## GE Site Yearly Performance Evaluation GE Signa Excite HD - 3T 1-Sep-08

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Site Name:	GE Site			MRAP #_	00139-05
Address:				Survey Date:	9/1/08
City, State, Zip				Report Date:	9/5/08
MRI Mfg:	GE	Model:	Excite HD	Field:	3T
MRI Scientist:	Moriel NessAiver, Ph.D.	Signature:	Moriel ,	Verstwer, P.	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				
	Evaluation of Site's Techno	lagist OC Pro	oram	ass ail * VA	
1	Set up and positioning accu	racy: (daily)	5' "		
2	Center frequency: (daily)	iucy: (duily)			
2.	Transmitter attenuation or o	ain: (daily)			
4	Geometric accuracy measure	ments <sup>•</sup> (daily)			
5	Spatial resolution measurer	nents: (daily)			
6	Low contrast detectability.	(daily)			
7	Head Coil SNR (daily)	(4411))			
8	Body Coil SNR (weekly)				
9	Fast Spin Echo (FSE/TSE)	ghosting levels	: (dailv)	$\overline{\times}$ $\Box$ $\Box$	
10	Film quality control: (week	ly)	<u> </u>		
11.	Visual checklist: (weekly)	57			
	(				

Specific Comments and Recommendations	
1. The breast coil has an effectively dead channel. When using bilateral mode, 7 channels were good, one bad. When	1
using EITHER the left side or the right side only, there were 3 good channels and one bad.	
2. There is no difference between ports A & B (if the coil can use either.)	
3. The magnet homogeneity is good.	
4. The display console is good and there is good agreement between the screen and the film.	
5. Everything else looks fine.	
6	
7	
8	
9	
10	
11	
12	
13	
	<u> </u>
NOTE: Please be sure to read appendix D for an explanation of the format of this document.	

C	ontact	·	Title	·	Phor	<u>ne</u>		Fax		eMail
Equipmer	nt Inform	ation						1024	- <u> </u>	
MRI Mar	nufacturer:	G	E	Model:	Twinsp	eed	SN	: 1234	Software:	14.0_M4_62
amera Mar	nufacturer:			Model:			SN		Software:	
PACS Mar	nutacturer:		hantom Nu	mber used:	10061		SIN		_ Sonware:	
		ACKI		inder useu.	30001	-				
. Table I	Positionin	g Reprodu	ucibility:							Pass
	Table mot	ion out/in:	IsoCenter	Out/In	Out/In	Out	'In			
	rad Dhant	om Center	-0.40	-0.39	-0.40	-0.4	41			
Measu	пец г папи					•				
Meası Comn . Magne	etic Field	<b>Homogene</b> r CF: <u>127</u>	eity 7,728,584	See append Thi GRE	lix A for fi s Year CF: <b>TR: 500, T</b>	eld plot : <u>127,</u> : E: 10 &	s. 727,086 5 15 Flip 4	_ CF Cł Angle: 45, F	nange:14 OV: 40	PASS 98
Meası Comn 2. Magne	etic Field Last Yea	Homogene r CF: <u>127</u> 20 cm	eity 2,728,584 25 cm	See append Thi GRE 5 mm	lix A for fi s Year CF: TR: 500, T skip 5 mm	eld plot : <u>127,</u> E: 10 &	s. 727,086 : 15 Flip A 0.4KHz,	_ CF Cł Angle: 45, F 256x128, 2n	nange: <u>-14</u> OV: 40 ex	PASS 98
Measu Comn 2. Magne Axial:	tic Field Last Yea	Homogene r CF: <u>127</u> 20 cm 0.24	eity 7,728,584 25 cm 0.32	See append Thi GRE 5 mm Comn	lix A for fi s Year CF: <b>TR: 500, T</b> skip 5 mm nents: <u>Shim</u>	eld plot <u>127,</u> E: 10 & <b>b, BW: 1</b> n is very	s. 727,086 : 15 Flip / 0.4KHz, good.	_ CF Cł Angle: 45, F 256x128, 2nd	nange: <u>-14</u> OV: 40 ex	<b>PASS</b> 98
Meası Comr . Magne Axial: Coronal:	etic Field Last Yea 15 cm 0.17 0.09	Homogene r CF: <u>127</u> 20 cm 0.24 0.16	eity 2,728,584 25 cm 0.32 0.28	See append Thi <b>GRE</b> <b>5 mm</b> Comn	lix A for fi s Year CF: <b>TR: 500, T</b> skip 5 mm nents: <u>Shim</u>	eld plot = <u>127,</u> E: 10 & h, BW: 1 h is very	s. 727,086 5 15 Flip A 0.4KHz, good.	_ CF Cł Angle: 45, F 256x128, 2nd	nange:14 OV: 40 ex	<b>PASS</b> 98
Meası Comr • Magne Axial: Coronal: Sagittal:	etic Field Last Yea 15 cm 0.17 0.09 0.16	Homogene r CF: <u>127</u> 20 cm 0.24 0.16 0.26	eity 2,728,584 25 cm 0.32 0.28 0.40	See append Thi GRE 5 mm Comn	lix A for fi s Year CF: <b>TR: 500, T</b> skip 5 mm nents: <u>Shim</u>	eld plot = <u>127,</u> E: 10 & h, BW: 1 h is very	s. 727,086 5 15 Flip 4 0.4KHz, good.	_ CF Cł Angle: 45, F 256x128, 2nd	ange: <u>-14</u> OV: 40 ex	PASS 98
Measu Comr . Magne Axial: Coronal: Sagittal: . Slice T	etic Field Last Yea 15 cm 0.17 0.09 0.16 hickness	Homogene r CF: <u>127</u> 20 cm 0.24 0.16 0.26 Accuracy	eity 2,728,584 25 cm 0.32 0.28 0.40	See append Thi <b>GRE</b> <b>5 mm</b> Comn	lix A for fi s Year CF: <b>TR: 500, T</b> skip 5 mm nents: <u>Shim</u> (Slig	eld plot = <u>127</u> , E: 10 & h, BW: 1 h is very e #1 fr	s. <b>727,086</b> <b>15 Flip 4</b> <b>0.4KHz,</b> good.	_ CF Cł Angle: 45, F 256x128, 2nd	nange: <u>-14</u> OV: 40 ex	<b>PASS</b> 98
Measu Comr . Magne Axial: Coronal: Sagittal: . Slice T F	nent:	Homogene r CF: <u>127</u> 20 cm 0.24 0.16 0.26 Accuracy nm Ma ience	eity 2,728,584 25 cm 0.32 0.28 0.40 atrix: 256x TR	See append Thi <b>GRE</b> <b>5 mm</b> Comn 	lix A for fi s Year CF: TR: 500, T skip 5 mm nents: <u>Shim</u> (Slic Flip	eld plot = <u>127</u> , E: 10 & h, BW: 1 h is very ce #1 from NSA	s. <b>727,086</b> <b>15 Flip 4</b> <b>0.4KHz,</b> good. <u>om ACR 1</u> <b>Calc</b>	_ CF Ch Angle: 45, F 256x128, 2nd Phantom) A Target	ange:14 OV: 40 ex .ll values in % Error	<b>PASS</b> 98
Measu Comr • Magne Axial: Coronal: Sagittal: • Slice T F	tic Field Last Yea 15 cm 0.17 0.09 0.16 hickness FOV: 250n Seque	Homogene r CF: <u>127</u> 20 cm 0.24 0.16 0.26 Accuracy m Ma ence E (ACR)	eity 2,728,584 25 cm 0.32 0.28 0.40 atrix: 256x TR 500	See append Thi <b>GRE</b> <b>5 mm</b> Comn 256 <u>TE</u> 20	lix A for fi s Year CF: TR: 500, T skip 5 mm nents: <u>Shim</u> (Slic Flip 90	eld plot = 127, E: 10 & n, BW: 1 n is very ee #1 fro NSA 1	s. 727,086 15 Flip 4 0.4KHz, good. 0.0000 0.0000 0.0000 00	_ CF CF Angle: 45, F 256x128, 2nd Phantom) A Target 5	ange: <u>-14</u> OV: 40 ex Ill values in % Error 5.2%	<b>PASS</b> 98
Measu Comr • Magne Axial: Coronal: Sagittal: • Slice T F	etic Field Last Yea 15 cm 0.17 0.09 0.16 hickness FOV: 250n Sequ SI SE	Homogene r CF: <u>127</u> 20 cm 0.24 0.16 0.26 Accuracy m Ma ence E (ACR) (Site T1)	eity 2,728,584 25 cm 0.32 0.28 0.28 0.40 atrix: 256x TR 500 500	See append Thi GRE 5 mm Comn 256 TE 20 14	lix A for fi s Year CF: <b>TR: 500, T</b> skip 5 mm nents: <u>Shim</u> (Slic Flip 90 90	eld plot = <u>127</u> , E: 10 & h, BW: 1 h is very ee #1 fro NSA 1 1	s. <b>727,086</b> <b>15 Flip</b> <b>0.4KHz,</b> good. <u>bm ACR</u> <u>Calc</u> 5.26 5.26	_ CF CF Angle: 45, F 256x128, 2nd Phantom) A Target 5 5	ange: <u>-14</u> OV: 40 ex Il values in % Error 5.2% 5.2%	<b>PASS</b> 98
Measu Comr • Magne Axial: Coronal: Sagittal: • Slice T F	tic Field Last Yea 15 cm 0.17 0.09 0.16 hickness FOV: 250n Sequ SI SE	Homogene r CF: <u>127</u> 20 cm 0.24 0.16 0.26 Accuracy m Ma ence E (ACR) (Site T1) C (20/80)	eity 2,728,584 25 cm 0.32 0.28 0.40 atrix: 256x TR 500 500 2000	See append Thi <b>GRE</b> <b>5 mm</b> Comn 	lix A for fi s Year CF: TR: 500, T skip 5 mm nents: <u>Shim</u> (Slic Flip 90 90 90	eld plot = 127, E: 10 & n, BW: 1 n is very ee #1 fro NSA 1 1 1 1	s. 727,086 15 Flip 4 0.4KHz, good. 0.4KHz, good. 0.4KHz, 15 Flip 4 0.4KHz, 15 Flip 4 0.4KHz, 15 Flip 4 0.4KHz, 15 Flip 4 0.4KHz, 15 Flip 4 0.4KHz, 15 Flip 5 0.4KHz, 10 Flip 5 0.26 0.5.5 0.5.5	_ CF CF Angle: 45, F 256x128, 2nd Phantom) A Target 5 5 5 5	ange: <u>-14</u> OV: 40 ex Ill values in % Error 5.2% 5.2% 5.2%	<b>PASS</b> 98
Measu Comr . Magne Axial: Coronal: Sagittal: . Slice T F	etic Field Last Yea 15 cm 0.17 0.09 0.16 hickness FOV: 250n Sequ SI SE SE	Homogene r CF: <u>127</u> 20 cm 0.24 0.16 0.26 Accuracy m Ma ence E (ACR) (Site T1) (20/80) E (20/80)	eity 2,728,584 25 cm 0.32 0.28 0.40 atrix: 256x TR 500 500 2000 2000	See append Thi GRE 5 mm Comn 256 TE 20 14 20 80	lix A for fi s Year CF: <b>TR: 500, T</b> skip 5 mm nents: <u>Shim</u> (Slic Flip 90 90 90 90 90	eld plot = 127, E: 10 & b, BW: 1 a is very ee #1 from the second s	s. 727,086 15 Flip 4 0.4KHz, good. 0m ACR 5.26 5.26 5.26 5.26 5.26 5.26	_ CF Ch Angle: 45, F 256x128, 2nd Phantom) A Target 5 5 5 5 5	ange: <u>-14</u> OV: 40 ex Il values in % Error 5.2% 5.2% 5.2% 12.2%	<b>PASS</b> <u>98</u> mm
Meası Comr • Magne Axial: Coronal: Sagittal: • Slice T F	tic Field Last Yea 15 cm 0.17 0.09 0.16 hickness FOV: 250n Sequ SI SE SE SE	Homogene r CF: <u>127</u> 20 cm 0.24 0.16 0.26 Accuracy m Ma ence E (ACR) (Site T1) C (20/80) E (20/80) SE(16)	eity 2,728,584 25 cm 0.32 0.28 0.40 atrix: 256x TR 500 500 2000 2000 2000 3000	See append Thi GRE 5 mm Comn 256 TE 20 14 20 80 80 80	lix A for fi s Year CF: <b>TR: 500, T</b> skip 5 mm nents: <u>Shim</u> (Slice Flip 90 90 90 90 90 90	eld plot = 127, E: 10 & n, BW: 1 n is very ee #1 fro NSA 1 1 1 1 1 1 1	s. 727,086 15 Flip 4 0.4KHz, good. 0.4KHz, good. 0.4KHz, 15 Flip 4 0.4KHz, 15 Flip 4 0.4KHz, 10 Flip 4 0.4KHz, 1	_ CF CF Angle: 45, F 256x128, 2nd Phantom) A Target 5 5 5 5 5 5 5	ange: <u>-14</u> OV: 40 ex ll values in % Error 5.2% 5.2% 5.2% 12.2% -10.4%	<b>PASS</b> 98
Measu Comr Axial: Coronal: Sagittal: Sagittal: F	etic Field Last Yea 15 cm 0.17 0.09 0.16 hickness FOV: 250n Seque SI SE SE SE SE SE SE FT1 1	Homogene r CF: <u>127</u> 20 cm 0.24 0.16 0.26 Accuracy m Ma ence E (ACR) (Site T1) (20/80) E (20/80) E (20/80) SE(16) MEMP SE	eity 2,728,584 25 cm 0.32 0.28 0.40 atrix: 256x TR 500 500 2000 2000 2000 3000 650	See append Thi GRE 5 mm Comn 256 TE 20 14 20 80 80 80 10	lix A for fi s Year CF: <b>TR: 500, T</b> skip 5 mm nents: <u>Shim</u> (Slic <b>Flip</b> 90 90 90 90 90 90 90 63	eld plot = 127, E: 10 & b, BW: 1 a is very = #1 from the set #1 from = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1	s. 727,086 15 Flip 4 0.4KHz, good. 0m ACR Calc 5.26 5.26 5.26 5.26 5.26 5.26 5.26 5.26 5.26	_ CF Cł Angle: 45, F 256x128, 2nd Phantom) A Target 5 5 5 5 5 5 5 5 5 5 5	ange:14 OV: 40 ex 	<b>PASS</b> <u>98</u> mm
Measu Comr 2. Magne Axial: Coronal: Sagittal: 5. Slice T F	tic Field Last Yea 15 cm 0.17 0.09 0.16 hickness FOV: 250n Seque SE SE SE SE SE	Homogene r CF: 127 20 cm 0.24 0.16 0.26 Accuracy m Ma ence E (ACR) (Site T1) C (20/80) E (20/80) E (20/80) E (20/80) SE(16) MEMP SE GRE	eity 2,728,584 25 cm 0.32 0.28 0.40 atrix: 256x TR 500 500 2000 2000 2000 2000 2000 2000	See append Thi GRE 5 mm Comn 256 TE 20 14 20 14 20 80 80 80 10 2.1	lix A for fi s Year CF: <b>TR: 500, T</b> skip 5 mm nents: <u>Shim</u> (Slice Flip 90 90 90 90 90 90 90 90 90 90 90 90 90	eld plot = 127, E: 10 & h BW: 1 h is very ce #1 from NSA 1 1 1 1 1 1 1 1 1 1 1 1 1	s. 727,086 15 Flip 4 0.4KHz, good. om ACR 5.26 5.40 4.48 5.40 4.80 5.40 6.48 5.40 6.48 5.40 6.48 5.40 6.48 5.40 6.48 5.40 6.48 5.40 6.48 5.40 6.48 5.40 6.48 5.40 6.480	_ CF CF Angle: 45, F 256x128, 2nd 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	ange:14 OV: 40 ex 	<b>PASS</b> 98

