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Research Section,  
Engineer-in-Chief's Office,  
P.O. Research Station,  
Dollis Hill,  
London, N.W. 2.

April 15th 1923.

REPORT NO. 3400

TITLE Tests on Leclanche (wet) Cells supplied by  
Messrs. Siemens Brothers.

Request for Report received from Telephone Section.

Investigation carried out by F.O. Barralet, F.R. Ferris,  
H. Bourdeaux.

At Dollis Hill Research Station

Date October 1920.

File No. S.1.4.

February 1923.

Case No. 2771

7/16.

Signature..... *J. F. Hill* .....

for Engineer-in-Chief.

### Precis.

Six cells of each of the No. 0 No. 1 and No. 2 A types were submitted for test by Messrs. Siemens Bros. These cells were of the Leclanche Sack type, the sack consisting of a rush basket.

Types No. 1 and No. 2 A gave the output required by the Post Office Specification but type No. 0 failed to do so.

The cells were satisfactory as regards initial electro-motive force but their initial resistance and polarisation were in most cases higher than that allowed by Specification: they cannot be recommended for use in place of usual type of sack cell.

### Tests.

The cells were tested for initial E.M.F., Internal Resistance and Polarisation and the results are shown in Table I. It will be seen that in every case except one the initial internal resistance is too high and in some cases considerably so. The polarisation is, for most of the cells tested, above that allowed by Specification.

The cells were put on Output tests at the rates indicated in the table, the ampere-hour output was determined by means of a copper voltmeter and from this the watt-hour output was calculated. The results are shown in Table I.

It will be seen that both pairs of No. 0 type give very small outputs at the Specification rate of 100 m.a.

Owing to the inferior results given by the No. 0 cells at the specified rate further tests were carried out on another pair of these cells at a discharge rate of 50 m.a. The output obtained in these tests up to the present is considerably larger viz., 150 watt hrs. approximately.

The reason for the failure of the No. 0 cells at the higher discharge rate is not evident but on opening one of these cells after the discharge it was found that a hard crust had formed on the depolariser just beneath the rush basket covering. This crust varied in thickness from  $1/16$ " to  $\frac{1}{4}$ " and covered the whole surface exposed to the action of the electrolyte and would

appear

appear to have prevented the full utilisation of the depolarising material of the cell.

Types No. 1 and No. 2 A give the required outputs. They were also discharged at higher rates and the results obtained are tabulated.

The curves Ex 30201 to Ex 30206 show the fall of voltage and rise of resistance for the various cells during the discharges.

