



***GE Advantx 1
PlatinumOne
Cardiac Generator
Interface***



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| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
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Table of Contents

| | | |
|--------|--|----|
| 0.0 | Revisions..... | 3 |
| 1.0 | Purpose..... | 3 |
| 2.0 | Scope..... | 3 |
| 3.0 | References and Forms..... | 3 |
| 4.0 | Equipment and Materials | 3 |
| 5.0 | Responsibilities..... | 3 |
| 6.0 | Definitions..... | 3 |
| 7.0 | Instructions..... | 4 |
| 7.1 | Overview..... | 4 |
| 7.2 | Operational Issues..... | 5 |
| 7.3 | X-Ray Generator Requirements..... | 5 |
| 7.3.1 | Image Gate..... | 5 |
| 7.3.2 | Cine Film Camera..... | 5 |
| 7.4 | Modifications | 6 |
| 7.4.1 | Position the <i>PlatinumOne</i> Components | 6 |
| 7.4.2 | Video Display Monitors and Supports..... | 6 |
| 7.4.3 | VIC Image Gate Modifications..... | 6 |
| 7.4.4 | Replacing the Existing Video Camera..... | 7 |
| 7.4.5 | Reprogramming of the Advantx 1 system. | 7 |
| 7.4.6 | Cine / PS Control board (A1) modifications: | 7 |
| 7.4.7 | Cine Power Amp board (A2) modification..... | 8 |
| 7.4.8 | Image Processor Board Modification | 9 |
| 7.4.9 | Iris Control Board Modification | 9 |
| 7.4.10 | Image Processor Board Modifications..... | 9 |
| 7.4.11 | PlatinumOne Signal Connections | 10 |
| 7.5 | Configuring the PlatinumOne System | 11 |
| 7.5.1 | PlatinumOne System Configuration | 11 |
| 7.5.2 | Calibration and Testing of <i>PlatinumOne</i> Systems..... | 14 |
| 7.5.3 | Fluoro Dose Calibration..... | 15 |
| 7.5.4 | Cine Dose Calibration..... | 15 |
| 7.5.5 | Cine Framing Adjustment..... | 15 |
| 8.0 | Appendixes | 16 |
| 8.1 | Image Processor Board Modification Diagram | 16 |
| 8.2 | Interconnection Diagram | 17 |
| 8.3 | Shadow Artifact Correction | 18 |

| | | |
|--|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

0.0 Revisions

[Click here to view Revisions](#)

1.0 Purpose

The purpose of this document is to provide the information necessary to interface the PlatinumOne Cardiac system with a GE Advantx 1 host x-ray system.

2.0 Scope

This document contains interface information for InfiMed PlatinumOne Cardiac on the Advantx 1 (LFX, MPPU and SCPU) host X-ray Generator for digital fluoroscopy and cine image acquisition only. This interface does not apply to the Advantx E. All support documentation; InfiMed product Technical manuals, X-ray generator documents, and drawings must be on hand when performing the interface.

3.0 References and Forms

GE Medical Systems Advantx Cine Schematics. Direction 46-019464.

4.0 Equipment and Materials

The following a parts list of required additional components.


- ◆ Barrier Strip, 16 connection or greater.
- ◆ 26 ga. hookup wire.
- ◆ 20 ga. Hookup wire.
- ◆ Adhesive glue.

5.0 Responsibilities

It is the responsibility of the InfiMed Customer Care team to insure that the instructions and procedures put forth in this document are sufficiently correct and complete.

6.0 Definitions

CPS1 Cine / Photo Spot Module 1
VIC Video In-room Controller

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|---|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

7.0 Instructions

7.1 Overview

The InfiMed *PlatinumOne* Cardiac Digital imaging system adds digital fluoroscopy digital and digital cine acquisition capabilities to the GE *Advantx 1 Cardiac* x-ray system.

For *Fluoroscopy*, the existing video camera and image display monitors are removed during the installation process and replaced with the *PlatinumOne* CCD camera and displays. Modifications are made to the Image Processor Board and Iris Control Board in the *VIC1* module to allow proper operation of the *PlatinumOne* system.

The digital *Cine* acquisition is accomplished by configuring the *Advantx 1* system for 35 mm cine film camera acquisition. The *CPS1 module hardware must be present* on the system and properly software configured. Most host x-ray systems will already have an existing 35 mm Arri camera, which ***is retained and will run*** during acquisitions.

Please Note:


Many of the HX intensifier systems have objective lenses that have experienced optical deterioration, which if sufficiently poor, will produce artifacts on the final digital images. It must be verified that the lens to be used does not contain this optical deficiency.

This implementation will display a shadow on the periphery of the fluoro and cine image field of view. This is due to the optical configuration of the InnoVision camera and the existing intensifier-collimating lens enhancing visualization of the photodiode light pickup. To remove this effect, refer to Appendix 8.4 of this document.

