

Three-field Ionization Chamber
Calibration Procedure
for
Pre-Amplifier board assemblies 61166A

The following adjustments apply to the calibration of a 61166A pre-amplifier board for a stationary 3-field ion chamber, e.g. for chest or table use. (Also valid for 61166C and 61166E)

Pre-amp Assembly	Description	Difference from 61154A
61166A	Calculated Gain Range = 1.0 to 6.0	None
61166C	Calculated Gain Range = 1.47 to 8.82	R16, R17, R21 = 6800 ohm
61166E	Calculated Gain Range = 1.47 to 8.82	R16, R17, R21 = 6800 ohm Side-Turn Pots

WARNING:

- 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 and mechanical or other hazards.

Note: When working with the pre-amplifier assembly it is important that electrostatic discharge (ESD) prevention techniques be observed. Before touching the pre-amp assembly, attach an ESD wrist strap to yourself. Be sure to ground yourself and the ion chamber frame to dissipate static charges.

Note: The pre-amp assembly is a very delicate and sensitive device. It is important to keep it as clean as possible. Wash and dry your hands thoroughly before working with it and, when possible, use unpowdered latex or cotton gloves. Take care to touch the pre-amp board as little as possible. Take extra care to avoid touching the three air-mounted field inputs. Oils from your fingers on the air-mounts or their components can cause performance degradation.

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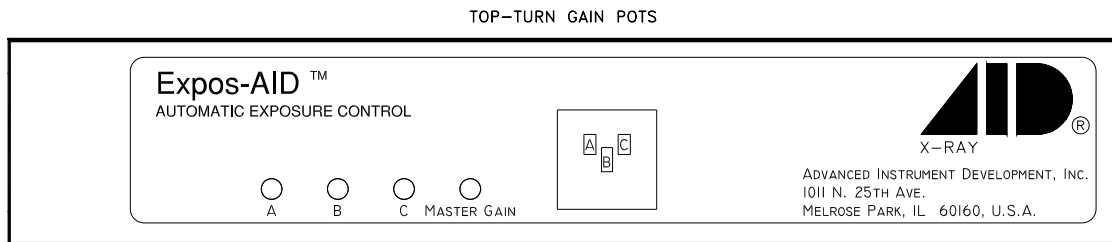
The following adjustments apply to the calibration of a 61166A pre-amplifier board for a stationary 3-field ion chamber, e.g. for chest or table use. The 61166A pre-amplifier board is configured to operate with Siemens AEC systems.

The procedure assumes that the installation of the Automatic Exposure Control (AEC) is complete and that the AEC and x-ray generator are in proper working condition. After making the necessary interconnections between the ion chamber and the AEC, power up the system.

Calibration/Test Set Up:

Select the center field of the ion chamber. Set the generator for 100 kVp and maximum backup time. For 100 kVp use 8 to 10 inches (20 to 25 cm) of water or plastic for a phantom. Metals such as copper, aluminum or lead are not suitable for use as phantoms. Make sure the phantom is homogeneous and completely covers all fields equally. Center the x-ray beam on the center field. Collimate the x-ray beam so that it completely covers all three fields but does not extend beyond the limits of the phantom.

Adjustment Potentiometers:



All necessary adjustment potentiometers are accessible through the pre-amp chassis cover. There is no need to open the pre-amp cover during normal calibration procedures.

Master Gain Adjustment:

Typically, the master gain adjustment is the only adjustment needed when installing ICX series ion chambers. Use the master gain adjustment to match the overall chamber sensitivity to that of the other stationary chambers connected to the system. Note that the master gain adjustment is a multi-turn potentiometer. A clockwise adjustment to the master gain potentiometer will increase the sensitivity of the chamber, causing the length of the exposure (mAs) to decrease.

Make exposures and process the films. Adjust the master gain for the desired optical density. Make the master gain adjustment for each stationary chamber being installed.

Field Balance Check:

Using the AEC post-exposure mAs display or other calibrated mAs meter check the individual fields to see that they are balanced, that is, that they produce the same mAs reading. If mAs readings are not stable from exposure to exposure for an individual field, then it will be necessary to expose films and make these adjustments based upon optical density.

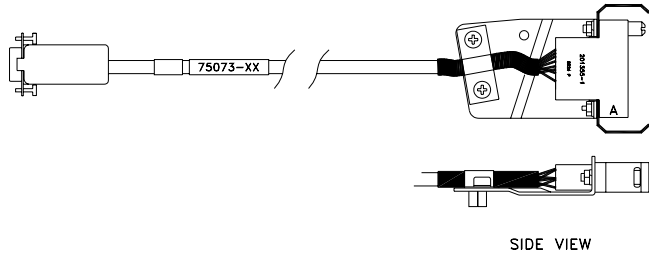
If necessary, adjust the individual gain potentiometers to balance the outputs to give the same mAs reading for each field selected individually. Note that individual gain adjustments are multi-turn potentiometers. A clockwise adjustment to a field gain potentiometer will increase the sensitivity of that field, causing the length of the exposure (mAs) to decrease.