#### Conclusions.

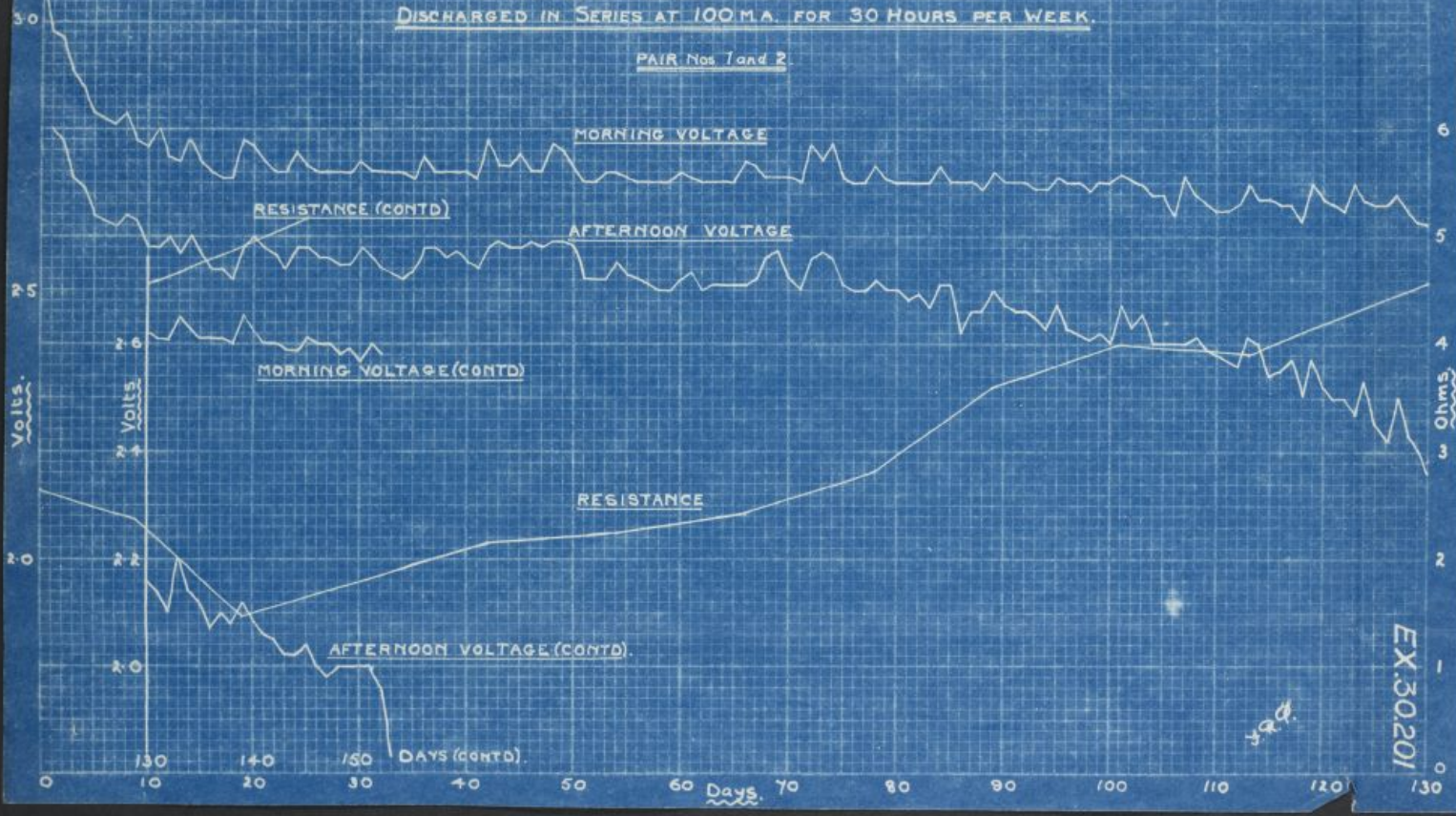
Type No. 0 failed to give the required output. Types No. 1 and No. 2 a gave the specification output but do not compare well with the ordinary sack type of cell in resistance and polarisation. It is not considered advisable to replace the usual sack cell by the rush basket type.

TABLE I

Cell	Initial Voltage	Initial Resistance ohms	Polarisation at 500 m.a. %	Discharge Rate m.a.	Output Ampere Hours	Output Watt Hours	Remarks		
<u>Type No. Q</u>	1	1.57	17.2	100	73.12	83.22	Cells 3 & 4 still on discharge at 50 m.a. Output up to date about 150 watt hrs.		
	2	1.57	9.56						
	3	1.57	13.4	50					
	4	1.56	16.7						
	5	1.52	10.4	100				45.44	49.77
	6	1.52	15.1						
<u>Type No. 1</u>	1	1.50	8.67	50	65.77	73.47			
	2	1.51	9.28	30					
	3	1.52	16.8	100				52.02	53.78
	4	1.47	8.85						
<u>Type No. 2A</u>	1	1.46	13.7	20	23.28	27.29			
	2	1.50	11.3						
	3	1.47	15.65	50				16.89	18.16
	4	1.40	8.73						

