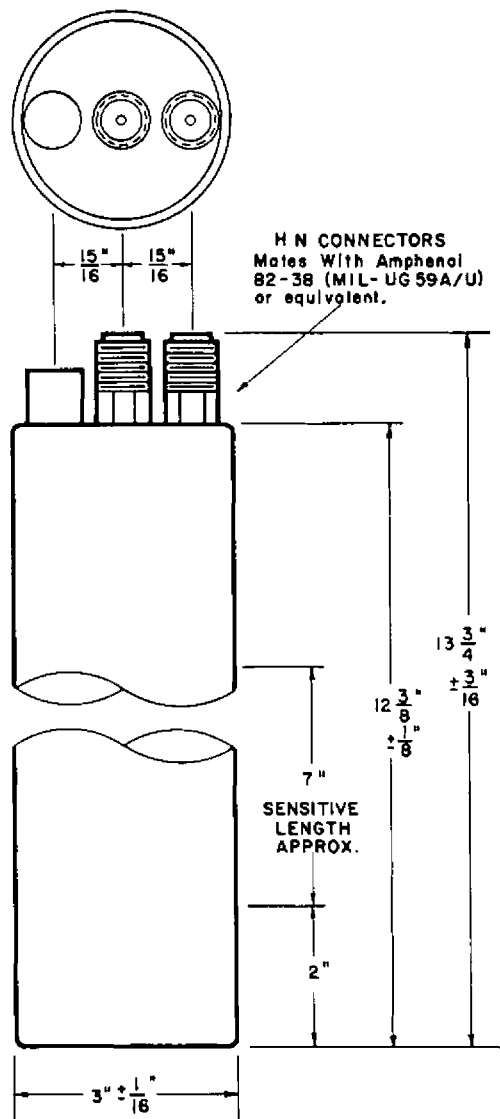


April 1, 1960

HIGH TEMPERATURE GUARD RING FISSION CHAMBER 7657

The 7657 fission chamber is designed to detect thermal neutrons in the range of 1.4 to 1.4×10^5 neutrons/cm²/second. The detector is extremely rugged in construction designed to pass MIL-S-901 for shock and MIL-Std-167 (Type 1) for vibration. The 7657 is of guard ring construction, a feature which minimizes electrical leakage across the internal insulators, and it may be operated in any position at temperatures up to 500°F.

The 7657 is constructed of aluminum, with high purity alumina ceramic insulators throughout, including those used in the type HN coaxial connectors. In typical operation, the counter has a thermal neutron sensitivity of 0.7 counts/neutron/cm² throughout a wide range of applied voltage.



MECHANICAL:

Maximum Diameter	3-1/32	Inches
Maximum Overall Length	13-3/4	Inches
Approximate Sensitive Length	7-1/2	Inches
Net Weight	2-1/2	Pounds
Shipping Weight	10	Pounds

MATERIALS:

Element Body	Aluminum
Electrodes	Aluminum
Insulation	Hi-purity Alumina Ceramic
Neutron Sensitive Material:	
Content	U ₃ O ₈ Enriched to more than 90% in U-235
Thickness	2 mg/cm ²
Total Quantity	1.72 grams
Gas Filling	Argon-Nitrogen Mixture
Gas Pressure	76 Cm of Hg

IMPEDANCE:

Resistance at 500°F (minimum)	10 ⁹	Ohms
Capacitance:		
Signal Electrode to Case (approx.)	225	μμf
High Voltage Electrode to Case (approx.)	160	μμf

MAXIMUM RATINGS:

Voltage Between Electrodes	1000	Volts
Temperature	500	° F
External Pressure (Note 2)	180	Pounds/inch ²
Thermal Neutron Flux	10 ¹¹	nv

TYPICAL OPERATION: (Note 1)

Operating Voltage	300	Volts
Operating Voltage Plateau (See Figure 2)	200 to 800	Volts
Thermal Neutron Flux Range	1.4 to 1.4 x 10 ⁵	nv
Sensitivity (Note 1)	0.7	cps/nv
Output Pulse Characteristics:		
Amplitude (Unloaded)	2 x 10 ⁻⁴	Volts
Inherent Rise Time (Average)	2 x 10 ⁻⁷	Seconds

1. The sensitivity is 0.7 counts/neutron/cm² when the alpha background counting rate of the naturally radioactive uranium is adjusted to 5 counts/second. By varying the pulse height selector on the associated circuitry other sensitivities are available. See Figure 1, also the section entitled "Fission Counter Operation".

