Germanium Detectors

User's Manual

9231358B

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Printed in the United States of America.

CANBERRA

DETECTOR SPECIFICATIONS AND PERFORMANCE DATA

Specifications

DETECTOR MODEL GUL0110P **SERIAL NUMBER** 08078301

CRYOSTAT MODEL 7905-BWR/S **PREAMPLIFIER MODEL** ITRP

The purchase specifications, and therefore the warranted performance, of this detector are as follows:
(Electric cooling may degrade performance by as much as 10%.)

Energy	5.9 keV	122 keV	1332 keV
Resolution [eV (FWHM)]	140		

Cryostat description (if special) 1.0" Ø Endcap x 11.5" Chamber penetration. Drawing # B202684X, Rev.1

Physical Characteristics

Active diameter	11.3	mm
Active area	100	mm^2
Thickness	10	mm
Distance from window	5	mm
Cryostat window thickness	0.025	mm
Cryostat window material	Beryllium	

Electrical Characteristics

Depletion voltage (-) 700 V dc
Recommended bias voltage (-) 1000 V dc
Reset rate at recommended bias 5.0 sec (Reset preamp only)
Preamplifier test point voltage at recommended bias --- V dc (RC preamp only)

Resolution and Efficiency

With amp time constant of 12usec shaping @ 1K CPS.

Isotope	^{55}Fe	^{57}Co	^{57}Co	^{60}Co	Peak to Bkgd.
Energy (keV)	5.9	6.4*	122	1332	5.9:1.0
FWHM (eV)	122		534		
FWTM (eV)	226		980		6325:1.0

*Substitutes for ^{55}Fe in some cases where ^{55}Fe peaks are not well separated.

Cool Down Time 4 Hours Cryostat Liquid Nitrogen Consumption Rate < 1.2 Liters per Day

Tested by: Peter Ehmann Date: 08/24/07

Approved by: John M Gostilo Date: 08/24/07

800 Research Parkway, Meriden, CT USA 06450 • Tel. 203-238-2351/Fax. 203-639-2420

CERTIFICATE OF COMPLIANCE	QA-2007	Rev. E
	Effective 8/93	Page 1 of 1
	CANBERRA INDUSTRIES	
CUSTOMER: TRIUMF	Customer Order# **PO-12508**	Canberra ACK# **0614489**

MODEL	SERIAL NUMBER
GUL0110P-7905-BWR/S C of C	08078301 In the detector manual

The undersigned certifies that the instruments described above as a part of the above referenced purchase order are in accordance with all requirements, specifications, and drawings referenced therein, are in conformance with the required manufacturer's specifications, and that records of inspection and test providing objective evidence of the foregoing are on file and are available upon request.

Test equipment utilized in the calibration of Canberra instruments is calibrated on a scheduled basis with N.B.S. traceable standards.

Dennis (Name) Brozowski

08/23/07 (Date)

Production Manager (Title)

INSTRUCTIONS

Full Function I-TRP
Integrated-Transistor Reset Preamplifier
(For Single-element Detectors)

General Description

The I-TRP makes use of a low capacitance FET having a built-in transistor switch to discharge it. Compared to resistive feedback and optical reset preamplifiers it has lower noise and better transient response (no light-induced spurious effects).

Circuit Description

Refer to the block diagram. The preamplifier comprises a charge sensitive amplifier (U15) plus an FPGA controlled logic circuit which produces a reset signal to reset the preamplifier when the charge sensitive stage reaches the upper limit of its range. For ease of understanding the reset circuit is depicted as a comparator on the block diagram.

A comparator (A4) monitors a temperature sensor in the associated cryostat and provides a H.V. Inhibit signal in case of detector warm-up. A monostable provides an Inhibit Pulse to gate off the associated ADC during the amplifier overload recovery period. A rear panel control (P1) adjusts the width of this pulse.

Input/Outputs

The preamplifier circuit is built using surface-mount technology. Connection to the cryostat electrical feedthrough is by means of a 7 place socket. An eighth connection is located in the center of this socket. The rear panel contains the BNC connectors for Signal Output, Test Input, H.V. Inhibit and Reset Inhibit. In addition there is an SHV connector for detector bias voltage and a 9-pin D connector for preamplifier power.

Controls and Adjustments

The only external control is a rear panel potentiometer (P1) for Reset Inhibit pulse width. This control sets the inhibit pulse width appropriately to gate off the ADC during the amplifier overload recovery period following reset.

The internal controls are optimized at the factory for the detector with which the preamplifier is used. Should it be replaced or swapped with another preamplifier, the following controls may require re-adjustment:

Refer to the "Adjustments and Test Points" drawing.

P1 Reset Inhibit
Adjusts the Reset Inhibit pulse width to allow the ADC to be gated off long enough to avoid reset overload artifacts but not so long as to unnecessarily increase dead time.

P2 FET Substrate
Adjusts the bias on the FET for proper operation and minimum noise.

P3 Drain Voltage
Adjusts the drain voltage of the FET.

P5 FET Heater (optional)
Adjusts power to a FET heater for independent control of FET temperature.

P6 H.V. Inhibit
Trims the H.V. Inhibit circuit to match the temperature sensor.

P7 Risetime
Adjust this potentiometer to prevent oscillation of the preamp should it be unstable.

SW2 Drain Current
Affects ramp range and noise slope (noise vs. input capacitance) and controls FET temperature which also affects noise.

R_x/R_y These components can be chosen to trim the preamplifier gain in special applications.

Set-up and Tuning

The following settings will usually result in optimum results. Use a short amplifier time constant for set-up. This will make it easier to see a change in noise level which should be measured at the amplifier output. Ramp range, ramp rate, and reset time are measured at the preamplifier output. Always discharge the detector H.V. bias before removing or replacing preamplifiers.