#### 4. Slice Crosstalk (RF interference)

The following data were obtained using the ACR phantom slice thickness wedges to measure the slice profile of three 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. The T1 MEMP sequence is a spin echo sequence with a a 63° flip angle. Both this sequence and the standare SE sequence shows a drop in the profile once the gap drops below 50%. The interference is less with the smaller flip angle and longer TR (as expected) The GRE sequence is more complicated to evaluate because the images were not as sharp and the profile wedges were not well defined. All of the slice profiles can be seen in Appendix B. There you can see how the SE profile is very square while the GREs are more triangular.

Sequence Type	TR	TE	Flip Angle	FOV (cm <sup>2</sup> )	Matrix	NSA	Thickness	# of slices
SE Min Full	400	12	90	25	256x256	1	5	11
T1 MEMP	650	10	63	25	256x256	1	5	11
GRE in Phs	200	2.1	80	25	256x256	4	5	11

Skip	SE Min Full	T1 MEMP	GRE In- Phase
0	4.94	5.13	4.57
0.2	5	5.17	4.58
0.5	5.03	5.19	4.7
1	5.21	5.32	4.89
1.5	5.33	5.38	4.81
2	5.43	5.41	4.76
2.5	5.45	5.44	4.82
5	5.46	5.41	4.91
10	5.46	5.4	4.8



#### 5. Soft & Hard Copy Displays

Luminance Meter Make/Model: Tektronix J16 Digital Photometer

Monitor Description: Efilm workstation

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	86.7	77.9	79.2	83	84.5	

Uniformity					
MAX	MIN	Percent Delta			
86.7	77.9	11%			

Cal Expires:

SMPTE
OK?
Y

4/6/06

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

Minimum Brightness must be > 26.24 Ft. Lamberts

The monitor is excellent and the agreemen between the screen and film is good.



# Coil and Other Hardware Inventory List

Site Name GE Site

ACR Magnet # 05 Nickname Signa 3

Activ	e Coil Description	Manufacturer	Model	Rev	Mfg. Date	SN	Channels
	Body Integrated						1
⊠	Breast 8 Ch	GE	2415544		Sep, 2006	370	8
⊠	Cardiac 8 Ch	GE	2411986		Oct, 2005		8
⊠	Head 8 Ch	GE	5147134-2		Aug, 2006	U28780	8
	Head Split Top	GE	795WH3		Apr, 2006	7953WH3	1
	Knee 8ch	Invivo	104504		Sep, 2006	U29317	8
	Knee T/R	Invivo				U222191	1
⊠	Neurovascular Array 8 Ch	USAI	2414390		Sep, 2006	582	8
	Shoulder 3 Ch	USAI	2414331		May, 2006	321	3
⊠	Spine 8 Ch	USAI	2415542		Jul, 2006	329	8
⊠	Torso	USAI	2415410		Dec, 2006	344	8
⊠	Wrist HD	Mayo Clinic	BC-10			3HB10R006	1

RF Coil Performance Evaluation         Coil:       Body Integrated         Mfg.:	Test Date:       9/1/2008         Model:
Coil Mode: Body	TX gain: <u>166</u> R1: <u>13</u> R2: <u>28</u>
Analysis of Test	Image
Measured Data	Calculated Results
Label Mean Max Min ground SD Type	e Mean Normal- Max Uni- SNR ized SNR formity
N         1,068         1,130         997         -0.3         9.70         NEM           A         1,068         1,132         1,002         15.8         8.70         Air	A 77.9 30.4 82.4 93.7%
The SNR of the Body coil is 4 times higher than last year! Mean: 1068 ROI M: -0.34 Mean	: 1068 Air M: 15.76
O 1139	Airsd: 8.70
ROI Area: 750.97 ROI A	vrea: 750.97

<b>RF Coil Performance Evaluation</b>		Test Date:	9/1/2008			
Coil: Breast 8 Ch	Model:	2415544				
Mfg.: GE						
Mfg. Date: 9/1/2006 Coil ID: 901		SN:	370			
Phantom: HD Breast Phantom # of Channels 8						
SequenceTRTEPlaneFOVNxNyBWNSAThicknessGapSE30020T4825625615.613-						
Coil Mode: HD Breast Port A	_	TX gain: <u>160</u> R1	: <u>13</u> R2: <u>29</u>			
Analysis	s of Composite I	mage				
Measured Data			d Results			
Label Mean Max Min ground	SD Type	SNR ized	SNR formity			
N 1,458 1,877 1,063 1.0	2.77 NEMA	372.2 145.4	<u>479.2</u> 72.3%			
A 1,737 1,075 1,005 7.0		432.3 170.0	382.3			
Analysis	of Uncombined I	lmages				
Measured Data	-	Calculated	Results			
Ch Mean Max SD Type		Mean % of SNR Mean	Max % of SNR Max			
1 530 1,395 1.71 Air	-	203.1 77%	534.6 92%			
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-	<u>190.6</u> <u>187.4</u> <u>72%</u>	463.8 79%			
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		224.0 85%	507.5 87%			
5 505 1,114 1.25 Air		264.7 100%	584.0 100%			
6 483 1,015 1.59 Air		199.1 75%	418.3 72%			
7 48 119 0.50 Air		<b>62.9 24%</b>	<b>156.0 27%</b>			
8 643 1,476 1.88 Air	J	224.1 85%	514.5 88%			
Channel #7 is one fourth of what it should be.						
Mean: 1458 ROI M: 1.01 Mean: 1457 Air M: 7.64 ROIsd: 2.77 Airsd: 2.11	Channel 1 Mean: 530 Air M: 2.70 Mea	Channel 2 Channel	3 Channel 4			
	Airsd: 1.71	Airsd: 1.42 Airs	d: 1.50 Airsd: 1.29			
01063	014 0 ISSE	056				
Q1877 Q1875		01005	070			
	ROI Area: 303.98 ROI	Area: 303.98 ROI Area: 303.98	ROI Area: 303.98			
ROI Area: 303.98 ROI Area: 303.98	Mean: 505 Air M: 1.80 Mea Airsd: 1.25	In: 483 Air M: 2.45 Mean: 48 Air Airsd: 1.59 Airs	d: 0.50 Mean: 643 Air M: 3.04 d: 0.50 Airsd: 1.88			
Composites	ROI Area: 303.98 ROI	Area: 303.98 ROI Area: 303.98	ROI Area: 303.98			
	Channel 5	Channel 6 Channel	7 Channel 8			

