

HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17604, U.S.A. (717) 394-7161

July 11, 1985

United States Nuclear Regulatory Commission  
Region I  
631 Park Avenue  
King of Prussia, PA 19406

License No. 37-03572-06  
Docket No. 030-12704  
Control No. 103666

MS16  
P6

Dear Dr. L. F. Friedman,

The following memo contains responses to your questions sent to me in your letter of June 24, 1985. All responses are in reference to amend License No. 37-03572-06 which was dated April 10, 1985.

Item 1 - Radiation Safety Course

At the time of our application, Mr. D. M. Fenwick was acting as our Radiation Safety Officer. Due to reorganization of our technical staff, Mr. Fenwick will no longer serve in this capacity as of September 1, 1985.

His replacement is Mr. J. C. Sabol. Mr. Sabol will be attending a Radiation Protection course in August of this year at Harvard University. I have enclosed the form letter sent to Harvard University School of Public Health and Safety which was used to enroll Mr. Sabol.

Item 2 - Training Program

We have developed a memo which is posted on all bulletin boards in our Tritium Room area which lists procedures and precautions for contamination. All employees who enter this area are briefed by Mr. Fenwick before starting their new assignments. Please note that Mr. Fenwick takes care of all maintenance requirements in the area. We use the internal operators as janitorial staff at the close of each day and during off working hours, the room is secured until working hours resume.

I have enclosed this memo for your review.

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"OFFICIAL RECORD COPY"

ML10

JUL 15 1985

Item 3 - Facility Description

I have enclosed a copy of our tritium room layout for your review.

This area is secured during off working hours for no one's admittance. The following signs are posted on the entrance door:

"Caution Radioactive Materials"

"Authorized Employees Only"

The following is a list of employees who are allowed access to this area:

1. Mr. D. M. Fenwick
2. Mr. J. C. Sabol
3. Mr. T. E. Deitzler
4. Mr. C. Link
5. Ms. I. White
6. Ms. P. Heine

Our activity has been reduced drastically since the original application was filed. Activity at the present time is very minimal and is for servicing work only in this area.

Modules are repaired under exhaust hoods which have an air flow of 200 cubic feet per inch. Discharge is to the atmosphere with no return permitted. We store the modules in a cabinet which has an exhaust air flow of 200 cubic feet per inch. The discharge is to the atmosphere with no return permitted.

A bioassay program has been established. While it is highly impossible that any employee working in the area will receive more than the maximum permissible amount, we still insist on a quarterly bioassay. These urine samples are sent to the following address for analysis:

Self-Powered Lighting, Inc.  
8 Westchester Plaza  
Elmsford, NY 10523

As employees are trained for the servicing of these watches, Mr. D. Fenwick gives them the necessary instructions for access to the tritium room. Over the past two and one half years we have not needed to add additional personnel, in fact, we have reduced manpower by two operators.

Item 4 - Servicing Procedure

The Radiation Protection Program is based on the use of a Tritium Air Monitor (Betacec Model 20). The monitor is calibrated on a frequency of once per month by Mr. D. Fenwick. Each year during our summer factory shutdown, it is sent to Overhoff and Associates of Cincinnati, Ohio for servicing and recalibration. Each time the alarm is set off, we recalibrate and record readings. Daily records are kept of the monitoring.

The following specifications are used in this area:

Minimum scale: 0 to 10  $\mu\text{Ci}/\text{M}^3$  with gamma compensation.

Accuracy: 10% of full scale.

Reproductibility: (+) (-) 2%

Capacity: 10 Liter

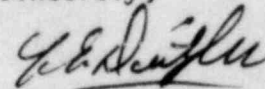
Time Constant: 15 seconds - 45 seconds

The monitor is equipped with a strip recorder which air records are based from. The sensitivity of this equipment is 1  $\mu\text{Ci}/\text{M}^3$  of Tritium.

If the alarm is triggered, we have employees respond to safety officers who follow through to the complete body wash and bioassay test sent for analysis.

If you have any questions to the information I have enclosed, please call me to discuss. Thank you once again for the cooperation your staff has given me in the refiling for this amendment to License No. 37-03572-06.

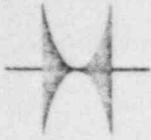
Sincerely,



Thomas E. Deitzler  
Director of Operations

Enc.