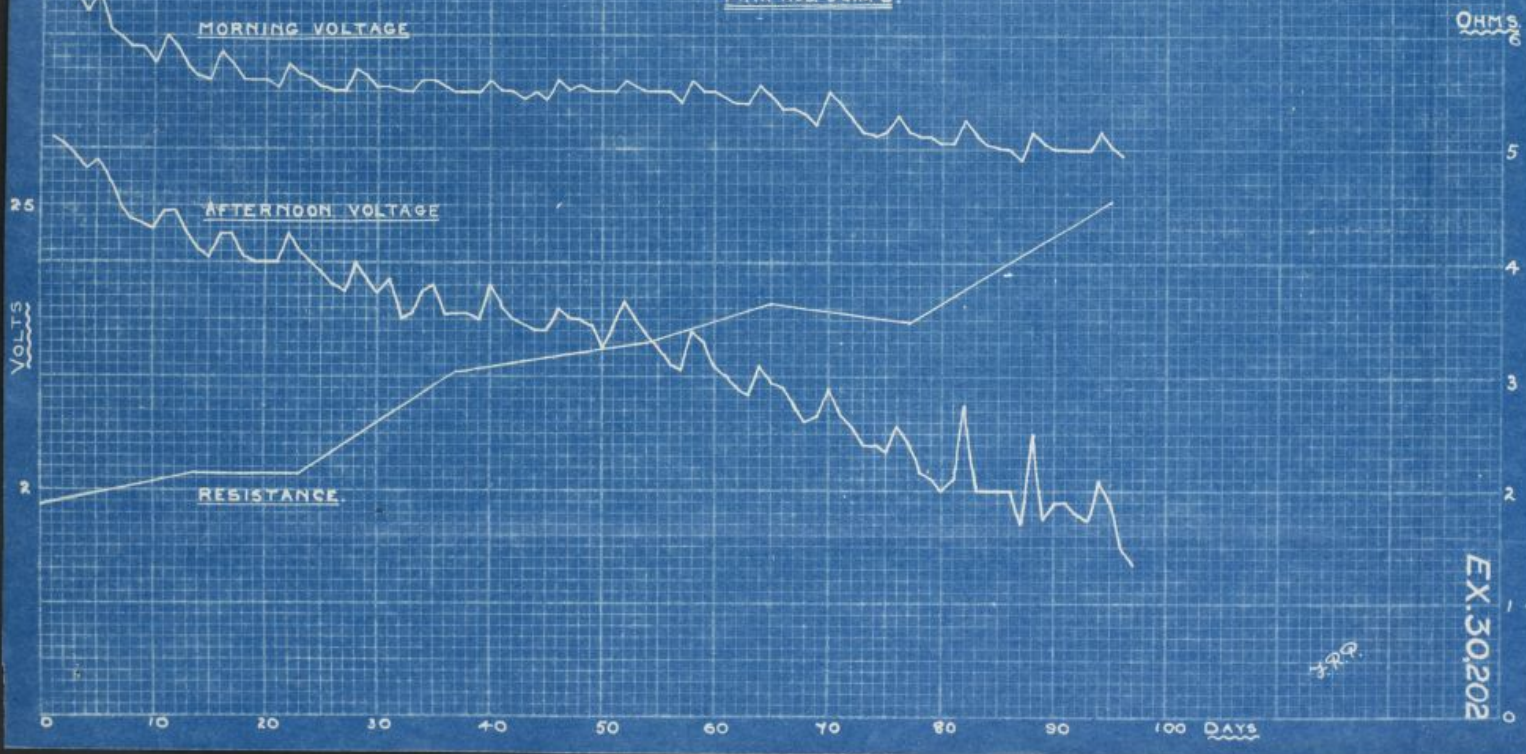
2 No. 0 TYPE WET CELLS BY SIEMENS BROS.  
DISCHARGED IN SERIES AT 100 M.A. FOR 30 HOURS PER WEEK.

PAIR Nos 1 and 2.