A. Set P5 to the voltage measured on the preamplifier that is being replaced. Measure the heater voltage at pin 4 on the cryostat connector or at the Heater Test Point. This setting will normally be 6.0VDC for single element detectors or 4.0-6.0VDC for array detectors.

B. Set the drain current to approximately 2.3mA by turning on SW2 switches 1 and 3. Measure the voltage across the Drain Current Test Points and convert to mA using: 100mV = 1mA

C. Set P7 at mid-range.

D. Set P3 to 2.0VDC. Measure the voltage at the test point adjacent to P3.

E. Set P2 to -9.0VDC. Measure the voltage at the test point adjacent to P2.

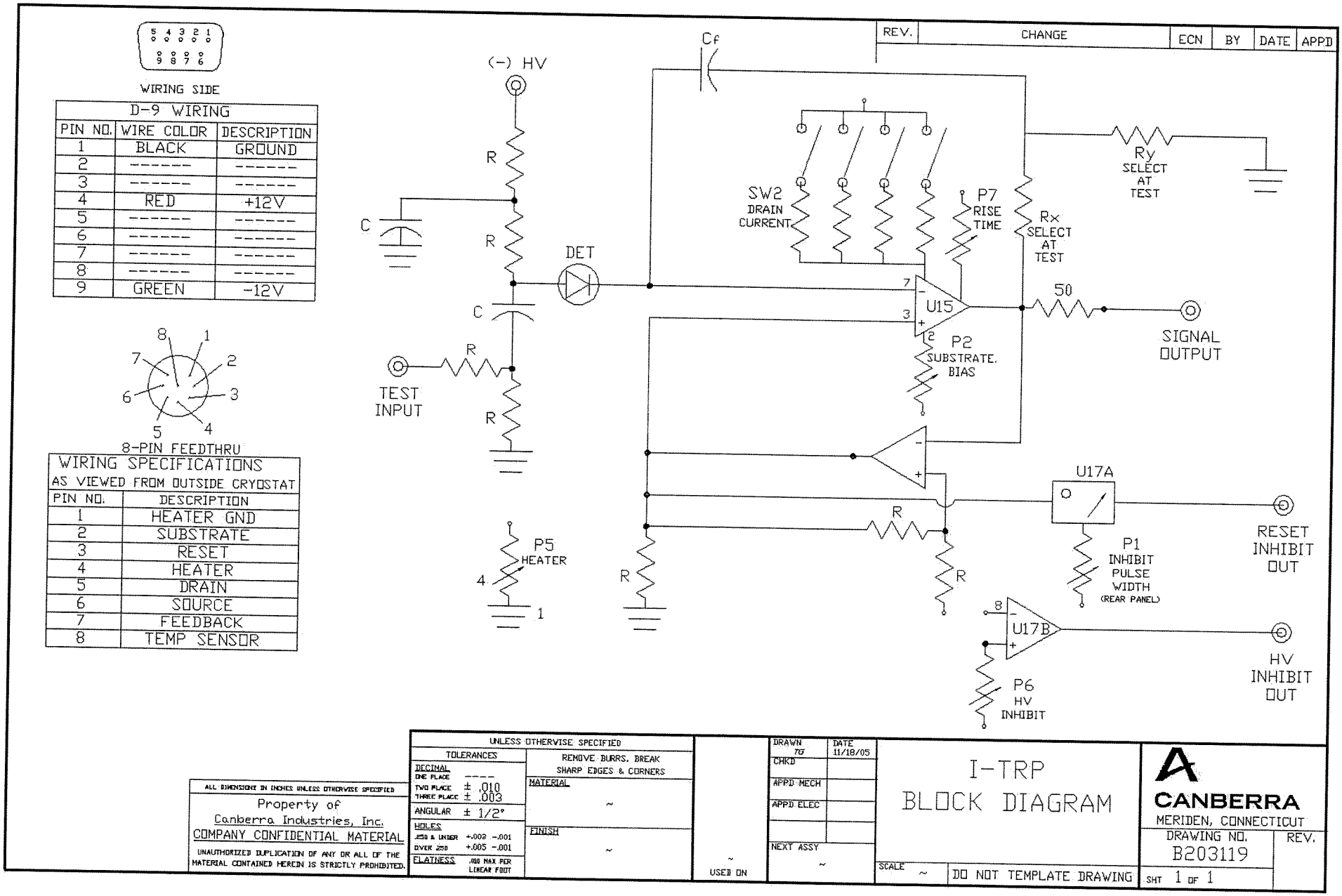
Apply a small amount of H.V. bias (10-30VDC) to the detector and observe the preamplifier output. The output should appear as a sawtooth with a very long rise and an abrupt fall. If a sawtooth is not evident then increase P2 in .5VDC increments by turning in the CW direction. Allow 10-20 seconds at each increment. If a sawtooth is still not evident then return P2 to -9.0VDC. Adjust P3 to 1.0VDC and increment slowly while observing the preamp output.

If a sawtooth is not evident when P3 has reached 4.0VDC then return P3 to 2.0VDC and decrease the drain current to 1.85mA by turning off switch 1 on SW2 leaving switch 3 as the only one on. If no sawtooth is evident then repeat the substrate voltage and drain voltage iterations described above at this lower drain current.

