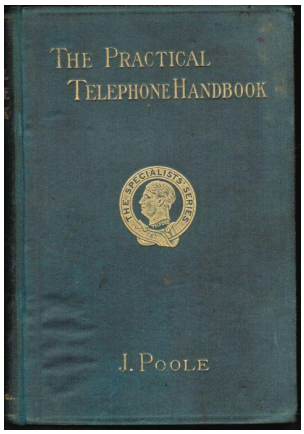
A Book Report – By Ian Jackson VK3BUF

Today I found myself at the Moorabbin Hamfest sale, where along with many others, I dug my way through various strata of pre-loved equipment. Before the pressing need for air forced me to the surface I was able to find a book on a topic of interest dear to me. So for five dollars I was the new owner of ***The Practical Telephone Handbook*** as written by **Joseph Poole**.



I figured that it was quite some time that I had put together a book report and that this 533 page tome would be worth a bit of a look. It is not what one would call a contemporary work as it was written in 1905, but fortunately it is the updated edition from the original 1895 release, so there is a wealth of new technology to be seen in this new 'third' edition, which originally sold for six shillings. A quick check with the *Historical Currency Conversions* website assures me that this amount has the same buying power as $42.16 USD in today's value, or fifty four dollars and five cents in Australian tender. So by this standard alone I consider my new purchase to be a bargain.

So, where to start? The book is a hardcover printed in London by Whittaker & Co, who published many technical documents in the day such as ***Crappers Electrical Measurements*** and ***How to Manage a Dynamo***, plus ***Hertzian Waves & Wireless Telegraphy***. All of which would make sterling reading, I am sure, but this document focuses on the then state-of-the-art of telephone equipment, an enormous topic in its own right.

The book makes a noble start in its introduction:

> *The remarkable development of the art and practise of telephony which has taken place during the last decade and more especially during the last five years has necessitated the complete re-writing and rearranging of the edition of this book published in 1895.*

Well it's true that technology does continue to change quickly….

> *It is not too much to say that within the period mentioned there has been a greater revolution that has taken place in any other technical business at the same time….*

In a bizarre twist exactly the same words could have been written a century later. Still, as with most civilisations at any given point in time, there is a feeling that there is nothing much more to be done as everything useful has now been invented.

> *….Whilst in the future there will no doubt be many improvements, those made will, it is believed, more likely in connection with smaller details than with general principles, unless some very great advance in automatic exchange working should lead to its adoption, which, however, is not considered likely by the writer.*

It appears that at this stage the author had not considered the advantages of building cameras into telephones, or last number redial...

Moving into the technical sphere, there is an enlightening description of how there are two types of electricity depending on whether one is rubbed with silk or flannel but the latter type may often escape if the rubber is not very careful. This is not so much an ill-informed description of electricity, but a dumbed-down introduction to those who wonder why it is so difficult to see this stuff with the naked eye.

There is a lot of solid data in early chapters on resistance of various metals and significant description of capacitive and inductive reactance with formulas. It then covers much on magnetism, electromagnetism and how currents flowing through wires generate these fields. Battery technology descriptions seems to be a who's-who of researchers with Hellese, Obach, Gasner, Leclanché and Danniel Cells all getting rated on their efficiency and usefulness in the field.

The question of "Who invented the Telephone" is one often posed by people with too much time on their hands. Many will instantly declare 'Don Ameche' , but he was just the guy playing Alexander Graham Bell in the 1939 movie when he sent "*Come here Watson*" to a young Henry Fonda. This book does give credit to Philip Reis, a German fellow who in 1861 made a crude device for sending audio over wires and successfully sent: *"Das Pferd frisst keinen Gurkensalat" (the horse doesn't eat cucumber salad)*" which sounds more like a press release than an audio test. But the book makes no reference to Antonio Mecucci of whom it is now regarded as doing serious phone pioneering work in front of Alexander Graeme Bell.

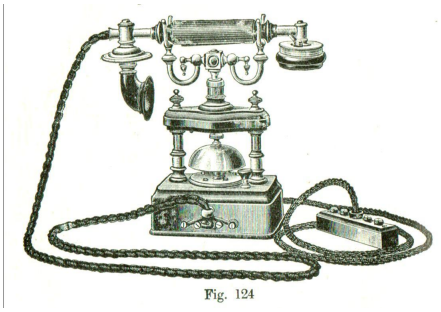


Fig. 124

Are you the person in charge of All your power bills???

