and expected. All slice profiles can be viewed in Appendix B.

Sequence Type	TR	TE	FOV (cm^2)	Matrix	NSA	Thickness	# of slices	Slice Measured
SE	500	20	25	256x256	1	5	11	6
SE	500	12	25	256x256	1	5	11	6

Skip	ACR T1	SE 15
0	4.73	4.62
0.2	4.78	4.67
0.5	4.91	4.76
1	5.02	4.88
1.5	5.01	4.93
2	5.05	4.96
2.5	5.03	4.99
5	5.06	4.96
10	5.04	4.98



5. Soft & Hard Copy Displays

Luminance Meter Make/Model: Tektronix J16 Digital Photometer Cal Expires: 4/6/06

Monitor Description: LCD

Luminance Measured: Ft. lamberts

Measured Data					
Which Monitor	Center of Image Display	Top Left Corner	Top Right Corner	Bottom Left Corner	Bottom Right Corner
Console					

Uniformity		
MAX	MIN	Percent Delta

SMPTE
OK?
Y

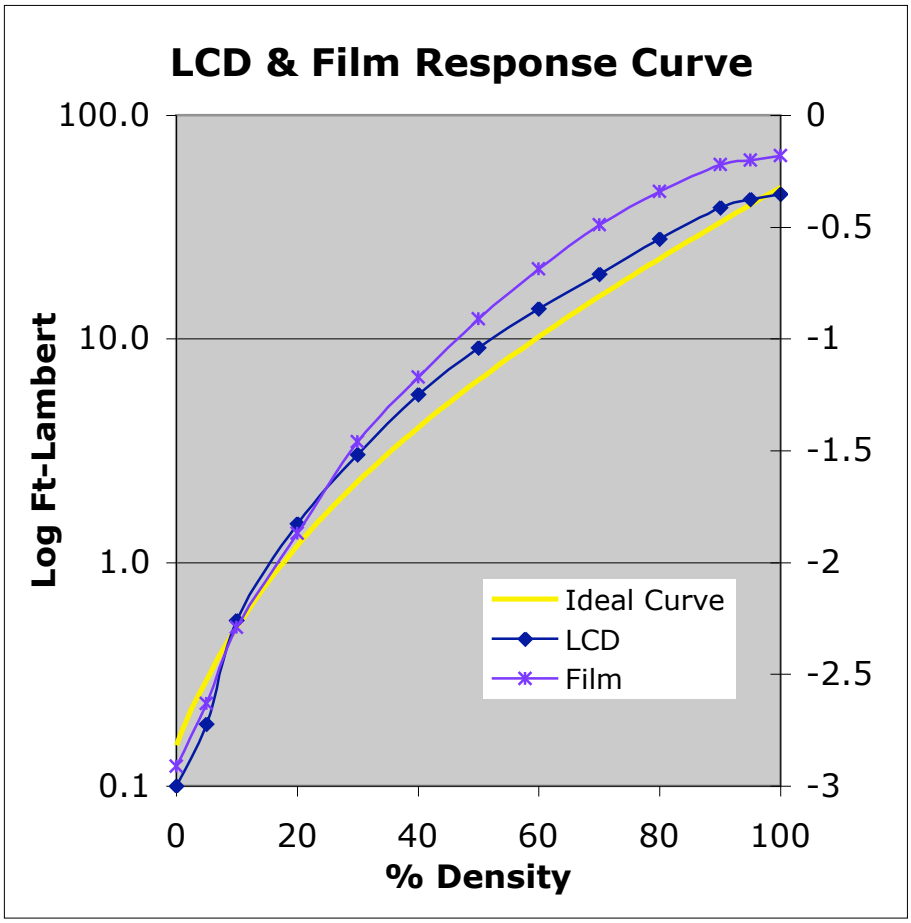
% delta =200% x (max-min)/(max+center) (>30% is action limit)

Minimum Brightness must be > 26.24 Ft. Lamberts

The LCD looks good. The film response matches the display well at the low end but rises a little too fast from 50%

to 80% making it a little hard to match what is seen on the screen to what comes out on the film.

Density	Ft-Lamber	Film Density
0	0.10	-2.91
5	0.19	-2.63
10	0.55	-2.29
20	1.49	-1.87
30	3.04	-1.46
40	5.63	-1.17
50	9.15	-0.91
60	13.7	-0.686
70	19.5	-0.49
80	28.0	-0.34
90	38.8	-0.22
95	42.3	-0.2
100	44.4	-0.18



Coil and Other Hardware Inventory List

Site Name Toshiba Site

ACR Magnet # _____ Nickname Vantage

Active	Coil Description	Manufacturer	Model	Rev.	Mfg. Date	SN	Channels
☐	Body Integrated	Toshiba					1
☐	CTL Spine PA QD	USA Instruments	MJAS-127A	1	May, 2005	S3A0562181	4
☐	GP Flex	Toshiba	MJCC-147A			A4592130	4
☐	Head Coil QD	Toshiba	MJQH-127A			A3532050	1
☐	Head Speeder w/ NV attch.	Toshiba	MJAH-117A	1	May, 2005	K2A0572001	8
☐	Knee QD	Toshiba	MJQJ-107A			SIB0562286	4
☐	Shoulder Array	Toshiba	MJCC-167A			S2A0562135	4
☐	Torso Speeder QD	Toshiba	MJAB-137A			SIA0562254	8
☐	Wrist - Quadrature	Toshiba	Alpha 7000	2	Sep, 2004		4
☐							

RF Coil Performance Evaluation

Coil: Body Integrated

Mfg.: Toshiba

Mfg. Date: _____ Coil ID: 1550

Phantom: 32 cm sphere

Test Date: 2/24/2008

Model: _____

Revision: _____

SN: _____

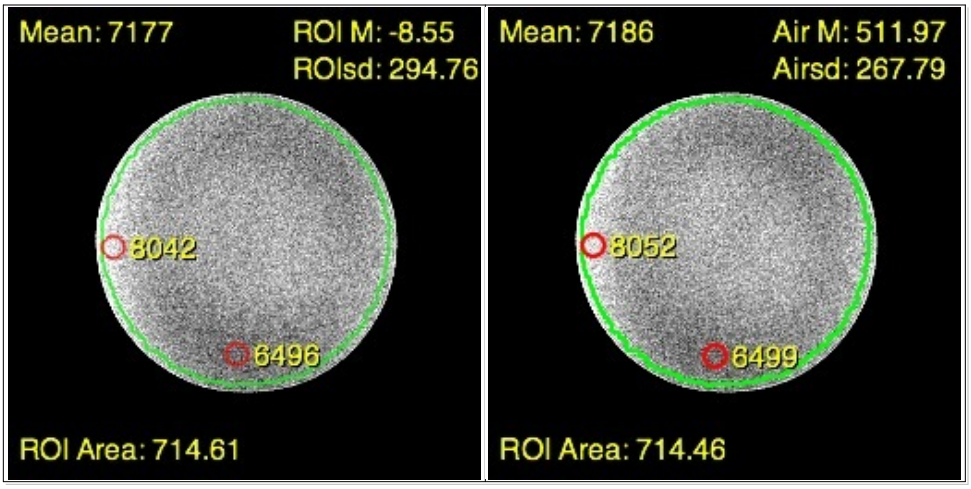
# of Channels 1

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	48	256	256	15.6	1	3	-

Coil Mode: Body QD

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
A	7,177	8,042	6,496	-8.6	294.76	NEMA	17.2	6.7	19.3	89.4%
N	7,186	8,052	6,499	512.0	267.79	Air	17.6	6.9	19.7	89.3%



Test Images

RF Coil Performance Evaluation

Coil: CTL Spine PA QD

Mfg.: USA Instruments

Mfg. Date: 5/1/2005 Coil ID: 1543

Phantom: Bottle in Neck, and jug for 234

Test Date: 2/24/2008

Model: MJAS-127A

Revision: 1

SN: S3A0562181

# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	50	256	256	15.6	1	3	-

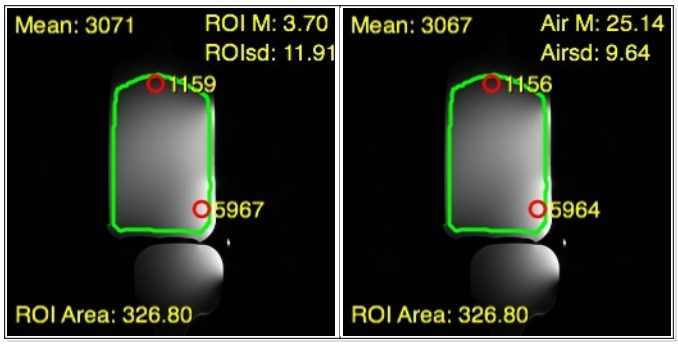
Coil Mode: CS12

Analysis of Composite Image

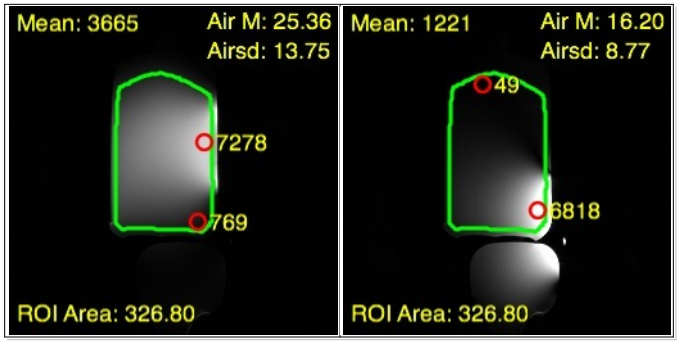
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	3,071	5,967	1,159	3.7	11.91	NEMA	182.4	65.6	354.3	32.5%
A	3,067	5,964	1,156	25.1	9.64	Air	208.5	75.1	405.4	32.5%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	3,665	7,278	13.75	Air	174.7	100%	346.9	68%
2	1,221	6,818	8.77	Air	91.2	52%	509.5	100%



Composites



Channel 1 Channel 2

RF Coil Performance Evaluation

Coil: CTL Spine PA QD

Mfg.: USA Instruments

Mfg. Date: 5/1/2005 Coil ID: 1543

Phantom: Bottle in Neck, and jug for 234

Test Date: 2/24/2008

Model: MJAS-127A

Revision: 1

SN: S3A0562181

# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	50	256	256	15.6	1	3	-

Coil Mode: CTL234

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Back ground	Noise SD	Noise Type
N	2,150	6,330	488	4.4	47.14	NEMA
A	2,146	6,222	493	37.8	12.68	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
32.3	11.6	95.0	14.3%
110.9	39.9	321.6	14.7%

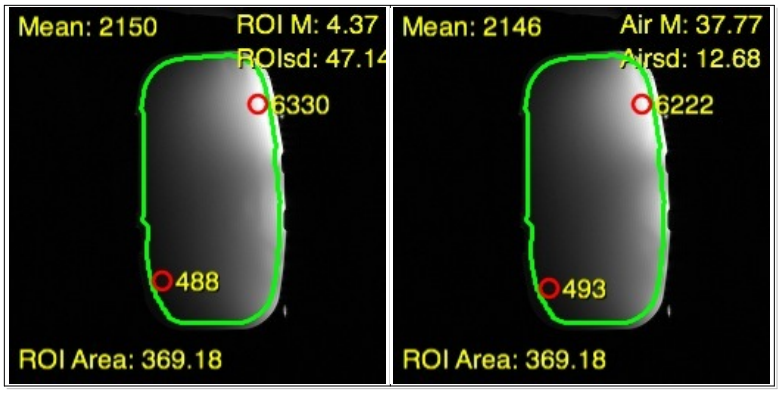
Analysis of Uncombined Images

Measured Data

Ch	Mean	Max	Noise SD	Noise Type
2	1,249	6,214	13.03	Air
3	1,415	6,287	13.51	Air
4	855	6,022	13.09	Air

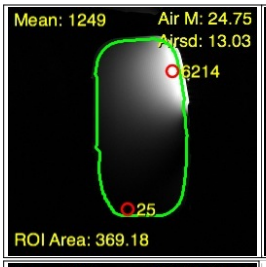
Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
62.8	92%	312.5	100%
68.6	100%	305.0	98%
42.8	62%	301.5	96%



Composites

Channel 1



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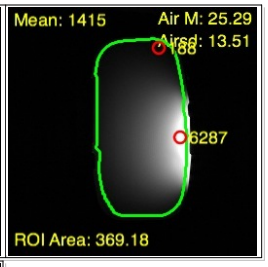
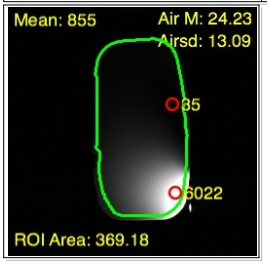




Channel 3

RF Coil Performance Evaluation

Coil: CTL Spine PA QD

Mfg.: USA Instruments

Mfg. Date: 5/1/2005 Coil ID: 1543

Phantom: Jug for 456

Test Date: 2/24/2008

Model: MJAS-127A

Revision: 1

SN: S3A0562181

# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	50	256	256	15.6	1	3	-

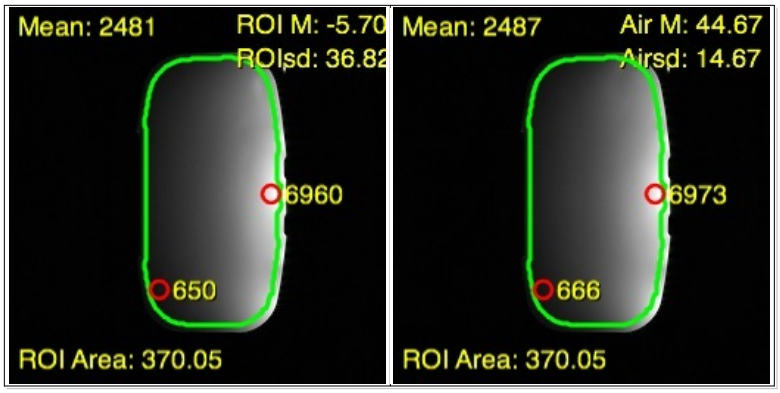
Coil Mode: LS456

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	2,481	6,960	650	-5.7	36.82	NEMA	47.7	17.2	133.7	17.1%
A	2,487	6,973	666	44.7	14.67	Air	111.1	40.0	311.5	17.4%

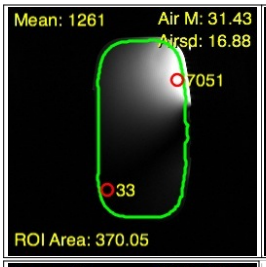
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	1,261	7,051	16.88	Air	49.0	72%	273.7	76%
2	1,630	6,974	15.74	Air	67.9	100%	290.4	81%
3	961	6,602	12.03	Air	52.3	77%	359.6	100%



Composites

Channel 1



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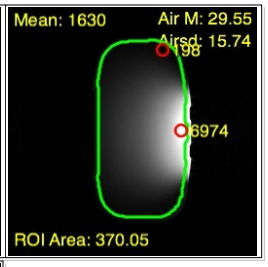
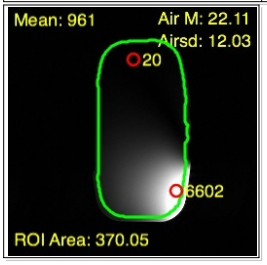




Channel 3

RF Coil Performance Evaluation

Coil: GP Flex
Mfg.: Toshiba
Mfg. Date: _____ Coil ID: 1546
Phantom: Bottle

Test Date: 2/24/2008
Model: MJCC-147A
Revision: _____
SN: A4592130
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	30	256	256	15.6	1	3	-

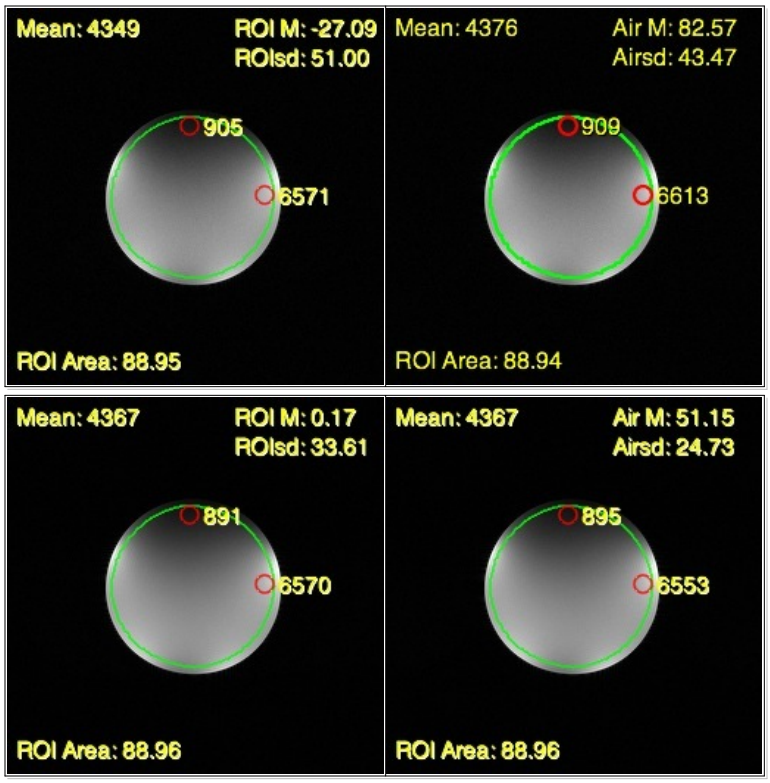
Coil Mode: GP flex Ports L1 & L2

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
L1N	4,349	6,571	905	-27.1	51.00	NEMA	60.3	60.3	91.1	24.2%
L1A	4,376	6,613	909	82.6	43.47	Air	66.0	66.0	99.7	24.2%
L2N	4,367	6,570	891	0.2	33.61	NEMA	91.9	91.9	138.2	23.9%
L2A	4,367	6,553	895	51.2	24.73	Air	115.7	115.7	173.6	24.0%

Port #L2 has 50-75% more SNR than port L1. I found the same results when using the wrist coil.

