Siemens Site Yearly Performance Evaluation Siemens Espree 1.5T 6-Jul-08

Table of Contents

Summary and Signature Page					
Specific Comments	3				
Site Information	4				
Equipment Information	4				
Table Position Accuracy					
Magnetic Field Homogeneity	4				
Slice Thickness Accuracy	4				
Slice Crosstalk	5				
Soft Copy Displays	6				
RF Coil Performance Evaluation					
Coil Inventory List	7				
Body - Integrated	8				
Body Matrix	9				
Breast	14				
CP Flex - Large	18				
CP Flex - Small	19				
Head Matrix	20				
Knee - CP Extremity	22				
Knee/Foot	23				
Neck Matrix	25				
Periph Angio Matrix	31				
Shoulder Array - Large	35				
Shoulder Array - Small	37				
Spine Matrix	39				
Appendix A: Magnet Homgeneity Map	43				
Appendix B: Slice Thickness / Profiles / RF Crosstalk	48				
Appendix C: ACR Phantom Analysis	50				
Appendix D: Explanation of RF Coil Test Format					

Site Name:	Siemens Site			MRAP # _	02362-02
Address:				Survey Date:	7/6/08
City, State, Zip				Report Date:	7/8/08
MRI Mfg:	Siemens	Model:	Espree	Field:	1.5T
MRI Scientist:	Moriel NessAiver, Ph.D.	Signature:	Moriel	Vesstwer, 6	h.O.
	Equipment Evalu	ation Tests		Pass Fail * N/A	
1.	Magnetic field homogeneity	y:			
2.	Slice position accuracy:				
3.	Table positioning reproduci	bility:			
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				
8.	Hard Copy (film) Display				
]	Evaluation of Site's Techno	logist QC Prog	gram	Pass Fail * N/A	
1.	Set up and positioning accu	racy: (daily)	-		
	Center frequency: (daily)				
3.	Transmitter attenuation or g	ain: (daily)			
4.	Geometric accuracy measur	ments: (daily)			
5.	Spatial resolution measurem	nents: (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: (week	ly)			
11.	Visual checklist: (weekly)				

Specific Comments and Recommendations
1. Magnet homogeneity is very good in the axial plane within \pm 7cm of isocenter.
2. The LCD response curve is very good.
3. There is VERY poor agreement between what is seen on the screen and what is sent to the laser printers.
4. Cable Ports 1, 3, 4 and 6 all have equivalent SNRs as do Ports 2 and 5.
5. Gradient calibrations are good.
6. The right side of the breast coil has 7% lower SNR than the left side.
7. I tested the Body Coil, CP Flex Small and Head Matrix coils with and without image INTERPOLATION. (I
normally never use interpolation.) Using interpolation increases the measured SNR by 30 to 50%. There must
be some filtering going on during the interpolation process.
8. There are no problems with any RF coils.
9
10
11
12
13
NOTE: Please be sure to read appendix D for an explanation of the format of this document.

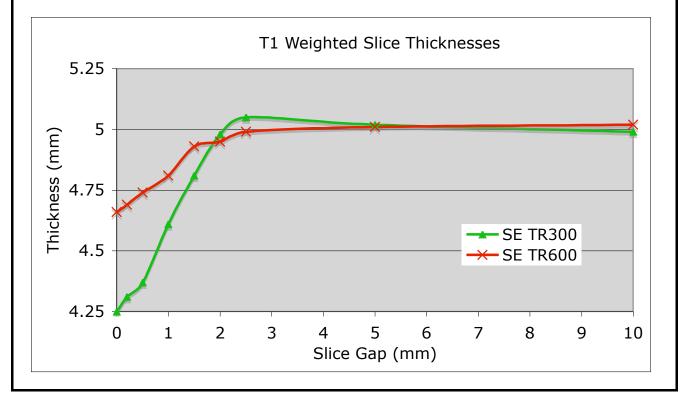
	Contact		Title		Phon	Phone		Fax			eMail	
			Technolo	gist			-			_		
			QC Tec				-					
			Radiolog	<u>gist</u>			-					
ipmen	nt Inform	ation					-					
-			nens	Model:	Espre	e		SN:	30196	Software:	B15	
ra Mar	nufacturer:	Kodak Dr	ystar 3000	Model:	Numari	is 4		SN:		Software:		
S Mar	nufacturer:							SN:		Software:		
		ACR F	Phantom Nu	mber used:	J5480?	_						
	~ • • •	. .	•••••								_	
able P		g Reprodu	IsoCenter	Out/In	Out/In	Out	/In				Pass	
			0.66	-0.7	-0.96	-0.						
		om Center					91					
	nont											
		Homogene		See append			ts.				PASS	
	tic Field		eity	See append	lix A for fie	eld plot : <u>63</u> ,	683,9			hange: <u>-6</u> FOV: 40		
	e tic Field Last Yea 15 cm	Homogene ar CF: <u>63</u> 20 cm	eity	See append Th GRE	lix A for fic	eld plot : <u>63,</u> E: 10 &	<u>683,9</u> 2 14.76	5 Flip	Angle: 45,	FOV: 40		
	tic Field Last Yea 15 cm 0.15	Homogene ar CF: <u>63</u> 20 cm 0.25	eity ,684,639 25 cm 0.35	See append Th GRE 5 mm	lix A for fie is Year CF: TR: 500, T skip 5 mm	eld plot : <u>63,</u> E: 10 &	<u>683,9</u> z 14.76 33.3KH	5 Flip Hz, 250	Angle: 45, 5x128, 2ne	FOV: 40	03	
lagne Axial:	etic Field D Last Yea 15 cm 0.15 0.26	Homogene ar CF: <u>63</u> 20 cm 0.25 1.05	eity ,684,639 25 cm 0.35 1.70	See append Th GRE 5 mm Comr	lix A for fic is Year CF: TR: 500, T skip 5 mm nents: <u>Mag</u> i	eld plot : <u>63,</u> E: 10 & , BW: 3 net hom	683,9 z 14.76 33.3KH ogenei	5 Flip Hz, 250 ity is ve	Angle: 45, 5x128, 2ne ery good ir	FOV: 40	93e within	
lagne Axial:	tic Field Last Yea 15 cm 0.15	Homogene ar CF: <u>63</u> 20 cm 0.25	eity ,684,639 25 cm 0.35	See append Th GRE 5 mm Comr	lix A for fic is Year CF: TR: 500, T skip 5 mm nents: <u>Mag</u> i	eld plot : <u>63,</u> E: 10 & , BW: 3 net hom	683,9 z 14.76 33.3KH ogenei	5 Flip Hz, 250 ity is ve	Angle: 45, 5x128, 2ne ery good ir	FOV: 40 ex a the axial plan	93 e within	
Lagne Axial: ronal: ittal:	tic Field Last Yea 15 cm 0.15 0.26 0.33	Homogena ar CF: <u>63</u> 20 cm 0.25 1.05 0.88	eity ,684,639 25 cm 0.35 1.70	See append Th GRE 5 mm Comr	lix A for fic is Year CF: TR: 500, T skip 5 mm nents: <u>Mag</u> i	eld plot : <u>63,</u> E: 10 & , BW: 3 net hom	683,9 z 14.76 33.3KH ogenei	5 Flip Hz, 250 ity is ve	Angle: 45, 5x128, 2ne ery good ir	FOV: 40 ex a the axial plan	93 e within	
Iagne Axial: ronal: ittal:	tic Field Last Yea 15 cm 0.15 0.26 0.33 hickness 2	Homogene ar CF: <u>63</u> 20 cm 0.25 1.05 0.88 Accuracy	eity ,684,639 25 cm 0.35 1.70 1.55	See append Th GRE 5 mm Comr ±7 cm	lix A for fid is Year CF: TR: 500, T skip 5 mm nents: <u>Mag</u> n of isocente	eld plot : <u>63,</u> E: 10 & , BW: 3 net hom er. The l	683,9 2 14.76 33.3KH ogenei homog	5 Flip A Hz, 250 ity is ve	Angle: 45, 6x128, 2ne ery good ir drops rapic	FOV: 40 ex a the axial plan fly outside of	e within this range.	
Iagne Axial: ronal: ittal:	tic Field Last Yea 15 cm 0.15 0.26 0.33 hickness A FOV: 250m	Homogena ar CF: <u>63</u> 20 cm 0.25 1.05 0.88 Accuracy nm M	eity ,684,639 25 cm 0.35 1.70 1.55	See append Th GRE 5 mm Comr $\pm 7 \text{ cm}$ 256	lix A for fic is Year CF: TR: 500, T skip 5 mm nents: <u>Mag</u> of isocente (Slic	eld plot : <u>63,</u> E: 10 & , BW: 3 net hom er. The l	683,9 2 14.76 33.3KH ogenei homog homog	Flip A Iz , 250 ity is ve eneity CR Ph	Angle: 45, 6x128, 2ne ery good ir drops rapic drops rapic	FOV: 40 ex a the axial plan fly outside of .ll values in r	e within this range.	
Lagne Axial: Tonal: ittal:	tic Field Last Yea Last Yea 15 cm 0.15 0.26 0.33 hickness A FOV: 250m Sequ	Homogene ar CF: <u>63</u> 20 cm 0.25 1.05 0.88 Accuracy nm M ience	eity ,684,639 25 cm 0.35 1.70 1.55 atrix: 256x TR	See append Th GRE 5 mm Comr <u>±7 cm</u> 256 TE	lix A for fie is Year CF: TR: 500, T skip 5 mm nents: <u>Mag</u> n of isocente (Slic Flip	eld plot : <u>63</u> , E: 10 & , BW: 3 net hom er. The l ce #1 fr NSA	683,94 2 14.76 33.3KH ogenei homog om A(Ca	5 Flip 2 Hz, 250 ity is ve eneity CR Ph Ilc	Angle: 45, 6x128, 2ne ery good ir drops rapic antom) A Target	FOV: 40 ex a the axial plan dly outside of all values in r % Error	e within this range.	
Lagne Axial: Tonal: ittal:	tic Field Last Yea 15 cm 0.15 0.26 0.33 hickness J FOV: 250m Sequ SI	Homogena ar CF: <u>63</u> 20 cm 0.25 1.05 0.88 Accuracy am M ience E (ACR)	eity ,684,639 25 cm 0.35 1.70 1.55 atrix: 256x TR 500	See append Th GRE 5 mm Comr <u>±7 cm</u> 256 <u>TE</u> 20	lix A for fid is Year CF: TR: 500, T skip 5 mm nents: <u>Mag</u> of isocente (Slic Flip 90	eld plot : <u>63,</u> E: 10 & a, BW: 3 net hom or. The l :: The l :: The l :: SA 1	683,94 2 14.76 33.3KH ogenei homog bom A0 Ca 5.2	5 Flip 2 Hz, 250 ity is vo eneity eneity CR Ph ilc	Angle: 45, 6x128, 2ne ery good ir drops rapic drops rapic antom) A Target 5	FOV: 40 ex the axial plan ally outside of all values in r % Error 4.2%	e within this range.	
Lagne Axial: Tonal: ittal:	tic Field Last Yea Last Yea 0.15 0.26 0.33 hickness A FOV: 250m Sequ SI SE	Homogene ar CF: <u>63</u> 20 cm 0.25 1.05 0.88 Accuracy am M ience E (ACR) (Site T1)	eity ,684,639 25 cm 0.35 1.70 1.55 atrix: 256x2 TR 500 500	See append Th GRE 5 mm Comr <u>±7 cm</u> 256 TE 20 14	lix A for fie is Year CF: TR: 500, T skip 5 mm nents: <u>Magn</u> <u>n of isocente</u> (Slic Flip 90 90	eld plot : E: 10 & : : BW: 3 net hom er. The l : : The l : _ : : : : : : :	683,94 2 14.76 33.3KH ogenei homog om A(Ca 5.2 5.1	5 Flip 2 Hz, 250 ity is vo eneity (CR Ph llc 21 12	Angle: 45, 6x128, 2ne ery good ir drops rapic antom) A Target 5 5	FOV: 40 ex a the axial plan dly outside of all values in r % Error 4.2% 2.4%	e within this range.	
Lagne Axial: Tonal: ittal:	tic Field I Last Yea 15 cm 0.15 0.26 0.33 hickness J FOV: 250n Sequ SE SE	Homogena ar CF: <u>63</u> 20 cm 0.25 1.05 0.88 Accuracy m M ence E (ACR) (Site T1) E (20/80)	eity ,684,639 25 cm 0.35 1.70 1.55 atrix: 256x2 TR 500 500 2000	See append Th GRE 5 mm Comr ±7 cm 256 TE 20 14 20	lix A for fid is Year CF: TR: 500, T skip 5 mm nents: <u>Mag</u> n of isocente (Slice Flip 90 90 90	eld plot : E: 10 & ;, BW: 3 net hom or. The l : : : : : : : : : : : : :	683,94 2 14.76 33.3KH ogenei homog om A0 Ca 5.2 5.1 5.2	Flip 2 Hz, 25 ity is very ceneity CR Ph lc 12 22	Angle: 45, 6x128, 2ne ery good ir drops rapic antom) A Target 5 5 5 5	FOV: 40 ex a the axial plan dly outside of all values in r % Error 4.2% 2.4% 4.4%	e within this range.	
Lagne Axial: Tonal: ittal:	tic Field Last Yea Last Yea 15 cm 0.15 0.26 0.33 hickness A FOV: 250n Sequ SE SE SE	Homogene ar CF: <u>63</u> 20 cm 0.25 1.05 0.88 Accuracy am M ience E (ACR) (Site T1)	eity ,684,639 25 cm 0.35 1.70 1.55 atrix: 256x2 TR 500 500	See append Th GRE 5 mm Comr <u>±7 cm</u> 256 TE 20 14	lix A for fie is Year CF: TR: 500, T skip 5 mm nents: <u>Magn</u> <u>n of isocente</u> (Slic Flip 90 90	eld plot : E: 10 & : : BW: 3 net hom er. The l : : The l : _ : : : : : : :	683,94 2 14.76 33.3KH ogenei homog om A(Ca 5.2 5.1	6 Flip 2 Hz, 250 250 ity is volume 250 ceneity 250 CR Ph 12 12 22 51 51	Angle: 45, 6x128, 2ne ery good ir drops rapic antom) A Target 5 5	FOV: 40 ex a the axial plan dly outside of all values in r % Error 4.2% 2.4%	e within this range.	

