



**OPERATION & MAINTENANCE
MANUAL
MODEL GSM-115
4 RANGE SURVEY METER
AND PROBES
HP-265 - GP200
GP-1001 - GP-1002
GLE-1**

SECTION

1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____

CONTENTS

SPECIFICATIONS
DESCRIPTION
THEORY OF OPERATION
OPERATING CONTROLS
OPERATING INSTRUCTIONS
MAINTENANCE
PARTS LIST
APPENDIX - PROBE INSTRUCTIONS

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1.0 SPECIFICATIONS

INPUT SENSITIVITY _____ MINIMUM SENSITIVITY 0.05 v-pp
MAXIMUM PULSE AMPLITUDE OVER
10 V-PP POSITIVE OR NEGATIVE
POLARITY.

RANGES _____ **4 LINEAR RANGES**
0 - 500 CPM/0 - 0.2 mR/h
0 - 5,000 CPM/0 - 2 mR/h
0 - 50,000 CPM/0 - 20 mR/h
0 - 500,000 CPM/0 - 200 mR/h
SCALE CALIBRATED IN CPM/ μ Sv/h
AVAILABLE

ELECTRICAL LINEARITY _____ \pm 5% OF FULL SCALE

RESPONSE TIME _____ CONTINUOUSLY VARIABLE FROM
4 - 20 SECONDS FOR 90% SCALE
LESS THAN 5%

DRIFT _____

TEMPERATURE COEFFICIENT _____ LESS THAN 0.2%/DEG. C.

HIGH VOLTAGE _____ ADJUSTABLE FROM 500 - 1300 VDC
REGULATED \pm 1%.

LOW VOLTAGE _____ + 5 VDC & - 5 VDC
REGULATION \pm 0.5%

BATTERY _____ 2 - 9 VDC ALKALINE

BATTERY OPERATION _____ 200 HOURS NOMINAL

MOVEMENT _____ 2.5" SCALE RUGGEDIZED MOVEMENT
TOP SCALE CALIBRATED 0 - 500 CPM
& 0 - 0.2 mR/h - SCALE CALIBRATED
0 - 500 CPM/ μ Sv/h AVAILABLE
BOTTOM SCALE CALIBRATED
0 - 15vdc ACCURACY & LINEARITY
 \pm 2%

TEMPERATURE RANGE _____ - 23 °C TO 60 °C
(-10 ° F TO 140 ° F)

HUMIDITY RANGE _____ 5 - 95% NON-CONDENSING

1.0 SPECIFICATIONS CONTINUED

DETECTOR SATURATION SYSTEM _____	SYSTEM ELECTRICALLY "LATCHES" THE METER FULL SCALE & ENERGIZES THE DETECTOR FAULT INDICATOR WHEN THE DETECTOR SATURATES IN A HIGH RADIATION FIELD. METER WILL RETURN TO NORMAL OPERATION WHEN THE RADIATION AT THE DETECTOR RETURNS TO NORMAL OPERATING LIMITS. THE SYSTEM WILL REMAIN LATCHED IN FIELDS OF OVER 1000 R/HR WITH GM DETECTOR
DIMENSIONS _____	5 ½" (14 cm) H X 3 " (7.5cm) W X 7" (18cm)L - INCLUDING PROBE HOLDER
WEIGHT _____	2 ¼ POUNDS (1 kilo) W/BATTERIES
HOUSING _____	CAST ALUMINUM TOP, EXTRA HEAVY DEEP DRAWN BOTTOM AND HEAVY DUTY CARRYING HANDLE
HOUSING FINISH _____	BLUE CATALYZED POLYURETHANE WASH PRIMER UNDERCOAT

