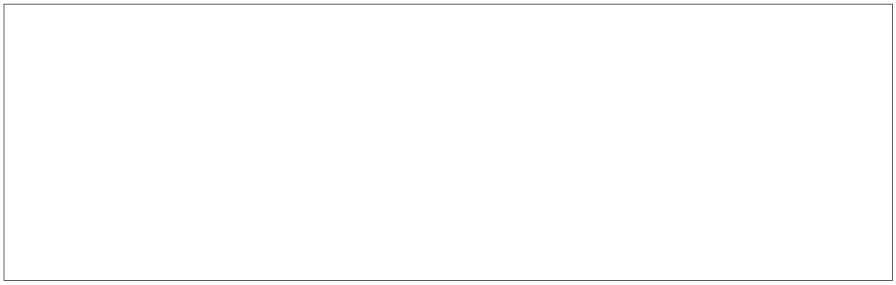
P-151

INFRA-RED DETECTOR CELLS



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REASON

DOCUMENT NO. 4
NO CHANGE IN CLASS. ☐
☐ DECLASSIFIED
CLASS. CHANGED TO: TS S C
NEXT REVIEW DATE:
AUTH: HR 70-2
DATE: REVIEWER: 010956

I. SSRI. Type OBS - PbS

An evaporated lead sulphide layer in an evacuated glass cell. Spectral sensitivity to 3.5μ at room temperature and 4.5μ at —180°C (liquid air).

II. SSRI. Type OBS - PbTe

An evaporated lead telluride layer in an evacuated glass cell. The cell has a ground glass stopper fitted to a special Dewar flask for cooling with liquid air.

Spectral sensitivity from 2μ to 6μ at —180°; 50% transmission at 5μ.

III. SSRI. Type OBS - PbSe

An evaporated lead selenide layer in an evacuated glass cell. This unit has a spectral sensitivity to 4.5μ at room temperature.

IV. SSRI. Type OBS - ChPb

A chemically precipated lead sulfide layer in an evacuated glass cell. Spectral sensitivity to 4.2μ when cooled to —180°C (liquid air).

INFRA-RED DETECTOR SSRI. Type OBS - PbS

An evaporated lead sulfide detector unit mounted in an evacuated glass cell.

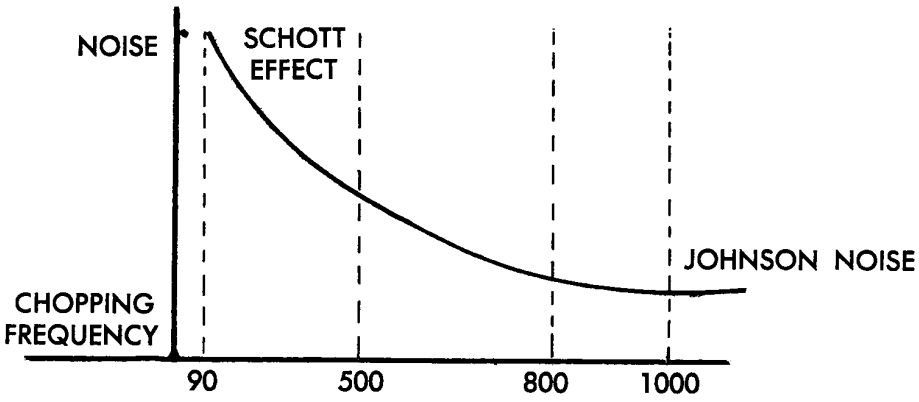
CELL SIZE		SENSITIVE AREAS
Outside Diameter	29 ± 2.0 mm	11 x 4 mm
Inside Diameter	16 ± 0.5 mm	5 x 5 mm
Length	45 ± 2.5 mm	4 x 4 mm
		3 x 3 mm

TEST CONDITIONS

Target Temperature:	300° C (Black Body)
Detector Temperature:	20° C
Chopping Frequency:	400 c.p.s.
Polarizing Voltage:	100 volts
Amplifier:	Band Pass: 50-5000 c.p.s.
	Gain: 10^6

NOTES:

1. The distance between the detector cell and the black body is 80 cm. This gives 0.3 watts/mm^2 of the total 300°C black body radiation on the sensitive target area.
2. The black body orifice is 1 cm^2.
3. The charge resistance is usually 1 megohm.
4. In the measurement of the signal to noise ratio an amplifier with a band pass of 50 to 5000 cycles is used. This wide band is chosen so that the amplifier will allow the passage of all types of noise. If the detector has a substantial flicker noise, discernible at low frequencies, the signal to noise ratio will be low and the cell is rejected.
5. A chopping frequency of 400 c.p.s. is used for the testing procedure. The optimum chopping frequency for the detector is 800 c.p.s. The low chopping frequency, coupled with the broad band amplifier is used so the cell can be tested under its poorest conditions. The curve below indicates the effect of chopping frequency on noise.