This interface utilizes the Doctor Preferences feature of the PlatinumOne Combo system. For each doctor created, the key settings are:
 General Acquisition: Auto Shutters=Off, Auto replay=Auto Replay, H & V Reverse = Off.

Fluoro: Integration Level = MC2 Frame Recursive, Edge level = 1.

Cine: Loop Acquisition Rate = 30 (Set Advantx Procedure Edit default rate to 30 fps to match), Edge = 1.

| | | |
|--|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

7.2 Operational Issues

There are some limitations related to the InfiMed /Advantx interface that should the customer should be aware of. Although minor in nature they may not allow the integrated system to meet GE or InfiMed stated product literature specifications.

- This interface supports 30 FPS and 15 FPS cine' acquisition. The user must select on both the PlatinumOne digital system and the Advantx operator console in order for the system to function correctly.
- The cine film camera must be installed and functional, but need not be used provided that the film magazine cover / bypass is installed.


7.3 X-Ray Generator Requirements

7.3.1 Image Gate

1. Simultaneous cine with the film camera requires a 50 / 50 beam splitter.
2. For Digital only cine, the Advantx system must be equipped with a dual port, pivot only optical distributor. The mirror component must be removed without disrupting the moving mechanism to allow the TV camera to view the output of the image intensifier during cine acquisition.

7.3.2 Cine Film Camera

An operational Cine film camera is required to perform this interface of the PlatinumOne to the Advantx 1 generator system. Modifications to allow the cine camera to run without film are listed in these instructions.

| | | |
|---|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

7.4 Modifications

7.4.1 Position the *PlatinumOne* Components


1. Unpack the components of the PlatinumOne system. Position, and connect the system as described in steps 2 through 4 of the PlatinumOne Technical Manual (726-106-G1).
2. The GIM should be mounted in the Kernel/VIC Cabinet (MPPU, LFX) in close proximity to the CPS1 Module, typically on the back wall frame of the system (positioner) cabinet.
3. Connect GIM power to SC1 TS1 (120VAC), TS2 (NEUT), and TS7 (GND). Many Advantx systems will have an existing power strip within the system cabinet that is already connected to this point.

7.4.2 Video Display Monitors and Supports

1. Disconnect and remove the existing OEM image display monitor(s) from the Advantx system. These items cannot be utilized with the P1 Combo System and will be permanently removed from the X-ray system. Angio and Cardiac systems, in particular, may require rebalancing of counterweights for overhead monitor suspensions. Be aware that either monitor *cars* or overhead *booms* most likely will require *replacement* or significant modification to be used with non-GE displays.

7.4.3 VIC Image Gate Modifications

1. The image gate must be a 3-port, pivot and rotate type mechanism. Remove the mirror without disrupting the moving mechanisms of the mirror assembly. Especially critical is the indexing of the feedback pot (take a measurement)
2. On the VIC3A2A1 Image Gate / NDF PCB, measure the following values for the position feedback, 1.25 VDC full CCW, 5VDC center, and 8.75 VDC full CW (TP2 to TP1). If these values are not +/- 5%, the Advantx will generate “image gate not in position” errors. In addition, “Bad Data Received” errors may result also.

| | | |
|---|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

7.4.4 Replacing the Existing Video Camera

1. Disconnect and remove the existing VIC video camera head. Pull back or cut the original camera head cable to a point in cable raceway. Store or discard the camera head. Assemble and mount the *PlatinumOne* InnoVision CCD camera to the optical distributor (Refer to Step 2 of *PlatinumOne* Installation Manual 726-106-G1). Install the 0.93 a-focal adapter (Included with the *PlatinumOne* system) and the image-housing mount at this time.
2. Connect the *PlatinumOne* LVDS camera cable to the CCD camera and the *PlatinumOne* system chassis per the instructions in the *PlatinumOne Service Manual, Camera Installation Tab, Step 2.*

7.4.5 Reprogramming of the Advantx 1 system.


Host x-ray systems currently using a plumbicon type video camera will require reprogramming of the Advantx configuration file to eliminate Bias Light Errors from occurring. A vidicon tube type tube must be selected.

7.4.6 Cine / PS Control board (A1) modifications:

Note: Steps 1 – 3 bring the *Prep sw, Exp sw, and +24 VDC RTN- Kernel* (Reference) signals from the GE real time bus to unused pins on the CPS1 A1 A20 back plane for easier access.

