

10/9/72
SMR

Summary of GM tube characteristics in Explorer 47

Tube	Window Thickness (mg/cm ²)	Proton Thres. (keV)	Electron Thres. (nominal, keV)	Geom Factor (cm ² -sr)	Omnidirectional Threshold (\geq MeV)
E1	0.44 mica	220	12(16)*	0.0154	
E2A	1.5 mica	567	24(30)	0.170	
E3	8.9 ^{Be} Al + 1.5 mica	2,200	75(85)	0.11	
E2B(south)	0.41 mica	210	11.5(16)	0.022	60 ⁺
E2(north)	0.43 mica	220	11.8(16)	0.022	60 ⁺

+ Vertical incidence on walls from outside the package.
Average threshold \uparrow should be lower to ~ 90 MeV
for omnidirectional flux (isotropic)

* Extrapolated range, according to Kutz & Penfold
RMP 24, 28
(1952)

Nominal range is from Berger & Seltzer,
NASA SP-3012, 1964

11/10/72

XRAY EFFS	Tube	Value
	E1	3.1×10^{-5}
	E2A	1.06×10^{-6}
	E3	4×10^{-8}

TEST SHEET

CUSTOMER P.O. # 3238045
 JOB # 1148
 DRAWING # D1887 Rev-A

DATE 5-18-70

LND, INCORPORATED
 3230 LAWSON BOULEVARD
 OCEANSIDE, NEW YORK 11572

Tube Type 7115
 Power Supply Fluke 408A
 Pre-Amplifier ORTEC 105
 Amplifier RIDL 3412
 Analyzer RIDL 3412
 Scaler Tracerlab SX1
 Pulse Gen. Johnson Labs VP2E

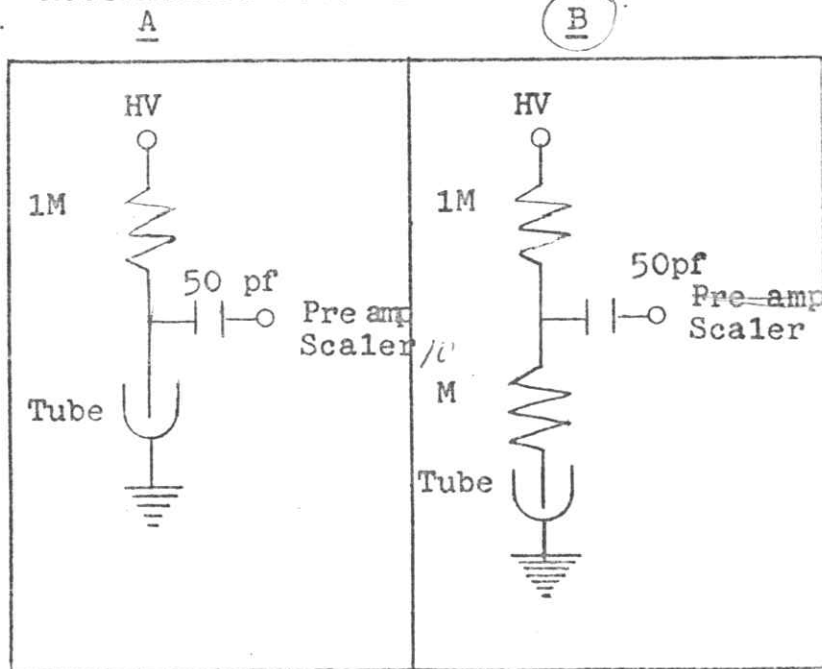
Serial Number 02690
 Entrance Window Thickness & Material 1.5 mg/cm² MI
 Exit Window Thickness & Material NA mg/cm²
 Operating Voltage 800
 Operating Voltage Range 775 - 875
 Pulse Height > 1 VOLT
 Resolution FWHM % @
 Plateau Length > 100 VOLTS
 Plateau Slope < 10 %/100 V
 Gas Fill K_A + HALOGEN
 Gas Pressure NA
 Connector Type NA
 Photograph Attached NA
 Tested By APC

WARRANTY

LND warrants each product of its manufacture to be free from defects in material and workmanship when used within specified ratings. This warranty is in effect for six (6) months after delivery to original purchaser. LND will not be responsible for damage or loss resulting from the use or application of any LND product. This warranty excludes devices not manufactured by LND which shall be warranted by the respective manufacturers' guarantee only.

