I. (AlGa)As-GaAs Solar Cell

Phase II

The four (Phase II) (AlGa)As-GaAs solar cells have been fabricated and will be delivered to JPL for radiation damage testing using 1 MeV electrons. These cells were LPE grown at 700°C for 4 minutes. The junction depth is measured to be 0.3 μm using a secondary electron microscope. The objective of this phase of the program is to verify our radiation model for the shallow junction cells (0.3 μm). Some mesa diodes were also fabricated and will be irradiated along with the cells for parallel evaluations of their electrical characteristics.

II. Solar Cell Characterization

Figures 1 through 4 show the photo i-v characteristics measured at AM0 and also the dark i-v characteristics. Figures 5 through 8 show the spectral response measurements for these cells before irradiation. The performance of each cell is summarized in Table 1. All these cells have similar characteristics and with a power conversion efficiency between 15.5% to 16%.

The first batch of cells (Phase I) have been irradiated at JPL and are presently being characterized. Detailed results on these will be reported on in the next quarterly report.

Table 1. Phase II (AlGa)As-GaAs
Solar Cell Characteristics

Cell #	I_{sc} ma	V_{oc} v	P_{max} mw	FF	η^* %
2751	110	0.985	83.2	0.77	15.4
2752	113	1.00	85.7	0.76	15.8
2753	110	0.995	84	0.77	15.5
2756	111	1.0	86.5	0.78	16.0

Tasks for the Next Report Period

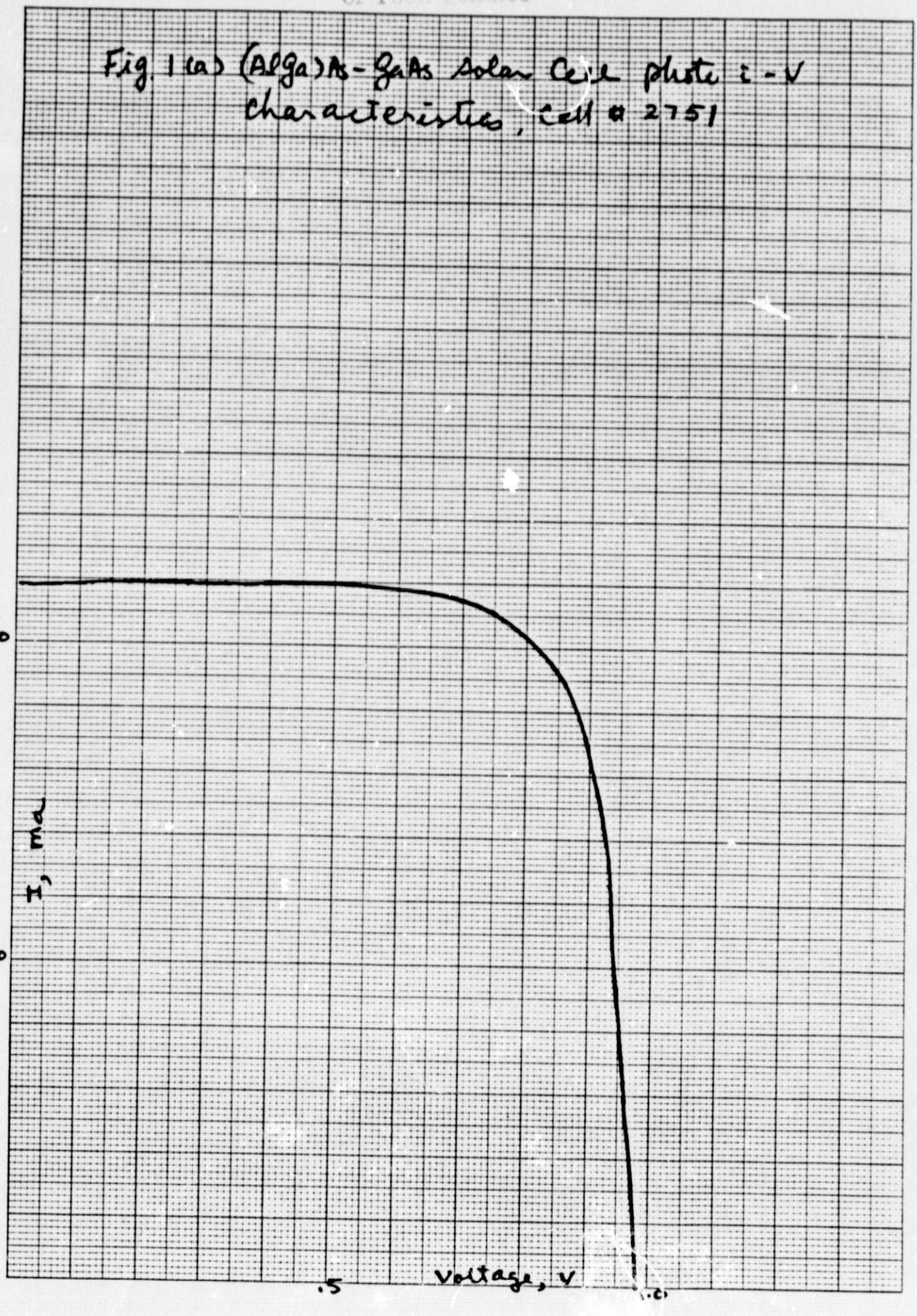
1. Testing of the first and second phase cells after irradiation.