2.0 DESCRIPTION

The Model GSM-115 is a ruggedized, moisture resistant Portable Rate meter designed to accept the signals from Johnson Geiger-Mueller detectors i.e. HP-265, GP-200, GP-1001, GP1002 and scintillation detectors L GLE-1, GSP-1, GSP-2 & ASP-2A. A durable taunt-band, waterproof panel meter displays the detector signal of the 4 linear ranges in CPM or mR/h ($\mu\text{Sv/h}$ AVAILABLE). The internal battery voltage and high voltage supply can be read directly AT ANY TIME on the meter by placing the VOLTAGE SELECTOR switch on the front panel in the correct position. A Low Battery LED (lower left corner of the meter) lights automatically indicating the internal battery voltage will soon be to low for proper operation. Saturation (continuous discharge) of the GM detector or a shorted probe cable will automatically latch the panel meter FULL SCALE and energize a RED LED in the right corner of the meter indicating the GM type detector has saturated or the probe cable has shorted. The meter will remain "latched" full scale in radiation fields of over 1000 R/Hr and will automatically return to normal operation when the radiation detector is no longer saturated or in the event of a cable failure, when the defective cable has been replaced. Response time is continuously variable from 4 - 20 seconds for 90% of full scale. A waterproof speaker indicating the relative strength of the radiation field at the detector can be switched on or off from the front panel. The top and bottom housings are securely sealed together by heavy duty stainless steel latches and a "O" ring gasket.

3.0 THEORY OF OPERATION

3.1 GENERAL:

The GSM-115 utilizes the very latest field proven, SMT (surface mount) solid state circuitry to accurately and reliably operate most ionizing radiation detectors. The electronic circuitry is located on 2 industrial type printed circuit boards that use the latest surface mount technology for good accessibility and reliability. The printed circuit boards are directly interconnected by durable pin type connectors to reduce wiring and increase the reliability of the instrument. Separate non-interacting controls are provided to calibrate each range, adjust the regulated low voltage supply and adjust the high voltage supply. Separate positive and negative 5 vdc power supplies provide clean, well regulated DC power to all of the GSM-115 circuitry. The High Voltage Supply is adjustable from 500 vdc to 1300 vdc and well regulated ($\pm 1\%$). The HV supply can provide the necessary voltage & current to operate most type radiation detectors. Separate circuitry automatically monitors GM type detectors for saturation and the voltage level of internal batteries. The high voltage and battery voltage can be measured directly from front panel meter by placing the VOLTAGE SELECTOR switch in the appropriate position and reading the voltage on the 0 - 15 vdc scale on the panel meter.

3.2 DETECTOR SIGNAL - BATTERY & HIGH VOLTAGE READOUT

The input amplifier (U1) amplifies all usable detector signals to a minimum level of 0.250 v -pp (gain of approximately 13.5). The output of U1 is connected directly to U2 which is an adjustable voltage comparator. The comparator functions as a gain control to permit only signals above a preset level to be further processed by the logic portion of the instrument. The minimum level INPUT signal that can be processed when the comparator is adjusted to maximum sensitivity is 0.050 v-pp. Detector signals of several volts amplitude WILL NOT saturate the GSM-115 circuitry or cause multi-pulsing. All detector signals with amplitudes above the 0.05 v-pp setting will be processed by the remaining circuitry. This feature minimizes and rejects low level noise in the meter circuit of the GSM-115. The signal from U2 is conveyed to U3 for processing into a precision constant area pulse that is generated for each input pulse. The constant area pulses are integrated into a precision analog signal that is proportional to the frequency of the detector signal. Individual non-interacting potentiometers (R9 = X1000, R11 = X100, R13 = X10 & R15 = X1) are provided to calibrate each range. The precision analog signal from U3 is conditioned in a potentiometer and capacitance network (R39 & C17) to provide a continuously variable response time of 1 - 20 seconds for 90% of full scale. The output of the response network is connected to a precision analog amplifier U4 and the audio output amplifier Q1 for further processing. The output of U4 is routed to a network of analog switches that are utilized to control the signals that can be displayed on the meter of the GSM-115. The analog switches are configured to connect the detector signal to the panel meter during normal operation and to display the battery or high voltage when the VOLTAGE SELECTOR switch is adjusted to display the battery or high voltage. All signal switching to the meter is automatic and only requires the MAIN SELECTOR OR VOLTAGE SELECTOR switch be adjusted to the desired function.

