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GE Medical Systems

Technical Publications

Direction 2329893
Revision 0

APA2 Upgrade Installation

Operating Documentation

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent, have notation **"damage in shipment"** written on **all** copies of the freight or express bill **before** delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage **MUST** be reported to the carrier **immediately** upon discovery, or in any event, within **14** days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this **14** day period.

Immediately complete a "Damage Loss Claim Form", available via MS Exchange Mail, after the damage is found.

MS Exchange Path:

Outlook/Public Folder/All Public Folders/Medical Systems/!Global Initiatives/Information Management/Forms/Common Forms/DAMAGE LOSS CLAIM FORM.

Send the completed form to the email address listed in the form.

For more information about the Transportation Claim Procedure, access the GE Medical Systems Intranet and enter the following URL address (case sensitive):

ftp://3.87.40.2/globepro/qualsys/Docs/190016MF.PDF

Rev. 11/15/2000

Direction 2128126 - Language Policy For Service Documentation, Rev 0

W A R N I N G

- **THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.**
- **IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.**
- **DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.**
- **FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.**

AVERTISSEMENT

- **CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.**
- **SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.**
- **NE PAS TENTER D'INTERVENTION SUR LES ÉQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ÉTÉ CONSULTÉ ET COMPRIS.**
- **LE NON–RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPÉRATEUR OU LE PATIENT DES BLESSURES DUES À DES DANGERS ÉLECTRIQUES, MÉCANIQUES OU AUTRES.**

WARNUNG

- **DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.**
- **FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.**
- **VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.**
- **WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.**

AVISO

- **ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS**
- **SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.**
- **NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.**
- **LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.**

ATENÇAO

- **ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.**
- **SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.**
- **NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.**
- **O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A' CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.**

AVVERTENZA

- **IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.**
- **SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.**
- **SI PROCEDA ALLA MANUTENZIONE DELL'APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.**
- **NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL'ADDETTO ALLA MANUTENZIONE, ALL'UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.**

警告

- このサービスマニュアルは英語版しかありません。
- GEMS以外でサービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
- このサービスマニュアルを熟読し、理解せずに装置のサービスを行わないでください。
- この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

注意:

- 本维修手册仅存有英文本。
- 非 GEMS 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。
- 未详细阅读和完全了解本手册之前，不得进行维修。
- 忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

REVISION HISTORY

REV	DATE	PRIMARY REASON FOR CHANGE
A	Feb 20, 2002	Preliminary version
0	Apr 11, 2002	Initial release

PAGE	REV	PAGE	REV	PAGE	REV	PAGE	REV
Title Page	0						
Damage in Trans.	-						
Direction 2128126	0*						
5 to 19	0						

* This revision/letter corresponds to the indicated document's revision control system.

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1- PURPOSE

This document describes the installation/replacement of the modified Preamp Protection, Driver-Splitter Box, and cables to the 1.5T system for the APA2. The configuration file will need to be updated. After this kit is installed, the system will have two additional new capabilities.
1) It will be able to hard bias off any coil in the CTL array. Currently the lack of sufficient control lines may leave some coil elements floating when they should be hard biased off.
2) In conjunction with the prescan APA2 software in Twin/LEO1/(9.0), if the user so chooses, the system will determine which coils are providing useful signal within the selected FOV and hard bias off all other coils.

Both will reduce coil coupling and reduce artifact propagation among the coils.

This document provides instructions for installing the following option catalogs:

M3033KH - Adaptive Phased Array (APA2) for Upgrades 1.5T
M3033KK – Adaptive Phased Array (APA2) for Forward Production 1.5T

1-1 Effectivity

- LCC and non-LCC magnets with Low Profile Carriage Cover
- Requires 9.0 software or higher

1-2 Parts List

Refer to table 1-1 for parts included in above catalogs.

