Donald Murray – Printing Telegraphy Pioneer

This is written in four sections. The first is an overview that should describe Murray and his accomplishments to the general reader and stand by itself. The second has more detail on the Murray family in New Zealand and its impact on Donald. The third has more details on Murray's technical achievements. The fourth describes his "The Philosophy of Power".

There is also, for interest, an account of his wife's family, the Cosgraves.

The approach taken is to include everything that might be interesting, blog style. If anything is eventually published it will likely be cut down. The "asides" will eventually become parenthetical remarks or footnotes.

Any comments, corrections, suggestions gratefully received.

Bob Doran

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Overview

Donald Murray M.A., M.I.E.E., was the first New Zealander (Aside: indeed Australasian?) to achieve a distinguished international career in Information Technology. He was one of the most significant contributors to the development of high-speed machine telegraphy, which, from the 1920s to 1970s was the main technique for communicating textual messages, particularly for international business.

Born in 1865, he was raised on a pioneering farm at Kaukapakapa near Auckland and briefly studied agriculture at Lincoln University College. However, he then changed career to become a journalist - a parliamentary reporter – firstly with the Auckland Herald newspaper, then with the Sydney Morning Herald. While working as a journalist he continued his education, gaining a B.A. at Auckland University College and an M.A. in Philosophy from the University of Sydney. Seeing the widespread use of the telegraph in journalism, he became interested in extending telegraphy to use standard typewriter keyboards. Moving to London, he worked on solving this problem, founding his own company and eventually perfecting the "Murray multiplex" telegraphy system that was used internationally, including in New Zealand and Australia. Retiring to Monte Carlo, he passed his remaining years writing on Philosophy, work not completed by the time of his death in Switzerland in 1945.

Donald Murray – His Life and Philosophy

Very few of those who sit down at their computer keyboards would be aware that they are about to invoke an invention introduced by New Zealander Donald Murray who gained a BA at Auckland University College in 1890. Murray is regarded as the "father" of the use of standard keyboards in high-speed telegraphy and, particularly, the "carriage return" character.

To explain - manual typewriters had a direct mechanical connection between any key that was pressed and the type that printed the character on the paper. In modern keyboards the direct connection is broken – instead, pressing the key generates a specific electrical code that is sent to the computer, which receives the code and decides what to do with it – usually displaying the character on its screen. On a manual typewriter, the act of returning the paper carriage to the right so that typing would restart at the left margin, and moving the paper to print a new line, was performed by an entirely different mechanism – a lever was pushed with the left hand and the carriage moved across manually. Murray is credited, in high-speed telegraphy, with representing the carriage return by a special character code generated by pressing a "return" key, that when received by the computer usually causes subsequent typing to be displayed on a new line. Over the years, in a clear line of influence, Murray's original carriage return character gradually evolved into that which is used currently.

(Aside: See section 3 for more detail on this claim.)

Those not familiar with the manual typewriter and the different noises made by typing and carriage return might like to listen to the concerto "The Typewriter" by Leroy Anderson, e.g. at

https://www.youtube.com/watch?v=g2LJ1i7222c. Note that the bell was not caused by the carriage return but would ring to warn of the end of line approaching so that the typist could prepare for the carriage return, maybe hyphenating the last word on the line. (Aside: In the video, perhaps the bell came from the orchestra's percussion section?)

Given that the carriage return character is used billions or trillions of times each day it has become quite a significant invention. This gives us cause to wonder more about Donald Murray, how come a Victorian Aucklander could have such influence; what else did he do? As we will see, Donald Murray was a very interesting "character" himself, with a very unusual career. He deserves to be much better known and more-widely recognized for his achievements.
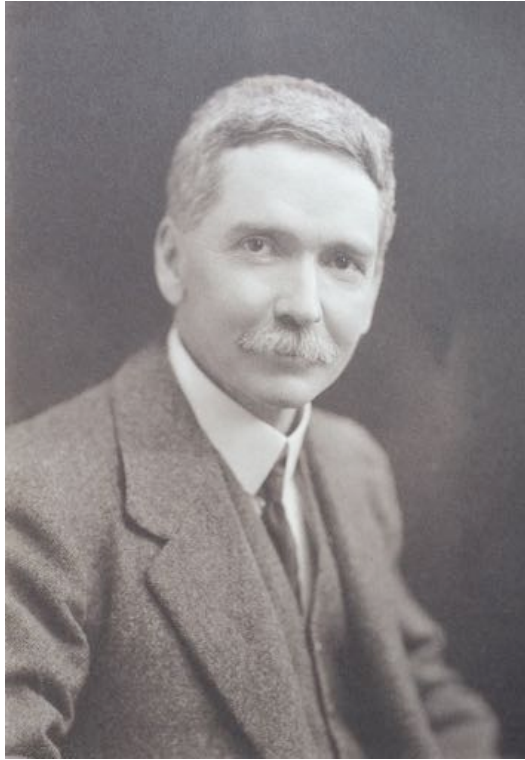
Donald Murray

1. Overview of Murray's life, career and accomplishments

After a long period of obscurity, the name and achievements of Donald Murray have started to become better known in recent years. Historians of Information Technology have always recognized that Murray was important because of what was called the *Murray-Baudot* code. That Murray was from New Zealand was common knowledge, but that was all. There is a lot written about Murray out on the web but it is riddled with errors such as "the *British* inventor Donald Murray" and *"*Donald Murray, a New Zealand *sheep farmer* …".

In popular literature there has been a reasonable account of Murray in the recent book "No. 8 Rewired". But the most thorough treatment of Murray so far is a 2012 article, in the Australian Typewriter Museum blog, entitled "New Zealand's Donald Murray: The Father of the Remote Typewriter". This was written by Robert Messenger, an expatriate New Zealander. Messenger uncovered much new information, including that Murray was a graduate of Auckland University. What justifies this extended treatment is that a great deal of new material has recently become available and that certain aspects of Murray's career have never been well explored.

1.1 Early life and education 1865-1885

Donald Murray was born in Invercargill, New Zealand, one of the southernmost towns in the world, on September 20, 1865. He was the son of John Murray and his wife Frances, née Stewart, who had migrated to New Zealand from Glasgow in Scotland in 1863. Donald's father was a banker, being manager of a branch of the Commercial Bank of Scotland in Glasgow before he emigrated, aged 26. Donald was born when his father spent a short period as the manager of the Invercargill branch of the Bank of Otago.


Baby Donald Murray with his parents in Invercargill, 1865

In early 1866 John Murray moved to the Bank of New Zealand in Auckland where he worked until retiring in 1895. (Aside: It's a bit more complicated than that, see section 2.) He had previously purchased undeveloped land at Kaukapakapa, north west of Auckland, which he intended to make into a grand farming estate that he called "Hafton". Because his initial job in Auckland was as a travelling inspector of bank branches and he was often far away on business, he installed his family on their farm – Donald was less that one year old.

The family remained on the farm until 1875 when John Murray became Auckland BNZ bank manager and his family were moved back into Auckland city. Donald's first 9 years were thus spent living in isolation, though not completely alone, being joined by two sisters and a brother. He had no formal education, though he no doubt received instruction from his mother who was well educated. (Aside: Kaukapakapa school was started in 1873, Donald could possibly have attended for two years though it was a long journey from the farm to the school.)

Now in Auckland, Donald attended the secondary school, Auckland Grammar, from 1875, aged 9! In the 1875 "Honor List" for the school, he was in the 6th (most senior) class and came 3rd in Geography. In 1876 he had dropped back to the 5th class but came 2nd overall. In 1877 he had dropped again to the 4th class but must have found his level, gaining 1st equal in the class. There is no record of him for 1878 and 1879 when the school was in accommodation turmoil, but he appears again in 1880. It is a bit puzzling, but it seems that he entered the Grammar School regarded as a prodigy but it did not turn out to be easy for him, initially.   He later dismissed all this with: *suffered the usual idiocies of better-class English education in Auckland.* (POP, p. 315)

Donald must have completed his University entrance qualification in 1880. In 1881 he had a "break year" and went with his mother on a trip to Norfolk Island, Fiji, Samoa, and New Caledonia on the missionary schooner "Southern Cross" (Alexander Murray letter.) Advanced university study was not a local option because Auckland University College was not founded until 1883. (Aside: Courses of the University of New Zealand were taught prior to 1883 in evening classes at AGS, and degrees were awarded, but there was not a full programme of study.) Donald instead went to Christchurch for 1882 (aged 16). Having been raised on a farm, he was interested in agriculture so studied at The School of Agriculture of Canterbury College at Lincoln near Christchurch. He was very successful, being awarded four "first in class" certificates, for Agriculture, Chemistry & Physics, Natural Science and Veterinary Science for 1882. But it seems that farming was not for him as he moved-on after one year of study (Aside: He was enrolled for 1882 and the first two terms of 1883).
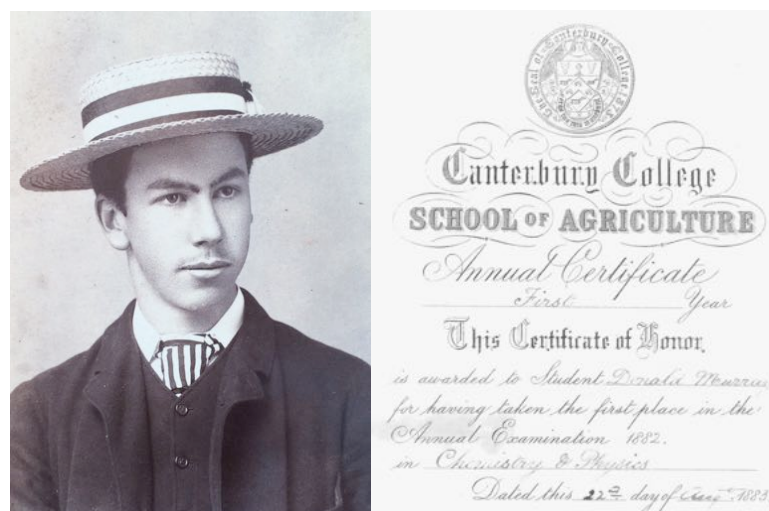
Donald, student in Christchurch, aged 16

(Aside: In his autobiographical outline in "The Philosophy of Power," Murray remembers different dates and a different sequence of events. The sequence here is based on dated correspondence and official records.)