3.3 HIGH & LOW VOLTAGE POWER SUPPLIES

Two 9 vdc alkaline batteries are utilized to provide power for the GSM-115 circuits. The power from the batteries is connected to E1 the positive 5 vdc power supply regulator. The output of E1 is connected to the circuits requiring a +5 vdc supply and U2 the negative 5 vdc regulator. The output of the -5 vdc regulator is connected to the circuits requiring a -5 vdc supply.

The high voltage supply utilizes a special high efficiency transformer with a feed back winding and oscillator circuit to generate a low ripple high voltage. The output of the transformer T1 is connected to a voltage doubler network to increase the voltage to at least 1500 vdc. The output of the voltage doubler circuit is filtered in a RC pi type filter and connected to the probe BNC receptacle through R1, a 1 meg ohm resistor. R1 is also the load resistor for the detector circuit. The output of the high voltage circuit is constantly measured by the HV oscillator circuit through a high resistance network consisting of R4-R8 & C1, Q2 & a part of U2. Any increase or decrease in the high voltage will result in the appropriate increase or decrease in the power being provided the high voltage oscillator Q1. The high voltage resistor R4 is also utilized by the high voltage readout circuit a part of U1 to measure and display the high voltage on the panel meter.

3.4 DETECTOR SATURATION CIRCUIT

The high resistance network consisting of R4 on the power supply PC board and part of the integrated circuits U2 & U5 on the logic board are utilized to monitor and energize the visual display for detector saturation. U2 monitors the High Voltage being provided the detector circuit. This network can detect any significant change in the current being supplied to a GM detector. Saturation of a GM detector greatly increases the current being provided to the detector and will dramatically increase the current required to maintain the High voltage. This large current change will result in a large signal change at the input of U2. This signal change at the input of U2 will result in a large change in the output of U2 that will switch LED D6 DETECTOR on and switch the output of U5 on energizing the analog switch U6 that will cause the panel meter to indicate full scale. The DETECTOR LED will automatically be extinguished when the detector is removed from the high radiation field and the power required to operate the High Voltage circuit returns to normal.

4.0 OPERATING CONTROLS - INDICATORS - FRONT PANEL

4.1 CONTROL - MAIN SELECTOR SWITCH

- OFF ——— ALL POWER DISCONNECTED TO THE INSTRUMENT.
- X 1000 ——— PANEL METER TOP SCALE IS CALIBRATED 0 - 500 CPM & 0 - 0.2 mR/HR IN 50 DIVISIONS. METER READING IS MULTIPLIED X 100 FOR ACTUAL READING IN COUNTS PER MINUTE OR mR/h. FULL SCALE 500,000 CPM OR 200 mR/h.
- X 100 ——— PANEL METER TOP SCALE IS CALIBRATED 0 - 500 CPM & 0 - 0.2 mR/HR IN 50 DIVISIONS. METER READING IS MULTIPLIED X 100 FOR ACTUAL READING IN COUNTS PER MINUTE OR mR/h. FULL SCALE 50,000 CPM OR 20 mR/h.

4.0 OPERATING CONTROLS LED INDICATORS - FRONT PANEL CONTINUED

- * X 10 ————— PANEL METER TOP SCALE IS CALIBRATED 0 - 500 CPM & 0 - 0.2 mR/h IN 50 DIVISIONS. METER READING IS MULTIPLIED X 10 FOR ACTUAL READING IN COUNTS PER MINUTE OR mR/h. FULL SCALE 5000 CPM OR 2.0 mR/h.
- * X 1 ————— PANEL METER TOP SCALE IS CALIBRATED 0 - 500 CPM & 0.2 mR/h IN 50 DIVISIONS. METER READING IS MULTIPLIED X 1 FOR ACTUAL READING IN COUNTS PER MINUTE OR mR/h. FULL SCALE 500 CPM OR 0.2 mR/h.