1. Using a length of 26 ga. hookup wire, connect A1 J1 A23 *Prep sw* (dwg. 46-232742-S sheet 4) to unused pin A1 J3 C16 (dwg. 46-275999-S sheet 1) **Prep.**
2. Using a length of 26 ga. hookup wire, connect A1 J1 C24 *Exp sw* (dwg. 46-232742-S sheet 4) to A1 J3 C17 (dwg. 46-275999-S sheet 1) Fluoro Expose.
3. Using a length of 26 ga. hookup wire, connect A1 J1 A24 *+24 VDC RTN- Kernel* (dwg. 46-232742-S sheet 4) to A1 J3 C15 (dwg. 46-275999-S sheet 1) **Return**

Note: Steps 4 and 5 remove the internal Cine Master clock and replace it with the *PlatinumOne* 30 Hz cine clock.

| | | |
|--|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

4. Disconnect pin 10 of IC U180 (Normally a socketed IC) (dwg. 46-232506-S sheet 5).
5. Using hookup wire, connect IC U231 pin 6 to unused backplane connector pin J3-A14 (dwg. 46-232506-S sheet 5).

Note: Step 6 brings the **ENABLE-PA** signal from the Cine controller board out to the to the A20 back plane connection for use as the REQUEST signal for PlatinumOne cine acquisition.

6. Using 26 ga. hookup wire, connect IC U184 pin 4 to unused backplane connector pin J3-C18 (dwg. 46-232506-S sheet 5).


7.4.7 Cine Power Amp board (A2) modification.

Note: Steps 1 and 2 of this modification re-routes the **ENABLE-PA*** signal from its normal back plane connection on A2 J3-A7 on the Cine Power Amp board. The signal is now introduced on pin A2 J3-B1 via the PlatinumOne Cine Enable relay. This modification inhibits cine exposure when the PlatinumOne is not ready to acquire cine images.

1. On solder side of the Cine Power Amp PCB, cut the trace connecting J3-A7 to resistors R16 and R17 (dwg. 46232508-S sheet 3).
2. Using a length of 26 ga. hookup wire, connect resistors R16 and R17 to unused backplane pin J3-B1.

Note: Steps 3 and 4 of this modification bypass the cine camera film interlock signals **Film Ind In** and **Intlk*** signals to allow the system to make "Filmless" cine.

3. Using a length of 26 ga. hookup wire, connect on the CPS1 backplane, A2J3-A17 (dwg. 46232508-S sheet 1) to A2J3-A28 (dwg. 46232508-S sheet 3). This connects INTLK* to PGND.
4. Using a length of 26 ga. hookup wire, connect on the CPS1 backplane, A2J3-C6 to A2J3-C24 (dwg. 46232508-S sheet 3). (dwg. 46232508-S sheet 1). This connects Film Ind In to +5V.
5. Replace the magazine with the ARRI magazine port cover, usually on site.

| | | |
|--|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

7.4.8 Image Processor Board Modification

Note: This modification is performed to accommodate an external synchronization clock for the 60 Hz pulsed fluoro used on GE Advantx Cath lab systems. The PlatinumOne system drives a 60 Hz clock synchronization signal to the Camera Interface Board that is used to replace the Advantx internal timing.

1. On the Camera Interface Board (VIC A9) cut the trace between IC U67 pin 13 and IC U137 pin 11. (dwg. 46-232760-S sheet 2)
2. Using 26 ga. hookup wire, connect IC 137 pin 11 to unused backplane pin J2-C16.

Note: The output frequency of the PlatinumOne Pulsed Fluoro Clock is configurable in the Service Application. The pulsed fluoro clock frequency must be set to 60Hz (See section 7.5 of this document).

7.4.9 Iris Control Board Modification

Note: This modification permanently sets the camera iris position signal into the ready state allowing the existing GE Fluoro camera to be removed.


1. Using 26 ga. Hookup wire, jumper TP2 and TP9 to TP11 on Iris Control board (VIC A4).

7.4.10 Image Processor Board Modifications

Note: This modification replaces the Advantx ABC DC fluoro brightness control signal with the PlatinumOne's ABS drive signal for fluoro dose control. Board A14 in the VIC module (dwg. 46-288426-S sheet 6) is modified as follows:
See diagrams in Appendix 8.1 of this document.

1. Lift pin 3 of AR670 or AR669 (Depending on board revision) out of board, lift end of R680 or R674 (Depending on board revision) that was connected to pin 3 out of board.
2. Using 26 ga. hookup wire, connect IC pin 3 and the lifted end of the resistor together and connect this point to unused backplane pin VIC A14 J1 B2. The input will be the PlatinumOne ABS signal.

Note: ABS range is 0VDC to +4VDC. +2VDC is the null or control point.

| | | |
|--|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

7.4.11 PlatinumOne Signal Connections

1. Attach a barrier terminal strip (16 positions or greater) to the aluminum support bars on the back of the CPS1 module.
2. Using 20 ga. hookup wire and the GIM interface cables supplied with the PlatinumOne system, connect the components of the Advantx to the PlatinumOne GIM via the intermediary terminal strip as listed in the table below.