4. Slice Crosstalk (RF interference)

The following data were obtained using the ACR phantom slice thickness wedges to measure the slice profile of two 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. As would be expected, the shorter the TR, the greater the slice-slice interference. This clearly shows that crosstalk can become a problem onse the slice gap of a SE sequence drops below 40%. All of the slice profiles can be seen in Appendix B. In those plots, it is easy to see that the slice profiles get more and more narrow, almost triangular, as the slice gap drops.

Sequence Type	TR	TE	FOV (cm ²)	Matrix	NSA	Thickness	# of slices	Slice Measured
SE	300	12	25	256x256	1	5	11	6
SE	600	12	25	256x256	2	5	11	6

Skip	SE TR300	SE TR600
0	4.25	4.66
0.2	4.31	4.69
0.5	4.37	4.74
1	4.61	4.81
1.5	4.81	4.93
2	4.98	4.95
2.5	5.05	4.99
5	5.02	5.01
10	4.99	5.02



5. Soft & Hard Copy Displays

Luminance Meter Make/Model: Tektronix J16 Digital Photometer Ca

Cal Expires:

Monitor Description: Siemens LCD

Luminance Measured: Ft. lamberts

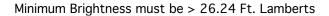
Measured Data								
Which Monitor	Center of Image Display	Top Left Corner	Top Right Corner	Bottom Left Corner	Bottom Right Corner			
Console	39	38.1	39	38.4	36.9			

Uniformity						
MAX	MIN	Percent Delta				
39	36.9	6%				

SMPTE
OK?
Y

4/6/06

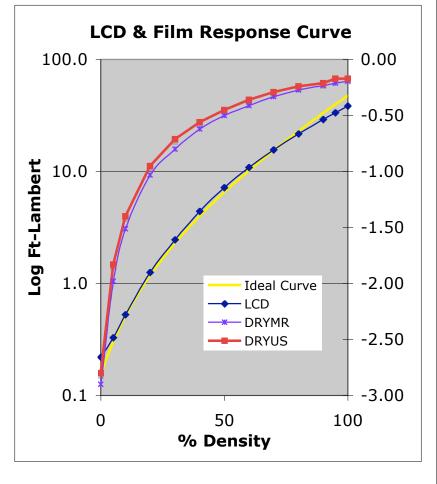
% delta =200% x (max-min)/(max+center) (>30% is action limit)



The LCD display is very good. There is very poor correlation between what is seen on the screen and what is sent

to the film. Your service engineer should recalibrate the Look Up Table (LUT).

Density	Ft- Lamber	DRYMR	DRYUS
0	0.22	-2.90	-2.80
5	0.33	-1.98	-1.83
10	0.53	-1.51	-1.40
20	1.26	-1.03	-0.95
30	2.47	-0.80	-0.71
40	4.41	-0.62	-0.56
50	7.18	-0.50	-0.45
60	10.91	-0.41	-0.36
70	15.66	-0.33	-0.29
80	21.70	-0.27	-0.24
90	29.20	-0.23	-0.21
95	33.60	-0.21	-0.17
100	38.50	-0.19	-0.17



Coil and Other Hardware Inventory List

Site Name Siemens Site

ACR Magnet # 02

Nickname Espree

ctive Coil Description	Manufacturer	Model	Rev	. Mfg. Date	SN	Channe
_ Body Matrix	Siemens	7579555		Jan, 2005	3005	2
Body Integrated Coil	Siemens					1
🛛 Body Matrix	Siemens	7579555		Jan, 2005	2434	2
🛛 Breast	Invivo	104461	1	Feb, 2006	U21321	7
CP Flex - Large	Siemens	5512053			5001	1
🛛 CP Flex - Small	Siemens	5512038			4915	1
🛛 Head Matrix	Siemens	7577732		Jan, 2005	1362	4
Knee - CP Extremity	Siemens	07579472		Jan, 2005	1450	1
🛛 Knee/Foot	Medical Advances	474SI-64F		Jun, 2006	503623	1
🛛 Neck Matrix	Siemens	75777906		Jan, 2004	2158	4
🛛 Periph Angio Matrix	Siemens	7579910			1802	8
🛛 Shoulder Array - Large	MRI Devices	100214			05901	4
🛛 Shoulder Array - Small	MRI Devices	100213			05668	4
🛛 Spine Matrix	Siemens	7579340			2181	8
						7

RF Coil Performance Evaluat	ion	-		Test Date:	. 7/	6/2008
Coil: Body Integrated Coil			1 A			
Mfg.: Siemens		à				
Mfg. Date: Coil ID:68	9	1				
Phantom: <u>32 cm sphere</u>				_	# of Cha	nnels <u>1</u>
	FOV Nx	Ny	BW		hickness	Gap
SE 300 20 T	45 256	256	25.6		3	<u> </u>
Coil Mode: <u>Body With and Without Interpo</u>	olation					
	Analysis of	Test Ima	ge			
Measured Dat	a			Calculate	d Result	ts
	ack Noise und SD	Noise Type	Mean SNR	Normal- ized	Max SNR	Uni- formity
N 414 502 366 -0	0.7 25.22	NEMA	11.6	6.6	14.1	84.3%
	2.5 20.99	Air	13.0	7.4	15.7	83.3%
	0.1 21.37	NEMA	13.7	7.8	16.9	82.1%
A int. 413 511 349 29	9.0 15.98	Air	16.9	9.6	21.0	81.2%
	Test Ir	nages				
Mean: 414	ROI M: -0.70			M: 42.48		
	ROIsd: 25.22	1	AIIS	d: 20.99		
		a starting				
U	502		O 504			
0.000			220			
			360			
ROI Area: 817.55	5	ROI Area:	817.55			
Mean: 413 ROI M: -0.05 ROIsd: 21.37		Mean: 413 Air Air	M: 29.01 sd: 15.98			
		65				
ROLArch: 883,/sr		ROI Arcenses 75				
O C	610		O	1		
Q****		0	9			

Coil: Mfg.:	Body M Siemens 1/1/2005	ormanc latrix g cylinders				B		Model: Revision:	7/6/2 7579 243 # of Chann	555 34
Sequen SE	ce TF			FOV 45	Nx 256	Ny 256	BW 25.6	NSA TI	3	Gap -
Coil Mode	e: <u>a BO</u>	12 Port 1		Analysis	 s of Cor	nposite I	mage			
		Me	easured	Data				Calculate	d Results	
Label	Mean	Max	Min	Back ground	Noise SD	Noise	Mear SNR		Max SNR	Uni- formity
NR	354	739	136	0.2	2.93	Type NEMA	85.4			31.1%
NL	366	721	141	2.7	7.67	NEMA	33.7			32.7%
AR	354	733	136	6.7	2.42	Air	95.9			31.3%
AL	363	699	137	6.7	2.42	Air	98.3			32.8%
			-							
			A	nalysis o	of Unco	mbined	mages			
	M	easured	Data		_		(Calculated	Results	
Ch	Mean	Мах	Noise SD	Noise Type			Mean SNR	% of Mean	Max SNR	% of Max
	217	429	2.57	Air			55.3	78%	109.4	72%
2	249	481	2.57	Air			63.5	90%	122.6	81%
3	279	595	2.58	Air			70.9	100%	151.1	100%
4	264	509	2.58	Air			67.1	95%	129.3	86%
Compo	osites	Mean: 354	ROI M: 0.16 ROIsd: 2.93		ROI M: ROIsd:	7.67	Airsd: :	2.58	Air M: 4.38 Airsd: 2.58	
		ROI Area: 173.2		ROI Area: 17		ROI Area		ROI Area: 17		
		Mean: 217	Air M: 4.37 Airsd: 2.57	Mean: 249	Air M: 4 Airsd: 2		54 Air M: Airsd:		Air M: 6.65 Airsd: 2.42	
Cha	nnels	02/28	Alisu. 2.57				136		0 559	

Siemens Site

Channel 3

Channel 4

Channel 2

Coil: Mfg.: Mfg. Date:	Body M Siemens 1/1/2005 Two long	g cylinders	Coil ID:	1718	Nx 256	Ny 256	BW 25.6	Mode Revision SI	N:	
Coil Mo	de: <u>BO12</u>	Port 1								
				Analysis	s of Con	nposite l	mage			
		M	easured	Data				Calculat	ed Resul	ts
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mea		- Max SNR	Uni- formity
NR	351	423	223	-0.6	1.74	NEMA	142.		171.9	69.0%
NL	368	560	207	-0.1	1.69	NEMA	154.		234.3	54.0%
AR	351	424	224	4.8	2.01	Air	114.	4 46.1	138.2	69.1%
AL	368	561	206	4.8	2.02	Air	119.	4 48.1	182.0	53.7%
			A	nalysis	of Unco	mbined	Images			
	Μ	easured	Data					Calculated	d Results	
Ch	Mean	Мах	Noise SD	Noise Type			Mean SNR	% of Mean	Max SNR	% of Max
	224	549	1.99	Air	1		73.8	100%	180.8	100%
2	212	475	1.96	Air			70.9	96%	158.8	88%
3	200	418	1.98	Air	_		66.2	90%	138.3	77%
4	209	423	1.95	Air			70.2	95%	142.2	79%
Com	posites	Mean: 351	Rolsd: 1.7	32 Mean: 368 4 ROI Area: 4	ROI M: Roisd: 207	0.56	0 4/24 ● 2/24 ■ 2/24 ■ 2/24 ■ 2/24 ■ 2/24		Airsd: 2.	
Ch	annels	HOI Area: 452.	Air M: 3.2e Aired: 1.99	Mean: 212	Air M: 3	3.19 Mean: 2	00 Air M Airsd	: 3.23 : 1.98 Mean: 20		

Channel 1

Channel 3

Channel 4

Coil: Mfg.: Ifg. Date:	Body N Siemens 1/1/2005					B		Mod Revisio	te: 7/6/20 el: 75795 on: SN: 2434 # of Channe	55
Seque SE				FOV	Nx 256	Ny 256	BW 25.6			Bap -
Coil Mo	de: <u>BO1</u> 2	Port 3								
				Analysi	s of Cor	nposite l	mage			
		М	easured	Data				Calcula	ted Results	
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mea SNI		I- Max SNR fo	Uni- ormity
NR	359	433	223	0.4	1.87	NEMA	135.	.8 54.7		8.0%
NL	378	572	210	0.7	1.82	NEMA	146.	.9 59.1	222.3 5	3.7%
AR	358	432	222	4.9	2.05	Air	114.	4 46.1	138.1 6	7.9%
AL	377	572	208	5.0	2.06	Air	119.	.9 48.3	182.0 5	3.3%
			A	nalysis	of Unco	mbined	Images			
	Μ	easured	Data					Calculate	d Results	
	Maara	Max	Noise SD	Noise			Mean	% of		% of
Ch	Mean 218	Max 492	2.03	Type	7		SNR 70.4	Mean 96%		Max 88%
2	228	560	2.03	Air			73.6	100%		00%
3	214	431	2.02	Air			69.4	94%	139.8	77%
4	204	426	2.01	Air			66.5	90%	138.9	77%
Com	posites	Mean: 359 04/3 0222 ROI Area: 452	3		ROI M: Roisd: 210 63.72	0.69 Mean: 35 1.82 057 ROI Area	Airsd 0492		77 Air M: 4.95 Airsd: 2.06 208 57 a: 463.72	
	annels	Mean: 218	Air M: 3.34 Airsd: 2.03	Mean: 228	Air M: 3 Airsd: 2	3.34 Mean: 2	14 Air M	I: 3.32 I: 2.02		

Channel 1

Channel 3

Channel 2

Coil: Mfg.: //fg. Date:	Body N Siemens 1/1/2005					B		Moo Revisi	nte: del: on: SN: # of Char	9555
Seque SF				FOV	Nx 256	Ny 256	BW 25.6	NSA	Thickness 3	Gap -
Coil Mo	de: <u>BO12</u>	Port 4								
				Analysi	s of Con	nposite I	mage			
		M	easured	Data				Calcula	ated Result	S
Label	Mean	Max	Min	Back ground	Noise SD	Noise	Mea	n Norma R ized		Uni- formity
NR	353	432	219	-0.1	1.64	Type NEMA	152.			67.3%
NL	372	559	21)	-0.1	1.68	NEMA	152.			54.8%
AR	354	432	218	4.8	2.04	Air	113.			67.1%
AL	372	559	211	4.9	2.05	Air	118.		178.7	54.8%
			Δ	nalveie	ofUnco	mbined l	magos			
	M	easured		11819515		Indined		Calculate	ed Results	
		easureu	Noise	Noise	-		Mean	% of	Max	% of
Ch	Mean	Max	SD	Туре	-		SNR	Mean	SNR	Max
1	223	546	2.00	Air			73.1	100%	178.9	100%
2	217 199	485	2.01	Air Air			70.7	97%	<u>158.1</u> 136.7	88% 76%
3	213	415	1.99 2.00	Air	-		65.5 69.8	90% 96%	141.2	70%
										.,,,,
Com	posites	Mean: 353 O 4/92	R©lsd: 1.6		ROI M: Bolsd: 211		Airsd: 04/92	2.04	372 Air M: 4.8 Airsd: 2.0	
		ROI Area: 452.	49	ROI Area: 4	63.94	HOI Area	: 452.49	HUTAR	54100.0-1	