RF Coil Performand	ce Eval	<u>uation</u>				Test Date:	9/1/	/2008
Coil: Breast 8 Ch					2	Model:	241	5544
Mfa.: GE						Revision		
Mfg. Date: 9/1/2006		901	-	-		SN	3	370
Phantom: HD Breast Phanton	_ COI 1D. m	, ,01				514.	# of Char	anole 8
Sequence     TR     TE     Plane     FOV     Nx     Ny     BW     NSA     Thickness     Gap       SE     300     20     C     40     256     256     156     1     3     -								
SE         300         20         C         40         230         13.0         1         5         -								
Coil Mode:         HD Breast Port A         TX gain:         160         R1:         12         R2:         29								
	4	Analysis	s of Cor	nposite	Image			
M	Measured Data Calculated Results							
Label Mean Max	Min	Back ground	Noise SD	Noise Type	Mean SNR	Normal- ized	Max SNR	Uni- formity
N 1,567 1,980	1,398	-0.7	3.59	NEMA	308.7	173.6	390.1	82.8%
N 1,672 1,934	1,504	0.1	3.70	NEMA	319.6	179.8	369.7	87.5%
A 1,568 1,985	1,398	11.3	3.05	Air	336.9	189.5	426.5	82.6%
A 1,672 1,934	1,503	11.3	3.04	Air	360.4	202.7	416.9	87.5%
	Α	nalysis	of Unco	mbined	Images			
Measured	Data		_		C	Calculated	Results	
Ch Mean Max	Noise SD	Noise Type			Mean SNR	% of Mean	Max	% of Max
1 1,252 1,611	2.48	Air	1		330.8	99%	425.7	93%
2 692 1,021	2.06	Air	]		220.1	66%	324.8	71%
3 638 1,003	2.13	Air			196.3	59%	308.6	68%
4 746 1,040	1.84	Air			265.7	80%	370.4	81%
5 872 1,238	1.78	Air	-		321.0	96%	455.8	100%
<u>6</u> <u>625</u> <u>997</u>	2.28	Air	-		179.6	54%	286.6	63%
$\frac{7}{8}$ $\frac{73}{1382}$ $\frac{100}{1663}$		Air	-		333.0		400.7	<u>21%</u> 880/
	2.12	All			555.0	100 /0	400.7	00 /0
Channel 7 is 1/4th of what it sho	uld be.							
Compositos			Ch	oppold	Channel 2	Channa		
Mean: 1567 ROI M: -0.70 Mean:	INEIVIA 1672 ROLM: 0.1	11	Mean: 125	2 Air M: 4.18	Mean: 692 Air M:	3.36 Mean: 638 /	1.3 Chan Air M: 3.49 Mean: 746	Air M: 2.96
ROIsd: 3.59	ROIsd: 3.7	0		Airsd: 2.48	Airsd:	2.06	Airsd: 2.13	Airsd: 1.84
O 1998	Q 1504		©193	22	01021			
0,980	1934			01611		0.1003	0.00	8555
ROI Area; 161.24 ROI Area	ea: 159.94		ROI Area:	159.94	ROI Area: 159.94	ROI Area: 159.94	ROI Area:	159.94
Mean: 1568 Air M: 11.30 Mean: Airsd: 3.05	1672 Air M: 11.3 Airsd: 3.04	10	Mean: 872	Air M: 2.84 Airsd: 1.78	Mean: 625 Air M: 3 Airsd: 2	3.74 Mean: 73 A 2.28 A	Air M: 0.75 Mean: 138 Airsd: 0.67	2 Air M: 4.61 Airsd: 2.72
						390	Q 85	
01698	<b>0</b> 15: <mark>8</mark>			<b>Q</b> (555)				01176
0/985	1988			0 288	0997		0100	<b>S</b> UBBR
ROLArea: 161.24 ROLAr Composites -	<sup>8a: 159.94</sup> Air		ROI Area:	161.24	ROI Area: 161.24 Channel 6	ROI Area: 161.24 Channe	ROI Area:	161.24
						Channe		

<b>RF Coil Performance Evaluation</b>	Test Date: 9/1/2008						
Coil: Breast 8 Ch	Model: 2415544						
Mfg.: GE	Revision:						
Mfg. Date: <u>9/1/2006</u> Coil ID: <u>901</u>	SN: 370						
Phantom: HD Breast Phantom	# of Channels 8						
SequenceTRTEPlaneFOVSE30020T48	NxNyBWNSAThicknessGap25625615.613-						
Coil Mode:         HD Breast Port B         TX gain:         160         R1:         13         R2:         29							
Analysis Moasurod Data	IS OF Composite Image						
Back	Noise Noise Mean Normal- Max Uni-						
Label Mean Max Min ground	SD Type SNR ized SNR formity						
A         1,404         1,816         1,018         7.4	2.04         Air         100.4         42.7         141.0         71.776           2.04         Air         451.0         176.2         583.4         71.8%						
Analysis of Uncombined Images							
Measured Data	Calculated Results						
Noise Noise Ch Mean Max SD Type	Mean % of Max % of SNR Mean SNR Max						
1 514 1,340 1.66 Air	202.9 78% 529.0 92%						
2 409 971 1.41 Air	<u>190.1</u> 73% 451.3 78%						
3 431 1,044 1.48 Air	$\begin{array}{c c c c c c c c c c c c c c c c c c c $						
4         438         980         1.30         An           5         481         1.064         1.21         Air	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
6 476 1,005 1.54 Air	202.5 78% 427.7 74%						
7 35 87 0.48 Air	<b>47.8 18% 118.8 21%</b>						
8 594 1,399 1.82 Air	213.9 82% 503.7 87%						
Channel 7 is 1/4th of what it should be	-						
	Channel 1 Channel 2 Channel 3 Channel 4						
Mean: 1405 ROI M: 0.50 Mean: 1404 Air M: 7.40 ROIsd: 9.08 Airsd: 2.04	Mean: 514         Air M: 2.60         Mean: 409         Air M: 2.13         Mean: 431         Air M: 2.27         Mean: 438         Air M: 1.90           Aired: 1.66         Aired: 1.67         Aired: 1.41						
	5						
818	BOLArea: 904.61 BOLArea: 304.61 BOLArea: 904.61 BOLArea: 904.61						
ROI Arroy 204 61	Mean: 481 Air M: 1.75 Mean: 476 Air M: 2.98 Mean: 35 Air M: nan Mean: 594 Air M: 2.89 Aired: 1.21 Aired: 1.54 Aired: 1.84 Aired: 1.84						
Composites							
	D01064         120         D0105         209         D017         0139         66           ROI Area: 304.61         ROI Area: 304.6						
	Channel 5 Channel 6 Channel 7 Channel 8						

<b>RF Coil Performa</b>	<u>nce Eval</u>	<u>uation</u>				Test Date	9/1/2008
Coil: Breast 8 Ch					2	Model	2415544
Mfa.: GE						Revision	
Mfg. Date: 9/1/2006	Coil ID	. 901	-	-		SN	
Phantom: HD Breast Phan						J. J.	# of Channels 8
	lom						
Sequence TR	TE Plane	FOV		Ny	BW	NSA 1	Thickness Gap
		40	256	256	15.0		3 -
Coil Mode:         HD Breast Port B         TX gain:         160         R1:         12         R2:         29							
		Analysis	s of Con	nposite	Image		
	Measured	Data				Calculate	ed Results
Label Mean Max	Min	Back ground	Noise SD	Noise Type	Mea SN	an Normal- R ized	Max Uni- SNR formity
N 1,509 1,891	1,348	-0.3	3.49	NEMA	305	.8 172.0	383.2 83.2%
N 1,616 1,881	1,457	-0.0	4.20	NEMA	272	.1 153.1	316.7 87.3%
A 1,509 1,896	1,348	11.0	3.00	Air	329	.6 185.4	414.2 83.1%
A 1,616 1,875	1,455	11.0	3.00	Air	353	.0 198.6	409.6 87.4%
	Α	nalysis o	of Unco	mbined	Images		
Measure	d Data		_			Calculated	Results
Ch Mean Max	Noise SD	Noise Type			Mean SNR	% of Mean	Max % of SNR Max
	2.44	Air	]		322.0	98%	413.9 91%
2 688 1,013	2.04	Air			221.0	67%	325.4 71%
3 634 987	2.12	Air			196.0	60%	305.1 67%
4 739 1,034	1.82	Air			266.1	81%	372.3 82%
5 831 1,190		Air			318.5	97%	456.0 100%
7 48 63		Air			1/8./	54%	
8 1,301 1,589	2.59	Air			329.2	100%	402.0 88%
Channel 7 is 1/4th of what it a	aculd he		1				
Channel 7 IS 1/4In OL What It S	nould be.						
Composites	- NFMA		Ch	annel 1	Channel	2 Channe	1.3 Channel 4
Mean: 1509 ROI M: -0.31 Me ROIsd: 3.49	an: 1616 ROI M: -0 ROIsd: 4.	.03 20	Mean: 1199	9 Air M: 4.07	Mean: 688 Air	M: 3.32 Mean: 634	Air M: 3.49 Mean: 739 Air M: 2.92
				All'su: 2.44	01013	<b>1</b> 8384	0546
© 1348	<b>O</b> 1487		0.977				
0/891	QUBBI			01541	<b>0435</b>	0.987	0.1984
ROI Area: 161.34 RC	Area: 159.99	02	ROI Area: 1	159.99 Air M: 2.71	ROI Area: 159.99	ROI Area: 159.99	ROI Area: 159.99
Airsd: 3.00	Airsd: 3.0	0	Mean, 631	Airsd: 1.71	Aire	ad: 2.20	Airsd: 0.64 Airsd: 2.59
<b>O</b> 1348	Q 14 <mark>5</mark> 5			Operat		<b>0</b> 369	O 1515 O 39 O 1099
0,896	O TEVES			0 190	05	85	0:8
ROI Area; 161.34 RC	l Area; 159.99		ROI Area:	161.34	ROI Area: 161.34	ROI Area: 161.34	ROI Area: 161.34
Composites	- Air		Ch	annel 5	Channel	6 Channe	el 7