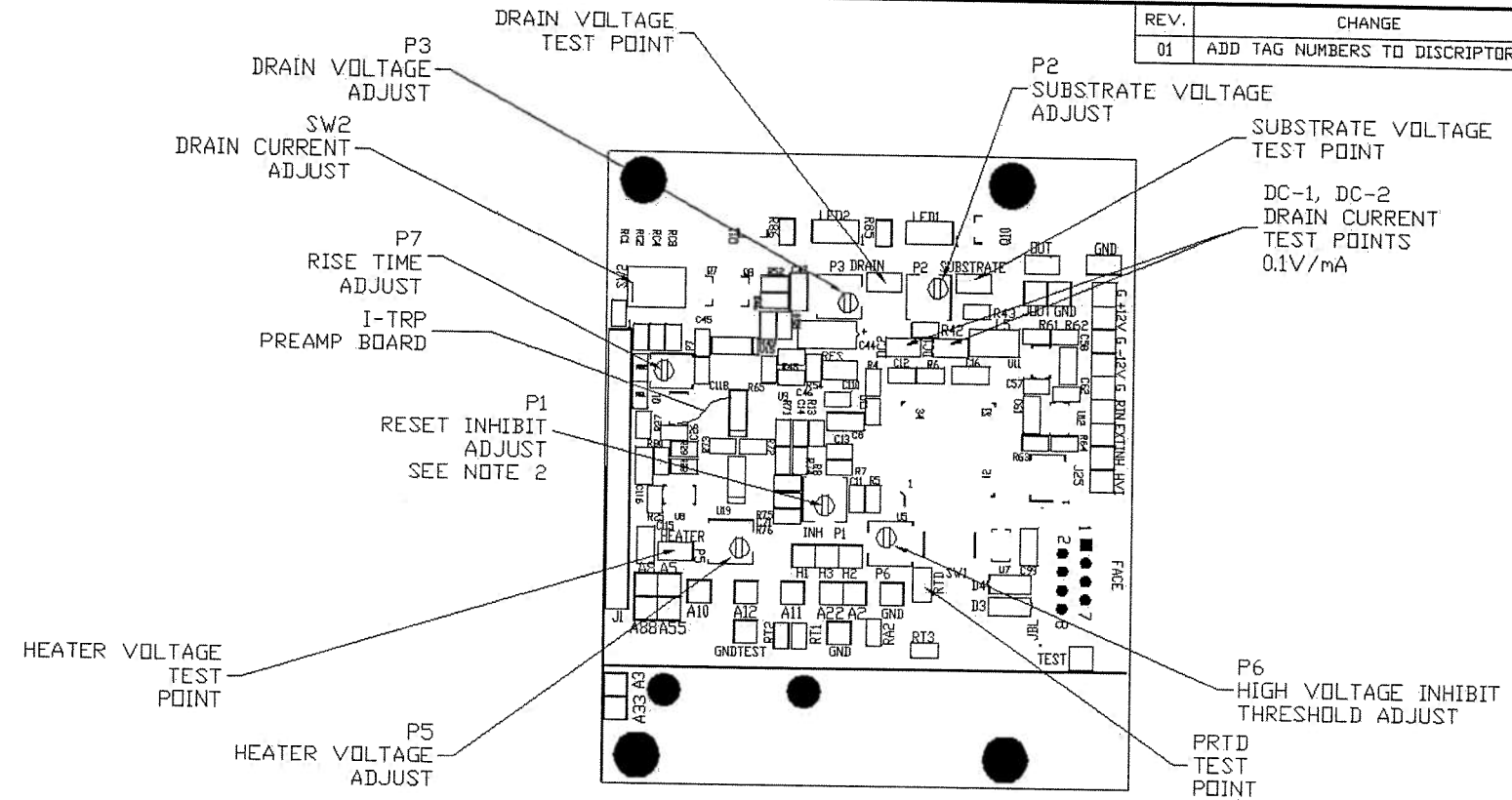
If a sawtooth is not evident then increase the drain current to 2.8mA by turning on switch 2 on SW2 so that switches 2 and 3 are on. If no sawtooth is evident then repeat the substrate voltage and drain voltage iterations described above at this higher drain current. If the preamplifier output sawtooth cannot be acquired then consult the factory or the service department of the distributor.

If the sawtooth output appears normal then apply full bias to the detector while observing the preamplifier output. The ramp rate will increase with each increment in H.V then slowly decrease to greater than 1 reset every .1 seconds. If the sawtooth locks positive and does not recover within a few seconds then the detector may be at fault and the user should reduce the H.V. and consult the factory or the service department of the distributor. At full bias the ramp rate without a radiation source should be on the order of .1 to >1 second with a range of about -1 to +4 volts. The reset time of the ramp should be on the order of 1-10us.

F. Set the H.V. Inhibit Trim. The H.V. Inhibit functionality is factory set for Canberra H.V. Power supply compatibility. With detector cold turn P6 fully CW. Turn P6 CCW until LED1 (yellow) turns on and the H.V. Inhibit output goes to ground thereby disabling the power supply. Slowly turn P6 CW ¼ turn past the point at which LED2 (green) turns on and the H.V. Inhibit output measures open circuit to ground thereby enabling the H.V. power supply.