Test Images



RF Coil Performance Evaluation

Coil: Head Coil QD
Mfg.: Toshiba
Mfg. Date: _____ Coil ID: 1544
Phantom: ACR Phantom

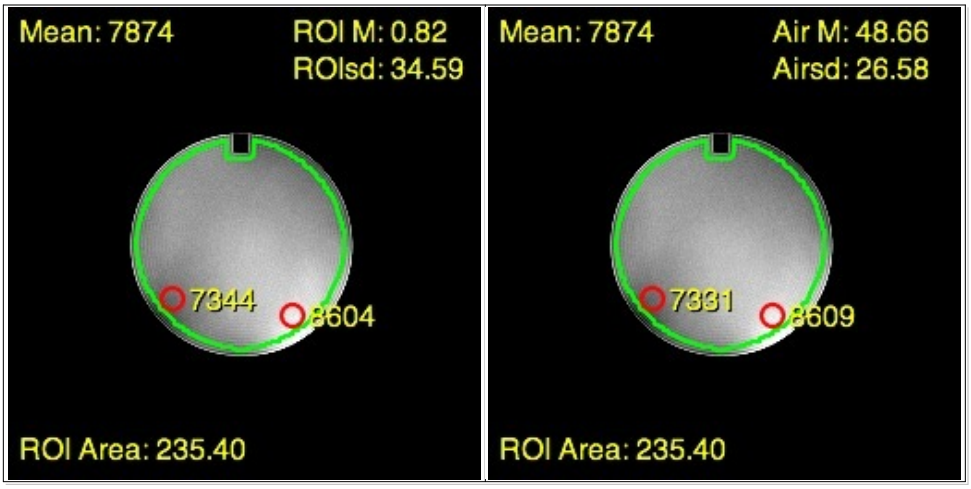
Test Date: 2/24/2008
Model: MJQH-127A
Revision: _____
SN: A3532050
# of Channels 1

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	40	256	256	15.6	1	3	-

Coil Mode: Head QD

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	7,874	8,604	7,344	0.8	34.59	NEMA	161.0	90.6	175.9	92.1%
A	7,874	8,609	7,331	48.7	26.58	Air	194.1	109.2	212.2	92.0%



Test Images

RF Coil Performance Evaluation

Coil: Head Speeder w/ NV attch.

Mfg.: Toshiba

Mfg. Date: 5/1/2005 Coil ID: 1548

Phantom: Large Bottle

Test Date: 2/24/2008

Model: MJAH-117A

Revision: 1

SN: K2A0572001

# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	50	256	256	15.6	1	3	-

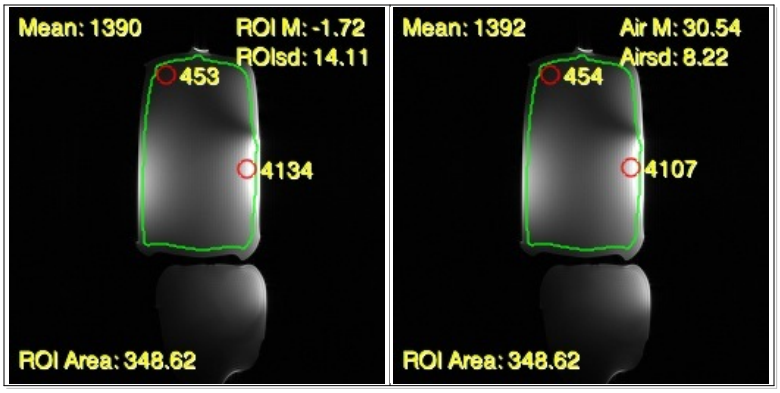
Coil Mode: NVA 4ch Neck

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,390	4,134	453	-1.7	14.11	NEMA	69.7	25.1	207.2	19.8%
A	1,392	4,107	454	30.5	8.22	Air	111.0	39.9	327.4	19.9%

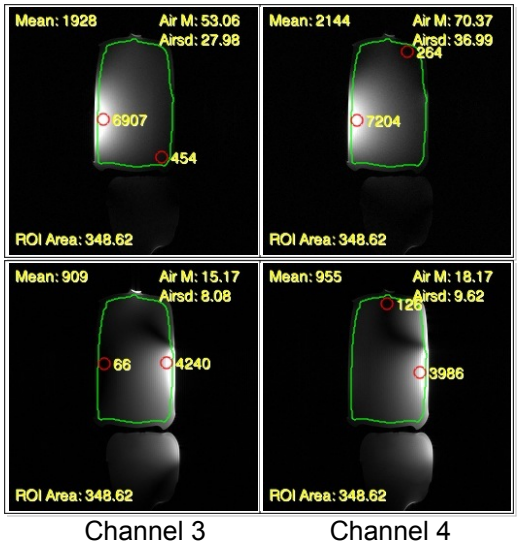
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	1,928	6,907	27.98	Air	45.2	61%	161.8	47%
2	2,144	7,204	36.99	Air	38.0	52%	127.6	37%
3	909	4,240	8.08	Air	73.7	100%	343.9	100%
4	955	3,986	9.62	Air	65.1	88%	271.5	79%



Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Head Speeder w/ NV attch.

Mfg.: Toshiba

Mfg. Date: 5/1/2005 Coil ID: 1548

Phantom: Large Bottle

Test Date: 2/24/2008

Model: MJAH-117A

Revision: 1

SN: K2A0572001

# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	50	256	256	15.6	1	3	-

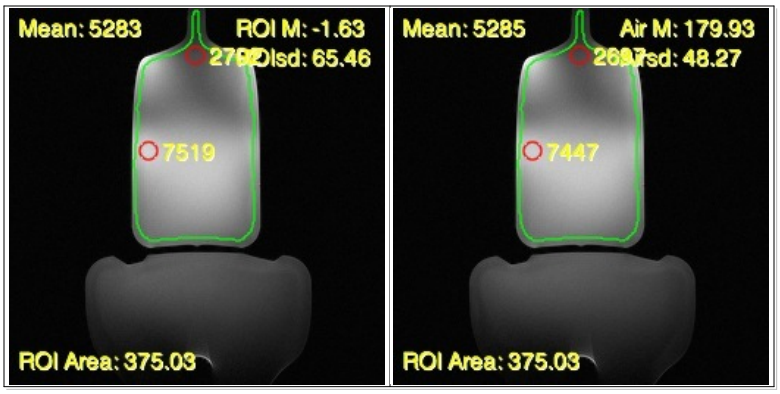
Coil Mode: NVA 4ch Neck

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	5,283	7,519	2,702	-1.6	65.46	NEMA	57.1	20.5	81.2	52.9%
A	5,285	7,447	2,697	179.9	48.27	Air	71.7	25.8	101.1	53.2%

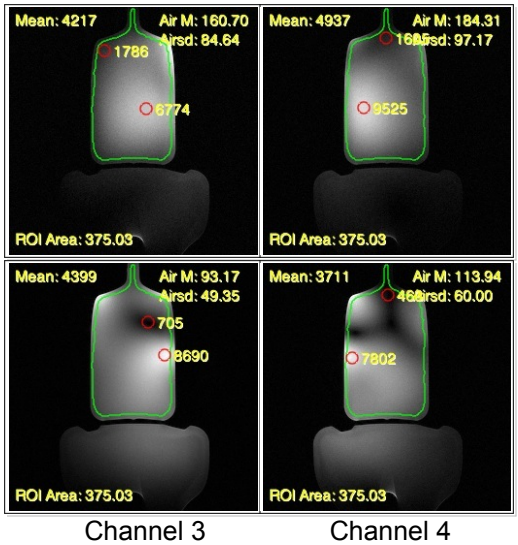
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	4,217	6,774	84.64	Air	32.6	56%	52.4	45%
2	4,937	9,525	97.17	Air	33.3	57%	64.2	56%
3	4,399	8,690	49.35	Air	58.4	100%	115.4	100%
4	3,711	7,802	60.00	Air	40.5	69%	85.2	74%



Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Head Speeder w/ NV attch.

Mfg.: Toshiba

Mfg. Date: 5/1/2005 Coil ID: 1548

Phantom: Large Bottle

Test Date: 2/24/2008

Model: MJAH-117A

Revision: 1

SN: K2A0572001

# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	40	256	256	15.6	1	3	-

Coil Mode: NVA 5ch Head

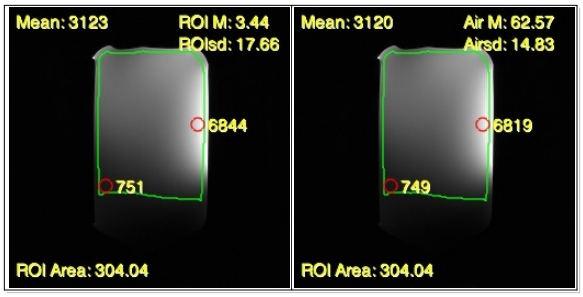
Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	3,123	6,844	751	3.4	17.66	NEMA	125.1	70.3	274.1	19.8%
A	3,120	6,819	749	62.6	14.83	Air	137.9	77.5	301.3	19.8%

Analysis of Uncombined Images

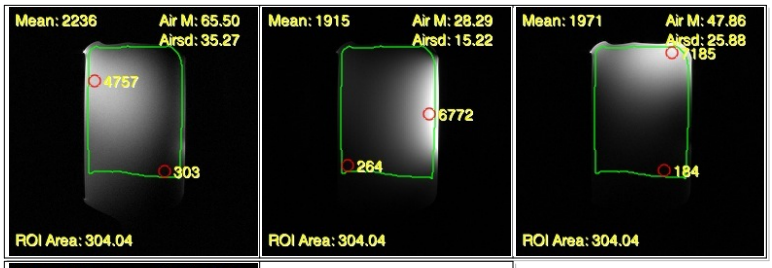
Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	2,236	4,757	35.27	Air	41.5	50%	88.4	30%
2	1,915	6,772	15.22	Air	82.5	100%	291.6	100%
3	1,971	7,185	25.88	Air	49.9	61%	181.9	62%
4	1,813	6,899	25.09	Air	47.4	57%	180.2	62%
5				Air	?	?	?	?

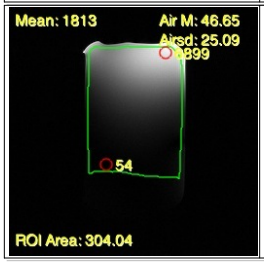
Channel 5 was mistakenly not reconstructed.



Composites

Channel 1 Channel 2 Channel 3





Channel 4 Channel 5

RF Coil Performance Evaluation

Coil: Head Speeder w/ NV attch.

Mfg.: Toshiba

Mfg. Date: 5/1/2005 Coil ID: 1548

Phantom: Large Bottle

Test Date: 2/24/2008

Model: MJAH-117A

Revision: 1

SN: K2A0572001

# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	40	256	256	15.6	1	3	-

Coil Mode: NVA 7ch Head

Analysis of Composite Image

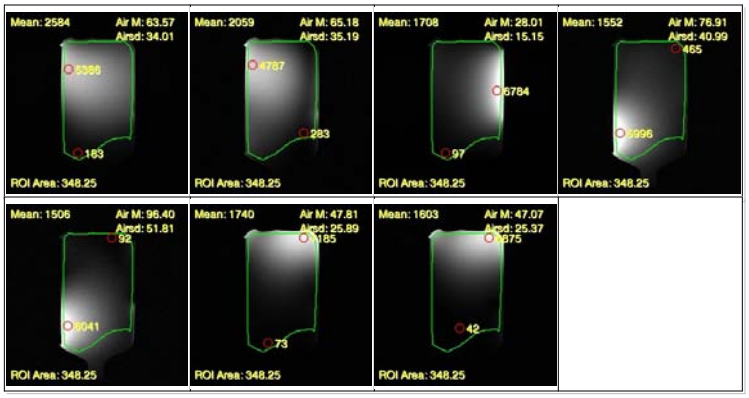
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	3,058	6,863	973	4.7	18.29	NEMA	118.2	66.5	265.4	24.8%
A	3,054	6,836	967	76.4	15.36	Air	130.3	73.3	291.6	24.8%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	2,584	5,386	34.01	Air	49.8	67%	103.8	35%
2	2,059	4,787	35.19	Air	38.3	52%	89.1	30%
3	1,708	6,784	15.15	Air	73.9	100%	293.4	100%
4	1,552	5,996	40.99	Air	24.8	34%	95.9	33%
5	1,506	6,041	51.81	Air	19.0	26%	76.4	26%
6	1,740	7,185	25.89	Air	44.0	60%	181.9	62%
7	1,603	6,875	25.37	Air	41.4	56%	177.6	61%
						0%		0%

Composites

Channel 1 Channel 2 Channel 3 Channel 4



Channel 5 Channel 6 Channel 7 Channel 8

RF Coil Performance Evaluation

Coil: Head Speeder w/ NV attch.