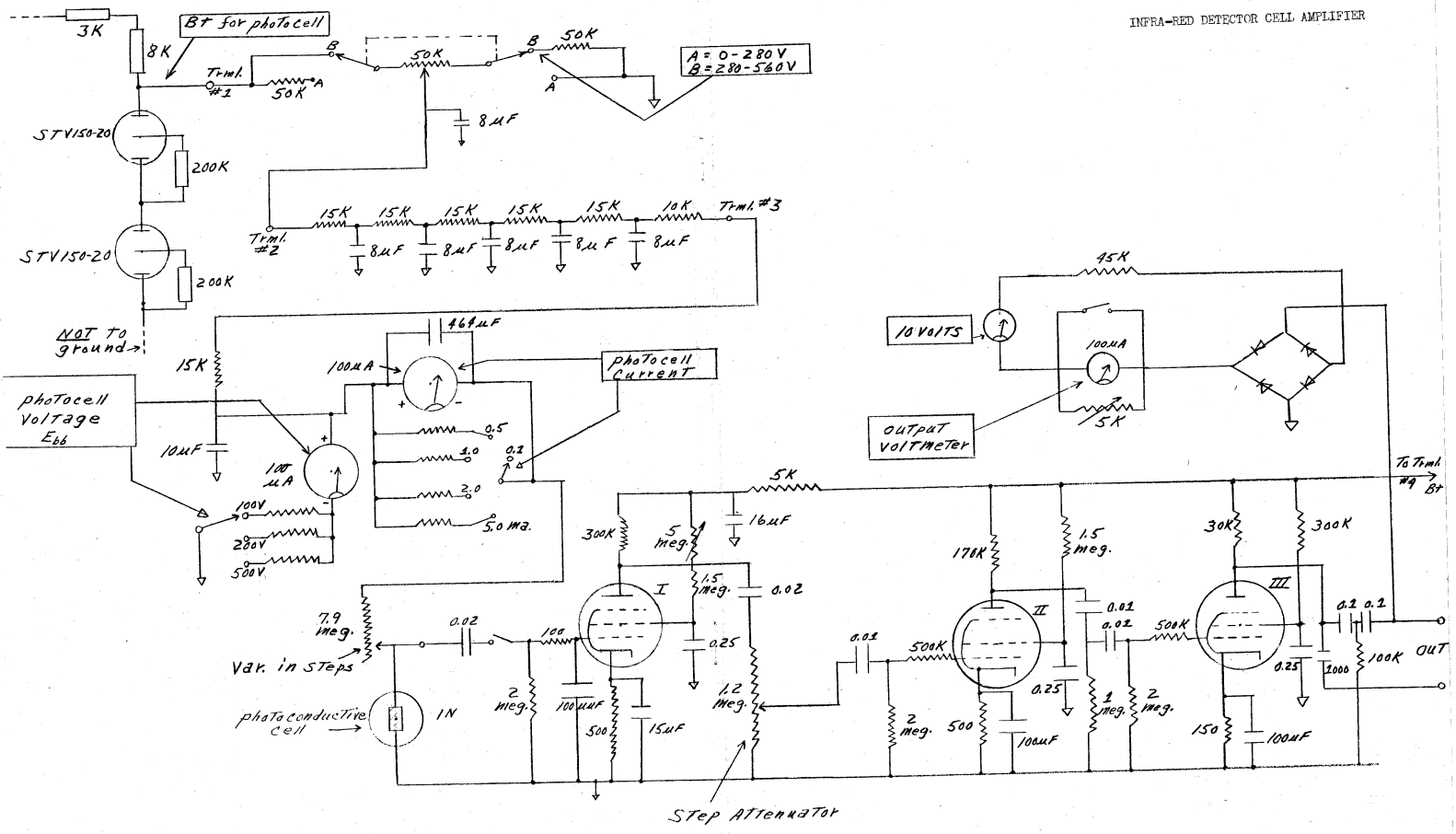


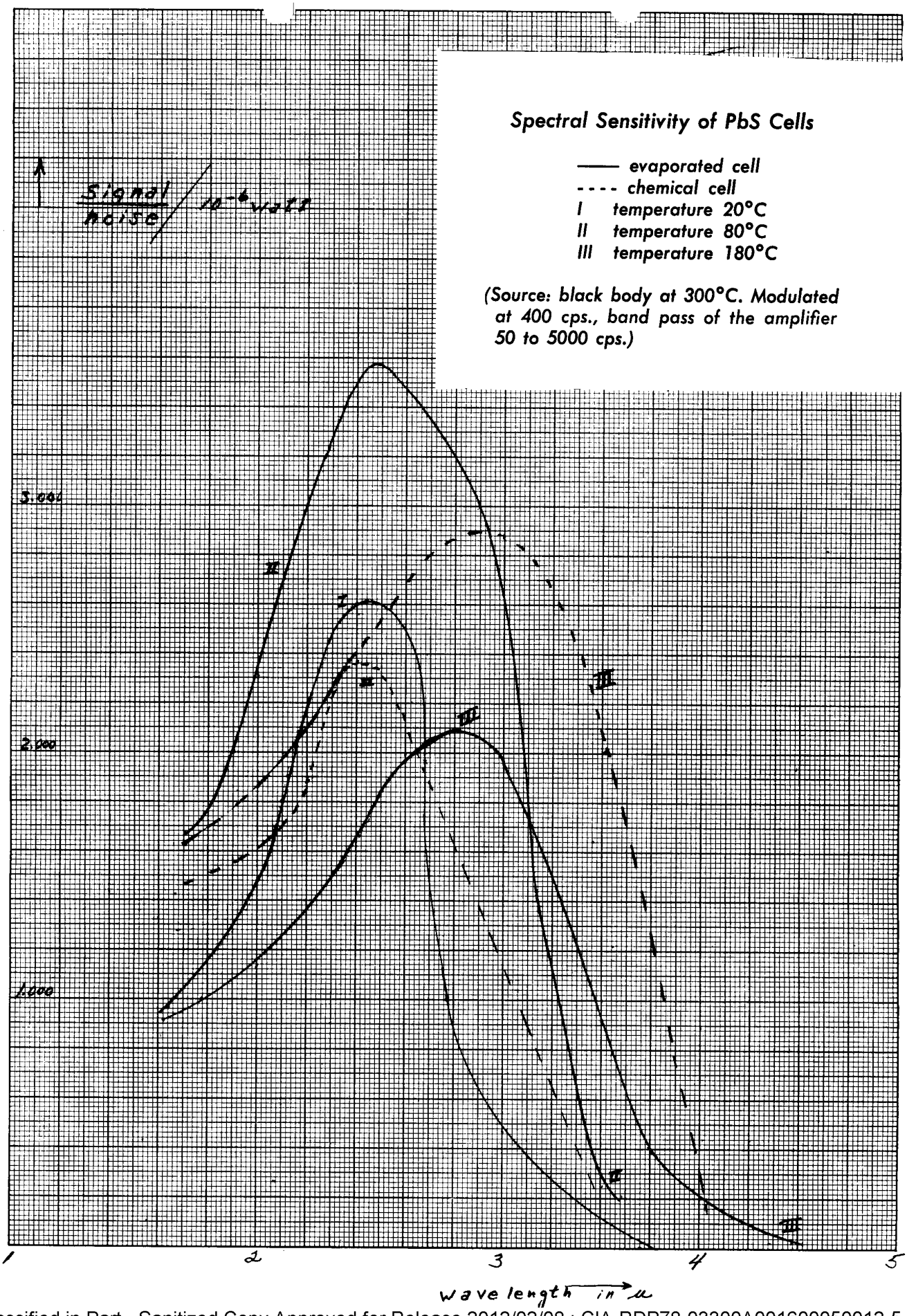
TEST RESULTS FOR A TYPICAL CELL AT 20°C

8 x 11 mm Sensitive Area

1. Internal Impedance	100,000 ohms
2. Time Constant	10^{-4} seconds
3. Signal : Noise	Grade A 500:1
	Grade B 400:1
	Grade C 300:1

INFRA-RED DETECTOR CELL AMPLIFIER





INFRA-RED DETECTOR SSRI. Type OBS - PbTe

An evaporated lead telluride detector unit mounted in an evacuated glass cell. This unit is designed to operate at liquid air temperatures of —180°C. The cell has a ground glass stopper fitted into a specially designed Dewar flask. When the Dewar flask is filled with liquid air (approximately 200 cc) the cell will operate for 1 hour without recharging.

CELL DIMENSIONS

Outside diameter . . . 24 ± 2.0 mm.
Length . . . 120 mm ± 5.0 mm.
Sensitive area 8 x 4 mm.

TEST CONDITIONS

Target Temperature: 300°C (Black Body)
Detector Temperature: —180°C (Liquid air)
Chopping Frequency: 400 c.p.s.
Polarizing Voltage: 50 volts
Amplifier: { Band pass: 50 - 5000 c.p.s.
Gain: 10^6

TYPICAL TEST RESULTS

Internal Impedance: 100,000 ohms
Time constant: 10^{-4} seconds
Signal to noise ratio: 300 : 1
Total Radiation on cell area from Black Body: 0.3 watt/mm^2

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