2 No 0 Type WET CELLS BY SIEMENS BROS.  
DISCHARGED IN SERIES AT 100 MA. FOR 30 HOURS PER WEEK.

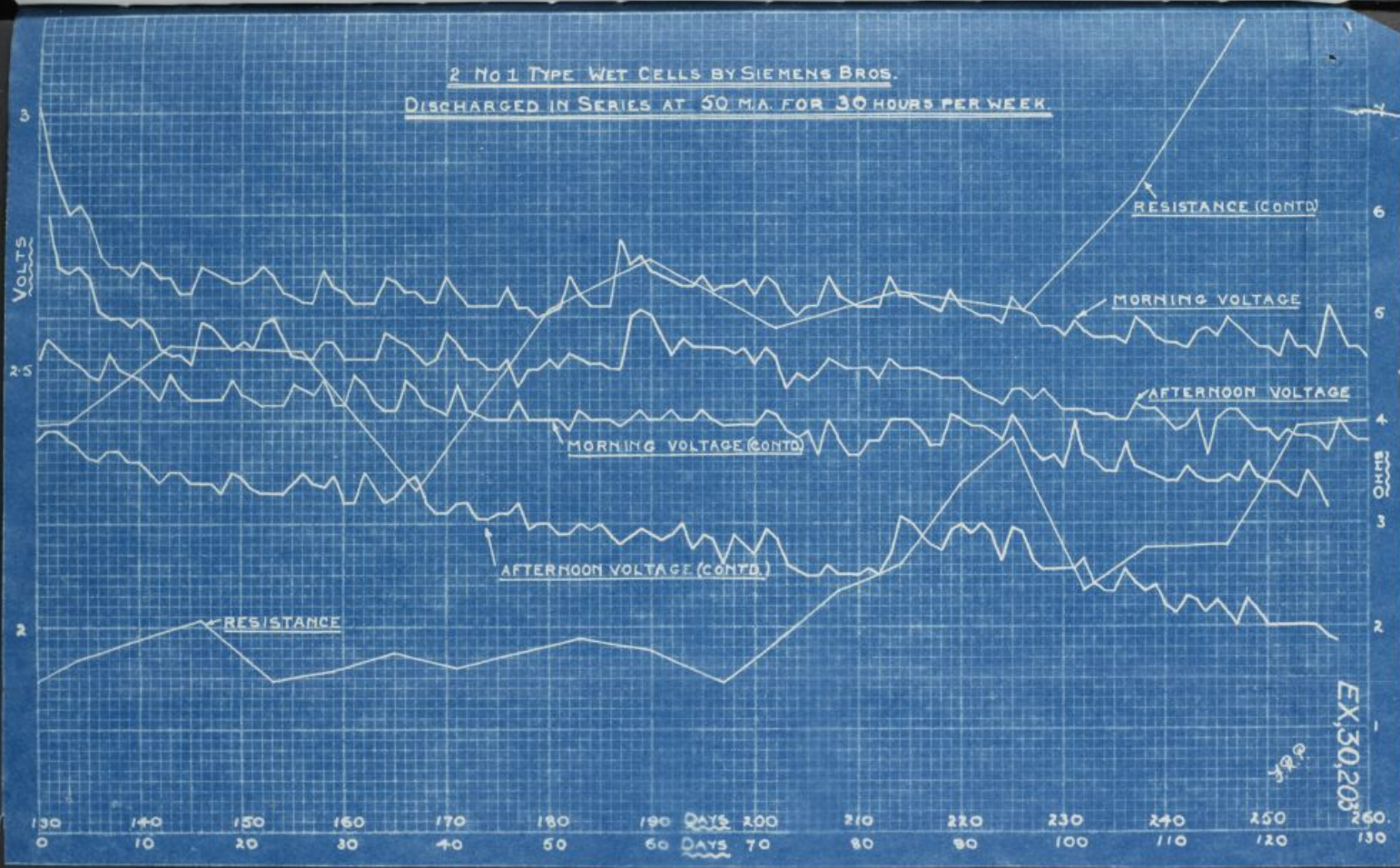
PAIR Nos. 5 and 6.