Refer to the interconnection diagram located in appendix 8.2 of this document for additional interconnection detail.

| <u>Term #</u> | <u>From</u> | <u>ADVANTX Signal Name</u> | <u>PlatinumOne Signal Name</u> | <u>GIM Cable Connection</u> |
|---------------|--------------------------|----------------------------|--------------------------------------|--|
| 1 | VIC A14 J1-B2 | ABC DC | ABS+ | P20-1 |
| 2 | VIC A14 J2-C1 | GND | ABS Comm | P20-2 |
| 3 | VIC A9 J2-C16 | N/A | Fluoro Drive | P18-1 |
| 4 | VIC TS1-6 | LGND | Fluoro Rtn | P18-3 |
| 5 | VIC TS1-4 | +5V | Fluoro Pwr | P18-2 |
| 6 | CPS1 A2 J3-C24 (A,B,C25) | +5 VDC | Cine Power Rad Pulse On** | P18-5 P1 Port 4 Input 1+ |
| 7 | CPS1 A2 J3-B1 | Enable PA* 1 | Cine Enable Comm | P2 Port 2 – Com 2 |
| 8 | CPS1 A2 J3-C25 | LGND | Cine Drive Rtn | P18-6 |
| 9 | CPS1 A2 J3-C25 (A,B,C25) | LGND | Cine Select 2 Rtn Request Rad Rtn | P1 Port 5 Input 2- P1 Port 1 Input 3- |
| 10 | CPS1 A2 J3-C31 | SGND | Not Used | Not Used |
| 11 | CPS1 A1 J3 C18 | Enable PA | Request Rad Cine Select 2 | P1 Port 1 Input 3+ P1 Port 5 Input 2+ |
| 12 | CPS1 A1 J3-A14 | Cine Osc. | Cine Drive Rad Pulse on Rtn** | P18 - 4 P1 Port 4 Input 1- |
| 13 | CPS1 A1 J3-A7 | Enable PA* | Cine Enable N.O. | P2 Port 2 - N.O. 2 |
| 14 | CPS1 A1 J3-C15 | +24VDC Return Kernel | Fluoro On Rtn Prep Expose Rtn | P1 Port 1 Input 1- P1 Port 1 Input 2- |
| 15 | CPS1 A1 J3-C16 | Prep Sw | Prep Expose | P1 Port 1 Input 2+ |
| 16 | CPS1 A1 J3-C17 | Expose Sw | Fluoro On | P1 Port 1 Input 1+ |

**"Rad pulse on" is used for both Cine and Pulsed Fluoro. (PFluoro On)
The PlatinumOne Cardiac Technical Manual may designate this signal "PFluoro On".

7.5 Configuring the PlatinumOne System

Note: Refer to Step 5 of the *PlatinumOne* Installation Manual (726-106-G1) for additional information on accessing the Service Application and the configuration variables of the PlatinumOne system.

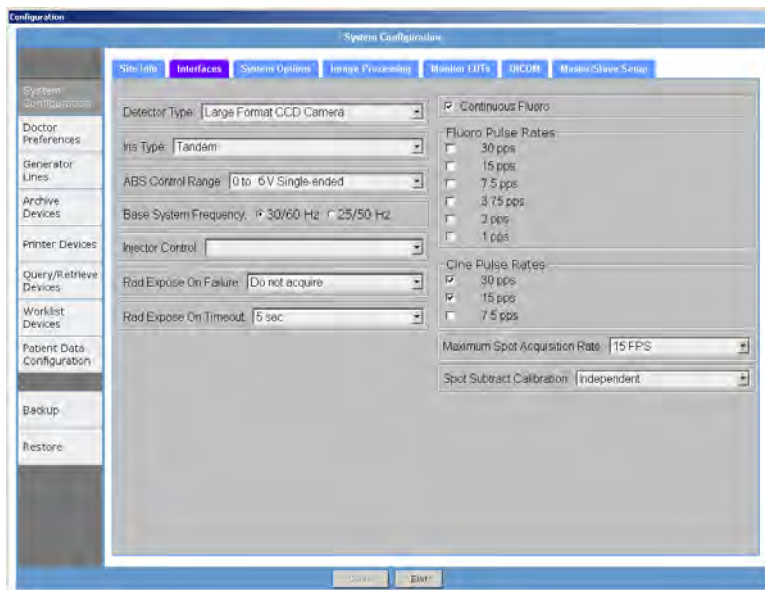
The following PlatinumOne system configuration variables are *Specific* to the Advantx generator interface. Additional customer or site-specific variables such as hardcopy or archive devices will also need to be configured as outlined in Step 5 in the PlatinumOne Installation manual (726-106-G1).

