From The Trenches

with David Wyatt

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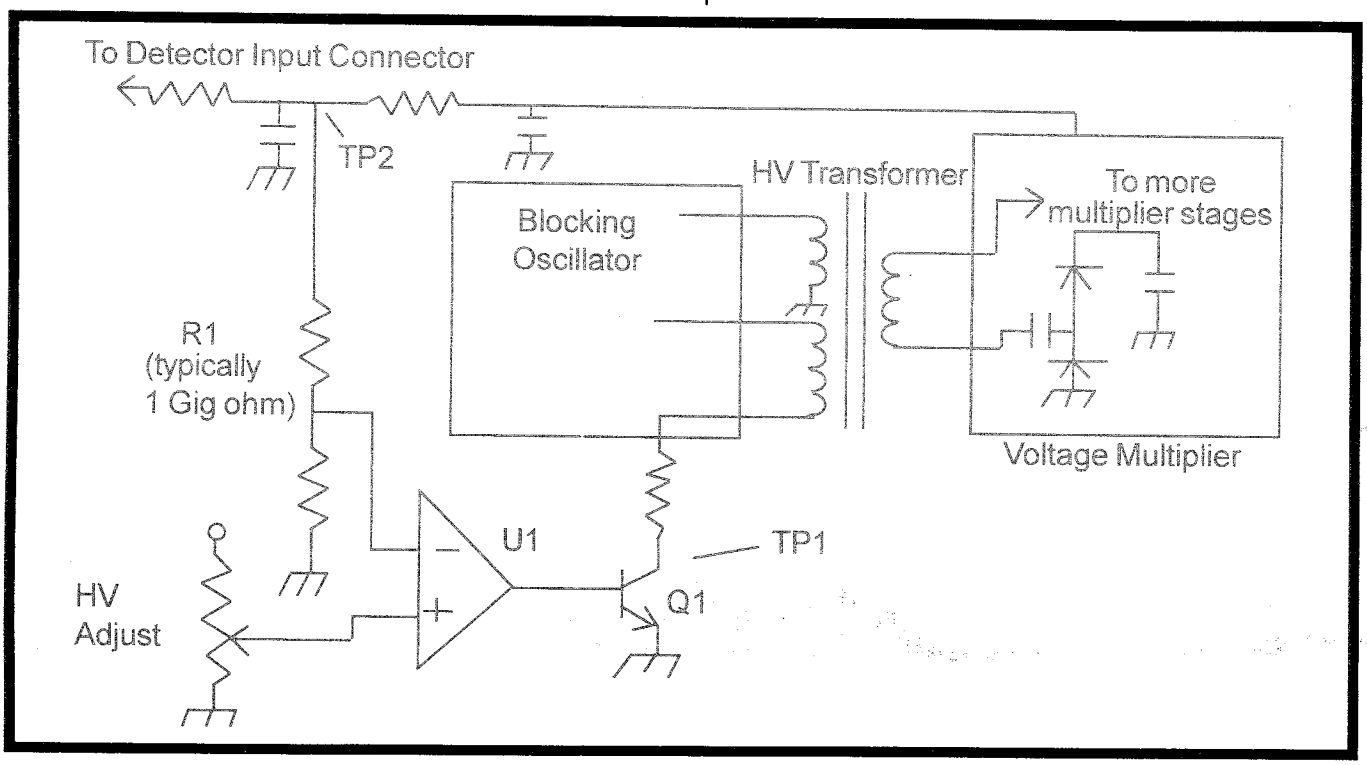
TROUBLESHOOTING HIGH VOLTAGE SUPPLY CIRCUITS

The majority of Ludlum instruments utilize a High Voltage (HV) power supply circuit similar to the one illustrated below to produce various GM, Scintillator, and Proportional detector operating voltages. The primary sections of the HV power supply circuit are a blocking oscillator; a "step-up" transformer to amplify the oscillator pulses; a voltage multiplier to rectify and multiply the voltage ouput; resistor divider network to lower the HV providing a low voltage feedback signal to the regulator and an op-amp configured as a comparator which provides voltage regulation.

The most common problem reported is the loss of HV at the detector input. The probable cause is a large transient pulse has caused U1 to be defective (either an inadvertant short at the detector input or loss of R1 causing the HV to drive to maximum). This problem can be identified by determining if the blocking oscillator and voltage multiplier circuits are functioning by momentarily shorting TP1 to chassis ground and observing the HV at the detector connector. If the HV comes up, then the problem should be between TP2 and TP1. R1 and therelated resistor divider network can be isolated by measuring the "-" input of U1 as TP1 is shorted; the voltage should range from 0.2 to 4 Vdc depending upon the HV output and resistor divider ratio (typically 1000 volts at HV out should equal 0.5 volts at U1 "-" for a 1.2 Vdc reference). The output of U1 should go positive or "high" when the "+" goes above the "-" input, saturating Q1. When the circuit is functioning properly, the "-" and "+" inputs should equal each other.