4.1 CONTROL - VOLTAGE SELECTOR SWITCH

- BATTERY — INDICATE THE BATTERY VOLTAGE ON 0 - 15 VDC SCALE
- HV ————— INDICATES THE HIGH VOLTAGE TO THE PROBE ON THE 0 - 15 SCALE MULTIPLIED X 100 (0 - 1500 VDC)

4.2 CONTROL - AUDIO SWITCH

- * TURNS THE AUDIBLE SIGNAL THAT INDICATES DETECTOR SIGNAL LEVEL ON OR OFF.

4.3 CONTROL - RESET SWITCH

- * RESETS THE PANEL METER TO ZERO.

4.4 CONTROL - RESPONSE CONTROL

- * POTENTIOMETER THAT ENABLES THE USER TO ADJUST THE RESPONSE TIME OF THE INSTRUMENT FROM 4 SECONDS TO 20 SECONDS FOR 90 % OF FULL SCALE METER DEFLECTION.

4.5 INDICATOR - LOW BATTERY

- * LOCATED IN THE LOWER LEFT SIDE OF THE PANEL METER UNDER THE LETTERS BATT. RED LED WILL LIGHT AUTOMATICALLY WHEN THE BATTERY VOLTAGE DROPS BELOW APPROXIMATELY 6.8 VDC.

4.6 INDICATOR - DETECTOR SATURATION

- * LOCATED IN THE UPPER RIGHT SIDE OF THE PANEL METER UNDER THE LETTERS DETECTOR. RED LED WILL LIGHT AND PANEL METER WILL LATCH FULL SCALE AUTOMATICALLY INDICATING THE GEIGER-MUELLER TYPE DETECTOR HAS SATURATED (CONTINUOUS DISCHARGE) AND IS NO LONGER PROVIDING ACCURATE INFORMATION OR THE PROBE CABLE HAS SHORTED. THE PANEL METER WILL RETURN TO NORMAL OPERATION AND THE LED WILL EXTINGUISH WHEN THE RADIATION FIELD AT THE DETECTOR IS BELOW THE SATURATION LEVEL OR THE PROBE CABLE HAS BEEN REPLACED.