LND detectors are not susceptible to major field repairs, the performance of any welding or soldering on the detector will invalidate our warranty.

Recommended Test Circuit



TEST SHEET

CUSTOMER P.O. # 338897

DATE 5/26/70

AND JOB # 01209

RAWING # 704

LND, INCORPORATED
3230 LAWSON BOULEVARD
OCEANSIDE, NEW YORK 11572

04693, 04691
04689, 04690, 04688

Tube Type 704
Power Supply Fluke 408A
Pre-Amplifier ORTEC 105
Amplifier RIDL 3412
Analyzer RIDL 3412
Scaler Tracerlab SX1
Pulse Gen. Johnson Labs VP2E

Serial Number _____
Entrance Window Thickness & Material 1.5 mg/cm² Mi
Exit Window Thickness & Material NA mg/cm²
Operating Voltage 750
Operating Voltage Range 725 - 925
Pulse Height > 1 VOLT
Resolution FWHM % @
Plateau Length > 200 V
Plateau Slope < 15 %/100 V
Gas Fill ARGON + HAL.
Gas Pressure NA
Connector Type NA
Photograph Attached NA
Tested By ELU

WARRANTY

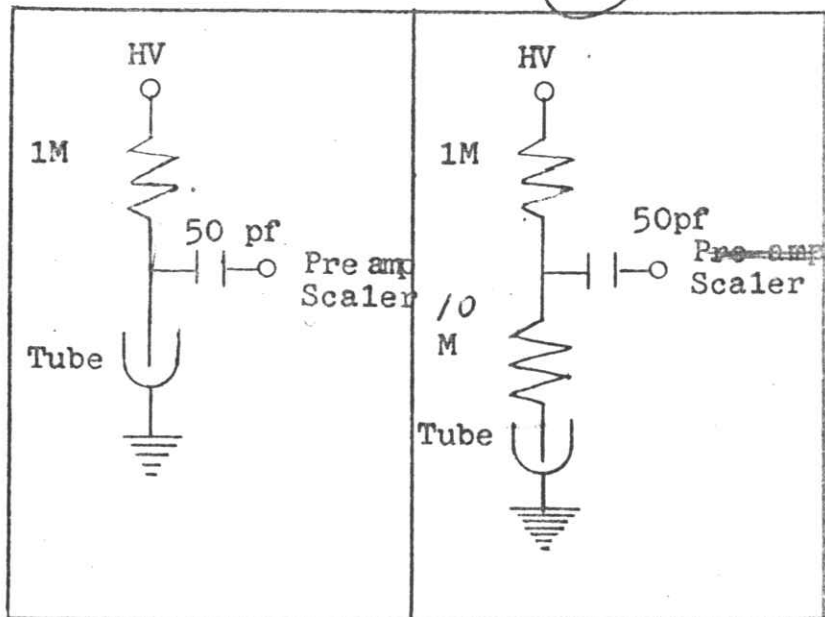
LND warrants each product of its manufacture to be free from defects in material and workmanship when used within specified ratings. This warranty is in effect for six (6) months after delivery to original purchaser. LND will not be responsible for damage or loss resulting from the use or application of any LND product. This warranty excludes devices not manufactured by LND which shall be warranted by the respective manufacturers' guarantee.

LND detectors are not susceptible to major field repairs, the performance of any welding or soldering on the detector will invalidate our warranty.

Recommended Test Circuit

A

B



TEST SHEET

CUSTOMER P.O. # 338897
 LND JOB # 01332
 WING # 705

DATE 7-10-70

LND, INCORPORATED
 3230 LAWSON BOULEVARD
 OCEANSIDE, NEW YORK 11572

04699, 296
 04728, 04709, 0470

Tube Type 705
 Power Supply Fluke 408A
 Pre-Amplifier ORTEC 105
 Amplifier RIDL 3412
 Analyzer RIDL 3412
 Scaler Tracerlab SX1
 Pulse Gen. Johnson Labs VP2E

