

REPORT BY PROFESSOR T. PARNELL,
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Report on Tests of Bleeck-Radio Cells.

At the request of Mr. Bleeck I carried out tests to determine the useful life of Bleeck-Radio cells for continuous discharge.

In each test, the cell was discharged through a resistance which was varied, so as to keep the current practically constant, and, at intervals, readings were taken of the "terminal voltage" (i.e. the voltage available for actual use).

By opening the circuit for a few seconds readings were taken of the E.M.F. or open circuit voltage of the cell thus enabling the resistance of the cell to be determined.

Corrections were made for the small falling off of the current during the night periods.

The detailed results of the tests are shown in the attached graphs and the date of most practical importance given below.

CELL A. initial E.M.F. 2.58
"De polarizing fluid" about 80% of full strength.
Discharged at .5 amp.

TIME	TERMINAL VOLTAGE	RESISTANCE	AMPERE-HOURS
0 hours	2.47	.23 ohm	22.5
45 "	2.0	.48	31.5
63 "	1.5	.73	

CELL B. initial E.M.F. 2.66
Discharged at .5 amp.

TIME	TERMINAL VOLTS	RESISTANCE	AMPERE-HOURS
0 hours	2.52	.28	0
55 "	2.0	.64	27.5
65 "	1.76	.75	32.5

CELL C. initial E.M.F. 2.62 Volt
Discharged at 1 amp.

TIME	TERMINAL VOLTS	RESISTANCE	AMPERE-HOURS
0 hours	2.354	.27 ohm	0
10 "	2.0	"	10
21.5 "	1.5	.85 "	21.5

CELL D. initial E.M.F. 2.66 Volt
Discharged at 1 amp.

TIME	TERMINAL VOLTS	RESISTANCE	AMPERE-HOURS
0 hours	2.39	.27 ohm	0
9.5 "	2.0	.56 "	9.5
21 "	1.5	.94 "	21

CELL E. Old pattern cell with porous pot stamped
"Bleek-Love"
initial E.M.F. 2.56 Volt.
Discharged at 1 amp.

TIME	TERMINAL VOLTS	RESISTANCE	AMPERE-HOURS
0	2.33	.23	0
28.5	2.0	.3	28.5
41	1.5	.49	41

Throughout the above tests no current fluctuations were noticed.

CELL F. Initial E.M.F. 2.64 Volt.
Discharged at 2 amp.

TIME	TERMINAL VOLTS	RESISTANCE	AMPERE-HOURS
0 hours	2.25	.19	0
1 "	2.0	.54	2
2.4 "	1.47	1.13	4.8
4.8 "	.27		9.6

After standing for 24 hours the resistance had fallen to such an extent that the cell gave on short circuit a current of 5.8 amps which fell to 5.5 amp. in one minute.

This test proved, that, while the cell is capable of giving large currents for short periods, 2 amp. is too large a current for economical prolonged discharge. This conclusion was confirmed by a test in which two cells in series were connected to a lamp rated at 4 Volt 8 Watt. In $3\frac{1}{2}$ hours the terminal voltage had fallen from 4.5 volts to 3 volts, and the current from 2 amp to 1.6 amp.

The tests on cells C, D and E indicate that with two cells of the C, D type in series and a 4 Volt 4 Watt lamp or four cells in series-parallel and an 4 Volt 8 Watt lamp the lamp would be lit for more than 20 hours before the voltage dropped to 3 volts. With cells giving the same results as cell E the lamp would be lit for more than 40 hours.

CONCLUSIONS.

Present cell at .5 amp
" " 1.0
Old pattern at 1.0

Capacity in Ampere-hours to 2 Volt	to 1.5 Volt
27	35
10	21
28	41

The very marked difference between the cell with the old pattern "Bleack-Love" porous pot and those with the new, is due to the more rapid increase in resistance of cells fitted with the new pattern. This difference would be less marked for slower rates of discharge.

(Signed) T. Parnell,
March 14, 1927.

NOTE. In my report I have confined my remarks strictly to statements of fact, i.e. the experimental results obtained in the tests and immediate deductions. It is better, I think, not to mix "facts" and "opinions" in the one report.

Earlier reports by Sir Thomas Lyle and others indicate that the cell does not rapidly deteriorate on open circuit. As it recuperates to some extent after discharge I should, therefore, expect that for intermittent use over a period not exceeding three weeks the cell would give results as good as, if not better than, those obtained in my tests.

The steady current given by the cells combined with the very slow voltage drop for currents up to .5 amp suggests that a Bleack-Radio battery is eminently suitable for use with wireless sets.

With valves now on the market it is easy to design a 5 valve set whose total filament current consumption does not exceed .5 amps at 4 volts and, according to my tests, such a set could be run for 50 hours by a two cell battery before recharging.

I know of no other primary cell of comparable voltage which gives an equally steady discharge.

(Signed) T. Parnell,
March 14th, 1927.