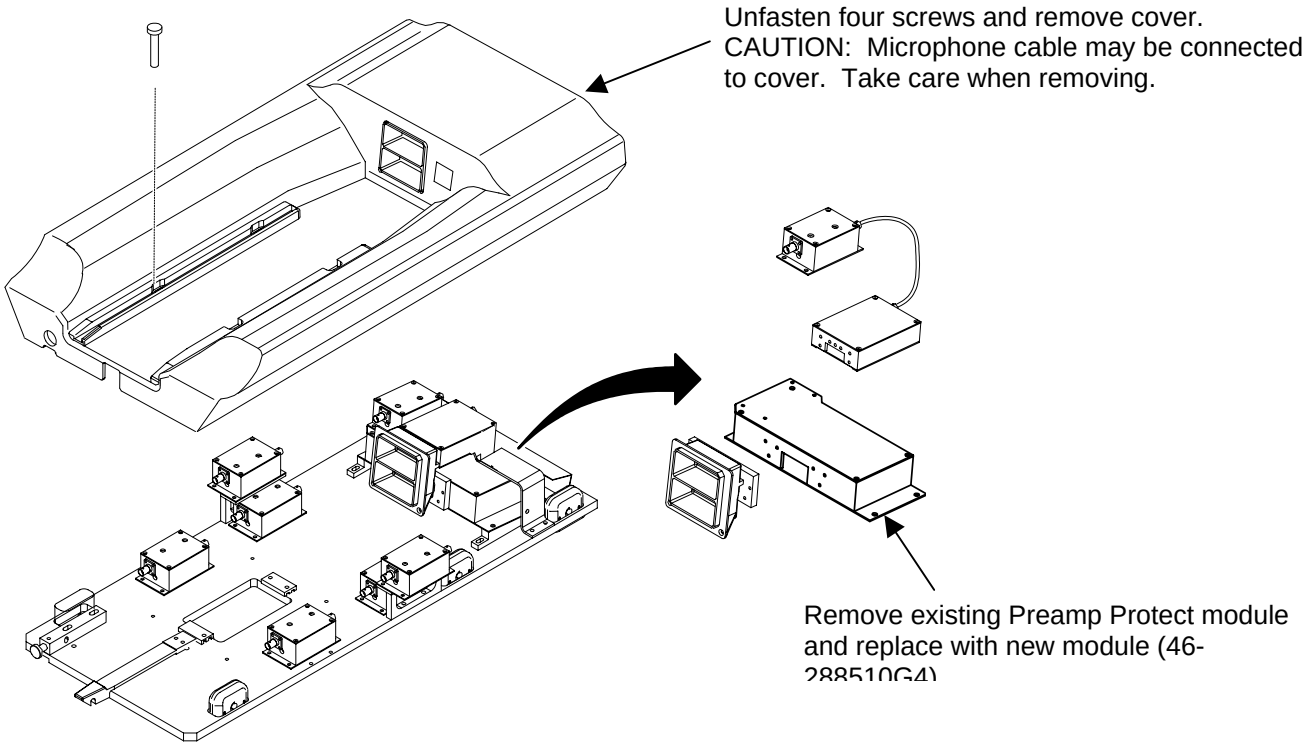
TABLE 1-1
PARTS LIST

#	Description	Quantity	Part Number	Notes
1	Drive Splitter Asm	1	2308832	
2A	SRI Intercept Cable	1	2308144	Install if site does not have new style SRI. If site has new style SRI, install 2308245.
2B	Cable, MG2-A33-J12 to MG3-A37-J2	1	2308245	Install if site has new style SRI with a J12 connection.
3	Cable, MG3-A36-J19 to MG3-A37-J1	1	2307994	
4	LPCC 1.5T Preamp Protect Asm APA2	1	46-288510G4	Install only for sites that are being upgraded. Site must have LPCC. (Part of M3033KH only)
5	M4 x 6mm Screw	2	2109873-12	
6	M6 x 30mm Screw	2	2109874-23	
8	M6 x 12mm Washer	2	2109878-3	
9	M6 Nut	2	2109875-3	
10	Insulator Mounting Bracket	1	2308830	
11	Write-on Label for marking cables	1	46-208781P2	Used for rerouting existing Run 736 to J19 on Drive Splitter Assembly.

2 – INSTALLATION PROCEDURE

2-1 Preamp Protection Installation (M3033KH Field Upgrade ONLY)

Replace the existing Preamp Protection Box (46-288510G3) with the new Preamp Protection Box (46-288510G4). Refer to Signa Carriage Cover Upgrade to Low Profile Carriage Cover (LPCC), Direction 2256047. This manual can be found on the MR Service Methods CD-ROM or the MR Service Engineering web site.



2-2 Driver Splitter Box Installation

1) Remove covers from rear pedestal. Determine type of rear pedestal on site (welded or bolted)
2) Disconnect cable at J19 of Select switch (Slide Latch). See illustration 2-1 or 2-2.
3) Install Insulator Bracket, 2308830, and Drive Splitter Module, 2308832, per illustration 2-1 (welded) or illustration 2-2 (bolted).

