

Three-field Ionization Chamber
Calibration Procedure
for
Pre-Amplifier board assemblies 61176C

The following adjustments apply to the calibration of a 61176C pre-amplifier board for a stationary 3-field ion chamber, e.g. for chest or table use. The 61176C pre-amplifier board is configured to operate with Siemens AEC systems. (Also valid for 61176N & 61176S)

| Pre-amp Assembly | Description | Difference from 61176C |
|------------------|--------------------------------------|---------------------------|
| 61176C | Calculated Gain Range = 1.47 to 8.82 | None |
| 61176N | Calculated Gain Range = 2.56 to 15.4 | R16, R17 & R21 = 3900 ohm |
| 61176S | Calculated Gain Range = 4.45 to 27.3 | R16, R17 & R21 = 2200 ohm |

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:

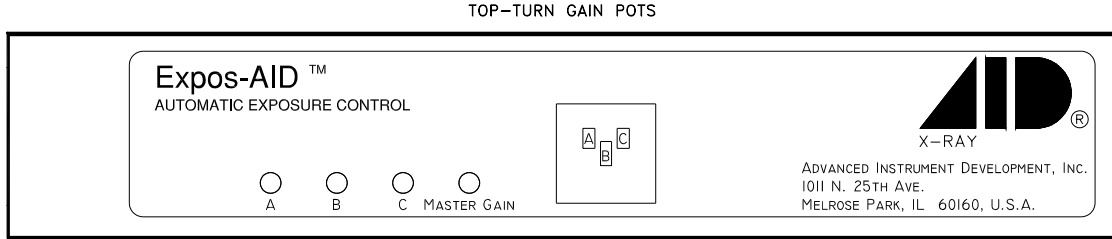
Select the center field of the ion chamber. Set the generator for 100 kVp and maximum backup time. For 100 kVp use 8 to 10 inches (20 to 25 cm) of water or plastic for a phantom. Metals such as copper, aluminum or lead are not suitable for use as phantoms. Make sure the phantom is homogeneous and completely 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.

WARNING:

- This service manual is available in English and Japanese 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 and mechanical or other hazards.

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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.

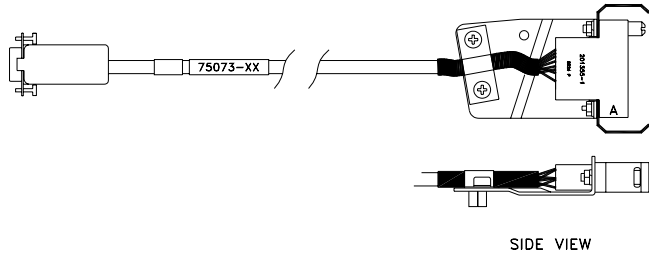
If necessary, adjust the individual gain potentiometers to balance the outputs to give the same mAs reading for each field selected individually. Note that individual gain adjustments are multi-turn potentiometers. A clockwise adjustment to a field gain potentiometer will increase the sensitivity of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

Ionization Chamber Pin-outs:

| 61176C 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 |

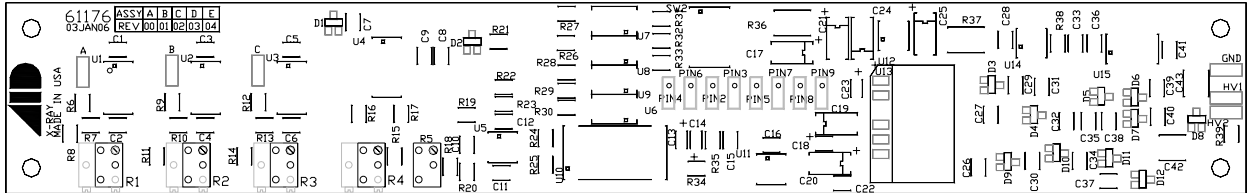
NOTE: Cable wire colors do not match those inside the pre-amp chassis. Cable pin-out details are available on-line at <http://www.aidxray.com> or by contacting Advanced Instrument Development, Inc.