7.5.1 PlatinumOne System Configuration

Set the variables on the System Configuration Interfaces menu as follows:

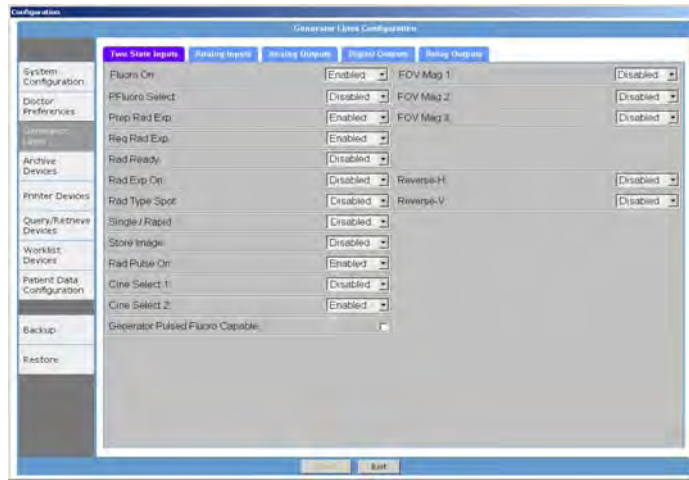
System Configuration \ Interfaces Tab:

| | |
|-------------------------|--|
| Detector Type: | Large Format CCD Camera |
| Iris Type: | Tandem |
| ABS Control Range: | 0 – 3 V Single Ended |
| Base System Frequency: | 60 Hz |
| Continuous Fluoro: | Checked |
| Fluoro and Cine delays: | 1 sec |
| Fluoro Pulse Rates: | DO NOT select any pulse fluoro rate boxes |
| Cine Pulse Rates: | Check 30 pps (Typical) Check 15 pps if requested by end user Uncheck 7.5 pps (Not supported) |



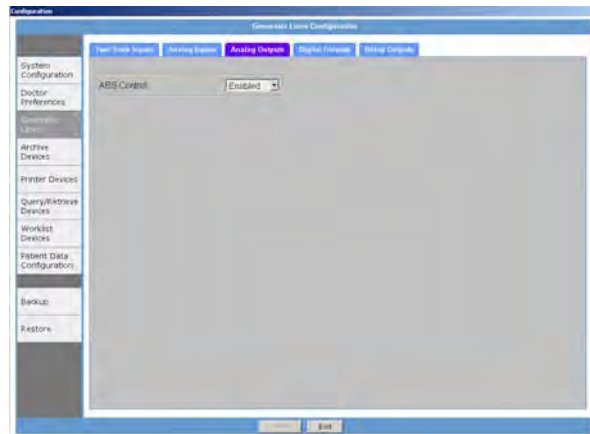
System Configuration \Generator Lines \ Two State Inputs Tab:

| | |
|---------------------------------|-----------|
| Fluoro On | Enabled |
| Prep Rad Expose | Enabled |
| Req Rad Expose | Enabled |
| Rad Pulse On | Enabled |
| Cine Select 2 | Enabled |
| Generator Pulsed Fluoro Capable | Unchecked |
| All other inputs | Disabled |



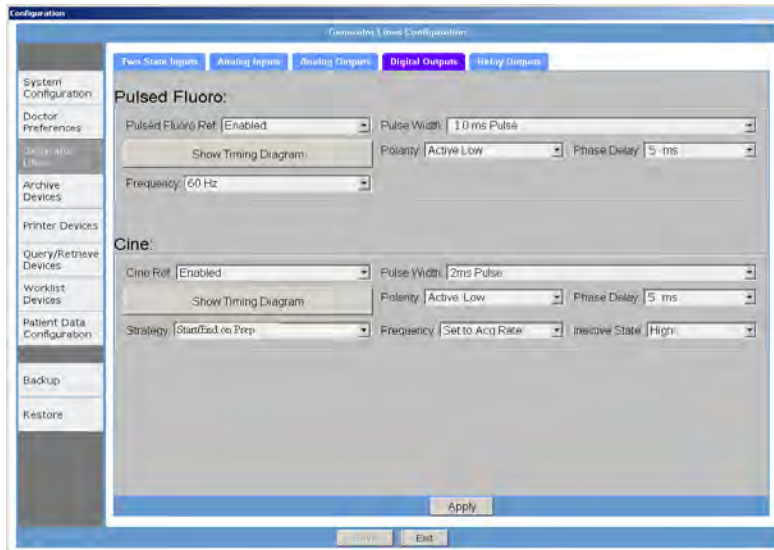
System Configuration \Generator Lines \ Analog Outputs Tab:


| | |
|-------------|---------|
| ABS Control | Enabled |
|-------------|---------|



System Configuration \ Generator Lines \ Digital Outputs Tab:

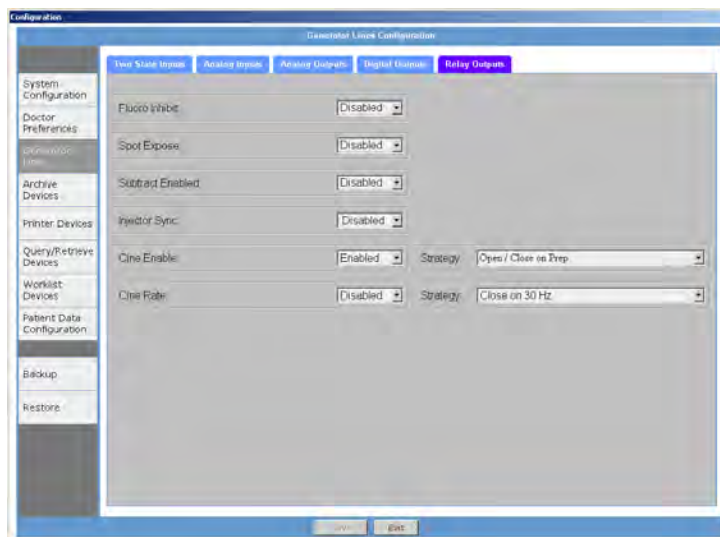
| | |
|-------------------|-----------------|
| Pulsed Fluoro Ref | Enabled |
| Pulse Width | 10 mS |
| Polarity | Active Low |
| Phase Delay | 5 mS |
| Frequency | 60 Hz |
| Cine Ref | Enabled |
| Pulse Width | 2 mS |
| Polarity | Active Low |
| Phase Delay | 5 mS |
| Strategy | Always On |
| Frequency | Set to Acq Rate |
| Inactive State | High |



| | | |
|--|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

System Configuration \ Generator Lines \ Relay Outputs Tab.


| | |
|----------------------|----------------|
| Fluoro Inhibit | Disabled |
| Spot Expose | Disabled |
| Subtract Enable | Disabled |
| Injector Sync | Disabled |
| Cine Enable | Enabled |
| Cine Enable Strategy | Always Closed |
| Cine Rate | Disabled |
| Cine Rate Strategy | Not Configured |



7.5.2 Calibration and Testing of *PlatinumOne* Systems

Calibrate and test the *PlatinumOne* system and components as described in Steps 7 and 8 of the *PlatinumOne* Technical Manual (726-106-G1). The *PlatinumOne* camera calibration requires that the fluoro and cine x-ray doses be calibrated and available at the Advantx console.

NOTE: The Advantx Cine frame rate and the *PlatinumOne* frame rate must each be selected for the desired rate.

| | | |
|---|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

7.5.3 Fluoro Dose Calibration

Select manual fluoro dose control at the Advantx console. Place the x-ray dosimeter at the intensifier input, grid removed, 9" FOV, measure and adjust the manual dose for 210 mR/hour (typ).

7.5.4 Cine Dose Calibration

Cine dose is measure at intensifier input by placing the dosimeter ion onto the intensifier input, grid removed, 2-3 mm copper, desired FOV selected (refer to *PlatinumOne* Technical Manual, Recommended Doses Tab). Typically, 9" FOV = 12 uR/frame. Be certain the KV is low enough to result in an AEC modulated pulse width greater than 1 mSec.

The Cine Dose (*PlatinumOne* Digital system) is varied by using Cine AEC Cal tool >Cine Dose (unit **X213**), which is accessible via the onsite service software (Cine). The desired dose as indicated on the display and changed by rotating the Advantx knob will most likely *not* correspond to the actual measured dose.