TED/jap



*HAMILTON WATCH CO., INC.*

LANCASTER, PENNSYLVANIA 17604, U.S.A. (717) 394-7161

July 11, 1985

Harvard School of Public Health  
Office of Continuing Education  
Department A  
677 Huntington Avenue  
Boston, MA 02215

Dear Sirs,

The enclosed check is for enrollment in your August 19 - 23, 1985 course on radiation safety. The course being offered is titled "Occupation and Environmental Radiation Protection".

Our newly appointed Radiation Safety Officer will be attending - Mr. Joseph C. Sabol. At your earliest convenience, would you please send to his attention convenient lodging recommendations and literature for the course.

Thank you for your assistance in enrolling Mr. Sabol in this course for Hamilton Watch Company.

Sincerely,

Thomas E. Deitzler  
Director of Factory Operations

TED/jap

Enc.

INTERNAL CORRESPONDENCE

TO: Tritium Room Operators

FROM: T. E. Teitler

CC: N.R.C. File

DATE: October 14, 1982

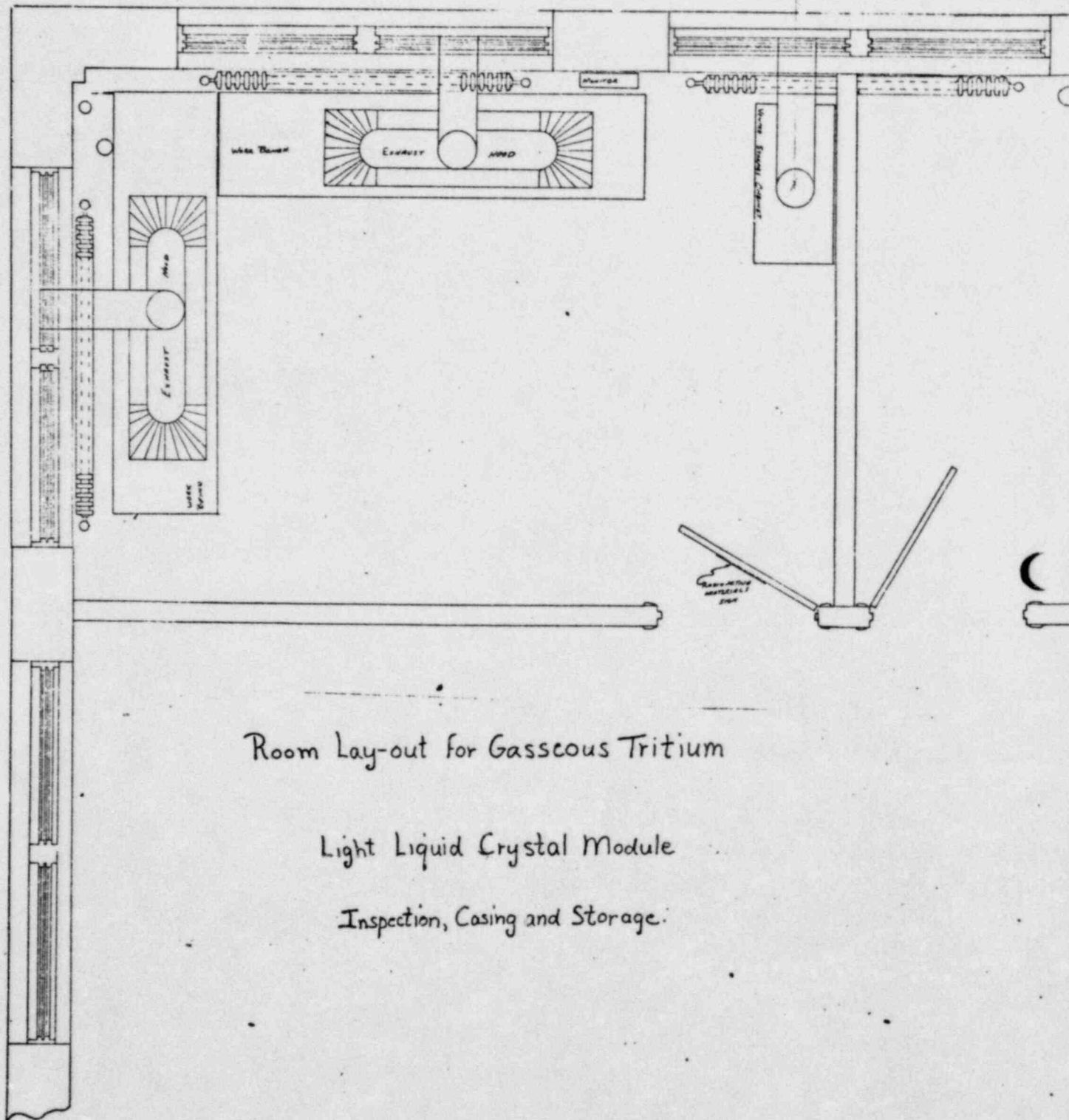
SUBJECT: PROCEDURES & PRECAUTIONS FOR CONTAMINATION