4.7 CONNECTORS - FRONT PANEL

4.7.1 DETECTOR PROBE

* BNC TYPE CONNECTOR

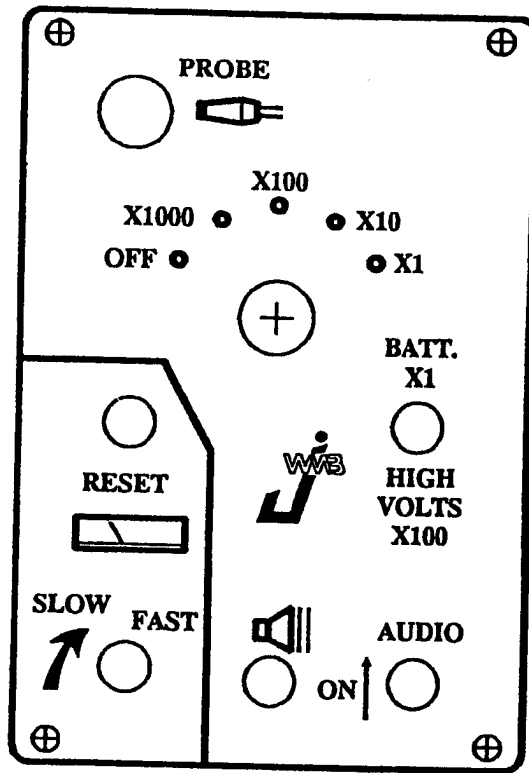
5.0 OPERATING INSTRUCTIONS

5.1 BEFORE OPERATION

- 5.1.2 The GSM-115 has been adjusted to operate with a probe utilizing a 900 vdc detector tube. This High Voltage setting will permit operation with Johnson probes HP-265, GP-200, GP-1001 & GLE-1 WITHOUT ANY CHANGE IN THE HIGH VOLTAGE SETTING. Other detectors requiring a different High Voltage and/or input sensitivity will require resetting the high voltage and input sensitivity to assure satisfactory detector operation. Refer to the Maintenance Section 6.2.2 or 6.2.4 for the High Voltage and input sensitivity adjustment procedure.
- 5.1.3 The input sensitivity has been to approximately 0.050 v-pp for operation with any of the detectors listed in 5.1.2. This sensitivity setting is recommended for operation with all GM & scintillation type detectors. See the MAINTENANCE SECTION 6.2.4 for adjustment instructions.
- 5.1.4 Check the Appendix for the specific operating instructions for the HP-265, GP-200, GP1001, GP1002 or GLE-1 detectors.

5.2 INSTRUMENT OPERATION

- 5.2.1 Connect the detector probe BNC to the INPUT BNC receptacle located on the front panel. FIGURE 1 shows the location of the front panel controls.
- 5.2.2 Adjust the MAIN SELECTOR switch to the X1000 position. CHECK the internal battery voltage by switching the voltage check switch to the BATTERY position and verify the internal battery is reading at least 6.8 vdc
- 5.2.3 Adjust the voltage check switch to the HIGH VOLTAGE position and verify the high voltage is reading the voltage required for the probe that will be connected to the GSM-115. Most GM type probes require 900 or 550 vdc for correct operation.
- 5.2.4 Adjust the MAIN SELECTOR switch to the X1 position. The panel meter will indicate the background radiation in the vicinity of the detector. If the meter is indicating in excess of full scale turn the MAIN SELECTOR switch to the next highest range or until the reading is below full scale.



GSM-115

FRONT PANEL CONTROLS
FIGURE 1

MODEL GP-1001 OPERATING INSTRUCTIONS:**6. GENERAL:**

The model GP-1001 is a energy compensated side window gm detector that is designed to detect gamma radiation up to 200 mR/hr between 40 keV and 2 Mev. The detector has a sensitive area of approximately 1.5" X 0.4". The probe is protected by an aluminum housing that is approximately 0.035" thick. The approximate center of the detector is engraved in the outer housing. The GP-1001 requires 900 vdc for proper operation.

7. RADIATION DETECTED:

The GP-1001 will detect:

Gamma radiation from 40 keV to 2 Mev.

SENSITIVITY: 1000 CPM/mR/hr

8. OPERATING RANGE:

0 - 200 mR/hr gamma radiation

9. OPERATION:

- a. CONNECT THE GP-1001 TO THE GSM-115 BY CONNECTING ONE END OF THE 39" COAXIAL (SUPPLIED) TO THE BNC CONNECTOR ON THE END OF THE GP-1001 HOUSING. CONNECT THE OTHER END OF THE CABLE TO THE INPUT CONNECTOR ON THE GSM-115.
- b. TURN THE MAIN SELECTOR SWITCH TO THE X1000 POSITION. DEPRESS THE VOLTAGE SELECTOR SWITCH TOWARDS THE BATT POSITION, PANEL METER SHOULD INDICATE BETWEEN 6.8 - 9 VDC. IF LOWER THAN 6.8 VDC CHANGE BATTERIES BEFORE OPERATION.
- c. TURN THE MAIN SELECTOR SWITCH TO THE X1000 POSITION. DEPRESS THE VOLTAGE SELECTOR SWITCH TOWARDS THE HV POSITION, PANEL METER SHOULD INDICATE BETWEEN 900 VDC (± 20 VDC). DO NOT OPERATE THE METER IF HV IS OUT OF RANGE.
- d. TURN THE AUDIO SWITCH ON.
- e. PLACE THE MAIN SELECTOR SWITCH IN THE X1 POSITION
- f. THIS COMPLETES THE VOLTAGE CHECKS AND METER IS NOW READY TO OPERATE.
- g. BE SURE THE GSM-115 HAS BEEN DOSE CALIBRATED WITH THE GP-1001 BEFORE MAKING ANY RADIATION MEASUREMENTS.
- h. THE SENSITIVE PART OF THE GP-1001 DETECTOR FOR MEASURING GAMMA RADIATION IS THE SIDE OF THE HOUSING NEAR THE ENGRAVED CENTER OF THE DETECTOR MARK. TO MEASURE CONTAMINATION, GRASP THE PROBE HOUSING IN ONE HAND WITH THE SIDE OF THE DETECTOR FACING TOWARDS THE AREA TO BE MEASURED. IF RADIATION IS PRESENT THE METER SHOULD BEGIN TO INDICATE UP SCALE AND PRODUCE AND AUDIBLE "CLICK".