Channel 1

Channel 2

Channel 3

Coil: Mfg.: fg. Date:	 Body M Siemens 1/1/2005 Two long 	g cylinders	Coil ID:	1718	Nx	Ny			Model: Revision: SN:	= <u>7/6</u> - 757 - <u>2</u> # of Char	19555
SI				45	256	256		5.6	2	3	
Coil Mo	de: <u>BO12</u>	Port 6									
				Analysi	s of Con	nposite	Image				
		M	easured	Data				С	alculate	d Result	S
				Back	Noise	Noise	N	lean	Normal-	Max	Uni-
Label NR	Mean 343	Max 418	Min 214	ground	SD 1.98	Type NEMA		SNR 22.5	ized 49.3	SNR 149.3	formity 67.7%
NL	343	543	214	-0.2	1.98	NEMA NEMA		33.7	49.3 53.8	201.1	54.4%
AR	343	419	205	4.7	1.91	Air		13.0	45.5	138.0	67.8%
AL	361	542	205	4.7	2.00	Air		18.3	47.6	177.6	54.9%
				nalysis	of Unco	mbined	Image				
	M	easured			_					Results	
Ch	Mean	Мах	Noise SD	Noise Type			Mean SNR		% of /lean	Max SNR	% of Max
1	216	530	1.95	Air	1		72.6		00%	178.1	100%
2	211	476	1.97	Air			70.2	9	97%	158.3	89%
3	193	404	1.93	Air			65.5		90%	137.2	77%
4	207	417	1.96	Air			69.2	9	95%	139.4	78%
Com	posites	Mean: 343	R©lsd: 1.9	23 Mean: 361 8	ROI M: F@lsd: 203 64.70	O 54		ir M: 4.71 jjsd: 1.99	Mean: 361	Air M: 4.7 Airsd: 2.0 205 64.70	
Ch	nannels	Mean: 216	Air M: 3.17 Airsd: 1.95	Mean: 211	Air M: 3 Airsd: 1	.23 Mean: 1	93 A A C4	ir M: 3.14 irsd: 1.93	Mean: 207	Air M: 3.2 Airsd: 1.9	

Channel 1

Channel 3

Channel 2

RF Coil Performance Evaluation		Test Date:	7/6/2008
Coil: Breast		Model:	104461
Mfg.: Invivo		Revision:	1
Mfg. Date: 2/01/2006 Coil ID: 691		SN:	U21321
Phantom: Two bottles in red phantom holders			# of Channels7
SequenceTRTEPlaneFOVSE30020C40	Nx Ny BW 256 256 25.6	NSA Th	ickness Gap 3 -

Coil Mode: BR Left,Right,Middle

Analysis of Composite Image

		М	easured	Data			С	alculate	d Result	ts
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal- ized	Max SNR	Uni- formity
NR	710	904	614	-0.5	3.11	NEMA	161.5	116.3	205.6	80.9%
NL	860	990	801	-0.4	3.41	NEMA	178.4	128.5	205.3	89.4%
AR	711	904	615	17.7	3.46	Air	134.7	97.0	171.2	81.0%
AL	860	990	802	17.7	3.46	Air	162.9	117.4	187.5	89.5%

Analysis of Uncombined Images

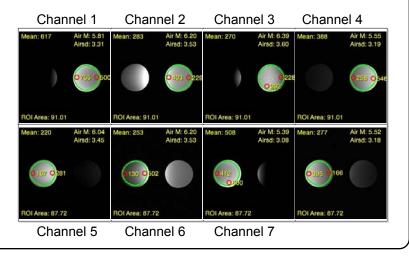
			Noise	Noise
Ch	Mean	Max	SD	Туре
1	617	755	3.31	Air
2	283	403	3.53	Air
3	270	292	3.60	Air
4	388	546	3.19	Air
5	220	281	3.45	Air
6	253	502	3.53	Air
7	508	600	3.08	Air
8	277	395	3.18	Air

Mean SNR	% of Mean	Max SNR	% of Max
122.2	100%	149.5	100%
52.5	43%	74.8	50%
49.1	40%	53.2	36%
79.7	65%	112.2	75%
41.8	34%	53.4	36%
47.0	38%	93.2	62%
108.1	88%	127.7	85%
57.1	47%	81.4	54%

 Composites - NEMA

 Mean: 710
 ROI M: -0.51
 Mean: 860
 ROI M: -0.42

 ROIsd: 3.11
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RF Coil Performance Evaluation		Test Date:	7/6/2008
Coil: Breast		Model:	104461
Mfg.: Invivo		Revision:	1
Mfg. Date: 2/01/2006 Coil ID: 691		SN:	U21321
Phantom: Two bottles in red phantom holders			# of Channels7
SequenceTRTEPlaneFOVSE30020T45	Nx Ny BW 256 256 25.6	NSA Th	ickness Gap 3 -

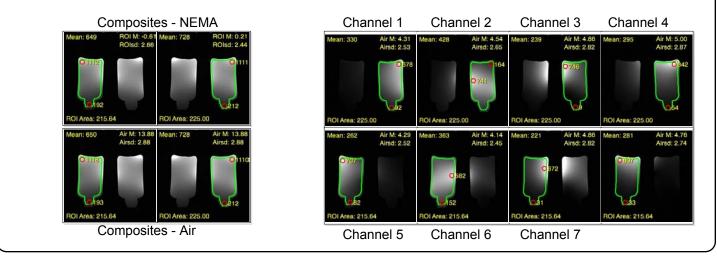
Coil Mode: BR Left,Right,Middle

Analysis of Composite Image

		М	easured	Data			C	alculate	d Result	ts
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal- ized	Max SNR	Uni- formity
NR	649	1,112	192	-0.6	2.66	NEMA	172.5	98.2	295.6	29.4%
NL	728	1,111	212	0.2	2.44	NEMA	211.0	120.1	322.0	32.0%
AR	650	1,118	193	13.9	2.88	Air	147.9	84.2	254.4	29.4%
AL	728	1,110	212	13.9	2.88	Air	165.6	94.3	252.6	32.1%

Analysis of Uncombined Images

	Me	easured	Data			Calculate	d Results	
Ch	Mean	Max	Noise SD	Noise Type	Mean SNR	% of Mean	Max SNR	% of Max
R1	330	678	2.53	Air	85.5	81%	175.6	91%
R2	428	741	2.65	Air	105.8	100%	183.2	95%
R3	239	746	2.82	Air	55.5	52%	173.4	90%
R4	295	842	2.87	Air	67.4	64%	192.3	100%
L4	262	707	2.52	Air	68.1	64%	183.9	95%
L5	363	582	2.45	Air	97.1	92%	155.7	81%
L6	221	672	2.82	Air	51.4	49%	156.2	81%
L7	281	807	2.74	Air	67.2	63%	193.0	100%



RF Coil Performance Evaluation Coil: Breast Mfg.: Invivo Mfg. Date: 2/01/2006 Coil ID: 691 Phantom: Two bottles in red phantom holders Sequence TR TE Plane FOV Nx	Test Date: 7/6/2008 Model: 104461 Revision: 1 SN: U21321 # of Channels 7 Ny BW NSA
SE 300 20 T 45 256	
Coil Mode: LBR	
Analysis of Compo	site Image
Measured Data	Calculated Results
	oise Mean Normal- Max Uni- ype SNR ized SNR formity
	ZMA 215.5 122.7 337.1 31.3% Air 167.5 95.4 262.1 31.3%
Analysis of Uncombi Measured Data	Calculated Results
Noise Noise	Mean % of Max % of
ChMeanMaxSDType12868352.88Air	SNR Mean SNR Max 65.1 61% 190.0 100%
2 238 749 2.78 Air	56.1 53% 176.6 93% 100.2 100.2 100.2 100.2
3 420 726 2.59 Air 4 329 683 2.51 Air	106.3 100% 183.7 97% 85.9 81% 178.3 94%
Mean: 704 ROI M: 0.83 ROIsd: 2.31 TOI Area: 219.86 ROI Area: 219.86 ROI Area: 219.86 ROI Area: 219.86	O ^{B35}

RF Coil Performance Evaluation Coil: Breast Mfg.: Invivo Mfg. Date: 2/01/2006 Coil ID: 691 Phantom: Two bottles in red phantom holders Sequence TR TE Plane FOV SE 300 20 T 45 Coil Mode: RBR	Test Date: 7/6/2008 Model: 104461 Revision: 1 SN: U21321 # of Channels 7 Nx Ny BW NSA Thickness Gap 256 256 25.6 1 3 -					
Analysis of	Composite Image					
Measured Data	Calculated Results					
Back No Label Mean Max Min ground S						
N 626 1,106 202 0.2 2.2	21 NEMA 200.3 114.1 353.9 30.9%					
A 626 1,105 202 10.1 2.0	63 Air 156.0 88.8 275.3 30.9%					
Analysis of U	ncombined Images					
Measured Data	Calculated Results					
Noise Noise Ch Mean Max SD Type	Mean % of Max % of					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	SNR Mean SNR Max 68.1 71% 180.7 95%					
2 229 680 2.68 Air	56.0 58% 166.3 88%					
3 358 556 2.43 Air	96.5 100% 149.9 79%					
	<u> </u>					
42848052.78Air66.969%189.8100%Image: Second s						

RF Coil Performance Evaluation	Test Date: 7/6/2008					
Coil: CP Flex - Large	Model: 5512053					
Mfg.: Siemens	Revision:					
Mfg. Date: Coil ID:	SN: 5001					
Phantom: Large Cylinder	# of Channels 1					
	IxNyBWNSAThicknessGap5625625.613-					
Coil Mode: <u>FL Ports 2 & 5</u>						
Analysis o	of Test Image					
Measured Data	Calculated Results					
Back Nois Label Mean Max Min ground SD	e Noise Mean Normal- Max Uni- Type SNR ized SNR formity					
N2 600 760 464 0.4 4.70						
A2 599 756 466 7.0 3.34	Air 117.5 104.5 148.3 76.3%					
N5 578 720 450 0.2 3.82						
A5 577 721 450 6.8 3.27	Air 115.6 102.9 144.5 76.9%					
	t Imagaa					
	t Images 37 Mean: 599 Air M: 6.99					
ROIsd: 4.7						
0760	O 760 O 756					
Q464	467					
ROI Area: 167.44	ROI Area: 167.44					
Mean: 578 ROI M: 0.2 ROIsd: 3.8						
ROIsd: 3.82 Airsd: 3.27 Of 720 Of 721 Of 450 ROI Area: 167.42						

Coil: <u>CP Flex - Small</u> Mfg.: <u>Siemens</u> Mfg. Date: Coil ID: 693 Phantom: <u>Small Cylnder</u> Sequence TR TE Plane FOV Nx Ny BW NS						Model: Revision SN	:	12038		
			Anal	ysis of	Test Ima	age				
	Μ	easured		<u>,</u>		Ĵ	C	alculate	d Result	S
			Back	Noise	Noise		Mean	Normal-	Max SNR	Uni-
Label Me	ean Max 98 1,094	Min 307	ground	SD 5.96	Type NEMA	1 Г	SNR 94.7	ized 84.2	129.8	formity 43.8%
A 79		307	12.4	5.75	Air		90.9	80.9	124.8	43.8%
N int. 80	01 1,150	276	-0.7	5.80	NEMA		97.7	86.9	140.2	38.7%
A int. 80	1,149	277	8.5	4.04	Air		129.9	115.6	186.4	38.8%
		lean: 708	BO	Test In		8	Air M [.]	12 44		
Mean: 798 ROI M: 0.43 ROIsd: 5.96 Mean: 798 Air M: 12.44 Airsd: 5.75 Image: State of the s										

	Test Date: 7/6/2008 Model: 7577732 Revision:					
Analysis of C	Composite Image					
Measured Data	Calculated Results					
Back Nois Label Mean Max Min ground SD						
N 1,465 1,714 1,288 -0.2 5.1						
A 1,466 1,715 1,288 20.1 4.99	8 Air 192.9 139.0 225.7 85.8%					
Analysis of Ur	combined Images					
Measured Data	Calculated Results					
Noise Noise Ch Mean Max SD Type	Mean % of Max % of SNR Mean SNR Max					
1 588 924 4.35 Air	88.6 89% 139.2 79%					
2 642 1,088 4.69 Air	89.7 90% 152.0 86% 75.0 75% 121.0 75%					
3 614 1,067 5.30 Air 4 835 1,485 5.50 Air	75.9 76% 131.9 75% 99.5 100% 176.9 100%					
Mean: 1465ROI M: -0.23 ROIsd: 5.17 BOIsd: 5.17 BOIsd: 5.17 BOIsd: 5.17 BOIsd: 5.17 BOIsd: 5.17 BOIsd: 5.17 BOIsd: 5.17 BOIsd: 5.17 						