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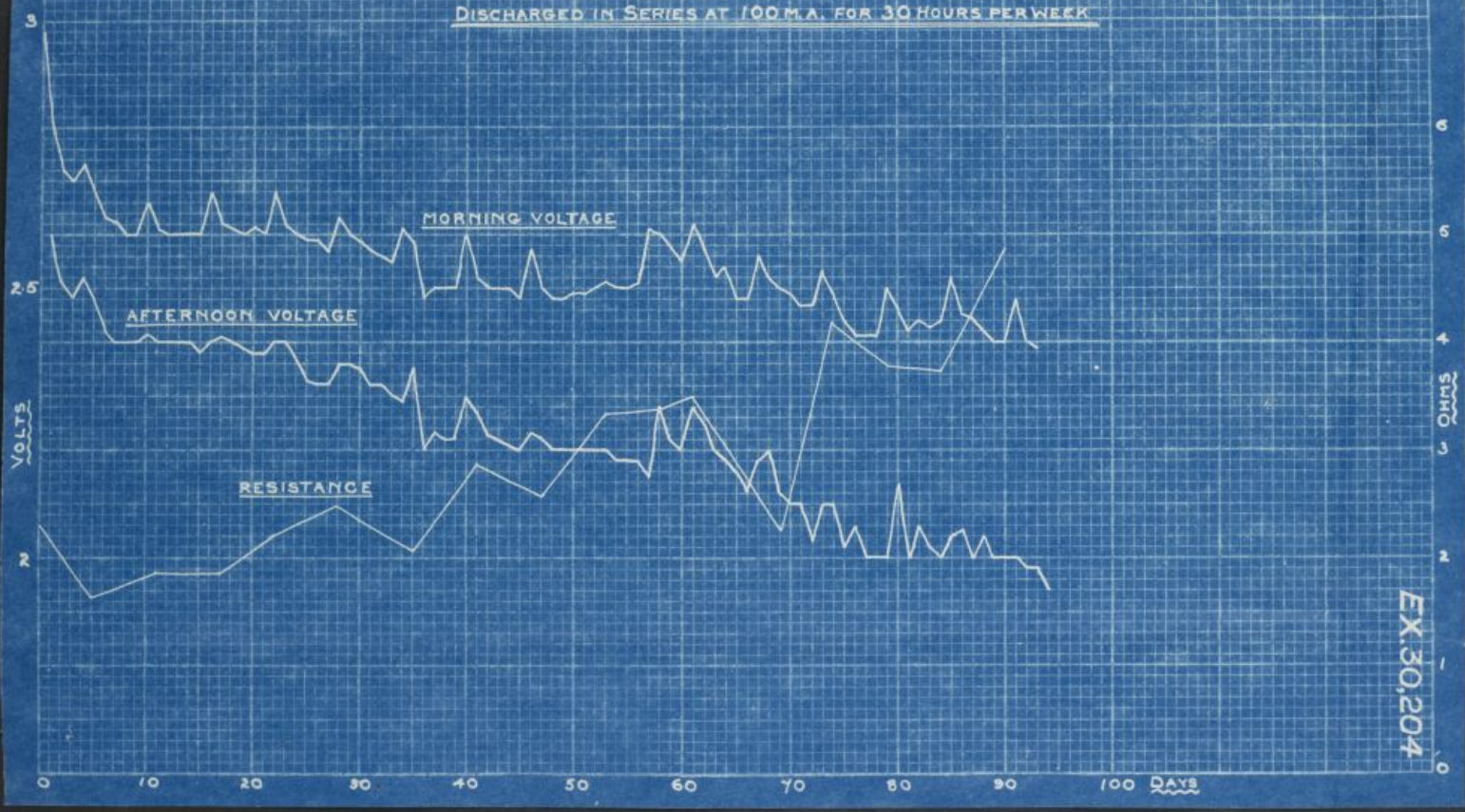
EX. 30.202