WIRING SIDE
D-9 WIRING
PIN NO. | WIRE COLOR | DESCRIPTION
1 | BLACK | GROUND
2 | ------ | ------
3 | ------ | ------
4 | RED | +12V
5 | ------ | ------
6 | ------ | ------
7 | ------ | ------
8 | ------ | ------
9 | GREEN | -12V
8-PIN FEEDTHRU
WIRING SPECIFICATIONS
AS VIEWED FROM OUTSIDE CRYOSTAT
PIN NO. | DESCRIPTION
1 | HEATER GND
2 | SUBSTRATE
3 | RESET
4 | HEATER
5 | DRAIN
6 | SOURCE
7 | FEEDBACK
8 | TEMP SENSOR
(-) HV
Cf
R
C
DET
TEST INPUT
SW2 DRAIN CURRENT
P7 RISE TIME
Rx SELECT AT TEST
Ry SELECT AT TEST
U15
50
SIGNAL OUTPUT
P2 SUBSTRATE. BIAS
U17A
RESET INHIBIT OUT
P5 HEATER
P1 INHIBIT PULSE WIDTH (REAR PANEL)
U17B
HV INHIBIT OUT
P6 HV INHIBIT
REV. | CHANGE | ECN | BY | DATE | APPD
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED
Property of Canberra Industries, Inc.
COMPANY CONFIDENTIAL MATERIAL
UNAUTHORIZED DUPLICATION OF ANY OR ALL OF THE MATERIAL CONTAINED HEREIN IS STRICTLY PROHIBITED.
UNLESS OTHERVISE SPECIFIED
TOLERANCES
DECIMAL ONE PLACE ---- TWO PLACE ± .010 THREE PLACE ± .003
ANGULAR ± 1/2°
HOLES .250 & UNDER +.002 -.001 OVER .250 +.005 -.001
FLATNESS .000 MAX PER LINEAR FOOT
REMOVE BURRS, BREAK SHARP EDGES & CORNERS
MATERIAL ~
FINISH ~
~ USED ON
DRAWN TG DATE 11/18/05
CHKD
APPD MECH
APPD ELEC
NEXT ASSY ~
I-TRP BLOCK DIAGRAM
SCALE ~
DO NOT TEMPLATE DRAWING
CANBERRA MERIDEN, CONNECTICUT
DRAWING NO. B203119
REV.
SHT 1 OF 1

REV.	CHANGE	ECN	BY	DATE	APPD
01	ADD TAG NUMBERS TO DISCRIPTORS	-	TG	11/16/05	



NOTE:

1. ALL ADJUSTMENTS INCREASE IN CLOCKWISE DIRECTION.
2. P1 RESET INHIBIT ADJUST MAY BE MOUNTED REMOTELY ON REAR PANEL OF PREAMP FOR SINGLE ELEMENT DETECTORS.

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UNAUTHORIZED DUPLICATION OF ANY OR ALL OF THE MATERIAL CONTAINED HEREIN IS STRICTLY PROHIBITED.

UNLESS OTHERVISE SPECIFIED

TOLERANCES	
DECIMAL ONE PLACE	----
TWO PLACE	± .010
THREE PLACE	± .003
ANGULAR	± 1/2°
HOLES .250 & UNDER	+.003 -.001
HOLES OVER .250	+.005 -.001
FLATNESS	.010 MAX PER LINEAR FOOT

REMOVE BURRS. BREAK SHARP EDGES & CORNERS

MATERIAL: ~

FINISH: ~

PREAMPS USED ON

	DRAWN	DATE
	TG	01/27/05
CHKD		
APPD MECH		
APPD ELEC		
NEXT ASSY	903002	

ADJUSTMENT & TEST POINTS

SCALE ~ DO NOT TEMPLATE DRAWING

CANBERRA
MERIDEN, CONNECTICUT

DRAWING NO. B203004 REV. 01

SHT 1 OF 1

Model 7905-WR
Model 7905-BWR
Windowless Retractable Cryostats

Instructions
Supplement to the Ge Detector
And Si(Li) Detector
Instruction Manuals

Contents:

1) General Description:

The Windowless Retractable Cryostat is equipped with a manual slide table, bellows (Model 7905-BWR only), and a high vacuum gate valve. When operated in the windowless mode the detector element occupies a common vacuum with the target chamber. Proper sequencing of the gate valve and slide table are essential to avoid damaging the detector and cryostat assembly.

The detector is shipped from the factory equipped with a beryllium window in a removable flange assembly. The detector is shipped with the gate valve in the closed position to protect the beryllium window. It is essential that the detector be tested with the beryllium window in place before attempting windowless operation. It is recommended that the detector be used with the beryllium window left in place unless improved sensitivity for low energy photons is required.

Caution! Do not remove the beryllium window assembly until preliminary testing is complete!

Warning! The detector can be damaged during windowless mode of operation due to condensable contamination from the target chamber. It is essential that the target chamber be kept clean and baked out to minimize moisture and other condensable contaminates from condensing on the detector's surface. It is also extremely important to prevent the detector from being exposed to atmosphere when cold. Such abuse is not covered by the warranty.

Summary of Features:

- Windowless operation.
- Manual slide table allowing up to 8 inch chamber penetration.
- 2.75 inch Conflat coupling spool.
- Metal bellows (Model 7905-BWR only).
- Dual Viton O-ring slide seal (Model 7905-WR only).
- High vacuum gate valve.
- Mini-Conflat pump out port.
- Built-in heater for de-icing.

2) Initial Testing

The Windowless Retractable Cryostat is delivered from the factory having a 1 mil thick (other thickness optional) removable cryostat window installed on the endcap. This allows full check out and characterization of the detector before attempting to operate the detector in windowless mode.

a) Open the gate valve to the full open position.

CAUTION

The beryllium cryostat window is exposed at this point. Extreme care must be taken to avoid touching the fragile beryllium window with anything. The slightest touch to the beryllium window will damage the window and cause a catastrophic cryostat vacuum failure and damage the detector element. Failures of this type are not covered by the warranty. Review the detector instruction manual for details concerning the beryllium cyrostat window.

b) Operate the slide table until the end cap protrudes approximately one inch from the coupling spool.

c) Follow the set-up and test procedures in the detector instruction manual. Compare the obtained test results with that shown on the detector test report supplied with the detector.

d) Once the detector has been proven to be in good operating condition, retract the detector to its HOME position such that the end cap is completely behind the gate valve. Close the gate valve to protect the detector and beryllium cryostat window.
The HOME position is indicated on the scale attached to the slide.