<b><u>RF Coil Performance Evaluation</u></b>	Test Date: 9/1/2008					
Coil: Breast 8 Ch	Model: 2415544					
Mfg.: GE	Revision:					
Mfg. Date: 9/1/2006 Coil ID: 901	SN: 370					
Phantom: HD Breast Phantom	# of Channels 8					
SequenceTRTEPlaneFOVNxSE30020T48256	NyBWNSAThicknessGap25615.613-					
Coil Mode: HD BreastLeft	TX gain: <u>160</u> R1: <u>13</u> R2: <u>29</u>					
Measured Data	Calculated Results					
Back Noise No	Dise Mean Normal- Max Uni-					
Label         Mean         Max         Min         ground         SD         Iy           N         760         1,515         141         0.2         2.18         NE	MA         246.6         96.3         491.5         17.0%					
A 760 1,517 140 4.7 1.74 A	Air 286.2 111.8 571.3 16.9%					
Analysis of Uncombined Images						
Measured Data	Calculated Results					
Noise Noise Ch Mean Max SD Type	Mean % of Max % of SNR Mean SNR Max					
1 460 1,077 1.23 Air	245.1         100%         573.8         100%           160.5         (5%)         200.0         (6%)					
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	160.5         65%         380.9         66%           62.0         25%         151.0         26%					
4 590 1,396 1.91 Air	202.4 83% 479.0 83%					
Channel 3 is dead in both the Left and Right only modes.						
Mean: 760 ROI M: 0.24 Mean: 760 Air M: 4.73	Channel 1 Channel 2 Mean: 460 Air M: 1.76 Mean: 404 Air M: 2.59					
ROIsd: 2.18 Airsd: 1.74	Airsd: 1.23 Airsd: 1.65					
01515 C141 01517 C140	01077 985 01959 C116					
	ROI Area: 304.00         ROI Area: 304.00           Moop: 52         Air M: 0.59         Moop: 500         Air M: 3.09					
ROI Area: 304.00 ROI Area: 304.00	Airsd: 0.56 Airsd: 1.91					
	ROI Area: 304.00 Chapped 2					
	Channel 3 Channel 4					

<b>RF Coil Performance Evaluation</b>	Test Date: 9/1/2008
Coil: Breast 8 Ch	Model: 2415544
Mfg.: GE	Revision:
Mfg. Date: 9/1/2006 Coil ID: 901	SN:370
Phantom: HD Breast Phantom	# of Channels 8
SequenceTRTEPlaneFOVNxNySE30020C48256256	BWNSAThicknessGap515.613-
Coil Mode: HD BreastRight	TX gain: R1: R2:
Analysis of Composite	Image
Measured Data Back Noise Noise	Mean Normal- Max Uni-
Label Mean Max Min ground SD Type	SNR ized SNR formity
N         085         1,413         94         0.5         2.19         NEMA           A         684         1,413         94         4.4         1.52         Air	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Analysis of Uncombined	
Measured Data	Calculated Results
Noise Noise Ch Mean May SD Type	Mean % of Max % of
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	SNR         Mean         SNR         Max           193.3         89%         499.8         96%
2 409 975 1.37 Air	195.6         90%         466.4         90%           33.4         1502         112.0         5392
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	216.7         100%         518.1         100%
Channel 3 is dead in both the Left and Right only modes.	
Mean: 685 ROI M: 0.26 Mean: 684 Air M: 4.42	Channel 1         Channel 2           Mean: 522         Air M: 2.83         Mean: 409         Air M: 2.05
HOIsd: 2.19 Airsd: 1.52	Airsd: 1.77 Airsd: 1.37
<b>0</b> 94 <b>0</b> 7413 <b>0</b> 7413	
	ROI Area: 303.86 ROI Area: 303.86
ROI Area: 303.86 ROI Area: 303.86	Mean: 28         Air M: 0.59         Mean: 420         Air M: 1.87           Airsd: 0.55         Airsd: 1.27
Composites	
	ROI Area: 303.86 ROI Area: 303.86
	Channel 3 Channel 4

RF Coil Perform	ance Eva	aluation					Test Date:	9/1/2008
Coil: Cardiac 8 C	h			1	A.	$\langle$	Model:	2411986
Mfg.: GE			~				Revision:	
Mfg. Date: <u>10/1/2005</u>	Coil I	D: 900			-		SN:	
Phantom: <u>Cardiac phanto</u>	)m							# of Channels8
Sequence TR SE 300	TE Pla 20 T	ne FOV 48	25 N	K Ny 6 25	6	BW 15.6	NSA T	hickness Gap 3 -
Coil Mode: <u>HD Cardiad</u>	Port A	<b>A</b> a h			т	X gain:	<u>169</u> R1:	: <u>13</u> R2: <u>29</u>
	Magguro	Analys	is of Co	omposit	e Ima	ge		
	weasured	Back	Noise	Noise		Mean	Normal-	Max Uni-
Label Mean Max	Min	ground	SD 2.40	Туре		SNR	ized	SNR formity
A 879 2,012	287	-0.3	2.40	Air		258.7	81.8	392.9         25.0%           479.9         24.9%
		ı						
Magau	rad Data	Analysis	s of Und	combine	d Ima	ges		
Measu		e Noise			M	ean Ca	% of	Max % of
Ch Mean M	ax SD	Type			S		Mean	SNR Max
1 191 1,7 2 209 14	$\frac{63}{36}$ 1.70		_		7	3.6 5.7	92%	679.6 100% 519.9 77%
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	18 1.83	Air			7	2.7	91%	472.0 69%
4 174 1,5	15 1.61	Air			7	0.8	88%	616.6 91%
5 194 1,4	10 1.88	Air			6	7.6	84%	491.5 72%
6 237 1,6	06 1.94	Air			8	0.1	100%	542.5 80%
7 243 1,6	96 1.99	Air			8	0.0 1	100%	558.5 82%
	30 2.01				5	8.0	72%	433.6 64%
There is no significant diffe	rence betweer	1 Ports A &	B					
Mean: 878 ROI M: -0.28 M	ean: 879 A	vir M: 12.01	C Mean: 19	hannel 1 1 Air M: 2.68	Cha Mean: 209	Air M: 2.87	Channel 3	3 Channel 4
02012	02014	ursu. 2.75		Airsd: 1.70	0	Airsd: 1.81	Airso	d: 1.83 Airsd: 1.61
				703			(	- Orals
( <b>°</b> ;		<b>O</b> 2		9		9	023	07
			ROI Area	: 948.16	ROI Area: 94	8.16	ROI Area: 948.16	ROI Area: 948.16
ROI Area: 948.16	Ol Area: 948.16		Mean: 19	4 Air M: 3.01 Airsd: 1.88	Mean: 237	Air M: 3.11 Airsd: 1.94	Mean: 243 Air M Airse	M: 3.21 Mean: 178 Air M: 3.21 d: 1.99 Airsd: 2.01
Compos	sites		017		040			der
			POI Area	049.16	ROLAma: 04	0.1648	0.1898	POLAron 948 15
			CI	hannel 5	Cha	nnel 6	Channel 7	7 Channel 8

<b>RF Coil Performance Evaluation</b>	Test Date: 9/1/2008
Coil: Cardiac 8 Ch	Model: 2411986
Mfg.: GE	Revision:
Mfg. Date: <u>10/1/2005</u> Coil ID: <u>900</u>	SN:
Phantom: Cardiac phantom	# of Channels 8
SequenceTRTEPlaneFOVSE30020T48	NxNyBWNSAThicknessGap25625615.613-
Coil Mode: HD Cardiac Port B	TX gain: <u>169</u> R1: <u>13</u> R2: <u>29</u>
Analysis o Moasurod Data	Calculated Results
Back No	Dise Noise Mean Normal- Max Uni-
Label Mean Max Min ground S	SD Type SNR ized SNR formity
A         845         1,907         275         11.0         2.	.50         Itelina         255.0         56.4         355.3         251.70           .56         Air         216.3         84.5         488.2         25.2%
Analysis of	Lincombined Images
Measured Data	Calculated Results
Noise Noise SD Type	Mean % of Max % of
$\begin{bmatrix} Cn & Mean & Max & SD & Type \\ \hline 1 & 178 & 1,643 & 1.61 & Air \end{bmatrix}$	SNR         Mean         SNR         Max           72.5         90%         668.7         100%
2 208 1,424 1.80 Air	75.7 94% 518.4 78%
3 193 1,255 1.73 Air	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
4         1/1         1,490         1.58         Air           5         185         1.352         1.81         Air	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
7 228 1,596 1.85 Air	80.8 100% 565.3 85%
8 173 1,296 1.95 Air	58.1     72%     435.5     65%
There is no significant difference between Ports A & B	
	Channel 1 Channel 2 Channel 2 Channel 4
Mean: 845         ROI M: 0.24         Mean: 845         Air M: 11.04           ROIsd: 2.50         Airsd: 2.56	Channel I         Channel Z         Channel S         Channel 4           Mean: 178         Air M: 247         Mean: 208         Air M: 285         Mean: 193         Air M: 2.72         Mean: 171         Air M: 2.44           Mean: 178         Air M: 2.15         Air
01907	Alfsc: 1,51 Alfsc: 1,30 Alfsc: 1,73 Alfsc: 1,36 O 1623 O 1623 O 1623 O 1625 O 1690
	ROI Area: 948.18         ROI Area: 948.18         ROI Area: 948.18         ROI Area: 948.18           Mean: 185         Air M: 2.86         Mean: 232         Air M: 3.07         Mean: 228         Air M: 2.97         Mean: 173         Air M: 3.12
ROI Area: 948.18 ROI Area: 948.18	Airsd: 1.81 Airsd: 1.91 Airsd: 1.85 Airsd: 1.95
Composites	
	ROI Area: 948.18 BOI Area: 948.18 BOI Area: 948.18 BOI Area: 948.18
	Channel 5 Channel 6 Channel 7 Channel 8

