

# The Early Central Battery Manual Telephone Exchange at Adelaide GPO

by Lloyd Butler VK5BR

Commencing in the early 1900's, the Central Battery Manual Exchange at the Adelaide GPO, connected to CBD subscribers. It had basic circuitry and there were no electron tubes, solid state amplifiers, or automatic switching networks. The exchange operated with plugs and sockets, relays, and indeed humans who did the line switching. The article looks at a part of the telephone communication technology as seen in South Australia in the 1940's.

## Introduction

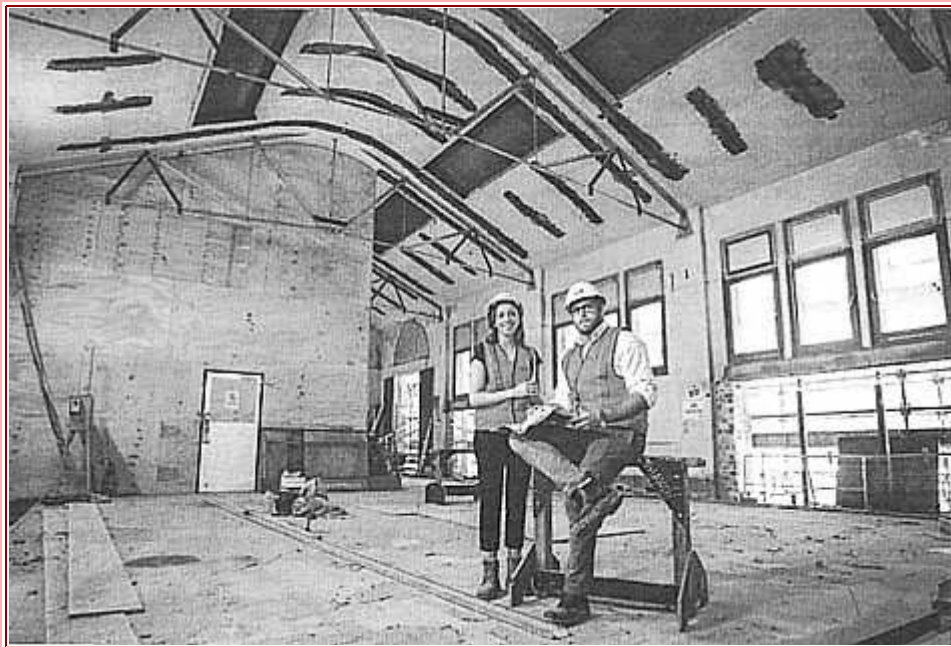
In September 1942, I joined the Transmission Section of the PMG. It was then located in the Commonwealth Offices building in Post Office Place, and part of the Adelaide Post Office (GPO) square, corner of King William Street and Franklin Street. With a previous background in radio servicing and AM broadcasting, I was about to be introduced to what was to me, the new world of telecommunications.

Our Transmission Laboratory was just around the corner from the Manual Telephone Exchange which serviced the CBD area of Adelaide. If you look at the photo of the Victoria Square end of Franklin Street, the building on the right is the Adelaide GPO. The building next to the GPO is the Manual Telephone Exchange which centres the discussion leading this article. Going down Franklin Street a little further is the right turn into Post Office Place.