In 1883 Murray headed overseas with his mother and sisters. They were in London at the end of 1883 and must have visited his parent's relations in Scotland with whom they had always kept in close contact. Donald wrote, from London, to his Uncle Robert at the Glasgow Commercial Bank in Rutherglen on September 3rd 1883.

> *Mother posted me your letter about electric engineering.*
>
> *I have quite made up my mind to be an electric engineer so that any information you can get will be valuable to me. I have been busy seeing "factories" about Halifax & Bradford & have enjoyed myself very much. I stayed some days with a Major Holroyde near Halifax who is interested in electric engineering & has fitted his house with electric light.*
>
> *He promised to help me in any way in his power & he also advised me (as you did) not to get into too big a firm. I intend seeing Robert Turnbull who will be able to give me some information. I am up here to see the Wool sales. Mother talks of going to Germany to choose a house, in which case I meet her in London. Other wise I go to Dunoon in a few days. I'll pay you a visit on my way and have a "yarn" about the electric business.*
>
> *Your Affectionate Nephew*
>
> *D Murray*

Mrs Murray went ahead with her plan to extend her families' education by passing the year 1884 with them in Dresden. Here the family learned German and Donald continued his self-tuition in matters pertinent to an electrical career. He recalls:

> *Some unearthly power forced me as a youth to plough successfully, alone and unaided, through two volumes of the calculus in German (Stegemann's* Differenzial und Integral Rechnung*) (PoP p.101)*

He wrote to his uncle again from Dresden in December 1884:

> *I have had a letter from Father in reply to mine about Electric Engineering. He says I am quite at liberty to choose my own profession but that he thinks Electric Engineering a fad on my part, & a "flashy"*

thing which will attract hundreds of young fellows & thus be overdone. This is very true, and I suppose that it is a fad on my part, but I don't see that it is any worse for that. Father further says that at present he certainly will not assist me with more than £250 & that I must earn my own living as most other people have had to do. This is very fair and I can't growl at it, so the upshot is that I must begin my luminous career with a capital of £250 or not at all.

He goes on to question his uncle about placement in some Glasgow electrical firm, at this stage firmly convinced that his future lay in the field of Electricity, very much the leading-edge technology of its day.

1.2 The career reporter 1886-1898

However, perhaps with some parental pressure, he decided instead to embark on a career in journalism. By February 1886 he was back in Auckland and had joined the *New Zealand Herald* newspaper as a cub reporter (aged 20) He wrote to his uncle Robert in Scotland:

> *I post you a copy of the "Herald" with my first bit of reporting. I am not a full-blown reporter yet, however, & am still in the jobbing-room sticking type together.*
>
> *I enclose my photograph. I think it is very good, only I did not know before that I was such a solemn-looking individual. I see by the papers that you have been having very cold weather lately, snow etc. I wish we had some of it here as it is very hot & damp. I am very much disappointed with the Auckland climate, it is very relaxing. Auckland is a very slow place, but it seems to be a good place for "money-grubbing" in so I must rest & be thankful I suppose.*

Donald Murray in Auckland

He seems to have done very well in his new career - he was soon promoted and became the Herald's parliamentary reporter for 1889 and 1890. This would have required him to travel, by ship, to/from Wellington to reside there while parliament was in session (Aside: 1889, 20th June – 16th September; 1890, 19th June – 17th September, thanks to the New Zealand Parliamentary library for these dates.) He seems to have made a reputation for himself, being referred to jocularly as *the demon reporter* and *the demon interviewer* in the Auckland newspaper "The Observer'. Also: *He made*

*himself generally liked at Wellington, where his ubiquitous note-book was well
known to members.*

While in Wellington he wrote long reports of parliament's activities, which
were transmitted back to Auckland by telegraph. It is thought that his
interest in improving telegraphy was based on this early experience. Later
reminiscences in New Zealand newspapers refer to this time and give a good
impression of his character and energy:

> *Rufus-headed Donald was a reporter on the staff of the Auckland Herald,
> brimful of energy, vitality and ambition, and restless for fresh fields to
> conquer.*

> *Donald Murray was an energetic youngster fresh from college, acting as
> general reporter for the* Auckland Herald*, and writing up special
> articles on all kinds of subjects. Being a bit of a scientist, he was an
> invaluable servant to the Hortons and Wilsons.*

> *Fifteen years ago, Donald Murray was an ordinary newspaper reporter,
> and came down regularly to Wellington in session time to report the
> doings of Parliament for the Auckland "Herald". The only things
> noticeable about him were that he wore a large size in hats, and that
> when he took his hat off the hue of his head warmed up the gallery so
> much that the other boys didn't feel the cold.*

> *He was of an inquiring turn of mind, and with a liking for mechanics.
> May good luck attend him. His zeal and pertinacity deserve it.*

However, he was not satisfied with this career alone. He enrolled at the new
Auckland University College for 1887-1889, working on a BA in Science
while still a full time reporter. This could have been particularly difficult for
him in 1889 when he was the parliamentary reporter at the same time as
preparing for his final examinations. But he passed, his degree being
awarded in 1890, one of only five Auckland BA graduands that year. We do
not know the entire contents of his course of study because his course in his
1889 final year was not recorded, but it does seem that his later claim of a
*first class Scientific education* (POP p. 315) is justified.

(Aside: In 1887 he took Maths II, Applied Maths II and Chemistry I. In 1888,
Latin I, Maths II again, Chemistry II and Practical Chemistry. Entry to Maths
II in 1887, without Maths I, shows his confidence but must have been
difficult for him as he had to repeat it. He received credit for his Lincoln
passes - Lincoln and Auckland colleges were both part of the University of

New Zealand. He could have taken Maths III and/or Applied Maths III in his final year or perhaps Chemistry III though it would have been a difficult major for him, being a laboratory subject. He would have needed only one unit at stage III to complete his degree, so his 1889, while also a journalist in Wellington for three months, might not have been as demanding as it first appears.)

Donald travelled to Australia in 1890. It seems that he was exploring employment options. In March 1891 he announced that he was leaving the New Zealand Herald and had taken a similar position in the Sydney Morning Herald. He departed Auckland for Sydney on the *Manapouri* on 31st March. The 1st April NZ Herald said *he ... carries with him the best wishes for his future success of his press comrades in this city.* He never returned to live in New Zealand though he remained a committed Kiwi.

Being a parliamentary reporter in Sydney had the advantage over Auckland that the parliament was in the same town. This must have made life too easy – Donald immediately enrolled for an MA degree at the University of Sydney. Rather than staying with Science he studied Philosophy. His degree was awarded in April 1892 – the work must have been mainly done in 1891, with the examinations in March 1892. It is at this stage that Donald was exposed to philosophical ideas that he would take up later in life.

(Aside: It is hard to tell what he studied. There were many different Philosophy MA topics offered but what was taught varied from year to year. The 1893 University Calendar, which should include the 1892 March exam papers for the 1891 year, has "Political Economy", what we would now call Economics, as the only topic, but dealt with in depth. However, the MA was a graduate degree and there was a comprehensive undergraduate Philosophy programme that local students would have been expected to have followed. Perhaps he taught himself? He certainly had read widely in Philosophy – *for my degree I took logic, among other subjects*. (PBT p. 29))
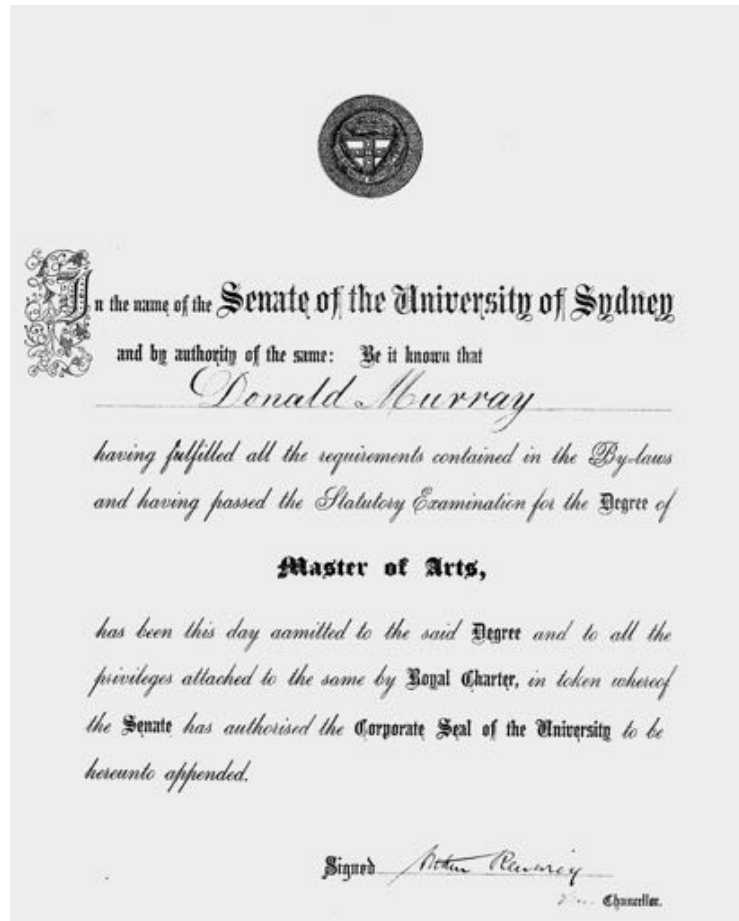
MA Certificate from Sydney

In a letter to his uncle in 1896 he said:

> *I am Leader of the Herald Reporting Staff, which is not much, but it keeps me in bread and butter and the work is interesting enough. It is all political.*

At this stage it might seem that Donald had settled down into a very successful life-long career at which he excelled and found that promotion came easily. He must have written reams of text while a journalist but it is difficult to ascribe any article to him because there were no by-lines. He continued working as a journalist for the Sydney Morning Herald until 1898 when he literally set sail for an entirely new career. His skill as a journalist would continue to serve him well. He retained contacts in the press and knew how to gather publicity with well-written and well-illustrated releases. Above all, he had gained the ability to write clear, well-structured English that he would continue to produce for the rest of his life.