2. The pressurizing atmosphere must be dry and non-corrosive.

Neutron & Radiation Detection Section

COUNTER SENSITIVITY AS FUNCTION OF PULSE HEIGHT SETTING

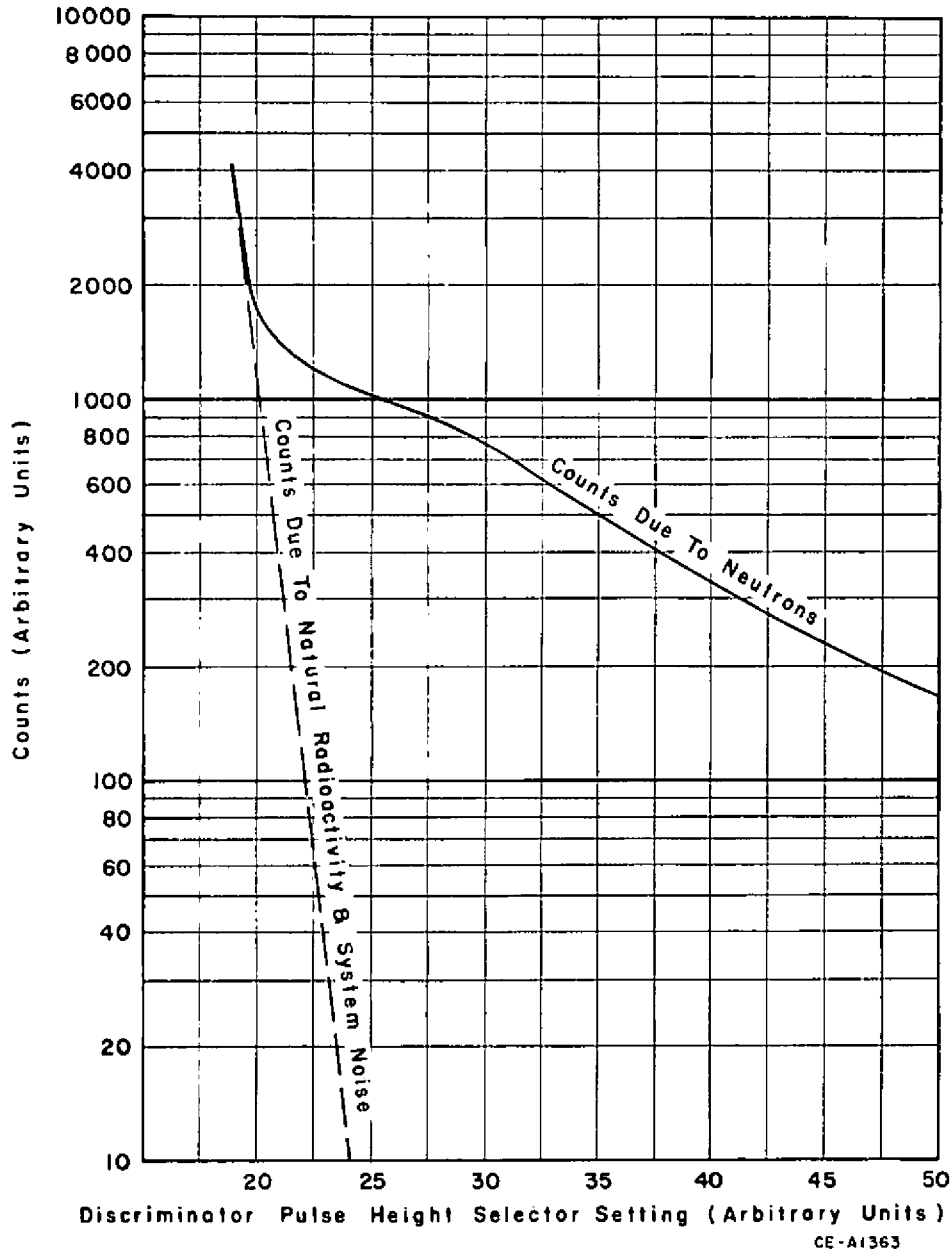
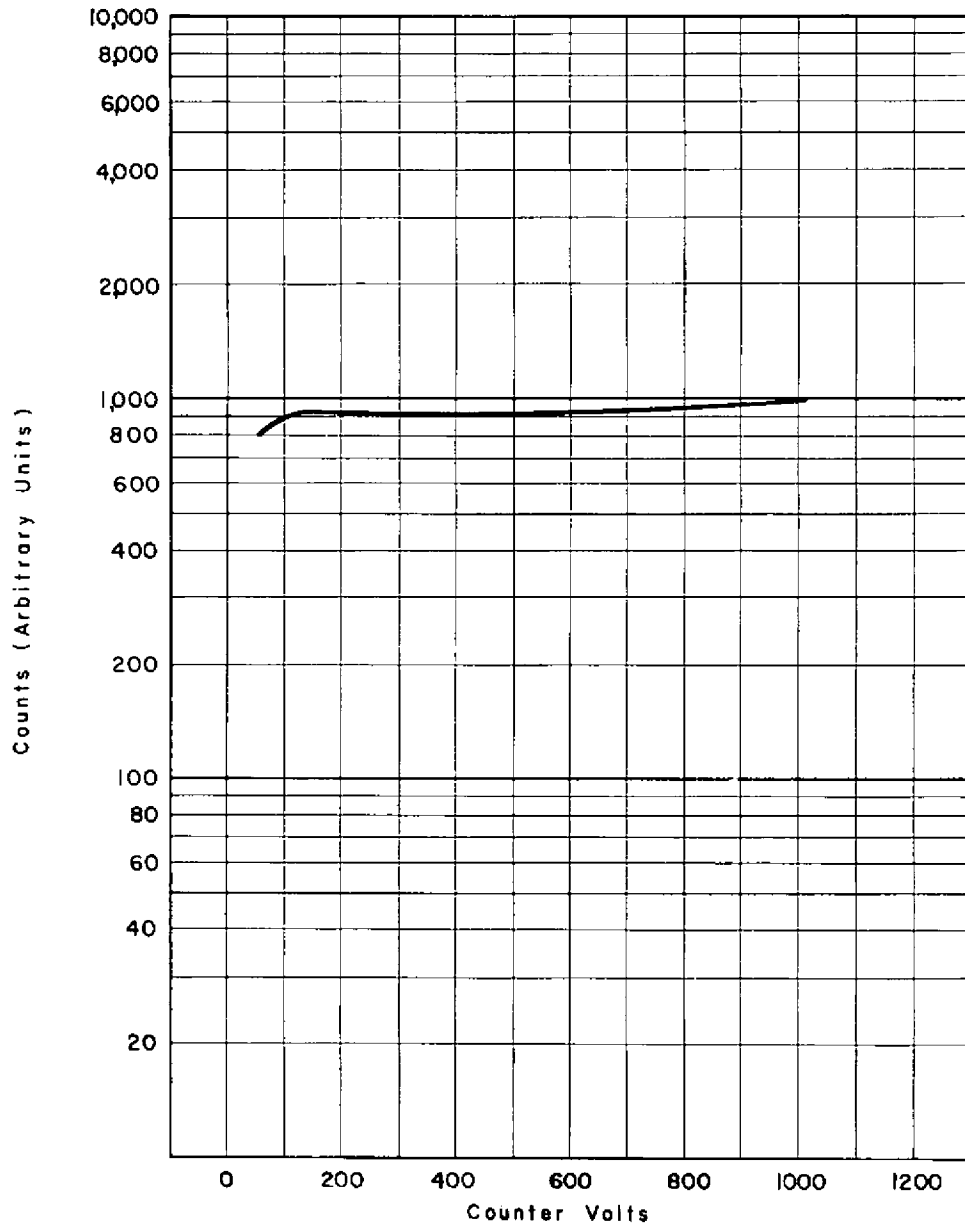


FIGURE 1

COUNTING RATE CHARACTERISTIC



CE-A 1362

FIGURE 2