3) Removing the Beryllium Cryostat Window

To achieve windowless operation the beryllium window must be removed. Canberra cannot be held responsible for damage caused by contamination or mishandling after the Be window is removed.

a) Power down the detector, remove all cables, remove the liquid nitrogen and allow the detector to warm-up to room temperature for a minimum of 24 hours before proceeding.

b) Open the gate valve and position the detector such that the end cap protrudes approximately one inch beyond the coupling spool. This will expose the beryllium window.

c) Connect a low pressure (<=1 PSIG) source of dry nitrogen gas to the vacuum valve operator supplied with the detector. Flush the valve operator with dry nitrogen gas purging any air from this assembly.

d) Connect the vacuum valve operator to the cryostat evacuation port located near the preamplifer section of the cryostat. Tighten the compression nut to form a vacuum tight seal around the outer diameter of the vacuum port. Insert the valve plunger until it makes contact with the vacuum port plug. Rotate the knob clockwise to engage the port plug with the valve operator handle. Complete instructions for the valve operator are provided in the appendix.

e) With the nitrogen gas supply on, slowly open the cryostat vacuum valve using the valve operator. This procedure will back-fill the cryostat with dry nitrogen gas and reduce the risk of contamination. Vent the cryostat very slowly to avoid a rush of gas that may damage internal materials or components.

f) The beryllium window is attached to a ring that slips over the end of the end cap. A radial O-ring seal is utilized to make a seal around the end cap.

g) Immediately retract the cryostat to the HOME position on the slide so that the end cap is completely behind the gate valve. Close the gate valve and evacuate the cryostat to pressures less than $1x10^{-6}$ torr for a minimum of 0.5 hours using an oil free or cold trapped vacuum system. It is also possible to evacuate the cryostat by connecting the detector to the target chamber, using the chamber vacuum system to pump down the cryostat. When pumping down the cryostat or backfilling the cryostat do so very slowly to avoid a rush of air that may damage internal materials or components. After most of the air is removed you may open the pump valve fully to achieve the desired low pressures.

h) Once the cryostat has been evacuated close off the evacuation port by pushing the plug back into position. Remove the valve operator in reverse order to that listed in step d of this procedure.

CAUTION

The detector is sensitive to corrosive atmosphere and humidity. For this reason the beryllium cryostat window should be removed in a clean and dry laboratory environment. The cryostat should not be left open exposed to atmosphere any longer than necessary for the removal of the window.

4) Detector Installation and Mechanical Operation

The cryostat assembly should first be attached to the target chamber by means of the appropriate adapter flange. The slide table must be supported to avoid excessive stress on the coupling flange. Once attached, the target chamber can be evacuated. The gate valve must not be opened until the target chamber is at a pressure less than 10^{-6} torr when operating the detector in windowless mode of operation. During the chamber evacuation the detector dewar may be filled with liquid nitrogen. Observe the cool down time as indicated on the detector serial number tag before applying high voltage to the detector.

System Considerations

There are potential system problems that can appear when detectors are attached to target chambers. Be aware of the following common ones:

a) Microphonics

Vibrations from pumps or other devices may be transmitted to the detector. Detectors are extremely sensitive to noise and vibrations. If you can feel any vibration in the chamber it is too much. The chamber should be isolated from the vibrations source(s) before even attempting to install the detector.

b) Electrical Interference

Electrical isolation between the detector and the slide table/gate valve assembly is designed in the cryostat. This means that the detector assembly is grounded only through the preamplifier connections. Nonetheless, there may be pick-up from noise sources in or around the vacuum chamber. These will have to be eliminated to achieve good detector performance.

c) Light Interference

Ge detectors are sensitive to visible light and **IR**. There is a light filter over the detector element but it is not effective against strong light or **IR** (from hot surfaces) Within view of the detector element. These detectors should be operated in the dark.

The step-by step procedure is as follows:

a) Attach the detector to the target chamber. Be sure to provide support for the detector as the flanges are not designed to support all the weight.

b) Evacuate the target chamber.

c) Open the gate valve only after the vacuum chamber pressure is less than $1x10^{-6}$ torr.

CAUTION

During windowless mode of operation high vacuum must be maintained in the target chamber at all times when the detector gate valve is open.

d) Operate the slide table to advance the detector to the desired location in the target chamber. **DO NOT** attempt to advance the detector beyond the LIMIT position which is indicated on the scale attached to the slide table.

The detector may be returned to the safe storage position as follows:

a) Operate the slide table until the detector is fully retracted to the HOME position. (The detector end cap must be fully retracted before the gate valve is closed.)

b) Once the detector is fully retracted, the gate valve may be closed.

c) The target chamber may then be vented.

5) Bellows/Seal Evacuation

An auxiliary evacuation port is provided just behind the gate valve. It is a seal-off valve attached to a mini-conflat flange. This port can be used to evacuate the bellows/seal volume when the detector is equipped with a beryllium window in case the user wishes to avoid air from this area to be pumped through his vacuum chamber.

6) De-Icing System

The Detector can accumulate an ice layer if used in a vacuum system in which water vapor is present. This ice layer will attenuate low energy photons and can lead to an increase in detector leakage current as well. In many applications the ice layer can be removed by temperature cycling the detector (allowing the detector to warm up thoroughly to room temperature and then cooling it again). This, of course takes time to accomplish and the ice build-up may occur again if conditions remain the same. Ideally, detectors should not be operated under these conditions, but if they are, it is possible to evaporate the ice by heating the detector assembly slightly on systems equipped with de-icing capability.

