

ICX2941
Three-field Ionization Chamber
Calibration Procedure for Pre-Amplifier board 61170V

The following adjustments apply to the calibration of the 61170V pre-amplifier board used with the model ICX2941 three-field ion chamber.

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

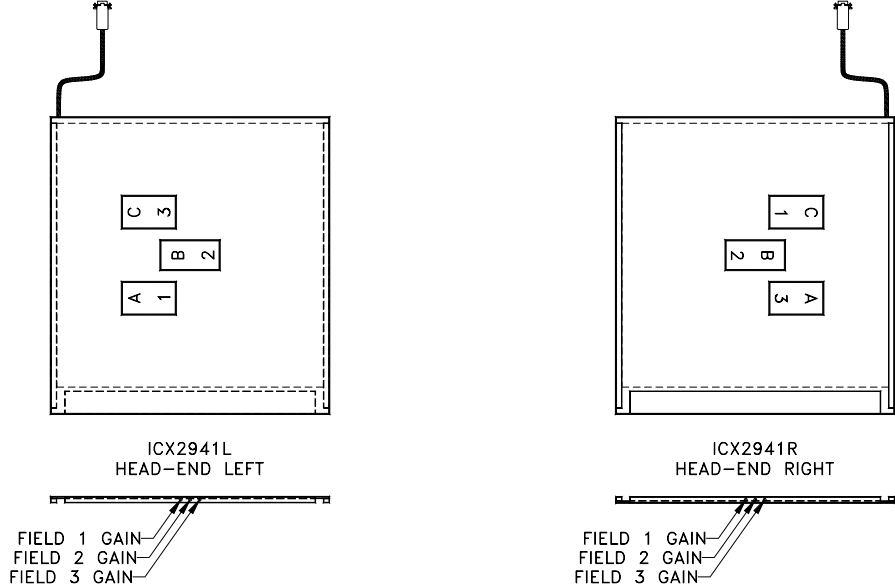
Calibration/Test Set Up:

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.

Field Selection and Orientation:

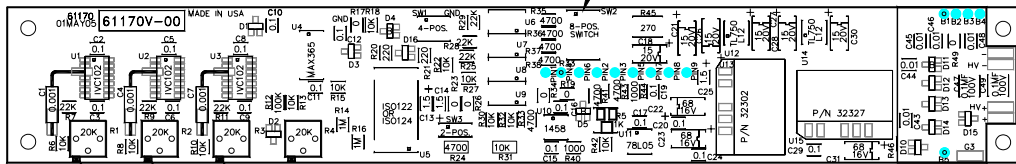
The ICX2941 can be used in either a head-end left (ICX2941L) or a head-end right (ICX2941R) configuration. Note that when changing the orientation, the left and right fields are reversed. Changing the field selection switches (61170V SW2) will maintain the association between the AEC field selection signals and the left, center and right fields.

| Model Configuration | 61170V Switch Setting | Field Configuration |
|---------------------|--|---------------------|
| ICX2941L | SW2-3,5 & 6: ON SW2-1,2,4, 7 & 8: OFF | 1-2-3 |
| ICX2941R | SW2-1,5 & 8: ON SW2-2,3,4, 6 & 7: OFF | 3-2-1 |



SW2 SELECTION:

- ICX2941R, HEAD-END RIGHT
 SW2-1, 5 & 8 = ON
 SW2-2, 3, 4, 6 & 7 = OFF
- ICX2941L, HEAD-END LEFT
 SW2-3, 5 & 6 = ON
 SW2-1, 2, 4, 7 & 8 = OFF



- ICX2941L FIELD 1 GAIN
- ICX2941R FIELD 3 GAIN
- FIELD 2 GAIN
- ICX2941L FIELD 3 GAIN
- ICX2941R FIELD 1 GAIN

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.