Ionization Chamber Pin-outs:

61166A Pre-amp Board Pin-out	Function	Siemens Signal Name	9-Pin Sub-D Pin-Out
1	NONE	NONE	1
2	FIELD 2 SELECT	DOM II	2
3	FIELD 1 SELECT	DOM I	3
4	FIELD SELECT RETURN	ANA_GND_IONTO	4
5	OUTPUT	RDL A	5
6	FIELD 3 SELECT	DOM III	6
7	NEGATIVE SUPPLY	N_15_A_IONTO	7
8	POSITIVE SUPPLY	P_15_A_IONTO	8
9	GROUND	ANA_GND_IONTO	9

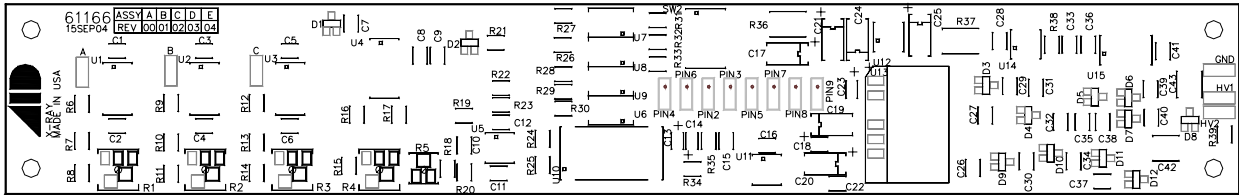
NOTE: Cable wire colors do not match those inside the pre-amp chassis. Cable pin-out details are available on-line at <http://www.aidxray.com> or by contacting Advanced Instrument Development, Inc.

Optional Ionization Chamber Cable:

75073-XX (-XX suffix denotes cable length in feet, available in -45, -65 and -85 foot lengths)			
ION CHAMBER CONNECTOR	SIEMENS COMPATIBLE ION CHAMBER CABLE		AEC CONNECTOR
FEMALE 9-PIN SUB-D	 <p style="text-align: center;">SIDE VIEW</p>		FEMALE 14-PIN AMP M SERIES (201355-1)
PIN NUMBER	WIRE COLOR	FUNCTION	PIN NUMBER
1	BLACK	NONE	N/C
2	BROWN	DOM II	L
3	RED	DOM I	B
4	ORANGE	ANA_GND_IONTO	K
5	YELLOW	RDL_A	C
6	GREEN	DOM III	F
7	BLUE	N_15_A_IONTO	D
8	VIOLET	P_15_A_IONTO	E
9	WHITE	ANA_GND_IONTO	H
9	CLEAR	SHIELD	N/C

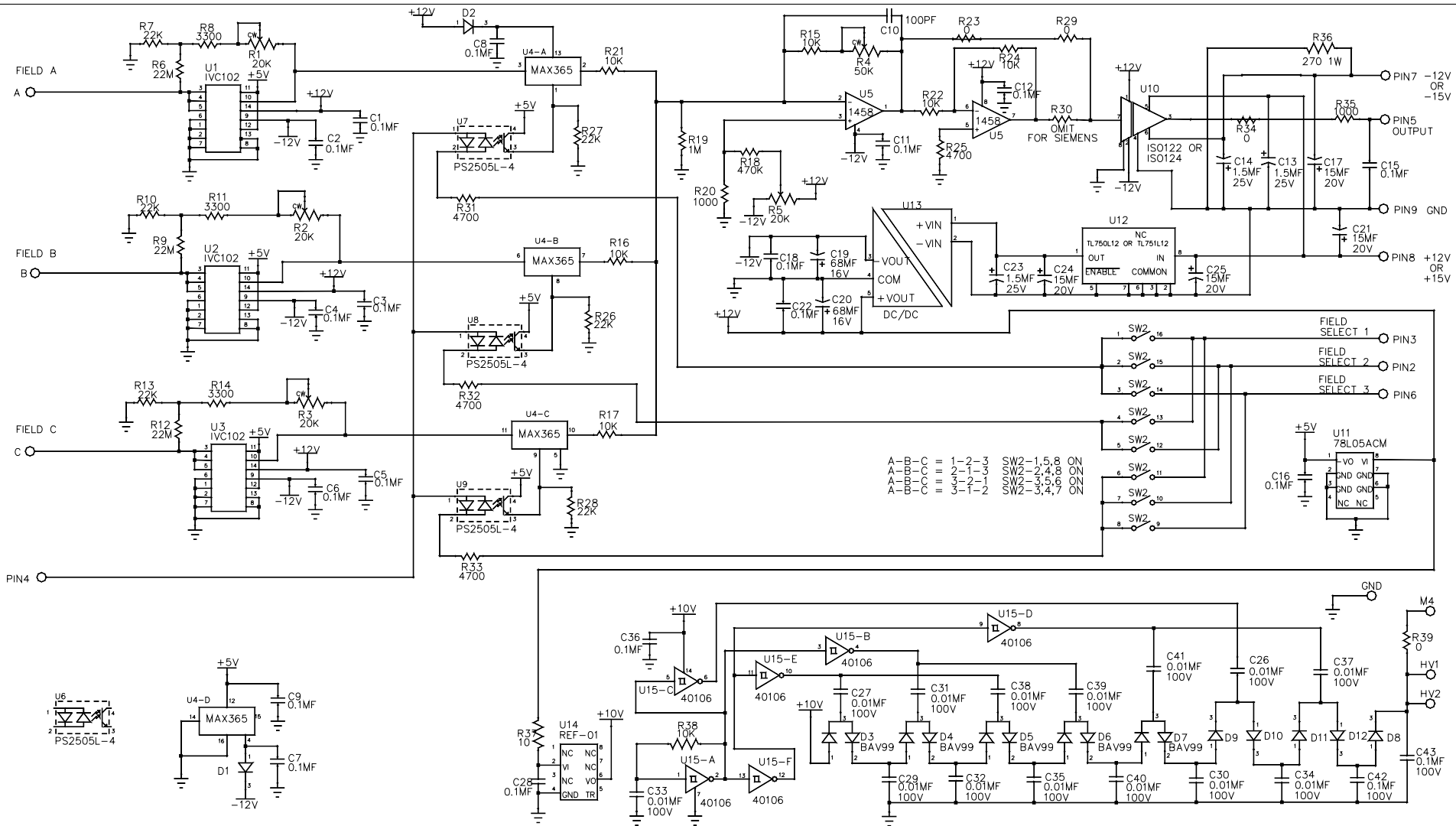
Ionization Chamber Inputs and Output:

Signal	Switch	Comments
Positive Supply Voltage Range	None	+11.4VDC to +15.8VDC less than 85 mA.
Negative Supply Voltage Range	None	-11.4VDC to -15.75VDC less than 15 mA.
Positive DC Level Output	None	DC level signal ranging from 0VDC to a maximum of at least 80% of the supply voltage (+9.6VDC for +12VDC supply). The amplitude of this signal is directly proportional to the amount of x-ray flux received.
High-Active Field Selects	None	Driving the field select lines high ($\geq 8VDC$) will select the field.
Field Configuration A=1, B=2, C=3	SW2-1,5 & 8 ON SW2-2,3,4, 6 & 7 OFF	Field selects 1, 2 and 3 select left (A), center (B) and right (C), respectively, as viewed from the x-ray tube-side of the ion chamber.
Field Configuration A=2, B=1, C=3	SW2-2,4 & 8 ON SW2-1,3,5, 6 & 7 OFF	Field selects 2, 1 and 3 select left (A), center (B) and right (C), respectively, as viewed from the x-ray tube-side of the ion chamber.
Field Configuration A=3, B=1, C=2	SW2-3,4 & 7 ON SW2-1,2,5, 6 & 8 OFF	Field selects 3, 1 and 2 select left (A), center (B) and right (C), respectively, as viewed from the x-ray tube-side of the ion chamber.
Field Configuration A=3, B=2, C=1	SW2-3,5 & 6 ON SW2-1,2,4, 7 & 8 OFF	Field selects 3, 2 and 1 select left (A), center (B) and right (C), respectively, as viewed from the x-ray tube-side of the ion chamber.



Acceptable Power Supply Ranges for 61166A Pre-amp:

Supply Voltage	Measurement Point	Acceptable Range
Pos. Input Supply Voltage	61166A pin 8 (Referenced to 61166A pin 9)	From +11.4VDC to +15.8VDC
Neg. Input Supply Voltage	61166A pin 7 (Referenced to 61166 pin 9)	From -11.4VDC to -15.8VDC
Internal +12VDC Regulated on board	Measure across 61166A C24	From +10.8VDC to +12.5VDC
Internal +12VDC Isolated	Measure across 61166A C20	From +10.8VDC to +12.5VDC
Internal -12VDC Isolated	Measure across 61166A C19	From -10.8VDC to -12.5VDC
Internal +5VDC Regulated on board	Measure across 61166A C16	From +4.7VDC to +5.3VDC
+75VDC Internal Bias Voltage Regulated on board	Measure across 61166A C43 (HV1 to GND)	From +65VDC to +85.0VDC



NOTES:

- * MANUFACTURER MAY USE ALTERNATE COMPONENTS UNLESS NOTED OTHERWISE.
- ALL SWITCHES OFF UNLESS OTHERWISE NOTED.
- U4,U5,U10, AND U11 MAY BE (4) SINGLE, (2) DUAL, OR (1) QUAD DEVICES.

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				UNLESS SPECIFIED OTHERWISE; DIMENSIONS ARE IN INCHES. FRACTIONS DECIMALS ANGLES ±1/64 ±0.010 ±1°			
				SCALE	DRAWN BY		
				MATERIAL	BRP	18APR05	ISOLATED 3-FIELD SIEMENS PRE-AMP CALCULATED GAIN RANGE = 1 TO 6 TOP-TURN POTS
				FINISH	CHECKED BY	APPROVED BY	
00	2272	06FEB04	NEW, REPLACES 61136A	BRP			USED ON
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