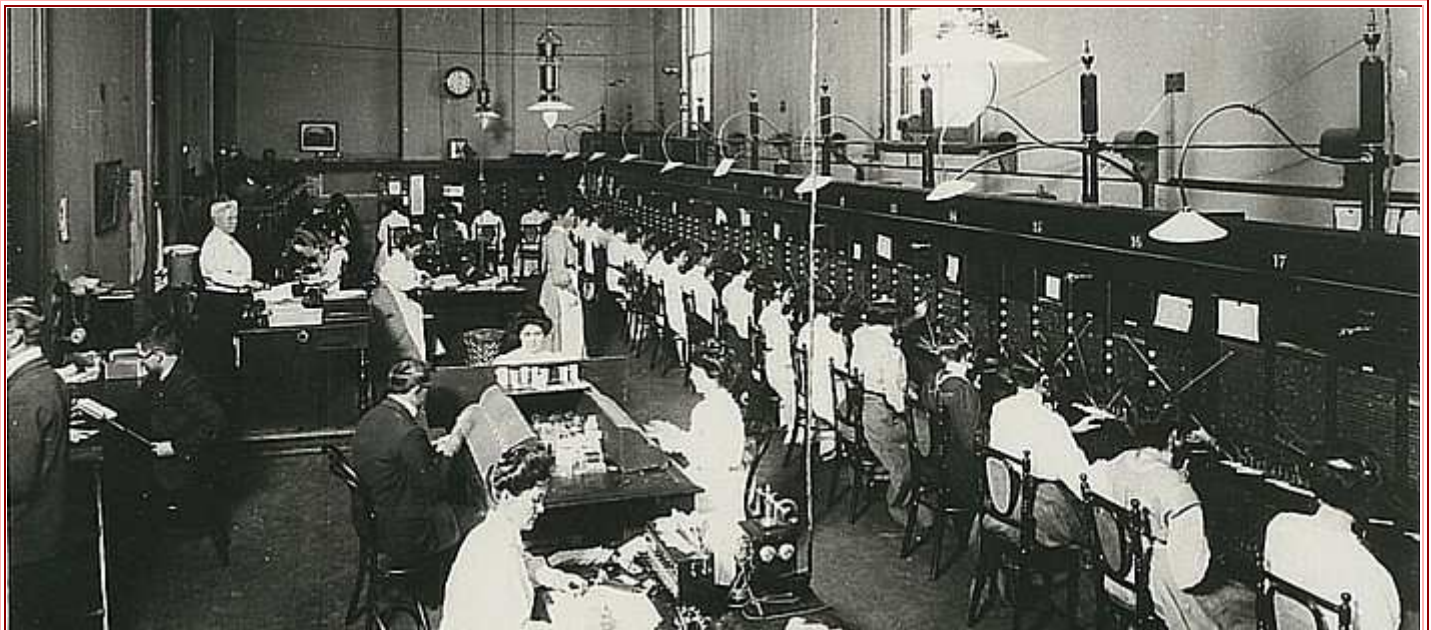
**GPO buildings in Franklin Street**  
The General Post Office is on the right with the Adelaide Manual Exchange building next left down the street

The Transmission Laboratory was in one floor of the Commonwealth Offices. The National AM Broadcast Station 5AN was also in that building and it had its vertical steel tower on top of the building. But for now, my attention was drawn to the old Telephone Exchange by an article in the February 19, 2019 issue of the Advertiser. This discussed how the building, still intact with its long exchange hall, was being rejuvenated for some future project.



**The old Telephone Exchange hall is now under rejuvenation**

Not long after I started with the PMG, I was shown into that exchange. What a site! A long row of manual telephone switchboards with ever so many operators, all ladies. Judging from the ladies attire in the photograph I have included, I imagine it was taken quite a few years earlier than my 1942. According to some research information I found, thousands of ladies were hired and worked in that Central Telephone Exchange from when it first opened in 1908 until it finally closed in 1955.



**An early photograph of the Adelaide central CBD Telephone Exchange in operation**

According to legend, men were initially hired as switchboard operators, but the ladies were found to be more comfortable in the job. Roughly counting the number of ladies working in the photograph, the number appears to be close to 30. And there are in fact, several men shown.