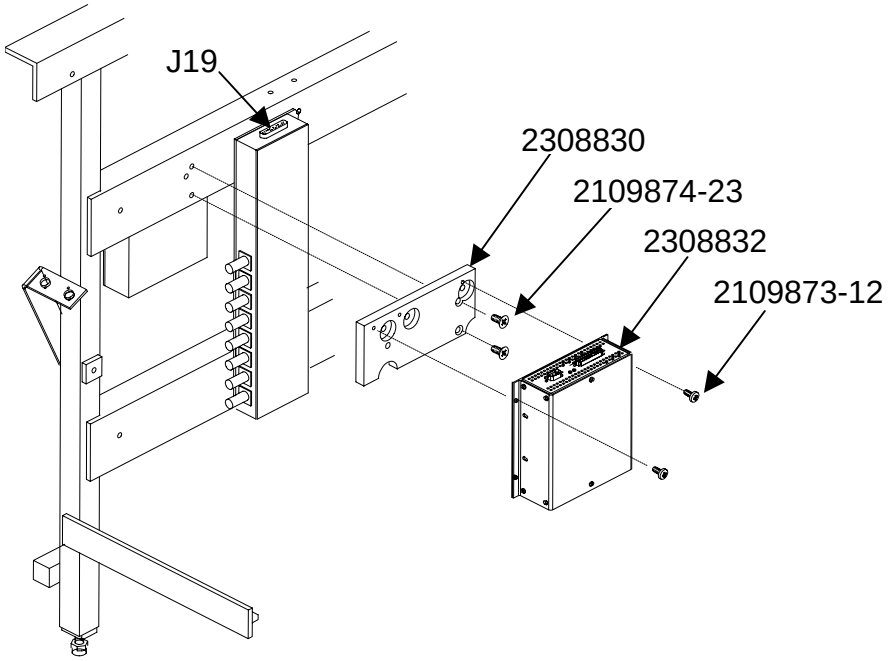


ILLUSTRATION 2-1
DRIVE SPLITTER MODULE INSTALLATION ON WELDED STYLE REAR PEDESTAL

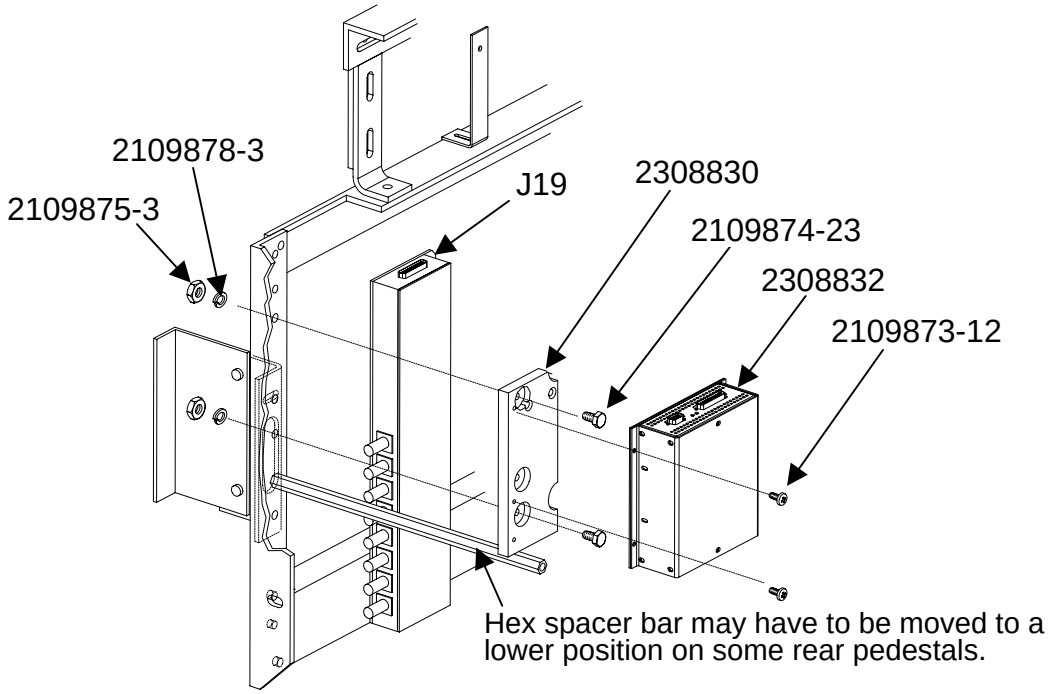


ILLUSTRATION 2-2
DRIVE SPLITTER MODULE INSTALLATION ON BOLTED STYLE REAR PEDESTAL

4) Connect cables to rear pedestal. See illustrations 2-3 or 2-4. Refer also to cable map in illustration 2-5.