The individual gain potentiometers, 61170V R1, R2 and R3, correspond to ion chamber C, B and A fields, respectively. Refer to the section on Field Selection and Orientation for the relationship between the A, B and C Fields and the selection of left, center and right fields for the models ICX2941L and ICX2941R. If necessary, adjust the individual gain potentiometers to balance the outputs to give the same mAs reading for each field. Note that individual gain adjustments are multi-turn potentiometers. A clockwise adjustment to a gain potentiometer will increase the sensitivity of a field, causing the length of the exposure (mAs) to decrease.

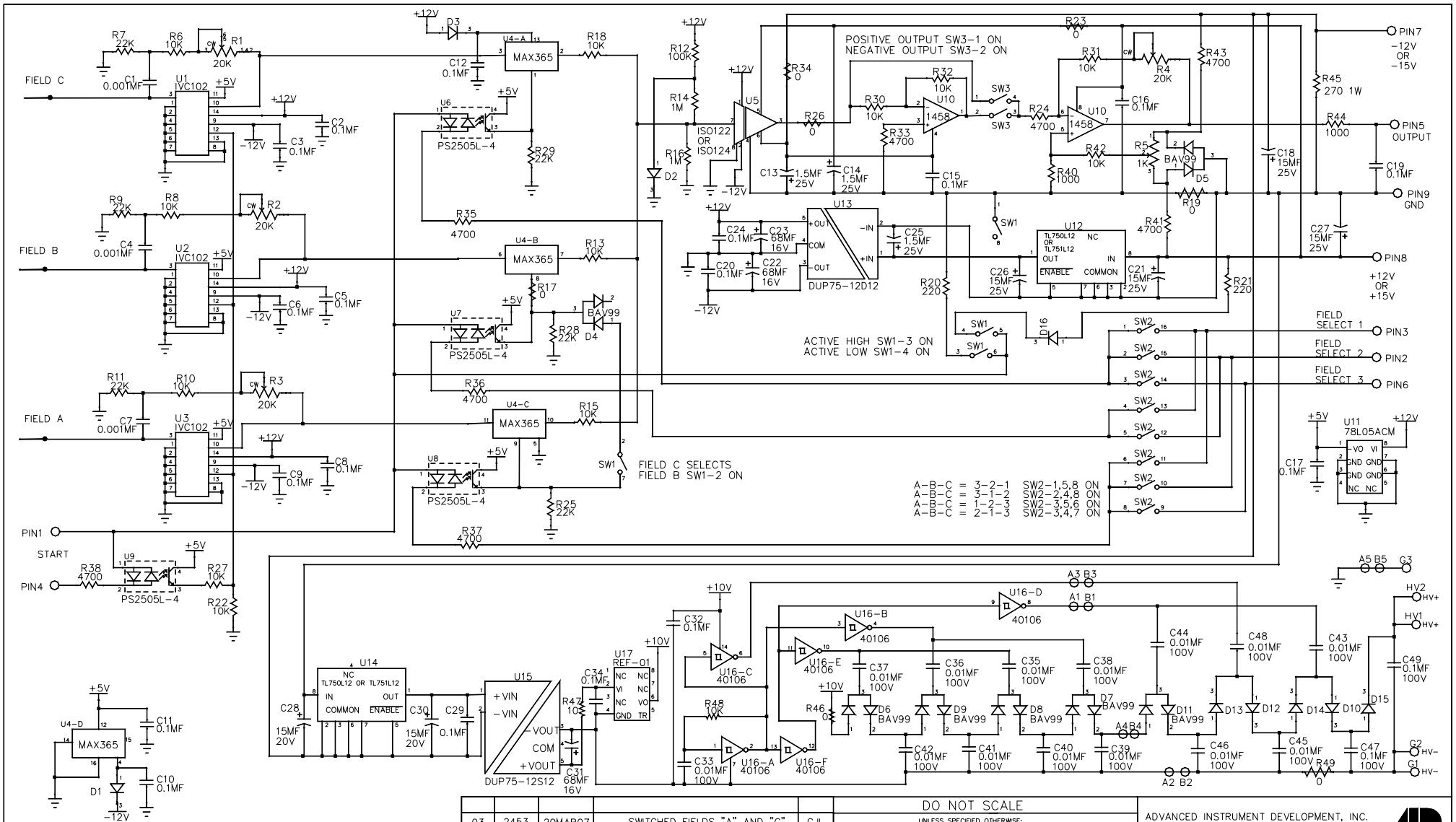
Ionization Chamber Pin outs:

| 61170V PRE-AMP BOARD PAD NUMBER | FUNCTION | J1 9-PIN SUB-D PIN NUMBER |
|---------------------------------------|-------------------------|------------------------------------|
| 1 | GROUND, 24V RTN | 1 |
| 2 | FIELD 2 SELECT (CENTER) | 2 |
| 3 | FIELD 1 SELECT (LEFT) | 3 |
| 4 | OUTPUT | 4 |
| 5 | START INTEGRATE | 5 |
| 6 | FIELD 3 SELECT (RIGHT) | 6 |
| 7 | -15VDC | 7 |
| 8 | +15VDC | 8 |
| 9 | GROUND, 15V RTN | 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.

Acceptable Power Supply Ranges for 61170V Pre-amp:

| Supply Voltage | Measurement Point | Acceptable Range |
|--------------------------|---|----------------------|
| External +12VDC | 61170V pin 8 (Referenced to 61170V pin 9) | +11.4VDC to +15.8VDC |
| External -12VDC | 61170V pin 7 (Referenced to 61170V pin 9) | -11.4VDC to -15.8VDC |
| Internal +12VDC Isolated | Measure across 61170V C23 | +10.8VDC to +12.5VDC |
| Internal -12VDC Isolated | Measure across 61170V C22 | -10.8VDC to -12.5VDC |
| Internal +5VDC | Measure across 61170V C17 | +4.7VDC to +5.3VDC |
| Internal +75VDC | Measure across 61170V C49 (HV+ to HV-) | +65VDC to +85.0VDC |



A-B-C = 3-2-1 SW2-1,5,8 ON
 A-B-C = 3-1-2 SW2-2,4,8 ON
 A-B-C = 1-2-3 SW2-3,5,9 ON
 A-B-C = 2-1-3 SW2-3,4,7 ON

- 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.

| REV | ECN NO. | DATE | REVISIONS | BY |
|-----|---------|---------|---|-----|
| 03 | 2453 | 20MAR07 | SWITCHED FIELDS "A" AND "C" | CJL |
| 02 | 2430 | 09NOV06 | SEE COMPONENT LAYOUT | SO |
| 01 | 2342 | 13FEB06 | REMOVED ARTWORK SW1-1 PIN 8 | TRW |
| 00 | 2337 | 19JAN06 | SEE COMPONENT LAYOUT | SO |
| 00 | 2324 | 28OCT05 | SAME AS 61170A-05 EXCEPT: D2=D14, R5,R8,R9=100K, R12=100K R14=1M, R24=4.7K, R31=1-K R1,R2,R3,R4 USE SIDE-TURN POTS | SO |

| DO NOT SCALE | | | |
|--|-----------------|------------------------|--|
| UNLESS SPECIFIED OTHERWISE: DIMENSIONS ARE IN INCHES | | | |
| FRACTIONS +/- 1/64 | DEC. | ANGLES +/- 1 DEGREE | |
| SCALE NONE | DRAWN BY TRW | DATE 10DEC01 | |
| MATERIAL | CHECKED BY | | |
| FINISH | APPROVED BY | | |
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| ADVANCED INSTRUMENT DEVELOPMENT, INC. 1011 N. 25TH AVE. MELROSE PARK, IL 60160 | | | |
| DOUBLE ISOLATED 3-FIELD PRE-AMP CALCULATED GAIN RANGE 2.1 TO 6.28 SIDE-TURN LOW-PROFILE POTS | | | |
| USED ON ICX SERIES | NEXT ASSY. | DRAWING NO. 61170V | REV 03 |