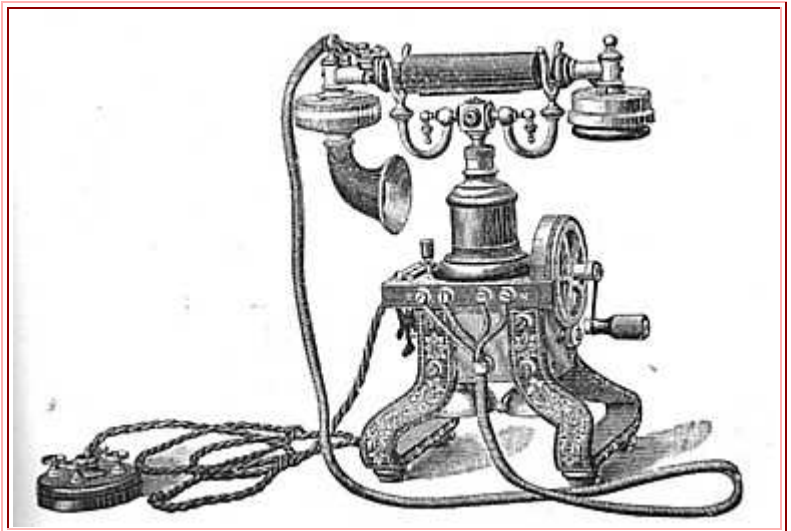
### **The different Telephone Systems**



In South Australia at that time, there were three different systems of distribution to subscribers. They differed in the method of calling and how the call was switched to the called party.

In the country, the telephones in general use were magneto types. With these, the calling operator turned a handle connected to the magneto, a generator which supplied quite high voltage alternating current at a frequency of around 17 hertz. This ringing signal was sent down the telephone line to be detected at the switching location. At the switchboard, a telephone operator manually connected the line requested and sent a similar ringing signal down that line to the called party.

When operating, the magneto telephone also needed a current flow through its transmitter (a carbon microphone). Operation of a magneto telephone is such that whenever the receiver (headpiece), or handset, is taken off its hook, the transmitter current is energised from a battery. The battery supply has commonly been provided by two local 1.5 volt dry cells, series connected,



**An Early Magneto Telephone Handset manufactured by Ericsson Co. of Stockholm**

In the Adelaide suburban area, automatic exchanges were centered in various areas with large lead acid storage batteries floated across mains operated chargers. Banks of these batteries provided a DC supply to every subscriber line looped for a call. The circuit provided current to operate the telephone transmitter as well as current which is pulsed by the dial (or other switch control) to generate the calling number code. In turn, this energises the electro-mechanical step by step switching of the multitude of uni-selectors and bi-motional switches. Truly a marvel of the technology of that era.

A finger position in the dial of the telephone determines the number of pulses sent for each digit or primary numeral in the composite telephone number. Primary numerals are sent in sequence by selecting the relevant finger positions and which in turn cause the relevant exchange switching.

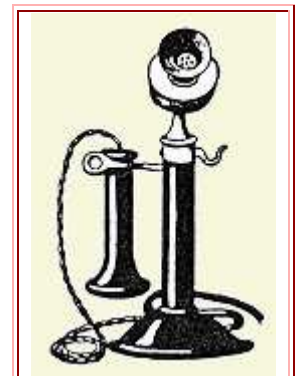
### **The Central Battery Signaling System**

The Central Business District of Adelaide (CBD), with its manual exchange at the GPO, had a third system of telephone technology called the Central Battery Signaling or CBS operation, no doubt another stage in the continual change in telephone technology.

But my allocation of the three telephone systems I have described to each of three specific areas must be taken as nominal. If one reads the book on Telephone Switching Technology in Australia by D. H. Freeman (Ref. 1), it is clear that selected parts of these areas were converted from manual to automatic switching in selected times over the period up to 1980. And even over those times, the electro-magnetic step by step switching changed a quite lot to crossbar switching and years later to computerised systems. However at this stage, my intention is to concentrate back onto the CBS circuitry - with the Adelaide CBD Exchange.