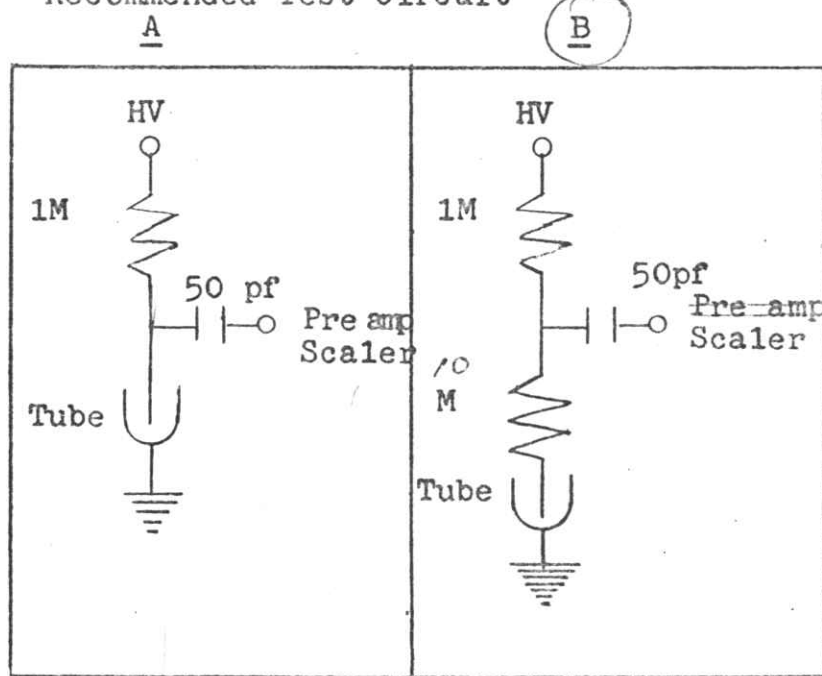
Serial Number _____
 Entrance Window Thickness & Material 0.3 mg/cm² MiC
 Exit Window Thickness & Material _____ mg/cm²
 Operating Voltage 700
 Operating Voltage Range 650 - 800
 Pulse Height > 1 VOLT
 Resolution FWHM % @ _____
 Plateau Length > 150 V
 Plateau Slope < 10 %/100 V
 Gas Fill NO + HALOGEN
 Gas Pressure NA
 Connector Type NA
 Photograph Attached NA
 Tested By RLY

WARRANTY

LND warrants each product of its manufacture to be free from defects in material and workmanship when used within specified ratings. This warranty is in effect for six (6) months after delivery to original purchaser. LND will not be responsible for damage or loss resulting from the use or application of any LND product. This warranty excludes devices not manufactured by LND which shall be warranted by the respective manufacturers' guarantee only.

LND detectors are not susceptible to major field repairs, the performance of any welding or soldering on the detector will invalidate our warranty.

Recommended Test Circuit



Summary of GM Tube Characteristics
on Explorer 50 (IMP-J)

Tube	Window Thickness (mg/cm ²)	Proton Thrust (keV)	Electron Thrust (nominal, keV)	Geom. Factor Limit (sr)	Considered Threshold (keV)
E1	0.305	162	10 (13)*	0.0154	
E2A	1.60	593	25 (31)	0.170	
E3	5.9 Be 1.5 mm	2,200	75 (35)	0.11	
E2B (shut)	0.24	133	8.6 (12)	0.022	60†
E2C (shut)	0.46	232	19.2 (17)	0.022	60†

† Vertical incidence on walls from outside gas loads.
Average threshold from omnidirectional flux should
be close to ~90 MeV.

* Extrapolated range, according to Katz / Peiffer EMP 24,
28, 1952.

Nominal electron range is from Berger / Selzer,
NASA SP-3012 1964.

