

**Memorandum:
Experimental Apparatus**

Thomson mirror astatic high r.	1000 cells vial battery
Standard B A Rheo.	1 Thomson portable Electrometer
Gaugain tangent Gal	1 Siemens Polzd Relay
Coulombs balance Gal.	2 Large regulating clock
Rhumkoff high Gal.	1 Chronograph
Siemens Universal Gal	1 Farley repulsion
2 ordinary gal. astatic	1 Electric Light & Bellong.
1 " low r "	1 Prong plate
1 Plate Glass E Mac	2 Hughes Prints
1 Holy large "	1 air pump
Bennett Electroscop.	Pith ball stands.
1 Plate Condenser on slide	20 Trays @ gutta S.
1 battery 20 Leyden jars	batteries.
1 Universal discharger	100 large Galvan battery box
1 Dry pile 5000 disks	25 Nobile-Thermo batteries
1 Voltmeter	6 Trays BPO battery
1 Small Rhumkoff coil	20 E Granter batteries
1 Large "	1 Ink recorder Siemens
1 Large Nobili Thermo pile	2 Clockworks for chronol.
One large Electroscop.	paper with Ferrum.
" Small do	1 (Hand) Gunter Equal
1 Single wire slide Rheo	2 Knott 1665 Cells.
1 Frame Magnet Mac	1 Rheo 1 Million Ohms
1 Small ordinary do	

- Thomson mirror astatic high r.²
 Standard B A Rheo.³
 Gaugain tangent Gal⁴
 Coulombs balance Gal.⁵
 Rhumkoff high r Gal.⁶
 Siemens Universal Gal⁷
 2 ordinary gal. astatic
 1 " " Low r"⁸
 1 Plate Glass E Mac⁸
 1 Holz Large " ⁹
 Bennetts Electroscop¹⁰
 1 Plate Condenser on slide¹¹
 1 battery 20 Leyden jars¹²
 1 Universal discharger¹³
 1 Dry pile 5000 disks¹⁴
 1 Voltmeter¹⁵
 1 Small Rhumkoff coil¹⁶
 1 Large " "
 1 Large Nobili Thermo pile¹⁷
 One Large Electrophosis¹⁸
 " Small d[itt]o
 1 Single wire slide Rheo¹⁹
 1 Frame Magneto Mac
 1 Small ordinary do
 1000 cells vial battery
 1 Thomson portable Electrometer²⁰
 1 Siemens Polzd Relay
 2 Large regulating clock

- 1 Chronograph
- 1 Varley replenisher²¹
- 1 Electric Light L Dubocq²²
- 1 Proof plane²³
- 2 Hughes printer²⁴
- 1 air pump
- Pith ball stands.
- 20 Trays 10^a gutta .P. batteries.²⁵
- 100 Large Carbon battery Laws²⁶
- 25 Nitro chromic batteries²⁷
- 6. Trays B.P.O. battys²⁸
- 50 E Gravity Batteries²⁹
- 1 Ink recorder Siemens³⁰
- 2 Clockworks for chemical paper with Governors.
- 1 Standard Condsr Equal 5 Knots 1865 Cable.³¹
- 1 Rheo 1 Million ohms

AX, NjWOE, DF (*TAEM* 12:993). *Circled.

1. Edison probably drew up this list of desired experimental apparatus following his 1873 trip to Great Britain, where he saw many of these items for the first time.

2. Galvanometers are instruments for measuring electric currents by movement of a needle or coil in a magnetic field; an astatic form is not affected by the earth's magnetic field. Thomson's mirror galvanometer was used for receiving signals on cable telegraphs. Knight 1876-77, s.v. "Galvanometer."

3. That is, a rheostat based on the standard ohm established in the 1860s by a committee of the British Association for the Advancement of Science.

4. The standard tangent galvanometer measured current by the tangent of the needle's deflection. Gaugain wound the current-carrying wire on a conical frame and placed the needle at the cone's apex, creating an "apparatus superior to all others for exact measurement." Prescott 1877, 136-39.

5. A Coulomb galvanometer employed Charles Coulomb's torsion balance. Knight 1876-77, s.v. "Galvanometer."

6. A Ruhmkorff galvanometer was designed by Heinrich Ruhmkorff (see *TAEB* 1:82) or employed his induction coil.

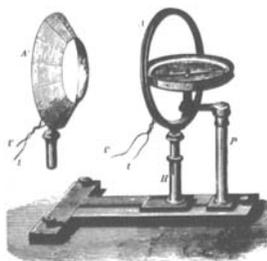
7. Probably the sine-tangent galvanometer of Werner Siemens and Johann Halske. Prescott 1877, 143-48.

8. That is, a device for producing static electricity by friction. Atkinson 1890, 721-23.

9. Wilhelm Holtz's machine produced static electricity by induction. *Ibid.*, 726-29.

10. An electroscope detects the presence of an electrical charge; Bennett's, which became the standard because of its sensitivity, employed gold leaf. *Ibid.*, 718-19.

11. Perhaps a variable condenser.



Gaugain's tangent galvanometer.

12. The Leyden jar (named after the Dutch town where it was invented) was the first condenser. It incorporated a glass bottle with separate internal and external coatings of metal foil; the internal coating touched a conducting rod passed through an insulated stopper. Atkinson 1890, 741-43.

13. That is, a device for discharging condensers, electroscopes, etc. *Ibid.*, 745-46.

14. A dry pile is a battery in which hundreds or thousands of metallically coated disks of paper or leather replace liquid electrolytes. It produces a high voltage but very little current. *Ibid.*, 789.

15. A voltmeter determines current strength by passing the current through dilute or pure sulfuric acid and measuring the volume of gas evolved. Prescott 1877, 157-61.

16. That is, an induction coil.

17. The Nobili pile, devised by Leopoldo Nobili, is a thermoelectric battery consisting of bars of bismuth and antimony soldered together. Atkinson 1890, 956.

18. Perhaps an electrophorus, a device invented by Alessandro Volta for producing static electricity by induction. *Ibid.*, 720.

19. Probably an adjustable rheostat.

20. Sir William Thomson devised a delicate electrometer, an instrument to measure electrical charge. *Ibid.*, 749.

21. A small generator of static electricity used to maintain the charge on an electrometer. Atkinson 1910, 814.

22. Jules Duboscq, Parisian instrument maker, manufactured an arc light. King 1962b, 339.

23. A proof plane (or "carrier") transferred static charges in experiments. Atkinson 1910, 699.

24. See *TAEB* 1:109 n. 5.

25. See *TAEB* 1:607 n. 4.

26. Possibly a battery, employing carbon as one of the electrodes, such as that used with Samuel Laws's gold-reporting telegraph.

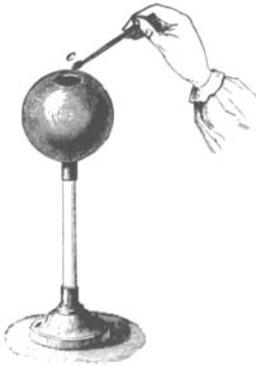
27. Probably a battery employing nitric acid with bichromate of potash. This type of battery gave a fairly constant current and was considered useful when a strong current was required. Sprague 1875, 108.

28. The British Post Office telegraph used a modified Daniell battery. Culley 1871, 19.

29. Possibly Edison's battery; see *TAEB* 1:481.

30. The ink-recording telegraph of Werner Siemens and Johann Halske was used extensively in Germany as well as on government telegraph lines in Great Britain and India. Prescott 1877, 489-96.

31. That is, the 1865 Atlantic cable.



A proof plane was a small copper disc at the end of a glass or shellac rod.