RF Coil Perf	ormano	ce Eval	uation					Test Date	e:7/	6/2008
Coil: Head Matrix							l: 75			
Mfg.: Siemens							/			
Mfg. Date: <u>1/1/2005</u>		Coil ID:	695		1			SN	l:	1362
Phantom: ACR Pha	intom								# of Cha	annels <u>4</u>
Sequence TF				Nx	Ny		BW		Thickness	Gap
SE 30	0 20	Т	40	256	256		25.6	1	3	<u> </u>
Coil Mode: <u>HE1,</u> 2	2,3,4 Inter	polated In	nage							
			Analysis	s of Con	nposite I	mag	е			
	M	easured	Data		-		C	alculat	ed Resul	ts
Label Mean	Max	Min	Back ground	Noise SD	Noise Type		Mean SNR	Normal- ized	Max SNR	Uni- formity
N 1,476	1,774	1,229	-0.3	4.38	NEMA		238.3	171.7	286.4	81.9%
A 1,477	1,774	1,228	14.5	3.56	Air	L	271.9	195.9	326.5	81.8%
		A	nalysis	of Unco	mbined	lmag	jes			
M	easured			_					I Results	
ChMean	Max	Noise SD	Noise Type	_		Me SN		% of <u>Mean</u>	Max SNR	% of Max
1 842 2 617	1,567	3.68	Air			149		.00%	279.0	100%
2 617 3 640	1,098 1,102	3.51	Air Air			115 134		77% 90%	205.0 231.5	73% 83%
4 578	957	2.89	Air]		131	1.1	87%	217.0	78%
Mean: 1476 ROIM: -0.31 Rolad: 4.39 Mean: 1477 Air M: 14.50 Airsd: 3.36 Airsd:						2				
ROLArea: 271.2 Composites Composites Channel 3 Channel 4						4				

RF Coil Performance Evaluation		Test Dete: 7/6/2008
Coil: Knee - CP Extremity		Test Date: 7/6/2008 Model: 07579472
Mfg.: Siemens		Revision:
Mfg. Date: 1/1/2005 Coil ID: 697	a de	SN: 1450
Phantom: Small Bottle		# of Channels1
Sequence TR TE Plane FOV	Nx Ny BW	NSA Thickness Gap
SE 300 20 T 40	256 256 25.6	
Coil Mode: EX		
Analysis	of Test Image	
Measured Data	U	Calculated Results
	ise Noise Mea D Type SNF	n Normal- Max Uni- R ized SNR formity
N 1,329 1,440 1,183 -0.2 7.4		
A 1,329 1,440 1,181 15.7 7.2	20 Air 121.	0 87.2 131.1 90.1%
Mean: 1329 ROI M: -0.2	2 Mean: 1329	Air M: 15.72
ROIsd: 7.65		Airsd: 7.20
	\sim	
01188	0 1181	
0/440		21440
ROI Area: 166.70	ROI Area: 166.70	
Tes	Images	

Coil: Mfg.: Mfg. Date: Phantom: Seque SE	RF Coil Performance Evaluation Coil: Knee/Foot Image: Coil Advances Mfg.: Medical Advances Image: Coil ID: 1158 Mfg. Date: 6/1/2006 Coil ID: 1158 Phantom: Small bottle and Wrist in foot. Sequence TR TE Plane FOV Nx Ny BW SE 300 20 T 40 256 256 25.6 Coil Mode: EX						Revision SN	:47 :	48I-64F 503623	
				Anal	ysis of	Test Ima	age			
		М	easured	Data			_	Calculate	ed Resul	ts
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mea SNF	n Normal- R ized	Max SNR	Uni- formity
Ν	1,016	1,177	921	-1.2	3.12	NEMA	230.	3 165.9	266.8	87.8%
Ν	820	881	757	-1.1	3.21	NEMA	180.	7 130.2	194.1	92.4%
A	1,017	1,178	921	6.3	3.06	Air	217.		252.3	87.8%
A	821	883	758	6.3	3.06	Air	175.	8 126.7	189.1	92.4%
			loop: 1016	BO	Test Ir	-				
	Mean: 1016 ROI M: -1.24 ROIsd: 3.12 177 ROI Area: 34.87 ROI M: -1.14 ROIsd: 3.21 ROI M: -1.14 ROIsd: 3.21 ROI M: -1.14 ROIsd: 3.21 ROIsd: 3.21 ROI M: -1.14 ROIsd: 3.21 ROIsd: 3.21 ROI M: -1.14 ROIsd: 3.21									
	ROI Area: 34.87 Mean: 1017 Air M: 6.28 Airsd: 3.06 921 178 ROI Area: 34.87					Mean: 82	Air	M: 6.28 sd: 3.06 83		

RF Coil Performance EvaluationCoil:Knee/FootMfg.:Medical AdvancesMfg. Date:6/1/2006Coil ID:1158Phantom:Small bottle and Wrist in foot.SequenceTRTEPlaneFOVNxNyBWSE30020S4025625625625.62.03-Coil Mode:EX						SI-64F)3623 nnels <u>1</u>
	Analysis of	Test Image				
Measured Da			8	alculate		
	Back Noise round SD	Noise Type	Mean SNR	Normal- ized	Max SNR	Uni- formity
N 1,055 1,216 974	-0.2 1.95	NEMA	382.6	195.0	441.0	88.9%
	-0.4 2.10	NEMA	240.8	122.7	317.9	40.5%
A 1,056 1,216 975 A 715 945 240	4.3 2.23 4.3 2.22	Air	310.3 211.1	158.1 107.5	357.3 278.9	89.0% 40.5%
Test Images Mean: 1055 ROI M: -0.23 Mean: 715 ROI M: -0.43 ROIsd: 1.95 ROIsd: 2.10 0 944						
ROI Area: 38.1 Mean: 1056	ROI Area: 184 Mean: 715	.42 Air M: Airsd:				
Image: Second						

RF Coil Performance Evaluation Coil: <u>Neck Matrix</u> Mfg.: Siemens		Model:	7/6/2008 75777906
Mfg. Date: <u>1/1/2004</u> Coil ID: 698		Revision:	2158
Phantom: Long cylinder		SN.	# of Channels 4
SequenceTRTEPlaneFOVSE30020T36	Nx Ny 256 256	BW NSA Thi 25.6 1	ckness Gap 3 -
Coil Mode: a He 1,2,3,4	_		
Analysis	of Composite Ima	age	
Measured Data		Calculated	Results
	Noise Noise SD Type	Mean Normal- SNR ized	Max Uni- SNR formity
N 1,114 1,234 1,040 0.6	7.21 NEMA	109.3 97.2	121.0 91.5%
A 1,113 1,234 1,039 25.4	6.26 Air	116.5 103.6	129.2 91.4%
Analysis o	f Uncombined Ima	ages	
Measured Data		Calculated R	
Noise Noise Ch Mean Max SD Type		Mean % of SNR Mean	Max % of SNR Max
1 573 834 7.18 Air		52.3 79%	76.1 81%
2 408 578 4.98 Air 3 487 802 6.47 Air		53.7 81% 49.3 74%	76.1 81% 81.2 86%
3 407 602 6.11 Air 4 619 879 6.11 Air		49.5 7470 66.4 100%	94.3 100%
	Mean	n: 573 Air M: 13.24 Mean: 4	
Mean: 1114 ROI M: 0.59 Mean: 1113	Air M: 25.36	Airsd: 7.18	Airsd: 4.98
ROIsd: 7.21	Airsd: 6.26	259	0 578
01040	189	0 8/34	C169
		Area: 166.27 ROI Are n: 487 Air M: 11.87 Mean: 6	a: 166.27 19 Air M: 11.18
0.1234	21234	Airsd: 6.47	Airsd: 6.11
		0.905	302
ROI Area: 166.27 ROI Area: 166.27		9 178	OBTO
Composites		Areas 100.07	. 100.07
	ROIZ		a: 166.27 Channel 4

RF Coil Performance Evaluation Coil: Neck Matrix Mfg.: Siemens Mfg. Date: 1/1/2004 Coil ID: 698 Phantom: Long cylinder	Test Date: 7/6/2008 Model: 75777906 Revision:					
Sequence TR TE Plane FOV SE 300 20 C 45 Coil Mode: b HE 1,2,3,4	NxNyBWNSAThicknessGap25625625.613-					
Analysis o	f Composite Image					
Measured Data	Calculated Results					
LabelMeanMaxMingroundN1,1701,9295061.1	oise SD Noise Type Mean SNR Normal- ized Max SNR Uni- formity 4.22 NEMA 196.1 111.6 323.3 41.6% 4.18 Air 183.3 104.3 302.1 41.5%					
Measured Data	Uncombined Images Calculated Results					
Ch Mean Max Noise SD Noise Type 1 617 1,007 4.61 Air 2 512 1,660 3.94 Air 3 515 780 4.16 Air 4 371 1,076 3.21 Air	Mean SNR% of MeanMax SNR% of Max87.7100%143.152%85.297%276.1100%81.192%122.945%75.786%219.780%					
Mean: 1170ROI M: 1.06 ROIsci 4.22 OI Area: 345.75Mean: 1169Air M: 16.05 Airsci 4.18 OI Area: 345.75Channel 1Channel 2 Airsci 3.94 OI Area: 345.75CompositesMean: 1169Air M: 16.05 Airsci 4.18 OI Area: 345.75Mean: 1169Air M: 16.05 Airsci 4.18 OI Area: 345.75Mean: 1169Air M: 16.05 Airsci 4.18 OI Area: 345.75Mean: 512Air M: 7.03 Airsci 3.21 OI Area: 345.75CompositesCompositesCompositesCompositesChannel 3Channel 4						

RF Coil Performance Evaluation Coil: Neck Matrix Mfg.: Siemens Mfg. Date: 1/1/2004 Coil ID: 698 Phantom: Long cylinder Sequence TR TE Plane FOV Nx SE 300 20 S 45 256	Test Date: 7/6/2008 Model: 75777906 Revision:					
Coil Mode: <u>c He 1,2,3,4</u> Analysis of Compo	site Image					
Measured Data	Calculated Results					
LabelMeanMaxMingroundSDTypeN1,2082,017401-0.44.14NE	Dise ypeMean SNRNormal- izedMax 					
Analysis of Uncomb	ined Images					
Measured Data	Calculated Results					
Ch Mean Max SD Noise Type 1 597 1,272 4.64 Air 2 337 1,579 3.21 Air 3 496 1,032 4.17 Air 4 505 2,000 3.96 Air	Mean % of SNR Max Mean % of SNR Max Max 84.3 100% 179.6 54% 68.8 82% 322.3 97% 77.9 92% 162.2 49% 83.6 99% 331.0 100%					
45052,0003.96Air83.699%331.0100%Image: Second colspan="4">Image: Second colspan="4" Second colspan="4" Image: Second colspan="4" Image						

RF Coil Performance Eval Coil: Neck Matrix Mfg.: Siemens Mfg.: Siemens Mfg. Date: 1/1/2004 Coil ID: Phantom: Long cylinder Sequence TR TE Plane SE 300 20 T Coil Mode: d He 3,4 NE 1,2 Coil Mode: d He 3,4 NE 1,2	698	Ny 256	Model Revision SN	: 7/6/2008 : 75777906 : 2158 # of Channels 4 Thickness Gap 3 -
	Analysis of Cor	mposite Ima	ge	
Measured	l Data		Calculate	ed Results
Label Mean Max Min	Back Noise ground SD	Noise Type	Mean Normal- SNR ized	Max Uni- SNR formity
N 1,029 1,316 797	0.3 6.34	NEMA	114.8 102.1	146.8 75.4%
A 1,029 1,315 796	24.8 5.94	Air	113.5 101.0	145.1 75.4%
Α	Analysis of Unco	ombined Ima	ges	
Measured Data			Calculated	
ChMeanMaxSD	Noise Type		ean % of <u>NR Mean</u>	Max % of SNR Max
1 554 776 6.87	Air		2.8 81%	74.0 51%
$\begin{array}{ c c c c c c c c } \hline 2 & 412 & 734 & 6.08 \\ \hline 3 & 473 & 689 & 6.36 \\ \hline \end{array}$	Air		4.4 68% 8.7 75%	79.1 55% 71.0 49%
4 480 1,064 4.83	Air	6:	5.1 100%	144.4 100%
Wean: 1029 ROI M: 0.25 Mean: 1029 Air M: 24.77 Airsd: 5.94 Airsd: 5.94 Image: Channel 1 Channel 2 Mean: 169.15 ROI Area: 169.15 Composites Composites				

RF Coil Performance Evaluation Coil: Neck Matrix Image: Neck Matrix Nec	Test Date: 7/6/2008 Model: 75777906 Revision:
Analysis of Composit	e Image
Measured Data	Calculated Results
Back Noise Noise Label Mean Max Min ground SD Type	SNR ized SNR formity
N 1,031 1,367 479 -0.4 3.85 NEM. A 1,032 1,366 479 15.7 3.94 Air	A 189.4 107.8 251.1 51.9% 171.6 97.7 227.2 51.9%
Analysis of Uncombine	ed Images
Measured Data	Calculated Results
Ch Mean Max SD Noise Type 1 351 991 3.12 Air 2 459 713 4.10 Air 3 543 988 4.47 Air 4 361 1,039 3.91 Air	Mean SNR % of Mean Max SNR % of Max 73.7 93% 208.1 100% 73.4 92% 114.0 55% 79.6 100% 144.8 70% 60.5 76% 174.1 84%
Mean: 1031ROI M: -0.43 ROIsd: 3.85 ROIsd: 3.85 ROIsd: 4.85 ROI Area: 418.22Mean: 1032 Air M: 15.67 Airsd: 3.94 Airsd: 3.94 FOI Area: 418.22Mean: 1032Air M: 15.67 Airsd: 3.94 Poi Area: 418.22Airsd: 3.94 Airsd: 3.94 Poi Area: 418.22	Channel 1Channel 2Mean: 351Air M: 5.43 Airsd: 3.12 Airsd: 3.12 Airsd: 4.10 Airsd: 3.11 Airsd: 3.11 Airsd: 4.17 Airsd: 4.17 Airsd: 4.18.22Mean: 543Air M: 8.02 Airsd: 4.47 Airsd: 4.47 Airsd: 4.47Mean: 543Air M: 8.02 Airsd: 4.47 Airsd: 4.47Mean: 543Air M: 8.02 Airsd: 4.47Air M: 8.02 Airsd: 4.47Mean: 361 Airsd: 3.91 Airsd: 3.91 Airsd: 3.91 Airsd: 4.18.22Mean: 543Air M: 8.02 Airsd: 4.47Air M: 8.02 Airsd: 4.47Mean: 361 Airsd: 3.91 Airsd: 3.91 Airsd: 3.91 Airsd: 4.18.22Channel 3Channel 4