Sydney Morning Herald Staff Picnic 1890s, Murray middle row on right? (from Robert Messenger)

1.3 The technology inventor and electrical engineer 1893-1925

After passing the MA examinations in March 1892, Donald must have had time on his hands – one job not being enough to keep *him* occupied. His interest had been piqued by the use of telegraphy at the newspapers for which he worked.

(Aside: For the general reader. Telegraphy, "writing at a distance", had been developing for over 40 years before Murray got interested. It enabled a written message to be transmitted a long distance over a wire by electricity. It was a game-changing development – for example, instructions from a London business to a subsidiary in New Zealand could be sent in hours rather than the four months required hitherto. It was effective, but expensive and clunky. A hand-written, or typed, message was keyed by hand in code (usually Morse code.) It was received with a sounder as aural dots and dashes and written down, being converted mentally from code to letters. In later improvements, the message might be punched to paper tape before being sent and received as marks on tape, even later, received as punched tape and printed alphabetically, but not at the beginning of Murray's involvement. It was very simple technology that used very low-cost equipment (apart from the cables, and staff), which is why it lasted so long. There are nice examples out there on You Tube.

https://www.youtube.com/watch?v=SythbsvxZfA

https://www.youtube.com/watch?v=snkwsU98QlQ

)

Not lacking in self-confidence, Murray set about designing a telegraph system that could use standard typewriter keyboards to send and receive messages. He saw the possibility that this gap might be the opening through which he might achieve his "luminous career". His first application for a US patent was filed as early as 2nd November 1892 (granted May 30, 1893) for a "Printing-Telegraph".

This patent was granted with very general claims. It covers the use of a typewriter to send a code of positive/negative pulses (5-bits, we would say now, but the claim is more general) to a receiving station that responds uniquely to that code by printing the same character as was pressed on the sending typewriter. It is likely not the first patent for such a device nor for the use of binary codes but is probably the first to combine these features together. In any case, the patent was granted and it may be regarded as the founding patent of "modern" typewriter printing telegraphy. (Aside: No

carriage return character at this stage – the receiving typewriter returned the carriage when a full line was printed.)

Murray must have been very pleased with his invention and his publicity machine was put into action with the award of the patent being a news-item worldwide. One coup was an article in the Scientific American of July 29, 1893, which included a publicity sketch (the patent had more detailed technical diagrams):

MURRAY'S PRINTING TELEGRAPH.
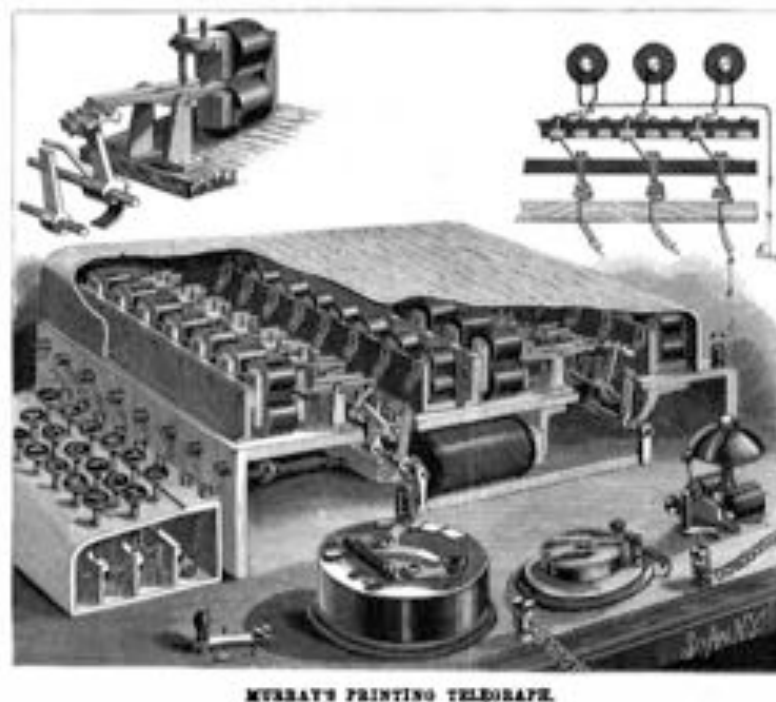
Scientific American July 1893

His invention was intended to implement his dream of a simple device that would enable anybody connected to type messages to, and receive replies from, anybody else connected, using the same device at each end of the connection. He would continue to champion this dream throughout his life and career – nowadays he would feel vindicated by the current ubiquitous use of email and SMS communication. He would not see the dream realized during his own career, though it was emerging during the time of his retirement.

Although his patent reads as though there was a working system, it must have been difficult for his printing telegraph to be made reliable at speed. Murray acknowledged the problems in his 1905 paper "Setting Type by Telegraph":

> *In hardly any other field of human endeavor has so much labor resulted in so little return. There are many reasons for this want of success; but*

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they are all due to the extreme complexity of the conditions to be fulfilled, and the absence of any technical literature explaining what these conditions are. With one or two exceptions, telegraph engineers, realizing the difficulties of the subject, have left it alone, and printing telegraph inventors have, in most cases, been outsiders. In fact the whole of the problems connected with the handling of type, including typewriters, type-setting, type-casting, and similar machines, have proved very refractory, and the best solutions have often come from outsiders, who have stepped in where experts feared to tread, and have in this way blundered into unexpected success. (STT p.555)

Although initially not practical, Murray continued to improve his invention, occupying his spare time and consuming his finances. He later claimed *I spent 12 years and some thousands of pounds in developing the Murray Automatic* (PBT p. 76). It was reported that *he used to boast that he lived on ninepence a day*.

In his 1896 letter to his Uncle he was both despondent and somewhat hopeful:

The Murrays of the latest generation certainly are not a marrying crowd, or as we would say in Sydney a marrying "push", and as for taking to myself a wife I am afraid you will have to wait a long time for that news.

In my spare moments I mess away with an invention which, so far, wont gee, but it is beginning to look a trifle more shipshape now, and there is just a bare possibility that in a year or two I may be going Home for a trip in connection with it. …… As for the invention I am sorry to say there are hated rivals in the field, base creatures who have dropped on almost the same idea. So I have no great hopes about it. However it may provide me with a trip Home, and that will always be something.

(Aside: "Home" meant Britain.)

He persisted, made progress and eventually arrived at a system that looked practical in principle. He began to file more patents. His second must have been prepared in Sydney, he is the owner of the patent with address Sydney, though it is applied for in May 4 1899 and granted Dec 5, 1899, when he was no longer there. There has been a fundamental change to his system. Transmission is now at speed, made possible by preparation of a punched paper-tape containing the message before transmission, and received messages are also punched to tape. Now his system can operate at the maximum speed possible on the link, not held back by a typist. The patent is notable for its wry example news message from Bourke, "Back of Bourke"

being an Australian expression for the "wop wops". It also shows his use of a 5-bit code for the first time.
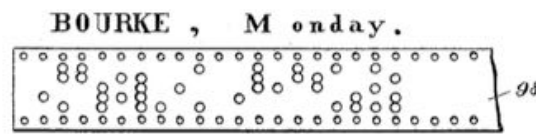
Cross-punched tape example from 1899 patent

Rather than just a machine, he now had a set of machines with operating procedures to be followed – a keyboard and tape perforator, a transmitter from tape, a receiver and tape perforator, finally, a printer from tape. This may seem to be diminution of his dream but it had the advantage that it worked. Also, other high-speed telegraph systems now used tape as an intermediary, so his use of tape was not seen as a disadvantage.

In 1899, Murray was satisfied enough with his invention to take it to the world. He passed through Auckland in March 1899 on the steamer *Alameda* on his way to New York via San Francisco. This called for local comment:

> *It is pleasant to see young Aucklanders keeping the banner of their province to the front. …. Mr Murray knows that the Yankees are always sweet on new inventions, if capable of being utilized, and is taking his wares to a rising market.*

Six months later we are reading about the Murray telegraph in both local and international papers. When he arrived in New York he set about demonstrating his system, first ensuring that it was patented. He travelled with his working model in his baggage. He had arranged with the Scientific American magazine to sponsor a demonstration – the sequence of events was later recalled in a 1906 Scientific American article.

> *When the model was unpacked … it was found to have been wrecked by careless handling in transit …. An unknown journalist in a strange city with a smashed-up model of an invention that nobody wanted was hardly the sort of combination to win success on lower Broadway. But the model was patched up … it was exhibited at the Astor House.* (Aside: The most up-market hotel in New York at the time.)

> *The novelty of the thing attracted attention, and although there was no field for it as automatic typesetter, its telegraphic possibilities attracted the notice of the Postal Telegraph Company and the inventor was engaged by the company to develop it as a printing telegraph. After two years of work with the Postal Company it had grown almost out of*

recognition and had evolved into the "Murray Automatic Page-Printing Telegraph System", and was able to transmit and print messages in page form at the rate of 100 words per minute.

Murray with his first model

(Aside: One cannot help gaining the impression that some of the positive reporting about Murray might have been written by the man himself – a "press release". We will never know, so will just take it as it is.)

While working on improving his invention, he undertook some, likely paid, journalism on the side, contributing "How Cables Unite the World" to the 1902 "World's Work" – an omnibus describing the latest progress in many fields. This is a very nice popular article that describes the then current state of the submarine telegraphy industry. He continued with the Postal Telegraph Company for two years.

Murray thought that Europe might provide more opportunities so he moved to London, arriving early October 1901. He quickly arranged demonstrations of his system. Continuing the Scientific American story:

> *"The Baby", as friends jokingly called the system, … was taken up by the British Post Office, The infant, however, was still very delicate and required the most careful nursing. After a year in London a circuit equipped with the system between London and Edinburgh was started on regular telegraph traffic. It was then exhibited in Berlin and the German government had a set constructed to work between Emden and Berlin. What the German telegraph engineers described as* Kinderkrankheiten *or ailments of childhood were, however, so*

numerous that in both England and Germany the system led a very precarious existence for a couple of years, and a long series of radical improvements had to be made before it could really be described as a success.

We do not know the details of Murray's arrangement with the British Post Office, though he describes his position as "Printing Telegraph Development Engineer". He seems to have been paid by the BPO but continued developing his own system. He also made proposals for future products – perhaps we would describe him nowadays as a "consultant". Importantly for him, he retained ownership of his patents during this period. He continued his relationship with BPO until 1909.