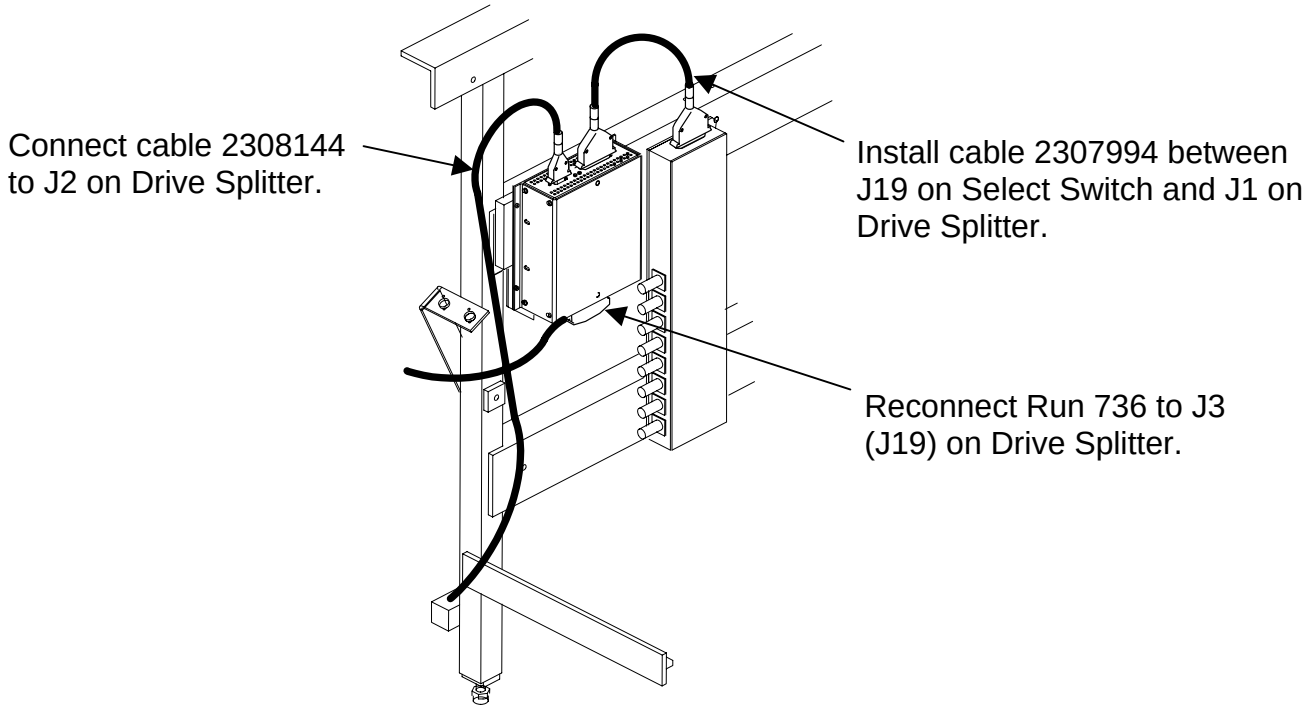


ILLUSTRATION 2-3
CABLE CONNECTIONS ON WELDED STYLE REAR PEDESTAL

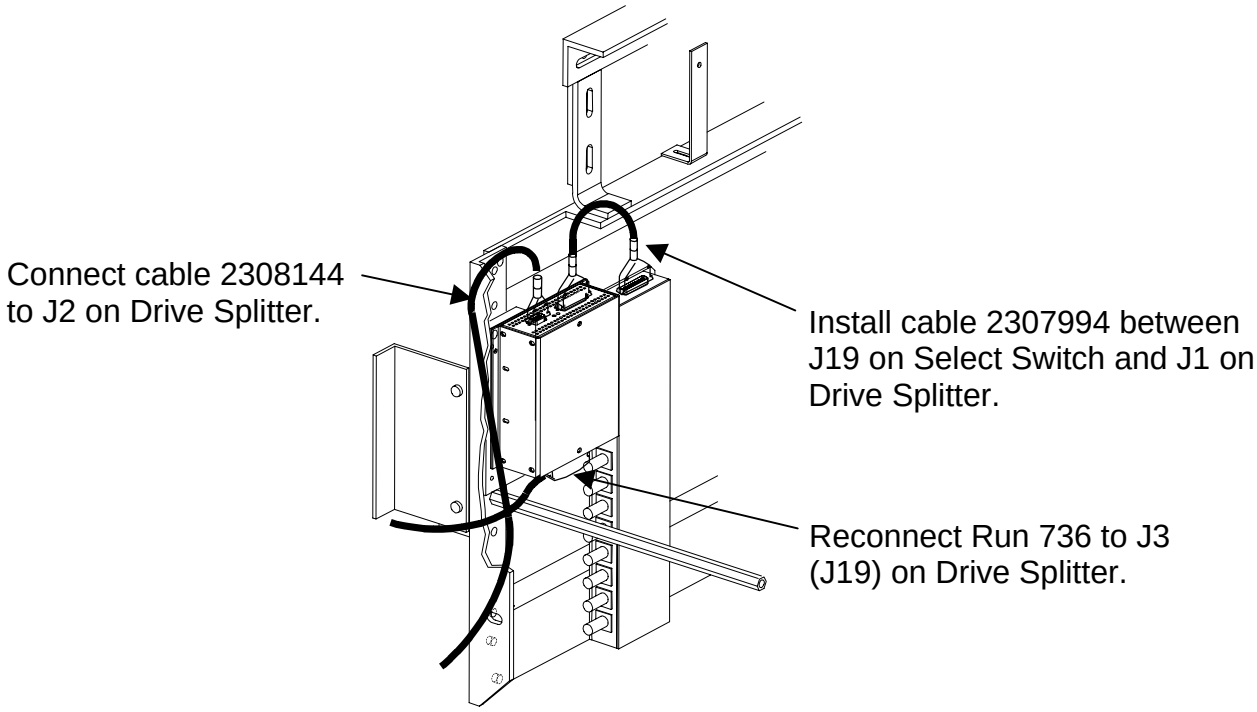
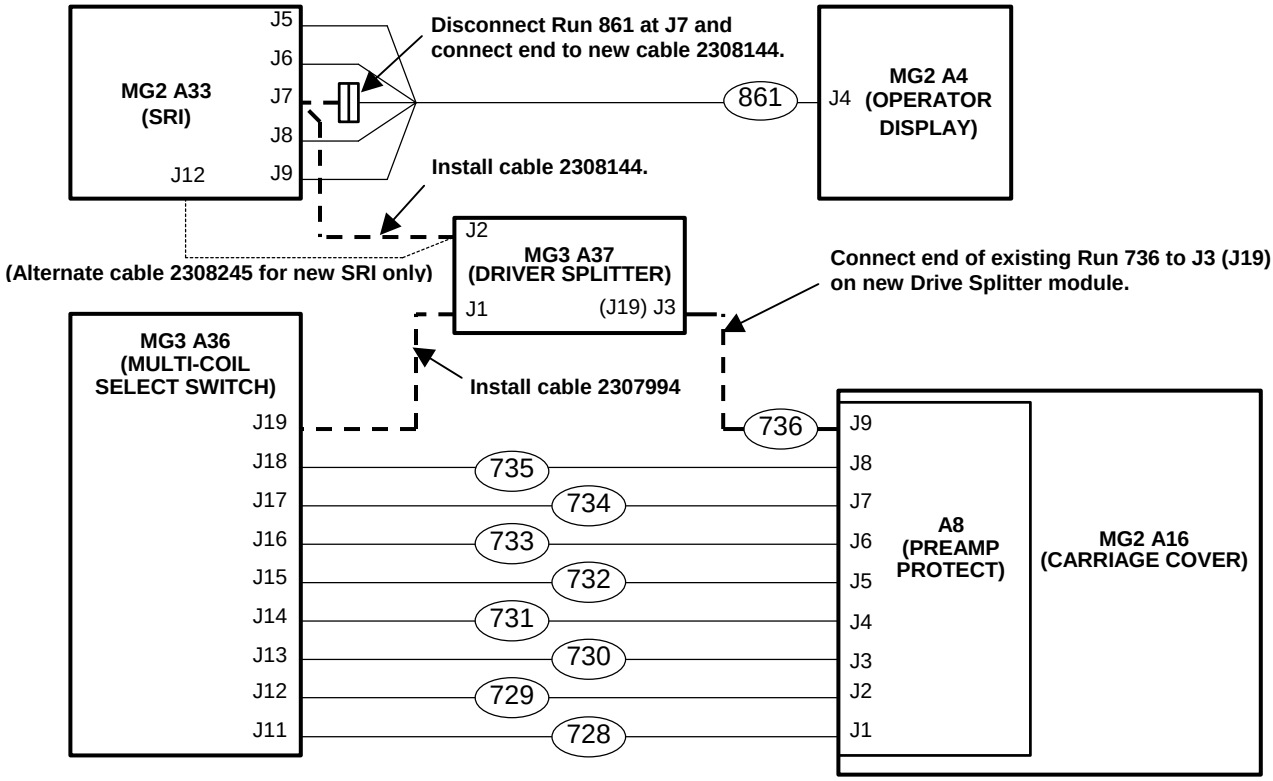


ILLUSTRATION 2-4
CABLE CONNECTIONS ON BOLTED STYLE REAR PEDESTAL

5) Locate SRI and disconnect cable at J7. Connect the intercept cable (2308144) to cable disconnected from J7 on SRI. Route 9 PIN sub-d cable to rear pedestal and connect to J2 of Driver Splitter box. Refer to illustration 2-5.



6) Test system after install and replace all covers.

3 - CONFIGURATION FILE INSTALLATION

3-1 Configuration

A new coil configuration parameter, mcSwitchSel, has been added for all coils for all field strengths. This new parameter is only relevant for 1.5T CTL coils. For 1.5T this parameter has certain default values for the (US)CTL coils. All other field strengths, all non-CTL coils have mcSwitchSel set to 0 (zero).

3-2 Summary

When the hardware is installed, a script called “update_for_apa_switch” is to be run. This script is written in perl. The script will update the mcSwitchSel entry for the CTL coils, thereby indicating that the hardware is present. See table 3-1.

In order to run the script the user must be in /w/config directory and must type "update_for_apa_switch". The script also makes a backup of the earlier template config files (CoilConfig.cfg.1.5T, CoilConfig.cfg.1.5T.crm, CoilConfig.cfg.1.0T) by naming them as:

- CoilConfig.cfg.1.5T.pre_apa
- CoilConfig.cfg.1.5T.crm.pre_apa
- CoilConfig.cfg.1.0T.pre_apa.