RF Coil Performance Evaluation Coil: Neck Matrix Mfg.: Siemens Mfg. Date: 1/1/2004 Coil ID: 698 Phantom: Long cylinder SE 300 20 S 45 25	
Coil Mode: f He 3,4 NE 1,2	
Analysis of C	omposite Image
Measured Data	Calculated Results
Label Mean Max Min Back ground Noise SD N 1,127 1,882 382 1.3 4.04 A 1,125 1,876 383 15.7 3.99	Noise TypeMean SNRNormal- izedMax SNRUni- formityNEMA197.3112.3329.433.7%Air184.8105.2308.133.9%
Analysis of Un	combined Images
Measured Data	Calculated Results
Ch Mean Max SD Noise Type 1 537 1,249 4.45 Air 2 478 1,021 4.11 Air 3 372 1,656 3.15 Air 4 354 1,829 3.95 Air	Mean SNR% of MeanMax SNR% of
	tornal channel 2 15.74 3.99 15.74 3.99 15.74 3.99 15.74 3.99 15.74 3.99 15.74 3.99 15.74 3.99 15.74 3.99 15.74 15.75 15.74

RF Coil Performance Evaluation Test Date: 7/6/2008	8					
Coil: Periph Angio Matrix Model: 7579910						
Mfg.: Siemens Revision:						
Mfg. Date: Coil ID: 699 SN: 1802						
Phantom: 2 Long cylinders # of Channels	s <u>8</u>					
Sequence TR TE Plane FOV Nx Ny BW NSA Thickness Ga	ip					
SE 300 20 T 45 256 256 25.6 1 3 -						
Coil Mode: PVA RL 12 (lower)						
Analysis of Composite Image						
Measured Data Calculated Results						
Back Noise Noise Mean Normal- Max U Label Mean Max Min ground SD Type SNR ized SNR for	ni- mity					
	1%					
N 506 940 140 0.1 2.58 NEMA 138.7 79.0 257.7 25.	9%					
A 517 969 127 13.2 3.24 Air 104.6 59.5 196.0 23.	2%					
A 506 940 139 13.2 3.24 Air 102.3 58.3 190.1 25.	.8%					
Analysis of Uncombined Images						
Measured Data Calculated Results						
	of					
	ax 1%					
	9%					
3 402 844 3.52 Air 74.8 100% 157.1 100	0%					
4 314 583 3.07 Air 67.0 90% 124.4 79)%					
Mean: 516 ROI M: -0.27 Mean: 506 ROI M: 0.13 Mean: 517 Air M: 13.22 Mean: 506 Air M: 13.22						
ROIsd: 2.68 ROIsd: 2.58 Airsd: 3.24 Airsd: 3.24						
0 940 0 940						
Composites						
ROI Area: 181.19 ROI Area: 182.23 ROI Area: 181.19 ROI Area: 182.23						
Mean: 337 Air M: 5.88 Mean: 371 Air M: 5.91 Mean: 402 Air M: 6.21 Mean: 314 Air M: 5.31 Airsd: 3.35 Airsd: 3.36 Airsd: 3.56 Airsd: 3.52 Airsd: 3.14 Air M: 5.31						
0795						
Channels						
0.93 0.102 0.71						
ROI Area: 182.23 ROI Area: 182.23 ROI Area: 181.19 ROI Area: 181.19						
Channel 1 Channel 2 Channel 3 Channel 4						

RF C	oil Per	formance Eval	uation	The line		Test Date [.]	7/6/2008	
Coil	: Periph	Angio Matrix	10		A A	_	7579910	
	: Siemens	0				-		
_		Coil ID:	699	The second s			1802	
Phantom	: <u>2 Long c</u>	cylinders				-	# of Channels 8	
Sequ	ence T	R TE Plane	FOV N	lx Ny	BW	NSA Thi	ckness <u> </u>	
S		00 20 C		56 256	25.6	2.0	3 -	
Coil Mo	ode: PVA	RL 12 (lower)						
			Analysis of C	omposite Ir	nage			
		Measured	Data	-	(Calculated	Results	
Label	l Mean	Max Min	Back Nois ground SD	e Noise Type	Mean SNR	Normal- ized	Max Uni- SNR formity	
Ν	589	1,096 307	0.1 2.00	NEMA	208.3	83.8	387.6 43.8%	
Ν	599	956 425	0.1 2.08	NEMA	203.7	82.0	325.0 61.5%	
Α	589	1,096 307	9.8 2.95	Air	130.8	52.7	243.5 43.8%	
Α	599	956 425	10.0 3.04	Air	129.1	52.0	206.1 61.5%	
		A	nalysis of Un	combined l	mages			
	M	leasured Data		_	Ca	Iculated R	lesults	
Ch	Mean	Noise Max SD	Noise Type			% of Mean	Max % of SNR Max	
	329	710 2.56	Air	[92%	181.7 60%	
2	352	934 2.51	Air			100%	243.8 80%	
3	322	1,064 2.30	Air		91.7	100%	303.2 100%	
4	356	825 2.66	Air		87.7	95%	203.2 67%	
	[Mean: 589 ROI M: 0.0		I M: 0.08 Mean: 589			Air M: 9.98	
		BOIsd: 2.0 0 1096		lsd: 2.08	Airsd: 2.95 0 1096		Airsd: 3.04	
			O 956			7	56	
Com	posites							
			07 0425			307 0 42	5	
	l	ROI Area: 446.73	ROI Area: 451.97	RÓI Area:		RÓI Area: 451		
		Mean: 329 Air M: 4.34 Airsd: 2.56		M: 4.28 Mean: 323 sd: 2.51	2 Air M: 3.8 Airsd: 2.3 0 1064		Air M: 4.51 Airsd: 2.66	
		010	0 934		0 1004	7	097	
Cł	nannels							
			09		014			
		0710				~	0 825	
		ROI Area: 451.97	ROI Area: 451.97	ROI Area:	446.73	ROI Area: 446	.73	
l		Channel 1	Channe	12 C	hannel 3	Chan	nel 4	

RF Coil Performance Evaluation	Test Date: 7/6/2008
Coil: Periph Angio Matrix	Model: 7579910
Mfg.: Siemens	Revision:
Mfg. Date: Coil ID:	SN: 1802
Phantom: 2 Long cylinders	# of Channels 8
Sequence TR TE Plane FOV N	Ny BW NSA Thickness Gap
SE 300 20 C 45 250	
Coil Mode: PVA RL 34 (upper)	
	omposite Image
Measured Data	Calculated Results
Back Noise Label Mean Max Min ground SD	Noise Mean Normal- Max Uni- Type SNR ized SNR formity
N 635 1,477 301 0.3 2.02	NEMA 222.3 89.5 517.1 33.9%
N 617 1,190 353 -0.1 2.42	NEMA 180.3 72.6 347.8 45.8%
A 634 1,474 301 7.9 2.47	Air 168.2 67.7 391.1 33.9%
A 617 1,196 358 8.1 2.64	Air 153.2 61.7 296.9 46.1%
Analysis of Unc	ombined Images
Measured Data	Calculated Results
Noise Noise Ch Mean Max SD Type	Mean % of Max % of
ChMeanMaxSDType13227811.89Air	SNR Mean SNR Max 111.6 98% 270.8 66%
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
3 408 1,464 2.34 Air	114.3 100% 410.0 100%
4 302 803 1.86 Air	106.4 93% 282.9 69%
Mean: 635 ROI M: 0.34 Mean: 617 ROI Roisd: 2.02	M: -0.11 Mean: 634 Air M: 7.89 Mean: 617 Air M: 8.13 d: 2.42 Airsd: 2.47 Airsd: 2.64
©301 V ³³³	6 301
Composites	
ROI Area; 477.35 ROI Area: 472.59	O:1474 O[1196 ROI Area: 477.35 ROI Area: 472.59
	1: 3.65 Mean: 408 Air M: 3.92 Mean: 302 Air M: 2.95
Airsd: 1.89 Airsd	4: 2.20 Airsd: 2.34 Airsd: 1.86
O 781 O 8	O 808 O
Channels	
09	08
	91464
ROI Area: 472.59 ROI Area: 472.59	ROI Area: 477.35 ROI Area: 477.35
Channel 1 Channel	2 Channel 3 Channel 4

<u>RF (</u>	Coi	il Per	forman	ce Evalı	<u>uation</u>				Test Date	7/6/20)08
Coil: Periph Angio Matrix			65	and the second			: 75799				
	-	Siemens				4	at -			:	
Mfg. Da	te:			Coil ID:	699			35		: 180	
Phanto	om: <u>2</u>	2 Long c	ylinders						_	# of Chann	els <u>8</u>
	quen				FOV	Nx	Ny	BW			Gap
	SE	30	00 20	Τ	45	256	256	25.6		3	-
Coil I	Mode	e: <u>PVA</u>	RL 34 (up)	oer)							
					Analysis	s of Con	nposite l	mage			
			М	easured	Data				Calculate	ed Results	
Lab	bel	Mean	Max	Min	Back ground	Noise SD	Noise Type	Mear SNR		Max SNR f	Uni- ormity
Ν		463	741	202	6.3	10.61	NEMA	30.9	17.6	49.4	2.8%
Ν		454	777	182	2.3	6.05	NEMA	53.1	30.2	90.8 3	8.0%
Α		457	716	198	10.4	2.67	Air	112.2	63.9	175.7 4	3.3%
Α		451	776	180	10.4	2.67	Air	110.7	63.0	190.5 3	57.7%
				А	nalysis d	of Unco	mbined	Images			
		M	leasured	Data		_			Calculated	Results	
Ch		Mean	Max	Noise SD	Noise Type			Mean	% of		% of
		319	573	2.44	Air			SNR 85.7	Mean 88%		<u>Max</u> 96%
2		313	548	2.99	Air			68.6	70%		75%
3		372	609	2.50	Air			97.5	100%	159.6	100%
4		257	394	2.84	Air			59.3	61%	90.9	57%
		[Mean: 463	ROI M: 6.30	Mean: 454	ROI M:	2.33 Mean: 4	57 Air M: ⁻	0.44 Mean; 451	Air M: 10.43]
				ROIsd: 10.6		ROIsd:		Airsd: 2		Airsd: 2.67	
			074					0716			
Co	ompo	osites				0777				0776	
			0.202			01	62	198		0160	
			ROI Area: 173	76	ROI Area: 17	8.71	ROI Area	a: 173.76	ROI Area: 1	178.71	
		L	Mean: 319	Air M: 4.12	Mean: 313	Air M: 5					
				Airsd: 2.44		Airsd: 2	2.99	Airsd:	2.50	Airsd: 2.84	
				0 573	1			0609			
	Cha	nnels				0548				0394	
				0123			30	49		1	
			ROI Area: 178	.71	ROI Area: 17	78.71	ROI Are	a: 173.76	ROI Area:	173.76	
l			Cha	nnel 1	С	hannel 2		Channel 3		annel 4	

RF Coil Performance Evaluation Coil: Shoulder Array - Large Mfg.: MRI Devices Mfg. Date: Coil ID: 701 Phantom: Small Bottle FOV SE 300 20 T 36 Coil Mode: SH	NxNy256256	Model: Revision: SN:	7/6/2008 100214 05901 # of Channels ckness Gap 3		
Analysis	of Composite Ima	age			
Measured Data	-	Calculated	Results		
Back Label Mean Max Min ground	Noise Noise SD Type	Mean Normal- SNR ized	Max Uni- SNR formity		
N 867 1,175 486 -0.2	2.75 NEMA	223.0 198.3	302.2 58.5%		
A 867 1,173 487 11.3	2.92 Air	194.6 173.1	263.2 58.7%		
Analysis o	f Uncombined Ima	ages			
Measured Data		Calculated R	lesults		
Noise Noise Ch Mean Max SD Type		Mean % of SNR Mean	Max % of SNR Max		
1 433 617 2.65 Air		107.1 100%	152.6 94%		
2 484 800 3.22 Air 3 373 654 2.80 Air		<u>98.5</u> <u>92%</u>	162.8 100% 148.3 019/		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			111.0 68%		
$\frac{3}{4} \frac{373}{406} \frac{654}{476} \frac{2.89}{2.81} \frac{\text{Air}}{\text{Air}} \frac{84.6}{94.7} \frac{79\%}{88\%} \frac{148.3}{111.0} \frac{91\%}{68\%}$					