<b>RF Coil Performance Evaluation</b>	Tes	t Date: 9/1/2008
Coil: Head 8 Ch	AL	Model: 5147134-2
Mfg.: GE	Re	evision:
Mfg. Date: <u>8/6/2006</u> Coil ID: <u>898</u>		SN: U28780
Phantom: Head TLT sphere		# of Channels <u>8</u>
SequenceTRTEPlaneFOVSE30020T36	Nx         Ny         BW         N           256         256         15.6	SA Thickness Gap 1 3 -
Coil Mode: 8HRBrain	TX gain: <u>163</u>	R1: <u>13</u> R2: <u>29</u>
Analysi	s of Composite Image	
Measured Data		ulated Results
Label Mean Max Min ground	SD Type SNR	ized SNR formity
N 1,537 1,902 1,193 1.1	3.04 NEMA 357.6 2	48.3 442.5 77.1%
A 1,530 1,902 1,192 13.5	2.04 AIF	40.1 438.9 77.170
Analysis	of Uncombined Images	
Measured Data	Calcu	lated Results
Noise Noise Ch Mean Max SD Type	Mean % of SNR Mea	Max % of SNR Max
1 458 1,126 2.21 Air	135.8 96%	333.9 94%
2 492 1,245 2.30 Air		354.7 100%
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	119.6 85%	305.0 86%
5 438 1,139 2.20 Air	130.5 92%	339.3 96%
6 448 1,184 2.21 Air	132.8 94%	351.1 99%
7 502 1,195 2.33 Air	141.2 100%	<u>6</u> 336.1 95%
8 426 1,030 2.07 Air	134.9 96%	326.1 92%
There is a 7% drop in SNR since last year.		
Mean: 1537 ROI M: 1.13 Mean: 1536 Air M: 13.33	Channel 1 Channel 2 Ch	annel 3 Channel 4
Alisu. 2.04	Airsd: 2.21 Airsd: 2.30	Aired: 2.59 Aired: 2.63
911960 koos	0166 01245	0179
0///902		01+24
	ROI Area: 195.85 ROI Area: 195.85 ROI Area	a: 195.85 ROI Area: 195.85
ROI Area: 195.85 ROI Area: 195.85	Mean: 436 All W. 3.55 Mean: 448 All W. 3.56 Mean: 5 Airsd: 2.20 Airsd: 2.21	Airsd: 2.33 Airsd: 2.07
Composites	ROI Area: 195.85 ROI Area: 195.85 ROI Area	a: 195.85 ROI Area: 195.85
	Channel 5 Channel 6 Ch	annel 7 Channel 8

<b>RF Coil Performance Evaluation</b>	Test Date: 9/1/2008
Coil: Head Split Top	Model: 795WH3
Mfg.: GE	Revision:
Mfg. Date: <u>4/1/2006</u> Coil ID: <u>905</u>	SN: 7953WH3
Phantom: ACR	# of Channels 1
SequenceTRTEPlaneFOVNaSE30020T4025	KNyBWNSAThicknessGap625615.613-
Coil Mode: <u>Head</u>	TX gain: R1: R2:
Analysis o	f Test Image
Measured Data Back Noise	Noise Mean Normal- Max Uni-
Label Mean Max Min ground SD	Type     SNR     ized     SNR     formity       NFMA     373.8     210.3     465.2     74.6%
A         3,602         4,488         2,660         9.2         5.12	Air         461.0         259.3         574.4         74.4%
Mean: 3605 ROI M: 2.17	Mean: 3602 Air M: 9.22
ROIsd: 6.82	Airsd: 5.12
<b>2668</b>	LO2660
O 4488	O 4488
ROI Area: 242.34	ROI Area: 242.34

RF Coil Performance Evaluation         Test Date:         9/1/2008							
Coil: Head Split Top Model: 795WH3							
Mfg.:         GE         Revision:	_						
Mfg. Date:         4/1/2006         Coil ID:         905         SN:         7953WH3							
Phantom: Oil filled sphere       # of Channels							
SequenceTRTEPlaneFOVNxNyBWNSAThicknessGapSE30020T3625625615.613-							
Coil Mode:         Head         TX gain:         152         R1:         13         R2:         29							
Analysis of Test Image							
Measured Data Calculated Results							
Label Mean Max Min ground SD Type SNR ized SNR formity							
N         1,065         1,120         1,021         0.5         7.32         NEMA         102.9         71.5         108.2         95.4%           A         1.064         1.119         1.022         11.8         6.51         Air         107.1         74.4         112.6         95.5%							
	3000 0000						
	****						
Mean: 1065 ROI M: 0.45 Mean: 1064 Air M: 11.75							
ROIsd: 7.32 Airsd: 6.51							
Q1021 Q1022							
ROI Area: 194.86 ROI Area: 194.86							

<b>RF Coil Performance Evaluation</b>		Test Date: 9/1/2008
Coil: Knee 8ch	6	Model: 104504
Mfg.: Invivo		Revision:
Mfg. Date: 9/1/2006 Coil ID: 912		SN: U29317
Phantom: Knee phantom.		# of Channels 8
Sequence TR TE Plane FOV	Nx Ny	BW NSA Thickness Gap
SE         300         20         T         30	256 250	56     15.6     1     3     -
Coil Mode: HD TR Knee PA		TX gain: <u>168</u> R1: <u>13</u> R2: <u>29</u>
Analysis	s of Composite	e Image
Measured Data		Calculated Results
Label Mean Max Min ground	SD Type	SNR ized SNR formity
N 2,042 2,762 1,362 -0.3	3.04 NEMA	<u>475.0</u> <u>475.0</u> <u>642.5</u> <u>66.1%</u> <u>437.5</u> <u>437.5</u> <u>591.5</u> <u>66.1%</u>
A 2,045 2,702 1,502 14.7		437.3 437.3 371.3 00.170
Analysis	of Uncombined	d Images
Measured Data	_	Calculated Results
<u>Ch Mean Max SD Type</u>	_	Mean % of Max % of <u>SNR Mean SNR Max</u>
1 695 1,978 2.43 Air		187.4         100%         533.4         100%
2 662 1,878 2.67 Air	-	162.5         87%         460.9         86%           120.1         74%         420.0         82%
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
6 515 1,559 2.51 Air		134.5 72% 407.0 76%
7 521 1,739 2.53 Air		134.9 72% 450.4 84%
8 638 1,372 2.26 Air	]	185.0         99%         397.8         75%
Mean: 2042 ROI M: -0.31 Mean: 2043 Air M: 14.68 ROIsd: 3.04 Airsd: 3.06	Channel 1 Mean: 695 Air M: 4.11	Channel 2         Channel 3         Channel 4           Mean: 662         Air M: 4.55         Mean: 586         Air M: 4.70         Mean: 426         Air M: 4.10
	Airsd: 2.43	Airsd: 2.67 Airsd: 2.76 Airsd: 2.43
0 2762	61978 C249	Q 1878 Q 176 Q 123 Q 008
01362		01030/
	ROI Area: 92.84	ROI Area: 92.84 ROI Area: 92.84 ROI Area: 92.84
ROI Area: 92.84 ROI Area: 92.84	Mean: 646 Air M: 4.29 Airsd: 2.54	Mean: 515 Air M: 4 21 Mean: 521 Air M: 4 25 Mean: 638 Air M: 3.74 Airsd: 2.51 Airsd: 2.53 Airsd: 2.26
Composites	60 F01 Area: 92 84	071         01559         050         739         01572           ROI Area: 92.84         ROI Area: 92.84         ROI Area: 92.84         ROI Area: 92.84
	Channel 5	Channel 6 Channel 7 Channel 8

RF Coil Performance         Coil:       Knee T/R         Mfg.:       Invivo         Mfg. Date:	Coil ID: 904         and my wrist bottle in         Plane       FOV         T       36	foot. Nx 256	Ny 256	BW 15.6	Test Date Mode Revision SM 	e:	1/2008 222191 annels <u>1</u> Gap -
Coil Mode:       QUADKNEE       TX gain: 77       R1: 10       R2: 28							
		y313 01	1631 1116	ige	0		4
Me	easured Data			. <u> </u>	Calculat	ea Kesul	
Label Mean Max	Back Min ground	Noise SD	Noise Type	Mea SNI	n Normal- R ized	Max SNR	Uni- formity
N 12,481 13,957	10,868 1.7	29.14	NEMA	302.	.9 210.4	338.7	87.6%
N 4,243 4,795	3,777 3.1	12.49	NEMA	240.	.2 166.8	271.5	88.1%
A 12,479 13,930	10,877 12.3	6.74	Air	1213	842.6	1354.4	87.7%
A 4,240 4,798	3,765 12.4	6.75	Air	411.	.6 285.9	465.8	87.9%
	ean: 12481RO	Test Ir	nages Mean: 424	13 RC	DI M: 3.12		
ROIsd: 29.14 010868 013957 03777							
R	OI Area: 37.19		ROI Area:	85.45			
R	ean: 12479 Air I Airs 010877 013930 Ol Area: 37.19	M: 12.34 :d: 6.74 ,	Mean: 424 ROI Area:	40 Air Air 0376 02738 85.45	r M: 12.35 rsd: 6.75		

RF Coil Performance Evaluation Test Date: 9/1/2008											
Coil: Knee T/R		R		Model:	·						
Mfg.: Invivo			Revision	:							
Mfg. Date:	: <u> </u>	22191									
Phantom:       8ch Knee phantom and my wrist bottle in foot.       # of Channels											
SequenceTRTEPlaneFOVNxNyBWNSAThicknessGapSE30020S4025625615.613-											
Coil Mode:         QUADKNEE         TX gain:         77         R1:         9         R2:         29											
Analysis of Test Image											
Me	easured Data				Calculate	d Result	s				
Label Mean Max	Back Min ground	Noise SD	Noise Type	Mea SNF	n Normal- R ized	Max SNR	Uni- formity				
N 11,895 13,443	10,859 -2.9	8.03	NEMA	1047	.6 589.3	1183.9	89.4%				
N 4,092 5,274	1,765 1.4	5.74	NEMA	504.	2 283.6	649.8	50.1%				
A 11,898 13,446	10,857 12.8	6.51	Air	1197	.7 673.7	1353.5	89.3%				
A 4,090 5,275	1,766 11.4	6.02	Air	445.	2 250.4	574.2	50.2%				
·		Tost Ir	nades								
Μ	ean: 11895 BO	IM: -2.94	Mean: 409	2 BC	DI M: 1.43						
	RO	lsd: 8.03		RC	DIsd: 5.74						
	010358 10443				0 5274						
R	OI Area: 41.53		ROI Area: 181.34								
Μ	ean: 11898 Air   Airs	M: 12.79 sd: 6.51	Mean: 409	00 Air Air	<sup>•</sup> M: 11.35 <sup>•</sup> sd: 6.02						
R	Ol Area: 41.53		ROI Area:	181.34	<mark>0</mark> 5278						