- h. THE METER WILL INDICATE FURTHER UP SCALE AND THE "CLICK" INCREASE IN FREQUENCY THE CLOSER THE FACE OF THE PROBE IS HELD TO THE RADIATION SOURCE OR CONTAMINATION. IF THE METER READING EXCEEDS THE RANGE SWITCH TO THE NEXT HIGHER RANGE (X10, X100 OR X1000). THE METER READING IS OBTAINED BY TAKING THE METER READING IN CPM OR DOSE AND MULTIPLYING BY THE RANGE (X1, X10, 100 OR X1000). THE METER COMES FROM THE FACTORY CALIBRATED IN CPM (COUNTS PER MINUTE). THE METER CAN BE CALIBRATED IN DOSE (mR/hr) BY A LAB OR FACILITY THAT HAS A CERTIFIED CALIBRATION SYSTEM. BE SURE TO VERIFY THE TYPE CALIBRATION BEFORE MAKING MEASUREMENTS WITH THE GSM-115 **CAUTION: DO NOT LET THE PROBE TOUCH A SURFACE CONTAMINATED WITH RADIOACTIVE MATERIAL OR THE PROBE WILL HAVE TO BE CONTAMINATED. DO NOT LET SHARP OBJECTS PROTRUDE THROUGH THE COPPER SCREEN OR THE FACE OF THE DETECTOR CAN BE DESTROYED AND WILL REQUIRE A NEW DETECTOR TO REPAIR.**

5. DECONTAMINATING THE PROBE:

PLEASE CHECK WITH YOUR RADIATION SAFETY OFFICER BEFORE ATTEMPTING THE FOLLOWING PROCEDURE TO BE SURE YOU ARE COMPLYING WITH ALL REGULATORY REQUIREMENTS.

- a. IF THE METER HAS A HIGH BACKGROUND READING WITH NO RADIATION PRESENT ~~THEN~~ THE SURFACE OF THE PROBE IS PROBABLY CONTAMINATED.
- b. THE PROBE HOUSING CAN BE DECONTAMINATED BY USING A MILD DETERGENT AND Q TIPS, PAPER TOWELS ETC.
- c. MOISTEN A Q TIP OR TOWEL AND SCRUB ALL OUTER SURFACES OF THE PROBE HOUSING INCLUDING THE STAINLESS STEEL SCREEN. TURN THE METER ON TO DETERMINE IF THE CONTAMINATION HAS BEEN REMOVED. IF THE PROBE IS STILL CONTAMINATED THE SCREEN COVERING THE DETECTOR CAN BE CLEANED AGAIN USING STEP C IN THIS PROCEDURE.
- d. IF THE PROBE STILL SHOWS SIGNS OF CONTAMINATION CONTACT YOUR RADIATION SAFETY OFFICER FOR FURTHER ASSISTANCE.
- e. **DO NOT RETURN A CONTAMINATED METER OR PROBE TO THE MANUFACTURER.**