The config files could be restored if the hardware is removed.

After running the script, it is **very important to do a SaveInfo**

3-3 Procedure

1. *cd /w/config*
2. Run script by typing **update_for_apa_switch**
3. Check files in */w/config*

   The new modified files are;

   CoilCongif.cfg.1.5T
   CoilConfig.cfg.1.0T
   CoilConfig.cfg.1.5T.crm

   The previous files are saved as

   CoilCongif.cfg.1.5T.pre_apa
   CoilConfig.cfg.1.0T.pre_apa
   CoilConfig.cfg.1.5T.crm.pre_apa

   Note that the 1.0T coilconfig file is altered although APA2 is not available for 1.0T systems. The script was added to 9.0 software before the APA2 compatibility was determined. The script is intended only for a 1.5T system and the CoilConfig.cfg.1.0.T will be irrelevant.

4. Reboot. (Must reboot system for config changes to be seen by the system.)
5. **Saveinfo**

TABLE 3-1
COIL mcSwitchSel VALUES

Coil Name	***Before APA2 upgrade***	***After APA2 upgrade***
(US)CTLTOP	8	136
(US)CTLMID	0	128
(US)CTLBOT	1	129
(US)CS123	0	128
(US)CT234	8	136
(US)TL345	1	129
(US)LS456	0	128
(US)CS12	2	130
(US)TS34	0	128
(US)TL45	0	128
(US)LS56	4	132

4 - FUNCTIONAL CHECK FOR IIQ APA2

4-1 Purpose

This procedure will verify the functionality of Adaptive Phased Array (APA2) hardware and software to automatically detect and select the appropriate coil selection of elements in the CTL coils (both the Teledyne and USAI) for signal collection and to hard bias off those elements that should not be used.

In order to verify functionality a series of 9 scans will be collected at different locations with different Fields of Views (FOVs) and the resultant image will be viewed.

Prescribe the following protocol:

TABLE 4-1
PROTOCOL

Patient ID:	geservice	**Freq:**	256
Patient Name :	APA2	**Phase:**	128
Patient Weight:	300	**NEX:**	2
Landmark :	Xyphoid	**Phase FOV :**	1
Patient Position :	Supine	**Freq DIR:**	A/P (shows annefact better than S/I)
Patient Entry :	Head First	**Auto Center Freq:**	Water
Coil :	(US) CTLTOP, MID, or BOT	**Autoshim**	off
Series Description :	APA2 test	**# Acqs Before Pause:**	0
Plane :	Sagittal	**FOV:**	18, 36, or 48cm
Pulse Sequence :	2D	**Slice Thickness:**	5
Imaging Options :	FSE	**Spacing:**	5
Number of Echoes :	1	**Start =**	0
TE :	17	**End =**	0
TR:	500	**Number of Slices:**	1
Echo Train Length:	16	**User CVs:**	UserCV10 =1
Bandwidth:	15.6	**User CVs:**	UserCV24=1

4-2 Procedure Overview

Using the protocol in Table 4-1 a series of 9 scans will take place at a particular FOVs and a specific landmark (see illustration 4-1).

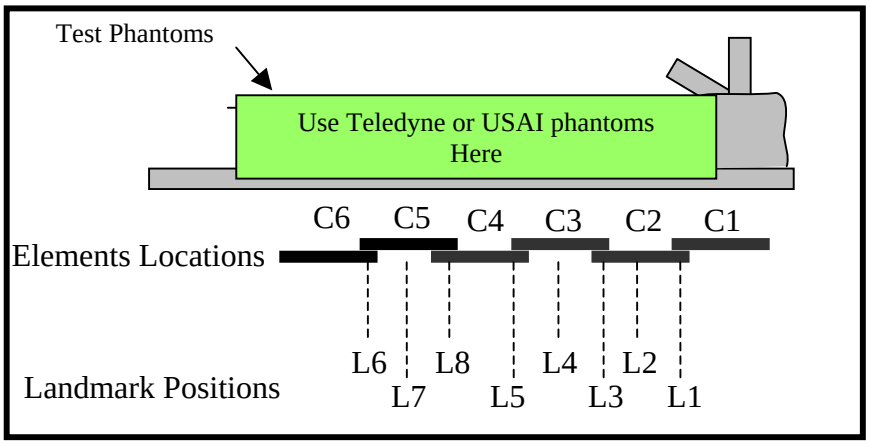


ILLUSTRATION 4-1
SPECIFIC LANDMARKS FOR FOV'S

TABLE 4-2
CORRESPONDING IMAGE SET

Series	Coil Name	FOV	Landmark (see illus. 4-1)	USAI CTL Landmark	Teledyne CTL Landmark	Compare with
1	(US)CTLTOP	18	L1	16	Between ball 1&2	Image set 1
2	(US)CTLTOP	36	L2	22	Center of ball 2	Image set 2
3	(US)CTLTOP	48	L3	28	Between balls 2&3	Image set 3
4	(US)CTLMID	18	L3	28	Between balls 2&3	Image set 4
5	(US)CTLMID	36	L4	35	Center of ball 3	Image set 5
6	(US)CTLMID	48	L5	40	Between balls 3&4	Image set 6
7	(US)CTLBOT	18	L6	65	Between balls 5&6	Image set 7
8	(US)CTLBOT	36	L7	59	Center of ball 5	Image set 8
9	(US)CTLBOT	48	L8	52	Between balls 4&5	Image set 9