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 |

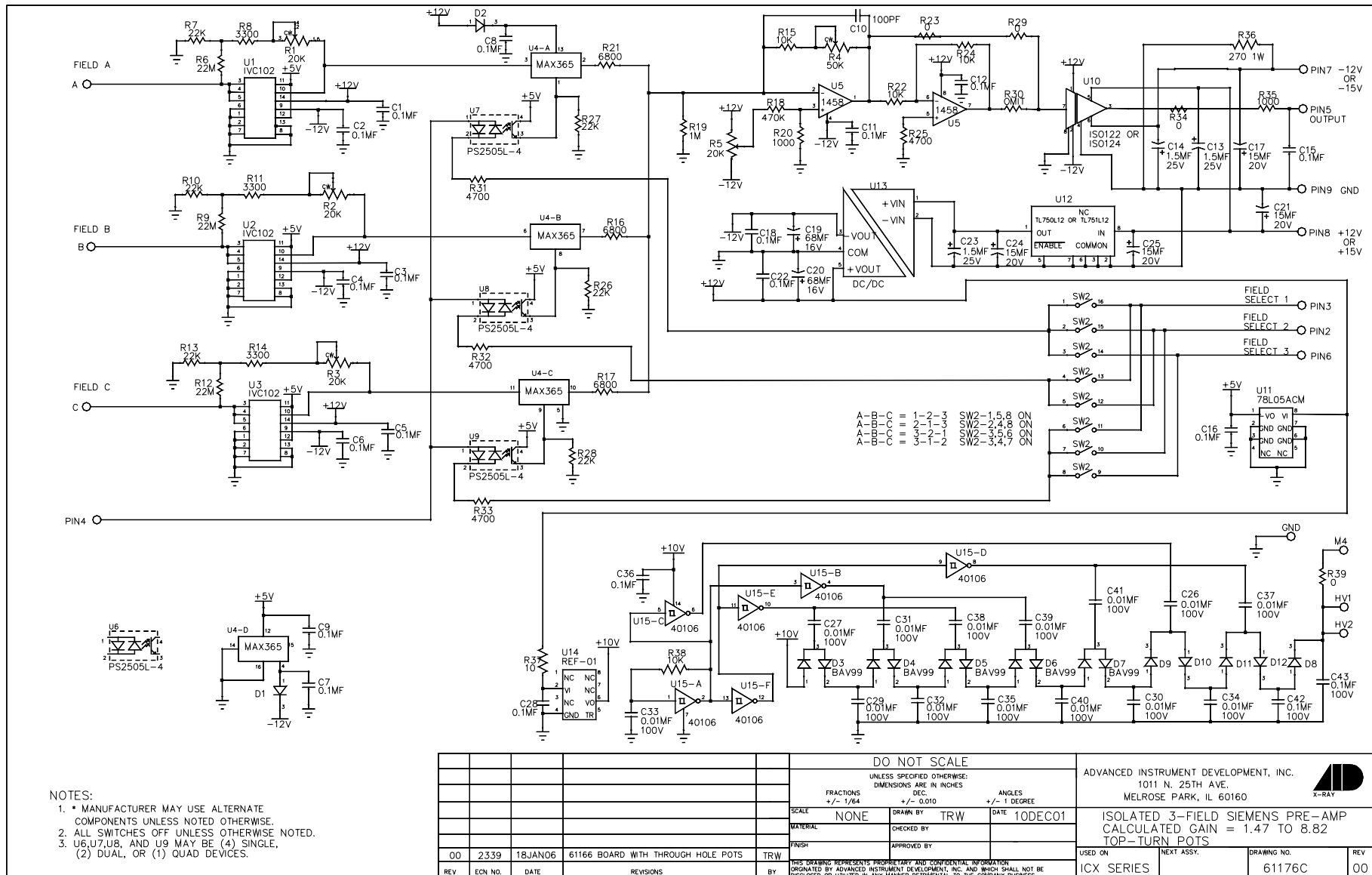
Ionization Chamber Inputs and Output:

| 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 61176C Pre-amp:

| Supply Voltage | Measurement Point | Acceptable Range |
|---|--|------------------------------|
| Pos. Input Supply Voltage | 61176C pin 8 (Referenced to 61176C pin 9) | From +11.4VDC to +15.8VDC |
| Neg. Input Supply Voltage | 61176C pin 7 (Referenced to 61176C pin 9) | From -11.4VDC to -15.8VDC |
| Internal +12VDC Regulated on board | Measure across 61176C C9 | From +10.8VDC to +12.5VDC |
| Internal +12VDC Isolated | Measure across 61176C C38 | From +10.8VDC to +12.5VDC |
| Internal -12VDC Isolated | Measure across 61176C C31 | From -10.8VDC to -12.5VDC |
| Internal +5VDC Regulated on board | Measure across 61176C C29 | From +4.7VDC to +5.3VDC |
| +75VDC Internal Bias Voltage Regulated on board | Measure across 61176C C21 (HV1 to GND) | From +65VDC to +85.0VDC |



- NOTES:
- * MANUFACTURER MAY USE ALTERNATE COMPONENTS UNLESS NOTED OTHERWISE.
 - ALL SWITCHES OFF UNLESS OTHERWISE NOTED.
 - U6,U7,U8, AND U9 MAY BE (4) SINGLE, (2) DUAL, OR (1) QUAD DEVICES.

| | | | | | DO NOT SCALE | | | ADVANCED INSTRUMENT DEVELOPMENT, INC. 1011 N. 25TH AVE. MELROSE PARK, IL 60160 | | | |
|----------|---------|-------------|------------------------------------|------|---|---|------------------------|---|--------|-----|----|
| | | | | | UNLESS SPECIFIED OTHERWISE: DIMENSIONS ARE IN INCHES | | |  | | | |
| | | | | | FRACTIONS +/- 1/64 | DEC. +/- 0.010 | ANGLES +/- 1 DEGREE | | | | |
| SCALE | NONE | DRAWN BY | TRW | DATE | 10DEC01 | ISOLATED 3-FIELD SIEMENS PRE-AMP CALCULATED GAIN = 1.47 TO 8.82 TOP-TURN POTS | | | | | |
| MATERIAL | | CHECKED BY | | | | | | | | | |
| FINISH | | APPROVED BY | | | | | | | | | |
| Q0 | 2339 | 18JAN06 | 61166 BOARD WITH THROUGH HOLE POTS | TRW | | USED ON | NEXT ASSY. | DRAWING NO. | 61176C | REV | 00 |
| REV | ECN NO. | DATE | REVISIONS | BY | <small>THIS DRAWING REPRESENTS PROPRIETARY AND CONFIDENTIAL INFORMATION ORIGINATED BY ADVANCED INSTRUMENT DEVELOPMENT, INC. AND WHICH SHALL NOT BE DISCLOSED OR UTILIZED IN ANY MANNER DETRIMENTAL TO THE COMPANY BUSINESS.</small> | | | ICX SERIES | | | |