- i. THE METER WILL INDICATE FURTHER UP SCALE AND THE "CLICK" INCREASE IN FREQUENCY THE CLOSER THE FACE OF THE PROBE IS HELD TO THE RADIATION SOURCE OR CONTAMINATION. IF THE METER READING EXCEEDS THE RANGE SWITCH TO THE NEXT HIGHER RANGE (X10, X100 OR X1000). THE METER READING IS OBTAINED BY TAKING THE METER READING IN CPM OR DOSE AND MULTIPLYING BY THE RANGE (X1, X10, 100 OR X1000). THE METER COMES FROM THE FACTORY CALIBRATED IN CPM (COUNTS PER MINUTE). THE METER CAN BE CALIBRATED IN DOSE (mR/hr) BY A LAB OR FACILITY THAT HAS A CERTIFIED CALIBRATION SYSTEM. BE SURE YOU KNOW THE CALIBRATION OF THE SYSTEM BEFORE PROCEEDING TO MAKE MEASUREMENTS. CAUTION: DO NOT LET THE PROBE TOUCH A SURFACE CONTAMINATED WITH RADIOACTIVE MATERIAL OR THE PROBE WILL HAVE TO BE CONTAMINATED.

10. DECONTAMINATING THE PROBE:

PLEASE CHECK WITH YOUR RADIATION SAFETY OFFICER BEFORE ATTEMPTING THE FOLLOWING PROCEDURE TO BE SURE YOU ARE COMPLYING WITH ALL REGULATORY REQUIREMENTS.

- a. IF THE METER HAS A HIGH BACKGROUND READING WITH NO RADIATION PRESENT THEN THE SURFACE OF THE PROBE IS PROBABLY CONTAMINATED.
- b. THE PROBE HOUSING CAN BE DECONTAMINATED BY USING A MILD DETERGENT AND Q TIPS, PAPER TOWELS ETC.
- c. MOISTEN A Q TIP OR TOWEL AND SCRUB ALL OUTER SURFACES OF THE PROBE HOUSING. TURN THE METER ON TO DETERMINE IF THE CONTAMINATION HAS BEEN REMOVED. IF THE PROBE IS STILL CONTAMINATED REPEAT THE CLEANING PROCEDURE.
- d. IF THE METER IS STILL INDICATING A HIGH READING WITH NO RADIATION PRESENT
- e. CONTACT YOUR RADIATION SAFETY OFFICER FOR FURTHER INSTRUCTIONS.
- f. DO NOT RETURN A CONTAMINATED METER OR PROBE TO THE MANUFACTURER.

MODEL GP-1002 OPERATING INSTRUCTIONS:**11. GENERAL:**

The model GP-1002 is a energy compensated side window gm detector that is designed to detect gamma radiation up to 1000 mR/hr between 50 keV and 2 Mev. The detector has a sensitive area of approximately 1.1" X 0.308" (). The probe is protected by an aluminum housing that is approximately 0.035" thick. The approximate center of the detector is engraved in the outer housing. The GP-1001 requires 550 vdc for proper operation.

12. RADIATION DETECTED:

The GP-1002 will detect:

Gamma radiation from 50 keV to 2 Mev.