2. Fabrication and characterization of the third phase cells.

3. Delivery of the third phase cells to JPL for electron irradiation.

4. Testing of the third phase cells after irradiation.

5. Annealing studies on the irradiated cells.



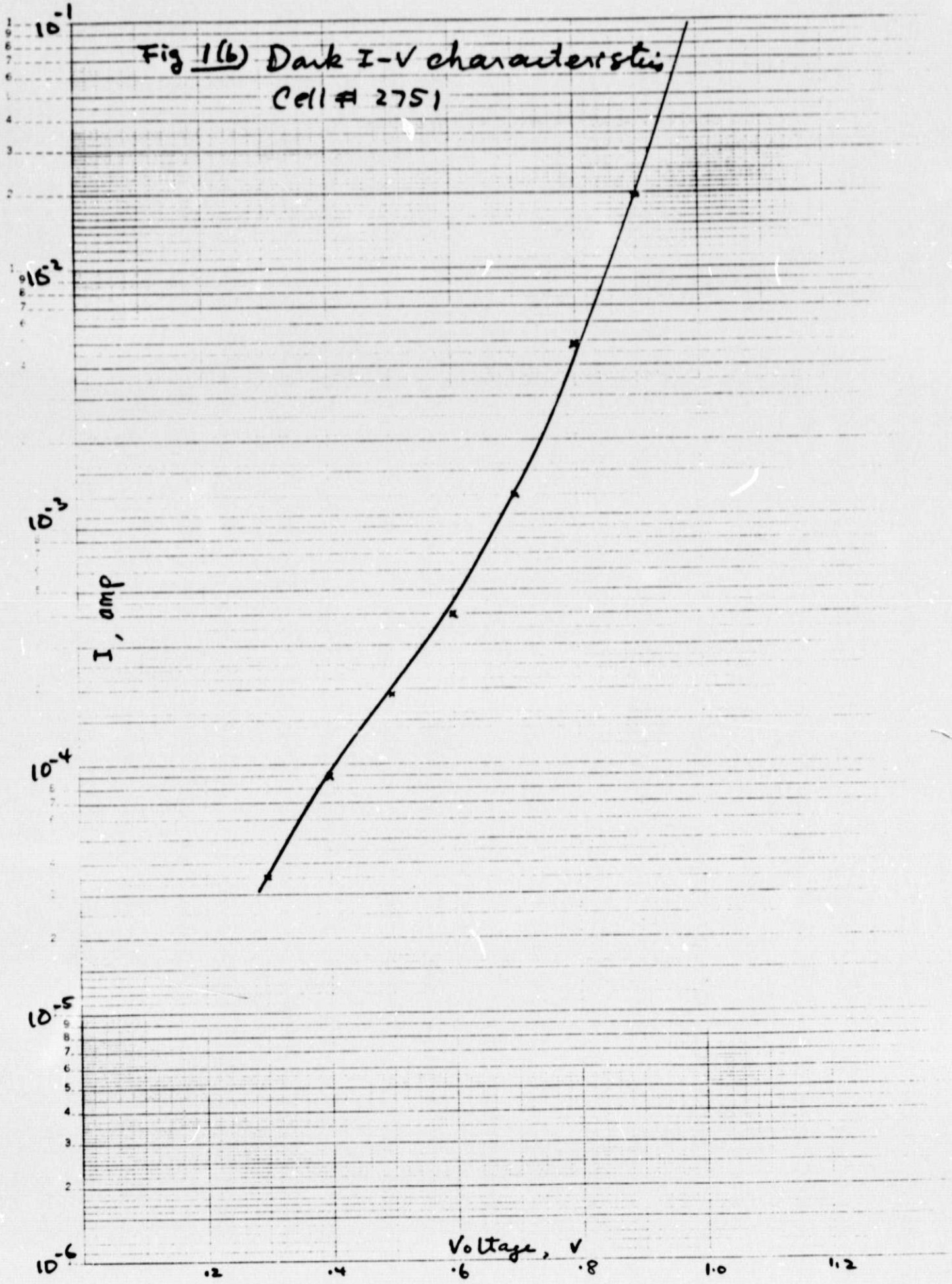
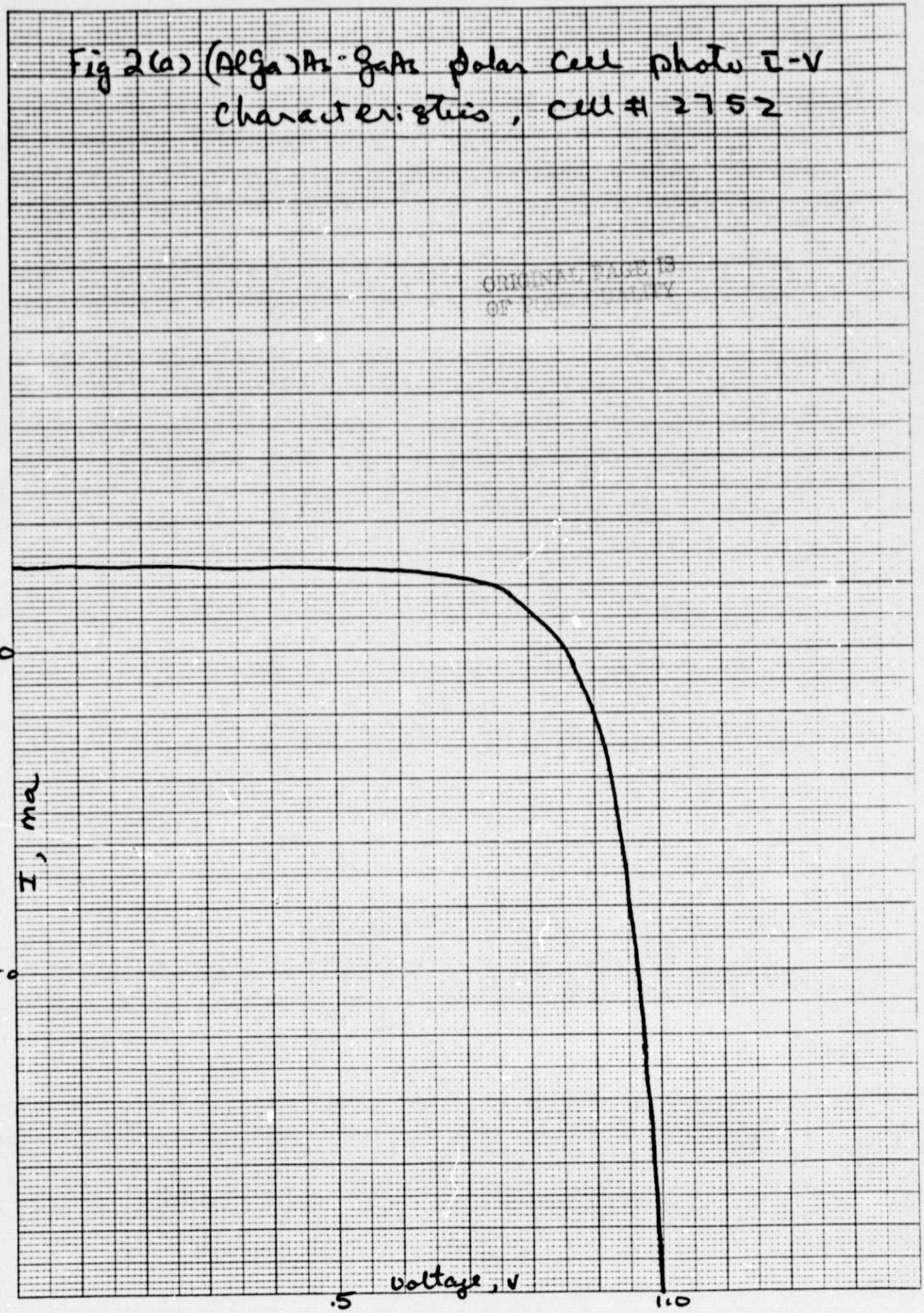