$\int$	RF	<u>Coil Pe</u>	rforma	nce Ev	aluatio	<u>n</u>		-	1	Те	st Date:	9	/1/2008		
Coil: Neurovascular Array 8 Ch											Model:	2	2414390		
	Mfg.: USAI Rev									Revision:					
Mfg. Date: 9/1/2006 Coil ID: 902 SN: 582										582					
P	hanto	om: <u>Two-p</u>	iece NVA j	phantom se	et.							# of Ch	annels <u>8</u>		
	SequenceTRTEPlaneFOVNxNyBWNSAThicknessGapSE30020T3625625615.613-														
	Coil Mode:         a HDNV Head         TX gain:         165         R1:         13         R2:         30														
	Analysis of Composite Image														
	Measured Data Calculated Results														
	Labe	l Mean	Max	Min	Back ground	Noise SD	Noise Type		Mea SNI	n I R	lormal-	Max SNR	Uni- formity		
	N	835	982	708	-0.2	2.75	NEMA		214.	.7	149.1	252.5	83.8%		
	A	835	982	708	14.0	2.87	Air		190.	.7	132.4	224.2	83.8%		
	Analysis of Uncombined Images														
			Measure	ed Data						Calc	ulated	Results	<u> </u>		
	Ch	Mean	Max	Nois SD	e Noise Type	e •		l	Mean SNR	% ( Mea	of an	Max SNR	% of Max		
	1	281	612	2.47	Air				74.6	84	%	162.4	89%		
	2	236	510	2.23	Air	·			69.4		69.4		%	149.9	82%
		272	519	2.41					74.0 60.5	68	2/0 2/0	145.2			
	5	216	467	2.35					60.2	68	2/0	130.2	71%		
	6	225	459	2.34	Air				63.0	71	%	128.5	70%		
	7	350	718	2.58	Air				88.9		%	182.4	100%		
	8	301	621	2.28	Air	·			86.5	97	%	178.5	98%		
	$\frac{7}{8} \frac{350}{301} \frac{718}{621} \frac{2.58}{2.28} \frac{Air}{Air} \frac{88.9}{86.5} \frac{100\%}{97\%} \frac{182.4}{178.5} \frac{100\%}{98\%}$														

<u>RF C</u>	<u>oil Perf</u>	forman	<u>ce Eval</u>	<u>uation</u>						: 9	9/1/2008	
Co	il: Neuro	vascular .	Array 8 (	Ch					Model	2	2414390	
Mfg	g.: USAI		· ·				10		Revision	:		
Mfg. Dat	e: 9/1/2000	6	_ Coil ID	: 902	5				SN	:	582	
Phantor	n: <u>Two-pie</u>	ece NVA ph	antom set.	, <b></b>						# of Cl	nannels <u>8</u>	
Sequ	ence Ti	R TE	Plane	FOV	Nx	Ny	В	w	NSA 1	hickness	Gap	
SE     300     20     S     48     256     256     15.6     2     3     -												
Coil Mode:         HDNV Array         TX gain:         177         R1:         13         R2:         29												
Analysis of Composite Image												
		M	easured	Data			_	C	alculate	ed Resu	lts	
Label	Mean	Max	Min	Back ground	Noise SD	Noise Type	M S	ean NR	Normal- ized	Max SNR	Uni- formity	
N	1,122	1,611	662	0.9	1.68	NEMA	4'	2.3	130.5	678.2	58.2%	
N	956	1,879	644	0.3	1.98	NEMA	3	11.5	94.3	671.1	51.1%	
A	955	1,610	645	5.8	1.19	Air	5	25.9	145.3	880.0	51.1%	
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1,072										
	N/	aggurad	A	nalysis	of Unco	mbined	Images	5 Co	loulated	Popult		
	111	easureu	Noise	Noise	-		Mean	Ca	s of	Max	% of	
Ch	Mean	Max	SD	Туре	7		SNR		<u>Alean</u>	SNR	Max	
	563	1,144	1.33	Air	-		277.4		81%	563.7	82%	
2	303	767	0.92		-		225.8		00% 75%	434.5	73%	
4	544	1.090	1.31	Air			272.1		79%	545.3	79%	
5	549	1,100	1.05	Air	1		342.6	1	00%	686.5	100%	
6	392	897	0.93	Air	1		276.2		81%	632.1	92%	
7	396	705	0.96	Air			270.3		79%	481.2	70%	
8	516	1,048	1.01	Air			334.8		98%	680.0	99%	
	Cor Mean: 1122	mposites -		27	Ch	annel 1	Chann	el 2	Channe	el 3 Ch	nannel 4	
		7Olsd: 1.68	POlsd: 1.	98	Weart, 563	Airsd: 1.33	Weart. ST/	8491: 0.92	Mean. 393	Airsd: 1.00	Airsd: 1.31	
			0.00000644									
	OTH					0239 01144	<b>11</b> 18			65	<b>12</b> 41 01 090	
	ROI Area: 141,70	682 ROLAN	ea; 31273		ROI Area:	141.70	ROI Area: 312.73		ROI Area: 312.73	ROLA	rea: 141)70	
	Mean: 1121	Air M: 5.81 Mean: Airsd: 1.19	955 Air M: 5.8	1 9	Mean: 549	Air M: 1.44 Airsd: 1.05	Mean: 392	Air M: 1.19 Airsd: 0.93	Mean: 396	Air M: 1.27 Mean: 7856: 0.96	516 Air M: 1.38 Airsd: 1.01	
			0.1879 845					161	<b>4</b> 160			
	0181	10. 681				01100	POLA		2014		0/1048	
	Cor	mposites -	Air		HOI Area: Ch	annel 5	Chann	el 6	Channe	el 7	rea: 141,49~	
GΕ	Site				Signa 3						24	

( E	RF C	oil Perf	orman	<u>ce Eval</u>	<u>uation</u>	7		2 /	6	Test Date:	9/2	1/2008
	Coi	: Neuro	vascular	Array 8 (	Ch	P	Model: 24143					14390
	Mfg	.: USAI		U				10	2	Revision:		
M	Mfg. Date: 9/1/2006 Coil ID: 902 SN: 582											
Р	hanton	n: Two-pie	ece NVA pl	nantom set.	- <u> </u>						# of Cha	annels 8
Г			·									
	Sequence     TR     TE     Plane     FOV     Nx     Ny     BW     NSA     Thickness     Gap       SE     300     20     C     48     256     256     156     15     3											
l	$\begin{bmatrix} 3E \\ 5U \end{bmatrix} \begin{bmatrix} 20 \\ 20 \end{bmatrix} \begin{bmatrix} 40 \\ 230 \end{bmatrix} \begin{bmatrix} 230 \\ 230 \end{bmatrix} \begin{bmatrix} 15.0 \\ 1.5 \end{bmatrix} \begin{bmatrix} 3 \\ - \end{bmatrix}$											
Coil Mode:         HDNV Array         TX gain:         177         R1:         13         R2:         29												
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
	Ν	892	1,531	632	0.5	1.41	NEMA		447.4	142.7	767.9	58.4%
	N	611	1,030	157	0.5	1.26	NEMA		342.9	109.4	578.1	26.5%
	A	<u>891</u> 610	1,532	631	5.9	1.22	Air	-	478.6 330.4	152.6	822.9	58.3%
	A	010	1,027	130	5.0	1.21	All		550.4	103.4	337.5	20.370
			<u> </u>	A	nalysis	of Unco	mbined	Image	es			
-		M	easured	Data	Ni si s s	_			Ca	Iculated	Results	0/ -5
	Ch	Mean	Max	SD	Noise Type	_		Mea SNF	n (	% of <u>/lean</u>	Max SNR	% of Max
	1	213	455	1.34	Air			104.	2 4	41%	222.5	32%
	2	318	738	0.93	Air	-		224.		87%	520.0	74%
	3	364	/81	1.00	Air	-		238.		95%	511.8	/3%
	5	364	772	1.50		-		227	, .	89%	481.8	69%
	6	351	832	0.95	Air	1		242.		95%	573.9	82%
	7	387	1.057	0.99	Air			256.	$\frac{1}{2}$	00%	699.7	100%
	8	323	712	1.02	Air			207.	5	81%	457.4	65%
						_						
1		Cor	mposites -	NEMA		Ch	annel 1	Chan	nel 2	Channe	I 3 Cha	annel 4
		Mean: 892	ROI M: 0.51 Mean: 101sd: 1.41	611 ROI M: 0 ROIsd: 1.	.53 26	Mean: 213	Air M: 1.99 Airsd: 1.34	Mean: 318	Air M: 1.21 38 Airsd: 0.93	Mean: 364 0781 A	ir M: 1.33 Mean: 19 irsd: 1.00	91 Air M: 1.92 Airsd: 1.30
		© 632 ROI Area: 398/27	BOLA	O 1950 e	157	BOLArea	04(55) 04(55)	BOI Area: 308	<b>5</b> 109	BOI Area: 308.27	95 <b>9</b> 41	0374
		Mean: 891	Mean:	610 Air M: 5.8 Airsd: 1.2	14	Mean: 364	Air M: 1.44 Airsd: 1.05	Mean: 351	Offic M: 1.24	Mean: 387	ir M: 1.31 Mean: 32 irso: 0.99	23 Air M: 1.40 Airsd: 1.02
		<b>G</b> 831	5	O 1029	156	5	077/2 035	295		098	45	0712
		HOLArea: 308.27	mposites -	Air		ROLATER:	annel 5	Chan	nel 6	Channel	ROI Abea	2.444-30
$\subseteq$												