The de-icing system involves a heater which is built in the detector holder assembly and a platinum resistance thermometer element (PRTD-100) to measure the temperature. The wiring diagram shows the external connections for these components. The detector holder assembly is coupled to the cold finger with appropriate thermal resistance so that a moderate amount of power can warm the detector assembly allowing de-icing while the dewar is filled with liquid nitrogen. It has been proven that raising the temperature by 10 to 50 degrees is sufficient to de-ice the system.

Operation

a) Remove preamplifier power and detector bias.

b) Attach an ohmmeter to the PRTD terminals and measure the temperature using the chart below.

c) Apply power from a variable transformer or d.c. power supply to the heater terminals in the heater box located on the cryostat near the preamplifier. Observe the power limitation of 10 watts maximum. This is approximately 115 V d.c. or RMS for the 1350 ohm heater.

d) Allow the temperature to rise until the ice layer has been eliminated.

It has been shown that the temperature need be raised only 10 to 20 degrees Celsius for 30 minutes or so to eliminate the ice layer. You will need to experiment with the temperature and time for your specific operating conditions.

e) Disconnect the power source and allow the detector to cool.

f) Once the original cold operating temperature has been reached, the preamplifier power and detector bias can be restored.

g) Disconnect the heater and temperature sensor leads as they can act as a noise source which can degrade the energy resolution of the system.

Temperature versus temperature sensor resistance chart:

Temp. (Celsius)	PRTD Value* (Ohms)	Temp. (Celsius)	PRTD Value* (Ohms)
-200	18.49	-130	48.00
-190	22.80	-120	52.11
-180	27.08	-110	56.19
-170	31.32	-100	56.19
-160	35.53	- 90	64.30
-150	39.71	- 80	68.33
-140	43.87	- 70	72.33

The temperature coefficient is about 0.4 ohms per degree Celsius in this range.

The resistance values above do not include the least resistance which is approximately 8 – 12 ohms.

Instructions

Seal-off Valve Operator

I. Introduction

Canberra cryostats are equipped with seal-off valves, which are opened and closed by means of a seal-off valve operator. This valve operator provides a sealed evacuation path between the cryostat and an evacuation hose (pump) along with a mechanism for withdrawing and replacing the seal-off valve plug.

II. Inspection

1. Valve Operator

Look at the valve operator and observe the following key design features:

1) The O-ring seal which is compressed against the seal-off valve by means of a hex or knurled threaded nut or ring.

2) The sealed shaft with the knob (outside) and the threaded tip (inside). The shaft can be rotated and depressed to engage the valve plug, then withdrawn to remove the valve plug.

3) The evacuation tube which can be connected to a vacuum pump by means of flexible hose or quick-disconnect fitting.

III. Operation

1. Prepare the seal-off valve by removing the cover (if present) and any vacuum grease that may be packed in the valve body. Clean the valve body with lint-free paper towels or swabs.

2. Attach the valve operator to the seal-off valve and tighten the nut or ring (hand tight).

3. Engage the valve plug by pushing the valve handle inward and turning it clockwise a few turns. You should feel the resistance to rotation as the threads engage and tighten.

4. Withdraw the handle pulling the plug out of its seat.

5. To reseal the valve reverse the order of the steps above. That is:

a) Push the handle inward and feel the plug returning to its seated position.

b) Turn the handle counterclockwise several turns to disengage the shaft. To ensure that the plug does not rotate you can push inward on the handle while turning it.

c) Withdraw the handle observing that it moves more freely with the plug detached.

d) Remove the valve operator from the valve.

e) Replace the vacuum grease (if desired) and the valve cover.

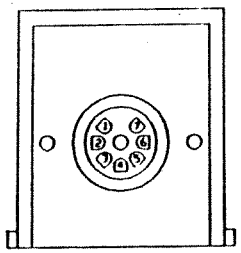
IV. Maintenance

Use silicone vacuum grease sparingly on the o-ring and on the shaft (only if it becomes hard to operate).

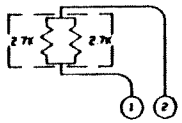
REV	CHANGE	ECN	BY	DATE	APPD

WIRING: 7 POSITION CONNECTOR,
(2")22 AWG STRAND PTFE COAT WIRE

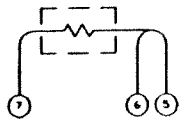
PIN 1 : #1 SCR ON TERMINAL BLOCK
PIN 2 : #2 SCR ON TERMINAL BLOCK
PIN 5 : GND SCR ON PRTD CONNECTOR
PIN 6 : + SCR ON PRTD CONNECTOR
PIN 7 : - SCR ON PRTD CONNECTOR