Another problem commonly confronted with the older designs is with R1. R1 is typically a 1 Gigohm chip type resistor which replaced a discrete resistor network (covered in heat shrink) which is still in some of the older designs. It is common to find 1 or 2 of the resistors in those networks to open or begin to open when encountering HV output problems with this design. These resistors should be replaced, when faulty, with the 1G chip resistor. This type of fault will produce the same type symptoms described in the above paragraph and can be isolated with the same fault finding procedure. Please contact LMI repair department for additional technical support in isolating and repairing LMI instruments.



Model 2350-1 Data Logger

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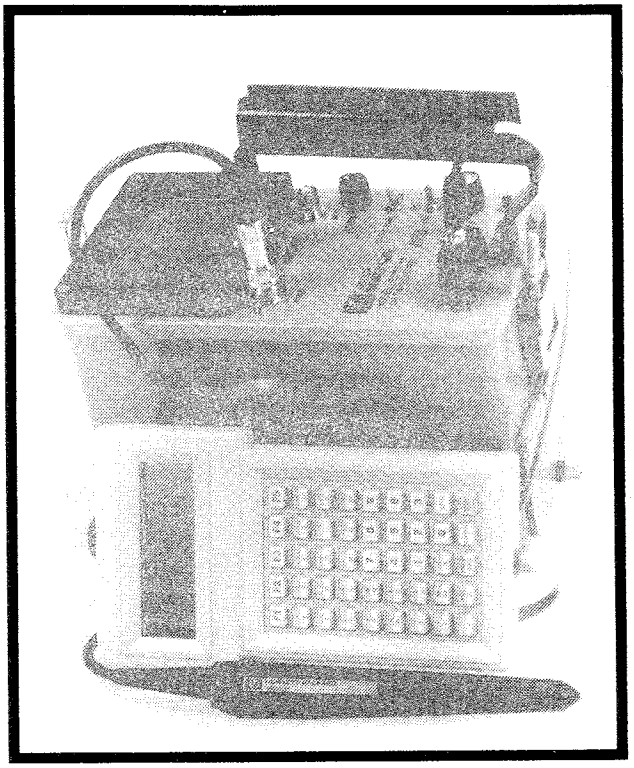

The Model 2350-1 Data Logger is a portable microprocessor-based counting instrument designed for use with Geiger-Mueller (G-M), proportional, and/or scintillation detectors for measurement of alpha, beta, gamma, and/or neutron radiation. Radiation data is presented in four ways:

1. Auto-ranging digital ratemeter
2. Timed Counter (scaler)
3. Integrated Dose Counter
4. Five decade logarithmic bar graph.

All readouts operate from a single input and each display can be enabled or disabled if desired.

Up to sixteen different sets of detector parameters can be stored, allowing for quick changing of detectors or operating parameters. Detector readings can be stored in the 1000 data point memory with identifiers for the date, time, sample number, detector number, and the type of count that was logged. There are also 8 different location code identifiers which include seven 5 character alphanumeric codes and a five-digit location coordinate. Other features include individual alarms for each readout, click-per-event audio with audio divide and volume control, voltage sensitive amplifier, single channel analyzer, adjustable detector high voltage, adjustable window and threshold, detector overload sensing circuitry, adjustable dead time compensation, calibration constant, and response time.

Controlling the Model 2350-1 can be done by connection to a PC, optional keypad, and/or optional bar code reader. Third-party software is also available on request to perform high voltage (HV) plateau calculations, spectrum analysis, terminal emulation, logged data transfer, and bar code generation. The M2350-1 also has built- in calibration subroutines for calculating the calibration constant and dead time of detectors.

The instrument readout is an eight line by fifteen character alphanumeric liquid crystal display (LCD). A display backlight can be turned on or off by a toggle switch on the front panel of the instrument. Batteries are externally accessible from the back of the instrument housing for quick and easy replacement when necessary.

Some of the Enhancements Over the Model 2350

- **Logs 1000 Data Points**
  Unit will log 1000 individual data points with the following identifiers for each point: 8 location codes, time of day, month, day, and year, detector number, count rate/scaler count/integrated dose, count time, logging mode, and sample number.

- **Modified from a 16K RAM to a 64K RAM**
  The Random Access Memory was enlarged to improve the following:
  a) Improved data storage and retrieval
  b) Faster Turn "ON" time
  c) Faster download time to PC

- **Acknowledge/Scroll Push Button**
  Push button will silence audio after alarm has been indicated and/or scroll through various displays.

- **"TAMPER-PROOF"**
  Equipped with 3 access levels to prevent unauthorized changes.

? **Question:** *Can my Model 2350 be upgraded to the Model 2350-1?* **YES!**

The Model 2350 can be sent back to LMI for modification. The price for the modification is $300.00 plus a re-calibration fee. If you have your own repair and calibration facility and would like to perform the modification, the upgrade kit is $250.00 (P/N 4371-057).

If you have any questions please call the LMI Sales Department or your Local Representative.