Fig 1(b) Dark I-V characteristics
Cell # 2751
I, amp
Voltage, V
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
.2
.4
.6
.8
1.0
1.2



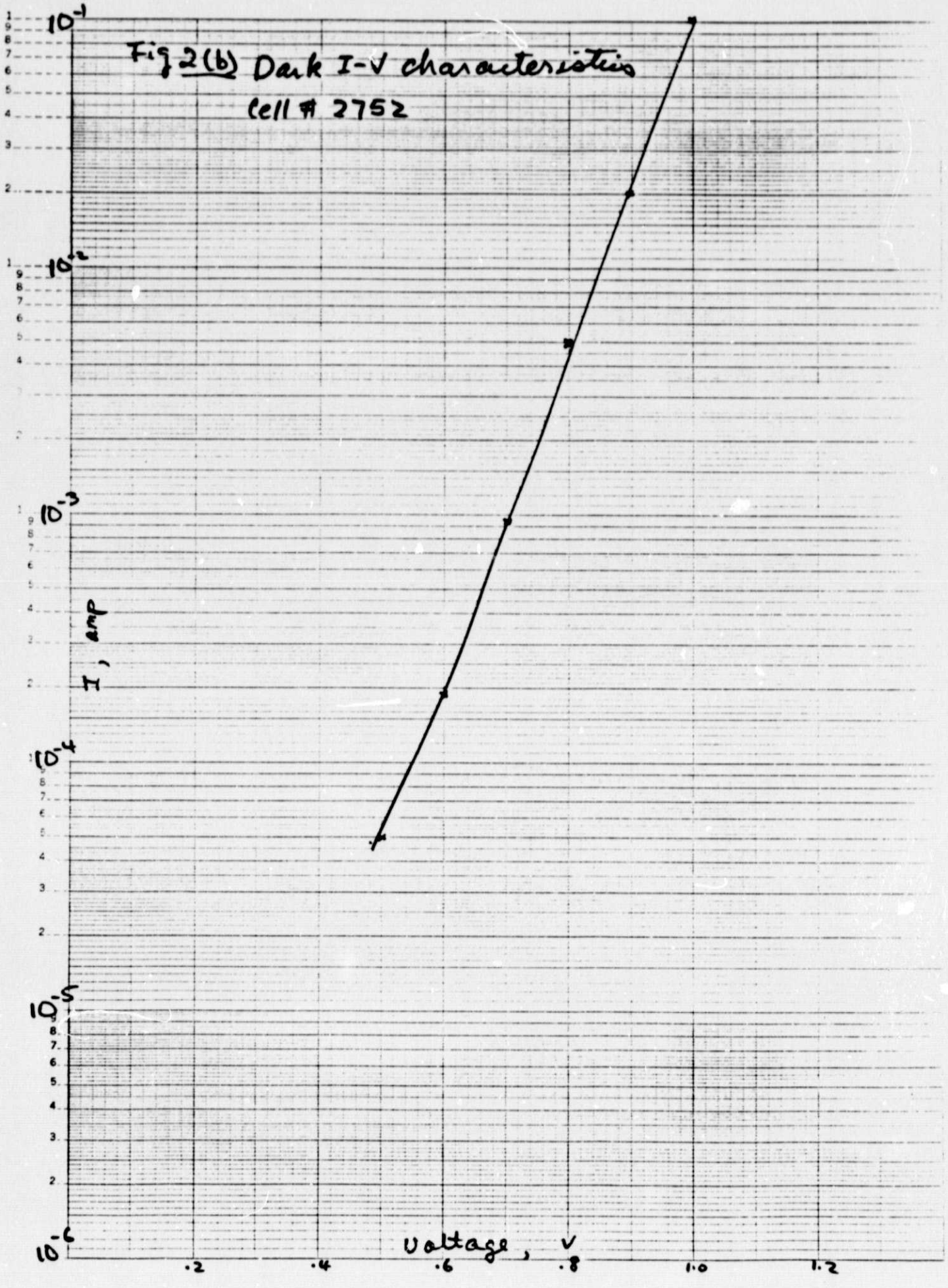
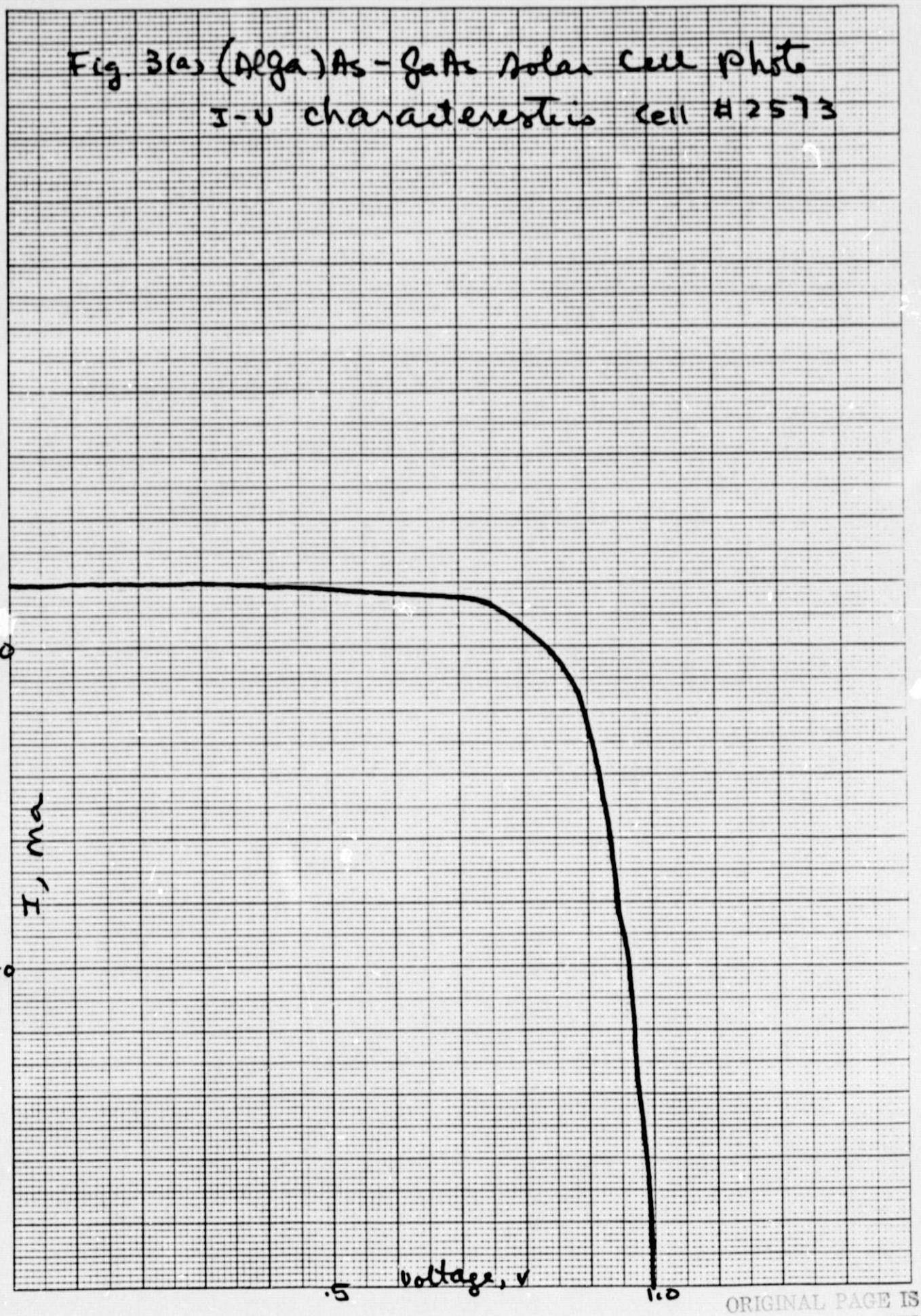