The following is a fundamental procedure that is required by the N.R.C. This is a seemingly simple requirement, however, it must be rigidly and continuously adhered to by all workers.

Working conditions must be arranged to provide a generally safe environment for the workers and to encourage their cooperation in carrying out rules intended to preclude any known possibility of injury. The essential requirement is neat and orderly "housekeeping" which, under proper supervision, results in better working conditions, increased productivity, and safety for the individual worker. All workrooms inhabited by workers shall be equipped with proper ventilation and a Tritium monitor. In addition to this, the personnel shall be instructed about: 1) Instruction of handling the modules; 2) Effects of radiation; 3) Personal cleanliness.

Radionuclides can be taken into the body by a number of routes including ingestion or absorption through the skin. Extreme personal cleanliness and care are therefore needed. In work with sealed sources (which we do here at Hamilton), contamination will be a very minor problem, barring rupture of the container and dispersion of the source material. Hands shall be washed frequently, and shall be washed before eating, smoking, and at the end of each work period. No edibles of any kind--food, gum, candy, beverages--shall be brought into contaminated areas or areas that may become contaminated between radiation control surveys. Smoking shall be prohibited in such zones. Personnel should refrain from using personal items in the work area. Personnel shall keep their work area free from equipment and materials not needed for the immediate work. Orderliness is a prime requirement for eliminating the spread of contamination.

TED:kbm



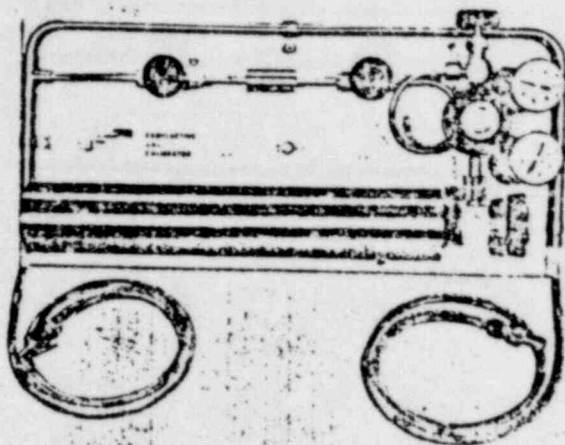
Room Lay-out for Gaseous Tritium

Light Liquid Crystal Module

Inspection, Casing and Storage:

# TRITON

## CL-1 Calibrator



### PRINCIPLE

A Precisely Measured Quantity of Tritiated Gas is Provided for Introduction Into Monitoring System to be tested.

### FEATURES

- LOW USER COST—1000 or more Calibrations.
- ACCURATE— $\pm 10\%$ .
- REPRODUCIBLE— $\pm 2\%$ .
- RAPID—Calibration time 3-5 minutes.
- RELIABLE—Specific activity of gas is constant under pressure.
- CONVENIENT—Self-contained, non-aqueous, portable.
- SIMPLE OPERATION—No special technique required.