Mfg.: Toshiba

Mfg. Date: 5/1/2005 Coil ID: 1548

Phantom: Large Bottle

Test Date: 2/24/2008

Model: MJAH-117A

Revision: 1

SN: K2A0572001

# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	40	256	256	15.6	1	3	-

Coil Mode: NVA 7ch Head

Analysis of Composite Image

Measured Data

Label	Mean	Max	Min	Back ground	Noise SD	Noise Type
N	3,088	7,038	743	1.6	22.11	NEMA
A	3,087	7,018	743	77.5	15.50	Air

Calculated Results

Mean SNR	Normal-ized	Max SNR	Uni-formity
98.8	55.6	225.1	19.1%
130.5	73.4	296.7	19.1%

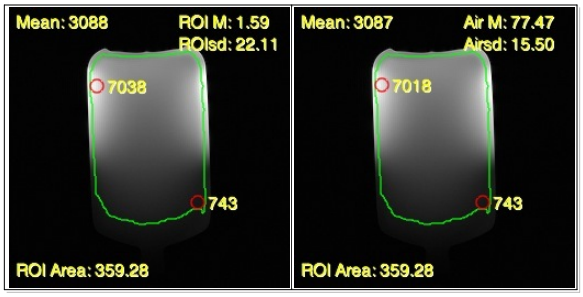
Analysis of Uncombined Images

Measured Data

Ch	Mean	Max	Noise SD	Noise Type
1	1,389	6,318	14.51	Air
2	1,422	6,979	14.57	Air
3	5,064	9,509	81.35	Air
4	4,467	7,804	147.51	Air
5	4,145	9,298	153.94	Air
6	1,543	6,139	22.06	Air
7	1,615	7,231	25.15	Air

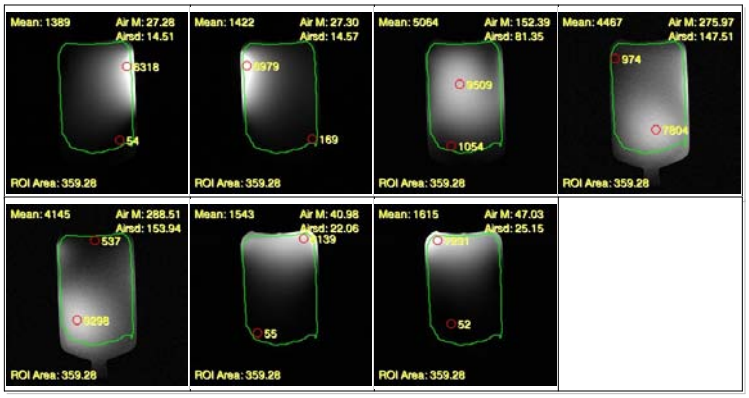
Calculated Results

Mean SNR	% of Mean	Max SNR	% of Max
62.7	98%	285.3	91%
64.0	100%	313.9	100%
40.8	64%	76.6	24%
19.8	31%	34.7	11%
17.6	28%	39.6	13%
45.8	72%	182.4	58%
42.1	66%	188.4	60%
	0%		0%



Composites

Channel 1 Channel 2 Channel 3 Channel 4



Channel 5 Channel 6 Channel 7 Channel 8

RF Coil Performance Evaluation

Coil: Knee QD
Mfg.: Toshiba
Mfg. Date: _____ Coil ID: 1542
Phantom: Large Bottle

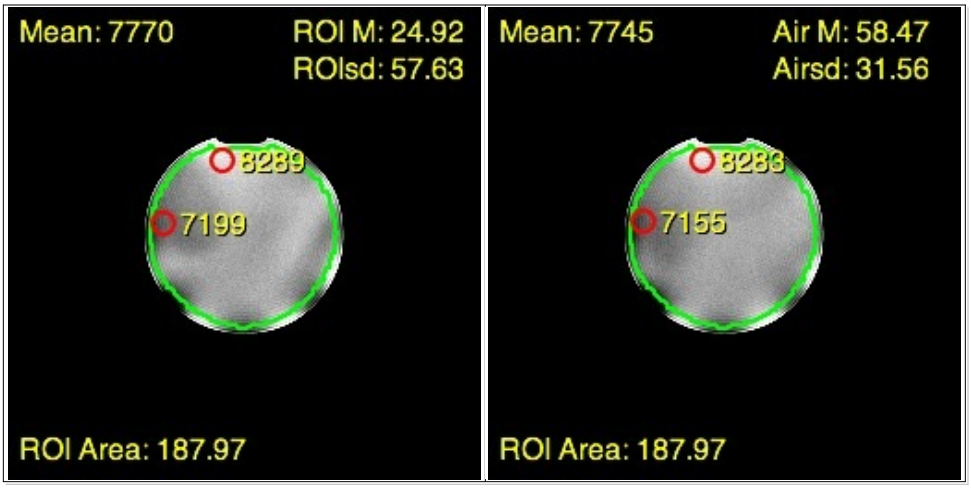
Test Date: 2/24/2008
Model: MJQJ-107A
Revision: _____
SN: SIB0562286
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	40	256	256	15.6	1	3	12

Coil Mode: Knee

Analysis of Test Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
	7,770	8,289	7,199	24.9	57.63	NEMA	95.4	53.6	101.7	93.0%
	7,745	8,283	7,155	58.5	31.56	Air	160.8	90.5	172.0	92.7%



Test Images

RF Coil Performance Evaluation

Coil: Shoulder Array
Mfg.: Toshiba
Mfg. Date: _____ Coil ID: 1547
Phantom: Large Bottle

Test Date: 2/24/2008
Model: MJCC-167A
Revision: _____
SN: S2A0562135
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	40	256	256	15.6	1	3	-

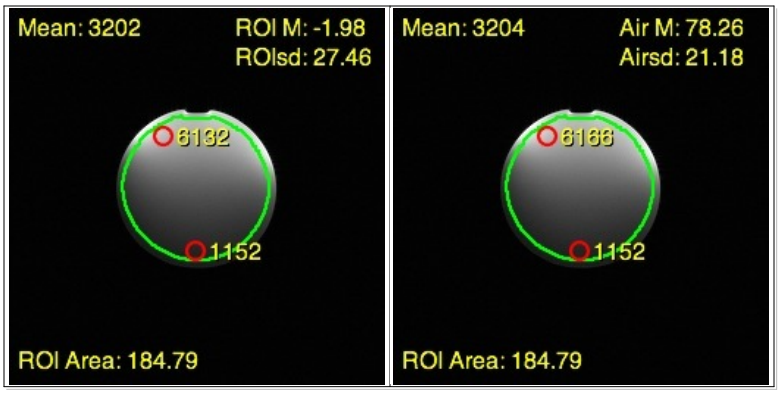
Coil Mode: Shoulder

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	3,202	6,132	1,152	-2.0	27.46	NEMA	82.5	46.4	157.9	31.6%
A	3,204	6,166	1,152	78.3	21.18	Air	99.1	55.8	190.8	31.5%

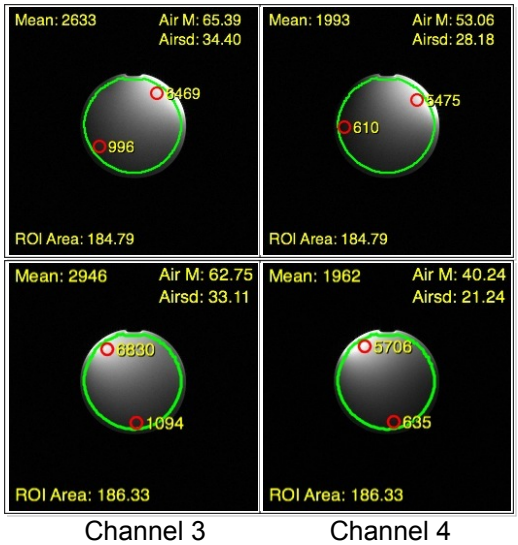
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	2,633	6,469	34.40	Air	50.2	83%	123.2	70%
2	1,993	5,475	28.18	Air	46.3	77%	127.3	72%
3	2,946	6,830	33.11	Air	58.3	96%	135.2	77%
4	1,962	5,706	21.24	Air	60.5	100%	176.0	100%



Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Shoulder Array
Mfg.: Toshiba
Mfg. Date: _____ Coil ID: 1547
Phantom: Large Bottle

Test Date: 2/24/2008
Model: MJCC-167A
Revision: _____
SN: S2A0562135
# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	40	256	256	15.6	1	3	-

Coil Mode: Shoulder

Analysis of Composite Image

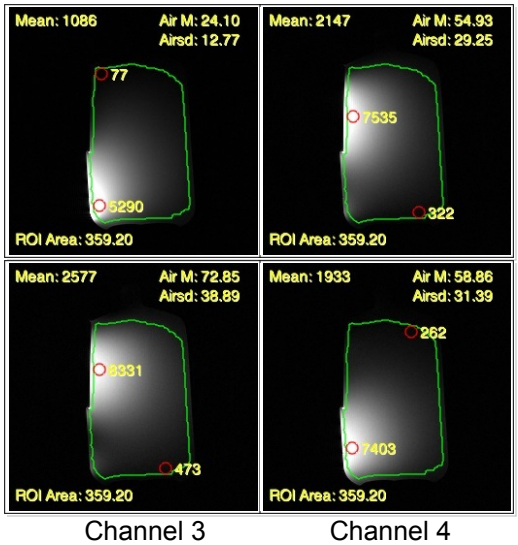
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,935	5,665	469	3.8	17.16	NEMA	79.7	44.9	233.5	15.3%
A	1,932	5,643	481	50.2	13.68	Air	92.5	52.1	270.3	15.7%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	1,086	5,290	12.77	Air	55.7	100%	271.5	100%
2	2,147	7,535	29.25	Air	48.1	86%	168.8	62%
3	2,577	8,331	38.89	Air	43.4	78%	140.4	52%
4	1,933	7,403	31.39	Air	40.4	72%	154.5	57%

Composites

Channel 1 Channel 2



Channel 3 Channel 4

RF Coil Performance Evaluation

Coil: Torso Speeder QD

Mfg.: Toshiba

Mfg. Date: _____ Coil ID: 1545

Phantom: 'Gas Can'

Test Date: 2/24/2008

Model: MJAB-137A

Revision: _____

SN: SIA0562254

# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	50	256	256	15.6	1	3	-

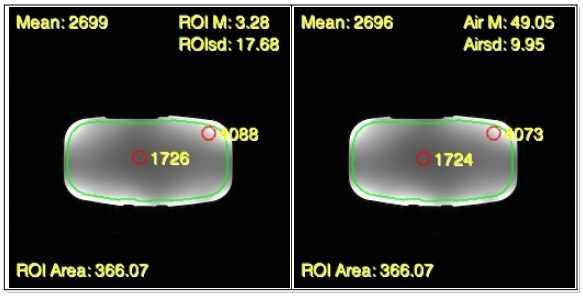
Coil Mode: Torso Speeder 8ch

Analysis of Composite Image

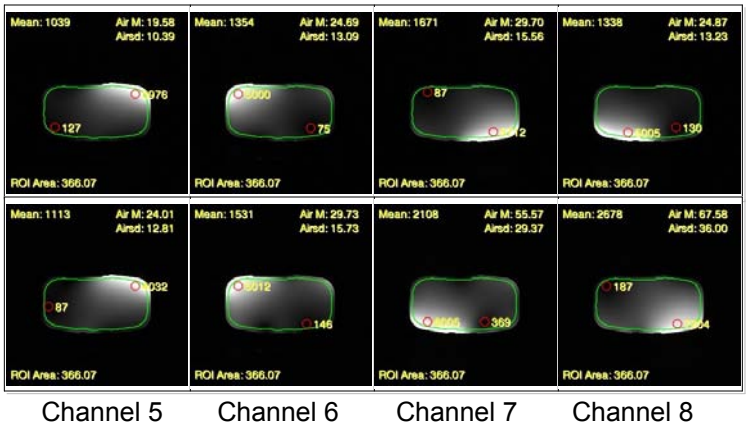
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	2,699	4,088	1,726	3.3	17.68	NEMA	108.0	38.9	163.5	59.4%
A	2,696	4,073	1,724	49.1	9.95	Air	177.6	63.9	268.2	59.5%

Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	1,039	3,976	10.39	Air	65.5	93%	250.8	100%
2	1,354	5,000	13.09	Air	67.8	96%	250.3	100%
3	1,671	5,712	15.56	Air	70.4	100%	240.6	96%
4	1,338	5,005	13.23	Air	66.3	94%	247.9	99%
5	1,113	4,032	12.81	Air	56.9	81%	206.3	82%
6	1,531	5,012	15.73	Air	63.8	91%	208.8	83%
7	2,108	6,005	29.37	Air	47.0	67%	134.0	53%
8	2,678	7,204	36.00	Air	48.7	69%	131.1	52%



Composites



RF Coil Performance Evaluation

Coil: Torso Speeder QD
Mfg.: Toshiba
Mfg. Date: _____ Coil ID: 1545
Phantom: 'Gas Can'

Test Date: 2/24/2008
Model: MJAB-137A
Revision: _____
SN: SIA0562254
# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	S	50	256	256	15.6	1	3	-

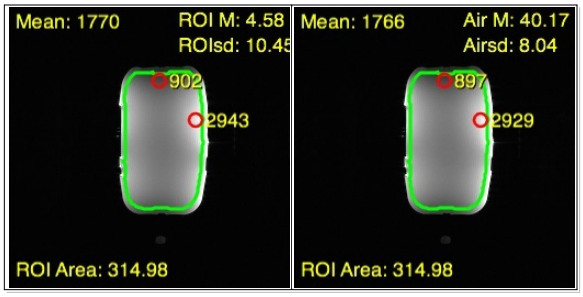
Coil Mode: Torso Speeder 8ch

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	1,770	2,943	902	4.6	10.45	NEMA	119.8	43.1	199.2	46.9%
A	1,766	2,929	897	40.2	8.04	Air	143.9	51.8	238.7	46.9%

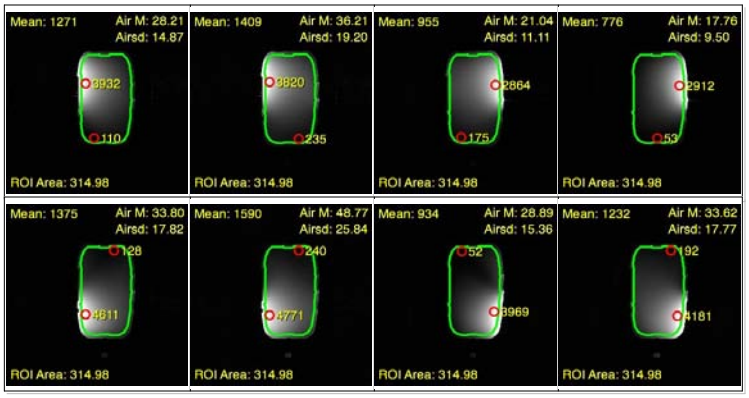
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	1,271	3,932	14.87	Air	56.0	99%	173.3	86%
2	1,409	3,820	19.20	Air	48.1	85%	130.4	65%
3	955	2,864	11.11	Air	56.3	100%	168.9	84%
4	776	2,912	9.50	Air	53.5	95%	200.9	100%
5	1,375	4,611	17.82	Air	50.6	90%	169.6	84%
6	1,590	4,771	25.84	Air	40.3	72%	121.0	60%
7	934	3,969	15.36	Air	39.8	71%	169.3	84%
8	1,232	4,181	17.77	Air	45.4	81%	154.2	77%



Composites

Channel 1 Channel 2 Channel 3 Channel 4



Channel 5 Channel 6 Channel 7 Channel 8

RF Coil Performance Evaluation

Coil: Torso Speeder QD

Mfg.: Toshiba

Mfg. Date: _____ Coil ID: 1545

Phantom: 'Gas Can'

Test Date: 2/24/2008

Model: MJAB-137A

Revision: _____

SN: SIA0562254

# of Channels 8

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	C	50	256	256	15.6	1	3	-

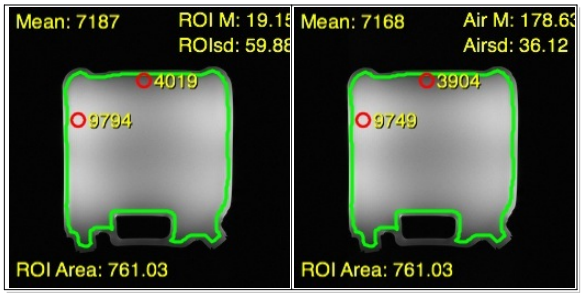
Coil Mode: Torso Speeder 8ch

Analysis of Composite Image

Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N	7,187	9,794	4,019	19.2	59.88	NEMA	84.9	30.6	115.7	58.2%
A	7,168	9,749	3,904	178.6	36.12	Air	130.0	46.8	176.9	57.2%

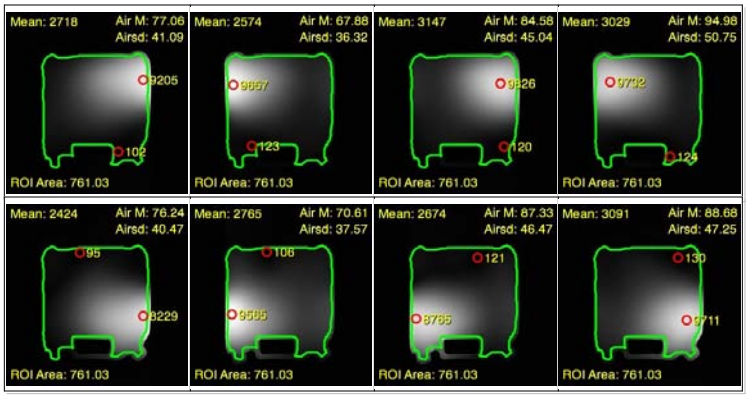
Analysis of Uncombined Images

Measured Data					Calculated Results			
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
1	2,718	9,205	41.09	Air	43.3	90%	146.8	84%
2	2,574	9,657	36.32	Air	46.4	96%	174.2	100%
3	3,147	9,826	45.04	Air	45.8	95%	143.0	82%
4	3,029	9,732	50.75	Air	39.1	81%	125.7	72%
5	2,424	8,229	40.47	Air	39.3	81%	133.2	76%
6	2,765	9,565	37.57	Air	48.2	100%	166.8	96%
7	2,674	8,765	46.47	Air	37.7	78%	123.6	71%
8	3,091	9,711	47.25	Air	42.9	89%	134.7	77%