Fig 2(b) Dark I-V characteristics
Cell # 2752
I, amp
Voltage, V
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
.2
.4
.6
.8
1.0
1.2



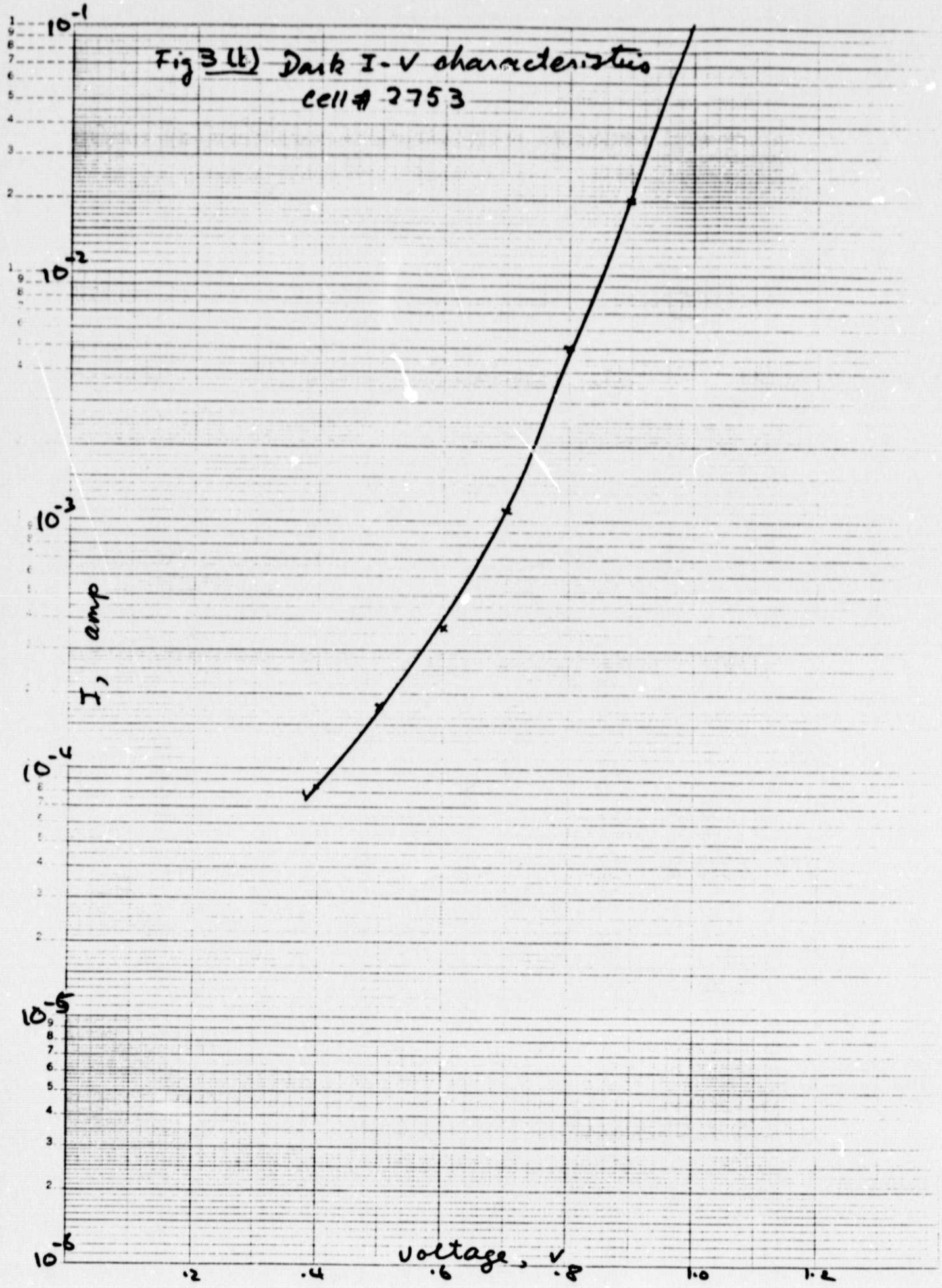
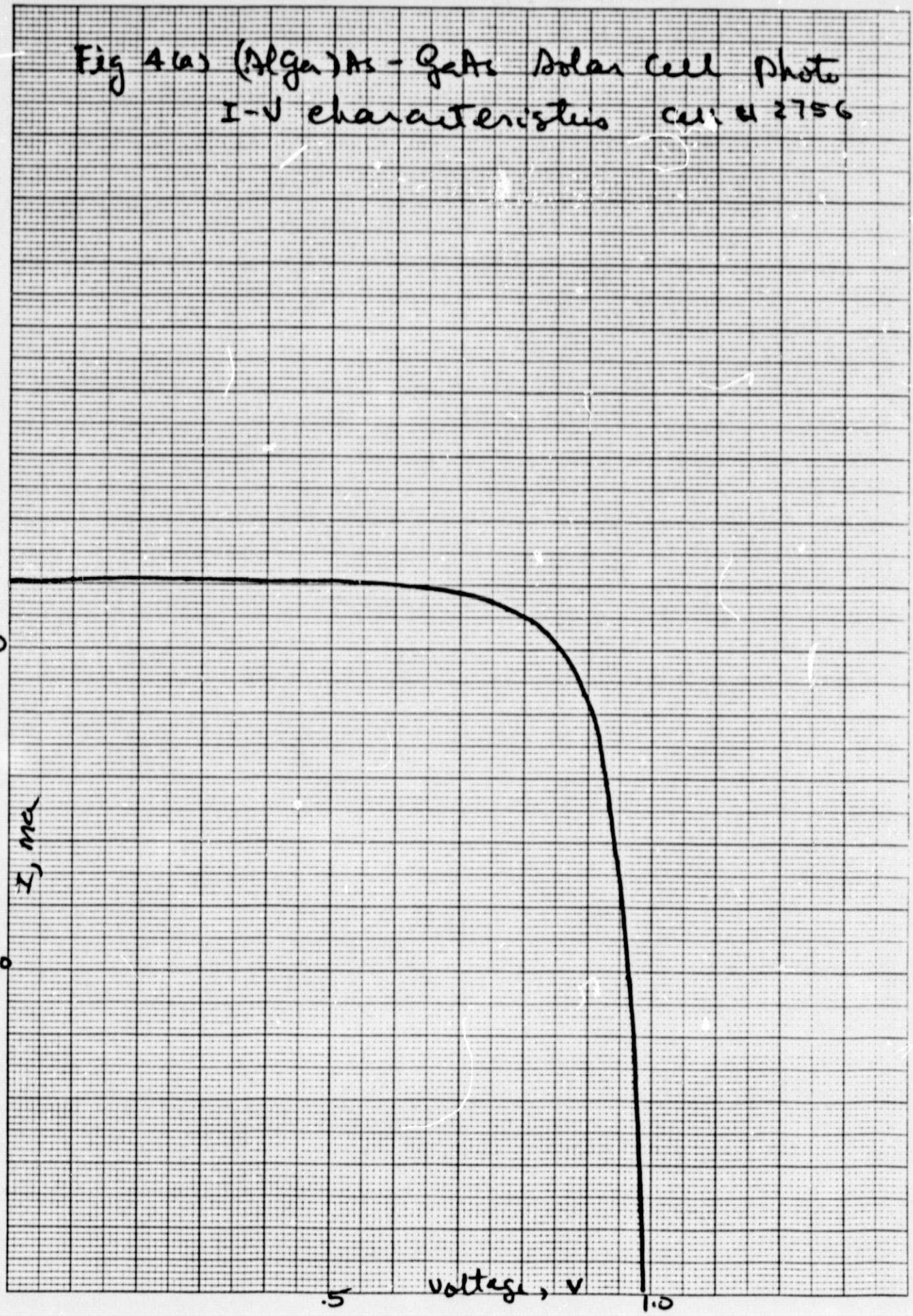