<b>RF Coil Performance Evaluation</b>	Test Date: 9/1/2008								
Coil: Shoulder 3 Ch	Model: 2414331								
Mfg.: USAI	Revision:								
Mfg. Date: 5/01/2006 Coil ID: 903	SN: 321								
Phantom: Shoulder sphere	# of Channels 3								
SequenceTRTEPlaneFOVNxNySE30020T36256256	BWNSAThicknessGap15.613-								
Coil Mode:         HD SHOULDER         TX gain:         164         R1:         13         R2:         29									
Analysis of Composite Measured Data	Calculated Results								
Back Noise Noise Label Mean Max Min ground SD Type	Mean Normal- Max Uni- SNR ized SNR formity								
N         878         1,540         422         -0.2         3.21         NEMA	193.4         134.3         339.3         43.0%								
A         878         1,539         422         8.1         2.64         Air	217.9 151.3 382.0 43.0%								
Analysis of Uncombined	Images								
Measured Data	Calculated Results								
Noise Noise Ch Mean Max SD Type	Mean % of Max % of SNR Mean SNR Max								
1 518 1,171 2.96 Air 2 251 436 2.39 Air	114.7         56%         259.2         80%           68.8         34%         119.5         37%								
3         577         921         1.86         Air	203.3         100%         324.5         100%								
These axial images were acquired at the center of the phantom and NOT at the	he '+' mark on the coil like last year.								
Mean: 878 ROI M: -0.21 Mean: 878 Air M: 8.08	Channel 1 Channel 2								
	Airsd: 2.96 Airsd: 2.39								
422	<b>6</b> 4								
ROI Area: 193.07 ROI Area: 193.07 RO	PI Area: 193.07 ROI Area: 193.07								
Composites	an: 577 Air M: 2.99 Airsd: 1.86								
RO	I Area: 193.07								
	Channel 3								

<b>RF Coil Performance Evaluation</b>	
Coil: Shoulder 3 Ch	
Mfg.: USAI Revision:	
Mfg. Date: 5/01/2006 Coil ID: 903 SN: 321	
Phantom:       Shoulder sphere       # of Channels	3
Sequence TR TE Plane FOV Nx Ny BW NSA Thickness Gap	
SE     300     20     C     36     256     256     15.6     1     3     -	
Coil Mode: HD SHOULDER TX gain: 164 R1: 13 R2: 29	)
Analysis of Composite Image	
Measured Data Calculated Results	
Back Noise Noise Mean Normal- Max Uni Label Mean Max Min ground SD Type SNR ized SNR form	ty
N         943         1,842         375         0.0         2.95         NEMA         226.1         157.0         441.6         33.8°	%
A         943         1,841         374         8.0         2.62         Air         235.9         163.8         460.5         33.89	/o
Analysis of Uncombined Images	
Measured Data Calculated Results	f
Ch         Mean         Max         SD         Type         SNR         Mean         SNR         Max           1         503         1.787         2.92         Air         112.9         57%         401.0         100%	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	ío l
3     560     883     1.86     Air     197.3     100%     311.1     78%	D
Mean: 943         ROI M: 0.01         Mean: 943         Air M: 8.04         Channel M         Channel Z           ROIsd: 2.95         Airsd: 2.62         Mean: 503         Air M: 5.05         Mean: 347         Air M: 3.94	3
Airsd: 2.92 Airsd: 2.32	
© 375 0 374 0 86 078	
ROLArea: 189-29	
ROI Area: 189.39         ROI Area: 189.39         Mean: 560         Air M: 2.98	
Composites Airsd: 1.86	
273	

<b>RF Coil Performance Evaluation</b>	Test Date: 9/1/2008										
Coil: Spine 8 Ch	Model: 2415542										
Mfg.: USAI	Revision:										
Mfg. Date: 7/01/2006 Coil ID: 899	SN: 329										
Phantom: Dual 3T spine phantoms	# of Channels 8										
SequenceTRTEPlaneFOVSE30020S48	NxNyBWNSAThicknessGap25625615.623-										
Coil Mode: HDCTL123 TX gain: 166 R1: 13 R2: 29											
Analysis of Composite Image											
Measured Data	Calculated Results										
Back J Label Mean Max Min ground	Noise Noise Mean Normal- Max Uni- SD Type SNR ized SNR formity										
N 1,545 3,091 623 0.3	1.85         NEMA         590.6         163.1         1181.6         33.5%										
A 1,545 3,091 622 6.5	1.52         Air         666.1         184.0         1332.6         33.5%										
Analysis o	of Uncombined Images										
Measured Data	Calculated Results										
Ch Mean Max SD Type	Mean % of Max % of										
1 707 2,844 1.57 Air	<u>295.1</u> <u>100%</u> <u>1187.1</u> <u>100%</u>										
2 549 1,796 1.29 Air	$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										
6 360 1,788 1.23 Air	191.8         65%         952.6         80%										
Composites	Channel 1 Channel 2 Channel 3										
Mean: 1545 ROI M: 0.27 ROIsd: 1.85 3091 6623 ROI Area: 371.91 ROI Area: 371.91 ROI Area: 371.91	Mean: 707       Air M: 2.45         Airsd: 1.57         Airsd: 1.57         2844         0 </td										
Extra Pics	6       Airsd: 1.18       Airsd: 1.39       Airsd: 1.23         0       0       1762       0       1864         ROI Area: 371.91       ROI Area: 371.91       ROI Area: 371.91       ROI Area: 371.91         Channel 4       Channel 5										

RF Coil Performance Evaluation         Coil:       Spine 8 Ch	Test Date:         9/1/2008           Model:         2415542								
Mfg.: USAI	Revision:								
Mfg. Date: 7/01/2006 Coil ID: 899	SN: 329								
Phantom: Dual 3T spine phantoms	# of Channels 8								
SequenceTRTEPlaneFOVNxNyBWNSAThicknessGapSE30020S4825625615.613-									
Coil Mode:       HDCTL34 PE AP       TX gain:       167       R1:       13       R2:       29									
Measured Data	Calculated Results								
Back Noise Noise	Mean Normal- Max Uni-								
Label         Mean         Max         Min         ground         SD         Type           N         1.430         3.126         502         -0.6         3.36         NEMA	SNR ized SNR formity								
A         1,430         3,126         501         7.3         2.14         Air	301.0         117.0         0.50.0         27.770           437.9         171.1         957.2         27.6%								
Analysis of Uncombine	ed Images								
Measured Data	Calculated Results								
Noise Noise	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           204.8         87%         786.0         100%								
2 560 1,969 1.71 Air	214.6 91% 754.6 96%								
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$								
	Channel 1 Channel 2								
Mean: 1430 ROI M: -0.59 Mean: 1430 Air M: 7.26 ROIsd: 3.36 Aired: 2.14	Mean: 597 Air M: 3.07 Mean: 560 Air M: 2.69								
	02291								
03126									
	HOI Area: 322.53 HOI Area: 322.53								
ROI Area: 322.53 ROI Area: 322.53	Airsd: 2.11								
Composites									
	O <mark>2510</mark> 1891								
	ROI Area: 322.53 ROI Area: 322.53								
	Channel 3 Channel 4								

<b>RE Coil Performance Evaluation</b>										
	Test Date: <u>9/1/2008</u>									
Coil: Spine 8 Ch	Model: 2415542									
Mfg.: USAI	Revision:									
Mfg. Date: 7/01/2006 Coil ID: 899	SN: 329									
Phantom: Dual 3T spine phantoms	# of Channels 8									
Sequence TR TE Plane FOV Nx Ny	BWNSAThicknessGap									
SE         300         20         S         48         256         256										
Coil Mode: HDCTL56 PE AP	Coil Mode: HDCTL56 PE AP TX gain: 167 R1: 13 R2: 29									
Analysis of Composite Image										
Measured Data	Calculated Results									
Back Noise Noise	Mean Normal- Max Uni-									
Label     Mean     Max     Min     ground     SD     Type       N     1.605     3.623     513     0.3     3.51     NEMA	323 4 126 3 730 0 24 8%									
A         1,605         3,627         512         7.0         2.07         Air	508.1         198.5         1148.2         24.7%									
Analysis of Uncombined										
Measured Data	Calculated Results									
Noise Noise	Mean % of Max % of									
Ch Mean Max SD Type	SNR         Mean         SNR         Max           232.9         88%         896.6         92%									
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	252.9         0070         050.0         9270           254.7         96%         889.7         91%									
3 653 2,693 1.81 Air	236.4 89% 975.0 100%									
4 668 2,247 1.65 Air	265.3     100%     892.4     92%									
Moon: 1605 BOI M: 0.33 Moon: 1605 Air M: 7.00	Channel 1 Channel 2									
ROIsd: 3.51	Mean: 693 Air M: 3.15 Mean: 688 Air M: 2.81 Airsd: 1.95 Airsd: 1.77									
	<b>O</b> 2668									
<b>0</b> 3623										
0510	©88 20 20 74 POLAros: 200 74									
	Mean: 653 Air M: 2.90 Mean: 668 Air M: 2.58									
ROI Area: 320.74 ROI Area: 320.74	Airsd: 1.81									
Composites	037									
	02247									
	02693									
	ROI Area: 320.74 ROI Area: 320.74									
	Channel 3 Channel 4									

RF Coil Performance Evaluation         Coil:       Torso         Mfg.:       USAI		Test Date:         9/1/2008           Model:         2415410           Revision:									
Mfg. Date: 12/1/2006 Coil ID: 1774		SN: 344									
Phantom: <u>Two large Torso phantoms one of whic</u>	h is centered.	# of Channels 8									
SequenceTRTEPlaneFOVSE30020T48	Nx         Ny           256         256	BWNSAThicknessGap515.613-									
Coil Mode: <u>8US TORSOPA</u> TX gain: <u>171</u> R1: <u>13</u> R2: <u>29</u>											
Analysis of Composite Image Measured Data Calculated Posulte											
Back	Noise Noise	Mean Normal- Max Uni-									
Label         Mean         Max         Min         ground           N         1.169         2.350         596         1.1	3.20 NEMA	258.4 100.9 519.4 40.5%									
A 1,168 2,349 593 13.8	3.02 Air	253.4 99.0 509.7 40.3%									
Analysis	of Uncombined	l Images									
Measured Data		Calculated Results									
Noise Noise Ch Mean Max SD Type		Mean % of Max % of									
1 266 1,528 2.21 Air	]	78.9         85%         453.1         74%									
2 305 1,102 2.62 Air		76.3 82% 275.6 45%									
3 280 1,129 2.92 Air	_	<u>62.8</u> <u>68%</u> <u>253.4</u> <u>42%</u>									
4 297 1,740 2.13 Air	_	91.4 98% 535.3 88%									
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-	<u>80.2</u> <u>86%</u> <u>526.7</u> <u>86%</u>									
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-	$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									
Mean: 1169         ROI M: 1.10         Mean: 1168         Air M: 13.78           ROIsd: 3.20         Airsd: 2.32											
ROI Area: 952.80 Composites	ROI Area: 952.80 R Mean: 262 Air M: 3.51 Airsd: 2.14 0 1720 ROI Area: 952.80 R Channel 5	Ale       FOI Area: 952.80       FOI Area: 952.80       FOI Area: 952.80         Mean: 208       Air M: 4.00       Mean: 295       Air M: 4.48         Airsd: 2.36       Airsd: 2.95       Air M: 4.48         Airsd: 2.37       Airsd: 2.97       Airsd: 1.92         O27       Air M: 4.48       Airsd: 2.67         Airsd: 2.38       Airsd: 2.95       Air M: 4.48         Airsd: 2.97       Air M: 4.48       Airsd: 2.67         O1 Area: 952.80       Air M: 4.48       Airsd: 2.67         Airsd: 2.95       Air M: 4.48       Airsd: 2.67         O1 Area: 952.80       Air M: 4.48       Airsd: 2.67         FOI Area: 952.80       FOI Area: 952.80       FOI Area: 952.80         Channel 6       Channel 7       Channel 8									