Composites

Channel 1 Channel 2 Channel 3 Channel 4



Channel 5 Channel 6 Channel 7 Channel 8

RF Coil Performance Evaluation

Coil: Wrist - Quadrature

Mfg.: Toshiba

Mfg. Date: 9/1/2004 Coil ID: 1549

Phantom: Small Bottle

Test Date: 2/24/2008

Model: Alpha 7000

Revision: 2

SN:

# of Channels 4

Sequence	TR	TE	Plane	FOV	Nx	Ny	BW	NSA	Thickness	Gap
SE	300	20	T	20	256	256	15.6	1	3	-

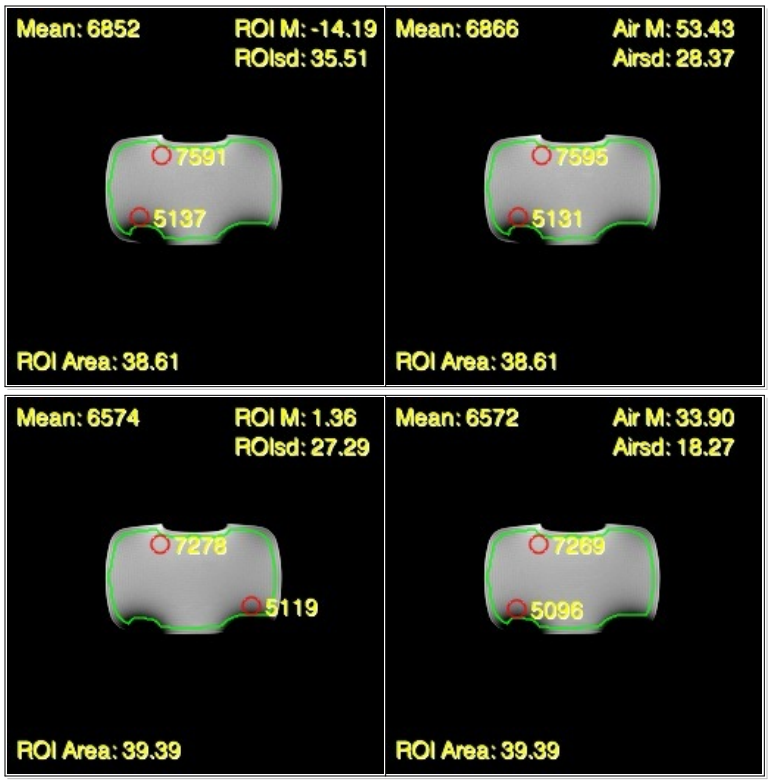
Coil Mode: Wrist - cable ports 1 # 2

Analysis of Test Image

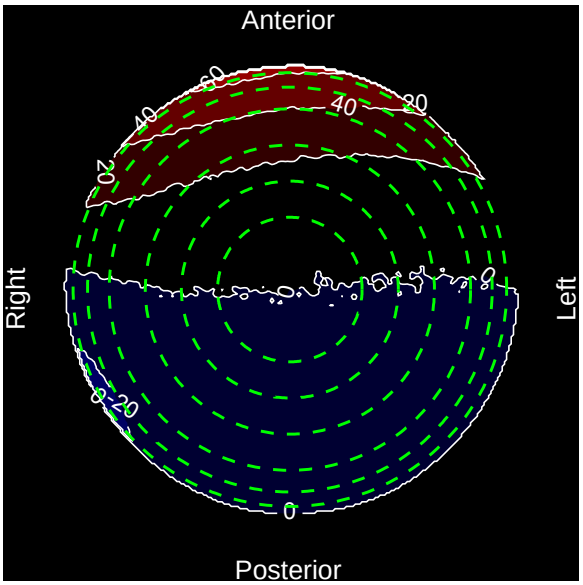
Measured Data							Calculated Results			
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal-ized	Max SNR	Uni-formity
N1	6,852	7,591	5,137	-14.2	35.51	NEMA	136.5	307.0	151.2	80.7%
A1	6,866	7,595	5,131	53.4	28.37	Air	158.6	356.8	175.4	80.6%
N2	6,574	7,278	5,119	1.4	27.29	NEMA	170.4	383.3	188.6	82.6%
A2	6,572	7,269	5,096	33.9	18.27	Air	235.7	530.4	260.7	82.4%

Port L2 has 50% better SNR than port L1. When using the GP coil there was an almost 75% difference. The two areas of low signal on the lower/outer sides are rather worrisome. This coil should always be used with adequate padding to keep the patient's wrist away from the surface of the coil.

Test Images

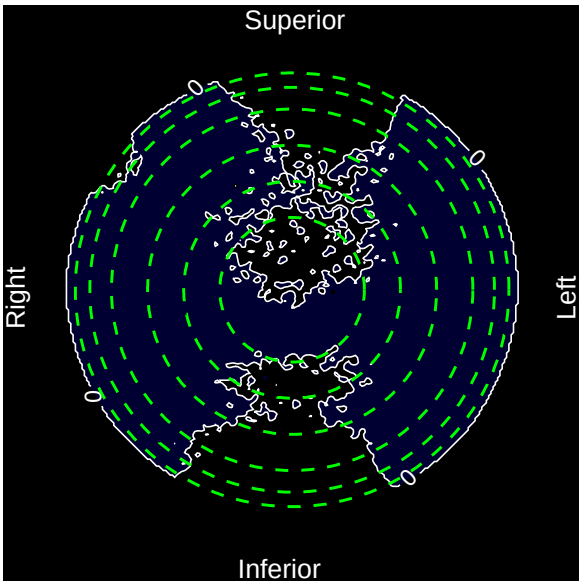


Appendix A: Magnet Homogeneity Field Maps
Toshiba Vantage 1.5T - 3 central planes
Measured February 25, 2008



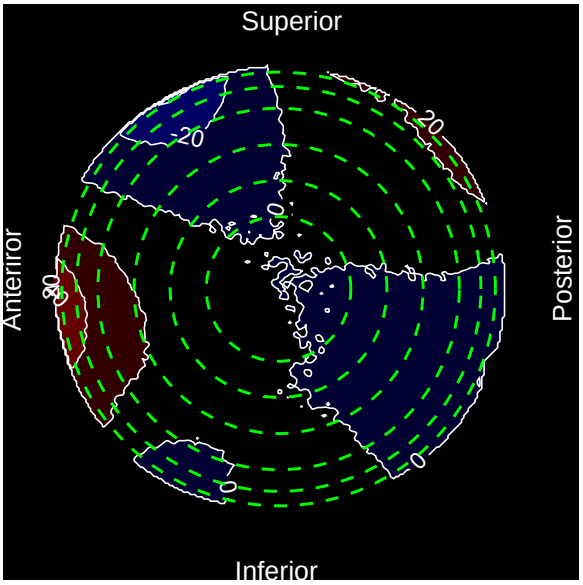
Axial

DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV
10	-4	8	12	0.2	0.5	2.5
15	-5	16	21	0.3	1.3	4.5
20	-10	26	36	0.6	2.4	7.1
25	-15	40	55	0.9	3.8	10.7
28	-19	52	72	1.1	4.9	13.5
30	-23	62	86	1.4	5.7	15.6



Coronal

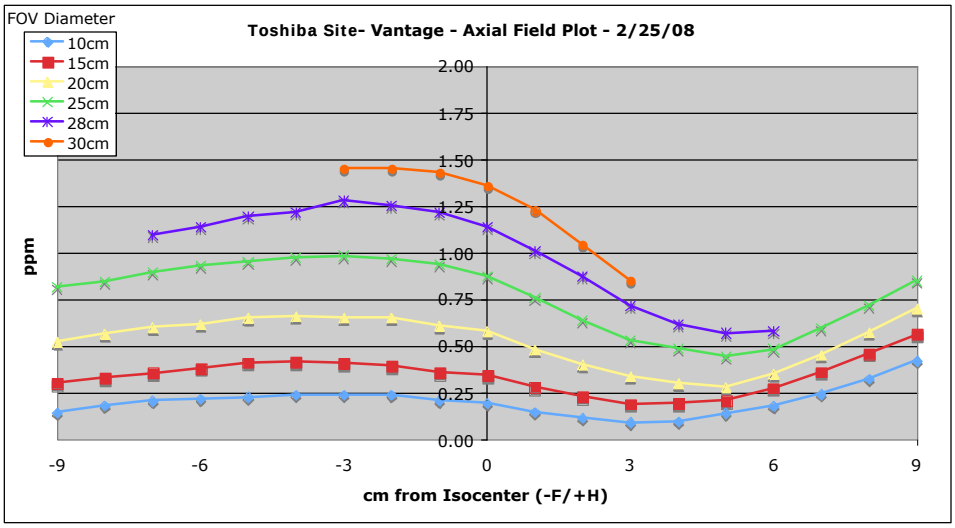
DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV
10	-2	1	4	0.1	-0.3	0.8
15	-5	2	7	0.1	-0.6	1.1
20	-7	4	11	0.2	-1.1	1.6
25	-10	6	17	0.3	-1.5	2.6
28	-13	12	25	0.4	-1.7	3.6
30	-16	16	32	0.5	-1.8	4.4

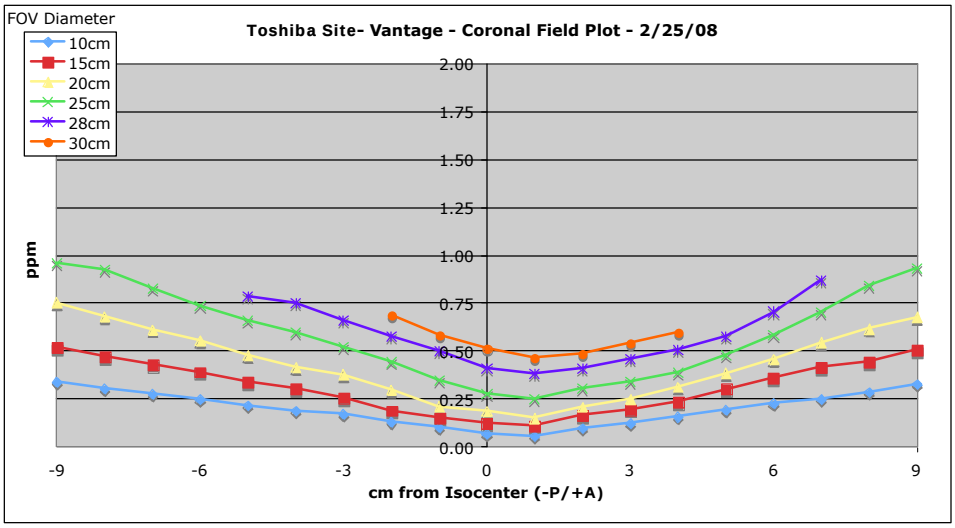


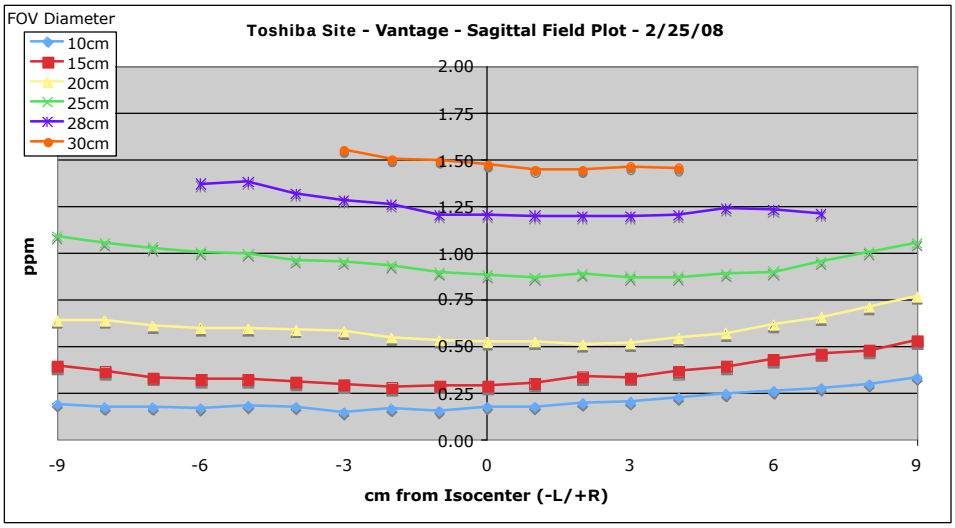
Sagittal

DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV
10	-2	8	11	0.2	1.2	2.0
15	-4	13	18	0.3	1.6	3.2
20	-10	22	33	0.5	2.1	5.1
25	-21	34	56	0.9	2.8	7.8
28	-31	44	76	1.2	3.2	9.9
30	-40	53	93	1.5	3.6	11.5

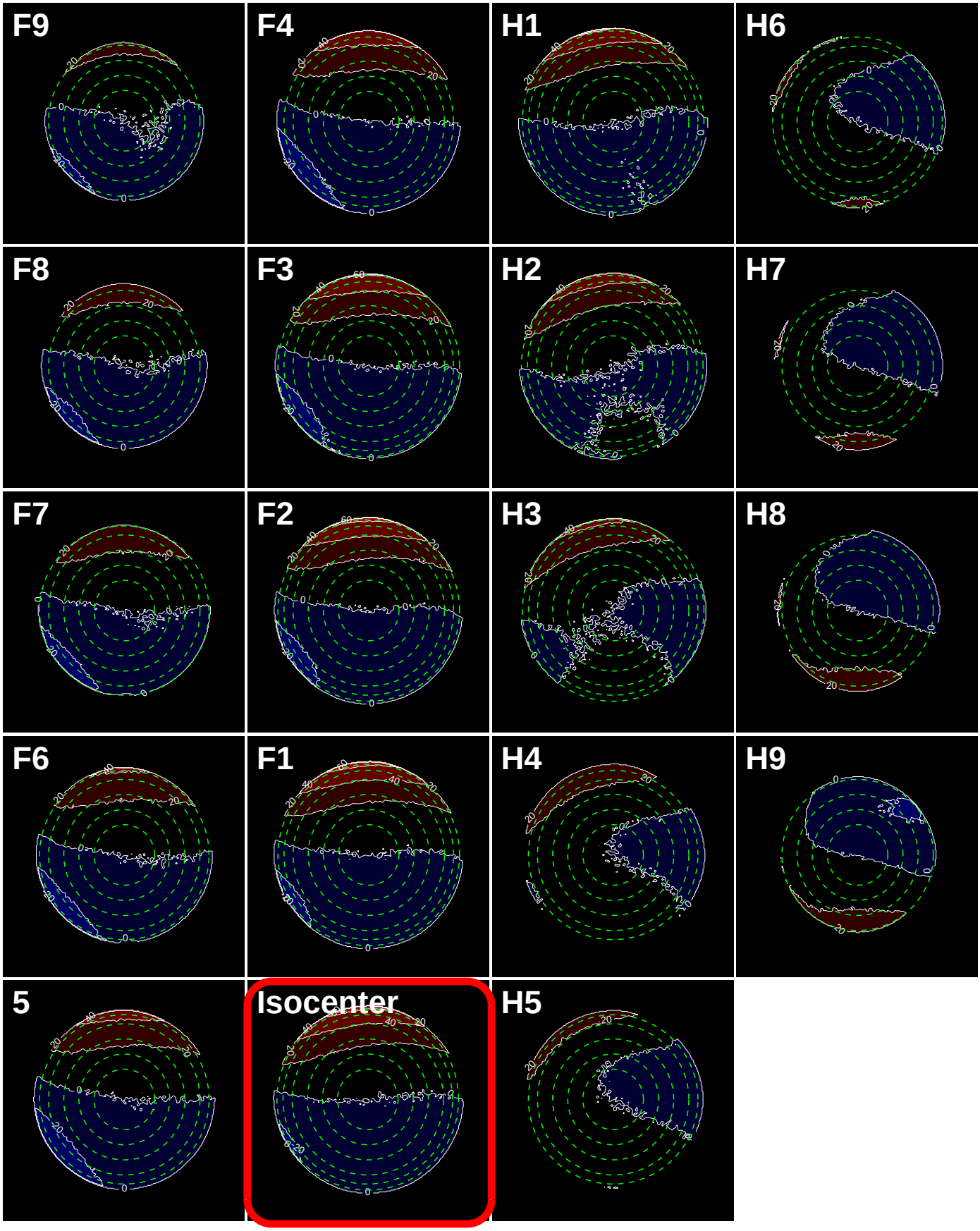
Appendix A: Magnet Homogeneity Field Maps
Toshiba Vantage 1.5T
Measured February 25, 2008