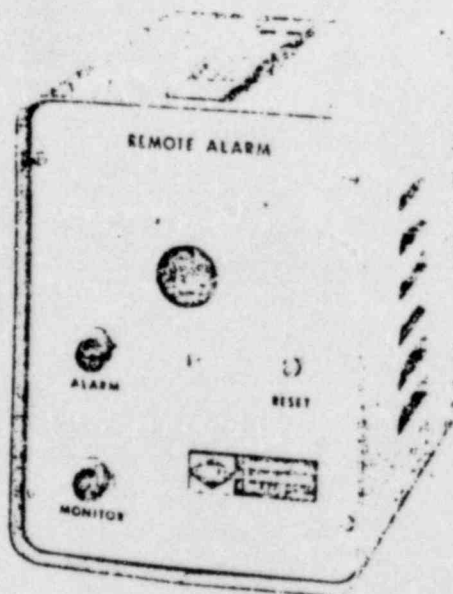
### DESCRIPTION

- CALIBRATOR—MODEL CL-1 consists of back-plate, cylinder holder, lecture bottle, pressure regulator, sample system.
- RADIOACTIVE GAS SUPPLIED—Lecture Bottle contains 60-liters tritiated methane in nitrogen; activity approximately  $4 \mu\text{Ci/liter}$ . Individual assay provided.
- PHYSICAL DIMENSIONS—  
8" high x 18" long x 5" deep.
- NET WEIGHT—12 lbs. (include gas lecture bottle).
- SHIPPING WEIGHT—18 lbs.

NOTE: A SPECIAL ATOMIC LICENSE NOT REQUIRED.

# TRITON

## RA-1 Remote Alarm



### ADVANTAGES

- VERSATILE—Permits TRITON monitor location in noisy, troublesome, or hazardous areas.
- CONVENIENT—Eliminates direct supervision of TRITON monitor.
- SAFE—Removes personnel from exposure to harmful radioactivity.

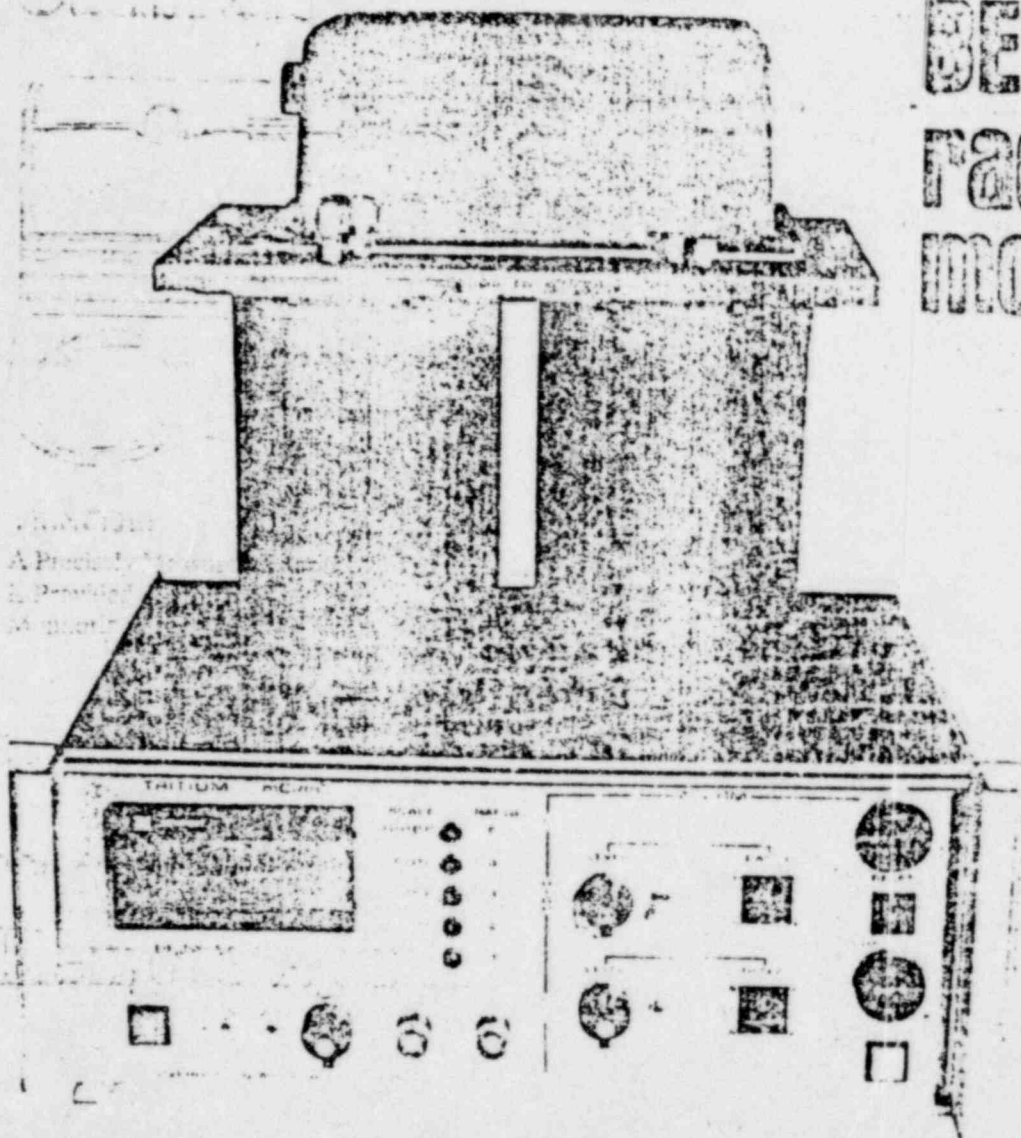
WARNING SYSTEM—Audible and Visible Alarm.  
ALARM RE-SET—on Remote Alarm (RA-1) resets main instrument also.  
MONITOR CONTROL—Power Indicator Light.  
MONITOR-POWERED  
COMPACT  
LIGHTWEIGHT