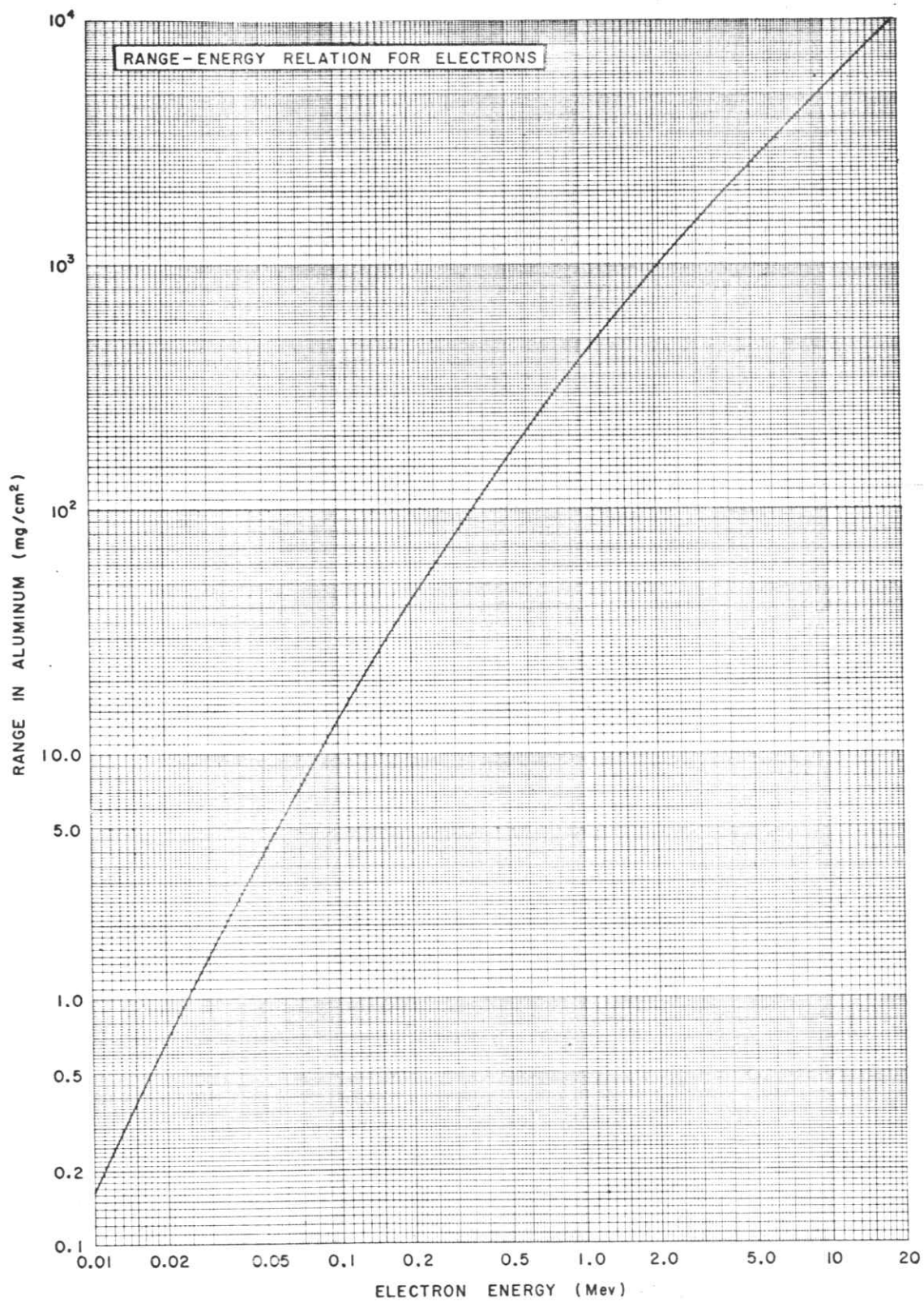


Figure 3. Electron Ranges in Aluminum

I. RANGES AND ENERGY LOSS OF CHARGED PARTICLES IN MATTER

Figure 3. Electron Ranges in Aluminum

The adjoining graph gives the range of monoenergetic electrons in aluminum as a function of electron energy. Since the range (expressed in mg/cm^2) varies only slightly with the atomic number Z of the medium, this curve is approximately correct for any stopping material.

Katz and Penfold¹ have proposed the following empirical relationship for electron ranges:

$$R(\text{mg}/\text{cm}^2) = 412 [E(\text{Mev})]^n, \quad 0.01 < E \lesssim 3 \text{ Mev} \quad (3-1)$$

$$\text{where } n = 1.265 - 0.0954 \ln E (\text{Mev}) \quad (3-2)$$

$$R(\text{mg}/\text{cm}^2) = 530 E(\text{Mev}) - 106, \quad 3 \lesssim E \lesssim 20 \quad (3-3)$$

This graph is based on these relationships.

¹ L. Katz and A. S. Penfold, *Revs. Modern Phys.* **24**, 28 (1952).