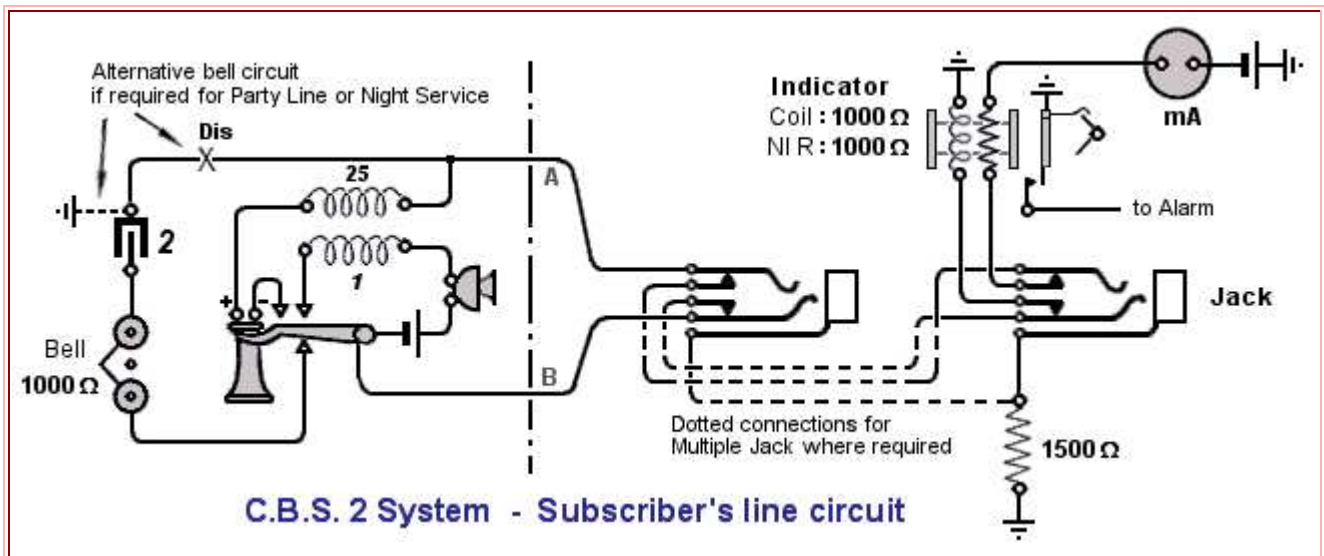
For calling the manual exchange, the CBS system had neither a magneto handle to wind nor a telephone dial to spin. When the telephone was idle, no current flowed in the line to the exchange. To call the switchboard operator the telephone receiver (or earpiece) was simply lifted and this looped the line so that a current flowed which actuated an indicator on the switchboard. Lifting of the receiver also directed current through the carbon granules of the transmitter (or microphone) which remained on whilst the receiver was off its hook.

Of course the power system for the Manual CBS system is much the same as the Automatic Telephone System except that line current is not digitally encoded for number dialing.