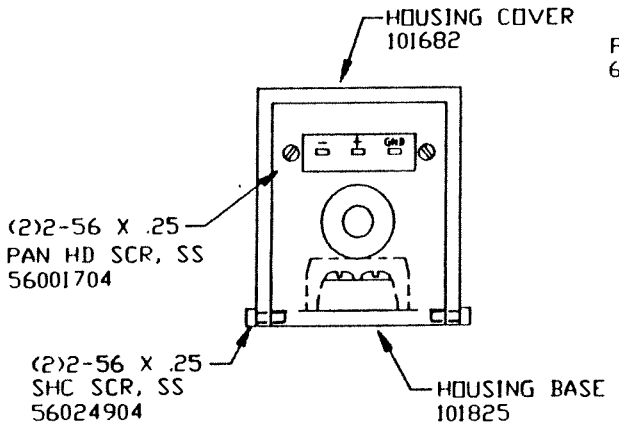
VIEW A-A

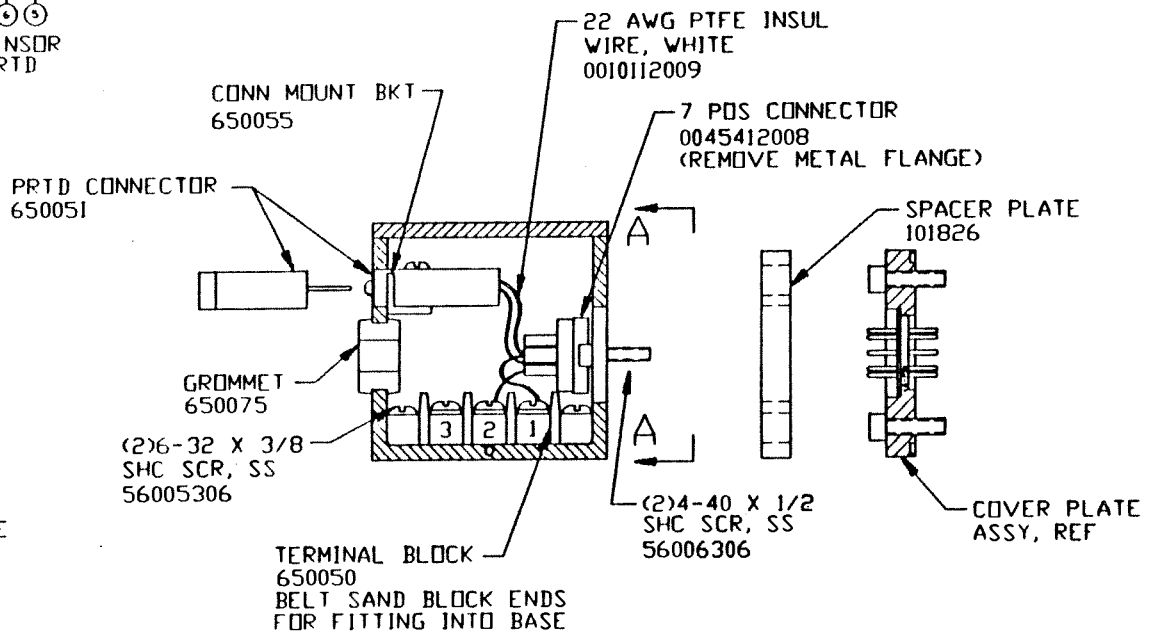


HEATER BLOCK
10 WATTS
115 VOLTS



HEATER SENSOR
100 OHM PRTD





UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMAL
ONE PLACE ----
TWO PLACE ----
THREE PLACE ----
ANGULAR ----
HOLES
FOR 6 UNDER +.003 -.001
OVER .250 +.005 -.001
FLATNESS .005 MAX PER LINEAR FOOT
REMOVE BURRS, BREAK SHARP EDGES & CORNERS
MATERIAL