His biggest publicity coup during this period was his presenting a paper to the Institute of Electrical Engineers in London in February 1905 with the title "Setting Type by Telegraph" (Aside: By "Setting Type" he just meant printing, but he wanted to not overlook the setting of type on a linotype machine.) This was an unusual technical paper of over 50 pages length. The style was discursive, using his journalistic skills to write in an easy-to-understand manner. The paper starts with a survey of the field and then goes into the details of the Murray Automatic system. (Aside: An "automatic" system was one in which the operator was not required to transmit manually, like with standard Morse or Baudot. There were automatic Morse systems which also transmitted and received using paper tape.) One member of the IEE commented on the paper:

> *I do not think this discussion should close without an appreciation of the admirable way in which Mr Murray's paper has been written. It is a model and an example of logical and orderly setting out of a beautiful invention. Both as regards the mechanical logic – if I may invent a phrase – and historical sequence the paper is an exceedingly interesting one. I do not think that a better paper as regards style and arrangement has been read before any scientific institution for many years.* (STT p. 603)

It is hard to overstate the importance of this paper, both for Murray, and for printing telegraphy. It was immediately awarded the "Fahey Premium" – essentially an outstanding paper award. A two-page summary was written-up in the prestigious scientific journal "Nature" (Oct. 5th, 1905, p. 568.) Murray himself quotes (POP p. 319), a letter from the Vice-President of the Western Union Company in 1925:

> *I think that it was your early paper on "Setting Type by Telegraph" which got us headed right. I grieve to think of the capital and labour that*

has been misspent by those unfamiliar with the principles you so plainly laid down at that time".

What we might now call a *seminal* paper. In terms of the progress of printing telegraphy it cemented in place Murray's version of the 5-bit Baudot code which would continue as a defacto standard (with only small alterations) and eventually be adopted as an international standard.

Murray in his workshop

Murray's 1905 system did finally introduce the carriage return character. Murray discarded lower-case printing to make room for the new character in his encoding – this rather negative aspect, only capital letters, that lasted until the 1960s in both telegraphy and computers, we can probably also blame on Murray. But perhaps his contribution was much more positive. Other forms of printing telegraphy used special clunky keyboards – by managing to get his system working with the standard QWERTY keyboard Murray caused the standard keyboard to be used in telegraphy and later it was adapted as the computer interface that we use today.

Murray faced an uphill battle to get his printing telegraph adopted by telegraph companies and governments. Although his system was superior it perhaps did not offer enough advantage for it to be adopted when there was an existing telegraph infrastructure. So, attention had to turn from the invention to the business of selling it in new markets where the telegraph was a novelty. That is the next phase of his story.

However, Murray's career as an inventor and engineer continued. Up until his retirement in 1925 he was granted over 40 patents. Murray was greatly pleased by being awarded membership of the Institution of Electrical Engineers in November 1910. At last the kid from Kaukapakapa had arrived and had been accepted as an equal by his chosen profession.

Award of Membership of the IEE

1.4 Businessman and entrepreneur 1909 – 1925

The separation of the inventor from the businessman in Murray is quite artificial. He was always in the telegraphy business with the goal of personal financial success. While working for others in the first decade of the 20th century he was continually boosting the adoption of his own inventions. Our choice of 1909 is because that was the year when he took off on his own account.

This is a difficult topic because of the lack of business records. However, Murray has helped by leaving a trail of published papers in which he did discuss, quite openly, the mixed extent of his success. Prior to 1910, Murray systems had been trialed in many countries and set in operation in some. In his 1915 article "Press-The-Button Telegraphy" Murray discussed the history of the Murray Automatic, the system as described in 1905. He exhibited this in Paris, but the French, not surprisingly, preferred their Baudot system. The German Post Office tried the Murray systems with installations in 1903 and 1909. Russia ordered Murray systems from 1905, operating on the long circuit from St. Petersburg to Omsk, later from St. Petersburg to Berlin, and other routes – Russia was, perhaps, his best customer.   And there were other less-successful sales to Sweden, Norway and India. In Britain, after much testing there was only one system installed, eventually used for London – Leeds traffic.

This was not a great result, particularly when compared to Baudot system, which had installations numbering in the many hundreds. Murray recognized that the Murray Automatic was not really suited to the current telegraph market. Initially, he had in mind that the telegraph was used to send long messages as fast and efficiently as possible over long distances. He realized quite early on that the growth market had changed and was now really for transmission of short messages, mainly over short distances.

In fact, at the end of 1903, while working for the BPO, Murray outlined, in a confidential memo, how he could adapt and improve on the Baudot system with what he called the *Murray multiplex*. Work on development of this system was started in the BPO in 1906. It was tested in 1909, ordered as a production model later that year and set in final operation in March 1911.

In 1909 he established a Telegraph Engineering factory in London in conjunction with S. G. Brown F.R.S., (initially the public company Brown & Murray, Ltd.) Brown dropped out before 1916 and Murray continued to operate the company himself. Later advertisements of his products were for "Murray Printing Telegraph Systems" or just "Donald Murray" – perhaps his

company was privately owned. (Aside: Brown was renowned for many inventions including the gyrocompass.)

The next we see in public from Murray is another paper read to the IEE on February 11, 1911 entitled "Practical Aspects of Printing Telegraphy". This is a discursive paper of 67 pages. It starts by describing what he has learned about the practical and business aspects of the field. There is lot of discussion of costs and of practical problems that have been overcome or are still at issue. He was frank about the lack of success

> *Printing telegraph inventors are still busy increasing the height of the printing telegraph scrap pile, as they have been doing for fifty years, ….. it is an actual fact that less than £1,000,000 sterling would cover the value of all of the printing telegraph machinery on the face of the earth today.* (PAPT p. 455)

He discussed applications where printing telegraphs are not even appropriate. He gave a nice example of a message, redolent of modern SMS messages, received at the Glasgow Herald newspaper `" SIR W ROBSON SD T GOVT CD NOT ACCEPT T AMDT WH WD STRIKE AT T ROOT O T DUTY"` (PAPT p. 467). The human translator of a Morse message would expand these abbreviations as he went along. Handling multiple destination messages was also a problem – spam was already rife – the London *Times* , to sell the "Encyclopedia Britannica," sent a telegraph message to 24,000 telegraph addresses!

In the third section of this paper Murray described his own new products. He mentioned his own very fast printer but most of the discussion was of the Murray multiplex. This used much of the ancillary equipment from the Automatic but its main feature was the distributor, which was modeled on Baudot's. (Aside: There is a nice short video of the Murray multiplex in operation at the Telstra museum in Brisbane https://www.youtube.com/watch?v=KlXXjqBtBQ8)

Murray Multiplex Distributor at MOTAT

His 1911 paper was also widely read and well-received. It was again awarded a Fahey Premium by the IEE. Whether by the paper's publicity, or by other negotiations, the Murray multiplex set up Murray for prosperity and renown within the telegraph industry. He had assigned two patents to his American employers in 1901 but after that he retained ownership of all of his patents. In the US, the telegraph company Western Union was impressed by Murray's multiplex and purchased the US rights to his patents later in 1911. Western Union developed the Multiplex further themselves and it was put into widespread use in the US, perhaps Murray's most-significant influence. Murray retained the rights to his patents for the rest of the world. He later maintained that patents are flawed but are the best mechanism we have for encouraging progress and that he personally had *made a fortune from patents* (POP p. 124).

Perhaps to deal with his interaction with Western Union, Murray visited the United States in late 1911 & 1912. Surprisingly, after the long wait predicted to his uncle in 1896, he was married to Patricia Cosgrave on 05 Jan 1912. Described as a *society girl* by the San Franciso newspapers, Patricia was aged 42, 5 years younger than Donald. Although they would have no family she remained his constant companion in his later years. Born in Auckland, it was said that she was a childhood friend of Donald. This is unlikely because of their differences in age, social status and religion. However, Murray was certainly a classmate at high school of Patricia's brother John O'Hara Cosgrave who was a year younger than Donald. Indeed, John "gave his sister away" at the marriage ceremony. Presumably, Donald renewed contact with Patricia through his continued friendship with her brother.

Society Girl Will Be Married
To Friend of Childhood Days

Patricia Cosgrave

THE
TELEGRAPH
AND
TELEPHONE
JOURNAL
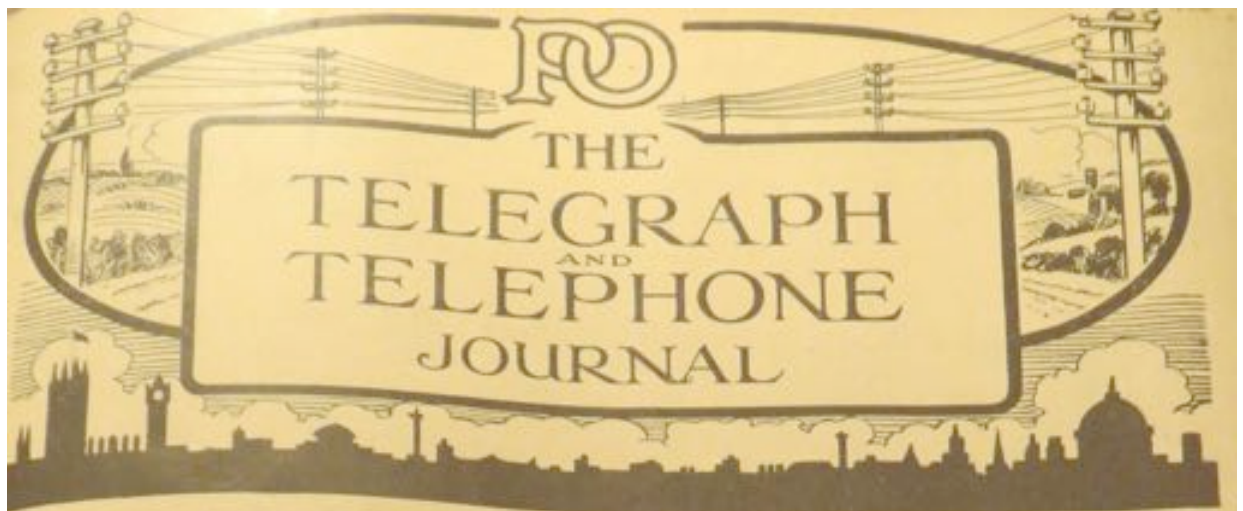
Another window into Murray's life is provided by the birth, in 1914, of a new journal for the profession, published in Britain, the "Telegraph & Telephone Journal". Although issued under the auspices of the BPO, this was more of a trade publication compared to the formal IEE journals and provided a useful place for Murray to sound off. He wrote two papers for the Journal, contributing, in the first issue, the beginning of a 6-part article entitled "Press the Button Telegraphy" (which was later published separately.) (Aside: His other paper-length contribution to the Journal was a 6-page survey of metal storage transmitters. (MST))