Fig 3 (b) Dark I-V characteristics
Cell # 2753
I, amp
Voltage, V
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
.2
.4
.6
.8
1.0
1.2



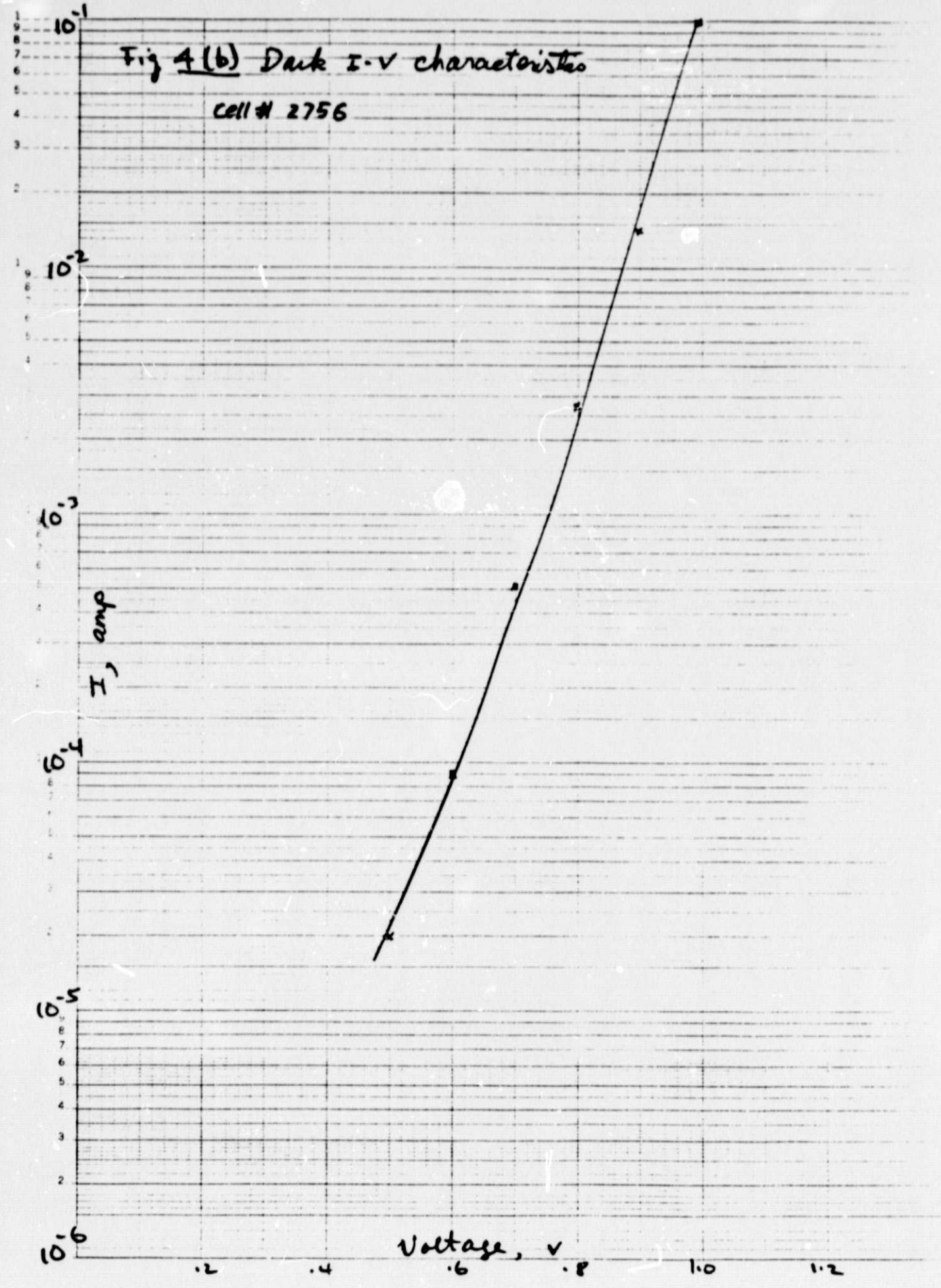


Fig 4(b) Dark I-V characteristics
Cell # 2756
I, amp
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
Voltage, V
.2
.4
.6
.8
1.0
1.2