FINISH

7905-BWR
7905-WR
USED ON

DRAWN HG	2/9/96
CHKD	
APPD MECH	
APPD ELEC	
NEXT ASSY	C201813 C201860

HEAT BOX ASSEMBLY

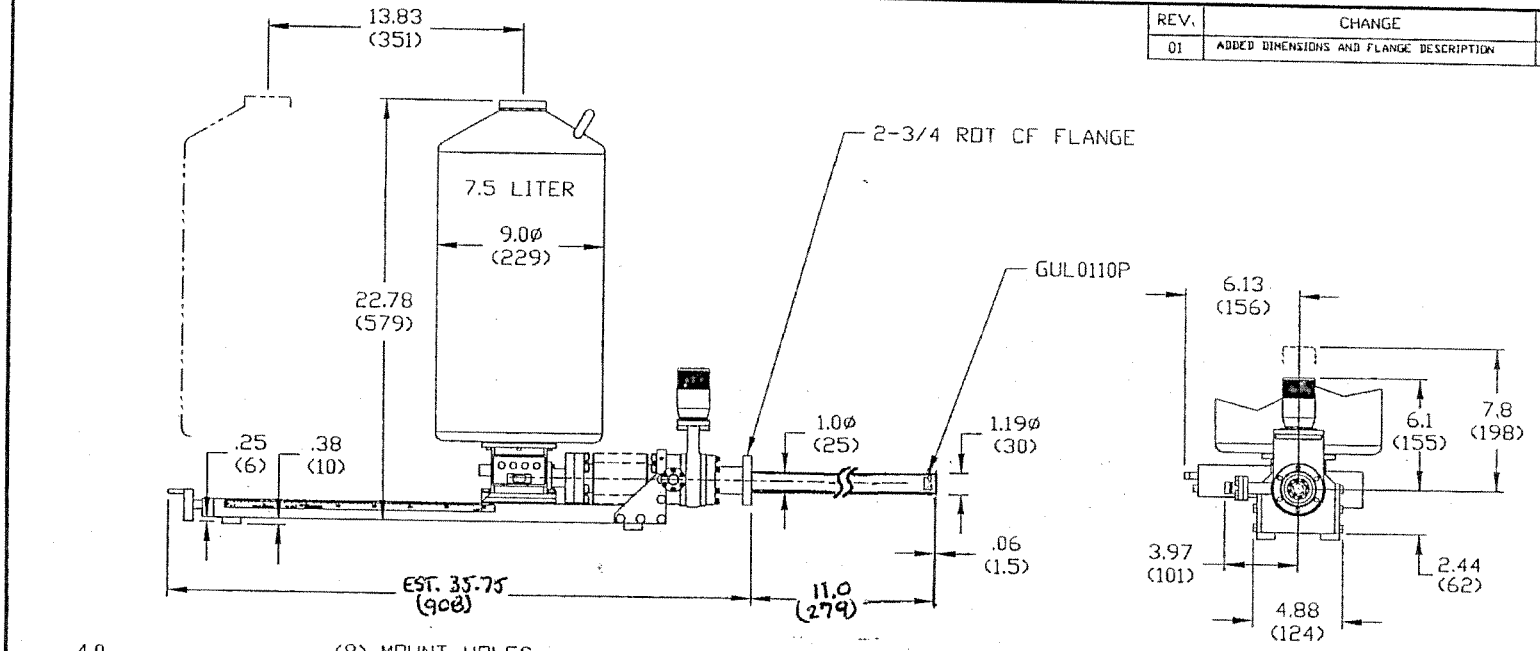
SCALE ~ | DO NOT TEMPLATE DRAWING

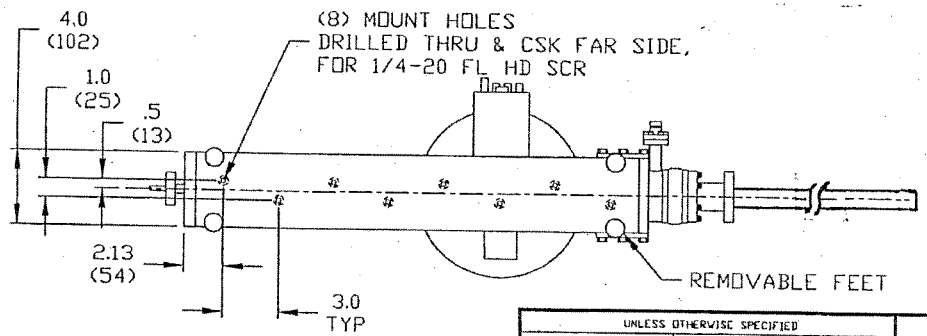
CANBERRA
MERIDEN, CONNECTICUT

DRAWING NO. B201824 | REV.

SHT 1 OF 1

REV.	CHANGE	ECN	BY	DATE	APPD
01	ADDED DIMENSIONS AND FLANGE DESCRIPTION		WFD	8/19/02	





X J.F.C.
OCT. 03, 2006

UNLESS OTHERWISE SPECIFIED

TOLERANCES

DECIMAL
ONE PLACE ----
TWO PLACE ----
THREE PLACE ----
ANGULAR ----
HOLES
.250 & UNDER +.003 -.001
OVER .250 +.005 -.001
FLATNESS .010 MAX PER LINEAR FOOT

REMOVE BURRS, BREAK SHARP EDGES & CORNERS

MATERIAL ----------

FINISH ----------

7905-BWRS
USED ON

DRAWN	WFD	7/31/02
CHKD		
APPD MECH		
APPD ELEC		
NEXT ASSY		

OUTLINE DRAWING MODEL 7905-BWRS

SCALE ~ DO NOT TEMPLATE DRAWING

CANBERRA
MERIDEN, CONNECTICUT

DRAWING NO. B202684X REV. 01

SHT 1 OF 1

Table of Contents

Important Safety Considerations Read Carefully

There are three potential hazards in the use and handling of Ge detectors that must be recognized and properly dealt with to avoid the risk of personal injury.

High Voltage

Ge detectors may operate at bias voltages of 5000 V dc or more. Always be sure that detectors are properly grounded (through the SHV coaxial cable ground to a properly grounded Power Supply/NIM Bin). Also use extreme caution when adjusting internal preamplifier controls to avoid contact with the high voltage circuit.

Liquid Nitrogen

LN_2 can cause frostbite if not handled properly. Avoid skin contact with LN_2 or with surfaces cooled by LN_2. Read "Handling Liquid Nitrogen" on page 54 for more detailed instruction on LN2 hazards.

Vacuum Failure - Overpressurization

When a cryostat exhibits signs of catastrophic vacuum failure, such as heavy moisture or ice formation on the surfaces, extremely high LN_2 loss rate, and so forth, the adsorber (molecular sieves or charcoal), which normally maintains vacuum, may be virtually saturated.

When allowed to warm up, the adsorber will outgas and the pressure in the cryostat will rise. Canberra cryostats and Dewars sold by Canberra have a pressure relieving seal-off valve which is designed to prevent dangerous levels of pressurization.

The pressure rise, however, can be high enough to break or break loose beryllium windows and/or end-caps. A frozen or ice clogged seal-off valve may fail to relieve pressure, resulting in dangerous levels of pressurization.

Precautions

For these reasons use extreme caution in handling cryostats with symptoms of catastrophic vacuum failure. When you do have to handle them, take the following precautions:

1. Stop using the failed unit immediately. Do not allow it to warm up until additional steps are taken to prevent damage or injury due to overpressurization.

2. Drape a heavy towel or blanket over the end-cap and point the end-cap away from personnel and equipment. If the unit is in a shield, close the shield door.

3. Call the factory for further instructions if the incident occurs during working hours.

4. If it is impractical to keep the unit cold until advice is available from the factory, keep the end-cap covered with a heavy towel or blanket and place the unit in a restricted area in a container (corrugated cardboard, for example). If the unit is in a shield, let it warm up in the shield with the door closed.

5. After the unit has warmed up, cautiously check for overpressurization (outwardly bulging end-caps or windows). If there are no signs of pressure, the unit may be shipped to the factory for repair. Consult the factory for shipping information.