

LIONEL ELECTRONIC LABORATORIES

HOFFMAN PLACE, HILLSIDE, N.J.

AREA CODE 201 • ESSEX 3-8600



Subject: NEW CIVIL DEFENSE GEIGER MUELLER TUBE
Lionel 301/OCD 101

Gentlemen:

DO YOU OWN A CDV 700? Regardless of the name of the manufacturer or model number, the enclosed information will be of interest to you.

LIONEL announces the availability of the 301/OCD 101 GM Tube for commercial distribution. This tube was developed by the LIONEL ELECTRONIC LABORATORIES Engineering Department for the Office of Civil Defense in order to extend the range of all models of the CDV 700 Survey Meter to 500 mr/hr.

Under a special offer we are now able to supply with each 301 a new index plate and instruction sheet for converting the instrument that you now own. The price for the complete kit is \$20.00.

If you require additional information on this new tube or any of our other nuclear products, please do not hesitate to contact us.

LIONEL ELECTRONIC LABORATORIES

A handwritten signature in cursive script, appearing to read "G. Achtekk".

G. Achtekk
General Sales Manager

GA:ph

COUNTER TUBE

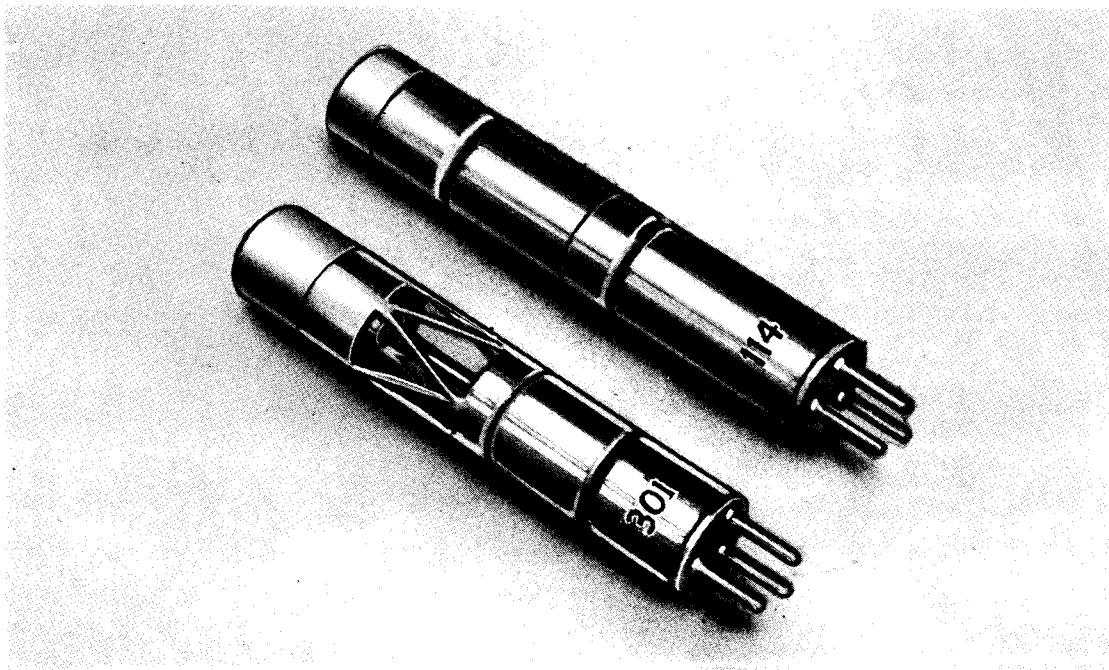
METAL THIN WALL

BETA, GAMMA

(HALOGEN QUENCH)

114 / 6993

301 / OCD 101



DESCRIPTION

Thousand of Lionel 114/6993 Tubes are in use as the beta gamma detector in the Office of Civil Defense CDV-700 radiacmeters. The CDV-700 covers the range of 0-50 mr/hr.