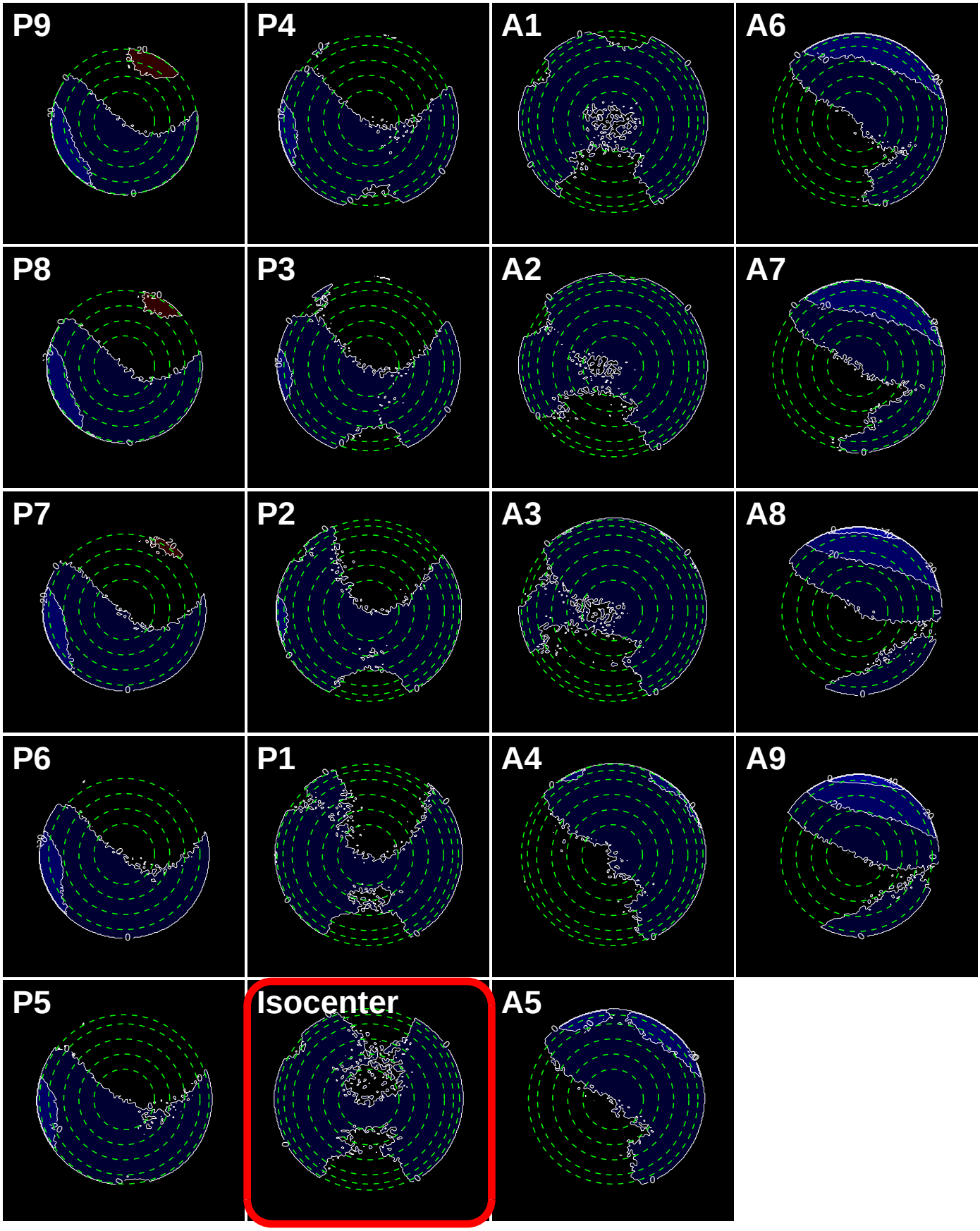




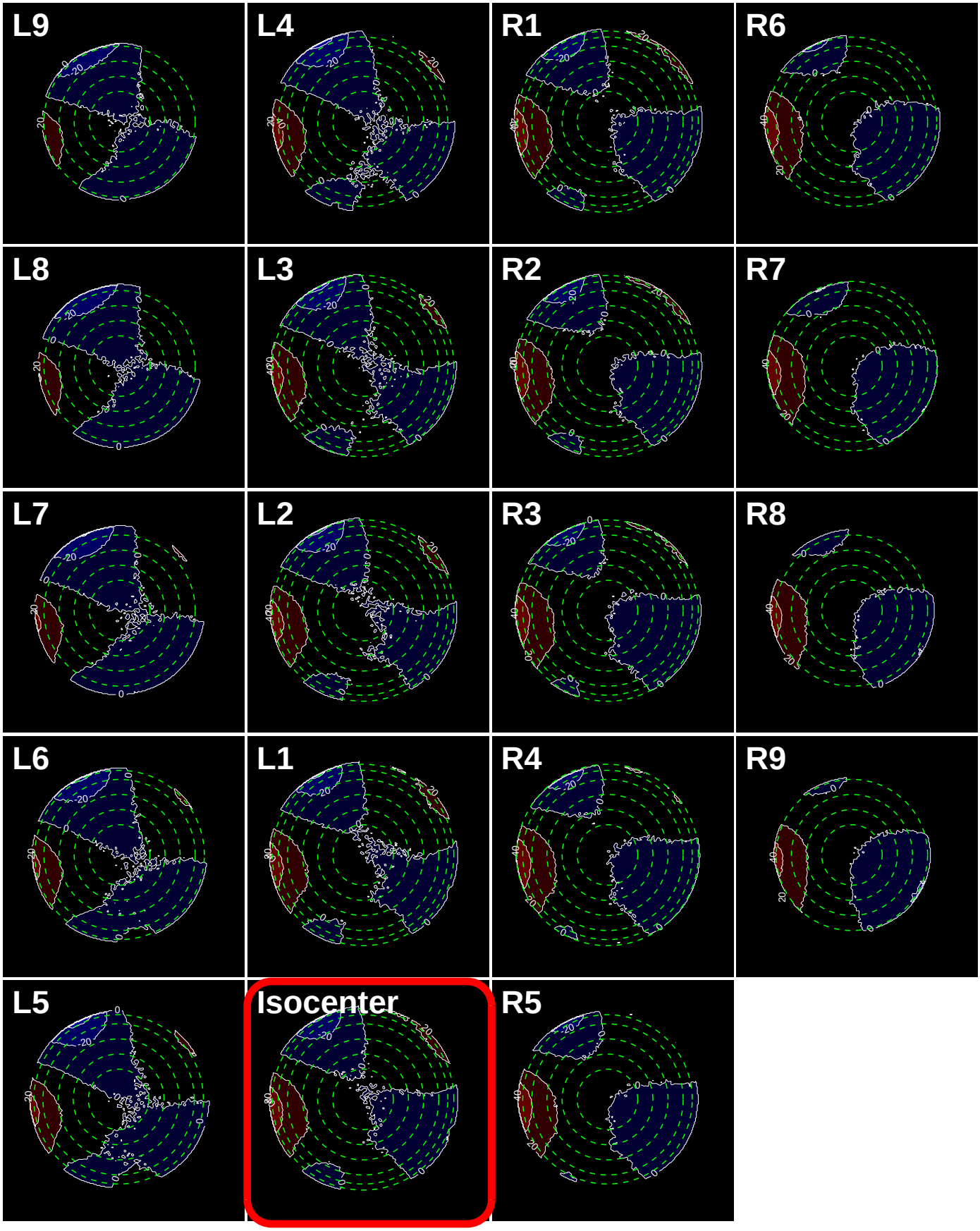
Axial Field Plots



Coronal Field Plots

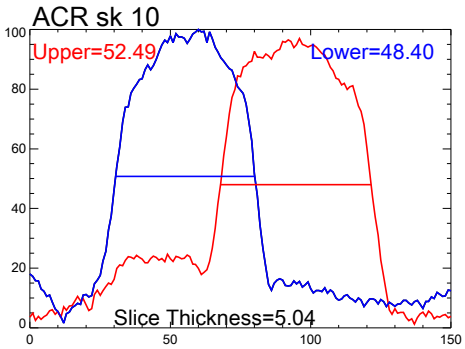


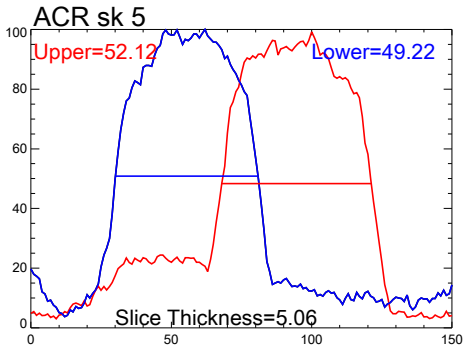
Sagittal Field Plots

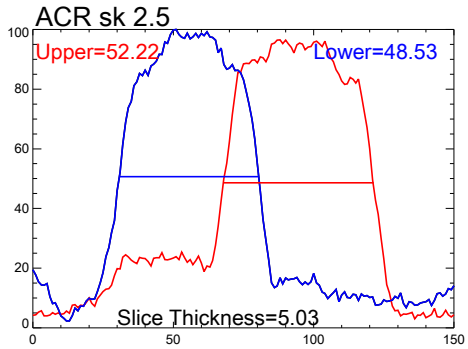


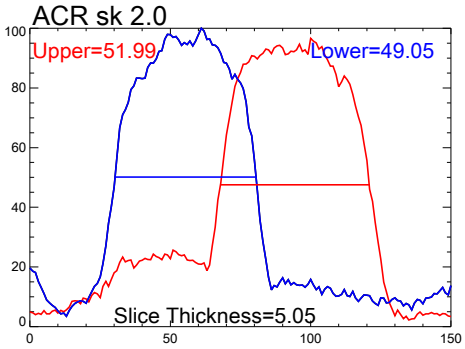
Appendix B: RF Slice Profiles and Crosstalk

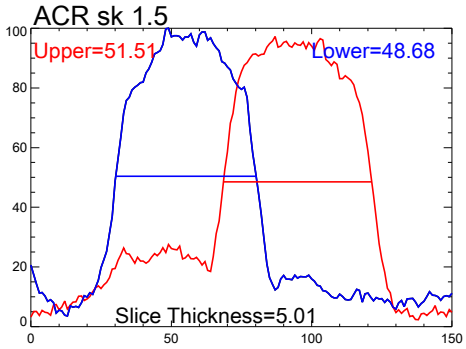
Spin Echo : ACR T1
TR/TE = 500/20
BW = 15.6 KHz
nex = 1.0
Scan time: 2:09

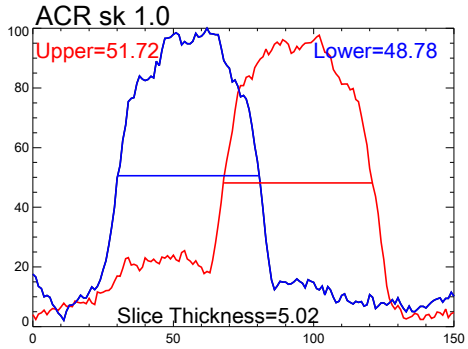


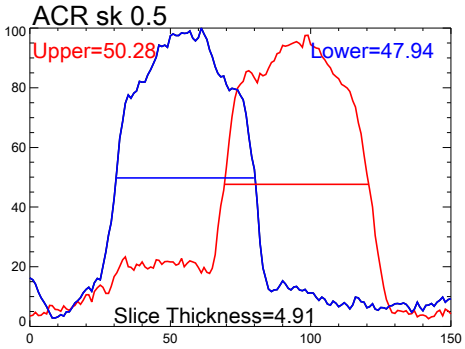


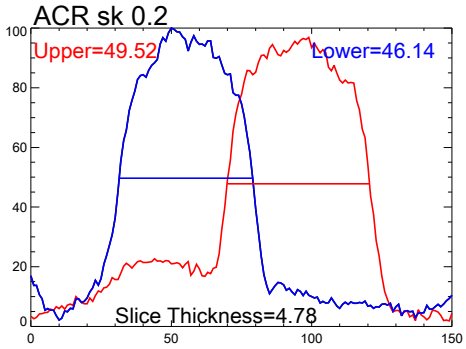


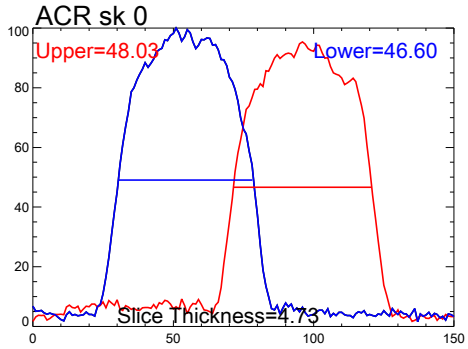


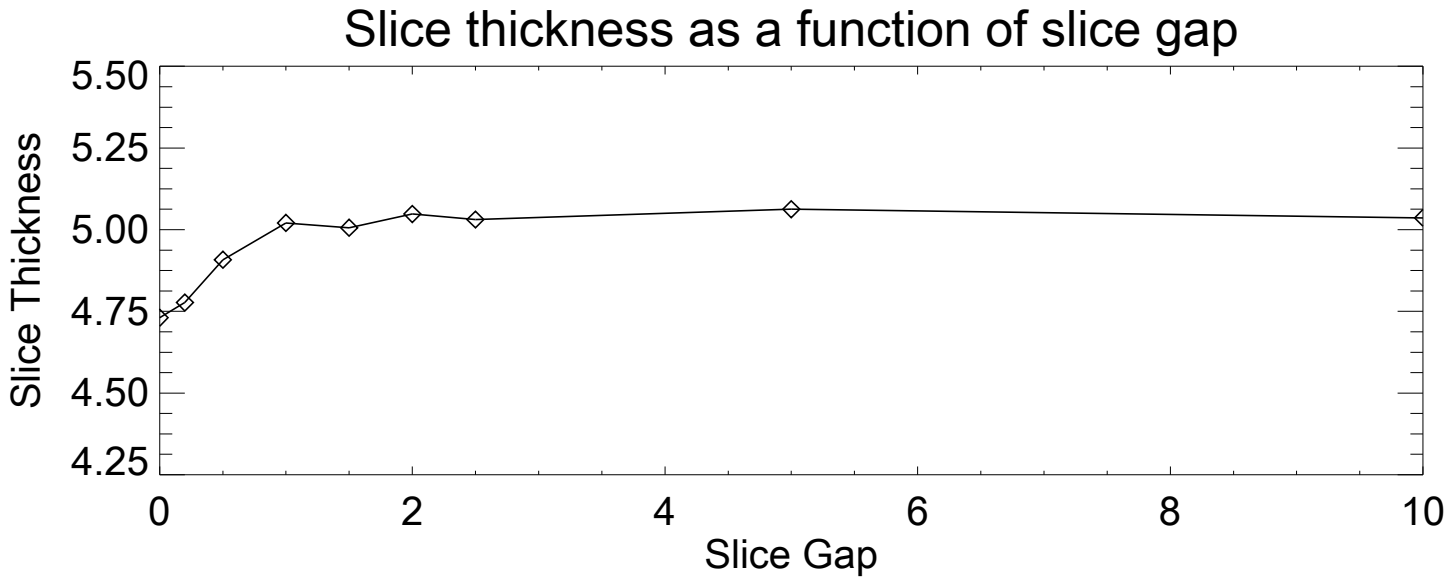






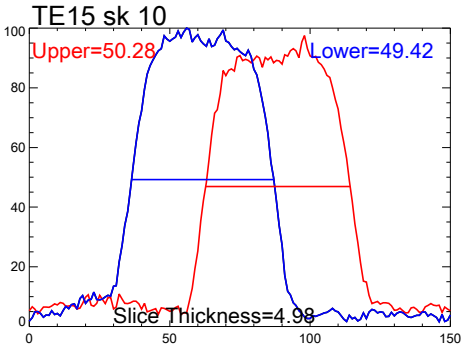


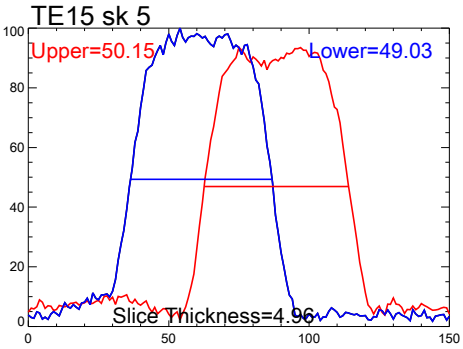


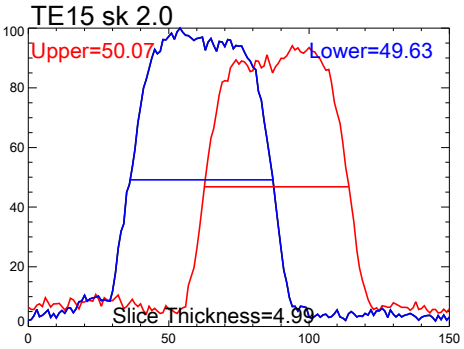


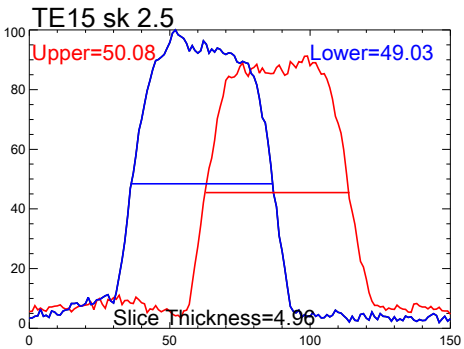
Appendix B: RF Slice Profiles and Crosstalk