<b>RF Coil Performance Evaluation</b>	Test Date: 9/1/2008
Coil: Wrist HD	Model: BC-10
Mfg.: Mayo Clinic	Revision:
Mfg. Date: Coil ID: 1775	SN: 3HB10R006
Phantom: Small wrist bottle.	# of Channels
Sequence TR TE Plane FOV N	x Ny BW NSA Thickness Gap
SE 300 20 1 15 2:	
Coil Mode: HD WristCoil	TX gain: <u>151</u> R1: <u>11</u> R2: <u>29</u>
Analysis o	of Test Image
Measured Data	Calculated Results
Label Mean Max Min ground SD	Noise Mean Normal- Max Uni- Type SNR ized SNR formity
N         8,352         8,872         7,497         6.7         22.07           A         8,345         8,870         7,470         341         18.31	NEMA         267.6         1070.5         284.3         91.6%           Air         209.7         1104.7         217.8         01.4%
A 0,545 0,679 7,470 34.1 10.51	AIr 296.7 [1194.7 517.6 91.476]
Mean: 8352 BOI M: 6.70	Mean: 8345 Air M: 34.08
ROIsd: 22.07	Airsd: 18.31
07497	07470
08872	0:879
POLAroot 22.22	POLAroot 20.22
HOTArea, 52.52	HOTATea: 52.32

RF Coil Performa	ance Evaluation		-	2		Test Date:	9/	1/2008		
Coil: Wrist HD				=)		Model:	B	BC-10		
Mfg.: Mayo Clinic			V	-		Revision:				
Mfg. Date:	Coil ID: 1775		-	1 and	194	SN:	3HF	310R006		
Phantom: Small wrist bott	le.						# of Cha	annels <u>1</u>		
SequenceTRSE300	TEPlaneFOV20C20	N 25	x Ny 6 25	6	BW 15.6	NSA TI	hickness 3	Gap _		
Coil Mode:         HD WristCoil         TX gain:         152         R1:         10         R2:         29										
	Ana Measured Data	ilysis o	of lest in	lage	C	alculate	d Result	te		
	Back	Noise	Noise	-	Mean	Normal-	Max	Uni-		
Label         Mean         Max           N         6,094         8,725	1,533 -2.3	15.85	NEMA	[	271.9	611.8	389.3	29.9%		
A 6,096 8,731	1,532 19.3	10.52	Air		379.7	854.4	543.9	29.9%		
Mean: 6094 ROI M: -2.32 ROIsd: 15.85 01533 03725 03731										
ROLA	rea: 65.79		ROI Are	a: 65.	79					
l										

<b>RF Coil Performance Evaluation</b>	Test Date: 9/1/2008								
Coil: Wrist HD	Model: BC-10								
Mfg.: Mayo Clinic	Revision:								
Mfg. Date: Coil ID: 1775	SN: 3HB10R006								
Phantom: Small wrist bottle.	# of Channels 1								
SequenceTRTEPlaneFOVNxNyBWNSAThicknessGapSE30020S2025625615.613-									
Coil Mode:       HD WristCoil         TX gain:       153       R1:       0       R2:       29									
Analysis	of Test Image								
Measured Data Back Nois	e Noise Mean Normal- Max Uni-								
Label Mean Max Min ground SD	Type         SNR         ized         SNR         formity           NEMA         238.4         536.5         235.0         20.19/								
N         6,009         8,526         1,515         -2.1         18.00           A         6,071         8,532         1,515         19.4         10.38	NEWIA         238.4         550.5         555.0         50.1%           3         Air         383.3         862.4         538.6         30.2%								
Mean: 6069 ROI M: -2.0	09 Mean: 6071 Air M: 19.35								
ROIsd: 18.0	Airsd: 10.38								
<mark>⊙ 85</mark> 26	O 85 <mark>62</mark>								
01518	01515								
ROI Area: 67.13	ROI Area: 67.13								

## Appendix A: Magnet Homogeneity Field Maps GE Site - Signa 3 Excite HD 1.5T - 3 central planes Measured September 1, 2008

eft-



AX10L											
DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV					
10	-8.3	5.2	13.5	0.11	-1.40	3.2					
15	-14.3	7.4	21.6	0.17	-2.58	5.1					
20	-22.2	8.5	30.7	0.24	-4.39	7.1					
25	-32.6	8.6	41.2	0.32	-7.05	9.7					
28	-45.2	8.6	53.7	0.42	-9.21	11.6					
30	-58.1	8.6	66.7	0.52	-10.87	13.1					

Coronal									
DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV			
10	-1.3	4.9	6.2	0.05	0.87	1.3			
15	-2.2	9.2	11.4	0.09	1.94	2.3			
20	-5.1	15.1	20.1	0.16	3.43	3.8			
25	-11.6	23.6	35.2	0.28	5.39	5.8			
28	-18.0	38.5	56.5	0.44	6.84	7.6			
30	-25.4	56.2	81.6	0.64	7.93	9.1			



Coronal Right

Sagittal									
DIAMETER	MIN	MAX	RANGE	PPM	MEAN	STDEV			
10	-5.5	5.1	10.6	0.08	0.83	2.1			
15	-11.2	9.1	20.3	0.16	0.50	3.7			
20	-18.0	14.5	32.5	0.26	-0.00	5.8			
25	-26.8	23.7	50.5	0.40	-0.66	8.4			
28	-34.2	37.3	71.5	0.56	-1.13	10.5			
30	-44.1	52.6	96.8	0.76	-1.46	12.2			

### Appendix A: Magnet Homogeneity Field Maps GE Site - Signa 3 Excite HD 1.5T Measured September 1, 2008







# **Axial Field Plots**



# **Coronal Field Plots**





### **Appendix B: RF Slice Profiles and Crosstalk**

Spin Echo TR/TE = 400/12BW = 19.23 KHz nex = 1 Scan time: 1:43



### **Appendix B: RF Slice Profiles and Crosstalk**

Spin Echo - T1 MEMP TR/TE = 650/10FLIP =  $63^{\circ}$ BW = 19.23 KHz nex = 1 Scan time: 2:47



### Appendix B: RF Slice Profiles and Crosstalk

GRE - In Phase TR/TE = 200/2.1FLIP =  $80^{\circ}$ BW = 83.32 KHz nex = 4Scan time: 3:25



### **GE Site**

## Coil Used: Head Split Top

	Sagittal Locator					
1	Length of phantom, end to en	nd (mn 148± 2)	14	8.4	= 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	0.9	0.9
3	(1.10, 1.00, 0.90 mm)	1.0	1.0	1.0	0.9	0.9
4	Slice Thickness Top	52.2	52.4	54.9	51.9	45.6
5	(fwhm in mm) Bottom	53.1	52.8	57.4	53.3	44.0
6	Calculated value 5.0±0.7	5.26	5.26	5.61	5.26	4.48
7	Wedge (mm) = + = -	-1.2	-1.2	-1.1	-1.2	-1.3
8	$\square$	191.1	191.1	191.1	191.1	191.0
9	$\ominus$	191.1	191.1	191.2	191.1	191.4
	Slice Location #5	]				
10	$\square$	190.9	190.9	190.9	190.9	190.8
11	Diamotor (mm) (190+2) $\Theta$	191.0	191.0	191.0	190.9	191.2
12		190.8	190.8	190.8	190.9	191.2
13		190.6	190.6	190.5	190.6	190.6
	Slice Location #7	]	-,			
14	Signal Big ROI	4412	4606	2363	4525	1701
15	(mean only) High	5119	5299	2762	5272	2079
16	Low	3140	3303	1538	3112	1193
17	Uniformity (>87.5%)	76.0%	76.8%	71.5%	74.2%	72.0%
18		70.070	70.870 24.8 + 12.47	71.370 23.9 + 11.87	74.270 25.1 + 13.51	$26.7 \pm 13.20$
19	Background Noise Bottom	$241.7 \pm 11.10$	$24.3 \pm 12.47$ 26.8 ± 14.43	$23.9 \pm 11.37$ 24.2 ± 11.73	$26.1 \pm 13.01$	$26.7 \pm 13.20$
20	(mean +std dev) Left	$51.8 \pm 16.93$	54.1 + 17.94	$39.9 \pm 17.34$	$26.1 \pm 14.80$	$28.5 \pm 14.58$
21	Right	$48.2 \pm 17.19$	40.1 + 16.82	$325 \pm 1541$	20.1 = 11.00 21.3 + 14.85	$30.7 \pm 15.11$
22	Chosting Patio (~2.5%)	0.6%	0.5%	0.5%		0.2%
23	SNR (no spec)	352	3/2	200	3/1	132
20		332	542	200	541	152
	Low Con Detectability					
24	Slice Location #8 1.4%	10	10	8	10	0
25	Slice Location #9 2.5%	10	10	8	10	9
26	Slice Location #10 3.6%	10	10	10	10	10
27	Slice Location #11 5.1%	10	10	10	10	10
28	Total # of Spokes (>=9)	40	40	36	40	29
	Slice Location #11	]				
29	Wedge (mm) = + = -	-1.9	-1.8	-1.9	-1.9	-2.1
30	Slice Position Error	-0.7	-0.6	-0.8	-0.7	-0.8

The low uniformity is expected because I did not use any homogeneity correction.

Signa 3 9/1/2008

Test Date:

43

# GE Site

## Sequence parameters

Coil Used:Head Split Top

# Signa 3

Test Date: 9/1/2008

Test ID 339

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	19.2	2:09
					1					1			1
ACR PD	Dual Echo SE	2000	20	25	1	11	5	5	1	256	256	19.2	8:32
ACR T2	Dual Echo SE	2000	80	25	1	11	5	5	1	256	256	19.2	8:32
					-								
Site T1	SE	400	12	24	1	11	5	5	1	256	256	19.2	1:43
													1
Site T2	FSE(20)	3617	123	24	1	11	5	5	2	256	256	31.2	1:32

Magnet ID: 112

Coil ID: 905

TestID: 339



### ACR PD



### ACR T2







# 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 15.6 KHz. 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<sup>2</sup>). 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 PURE, CLEAR or SCIC).

*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.