Fig 5 (AlGa)As-GaAs Solar Cell Spectral Response

Cell # 2751

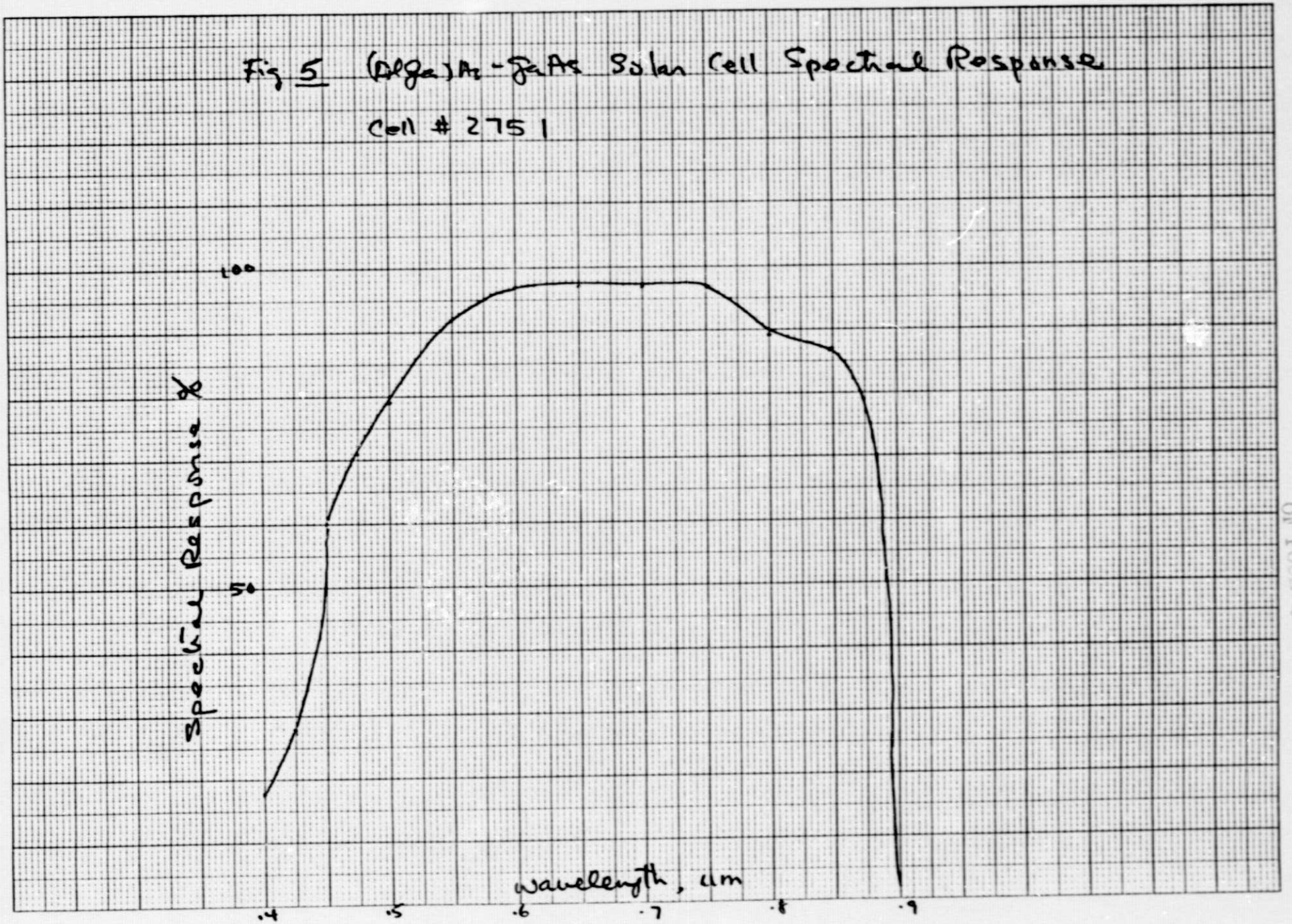


Fig 6 (AlGa)As-GaAs Solar Cell Spectral Response
Cal # 2752