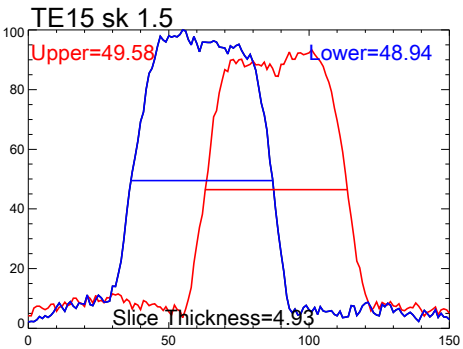
Spin Echo
TR/TE = 500/15
BW = ? KHz
nex = 1.0
Scan time: 2:09

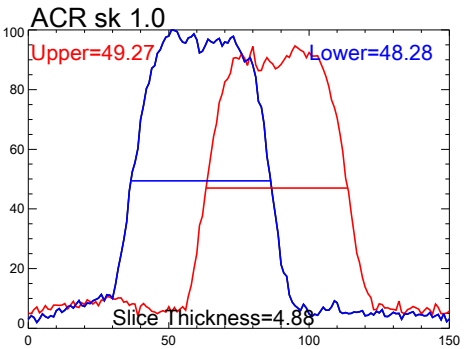


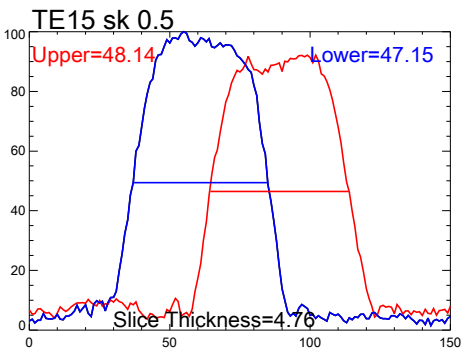


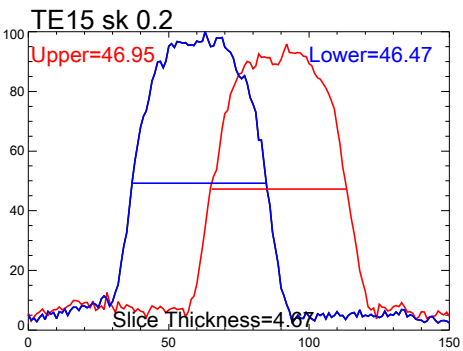


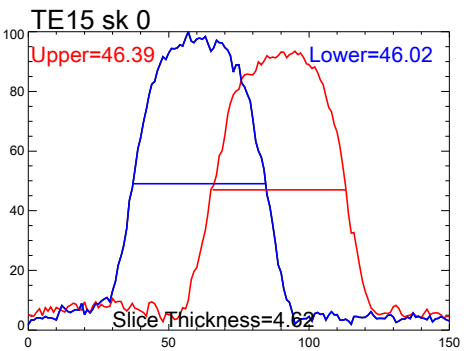


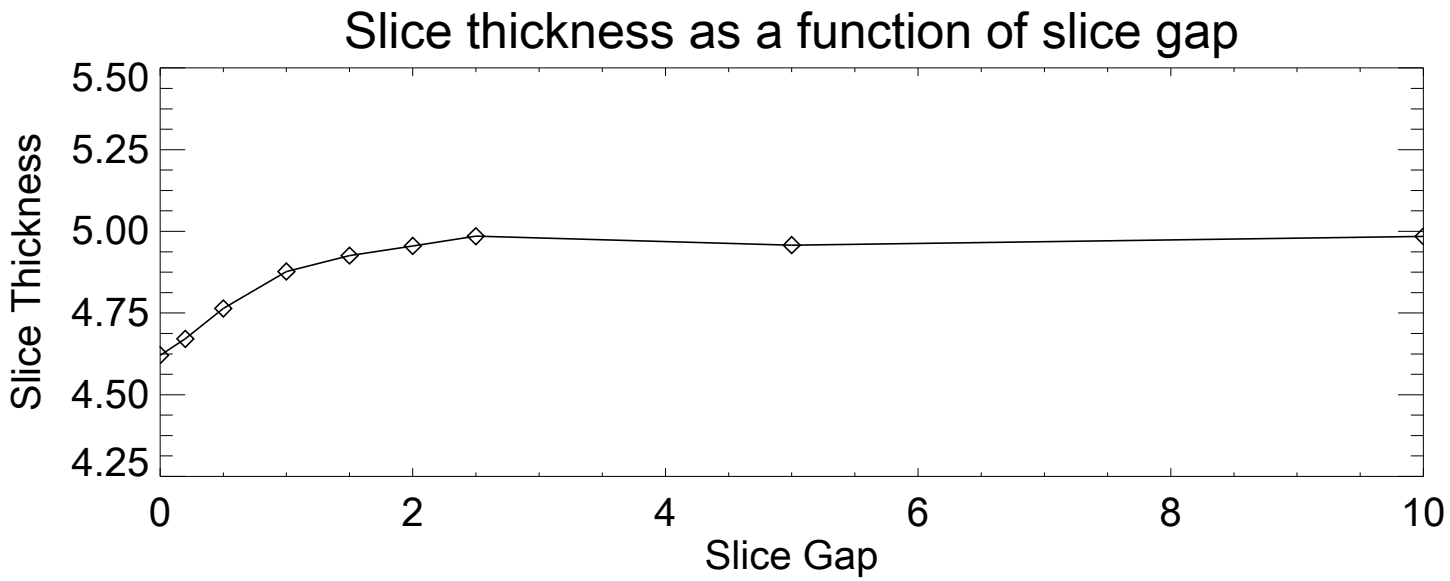












Toshiba Site **Vantage**

Coil Used: **Head Coil QD** Test Date: **2/27/2008**

	Sagittal Locator	
1	Length of phantom, end to end (mn 148± 2)	148.2

= calculated field

		(SE 500/20)	(SE 2000/20)	(SE 2000/80)	(Site T1)	(Site T2)
	Slice Location #1	ACR T1	ACR PD	ACR T2	Site T1	Site T2
2	Resolution	0.9	0.9	0.9	0.9	0.9
3	(1.10, 1.00, 0.90 mm)	0.9	0.9	0.9	0.9	0.9
4	Slice Thickness Top	47.1	44.4	42.3	48.0	47.8
5	(fwhm in mm) Bottom	52.2	48.1	46.3	51.8	49.4
6	Calculated value 5.0±0.7	4.95	4.62	4.42	4.98	4.86
7	Wedge (mm) = + = -	2.0	2.9	2.9	2.0	2.0
8	Diameter (mm) (190±2) ⊕	190.8	190.8	190.9	190.6	190.6
9	⊖	189.8	189.9	189.8	189.8	189.9
	Slice Location #5					
10	Diameter (mm) (190±2) ⊕	191.1	191.1	191.1	190.9	190.8
11	⊖	189.9	189.9	189.9	189.9	190.1
12	⊘	189.8	190.1	190.1	189.9	190.0
13	⊘	190.2	190.5	190.5	190.3	190.4
	Slice Location #7					
14	Signal Big ROI	7109	7303	4055	7171	7077
15	(mean only) High	7670	7803	4413	7655	7585
16	Low	6485	6574	3584	6594	6505
17	Uniformity (>87.5%)	91.6%	91.5%	89.6%	92.6%	92.3%
18	Background Noise Top	64.2 ± 41.0	98.0 ± 54.6	92.1 ± 49.4	73.3 ± 41.0	56.3 ± 40.9
19	Bottom	76.4 ± 47.9	94.6 ± 52.8	90.6 ± 49.9	75.4 ± 45.6	60.4 ± 43.0
20	(mean ±std dev) Left	80.4 ± 53.0	112 ± 90.8	164 ± 69.0	89.5 ± 47.7	113 ± 61.3
21	Right	71.3 ± 42.9	122 ± 63.8	167 ± 71.9	86.4 ± 48.1	102 ± 66.0
22	Ghosting Ratio (<2.5%)	0.1%	0.3%	1.8%	0.2%	0.7%
23	SNR (no spec)	160	136	82	166	169
	Low Con Detectability					
24	Slice Location #8 1.4%	7	7	0	8	8
25	Slice Location #9 2.5%	10	9	5	9	9
26	Slice Location #10 3.6%	10	9	6	10	9
27	Slice Location #11 5.1%	10	10	8	10	10
28	Total # of Spokes (>=9)	37	35	19	37	36
	Slice Location #11					
29	Wedge (mm) = + = -	0.4	1.3	1.2	0.4	0.4
30	Slice Position Error	-1.6	-1.7	-1.7	-1.6	-1.6

Toshiba Site

Vantage

Sequence parameters

Test Date: **2/27/2008**

Coil Used:**Head Coil QD**

Test ID **253**

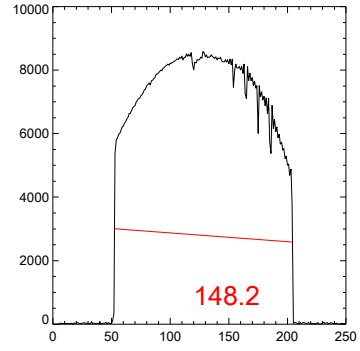
Study Description	Pulse Sequence (ETL)	TR (ms)	TE (ms)	FOV (cm)	Phase Sample Ratio	Number of Slices	Thick-ness (mm)	Slice Gap	NSA (Nex)	Freq Matrix	Phase Matrix	Band Width (kHz)	Scan Time (min:sec)
ACR T1	SE	500	20	25	1	11	5	5	1	256	256	15.6	2:09
ACR PD	Dual Echo SE	2000	20	25	1	11	5	5	1	256	256	63	8:32
ACR T2	Dual Echo SE	2000	80	25	1	11	5	5	1	256	256	63	8:32
Site T1	SE	560	12	24	1	11	5	5	1.3	256	256	17.92	3:03
Site T2	FSE(20)	4800	100	24	1	11	5	5	2	256	256	11.4	2:01

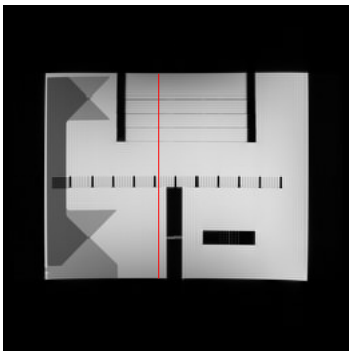
Magnet ID: **196** **Coil ID:** **1544** **TestID:** **253**