> *... I understand the aim of the Editors of the TELEGRAPH AND TELEPHONE JOURNAL is to interest and instruct their readers without going too deeply into technical engineering details ...*(PBT p. 29)

He discussed the evolution of the Murray multiplex. Recognizing that this might be egotistical he said:

> *... I shall have to use the perpendicular pronoun rather freely. I am sorry, but it cannot be helped.* (PBT p. 29)

We will see a lot of the perpendicular pronoun before we are finished! He predicted the replacement of Morse signaling by 5-bit Baudot variants, particularly because of the American momentum using developments from his multiplex:

> *... within a year or two it will be in use all over the United States. It should be borne in mind that this remarkable extension of the use of the five-unit alphabet is taking place in the classic land of the Morse alphabet, the land of its birth, America. The Morkrum printing telegraph, which has come into considerable use in America, also uses the Baudot alphabet .... In fact developments in this country as well as America render it probable that the five-unit alphabet will in time completely supplant the Morse alphabet on all circuits not worked by the telephone.* (PBT p. 57)

He discussed recent improvements to the Murray Multiplex and progress with sales, including orders from New Zealand:

> *I am making six (multiplex perforators) for the New Zealand Government to work in conjunction with the Murray multiplex apparatus being made for the Administration.* (PBT p. 98)

(Aside: The installation of the Murray multiplex in New Zealand did not take place until 1922. This was initially implemented using a strip printer. See Appendix 2.)

The plans of Murray and others were impacted by the need for factories to be devoted to supporting WW1 efforts:

> *The war has interfered with the progress of the Murray multiplex in Europe, but a number of Administrations are interested .... and orders have been received ...* (PBT p. 98)

> *If you wait for a Government to do a thing you will wait a long time, but that if you have sufficient patience you will eventually get there.*

It is evident that a lot of "Press the Button Telegraphy" is Murray publicizing his not-unbiased views and boosting his own products. This must have raised some eyebrows. But, before the final installment the editor summarises:

It is not a matter for surprise that these articles have attracted wide attention and equally wide appreciation. Mr. Murray has made a contribution to the development of telegraphy which will make his name famous in the history of telegraph invention. In addition to this practical work he has devoted himself to the study of telegraph problems as they present themselves to various administrations. He has added to our indebtedness by the readiness with which he has placed his stores of information at the disposal of the telegraphic world. But he is more than a repository of Information. He has the gift of speculation. He is able to look into the future and conjecture the problems as they will present themselves to the next generation. (PBT p. 220)

His views were, however, subject to dispute. One of his main competitors was F. G. Creed who made equipment, including printers, that worked-in with the widespread Morse-based telegraphy. This may well have been a more-profitable business approach than trying to move to 5-bit codes. Murray was quite inoffensive in his article, but it did provoke this letter from Creed:

In the course of the very interesting articles wherewith he has lately enriched your literary pages, my genial and learned friend, Mr. Donald Murray, has kindly gone out of his way to rescue me from oblivion, and incidentally to administer to me and all my works some very shrewd, but, I hope, not unfriendly knocks. Certain of my more warlike friends expect me to rush out of my cave and smite him hip and thigh. Not so! I know too well the power of his pen to dare to tackle him, with his own weapons, in the field of journalism – his native heath.

I am not yet among the prophets and I cannot even don the armour of Saul, so I must just go on inventing, and trust to my five smooth stones – speed, accuracy, flexibility, economy and reliability – to slay my giants for me.

If ever I shine in the public print it will be with the reflected glory of literary exploits of my advertising manager, whose ample field of battle is the front page of the cover of your JOURNAL.

I shall still venture, nevertheless, to cherish my peculiar ideas about the respective merits of the Morse and the five-unit alphabets; and I even believe that, for the edification of a very sympathetic audience, I could advance a sound argument in favour of the former. But I really fail to see any good reason why I should labour to convince the trade rivals of my firm that they have put their money on the wrong horse. (TTJ vol1 pp. 136, 137)

(Aside: Creed was a strong defender of Morse code. His company was much more successful than Murray's, and would finally absorb Murray's. However, Creed was eventually forced to support 5-bit codes. In his 1925 paper Murray had a final dig: *Mr Creed is to be congratulated on his conversion from the Morse to the five-unit system.* (STT p. 266))

Despite his propensity for blowing his own trumpet, Murray was always punctilious in giving credit to those whose ideas he had utilized. But he was very quick to pounce when his own contribution was glossed over. In 1915 there was a survey article in the Journal by J. H. Bell describing US Western Electric telegraph developments. It is fairly normal practice, in business, to extol your own developments while minimizing the contributions on which they are based, and Bell's article did not mention Murray at all! This article called for a sharp reply. Murray laid out the history of his relationship with Western Union, how they purchased his patents and developed his multiplex systems further. He regarded the Western Union system as the Murray multiplex's *twin brother*, its main features resting on Murray's inventions. Their printer is the only part that is not based on Murray. Western Union, the telegraphy company, had the rights to use his patents in the US. However, Western Union had engaged Western Electric (what would eventually become IT&T), the manufacturing arm of "Ma Bell" (AT&T) to make their systems. Western Electric had developed them even further and wanted to sell them internationally.

In addition to being slighted by Western Electric, Murray recounted his negotiations with them regarding extending their use of his patents internationally. He was not satisfied with their offer. Rather than negotiate further, Western Electric decided to bypass Murray's main patent by using a different, but inferior, method of synchronization.

Despite his complaint, he did not denigrate the American engineering, stating:

> In setting forth these facts I do not wish to deprive the Western Union and Western Electric engineers of the credit due to them. They have done a great deal of excellent detail development work on the multiplex and have put it in shape for Western Union requirements. (TTJ Vol 1 July 1915 pp 226)

There was interesting news in January 1917.

> Creed & Co (which advertises on the cover of the journal) has purchased the patents of the Indo-European Telegraph Co. and the Galletti Wireless

Telegraph Co. and the business and patents of Mr Donald Murray. Mr H. H. Harrison is the technical Chief of Staff. (TTJ January 1917 p. 46)

By the new development of Messrs. Creed & Co, various enterprises are now focused in the one great industry at Croyden. Mr Donald Murray has sold his patents and his business to the new firm and joins the board, so that the Murray-multiplex and the Creed instruments will be members of the one family. Mr H. H. Harrison brings with him that rich store of telegraph knowledge and wide range of historical knowledge which have been the envy of his friends.

(Aside. This actually took place in 1925. Maybe the agreement fell through at this stage, but was enacted later.)

In the same issue Murray fulminated about people's ignorance of commerce and the patent system:

During the discussion on Mr Pendry's paper, some miserable troglodyte, I did not catch his name, recommended the Post Office to adhere to the Baudot system as it was free from patents, that is to say, free from improvements. In order to encourage improvements and so benefit the nation and humanity the Government grants patents to inventors so that they can make money out of their inventions, and the suggestion of the cave-man at the meeting was that inventors should be deprived of their wages by the Government waiting till their patents expire. If we are to be deprived of our pay in this way we will not make any improvements, and then there would not even have been a Baudot system or a British Telegraph service or anything, not even a stone-axe for the cave-man. (TTJ, Jan 1917, p. 48).

But there was a big change coming to printing telegraphy. Murray mentioned the Morkrum system in 1914 in "Press the Button Telegraphy". He could see that this was the way of the future. What was different about this was that each character was transmitted individually – called "start-stop" or "asynchronous" telegraphy. It made it possible for the typewriter to be connected directly to the telegraph line and effectively work at the speed of the typist. It was no longer necessary to squeeze the last drop of bandwidth out of the line – there was now much spare capacity and it was cheap compared with the past. It was also possible to envisage telegraph exchanges. The market had changed again.

THE MURRAY PRINTING TELEGRAPH SYSTEMS
AGENTS FOR
The MORKRUM Printing Telegraph Machinery | The MURRAY MULTIPLEX Printing Telegraph
especially the TELETYPE. | System, and OTHER GOOD THINGS.
DONALD MURRAY, 55, GOSWELL ROAD, LONDON, E.C. 1, ENGLAND.

Rather than make his own start-stop system Murray, in 1921, *"took up the agency for the Morkrum Printing Telegraph (POP p. 317)* machines which soon produced the renowned American "Teletype".* In any case, the Morkrum system was based on many of Murray inventions and used his 5-bit code. In his last paper for the IEEE Journal "Speeding Up the Telegraphs" in 1924, Murray extolled the new possibilities, predicting what would become realized as Telex systems. Murray was, of course, also doing a sales-job for his own products. In any case, his paper was considered to be prophetic and, this time, was awarded the "Paris Premium", effectively a "best paper of the year award", but, in this case, perhaps a "life-time achievement award".

Murray retired from the telegraph business not long after his last technical paper was presented. Mind you, he kept inventing to the last.

> *In the Morkrum model-15 teletype there are two features demanding notice … I devised these two features and patented them in Great Britain in September 1922 only to find, on writing to the Morkrum Company, that they had hit upon the same ideas independently.* (SUT p. 269)

The sale of his company was covered back home in the New Zealand Herald (11 September 1925.)