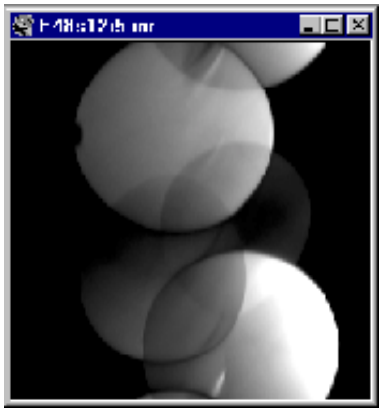
4-3 Procedure

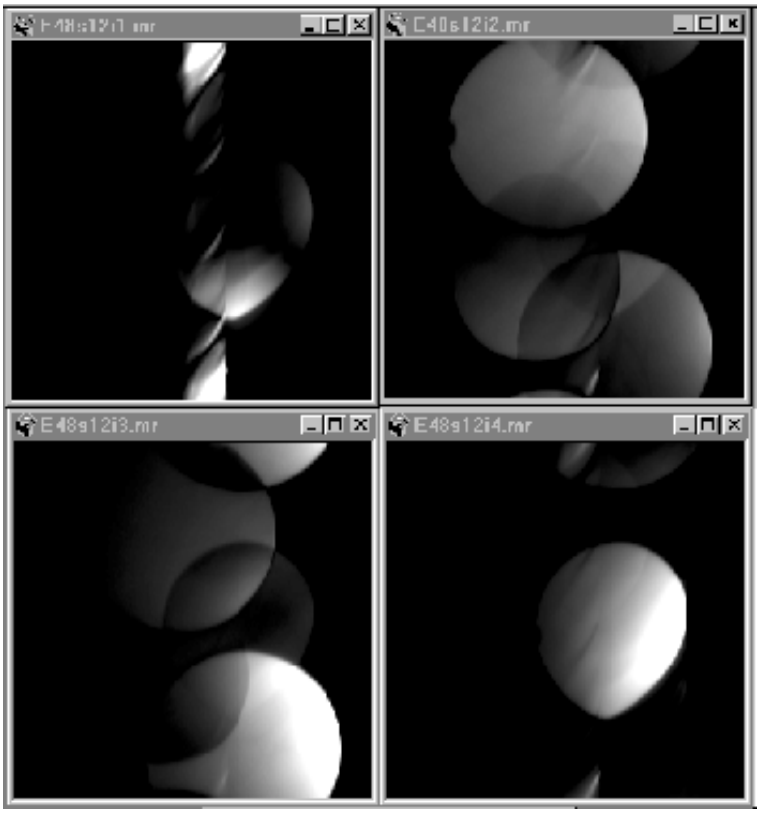
1. Setup the base protocol from Table 4-1 and coil name, FOV, and landmark from Table 4-2. (Note: If USAI CTL, use USCTLxxx. If Teledyne CTL, use CTLxxx)
2. Select from Research Options - Display CVs and type in for CV Name “saveinter”. Then change the values from 0 to 1.
3. Select from Research Options – Download.
4. Run each series changing Coil Name, FOV, and Landmark per Table 4-2
5. After each series is acquired view it in the Image Browser using a 4x4 format. Compare the acquired image set to corresponding image set listed in Table 4-2.
6. The important feature to look for in the image set is to make sure that the elements that should be turned hard-off by APA2 have very little signal (see Example 1). If the pattern of images biased hard-off by APA2 do not correspond with the reference image set from Table 4-2 it is likely that there is a cabling error or faulty APA2 hardware (less likely) and corrective action needs to be taken by the FE.
7. After completing Series 1 copy & paste it for each succeeding series (2 through 9) making the changes reflected in Table 4-2 and checking its corresponding image set for correctness.

NOTE: A new AutoPrescan must be run for each Series since this is where APA2 does its coil selection.

Example of artifact propagation without and with APA using the GE phantom and A/P frequency direction.

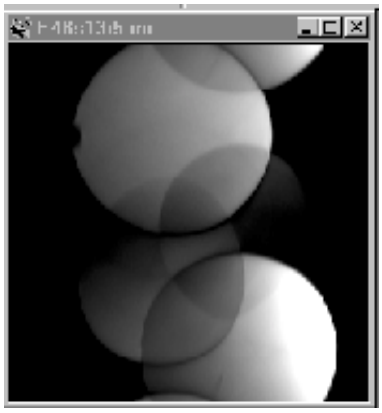
Without APA2* and using CTLTOP with an 18cm FOV, all coils are active and annefact propagates freely through the coil array.
Note coil elements connected to receivers 0 & 3 are not biased hard-off. They still have some signal.

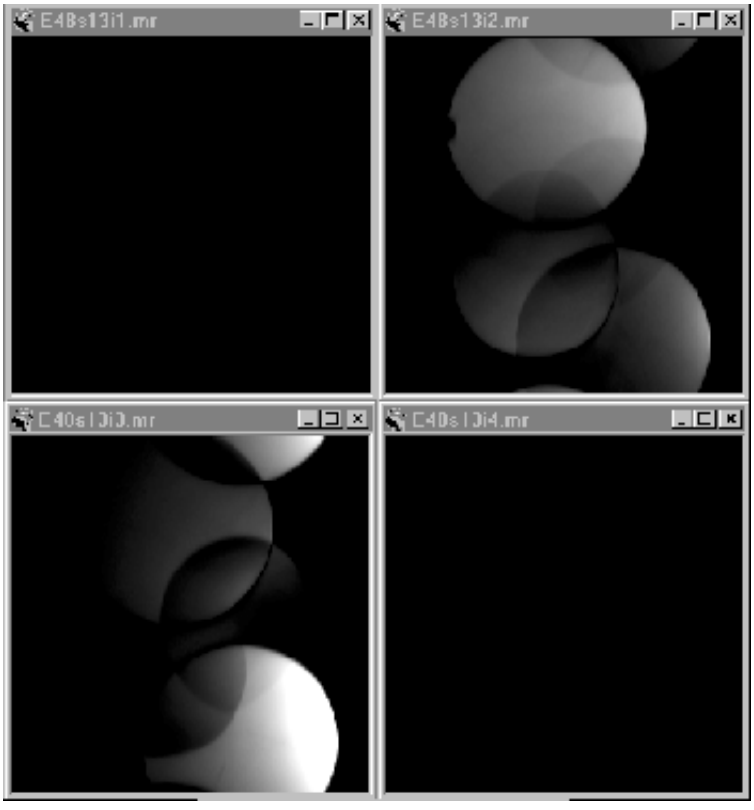




Combined image
*THIS IS BEFORE THE INSTALLATION OF THE APA2 HARDWARE AND RUNNING THE SCRIPT “UPDATE_FOR_APA_SWITCH”.