Lionel has now developed the 301/OCD 101+ which has one tenth the gamma sensitivity of the 114/6993, enabling the CDV-700 to cover a 0-500 mr/hr. range without circuit change. Because the 301 and 114 have the same outline dimensions, mounting base and operates at the same voltage, they are directly interchangeable. The ratio of gas volume to active volume of the 301 is greater than 40:1. This makes for an extremely stable tube. The beta and gamma response of both tubes are unaffected by temperature within the range -55°C to +75°C. Its electrical characteristics are given below and the transmission characteristics of the wall are given on the reverse side. These tubes cannot be damaged by overvoltage, exhibits no photosensitivity and will not be damaged by exposure to very high intensity radiation.

TECHNICAL INFORMATION

	114	301	
Recommended Operating Voltage:	890	890	Volts
Starting Voltage**:	830	830	V. Max.
Pulse Amplitude: when operating at 890 volts.....	2	10	V. Min.
Note: The pulse amplitude is substantially constant for values of series resistance from 1-20 megohms. The pulse amplitude increases linearly (approx.) with increase in overvoltage within the voltage interval over which the relative plateau slope is averaged***.			
Dead Time at Recommended Operating Voltage (anode resistor 1 megohm):	150	75	microsec.
Operating Plateau Length*, at 100 counts/sec:	100	150	V. Min.
Relative Plateau Slope*, averaged for 100 volt interval at approx. 100 counts/sec:20	.20	%/V. Max.
Efficiency of Detection of Very Fast β -Particles and Cosmic Rays:	85	85	%
Capacity:	2.0	2.0	
Life: unaffected by operation	Covered by Warranty I. See Price List		
Cathode Material:	28% chromium -72% iron		
Photosensitivity and Hysteresis:.....	None	11	
Background at Recommended Operating Voltage (shielded by 1/4" Alum. inside 2" Lead):	100	25	counts/min. Max.
Effective Cathode Dimensions:600" inside diameter x 3/4"	.098" inside diameter x 3/4"	
Effective Cathode Thickness:	30	30	mg./cm ²
Connectors: Both tubes terminate in a Peewee 3 pin base, RETMA No. A3-1			
Accessories: Lionel 6110 side window probe assembly with coil cord for Lionel 114 and 301 GM tubes.			



VACUUM TUBE DEPARTMENT

LIONEL ELECTRONIC LABORATORIES

HOFFMAN PLACE · HILLSIDE, NEW JERSEY

TECHNICAL INFORMATION (cont'd)

For every 1000 normally incident gamma photons per square centimeter of counter tube wall the following number of secondary electrons (computed) will emerge from the inner surface of the wall:

Energy of γ Photon	Number of Secondary Electrons
(Section of wall 30 mg/cm ² thick)	
.80 mev.	1.94
.10	1.63
.20	1.35
.30	1.39
.40	1.41
.50	1.41
.60	1.38
.70	1.35
.80	1.32
.90	1.27
1.0	1.27
1.1	1.24
1.3	1.19
1.5	1.18

Computed beta particle transmission for the Type 114 and 301 is as follows:

Energy of β Particle	Source	30 mg/sq. cm.
.050 mev	Eav of Carbon ¹⁴	—
.155 mev	E _{max} of Carbon ¹⁴	1.4%
.167 mev	E _{max} of Sulphur ³³	2.1%
.254 mev	E _{max} of Calcium ⁴⁵	9.1%
.29 mev	E _{max} of Technetium ⁹⁹	12.2%
.335 mev (9.3%)		17.0%
.608 mev (87.2%)	E of Iodine ¹³¹	41.7%
.815 mev (0.7%)		53.3%
.61 mev	E _{max} of Strontium ⁹⁰	41.7%
.695 mev	E _{max} of Krypton ⁸⁵	45.8%
.714 mev	E _{max} of Chlorine ³⁶	47.2%
1.701 mev	E _{max} of Phosphorus ³²	75.2%

- *Measured with sealer having a resolving time of 5 microseconds; series resistor = 1 megohm; coupling capacitor = 50 micro-microfarads; sealer input sensitivity = .025 volts.
- **Starting Voltage for this tube is that voltage at which uniform pulses of 1 volt amplitude appear across a 1 megohm series resistor (50 micro-microfarads coupling capacitor).
- ***Lionel 301 has a built-in 10 megohms resistor.
- †Patent Pending.