RF Coil Performance Evaluation Coil: Shoulder Array - Large Mfg.: MRI Devices Mfg. Date: Coil ID: 701 Phantom: Small Bottle Sequence TR TE Plane FOV SE 300 20 C 36 Coil Mode: SH	Nx Ny BW 256 256 25.6	Test Date: 7/6/2008 Model: 100214 Revision:			
Analysis	of Composite Image				
Measured Data		Calculated Results			
Back Label Mean Max Min ground	Noise Noise Mean SD Type SNR	Normal- Max Uni- ized SNR formity			
N 674 1,406 209 1.6	2.85 NEMA 167.2	148.8 348.9 25.9%			
A 672 1,403 209 11.2	2.91 Air 151.3	134.6 315.9 25.9%			
Analysis o	f Uncombined Images				
Measured Data	Ca	alculated Results			
Mean Max Noise SD Noise Type 1 282 444 2.63 Air 2 284 684 2.85 Air 3 379 1,145 3.21 Air 4 332 833 2.80 Air	70.3 65.3 77.4	% of Mean Max SNR % of Max 90% 110.6 47% 84% 157.3 67% 100% 233.7 100% 100% 195.0 83%			
43328332.80All71.710078133.0837.6Mean: 674FOI M: 1.56Mean: 672Air M: 11.16Airsd: 2.91Mean: 282Airsd: 2.93Mean: 282Airsd: 2.83Mean: 282Airsd: 2.83Mean: 282Airsd: 2.83Mean: 282Airsd: 2.83Mean: 373Air M: 4.50Mean: 323Air M: 4.84FOI Area: 122.32FOI Area: 122.32CompositesCompositesMean: 373Air M: 5.60Mean: 332Air M: 4.84CompositesCompositesConnel 3Channel 4Channel 4					

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RF Coil Performance Evaluation Coil: Shoulder Array - Small Mfg.: MRI Devices Mfg. Date: Coil ID: 706 Phantom: Small Bottle Sequence TR TE SE 300 20 T 36		Test Date: 7/6/2008 Model: 100213 Revision:								
Coil Mode: <u>SH</u>	- of Composite Image									
Analysis of Composite Image Measured Data Calculated Results										
Back Noise Noise Mean Normal- Max Uni-										
LabelMeanMaxMingroundN7511,059337-0.0	SD Type	SNR ized SNR formity 223.2 198.5 314.7 48.3%								
A 751 1,059 337 11.3		177.7 158.1 250.5 48.3%								
	Uncombined Image	°								
Measured Data	oncombined intege	Calculated Results								
Noise Noise	Mear	n % of Max % of								
ChMeanMaxSDType13115902.81Air	SNR 72.5	Mean SNR Max 63% 137.6 81%								
2 277 382 2.84 Air	63.9									
3 368 597 3.13 Air 4 482 714 2.76 Air	77.0 114.4									
ROIsd: 2.38	Mean: 311 Air M: 11.28 Airsd: 2.77 059 Mean: 368 ROI Area: 9	Air M: 5.44 Mean: 482 Air M: 4.73 Airsd: 3.13 Airsd: 2.76 172 0597								

RF Coil Performance Evaluation Coil: Shoulder Array - Small Mfg.: MRI Devices Mfg. Date: Coil ID: 706 Phantom: Small Bottle Sequence TR TE Plane FOV SE 300 20 C 36 Coil Mode: SH	Revision:	100213							
	of Composite I	_							
Measured Data		Calculated							
Label Mean Max Min ground	Noise Noise SD Type	Mean Normal- SNR ized	Max Uni- SNR formity						
N 682 1,726 205 0.5	2.44 NEMA	197.7 175.8	500.3 21.2% 404.0 21.2%						
A 682 1,724 205 11.2	2.79 Air	160.2 142.5	404.9 21.3%						
	of Uncombined I								
Measured Data		Calculated R							
Ch Mean Max SD Type 1 351 1,363 3.09 Air 2 312 572 2.73 Air 3 344 1,047 2.87 Air 4 245 654 2.82 Air									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									

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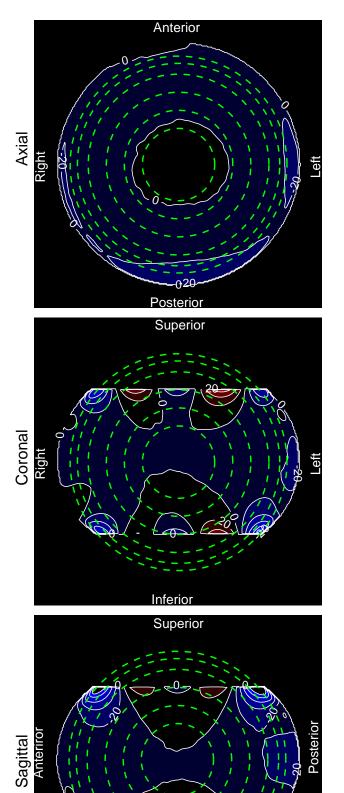
RF Coil Performance Evaluation Coil: Spine Matrix Mfg.: Siemens Mfg. Date: Coil ID: Phantom: Large Cylinder Sequence TR TE Plane FOV	Nx Ny	Test Date: 7/6/2008 Model: 7579340 Revision:							
SE 300 20 S 45	256 256	25.6 1 3 -							
Coil Mode: SP12	_								
Analysis	of Composite Imag	ge							
Measured Data Calculated Results									
Back Label Mean Max Min ground	Noise Noise SD Type	Mean Normal- Max Uni- SNR ized SNR formity							
N 310 621 111 0.9 A 309 618 111 6.6	2.33 NEMA 2.35 Air	94.1 53.6 188.5 30.3% 86.2 49.1 172.3 30.5%							
	of Uncombined Imag								
Measured Data		Calculated Results							
Measured Data Calculated Results Ch Mean Max SD Noise Type Mean % of SNR Max % of SNR Max % of Max 1 198 618 2.68 Air 48.4 100% 151.1 100% 2 171 500 2.36 Air 47.5 98% 138.8 92%									
Mean: 310 ROI M: 0.87 Rolsd: 2.33 Airsd: Rol Area: 404.64 Airsd: Rol Area: 404.64 Rol Area: 404.64	2.35 18 ROI Area: 404.	Air M: 4.60 Mean: 171 Air M: 3.97 Airsd: 2.68 Airsd: 2.36 Air M: 4.60 Airsd: 2.36 Airsd: 2.68 Airsd: 2.68 Airsd: 2.68 Airsd: 2.68 Airsd: 2.68 Airsd: 2.68 Airsd: 2.68							

RF Coil Performance Evaluation Coil Spine Matrix Mfg.: Siemens Mfg. Date: Coil ID: 703 Phantom: Large Cylinder Sequence TR TE Plane FOV SE 300 20 S 45	Nx 256	Ny BW 256 25.6	Model: Revision: SN:	7/6/2008 7579340 2181 # of Channels 8 iickness Gap 3 -						
Coil Mode: SP34										
Analysis of Composite Image										
Measured Data Calculated Results										
Back Label Mean Max Min ground	Noise No SD Tv	se Mean SNR	Normal- ized	Max Uni- SNR formity						
N 323 606 107 1.4	SD Ty 2.70 NEM		48.2	158.7 30.0%						
A 321 600 106 6.9	2.44 A		49.1	161.1 30.0%						
Analysis of	of Uncombir	ed Images								
Measured Data		C	alculated I	Results						
Measured DataCalculated ResultsChMeanMaxSDType12025992.75Air48.1100%142.7100%21855562.56Air47.498%142.3100%										
ROIsd: 2.70 Airsd	: 2.44 600		I: 4.72 I: 2.75 599 ROI Ar	185 Air M: 4.33 Airsd: 2.56 0556 0556 ea: 406.95 Channel 2						

RF Coil Performance Evaluation Coil: Spine Matrix Image: Spine Matrix Image: Sequence Tempore Sequence Tempore Sequence Tempore Sequence Tempore Sequence Nx Ny SE 300 20 S 45 256 256 Coil Mode: SP56	Test Date: 7/6/2008 Model: 7579340 Revision:									
Analysis of Composite I	mage									
Measured Data Calculated Results										
Back Noise Noise Label Mean Max Min ground SD Type	Mean Normal- Max Uni- SNR ized SNR formity									
N 332 615 104 0.4 2.28 NEMA	103.0 58.6 190.8 28.9%									
A 332 614 104 7.2 2.52 Air	86.3 49.2 159.7 29.0%									
Analysis of Uncombined I										
Measured Data	Calculated Results									
Ch Mean Max SD Type	Mean % of Max % of SNR Mean SNR Max									
1 197 594 2.67 Air 2 200 613 2.80 Air	48.4 100% 145.8 100% 46.8 97% 143.5 98%									
Mean: 332 ROI M: 0.37 Rolsd: 2.28 Air M: 7.17 Rolsd: 2.28 Airsd: 2.52 Pol Area: 406.83 Rol Area: 406.83 Rol Area: 406.83 Rol Area: 406.83	Airsd: 2.67									

RF Coil Performance Evaluation Coil Spine Matrix Mfg.: Siemens Mfg. Date: Phantom: Large Cylinder Sequence TR TE Plane FOV	Test Date: 7/6/2008 Model: 7579340 Revision:									
SE 300 20 S 45	256 256 25.6 1 3 -									
Coil Mode: SP78										
Analysis	of Composite Image									
Measured Data	Measured Data Calculated Results									
Back Label Mean Max Min ground	Noise Noise Mean Normal- Max Uni- SD Type SNR ized SNR formity									
N 327 606 100 0.3	2.15 NEMA 107.6 61.2 199.3 28.3%									
A 327 604 100 6.8	2.38 Air 90.0 51.3 166.3 28.4%									
Analysis o	f Uncombined Images									
Measured Data	Calculated Results									
Ch Mean Max Noise SD Noise Type 1 196 591 2.62 Air 2 199 603 2.60 Air										
Mean: 327 ROI M: 0.29 ROIsd: 2.15 Mean: 327 ROI Area: 407.25 Airsd: ROI Area: 407.25 ROI Area: 407.25	2.38 Airsd: 2.62 Airsd: 2.60									

Appendix A: Magnet Homogeneity Field Maps Siemens Espree 1.5T - 3 central planes Measured July 6, 2008



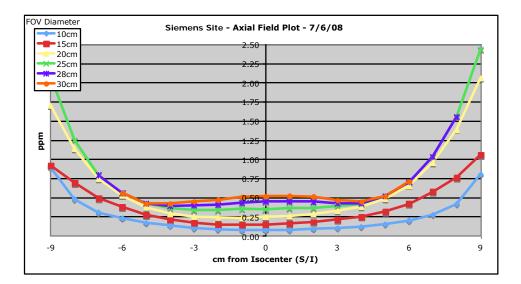
Inferior

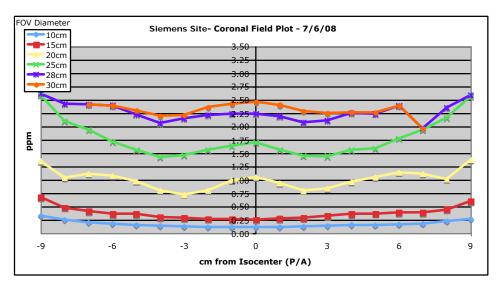
	Axial											
DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV						
10	0.9	5.6	4.7	0.07	3.55	1.2						
15	-3.8	5.6	9.5	0.15	1.50	2.2						
20	-10.1	5.6	15.7	0.25	-0.96	3.4						
25	-16.4	5.6	22.0	0.35	-3.55	4.7						
28	-22.9	5.6	28.5	0.45	-5.21	5.7						
30	-27.4	5.6	33.1	0.52	-6.37	6.6						

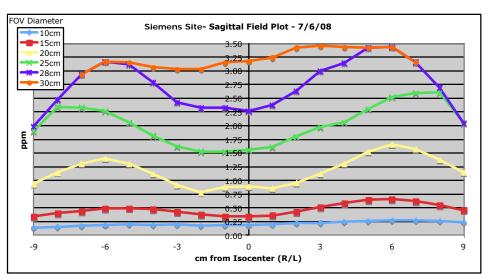
Coronal											
DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV					
10	-4.3	3.4	7.7	0.12	-0.73	1.3					
15	-7.4	9.3	16.6	0.26	-0.57	2.3					
20	-35.2	32.0	67.2	1.05	-0.73	6.3					
25	-36.9	71.5	108.4	1.70	-0.77	10.7					
28	-71.5	71.5	143.1	2.25	-2.61	12.0					
30	-85.5	71.5	157.1	2.47	-3.67	13.4					

Sagittal										
DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV				
10	-4.8	6.3	11.2	0.18	-0.41	2.1				
15	-9.7	11.4	21.1	0.33	-0.03	4.4				
20	-23.7	32.4	56.1	0.88	-0.17	7.7				
25	-43.9	54.9	98.7	1.55	-2.15	12.0				
28	-89.4	54.9	144.2	2.26	-4.98	14.8				
30 -	-147.6	54.9	202.5	3.18	-6.45	17.3				