> *Once a reporter on the NEW ZEALAND HERALD, Mr. Donald Murray, of London, inventor of the Murray multiplex printing telegraph system, has sold his business and patents to Messrs. Creed and Co., Ltd., of Croyden, England, for £30,000.*
>
> *In a letter to a friend in Auckland, Mr. Murray states that the business has grown rapidly and has overtaken his manufacturing facilities to such an extent that there have been serious delays in filling orders. Because of this he had sold the business. Mr. Murray believes the change will give a fresh impetus to the development of his system owing to the increased manufacturing facilities in the hands of the purchasers. For a time Mr. Murray will keep in touch with Messrs. Creed and Co., in order to give them the benefit of his advice and experience. He will also temporarily retain his agency for the Morkrum and Kleinschmidt telegraph apparatus.*

> *"Having regard to this and other sales of my patent rights I have done very well out of printing telegraphy,"* Mr Murray adds. *"It has, however, been a terribly worrying profession and I hope in a year of so to find some less strenuous employment."*

> *Mr. Murray's invention is employed to some extent in this country, a combination of the Murray multiplex and Baudot printing telegraph systems being employed in telegraphic communication between the chief cities. More extensive use will be made as time and circumstances permit.*

Murray retired at a time when synchronous back-bone telegraphy was mature and stable. The family of 5-bit multiplex synchronous telegraphs, Baudot, Siemens, American and Murray, represented the end of this line of development. Murray multiplex systems would continue to be made and sold for many more years (Aside: See Alan G. Hobbes. He says *Murray's Multiplex System and other telegraph patents were acquired by Creed in 1925 and these machines were produced at Croydon for many years. They were "Rolls-Royce" jobs and some of them are in service to this day.* (1962).)

However, the momentum had shifted to start-stop asynchronous telegraphy. International standards were agreed at the end of the twenties (See, Fischer, "The Evolution of Character Codes, 1875 - 1968"). By a strange twist of fate, Murray's version of the Baudot code was adopted as the *asynchronous* code standard (which is perhaps not surprising as it was widely used by the American manufacturers) and would be used in the telex systems until the 1980s. Baudot's original code was adopted as the synchronous standard.

Although Murray's multiplex was continued by Creed & Co, asynch was the new market and Creed & Co. very soon sold their business to Western Electric. Morkrum in Chicago sold out to AT&T for $32,000,000. (POP, p. 318.) The entire asynch telegraph world was now in the hands of AT&T, the *teletype* in the US and the Creed *teleprinter* in Britain, both ultimately being AT&T products.

The new telex exchange services built around asynch developed steadily. The first systems were in the US and Germany. Murray reported in 1940 that *there are now about 13,000 subscribers to the Teletype Exchange Service extending all over the United States*. (POP, p. 318.) Another war delayed development but telex systems took-off internationally in the 1950s and by the 1960s and 1970s private teletypewriters could use telex for user-to-user communication world-wide. It was particularly important for international air travel, for example. Murray's dream was finally realized. Telex would be an indispensible form of business communication until it was made obsolete

by firstly FAX, then email and finally SMS messaging. But Murray's dream in essence continues in the new technologies – doubters of the need for short telegraph messages back in the twenties would be astounded by their prominence today.

TELEX machine in 1963 (Canada Science & Technology Museum)

1.5 The Retired, but not Retiring, Inventor and Philosopher (1925-1945)

Murray retired in 1926. Shortly thereafter, he shifted his residence to Monte Carlo, where he called his house *Villa Waitemata.* (Aside: after Auckland's harbour.) There was also some residential arrangement with Montreux in Switzerland. He also maintained a London address for many years.

It seems that Donald & Patricia enjoyed their retirement, at least initially. It was warm on the Côte d'Azure and Donald's family, apart from his father who had died and his brother who stayed in Australia, were close at hand in England. Donald's mother died at Montreux on April 23 1930, aged 86, but his sisters made it through the 1930s

There was much travelling and touring to be done.

The Murrays at Madeira

By the piscine. Monte Carlo?

A first grand tour around the world included a two-month visit back to New Zealand in April/May 1927, apparently Donald's first return (apart from passing through) since he left in 1892. In Auckland they resided at the Hotel Cargen where they hosted functions for their friends and relatives. Mrs Murray held an afternoon tea on 21 April and a farewell lunch on 23rd May. The Auckland visit included a side trip to Kaukapakapa.

In passing, he made his conservationist views known. From the New Zealand Herald, 7th April 1927:

> *"I think that it is deplorable the way they are cutting away many of Auckland's hills," said Mr. Donald Murray, who is visiting Auckland after an absence of some 35 years. "Whoever is responsible is committing a crime." Mr. Murray also deplored the fact that rubbish was being tipped down one of the Mount Eden gullies. "Here is a place with a beautiful harbour and beautiful hills," he added, "and I cannot understand why they want to spoil nature."*

(Aside: It is interesting that the first mention of Murray by The NZ Herald, 6th December 1883, in a report on the Kaukapakapa flower show (organized by his Uncle George,) showed his interest in nature: *A very pretty bouquet of native flowers exhibited by Mr. Donald Murray, but not for competition, attracted great attention.*)

It was not in Donald Murray's nature to sit idle. In his mature years he had time for reflection on his life and its meaning. This led him to begin to write on more general matters. He had simple goals at first.

> *With the leisure that came after fifty years of other work (which, unknown to me, was a magnificent training in the philosophy of mechanics) I got the idea of writing a booklet on the neglected subject of windmills, particularly for farm work.* (POP p. 61)

One thought led to another and he decided that he would need more space and settled on the intention of writing a six-volume work that he called *The Philosophy of Power* (taking great delight in the pithiness of the title.) The original intention was preserved in the title page of the first volume as an image of a windmill.

Title Page of Philosophy of Power

Murray thought the wind-power would be important in future and could replace coal - not green energy, but blue. The circles represent the sun from which all power derived.

> *I proposed to call the windmill booklet* Blue Coal*, the idea being that wind-power comes from the blue sky. This title is no longer directly appropriate; but I have kept it as a sort of footnote title, and the symbol of the book will be blue, because at long last, when all coal and oil are gone we shall resort to the sun and the wind and the rain for our power – to the blue sky and the brown earth. Indeed the indications are that early in the coming century, and even sooner, we shall recognize the supreme importance of the windmill.* (POP p. 64)

The first volume of "The Philosophy of Power" was written in 1931 but not published until 1939. The second volume "The Theory of Control" was published in 1940. The entire work was never completed, though ½ of a third volume "Speeding Up the Railways – A forecast of the New transportation" was written. (Aside: Has been lost?)

It is hard to summarize "The Philosophy of Power" except to say that it is very unusual, indeed strange. Detail will be added in section 4 but for now just a brief outline.

There are a number of problems that make it difficult to get into Murray's philosophy. One is that he was a strong believer in Eugenics, which we now

look at askance, but was fashionable in the 1920s. He summarizes the topic of his work:

> *I am concerned with the* better feeding and better breeding of men. *(POP p.113)*

Murray muddied the waters somewhat regarding his own views:

> *It may be mentioned that in the Philosophy of Power considerable use is made of the Method of Outrageous Assertion, because it irritates readers and stimulates them to new thought and new spiritual growth. It does not follow that the author believes in his rash statements, nor does he want his readers to do so. He wants them to consider his facts and arguments and form their own conclusions.* (POP p.13)

The trouble with this is that he is not around to tell us which of his assertions he thinks to be outrageous. One would guess that the following is in that category:

> *... it is the duty of the State to kill and steal, that being the only method by which the State can establish and preserve order, which is the sole duty of the State.* (POP p.34)

And:

> *I am indifferent to human suffering, and I would blot out half the human races with a certain amount of calculated enjoyment.* (POP p. 89)

(At least, one would hope so!)

The first volume came out at a particularly bad time for a proponent of Eugenics. Murray was forced to defend himself in the preface to the second volume:

> *I regard Hitler, next to Stalin, as the worst monster that has afflicted mankind for centuries. ..... Emphatically my ideas have nothing to do with one race only, and they are in no way concerned with the Nazi Despotism of murderous brutes, which, like all the English-speaking world, I regard with horror. We have no use for despots. ... In addition I hold that .... "Every man should be free as his own thoughts."* (TOC p. 14)

Another difficulty is that Murray had an incredibly large ego that is hard to swallow – he believed that he was an important philosopher and said so frequently – much use being made of the perpendicular pronoun. But he

knew what he was doing so cannot be easily dismissed as a self-opinionated racist. Let's leave more detailed discussion of this point for section 4.

All the same, Murray makes an effort to ensure that his writing was easy to understand and even enjoyable.

> *Philosophy with Laughter . Our particular philosophy, the Philosophy of Power, is for all happy-minded Actualists, who wish to join our pilgrim band of laughing philosophers, with the dear fellow, Common Sense, at the head of the procession.* (POP p. 60)

It is definitely Philosophy that is being discussed, not Science. The big questions. As he said:

> *Philosophy deals with the two questions, 'What am I?' and 'What is* it *all about?"* (POP p. 51)

His philosophy apparently may be classed as an exposition of *religious thermodynamics*. (http://www.eoht.info/page/religious+thermodynamics) He was a committed Christian and produced biblical quotations as needed.

> *The knowledge of the existence of God is essential for the well-being of Men, for whom I am writing.* (POP p. 14)

He believed that he is taking the work of Herbert Spencer and bringing it up to date using modern terms and knowledge. One paragraph from Spencer that he quoted is central to the work:

> *But one truth must grow ever clearer – the truth that there is an Inscrutable Existence everywhere manifested, to which he can neither find nor conceive beginning or end. Amid the mysteries which become more mysterious the more they are thought about, there will remain the one absolute certainty, that he is ever in the presence of an Infinite and Eternal Energy, from which all things proceed.* (Herbert Spencer Ecclesiastical Institutions p. 175)

Murray repeats the last line of this many times. (Aside: He remembered the line from the past and wrote a letter to *Nature* asking for help in tracking it down. No Google in those days!) It almost seems as if Murray was equating Energy (which cannot be created or destroyed and is very mysterious stuff) with God. The law of conservation of energy is the principle from which all others are derived – he calls it the *Rock of Ages.* One of his conclusions is that *Wealth is Energy Controlled by Man* (POP p.38) and he went into this in detail. The "control" part of this was very important to him and he devoted the second volume to its explication. His work was about energy, not power,

which is the rate at which energy is expended, but the "Philosophy of Power" is such an attractive title.

Let's pick some extracts to get the flavour of the work.