Bell got some solid patents lodged first and usually takes credit for the invention. He was a seriously clever man and it helped that his father-in-law *Gardiner Hubbard* (that name again) was a lawyer and the foundation member of the National Geographic society. The book tells us it was Mr Hubbard who worked out that *Telephonic Exchanges* would be necessary and proceeds to describe how this guy figured out how to charge for phone calls. (If I had a time machine, it would be nice to go back and egg his house.)

Later on Bell did invent a type of metal detector, but it wasn't very good, as it couldn't find the assassins bullet wedged in the then president James Garfield, who promptly died from his spontaneous incursion of lead. (not in the book) Bell was renowned as being a great teacher who went on to marry one of his younger female students. (Hmmm) When he died in 1922 all the phones in the USA were briefly turned off in honour of the man and they haven't stopped ringing since.

The book has many diagrams and pictures of early telephone microphones and speakers (transmitters and receivers) and spends a lot of time on the attributes of each type. Lots of phone components were then built by the Kellogg Co. (does that name ring a bell?) It seems that this company had little to do with the breakfast cereal manufacturer of the same name.

There are whole chapters on switchboards, manual phone exchanges and party line operations. It seems that telephony services were just beginning to take off as major employers of men and women, but this was taking place alongside an impressive level of automation development.


Fig. 74

Resistance is futile, you will be assimilated!

Although the book is largely a technical document, there are interesting debates buried within the text.

> *It has now become in many cases a serious question for discussion as to which is the better system to adopt – the so-called "manual" switching by human operators or the automatic" system.*
> *Although the automatic system has had and still has many great difficulties to overcome, it has in America made such astonishing strides that it is likely to play a great part in the telephony of the future.*

The penetration of this new technology more than a century ago was larger and deeper than I had previously been aware of.

> *At the time of writing some 23 towns are working with automatic exchanges. The largest is Chicago which is already operating upwards of 5000 lines and is arranged for a capacity of 100,000 lines.*

Perhaps Bart Simpson thought he had invented the prank call at Moe's Tavern (*I'm looking for Amanda Hugankiss*) but this book succinctly highlights the issue from a long, long time ago.

> *What is in practise has been found to constitute a very serious defect with the automatic system is that owing to its secrecy (which is in itself one of the greatest advantages), it is especially open to silly tricks of the practical joker, who can operate by calling up any subscriber and give fictitious orders, or use bad language, but with little risk of being discovered. This has become so serious trouble in some towns of the United States that special laws have been proposed to frighten the jokers.*

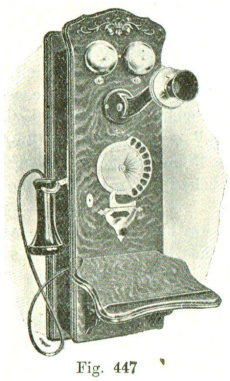


Fig. 447

Rotary Dial phone

The book introduces the concept of the rotary phone dial and elaborates in great detail on the dial impulse process. *A pivoted dial is provided with a set of finger holes numbered upward from 1 to 10 or 0.* Then it proceeds to describe freshly implemented systems for automated exchanges called Strowger systems, where mechanical banks and wipers create automatic subscriber links.

Many more chapters detail procedures to install underground and overhead phone wires in city and rural areas. Pictures and diagrams show how to manually stand up tall poles with ropes and pulleys.