Appendix C: ACR Phantom Analysis

ACR T1

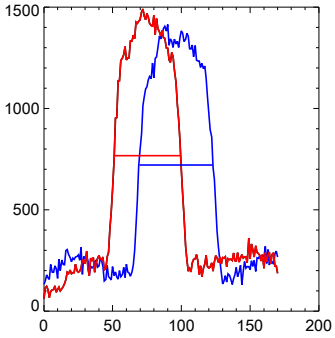
Sagital Length





High Contrast Resolution

Slice Thickness

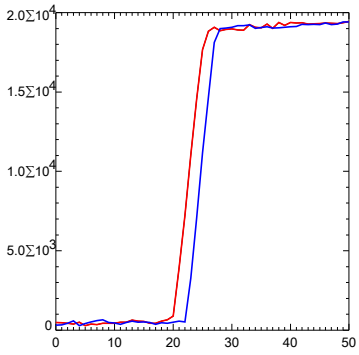


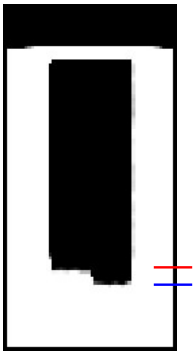
Upper=47.12

Lower=52.18

Slice Thickness=4.95

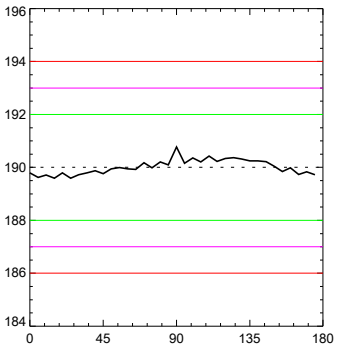
Slice Position - Inferior

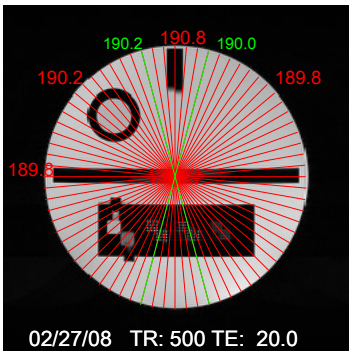




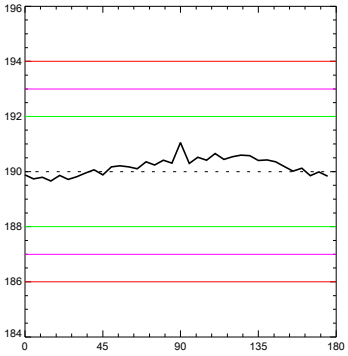
Diff.= 1.95

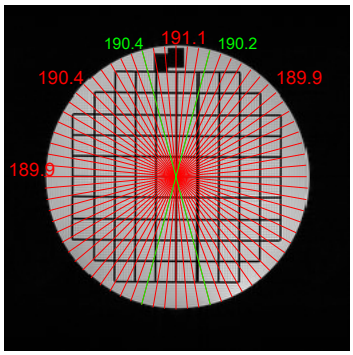
Axial Diameters - #1



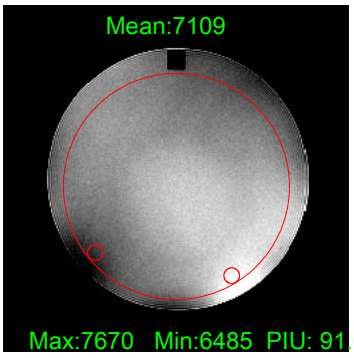


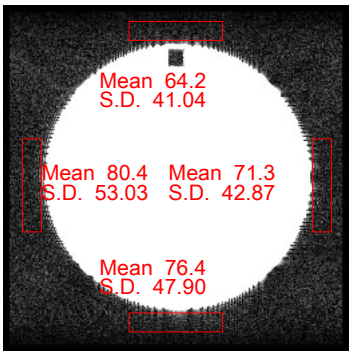
Axial Diameters - #5



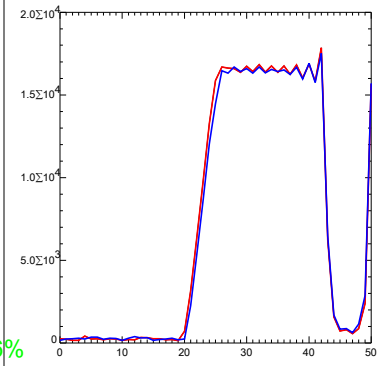


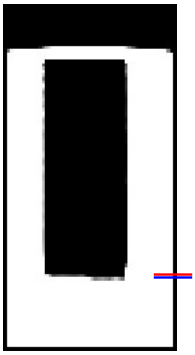
Uniformity & Ghosting - #7





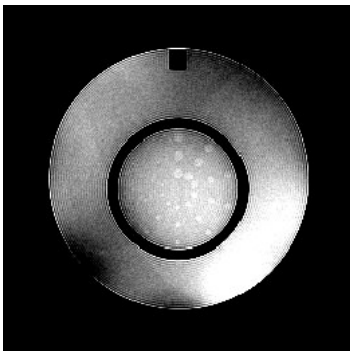
Slice Position - Superior



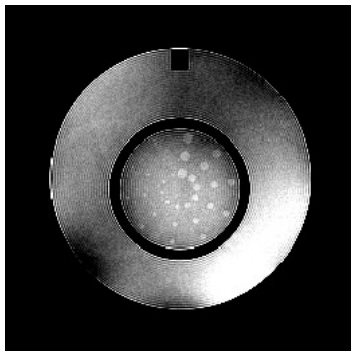


Diff.= 0.35

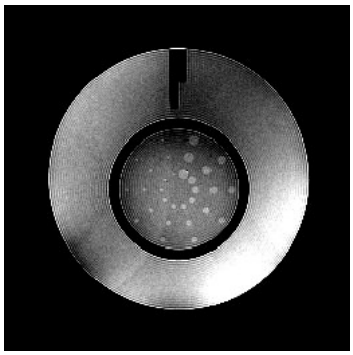
Low Contrast - #8



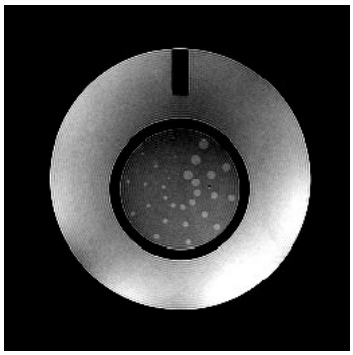
Low Contrast - #9



Low Contrast - #10



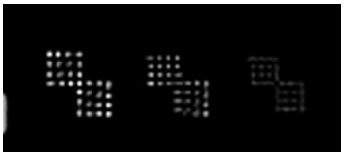
Low Contrast - #11



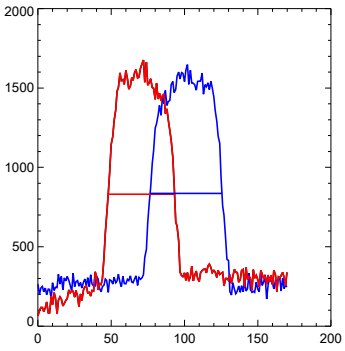
Appendix C: ACR Phantom Analysis

ACR PD

High Contrast Resolution



Slice Thickness

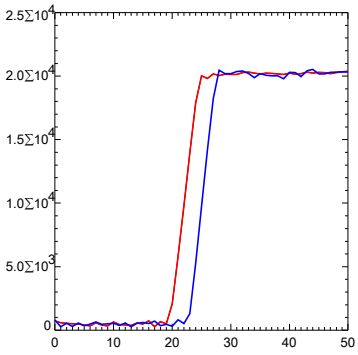


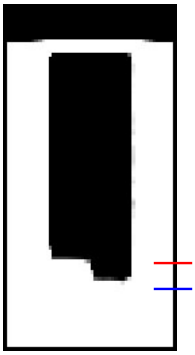
Upper=44.40

Lower=48.08

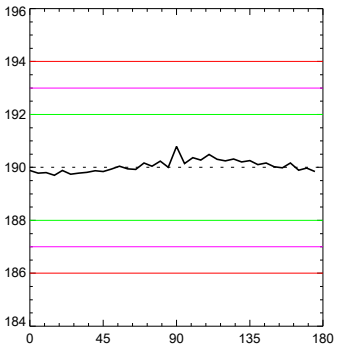
Slice Thickness=4.62

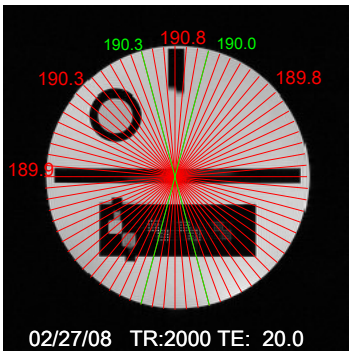
Slice Position - Inferior



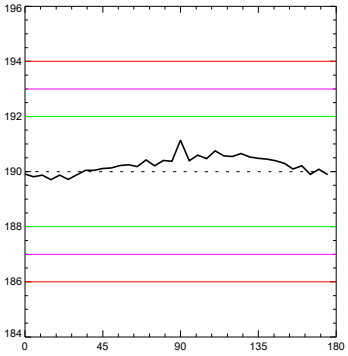


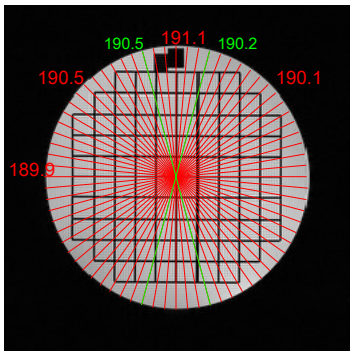
Axial Diameters - #1



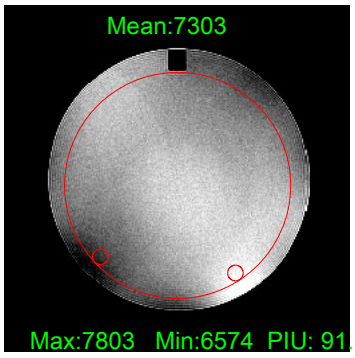


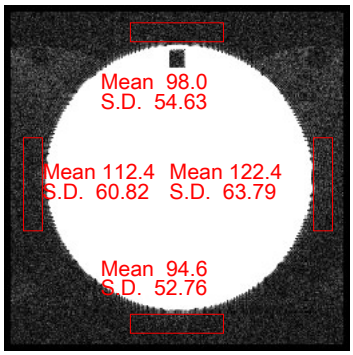
Axial Diameters - #5



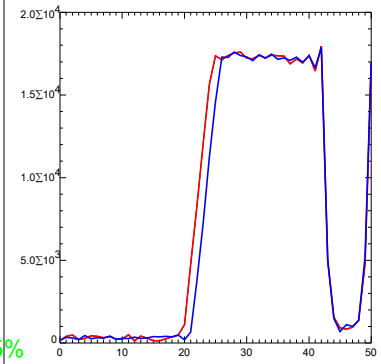


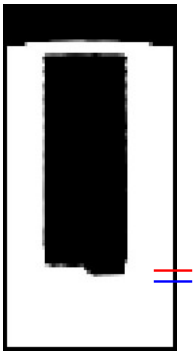
Uniformity & Ghosting - #7



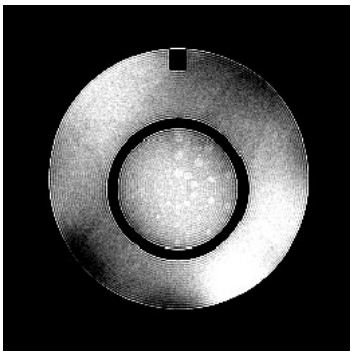


Slice Position - Superior

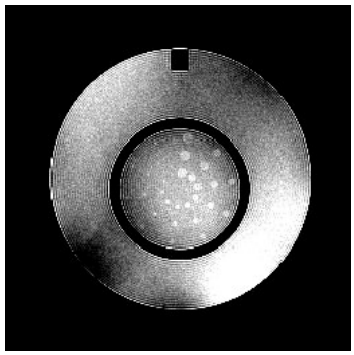




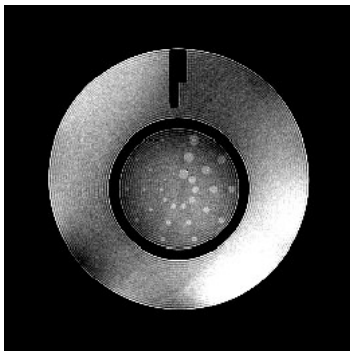
Low Contrast - #8



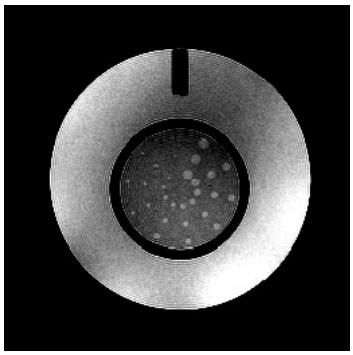
Low Contrast - #9



Low Contrast - #10



Low Contrast - #11

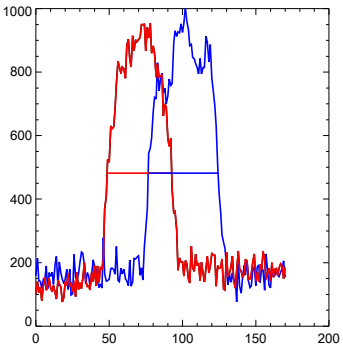


Appendix C: ACR Phantom Analysis

ACR T2

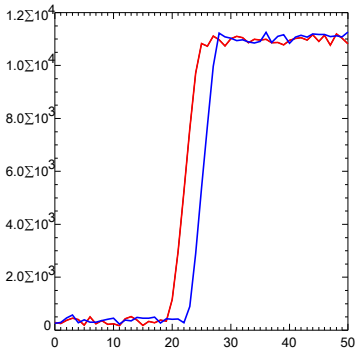
High Contrast Resolution

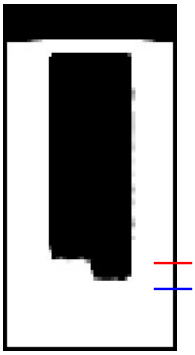
Slice Thickness



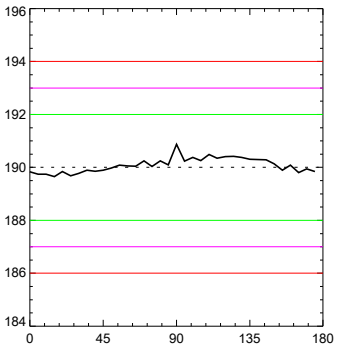
Upper=42.34
Lower=46.27
Slice Thickness=4.42