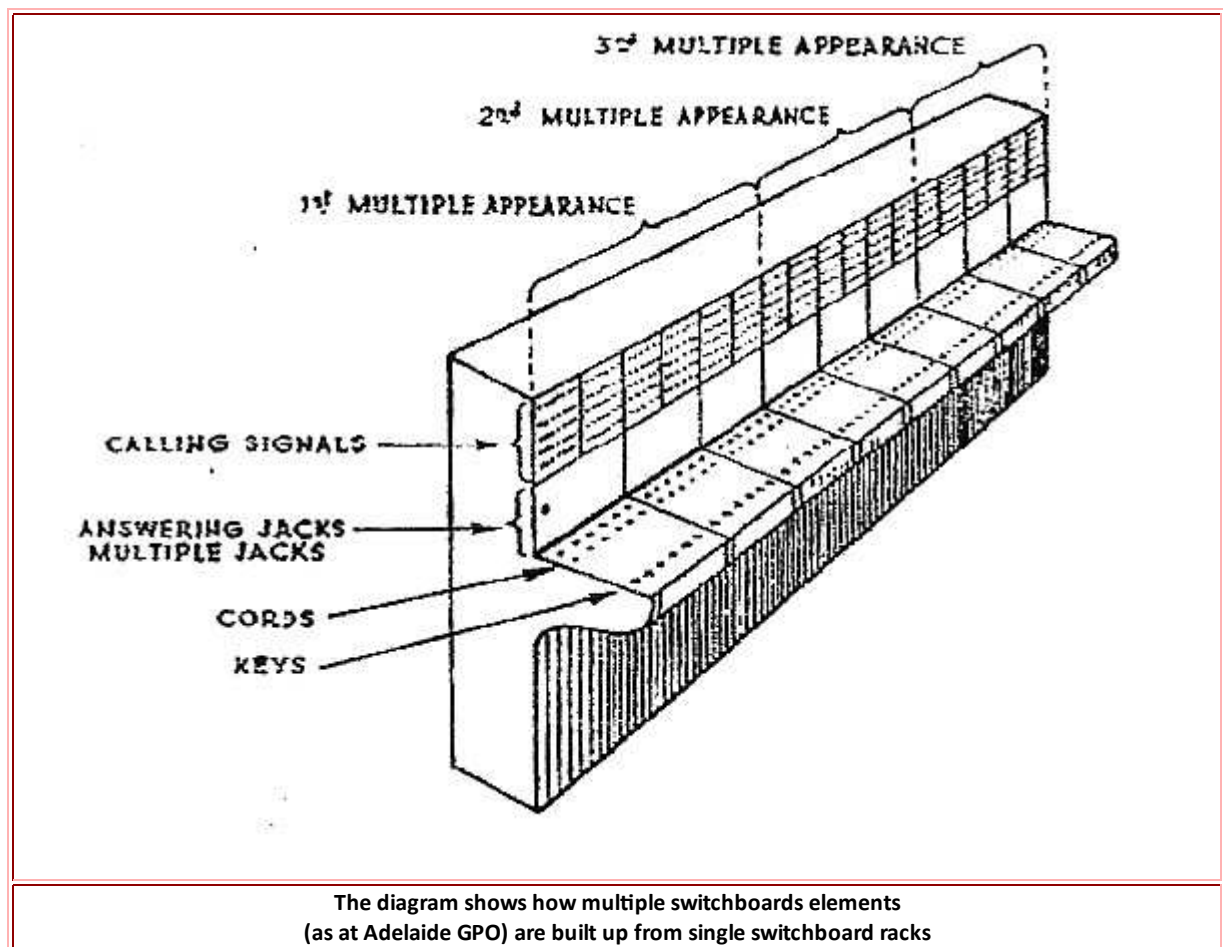


**A typical subscriber's handset (Neither magneto handle nor call dial)**

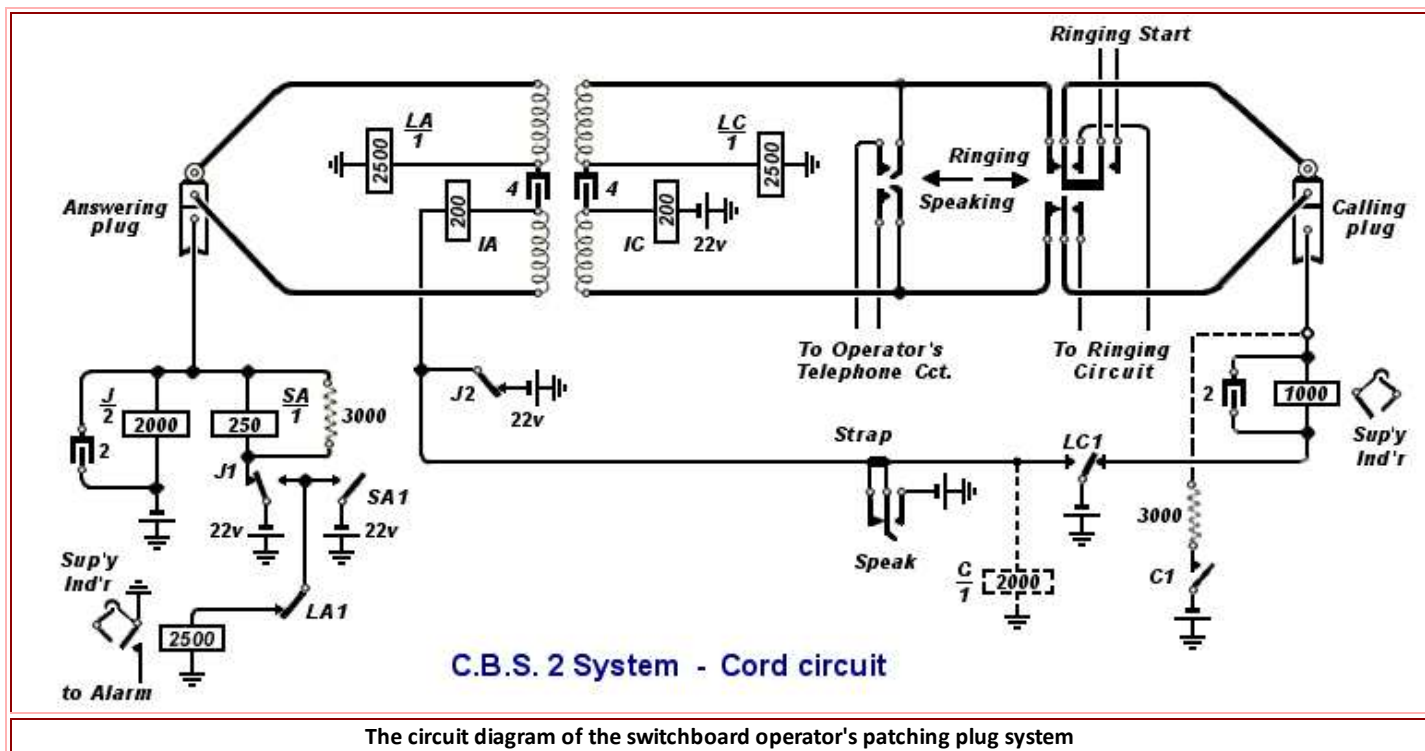
Sometimes the right diagrams are better than words and I decided that the following simple diagrams well described the operation of the Central Battery Signaling system and the operation of the exchange. The individual circuit diagrams multiplied by the number of telephone subscribers connected defined the complexity of the system. That would also have led to the number of switchboard operators which would have been needed.