With APA2, only the receivers within the 18cm FOV are used. Note the two intermediate images that have no signal. Annefact has been significantly reduced in the active coils.
Note coil elements connected to receivers 0 & 3 are biased hard-off. No signal present.

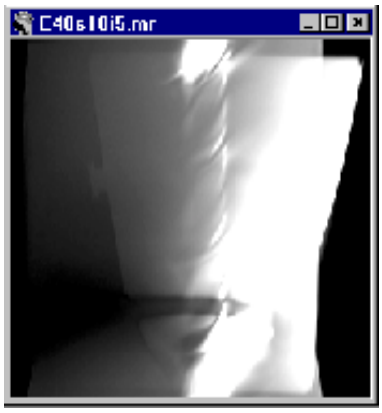




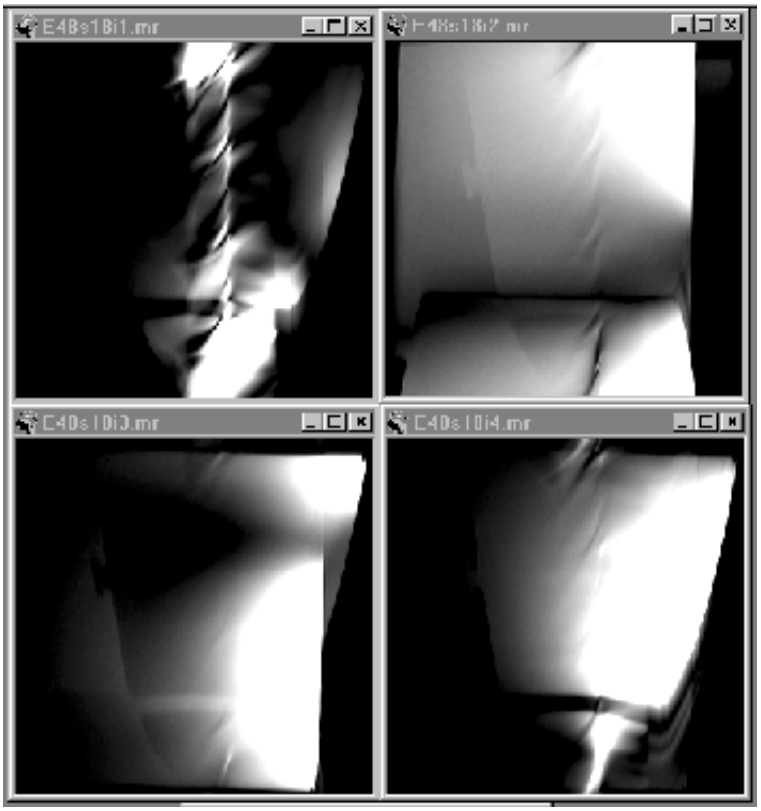
Combined image

Another example of artifact propagation without and with APA using the USAI phantom and A/P frequency direction.

Without APA2 and using USCTLTOP with an 18cm FOV, all coils are active and annefact propagates freely through the coil array.

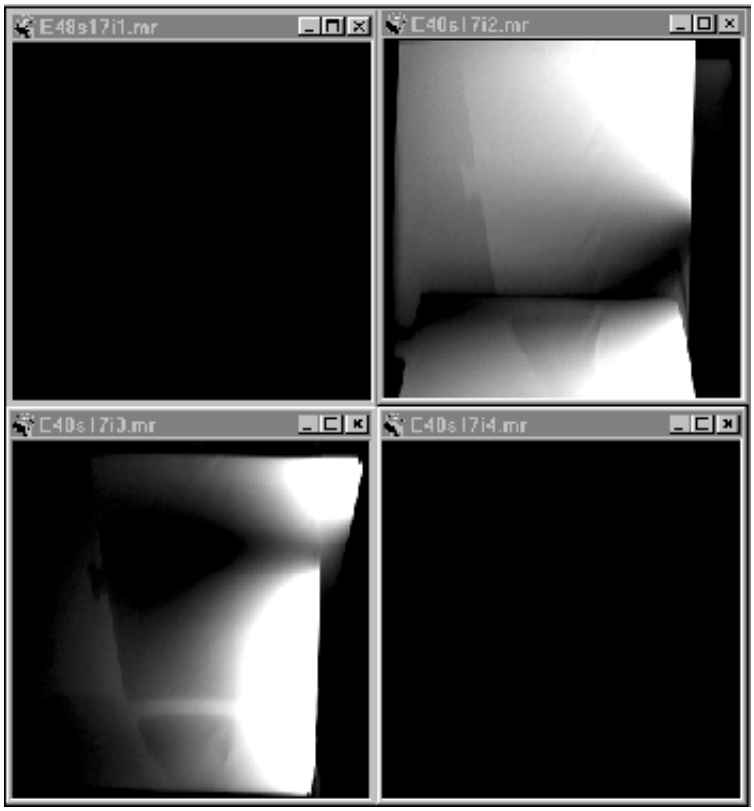


Combined image



With APA2, only the receivers within the 18cm FOV are used. Note the two intermediate images that have no signal. Annefact has been significantly reduced in the active coils.