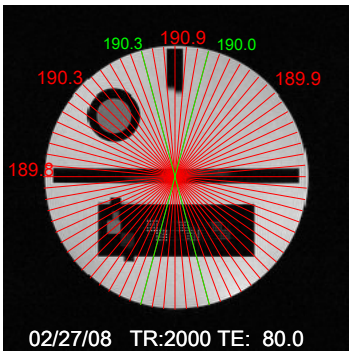
Slice Position - Inferior



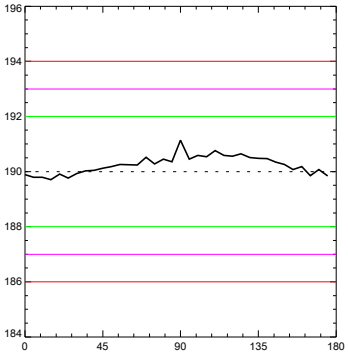


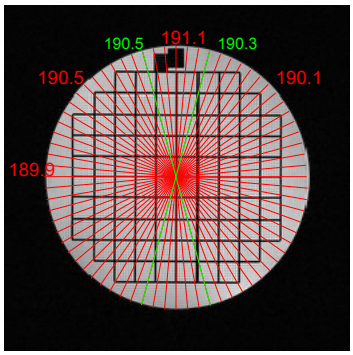
Axial Diameters - #1



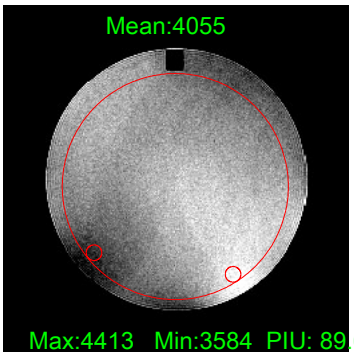


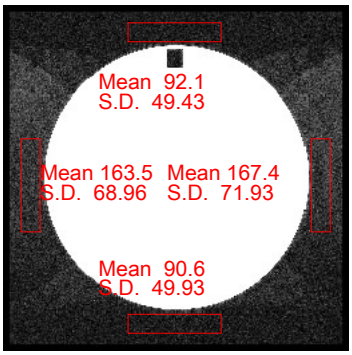
Axial Diameters - #5



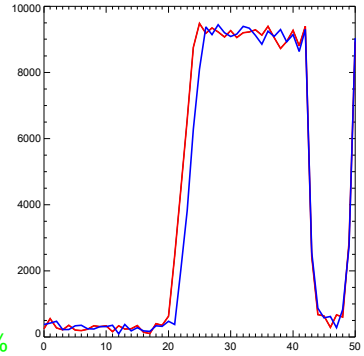


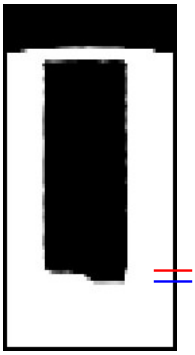
Uniformity & Ghosting - #7



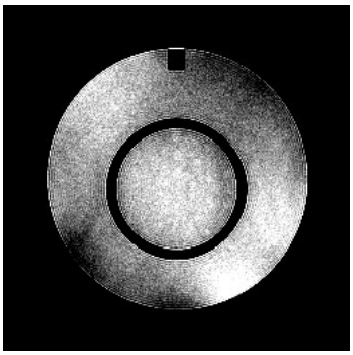


Slice Position - Superior

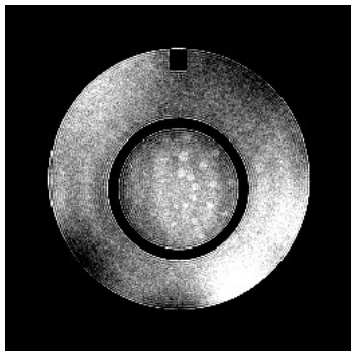




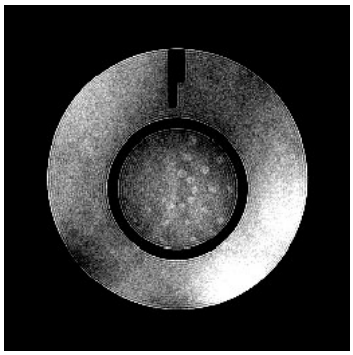
Low Contrast - #8



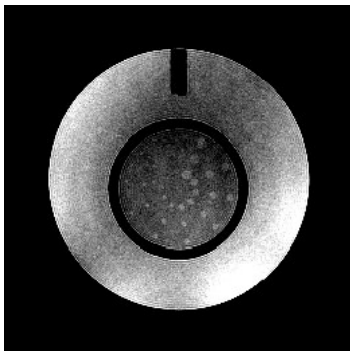
Low Contrast - #9



Low Contrast - #10



Low Contrast - #11

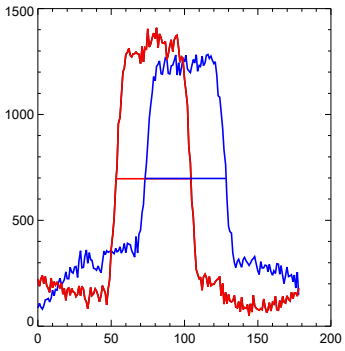


Appendix C: ACR Phantom Analysis

Site T1

High Contrast Resolution

Slice Thickness

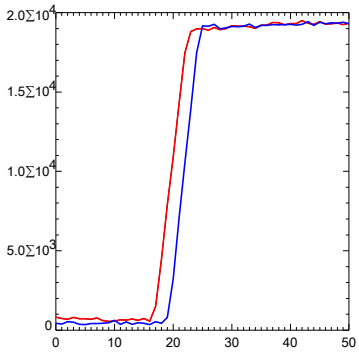


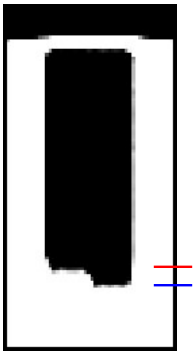
Upper=47.99

Lower=51.83

Slice Thickness=4.98

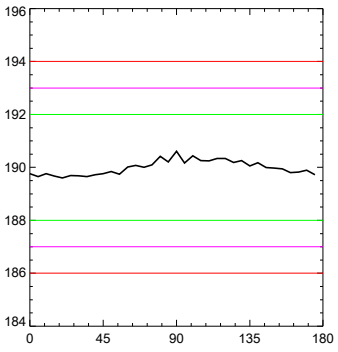
Slice Position - Inferior

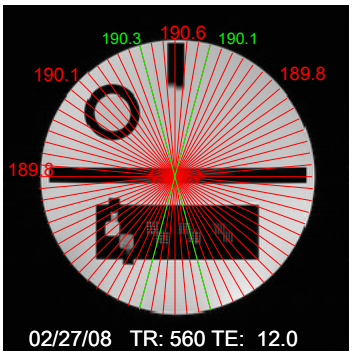




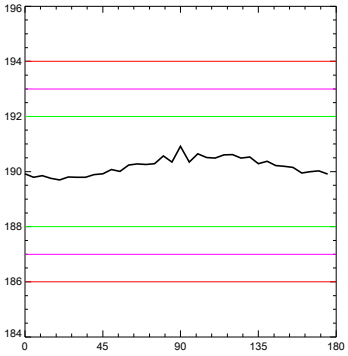
Diff.= 2.01

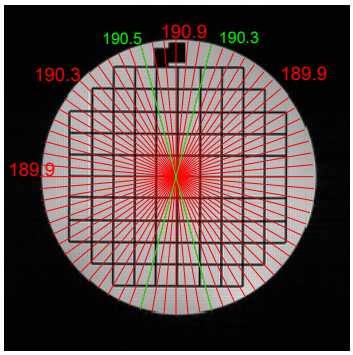
Axial Diameters - #1



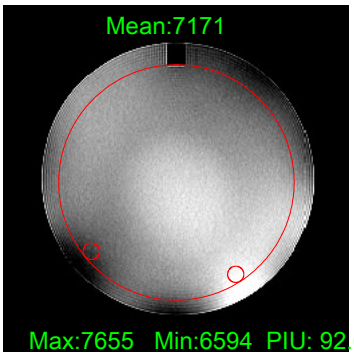


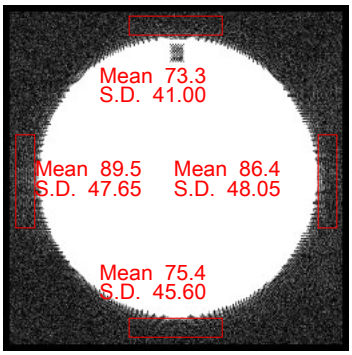
Axial Diameters - #5



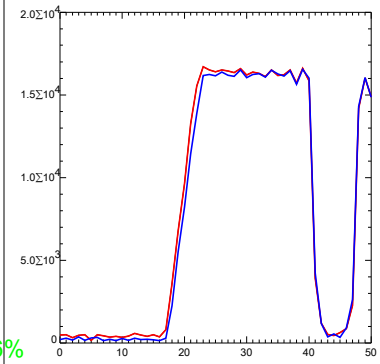


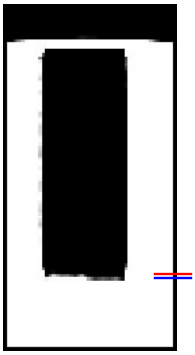
Uniformity & Ghosting - #7





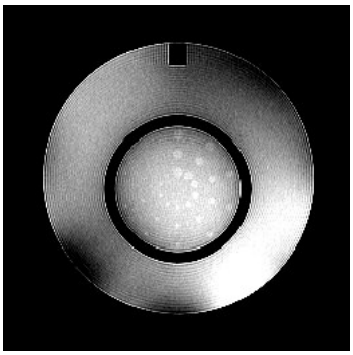
Slice Position - Superior



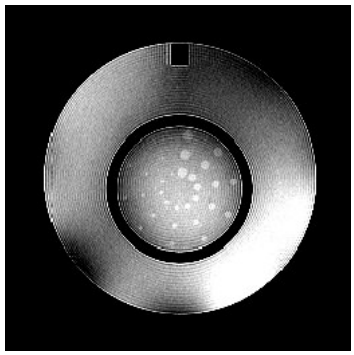


Diff.= 0.42

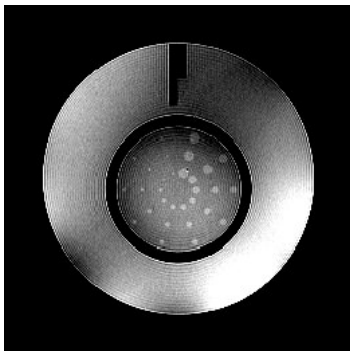
Low Contrast - #8



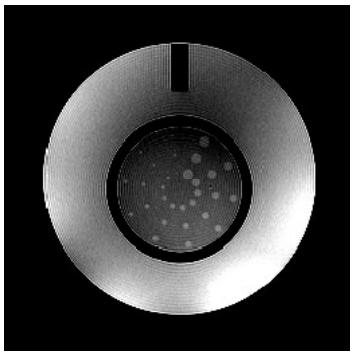
Low Contrast - #9



Low Contrast - #10



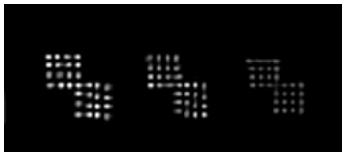
Low Contrast - #11



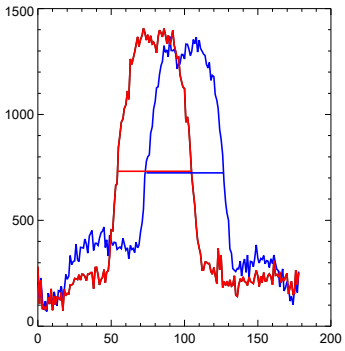
Appendix C: ACR Phantom Analysis

Site T2

High Contrast Resolution



Slice Thickness

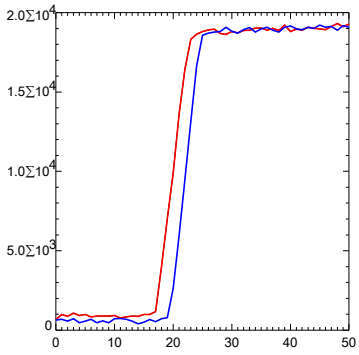


Upper=47.75

Lower=49.39

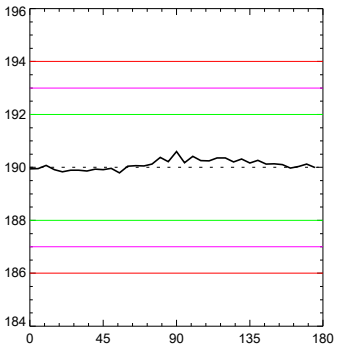
Slice Thickness=4.86

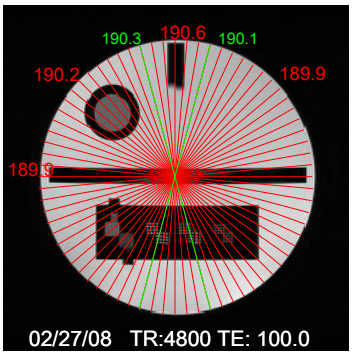
Slice Position - Inferior



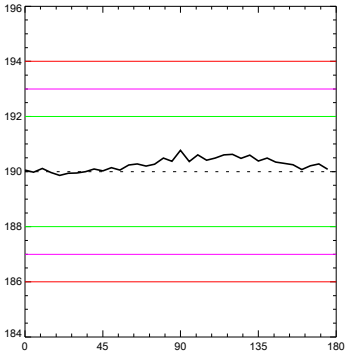
Diff.= 2.00

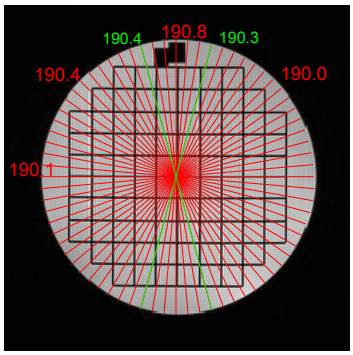
Axial Diameters - #1



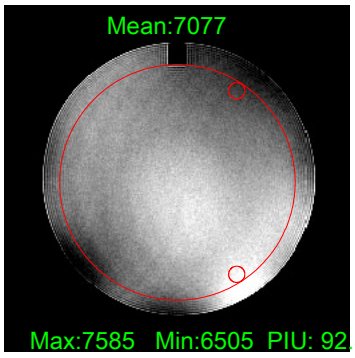


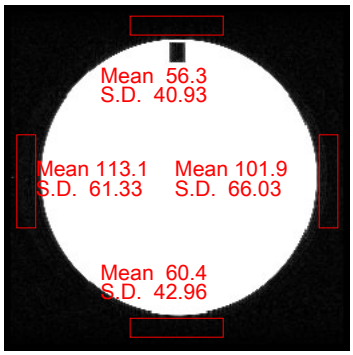
Axial Diameters - #5



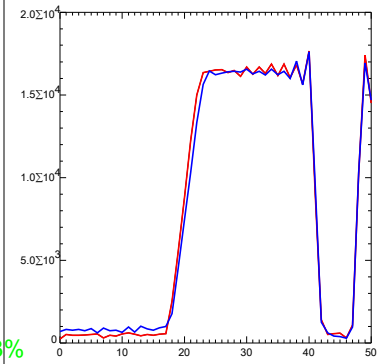


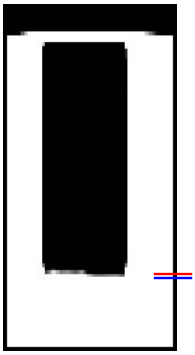
Uniformity & Ghosting - #7





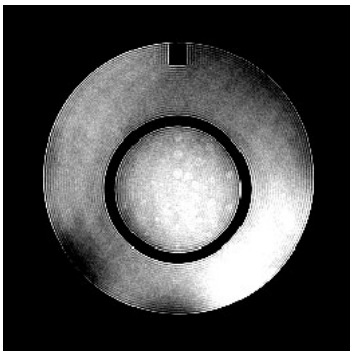
Slice Position - Superior



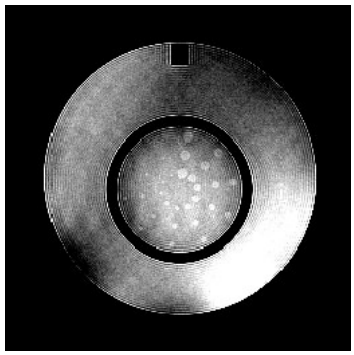


Diff.= 0.42

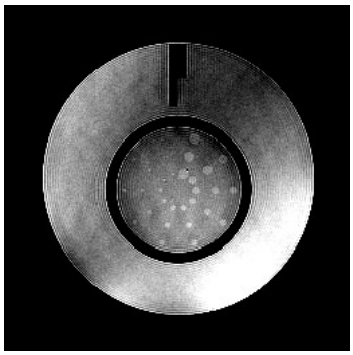
Low Contrast - #8



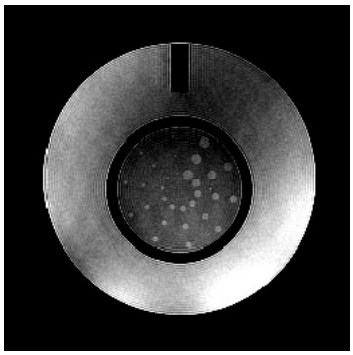
Low Contrast - #9



Low Contrast - #10



Low Contrast - #11



Appendix D:
Explanation of RF Coil Testing Report

Introduction

The primary goal of RF coil testing is to establish some sort of base line for tracking coil performance over time. The most common measure is the Signal to Noise Ratio or SNR. In addition, we can look at overall signal uniformity, ghosting level (or better - lack of ghosting) and in the case of phased array coils we look at the SNR of each and every channel and at symmetry between channels. Unfortunately, there is no single best method for measuring SNR. Below I explain the different methods used and the rationale for each.

SNR

One needs to measure the signal in the phantom (either mean or peak or both) and then divide that by the background noise. Measuring the signal is fairly straightforward, the noise can be more problematic. The simplest method is to measure the standard deviation (SD) in the background 'air'. However, MRI images are the magnitude of complex data. The noise in the underlying complex data is Gaussian but it follows a Rician distribution when the magnitude is used. The true noise can be estimated by multiplying the measured SD by 1.526.

During the reconstruction process, most manufacturers perform various additional operations on the images, This could include geometric distortion correction, low pass filtering of the k-space data resulting in low signal at the edge of the images, RF coil intensity correction (PURE, CLEAR, SCIC, SPEEDER, etc), and other processing during the combination of phased array data and parallel imaging techniques. All of these methods distort the background noise making it impossible to obtain an accurate (and reproducible) estimate of the image noise in the air region. The alternative is to use a method which I shall refer to as the NEMA (National Electrical Manufacturers Association) method. The signal in the phantom area is a sum of the proton signal and noise. Once the signal to noise ratio exceeds 5:1, the noise in the magnitude image is effectively Gaussian. To eliminate the proton signal, you acquire an image twice and subtract them. The measured SD in the phantom region should now be the true SD times the square root of 2. When determining the SNR using the NEMA method, calculate the mean signal of the average of the two source images then divide by .7071 x the SD measured in the same area as the mean signal.

Unfortunately, this doesn't always work. It is absolutely imperative that the RF channel scalings, both transmit and receive, be identical with both scans. Any ghosting in the system is not likely to repeat exactly for both scans and will cause a much higher SD. Finally, the phantom needs to be resting in place prior to the scan long enough for motion of the fluid to have died down. Depending on the size and shape of the phantom, this could take any where from 5 to 20 minutes.

One of the most common causes of ghosting is vibration from the helium cold-head. The best way to eliminate this artifact is to turn off the cold head, which will increase helium consumption. Because this vibration is periodic, the ghosting is usually of an N over 2 (N/2) nature. The affect inside the signal region of the phantom can be minimized by using a FOV that is twice the diameter of the phantom (measured in the PE direction.) If the noise is to be measured in the air, then be sure to NOT make measurements to either side of the phantom in the PE direction.

Scan parameters also significantly affect measured SNR. For most of the testing performed in this document I used a simple Spin Echo with a TR of 300, a TE of 20 and a slice thickness of 3mm and a receiver BW of 31.2 KHz (a 1 pixel fat/water chemical shift). The FOV was varied depending on the size of the coil and the phantom used. All of the parameters used for each test can be found on each page immediately below the coil description.

Report Layout

Each page of this report lists the data from a single test. The top third of the page describes the coil and phantom information, followed by the scan parameters used. The middle third contains the numbers measured and calculated results. This section will contain one table if the coil being tested is a single channel coil (i.e. quadrature or surface coils) and two tables if it is a multi-channel phased array coil. The entries in the table will be described further below. The bottom section contains a few lines of comments (if necessary), a picture of the coil with the phantom as used for the testing and one or more of the images that were used for the measurements.

There is usually one image for each composite image measurement and one image for each separate channel measurement. Each image shows the ROI (red line) where the mean signal was measured and two smaller ROIs (green lines) where the signal minimum and maximum was found. In the top left corner of each image is the mean signal in the large ROI. The bottom left corner contains the large ROI's area (in mm^2). The top right corner contains two numbers a mean and a standard deviation. If the NEMA method was used, then the top right corner will list the mean and SD of the large ROI (labeled ROI M and ROIsd) applied to the subtraction image. If the noise was measured in the background air the the numbers are labeled Air M and AirSD.

Data Tables

The meaning of most of the entries in the data table are should be self evident with a few exceptions. The first column in each table is labeled "Label". In the composite analysis, this field may be empty or contain some sort of abbreviation to identify some aspect of the testing. Some possibilities are the letter N for NEMA, A for Air, L for Left, R for Right, C for CLEAR, NoC for No CLEAR. In the Uncombined Image table, the label usually contains the channel number or similar descriptor. The column labeled "Noise Type" will be either Air or NEMA. Both tables contain a column for Mean SNR and Max SNR which are the Mean or Max signal divided by the SD of the noise scaled by either 1.526 (Air) or 0.7071 (NEMA).

Composite Image Table: The final two columns in this table are "Normalized" and "Uniformity". It can be rather difficult to compare the performance of different coils particularly if different scan parameters are used. (Of course, it's even more difficult from one scanner to another.) I have standardized most of my testing to use a spin echo with a TR/TE of 300/20msec and a thickness of 3 mm. The FOV changes to depending on the size of the phantom used although I try to use a FOV that is at least twice the diameter of the phantom as measured in the PE direction. For one reason or another, a change may be made in the scan parameters (either accidentally or intentionally such as turning on No Phase Wrap to eliminate aliasing, etc.). In order to make it easier to compare SNR values I calculate a "Normalized" SNR value. This value is theoretically what the SNR would be if a FOV of 30cm, 256x256 matrix, 1 average, receiver BW of 15.6 KHz and slice thickness of 3mm had been used. Obviously, the final number is affected by the T1/T2 values of the phantoms used as well as details of the coil and magnet field strength but it can be useful in certain situations.

The "Uniformity" value is defined by the ACR as 1 - (max-min)/(max+min). This is most important when looking at volume coils or for evaluating the effectiveness of surface coil intensity correction algorithms (such as PURE, CLEAR, SCIC or SPEEDER).

Uncombined Image Table: This table has two columns labeled "% of Mean" and "% of Max". When analyzing multi-channel coils it is important to understand the relationship between the different channels, the inherent symmetry that usually exists between channels. In a 8 channel head or 4 channel torso phased array coil, all of the channels are usually have about the same SNR. These two columns list how the SNR (either Mean or Max) of each channel compares to the SNR of the channel with the maximum value.