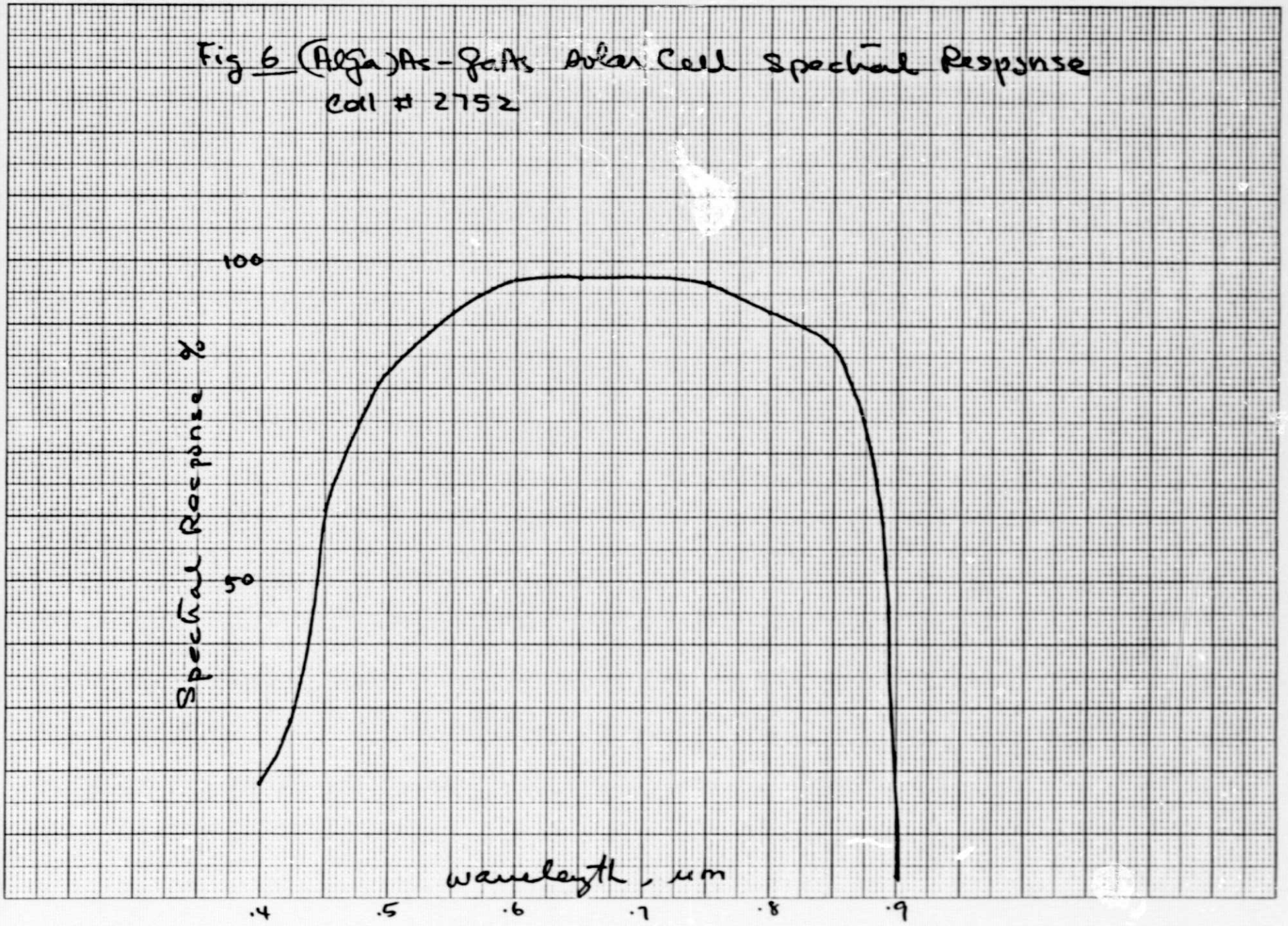


Fig 7 (AlGa)As-GaAs Solar Cell Spectral Response

Cell # 2753

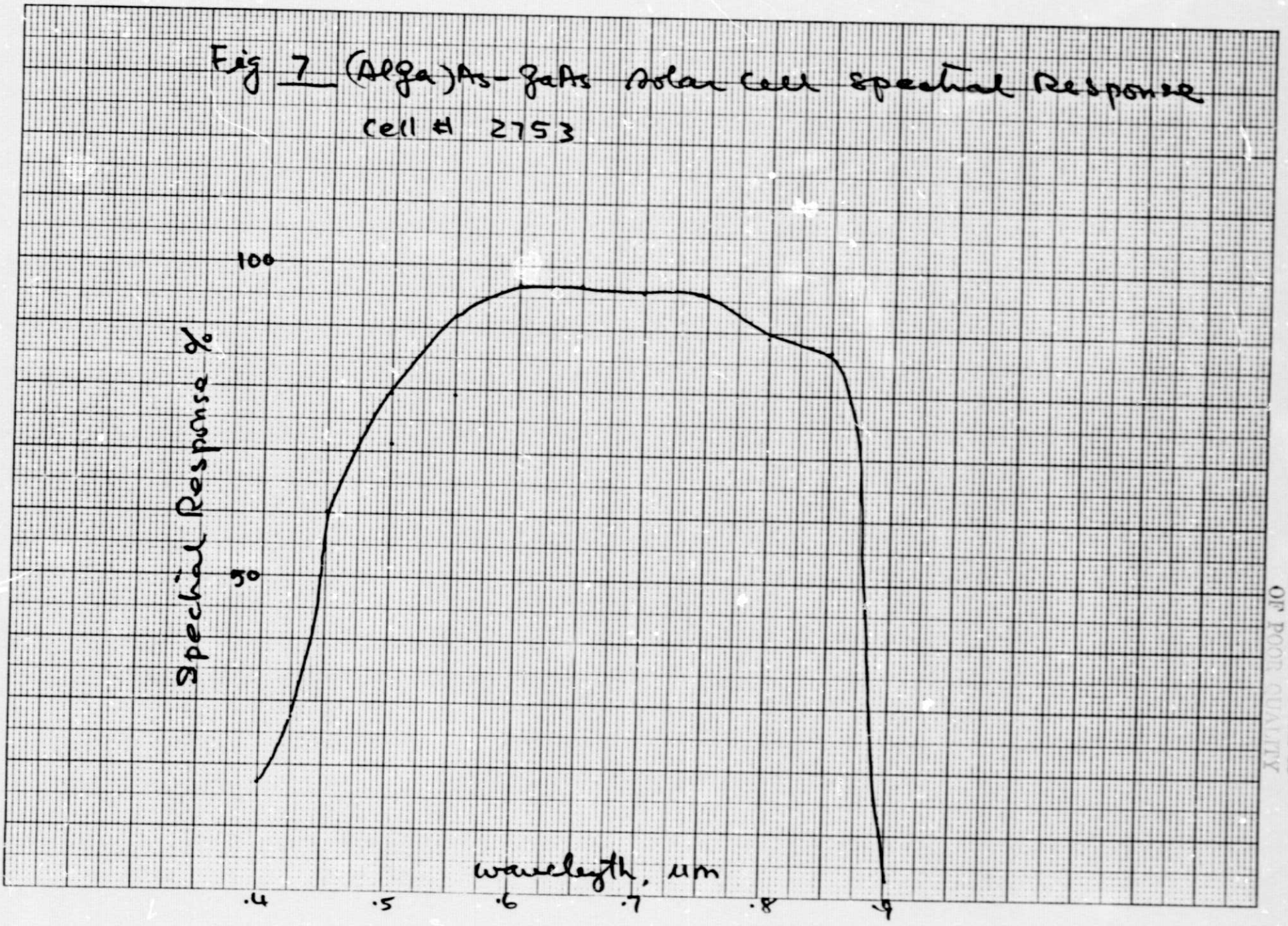
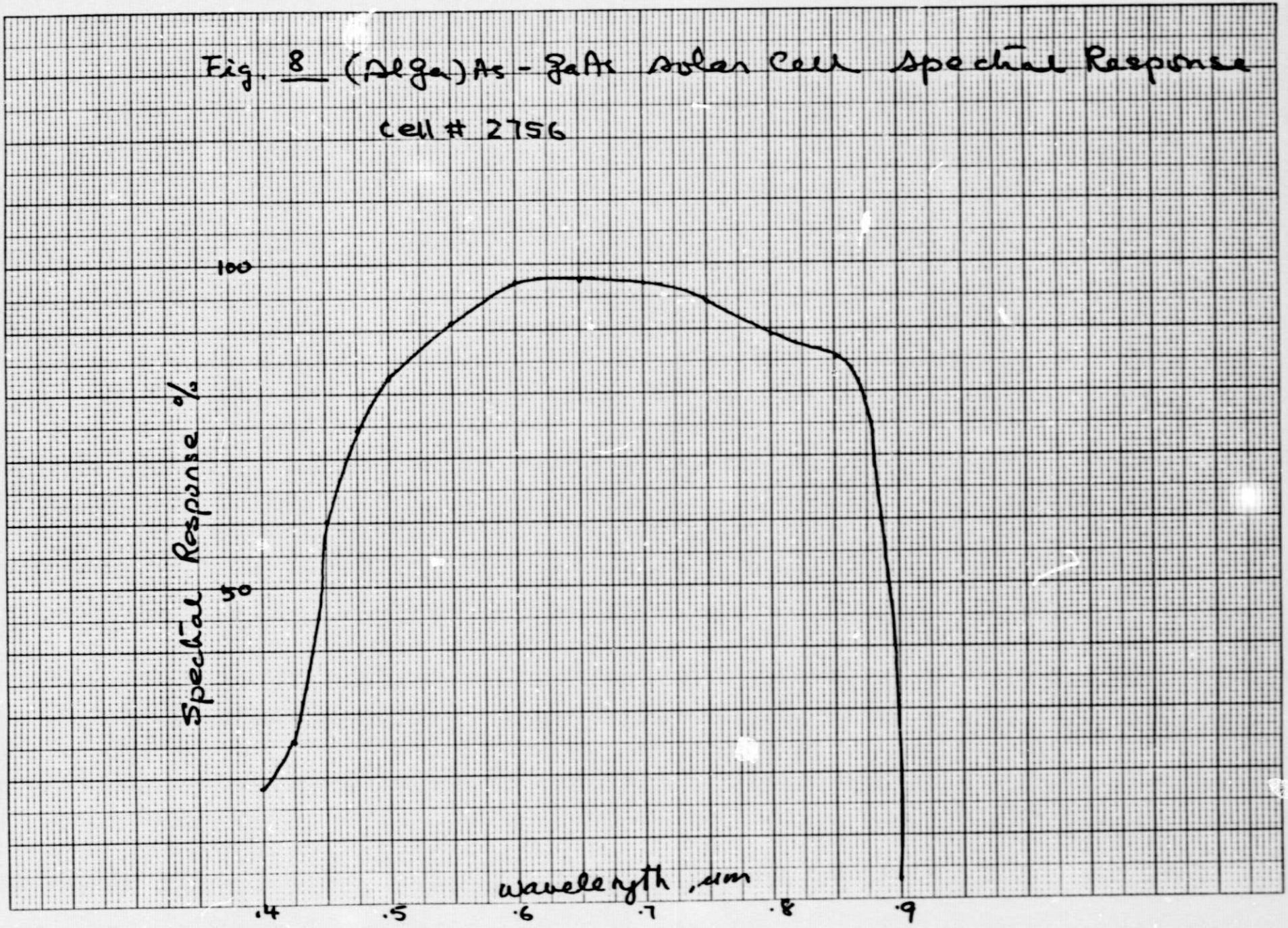