The elements of the subscribers telephone and its line connection into the switchboard jacks



The following circuit diagram shows the cord patching circuit for a single telephone operators station, probably one cord assembly per single switchboard rack, and controlled by one operator. The plugs connect the circuit from the calling party line jack to the called party line jack.



## Summary

World Wide Telephone communications has certainly changed since the early years of the nineteenth century. In our city, the CBD was connected via the central battery calling system and manually switched by telephone operators at the exchange. I have described this particular system in detail. In the very early years in the suburbs, the system changed to automatic calling and switching controlled by a dial on each telephone instrument. In the country, calling was achieved by a manually rotated magneto on each telephone instrument and again switching was by exchange telephone operators.

Today, telephone connection to premises is still essentially distributed via underground cables but much copper cable has been replaced with fibre optic cable. However, the earlier trunk line system of overhead wire transmission lines is now replaced by a complex system of fibre optic cables, microwave links, satellite circuit bearers and other miscellaneous transmission bearers. But all in all, much of the telephone communication via hard wired telephones on premises, is being replaced by mobile telephones and wireless connection to the mobile telephone network.

But I have to think that the old Central Battery Switching system, as used in the early CBD of Adelaide, is the simplest for the subscriber. All one had to do was to lift the earpiece or handset off the hook and you were connected to the operator. Tell the operator the telephone number and you would get connected. Today, we need to punch in up to 10 digits, Whilst that is not too much of a task, we are more often faced with more menus and delays.

But considering today's multitude of telephone connections and if the old manual system were used, would it not need an army of telephone operators? An answer to that is given in one quotation from the Poole Handbook (Ref. 5):

Gerard St. Exchange, London 1907  
 9520 Subscribers Lines  
 1269 Incoming Junction Lines  
 1520 Outgoing Junction Lines  
 103 Subscriber Operators positions  
 47 Junction Operators positions.

## References

- (1) History of Telephone Switching Technology in Australia 1880 to 1980 by D.H.Freeman
- (2) SA History Hub by Peter Strawhan <http://sahistoryhub.com.au/subjects/telephone>
- (3) Central Battery Signalling (C.B.S.) telephone system No.2 by John Hearfield <http://www.johnhearfield.com/Telephone/CBS2.htm>
- (4) Rejuvenation of old Telephone Exchange - Advertiser 19-2-19
- (5) The Practical Telephone Handbook 1912 - J. Poole