Model RA-1—Consists of aluminum cabinet with carrying handle, audible alarm, visible alarm, monitor power indicator light, alarm re-set button, 50 ft. of cable, (additional 100 ft. lengths available). Remote Alarm powered by TRITON monitor.

USE—with TRITONS 755C, 955B  
SIZE—8" long x 6" wide x  $8\frac{1}{2}$ " high.  
NET WEIGHT—5 lbs.  
SHIPPING WEIGHT—6 lbs.

# Ⓐ OVERHOFF and Associates

## BETATEC radiogas monitors



The BETATEC Radiogas Monitors manufactured by OVERHOFF & ASSOCIATES are the most sensitive, reliable and accurate linear ionization chamber systems available anywhere. They are used for the measurement of all radiogases and are specially useful for the detection of Tritium and other weakly emitting substances.

The battery powered portable is especially useful for nuclear power plants and other applications where radiogases are to be measured in the pre-

sence of background gamma radiation.

Electrometers, Amplifiers and Power Supplies are available separately. The OVERHOFF & ASSOCIATES Electrometers will respond accurately to currents as low as  $10^{-17}$  A.

Our equipment is built for reliability and service in arduous environments and has found acceptance with some of the most prestigious members of the nuclear community.

# system description

The BETATEC TRITIUM MONITORS consist of one or more linear ionization chambers coupled to an ultra sensitive electrometer. The major components assemblies are:

- 1. Ionization chambers
- 2. Electrometer
- 3. Main D.C. amplifier
- 4. Power Supplies
- 5. Automatic Scaling and Alarm Systems

Each of these assemblies is described below, and a summary of the performance specifications is presented.

## IONIZATION CHAMBERS

The electric current generated in an ionization chamber is accurately proportioned to the decay activity of the contained radio active gas and to the volume of the chamber. A one liter chamber containing Tritium in a concentration of  $1\mu\text{Ci}/\text{m}^3$  will collect a current of  $1 \times 10^{-15}$  A.

BETATEC IONIZATION CHAMBERS are available in numerous sizes and configurations, all chambers are equipped with coaxial ion traps for the removal of non radio active particulates.

Many BETATEC chamber systems are supplied in pairs. One chamber can be used for background gamma compensation or the two chambers can be used for difference measurements.

## ELECTROMETERS

Vibrating reed electrometers are capacitance parametric amplifiers that exhibit enormous power gain with practically no offset drift. Their input impedance is given by the insulation resistance of the capacitor structure with typical values of  $10^{18}$  ohms. BETATEC vibrating reed electrometers are suitable for measurement of currents as low as  $10^{-17}$  A, and possess excellent thermal stability.

## MAIN D.C. AMPLIFIER

This amplifier serves as interface between the electrometer and the data display. It incorporates all controls for scaling and calibration.

The BETATEC main amplifier printed circuit board is designed to include a logarithmic amplifier for accurate drift free direct logarithmic data display.