Fig. 8 (AlGa)As - GaAs solar cell Spectral Response

Cell # 2756



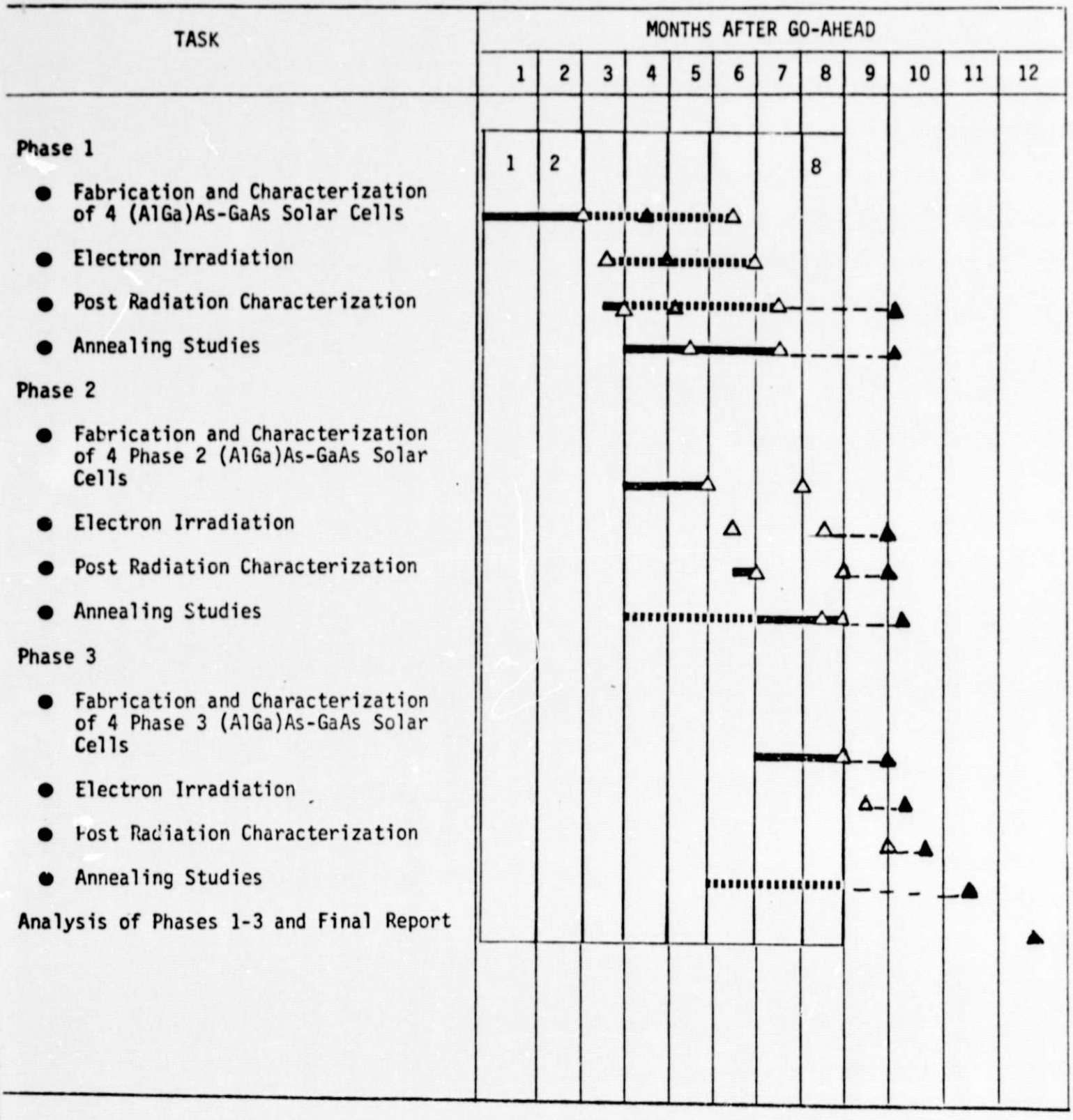


Figure 9. Program Schedule