Combined image



The following collection of image sets can be used to compare with your results to see if the APA is functionally correct:

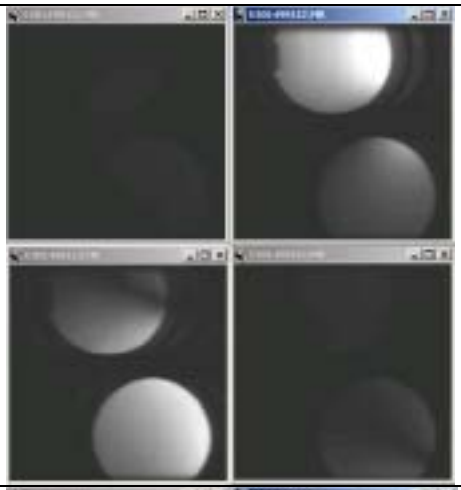
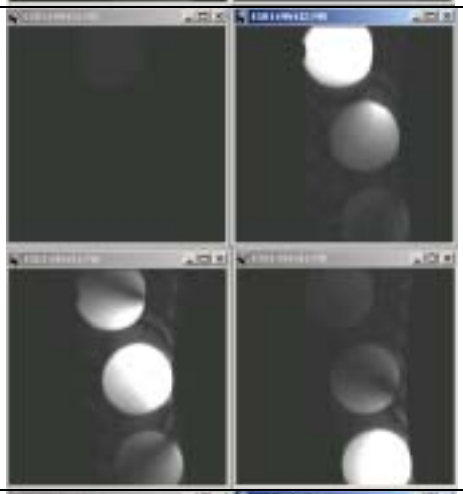
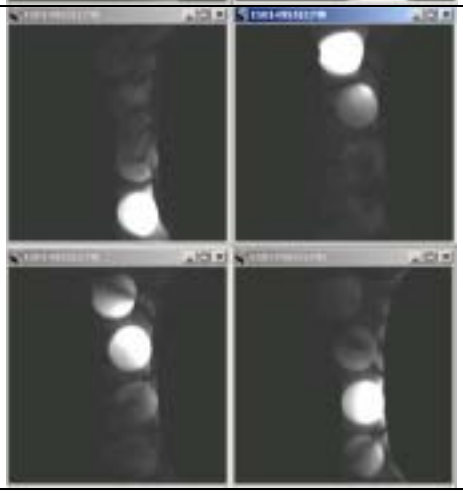
Image set 1 (US)CTLTOP 18 FOV Should have only 2 active elements	
Image set 2 (US)CTLTOP 36 FOV Should have only 3 active elements	
Image set 3 (US)CTLTOP 48 FOV Should have 4 active elements	

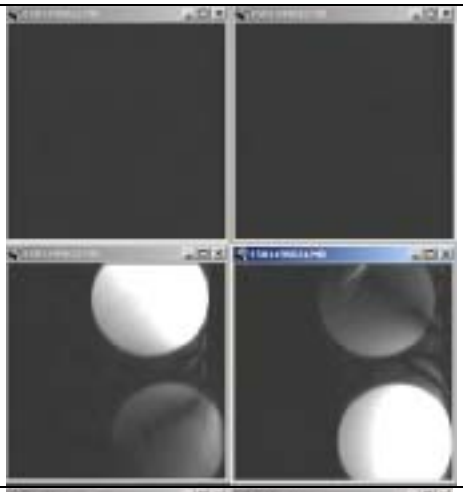
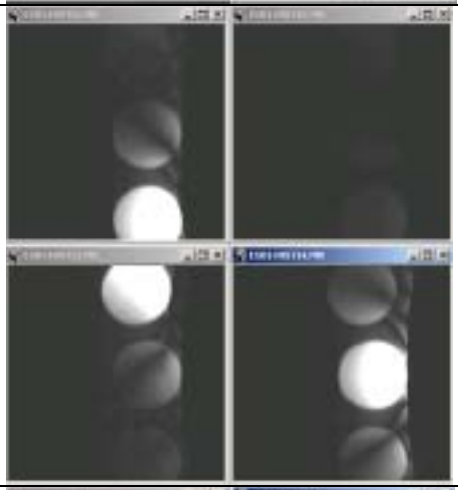
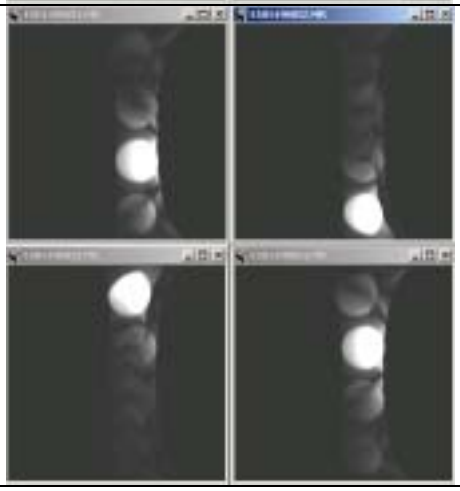
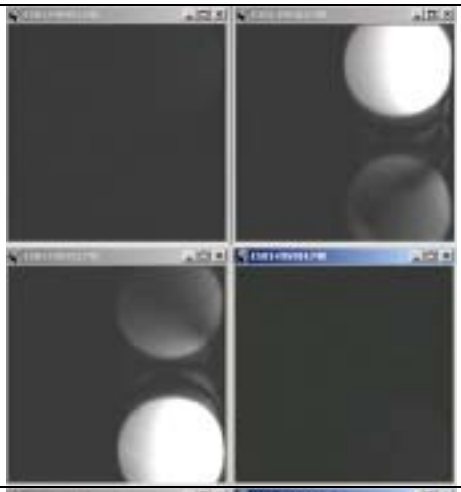
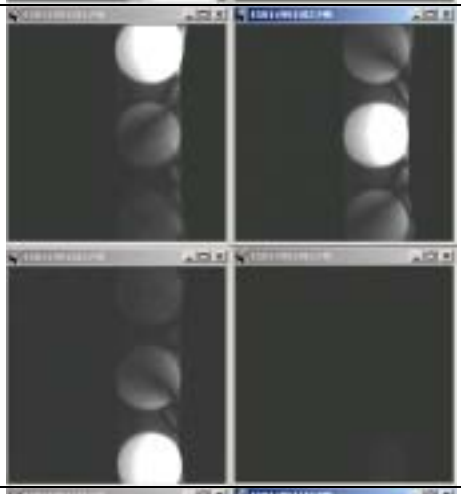
Image set 4 (US)CTLMID 18 FOV Should have only 2 active elements	
Image set 5 (US)CTLMID 36 FOV Should have only 3 active elements	
Image set 6 (US)CTLMID 48 FOV Should have 4 active elements	

Image set 7 (US)CTLBOT 18 FOV Should have only 2 active elements	
Image set 8 (US)CTLBOT 36 FOV Should have only 3 active elements	
Image set 9 (US)CTLBOT 48 FOV Should have 4 active elements