The Dedication

> *I dedicate this work on the Philosophy of Power to all men of power; moulders of the destiny of mankind by word and deed; religious and secular leaders, philosophers, statesmen, inventive engineering and scientific pioneers, social organizers, builders of industry; and above all to Christ and Lucifer.* (POP p. 9)

> *May those who are still with us, long be spared to serve their country and mankind; and when at last the Great Lady of Night comes to guide them, may the Winds of Ururangi, between the worlds, blow gently on their crossing.*

(Aside. Lucifer is the ancient morning star, angel of light and knowledge, not the devil. The blessing is modified from Maori legend and Kipling.)

The MOTTO (POP p. 11)

> "Aké, Aké, Kia Kaha"

> (For ever and ever we will fight on.)

The Antipodean:

> *I am a child of the Southern Cross, and I have no pre-ordained respect for geniuses born under Northern constellations. As the fact may escape the attention of readers, I shall repeat this sentiment occasionally.* (POP p. 51)

(Aside. And he certainly does!)

The essence of the Universe:

> *Any philosophy of the external world must of necessity extend from our domestic surroundings to the starry heavens, "the flaming ramparts of the Universe." Now when we put that vast brew into the retort of the human mind, the odour of a strange conclusion assails our nostrils. The fragrant conclusion is that all we feel and know are* dancing weights and springs*.* (POP p. 58.)

The humour:

In The Philosophy of Power *there are many old ideas and some new ones, and, alas, some old ideas all painted and powdered, with bobbed hair, short skirts, and smoking cigarettes, masquerading as new ideas. Forgive these foolish old ideas! They are uninvited guests, but I hate to turn the poor old things away. Somewhere they have collided with new ideas, they have absorbed a quantum of its energy, and they think they are young again. If you recognize any of these poor old masqueraders posing as new ideas forgive them and me!* (POP p.61)

Let's leave it there, to be continued in section 4.

Murray was struck down in 1940 by what must have been a brain tumour:

He underwent three operations at Monte Carlo, after he and Mrs Murray moved to Switzerland; but he was too ill to take up his work again and lingered on in a state of invalidism, never fully recovering. (Obituary, H. H. Harrison.)

Murray died in Montreux on 14 July 1945. His wife returned to Monte Carlo after the war and lived there until she in turn died on 26 March 1957.

That is not quite the end of the story. Although he was too ill to complete the Philosophy of Power, he managed to find the energy to write a last broadside "Australia. Poverty or Progress", giving Australia advice on how to proceed after the war. The title is a play on the work of the influential economist Henry George whose important work was called "Progress and Poverty". This is a political document, making the case for an "annual value" form of land tax that would, it is claimed, address the problems of runaway property prices and land speculation, not only a problem of the 21st century! Whether or not the material is persuasive, what is notable about the document is its very straightforward style, nothing like the unusual nature of the Philosophy of Power. This document is dated 1945 and refers to events in the preceding years – it shows that Murray, despite his illness, kept a clear mind until close to the end. He was enthusiastic about future progress:

Great advances are taking place in engineering, electricity, chemistry, physics and medicine. This is no leisurely, academic research which need not be hurried; it is a red hot battle of brains inspired by total war where we must get our blow in first or go under. Such being the conditions the results from this research will ultimately give a great impetus to peace-time industry ...... (APP p. 27)

(Aside. The difference in tone between *Philosophy of Power* and *Poverty or Progress* makes one question whether we are dealing with two different

Donald Murrays. Careful reading and checking of dates makes it fairly certain that is not the case.)

1.6 Summing Up

The reader will agree that Murray had a very interesting career. It was not "rags to riches" in that his family was well-established but it certainly the case that Murray did very well financially and deserved his leisure years.

His last work, the "Philosophy of Power" must be regarded as a failure even if only because it is largely unread. Also, the unpopular opinions expressed therein (even if deliberately outrageous) are rightly viewed with distaste and may partially account for Murray's current lack of recognition.

Let's put that aside and concentrate on his successes. There are many examples of people who start with little and end up well off, many of them who have gone overseas and made waves. Why does Murray deserve particular recognition?

There is, in fact, very little that we can point to nowadays and say "Donald Murray caused this to happen." Almost every detail that he achieved has been made obsolete by the progress of technology – the survival of his carriage return character is really rather fortuitous. His use of the QWERTY keyboard certainly was a major factor in its ubiquitous adoption in telegraphy, though it was not his invention.

But Murray did achieve a great deal in his time. He did not develop machine telegraphy on his own but he did design the British version of "backbone" trunk telegraphy that was widely used. It was inspired by the Baudot system, which was also one of its main competitors internationally. His own Murray multiplex was also widely used internationally until the 1960s, particularly in Australia and New Zealand. But Murray's work in turn inspired the American developments, which became the dominant technology and the base for 20th century telegraphy.

In modern equivalents, one wouldn't regard Murray as a great and inspirational entrepreneur like Jobs or Gates but he might rank with Donald Davies or Vint Cerf in the sense of laying the foundations for great developments (quite different kinds of development, of course.)

Despite his egotism Murray himself made a fairly modest claim to fame.

> *It would be difficult to apportion the credit to each of the inventors concerned, but Donald Murray, F. G. Creed, H. L. Krum, Sterling Morton, E. E. Kleinschmidt, the Western Union Telegraph engineers, the vast American Telephone and Telegraph Company and the Western Electric Company, were the leaders of the remarkable group of engineers, capitalists, and inventors who revolutionized telegraphy, establishing*

modern machine methods instead of the Morse key and old-fashioned and slow printing machines like the Hughes. A similar machine developed by F. G. Creed, known as the teleprinter, is widely used by the British Telegraph Service. (POP p. 317)

It is hard, nowadays, for us to look back and rank Murray's contributions, we just cannot ever know enough about what was happening at the time. Perhaps it is best to rely what others in the field thought. H. H. Harrison was a contemporary of Murray and wrote many books and papers on Machine Telegraphy. He also wrote Murray's obituary in the IEE Journal and summarized:

> *In the field of machine telegraphy his name deserves to rank with those of Wheatstone, Kelvin, Baudot and Gulstad.* (Obituary, H. H. Harrison IEE Journal Dec 1945.)

That is an outstanding evaluation – Murray would have been proud to see himself ranked among the "greats" whom he admired.

2. Murray's family background

Perhaps some knowledge of the family of Donald Murray might help in understanding his personality, but it is actually quite an interesting story in itself. There is no technology in this section. It is more of interest to Kiwis than to others.

Up until now this would have been a thin account. However, recently a set of Murray documents came to light – some of these are memoirs and others the typewritten transcriptions of handwritten material – likely done by, or for, our Donald Murray. There are a few individual letters. These documents are all interesting but the letters particularly so. In addition, we now have many family photos.

Our Donald's father, John Murray, was born in Dalquhurn, Dumbarton on the Clyde. John's father, also Donald Murray, was manager of a dyeing business. John's primary education and childhood was at Dalquhurn but when he was aged 10 his father started up his own business at Rutherglen, south of Glasgow. Donald was married to Mary Simpson – their family at Rutherglen comprised 5 boys and a girl. Their fortunes went up and down with the economy. Donald's business collapsed and they went through hard times until he was recruited into banking (of which he had little experience) with the Commercial Bank of Scotland (which eventually morphed into the Royal Bank of Scotland) in Rutherglen. Donald employed his eldest son John in the bank – John was often given the unpleasant jobs of collecting payments and foreclosing on loans. Although he had very little formal education, John learned the trade well, eventually rising to become a suburban branch manager of the Bank in Glasgow.

In 1863, aged 26, after marrying Frances Stewart (from Dunoon, also on the Firth of Clyde), John decided to migrate to New Zealand in the company of his wife and his brothers George (aged 18) and James (aged 16) on the ship *Aloe*. They arrived in Auckland in June 1863.

Back in Scotland, John left his parents Donald and Mary, two brothers Robert and Alexander, and a sister Maggie. Frances also had many brothers and sisters (some of who also later came to New Zealand) and a surviving mother who remained in Scotland.

John's intention was to buy land, develop the land in conjunction with his brothers and become a prosperous farmer. As he had no farming experience, on arriving in Auckland John took on a safe and familiar a job in the Bank of New Zealand in the interim. Still intent on farming, the three brothers went out to inspect land at Kaukapakapa. They were smitten by a beautiful valley

that leads down to the Kaipara Harbour. John purchased a large holding of around 400 hectares that they named "Hafton" after a castle and estate at Dunoon. George and James went out to live at Hafton and worked on establishing the farm. Unfortunately, the land was not very productive and the farm was always marginal - John never became laird of Hafton as he had dreamed.

John and Frances remained in Auckland, though John, as a bank inspector, made trips away. He was transferred to the Dunedin branch in 1864 where he lived for a year or so, Frances joining him. At some time James also went south, leaving George at Hafton. It is likely that Annie, the first daughter of John & Frances was born in 1864 either in Auckland or Dunedin.

In 1865, John was offered a better deal by the Bank of Otago and he was made their bank manager in Invercargill in July. The family moved there in August. It was a hard winter and Annie did not survive. Donald Jr. was born shortly after their arrival, named after John's father. John quickly made his mark as bank manager, winning a £50 prize for an essay on the advantages of Southland as a destination for migration. His brother James was with them, working on Southland farms to gain experience.

The family was joined in November 1865 by John Murray's mother Mary who had embarked on an exceedingly adventurous round trip to check on her sons (accompanied by Frances' sister Jessie Stewart). This took her four months out by sailing ship, 16 months in New Zealand and four months to get back home. Her account of her time in New Zealand is fascinating – she was not well-educated and writes in a stream-of-consciousness fashion, presumably like she talked.

Her first words on arrival in Invercargill:

> *My Dear Margt*
>
> *Hear I am sitting in Johns Parular writing this John is sawing turnips beside the parlour window and fany beside him jessy with me and baby sleping on the couch and blazing stick fire, James trenching at the foot of the garden, how strange when they are all a bout me I can hardly think I am so far from hom which place I am often thinking about and how you will all be getting on, ...*

The first description of Donald:

> *When the pilot came on board the ship he brought a letter from John giving me some instructions what I was to do and announcing the death of his little daughter which I was very sory to hear John and fanny has*

got over it they both often speak a bout her she had been a nice little thing James often speaks a bout her he says he was in the house when she was born and when she died she was a bony little gentel thing I believe her place is filled with a fine boy I cant say little he is a fine big strong bairn I cant say who he is like I think he takes more of the stuarts than murrays except the red hair, they have a horse two goats 10 hens a cat and dog and a nice larg garden …..