2 No 1 TYPE WET CELLS BY SIEMENS BROS.  
DISCHARGED IN SERIES AT 50 M.A. FOR 30 HOURS PER WEEK.



EX. 30, 208

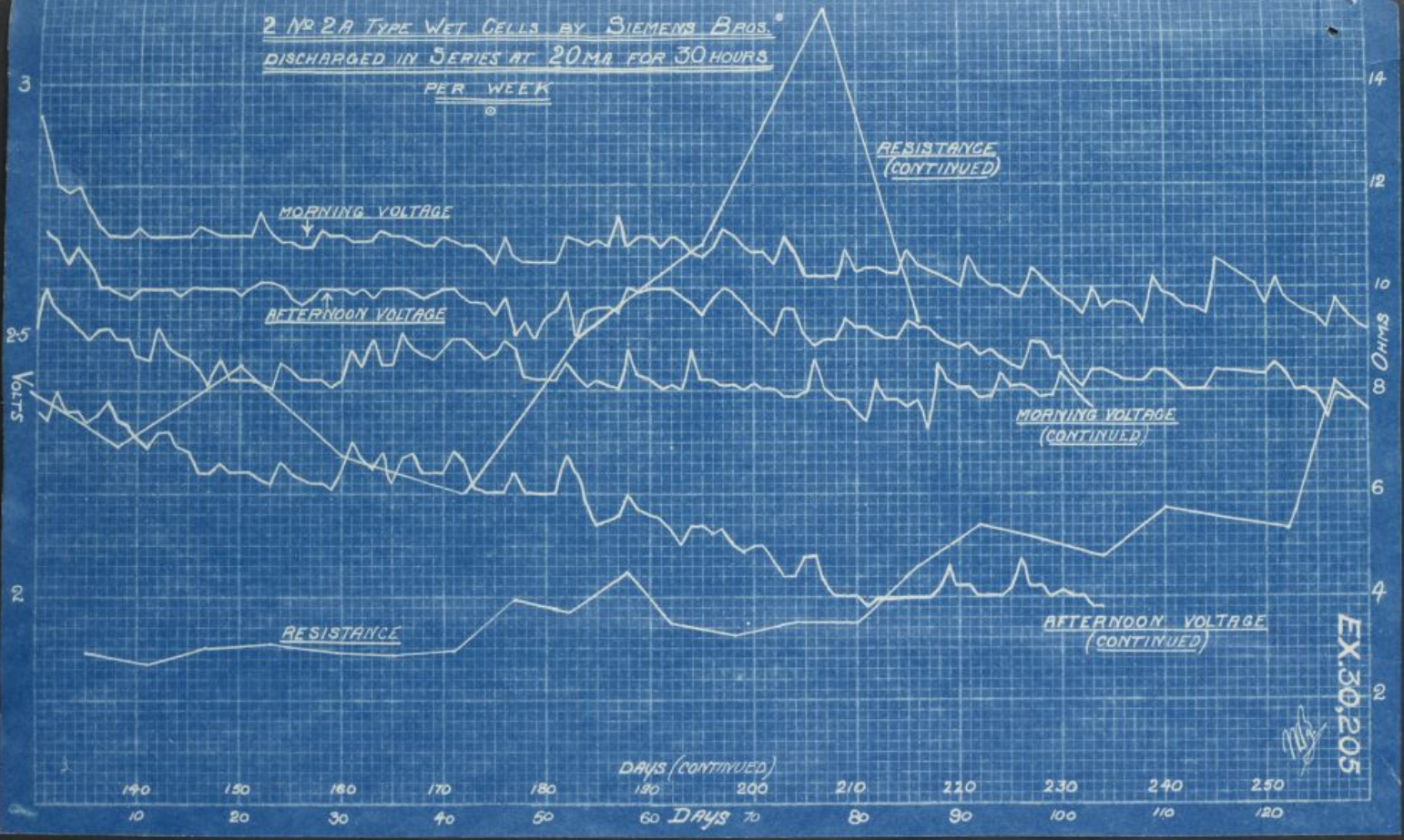
2 No 1 TYPE WET CELLS BY SIEMENS BROS.  
DISCHARGED IN SERIES AT 100 M.A. FOR 30 HOURS PER WEEK