## POWER SUPPLIES

All BETATEC power supplies are voltage regulated and are designed for a wide over and under voltage range (105 V - 150 V). The BETATEC high voltage power supply is nominally rated for  $\pm 400$  V and is regulated to better than 1 m V, special units are available with more stringent noise and drift characteristics.

## AUTOMATIC SCALING AND ALARM CIRCUITS

The BETATEC AUTOSCALER is a solid state stepping switch programmable for 2 to 6 ranges that permits the monitor to automatically select the optimum range of operation. Range and scale information is visually presented by a floating decimal point in the digital panel meter, or by separate lamps.

# specifications

The following specifications are guidelines and represent past and current product performance parameters.

## IONIZATION CHAMBERS

VOLUME ----- 20 cc, 2 liters, 20 liters  
NUMBER ----- Single, double or multiple  
ION TRAP ----- integral coaxial  
GAMMA -----  
COMPENSATION -- dual matched chambers  
LEAK RATE ----- leak tested on request to  
10<sup>-6</sup> cc/sec/AHe  
PORTS ----- SWAGELOK or as specified  
OUTER CHAMBER- stainless steel  
INNER CHAMBER - stainless steel or aluminum  
ELECTRODE----- brass, teflon insulator  
GASKETS----- O-Ring, Neoprene or as re-  
quested  
OPTIONS ----- plated chambers, gridded  
chambers, pumps, driers,  
adsorption columns and  
others

## ELECTROMETER

SENSITIVITY----- 2.5 Volts/Pico ampere,  
standard 25 V/pA & 250 V/  
pA available.  $\pm 1 \times 10^{-15}$   
Amperes. Ultra stable mo-  
dels, to 10<sup>-17</sup>A available on  
special request  
RANGES ----- one fixed and two remotely  
switched feedback resistors  
POWER  
REQUIREMENTS --  $\pm 15$  V, 100 mA, +200 V,  
1 ma  
STABILITY ----- 500  $\mu$ V/ $^{\circ}$ C typical, unaffec-  
ted by humidity for 0-90% R.  
H.

## HIGH VOLTAGE POWER SUPPLIES

VOLTAGES -----  $\pm 400$  nominal, fixed  
STABILITY -----  $\pm 1$  m V/sec,  $\pm 100 \mu$ V/sec  
special  
COMMON MODE  
STABILITY -----  $\pm 20 \mu$ V/sec  
CURRENT -----  $\pm 1$  mA

## AUTO SCALER

RANGES ----- 3, 4 or 5 ranges, hard wired  
STEPPING RATE -- 6 seconds per step  
BUFFER OUT ----- 100 mA, 15 V, negative logic  
(pull down)  
ALARMS ----- two independent alarms  
LEVEL SELECT----- thumbwheel or multiturn po-  
tentiometer  
RANGE SELECT----- thumbwheel  
SENSE ----- maximum or minimum, hard  
wired  
MODE ----- latching or non-latching  
INDICATORS ----- visual, accoustic or remote  
BUFFER OUT ----- S.P.D.T. relay

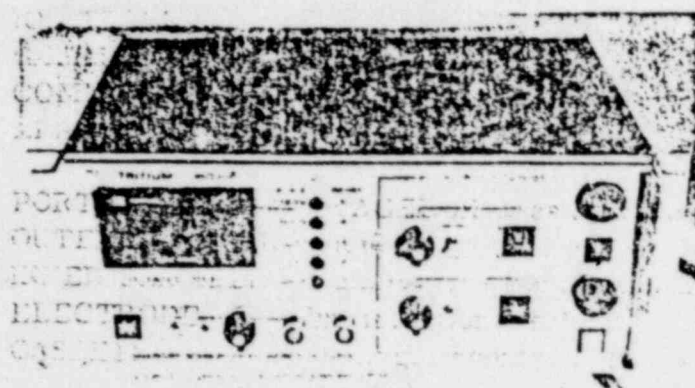
More complete specification data will be sent on  
special request. Please direct your enquiries to:

OVERHOFF & ASSOCIATES, INC.  
BETATEC DIVISION  
P.O. Box 8691  
CINCINNATI, OHIO 45208

Phone: (513) 271-8339 or (513) 871-7548



# standard systems

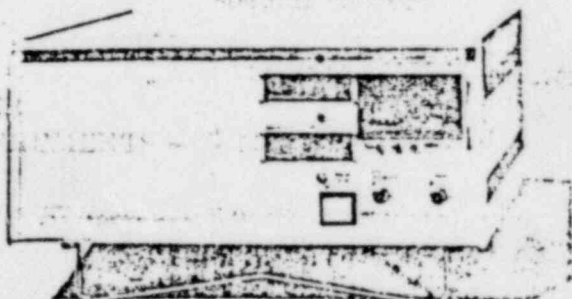


## OPTIONS

### MODEL 100 SERIES DISPLAY CABINETS

To be used with any of the Ionization Chambers listed in the second column.

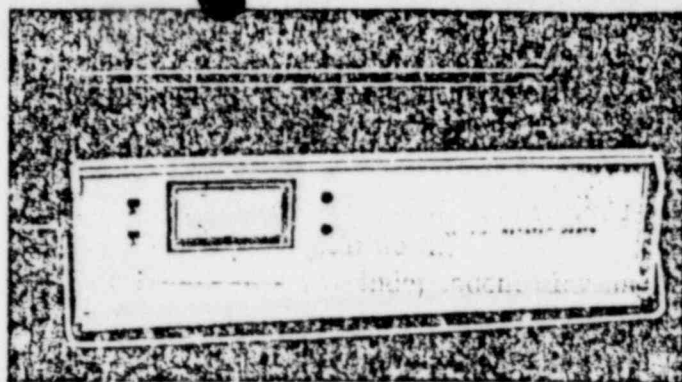
- Up to 5 manual or automatically switched ranges
- Alarms
- Chart recorders with linear or logarithmic scales
- Remote display units with meter and alarm indicators



### MODEL 220

BENCH TOP, self contained with two 2 liter ionization chambers for automatic gamma compensation.

RANGE	0 - 200,000 $\mu\text{Ci}/\text{m}^3$ in 3 manual or automatic ranges
SENSITIVITY	1 $\mu\text{Ci}/\text{m}^3$ Tritium
STABILITY	equivalent to $\pm 0.5 \mu\text{Ci}/\text{m}^3$ Tritium
ALARMS	two level, maximum or minimum
DISPLAY	3-1/2 digit Digital Panel Meter



MODEL 222 FS DUAL CHAMBER  
MODEL 260 FS SIXFOLD CHAMBER CLUSTER  
(model 260 FS not shown)

BATTERY POWERED GAMMA COMPENSATED  
PORTABLE

LIGHT WEIGHT --- 25 lbs.

HIGH

SENSITIVITY----- 1  $\mu\text{Ci}/\text{m}^3$

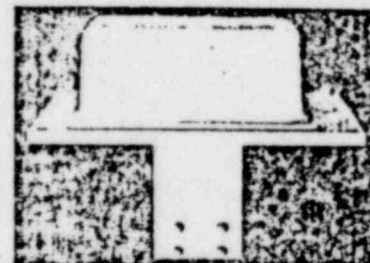
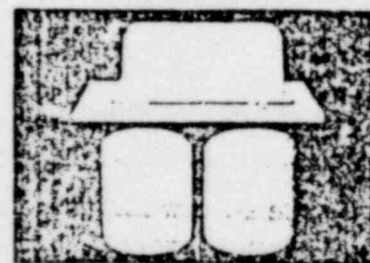
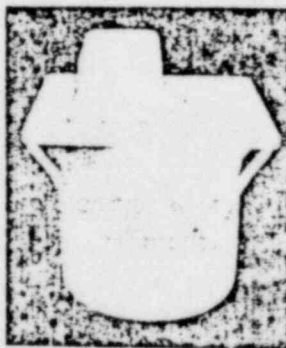
HIGH PUMPING

RATE ----- 6 volume changes per min.

CHARGER ----- separate or self contained

FULL GAMMA COMPENSATION

AUTOMATIC or MANUAL RANGE SWITCHING



## IONIZATION CHAMBER MODULES

20 liters	for measurements as low as 0.01 $\mu\text{Ci}/\text{m}^3$ Tritium
2 liters	for measurements as low as 1 $\mu\text{Ci}/\text{m}^3$ Tritium
20 cc	for measurements as low as 20 $\text{KCi}/\text{m}^3$ Tritium