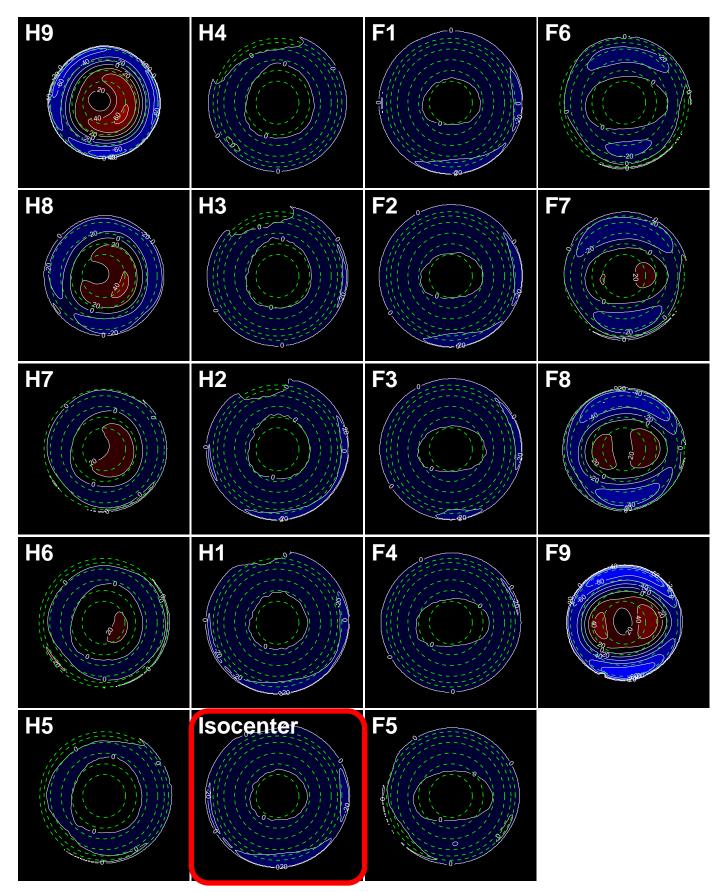
Appendix A: Magnet Homogeneity Field Maps Siemens Espree 1.5T Measured July 6, 2008



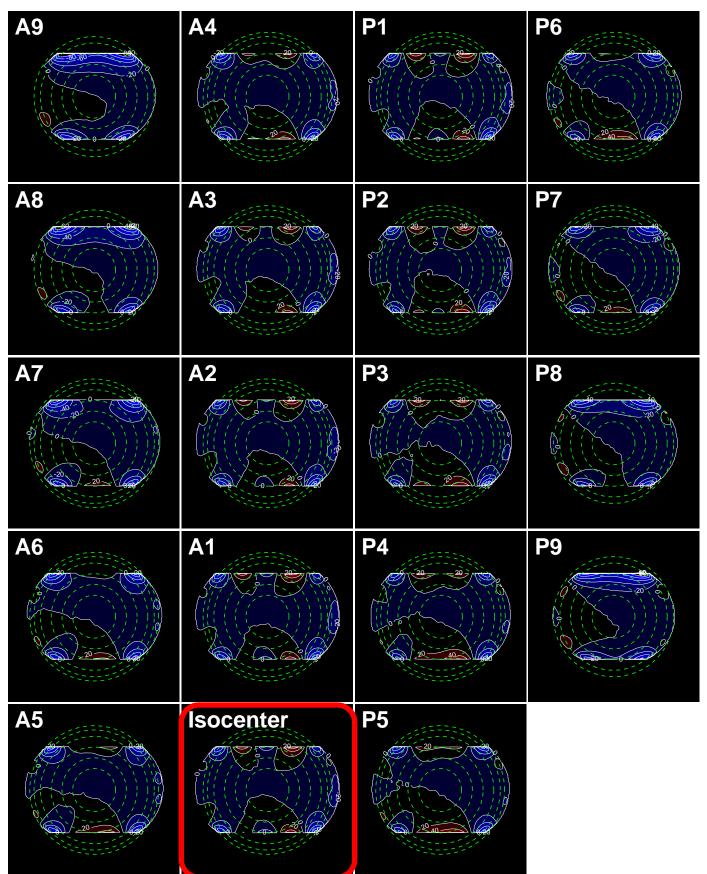


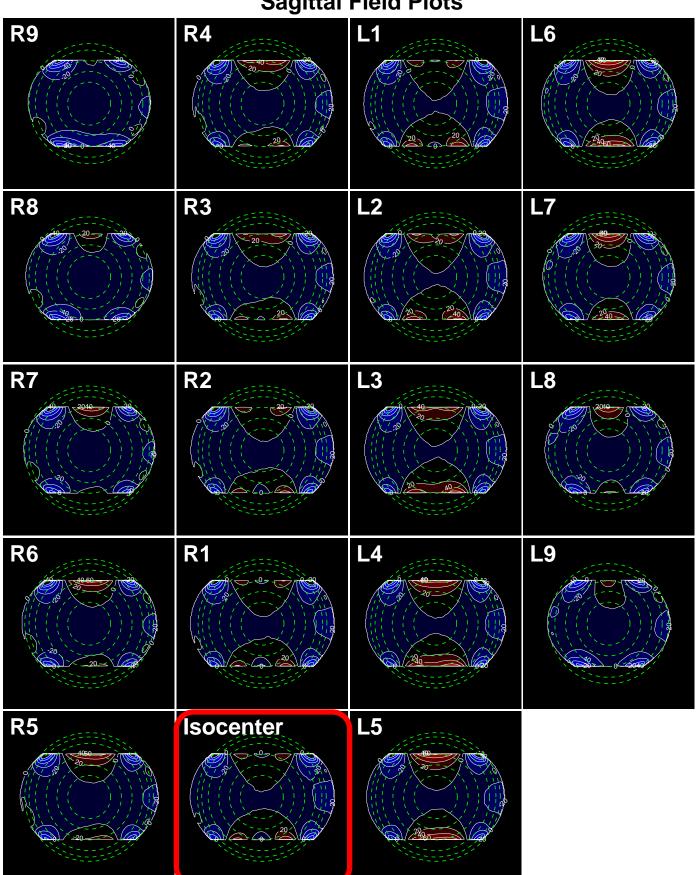


Axial Field Plots



Coronal Field Plots

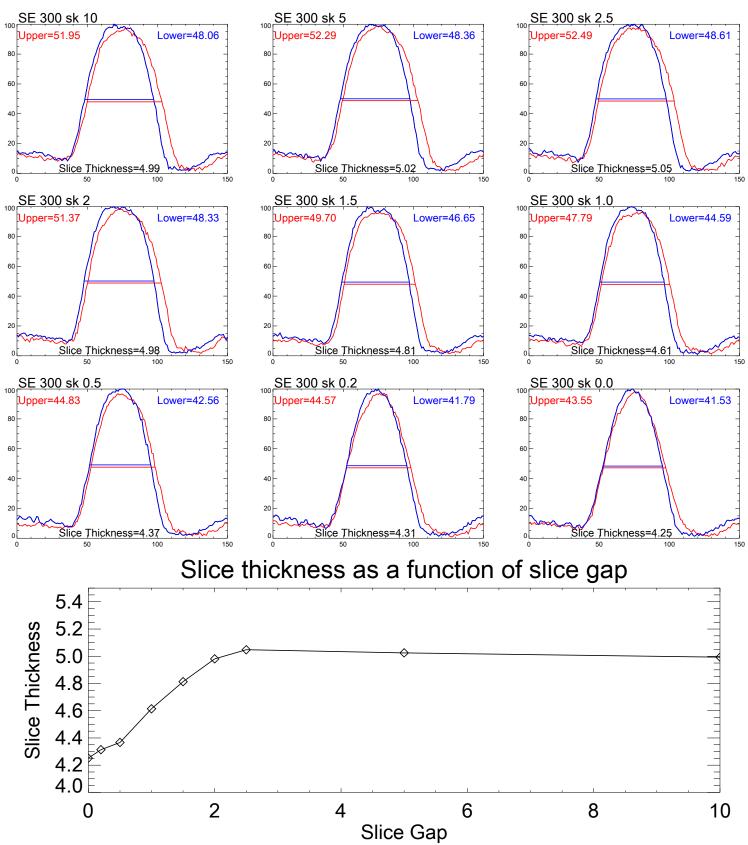




Sagittal Field Plots

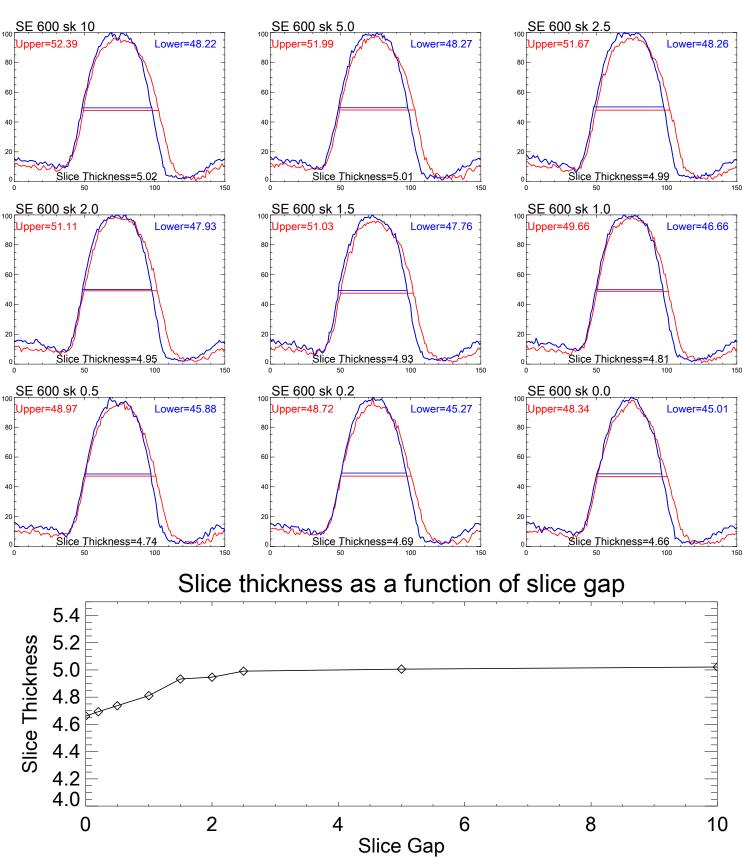
Appendix B: RF Slice Profiles and Crosstalk

Spin Echo : Minimum TR/TE = 300/12BW = 16.64 KHz nex = 2 Scan time: 2:34



Appendix B: RF Slice Profiles and Crosstalk

Spin Echo : Minimum TR/TE = 600/12BW = 16.64 KHz nex = 2 Scan time: 2:34



Siemens Site

Coil Used: Head Matrix

	Sagittal Locator										
1	Length of phantom, end to	end (mn 148± 2) 14	8.6	=	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	• 1.0	1.0	1.0	1.0	1.0					
3	(1.10, 1.00, 0.90 mm)	1.0	1.0	1.0	1.0	1.0					
4	Slice Thickness To	p 54.2	54.4	47.5	53.2	61.6					
5	(fwhm in mm) Botto	m 50.3	50.3	44.7	49.4	58.4					
6	Calculated value 5.0±0.7	5.21	5.22	4.61	5.12	6.00					
7	Wedge (mm) = + =	- 1.5	1.3	1.3	1.5	1.9					
8	Diameter (mm) (190±2)) 190.5	190.5	190.6	190.4	190.2					
9		€ 189.6	189.6	189.7	189.6	189.9					
	Slice Location #5										
10	(D 191.0	191.0	191.0	191.0	190.6					
11	1	∋ 190.0	190.0	190.0	189.9	190.1					
12		0 190.3	190.3	190.4	190.3	190.1					
13	1	189.6	189.6	189.7	189.5	189.5					
	Slice Location #7										
14	Signal Big RC	DI 1943	2015	1090	2001	1243					
15	(mean only) Hig	sh 2050	2116	1149	2122	1354					
16	Lo	w 1721	1813	963	1619	1030					
17	Uniformity (>87.5%) 91.3%	92.3%	91.2%	86.6%	86.4%					
18	Background Noise To	$pp 12.2 \pm 5.73$	12.1 ± 5.64	9.1 ± 4.11	12.9 ± 6.11	11.8 ± 5.59					
19	Botto	m 12.0 \pm 6.17	11.9 ± 6.13	9.2 ± 4.42	14.3 ± 7.60	10.9 ± 5.50					
20	(mean ±std dev) Le	ft 15.0 ± 7.83	15.7 ± 8.25	12.4 ± 6.18	15.8 ± 7.41	16.6 ± 8.61					
21	Rig	nt 14.3 ± 7.44	14.8 ± 8.02	12.4 ± 6.81	15.0 ± 7.72	17.2 ± 8.77					
22	Ghosting Ratio (<2.5%)	0.1%	0.2%	0.3%	0.1%	0.4%					
23	SNR (no spec)	327	342	256	292	224					
	Low Con Detectability		-	•							
24	Slice Location #8 1.4	% 8	8	4	7	0					
25	Slice Location #9 2.5		10	10	10	8					
26	Slice Location #10 3.6		10	10	10	9					
27	Slice Location #11 5.1		10	10	10	10					
28	Total # of Spokes (>=9)	38	38	34	37	27					
	Slice Location #11										
29	Wedge (mm) =+ =	- 1.0	-1.1	-1.1	-0.7	-0.8					
30	Slice Position Error	-0.5	-1.1	-1.1	-0.7	-0.8					
00		-0.5	-2.7	-2.4	-2.2	-2.1					

50

Espree

Test Date:

7/6/2008

Siemens Site

Sequence parameters

Coil Used:Head Matrix

Test Date: **7/6/2008**

Test ID 308

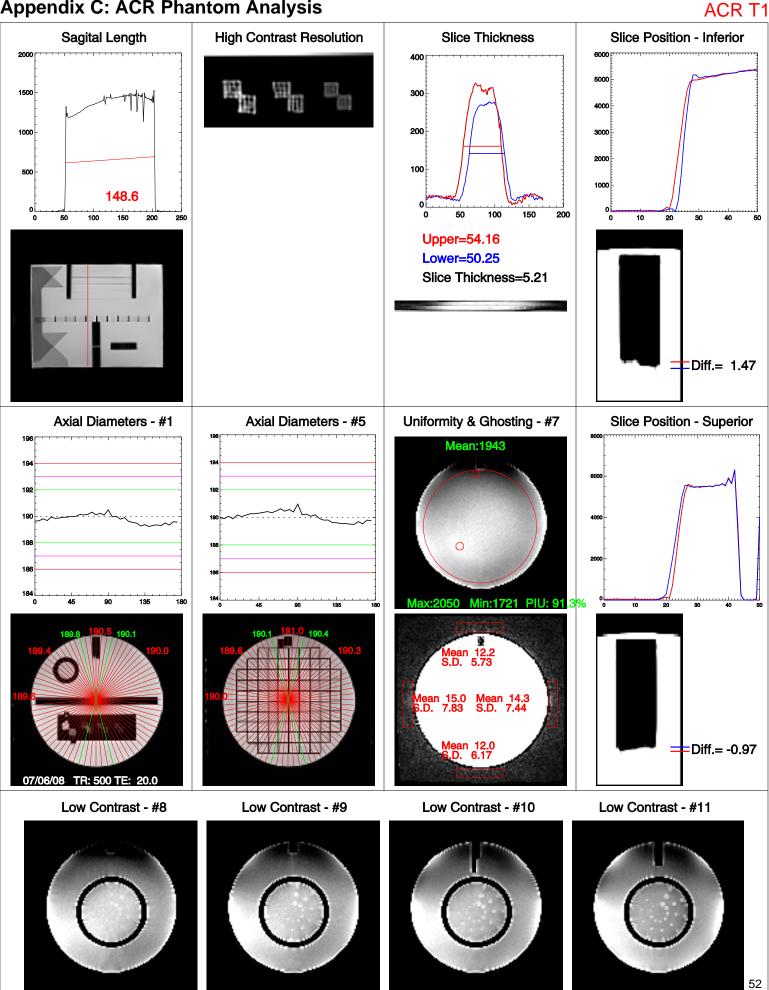
Study Descrip tion	Pulse Sequence (ETL)	TR (ms)	TE (ms)	FOV (cm)	Phase Sample Ratio	Number of Slices	Thick- ness (mm)	Slice Gap	NSA (Nex)	Freq Matrix	Phase Matrix	Band Width (kHz)	Scan Time (min:sec)
ACR T1	SE	500	20	25	1	11	5	5	1	256	256	16.64	2:09
ACR PD	Dual Echo SE	2000	20	25	1	11	5	5	1	256	256	16.64	8:32
ACR T2	Dual Echo SE	2000	80	25	1	11	5	5	1	256	256	12.8	8:32
Site T1	SE	400	12	24	1	11	5	5	1	256	256	16.64	1:43
Site T2	FSE(11)	5000	119	24	1	11	5	5	2	256	256	12.8	3:53

Magnet ID: 68

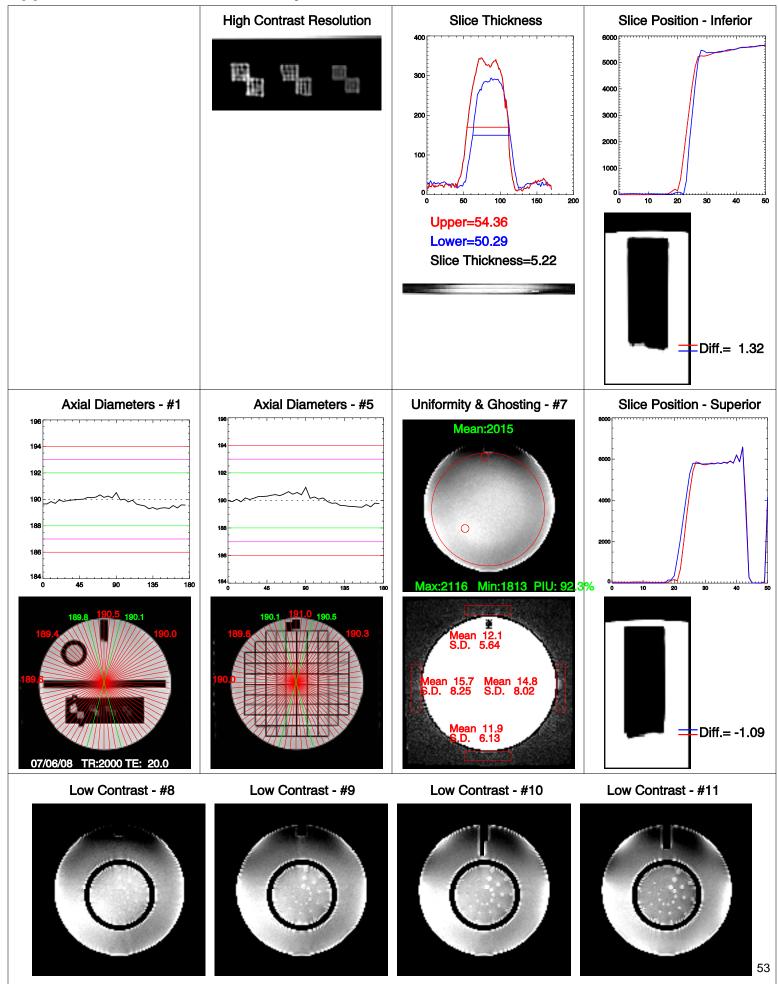
Coil ID: 695

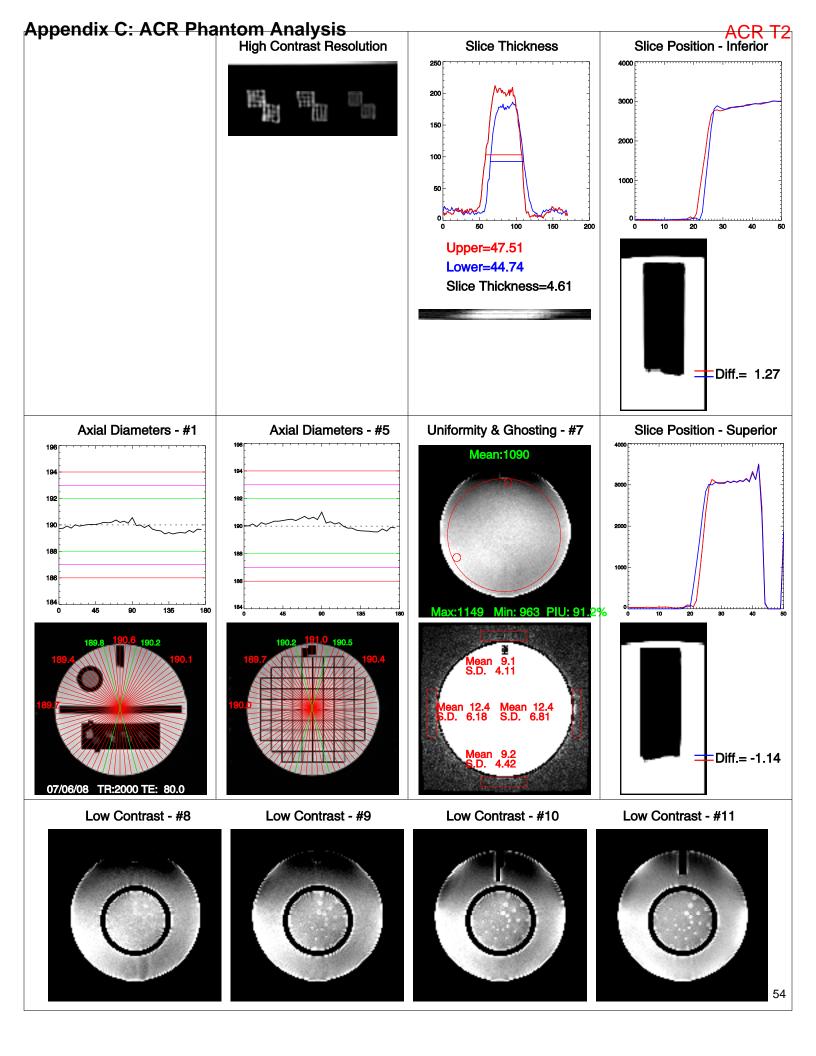
TestID: 308

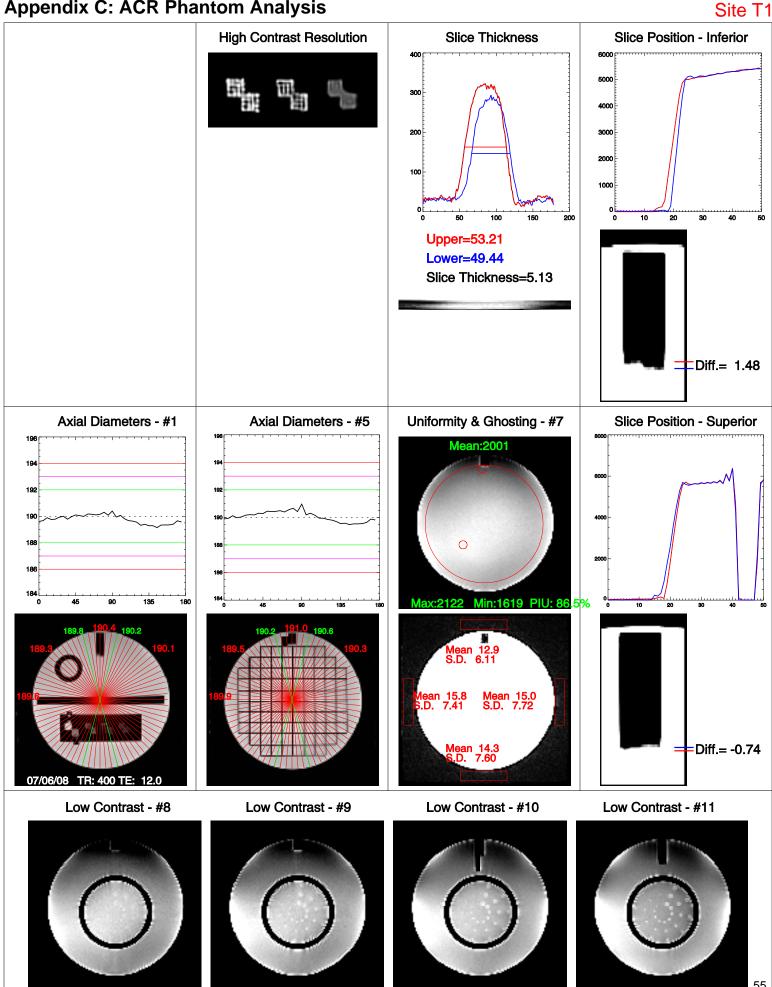
Espree

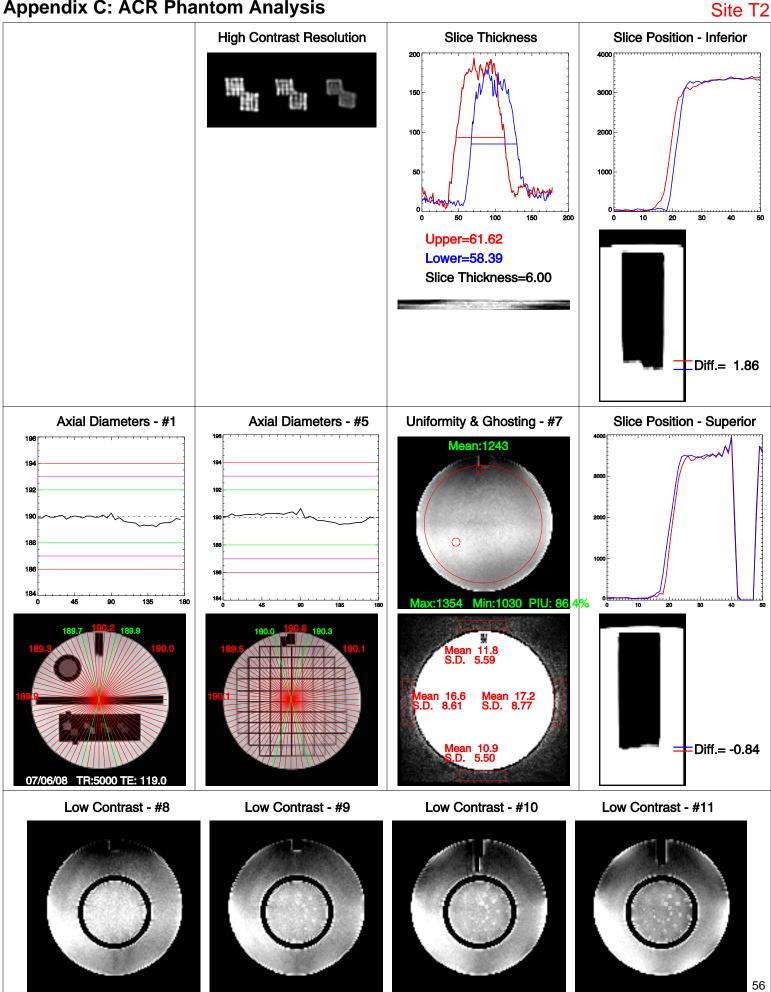


ACR PD









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.

<u>SNR</u>

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, 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 25.73KHz (200 Hz/pixel). 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 mm²). 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 SubSig which stands for Subtracted Signal, *i.e.* the NEMA method. 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 pre or post Normalization).

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.