EX. 30,204

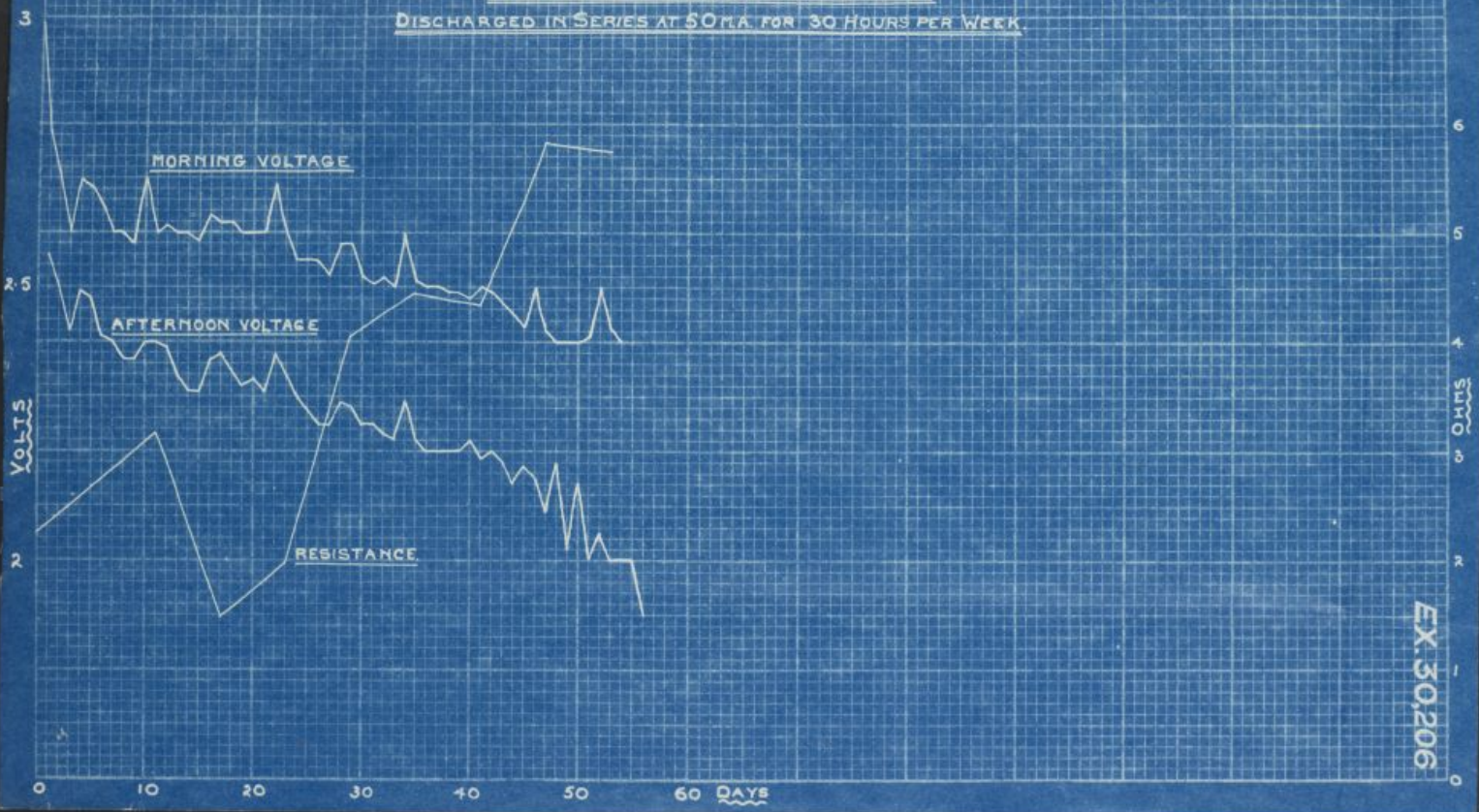


2 No 2A TYPE WET CELLS BY SIEMENS BROS.  
 DISCHARGED IN SERIES AT 20 MA FOR 30 HOURS  
 PER WEEK



EX. 30,205

2 No 2 TYPE WET CELLS BY SIEMENS BROS.  
DISCHARGED IN SERIES AT 50 MA FOR 30 HOURS PER WEEK.



EX. 30,206