SENSITIVITY: 450 CPM/mR/hr

13. OPERATING RANGE:

0 - 1000 mR/r gamma radiation

14. OPERATION:

- a. CONNECT THE GP-1002 TO THE GSM-115 BY CONNECTING ONE END OF THE 39" COAXIAL (SUPPLIED) TO THE BNC CONNECTOR ON THE END OF THE GP-1002 HOUSING. CONNECT THE OTHER END OF THE CABLE TO THE INPUT CONNECTOR ON THE GSM-115.
- b. TURN THE MAIN SELECTOR SWITCH TO THE X1000 POSITION. DEPRESS THE VOLTAGE SELECTOR SWITCH TOWARDS THE BATT POSITION, PANEL METER SHOULD INDICATE BETWEEN 6.8 - 9 VDC. IF LOWER THAN 6.8 VDC CHANGE BATTERIES BEFORE OPERATION.
- c. TURN THE MAIN SELECTOR SWITCH TO THE X1000 POSITION. DEPRESS THE VOLTAGE SELECTOR SWITCH TOWARDS THE HV POSITION, PANEL METER SHOULD INDICATE BETWEEN 550 VDC (± 20 VDC). DO NOT OPERATE THE METER IF HV IS OUT OF RANGE.
- d. TURN THE AUDIO SWITCH ON.
- e. PLACE THE MAIN SELECTOR SWITCH IN THE X1 POSITION
- f. THIS COMPLETES THE VOLTAGE CHECKS AND METER IS NOW READY TO OPERATE.
- g. BE SURE THE GSM-115 HAS BEEN DOSE CALIBRATED WITH THE GP-1002 BEFORE MAKING ANY RADIATION MEASUREMENTS
- h. THE SENSITIVE PART OF THE GP-1002 DETECTOR FOR MEASURING GAMMA RADIATION IS THE SIDE OF THE HOUSING NEAR THE ENGRAVED CENTER OF THE DETECTOR MARK. TO MEASURE CONTAMINATION, GRASP THE PROBE HOUSING IN ONE HAND WITH THE SIDE OF THE DETECTOR FACING TOWARDS THE AREA TO BE MEASURED. IF RADIATION IS PRESENT THE METER SHOULD BEGIN TO INDICATE UP SCALE AND PRODUCE AN AUDIBLE "CLICK".

- i. THE METER WILL INDICATE FURTHER UP SCALE AND THE "CLICK" INCREASE IN FREQUENCY THE CLOSER THE FACE OF THE PROBE IS HELD TO THE RADIATION SOURCE OR CONTAMINATION. IF THE METER READING EXCEEDS THE RANGE SWITCH TO THE NEXT HIGHER RANGE (X10, X100 OR X1000). THE METER READING IS OBTAINED BY TAKING THE METER READING IN CPM OR DOSE AND MULTIPLYING BY THE RANGE (X1, X10, 100 OR X1000). THE METER COMES FROM THE FACTORY CALIBRATED IN CPM (COUNTS PER MINUTE). THE METER CAN BE CALIBRATED IN DOSE (mR/hr) BY A LAB OR FACILITY THAT HAS A CERTIFIED CALIBRATION SYSTEM. BE SURE YOU KNOW THE CALIBRATION OF THE SYSTEM BEFORE PROCEEDING TO MAKE MEASUREMENTS. CAUTION: DO NOT LET THE PROBE TOUCH A SURFACE CONTAMINATED WITH RADIOACTIVE MATERIAL OR THE PROBE WILL HAVE TO BE CONTAMINATED.

15. DECONTAMINATING THE PROBE:

PLEASE CHECK WITH YOUR RADIATION SAFETY OFFICER BEFORE ATTEMPTING THE FOLLOWING PROCEDURE TO BE SURE YOU ARE COMPLYING WITH ALL REGULATORY REQUIREMENTS.

- a. IF THE METER HAS A HIGH BACKGROUND READING WITH NO RADIATION PRESENT THEN THE SURFACE OF THE PROBE IS PROBABLY CONTAMINATED.
- b. THE PROBE HOUSING CAN BE DECONTAMINATED BY USING A MILD DETERGENT AND Q TIPS, PAPER TOWELS ETC.
- c. MOISTEN A Q TIP OR TOWEL AND SCRUB ALL OUTER SURFACES OF THE PROBE HOUSING. TURN THE METER ON TO DETERMINE IF THE CONTAMINATION HAS BEEN REMOVED. IF THE PROBE IS STILL CONTAMINATED REPEAT THE CLEANING PROCEDURE.
- d. IF THE METER IS STILL INDICATING A HIGH READING WITH NO RADIATION PRESENT
- e. CONTACT YOUR RADIATION SAFETY OFFICER FOR FURTHER INSTRUCTIONS.
- f. DO NOT RETURN A CONTAMINATED METER OR PROBE TO THE MANUFACTURER.