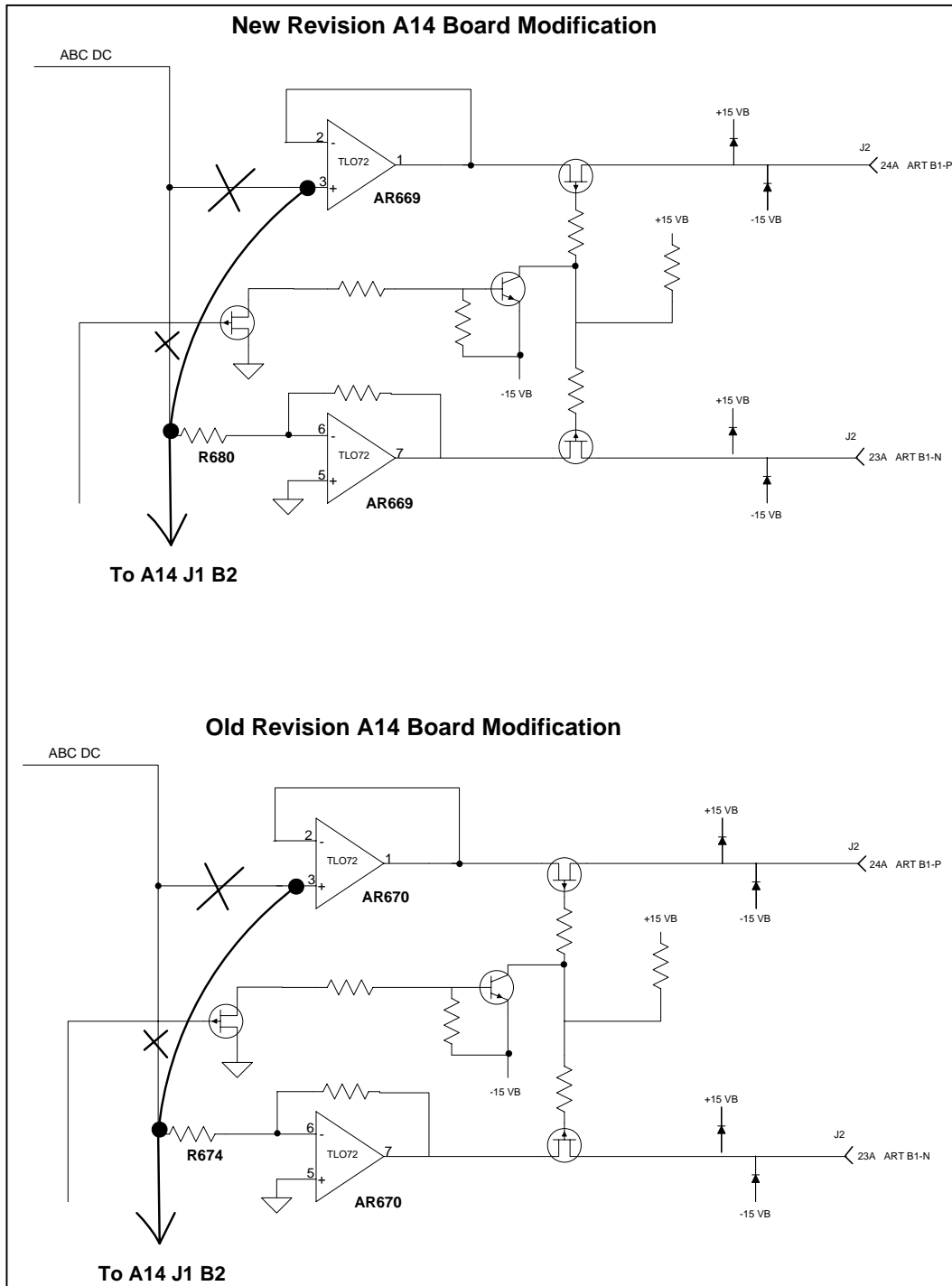
7.5.5 Cine Framing Adjustment

The collimator shutters are applied to each Cine frame exposure. Verify the shutter position by taking exposures at each intensifier Mag field. It is likely that they will require adjustment. To do this:

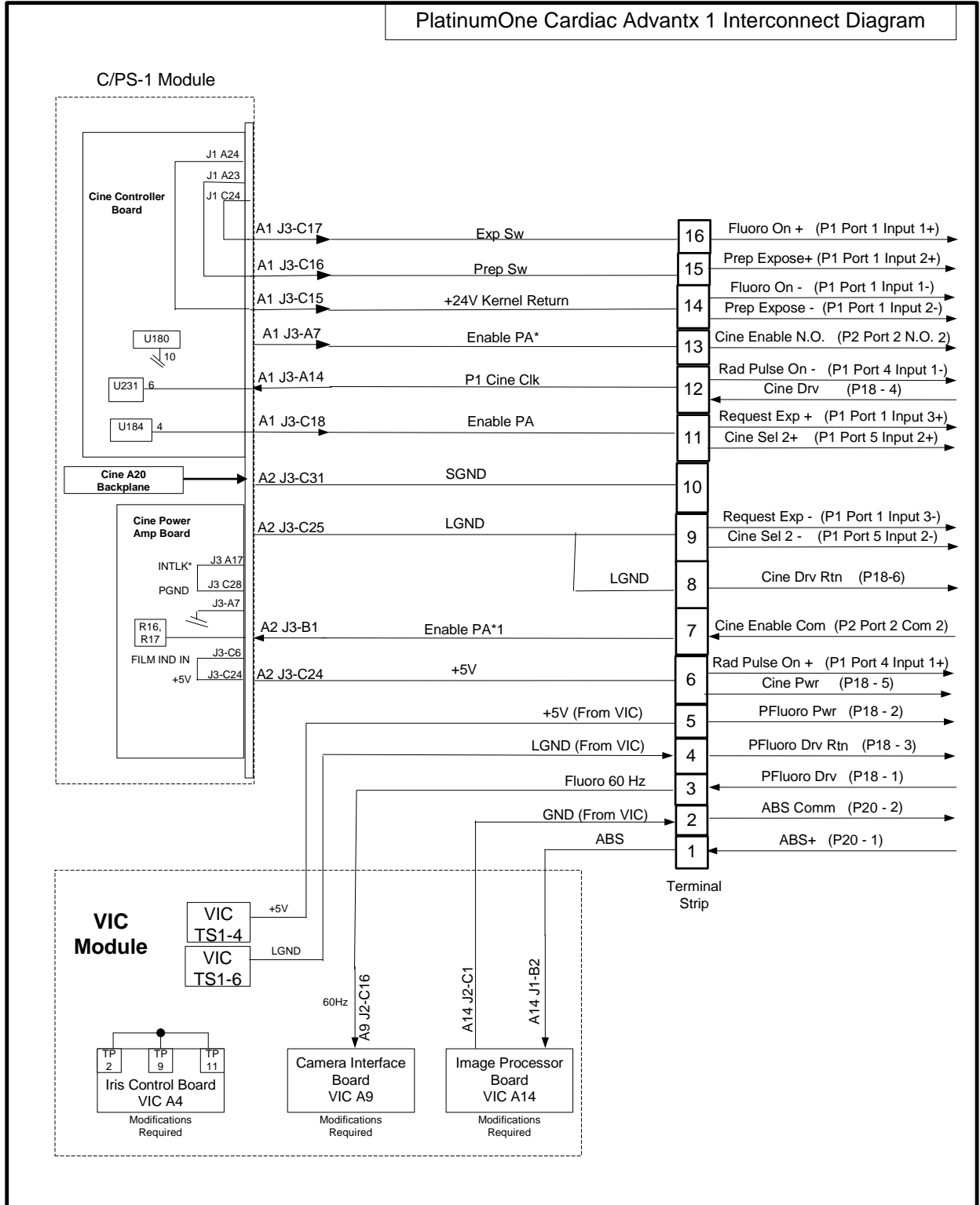
1. Enter Service and Calibration Mode on the Advantx.
2. Select the Cine camera calibration unit. There will be a cine framing Cal unit available.
3. Select and press "Re-cal with old film" option. The collimator shutters are applied to each Cine frame exposure. Verify positioning of the blades you will see cross and long blade position values. For each MAG Mode, **increase** the value to **close** the blades. Once a new value is entered, you will have to reenter the applications mode to test blade positioning for each Mag Mode exposure. Repeat as necessary.
4. The *PlatinumOne* can be booted up in Service mode to accomplish the above procedure.


8.0 Appendixes

8.1 Image Processor Board Modification Diagram



8.2 Interconnection Diagram




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|---|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

8.3 Shadow Artifact Correction

It is not uncommon to observe a “shadow” artifact on fluoro and spot images once the InfiMed *PlatinumOne* camera optics is mounted to the *Advantx 1* image gate port. Visualization is enhanced by some of the processing which occurs when calibrating the camera and x-raying a flat field. The artifact is contained to the extreme periphery of the image field.

If this is deemed objectionable, the following steps are required to correct for it.

1. With Advantx1 power off, open the front image gate cover to reveal the VIC3A2A3-Brightness Integrator PCB (46-264410G1).
2. Remove the Brightness Integrator PCB. This will reveal the photodiode prism tube and square aperture assembly.
3. Loosen the locking setscrew via appropriate small Allen wrench.
4. Remove the tube, one end is open, the other contains the prism lens.
5. Remove approximately 3/16 “ of the open end of the tube, taking *extreme care* to not damage the prism. It can be cut by hand with a hacksaw and a properly and *carefully* set slip jaw pliers (or Vise-Grips, or bench vise).
6. Reinsert the modified tube into its mount in the image housing.
7. With *PlatinumOne* serviceapp running at the entrance screen, select the Fluoro box at top right side of the GUI. This turns on the camera.
8. Shine a focusable light source through the prism barrel; you should see a bright square visualized on the display monitor.
9. Adjust centering of the visualized square by rotating the tube and watching the where the square places on the display. Proper centering occurs when square and image circle are concentric. Snug gently any loosened setscrews.
10. Reassemble the Brightness Integrator PCB and the image housing. Test AEC operation for reproducibility and sense are centering.

| | | |
|--|--|---|
| PlatinumOne Cardiac Advantx 1 Interface | |  |
| R & D | | ISO 9000:2000, Section 7.5.1 |
| Customer Care | | |

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| Rev | Date | Initials | ECN / DCN | Training Req'd (x) | Purpose |
|------------|-------------|-----------------|------------------|---------------------------|---|
| A | 9/28/06 | JJL | 4112 | -- | <ul style="list-style-type: none"> • New Release |
| B | 10/25/06 | JJL | 4132 | -- | <ul style="list-style-type: none"> • Updated with additional information |