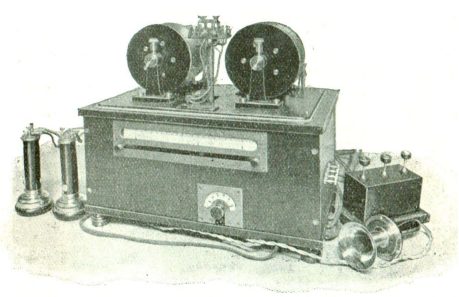
The final chapter titled *Miscellaneous Applications XXXI* is an extraordinary one that describes some of the potential of this new technology. It describes how networks may be used for fire and security alarms. Trials had been performed on dual phone lines to give the listener true stereo sound for transmitted music at remote concert halls. There were also some rather ominous toys for the police to play with:

> *Another special use is that of checking the speed and the intercepting of offending motorists. For this purpose lines are run along main roads in country districts and at various points provision is made for telephone sets so that two or more policemen may keep in touch with one another along any one line, or connected lines at certain measured distances apart along the road. By means of carefully timed*

and compared stopwatches the speeds of the motors between the points can easily be observed and the guilty ones brought to book.

Many military applications of telephones are described, with references to the Boer War in South Africa and the Japanese using their phones when fighting the Russians.

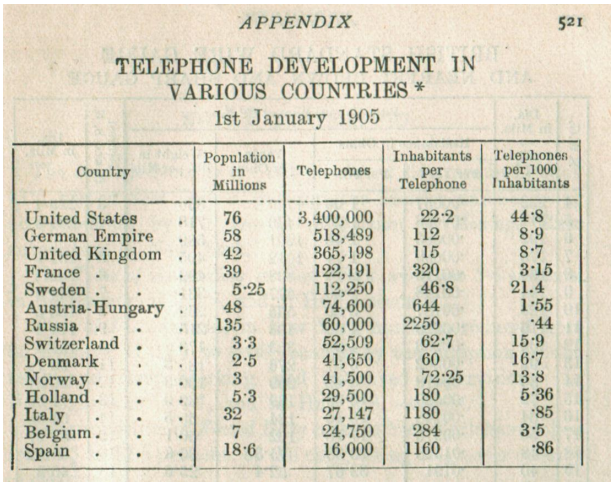
The invention of the *Telegraphone* rates a special mention. Phone conversations can be stored with wire recorders. A bobbin with 3 and a quarter miles of fine wire can record a full 30 minute conversation.



The Telegraphone

This hardware may be used in conjunction with the *Teleautograph*, which it says can use phone lines for sending SMS like messages to unattended phone points.

The author even describes *Simultaneous Telephony and Telegraphy* which is essentially voice-over-data networks by keying the line polarity of working voice lines with CW impulses.



APPENDIX 521

TELEPHONE DEVELOPMENT IN VARIOUS COUNTRIES *

1st January 1905

Country	Population in Millions	Telephones	Inhabitants per Telephone	Telephones per 1000 Inhabitants
United States	76	3,400,000	22·2	44·8
German Empire	58	518,489	112	8·9
United Kingdom	42	365,198	115	8·7
France	39	122,191	320	3·15
Sweden	5·25	112,250	46·8	21.4
Austria-Hungary	48	74,600	644	1·55
Russia	135	60,000	2250	·44
Switzerland	3·3	52,509	62·7	15·9
Denmark	2·5	41,650	60	16·7
Norway	3	41,500	72·25	13·8
Holland	5·3	29,500	180	5·36
Italy	32	27,147	1180	·85
Belgium	7	24,750	284	3·5
Spain	18·6	16,000	1160	·86

The book then finishes with numerous references, charts and call density statistics. There is an interesting chart reprinted here describing populations and telephone penetration in 1905.
It too is worth a bit of a look.

So what can we learn from such a document 110 years later? Certainly concepts, problems and technology that we thought was relatively new were already established back then. The world in 1905 didn't yet know of the ravages of global war, just nasty local ones here and there. A rich climate of innovation was in progress with a lot of people thinking very hard about technology and problem solving. This tells us much about humans in general today. I see a wide perception that all useful technology we now covet was developed in the past ten years and everything technical *before* that time is useless and irrelevant, which is of course a lie. The building blocks of what we now use were all shaped a long time ago. Our natural curiosity for how we got to here has wanned considerably and basics are forgotten.

Between the diagrams and technical details of the book there is another message in the use of the language itself. It is a chatty and well written prose that rivals much of contemporary documentation for its clarity. Today it is not a book to be read cover-to-cover for its expert content, but rather it is a benchmark of its time so that our rate of progress to *now* may be examined and perhaps to extrapolate our potential for advancement in the future.