They did not stay long in Invercargill. John was rehired as inspector by the BNZ and departed Bluff in April 1866, heading for Nelson. His mother accompanied him but went straight on to Manukau (the western harbor of Auckland). The idea seemed to be that she would go out to Hafton and supervise, getting it ready for John and Frances. She arrived at Hafton, the first lady of the house, in the middle of April 1866.

The conditions at Hafton were primitive – everybody living in a shack while the permanent house was being built. Mary describes the situation in her letters home, a wonderful record of pioneer life. She had many adventures:

I got a terriable fright last Wednessday with Moories, I was standing in the kitchen folding cloths the door was open when in coms a great big Moarie and says – tenakie – that is good day and holds out his hand to shake hands with me, of course I did it, then I looked into the garden heres another fellow coming through the garden, then other two in by the back doar then another big fellow bare headed and bare footed then the last not least an old fellow tattooed a perfact fright, what do you think of my company, here is 7 frightfull fellows all in the kitchen, and not a creature within reach but the servant and baby he comenced crying he was so frightened and the servant got as white as death could'ent speak a word, one of them said, where Murray, I said in the garden, - no – in the stockyard – no – I was trying to mak them beleive he was at hand, I went to the back dore and to my astonishment heres a whole cavelcad of horses that they had with them, george mad his aperance soon, I can tell you I was glad to see him, they had to get some meat and went away quitely, The only conversation we had was I was – Murrays Muder – where Murrays fader – england – they went up to Calfields and took some money of a mantelpiece, …

A month later Frances arrived with infant Donald. Mary describes George going to meet them – it was a two day journey, at least, from Auckland to Hafton, starting with a boat trip on the Waitemata habour up to Riverhead:

He is of today a gain to riverhead to bring up fanny riverhead is a bout half way from Auckland they are to stay all night at riverhead and start

nixt morning for hafton, George went off today in great style with three horses one for himself one for fanny with the sidesaddle and one for Calfields brother in law an officer in the army who is coming up with fanny I believe a very respectable gentleman , George took a pillow and my plaid to buckle donald on the front of his saddle poor little fellow rather a long rugh ride for him,..

For the next few years John worked as inspector out of Auckland but had to travel widely and was away for long periods. His role was not one that would have endeared him with others in the bank. He had to check that each bank branch was being properly operated and often dismissed local managers. Frances ("Fanny") remained at Hafton occupying the homestead with George, initially. Her brother John Stewart joined her for a while. John's mother returned home to Scotland in February 1867. She gives in her letters a great account of conditions and events with at least two near-disasters including infant Donald falling into a water trough. James might have returned to Hafton for a period but he did end up living independently of the rest of the family down south.

Children to John and Frances were born regularly while Frances was at Hafton. Isabella Simpson in 1868, Alexander Stewart in 1870, Frances Stewart in 1872. John lived in Auckland but evidently visited Hafton regularly. He also took the family away on some of his extended trips – there are photos of Donald and Isabella taken in Dunedin.

Isabella & Donald at Dunedin

But these first 8-9 years on the farm must have a great influence on Donald. They were isolated, even a trip to Kaukapakapa was an adventure. It was a pioneering farm, being "brought-in" with crops sown and animals raised. Forest was being cleared, trees felled for lumber, all around. Donald later recalled:

> *It was one of the joys of boyhood, including the crash of the big trees as they fell dead, killed by the murderous axe and saw. The noise of the falling trees echoed round the valleys for miles.* (TOC p. 155) *Yes, the great and glorious kauri forests were butchered to make habitations for men and awe-inspiring entertainment for the days of my youth.* (TOC p. 156)

There was close contact with local Maori, as illustrated by Mary's story. Donald Murray later recalled that his second word was "kaikai" (TOC p. 201) and he makes some use of Maori legend in his Philosophical work, e.g.:

> *FATHER-SUN AND MOTHER-EARTH. Between whom, and by whose Active and Passive Energies we live and move and have our being.* (POP p. 38)

Donald understood land-rights issues better than most:

> *The Maori chiefs who sold land to British settlers made it clear eventually that while they could dispose of their own specific right to the use of the land they had no authority to dispose of the right of future generations to a similar use of land.* (APP p. 8)

John Murray was an exceedingly "bossy" man. George took it for a while but soon, in 1868, bought his own small farm at Kaukapakapa. He studied and undertook examinations to become a teacher at the Kaukapakapa school. He married and had a daughter who helped him as an assistant teacher. George stayed in Kaukapakapa until he retired. He got involved in local politics, becoming a councilor for Rodney county, and also involved with the board of education. He died in 1923. The Director of Education sent condolences to the Auckland Education Board:

> *Few men in New Zealand have for so long and in so enthusiastic and unselfish a manner devoted themselves to the cause of education in the way which characterized all the work and activities of the late Mr. Murray. His genial, kindly and generous nature won him the high esteem and affection of all who knew him, and it will be generally recognized that education as suffered a distinct loss through the death of Mr. Murray.*

In 1875, John was given the position of Auckland manager of the BNZ, at first temporary, then after one year a full-time position – he would remain with the bank for 20 years. The family moved into Auckland where their last child Helen was born in 1876. They rented houses in Remuera, for some 5 years the 14-room mansion of Sir George Arney – an incredible step up from a pioneer farm house. They appointed a manager to operate Hafton. It remained their country retreat, keeping a room in the farmhouse vacant for themselves.

We get a glimpse of Auckland life in the late 1870s from another set of letters. Alexander, the youngest of the Murray brothers, who stayed behind in Scotland with their parents, arrived in Auckland in 1878. His letters home have been transcribed. He stayed with John's family in Auckland while trying to get a suitable job – he had worked in the Rutherglen bank managed by his brother Robert. John Murray finally arranged for Alexander to be given a job in the South British Insurance office. He worked in Auckland at the start then was sent to the larger more-important city of Dunedin to be branch manager. In mid-1881 he was transferred to Asian operations.

During his time in NZ Alexander made many observations about the Murray family. He visited George at Kaukapakapa a number of times and got on well with him – it was a much easier journey now that there was a train from Riverhead to Helensville . George had lost his first wife and was recently remarried. Alexander spent a lot of time with the John Murray family in Auckland, particularly when John was away, so he gives much insight into the family. Soon after his arrival:

> George says John has an excellent rule that he sticks to faithfully to, that is, "Never to help his relations", but that John and Fanny have been very kind of late years. George is soft, soft beyond anything I can give you an idea of and he submits to be lectured by John, Fanny and <u>Donald</u> in a way that is perfectly refreshing. Donald asked George if he knew the composition of the soil best suited to grow Maize, George said, No! – "Well, the fact is Uncle George, you'll never be a successful farmer until you get a knowledge of chemistry."

> I told him that if he made such a speech in my presence again I would cuff his ears soundly for him. Since his father went away he has become a perfect nuisance in the house, and 3 or 4 times I have had great difficulty in keeping my hands off him. I was reading aloud the other Sunday one of Christ's miracles from the Bible Fanny and I had been discussing it, when Donald interrupted me with – "Oh, Uncle, what a yarn!" this from a young man of the mature age of 13 years was rather much, Fanny only laughed and looked on it as a sign of his incipient

genius. The boy is being thoroughly spoiled by his mother insisting on his reading and reading with him Huxley's lectures in the Eclectic Review and freethought literature in general, the boy has only been four years at school, and hardly knows how many beans make five. He has a lot of good points about him, and his father keeps him in better order, of course there is no room for two of that sort in the house at once. The other children are very nice and much gentler and are thoroughly well trained in fact unusually so I must say that Fanny displays a deal of good sense in her management of them all except Donald, and I fancy his natural disposition accounts for his bullying tendencies.

Later, he had adjusted somewhat:

John & I now get on well enough, and Fanny I have got to like very much indeed, and the children are charming even Donald I begin to appreciate.

He gives more information on John's role

People here do not over work themselves although they think they do. John certainly does not spare himself, but he is looked on here as a prodigy of hard work and "hard" everything, in fact. I was greatly amused to hear two men talking about him in the train lately and abusing him for his mean-ness in refusing more credit, they were quite sure they would have got it out of Murdoch if it had not been for Murray. As a result of John's being south there have been 14 failures announced in Wellington, and a good many in Christchurch & Dunedin.

John although soft hearted enough to strangers is rather fond of playing the Roman father to his relations.

When in Dunedin he visited James at Tapanui where he was schoolmaster. James had become super-religious and puritan:

And he utterly despises Social intercourse, he astonished them here one evening when they had company by volunteering to sing. (It was a dancing party and James had come in unexpectedly). He sang "There is a fountain filled with blood" and followed it up with an exhortation to turn off the road to Hell. I can fancy that the Remuera young ladies would be "Took aback".

We have to leave James at this time, noting that he did have 5 children, has living Murray descendants in New Zealand, and ended his days at Eltham in Taranaki in 1929 aged 82. George had one daughter. Alexander married and had one child who died in infancy in India – he died in Singapore in 1914 aged 61.

John Murray

Returning to the family of John Murray, there is not much to record (other than Donald's progress that we have already covered.) There are occasional mentions of school prizes and the like. However, John Murray penned his own memoirs in 1905 written for his grandson Robin – Frances' son. This concentrates on his very early days in Scotland but there are some snippets about New Zealand. In 1889 he went to London. He consulted regarding his health and was told to take it easy. On return he dropped his position as bank manager and became a director instead. Times were tough in the late 80s and early 90s.

> *I had much stern work to do – had to get rid, for instance, of some half-dozen Managers of principal branches, for various reasons, from embezzlement to mere incompetence; had to wind up companies and firms in all directions. In the comparatively small town of Auckland alone I had to "put through" some dozen or fifteen concerns owing the Bank about £750,000.*

He made many enemies, but the importance of his work was recognized by those who knew the country's financial situation. He was elected president of the prestigious Northern Club for two years. The condition of the BNZ worsened. The chairman decamped to London and John was left to find a way to avoid default, both of the BNZ and the New Zealand economy. He

eventually got the Government to agree to a Guarantee of £1,000,000 to the bank in exchange for future returns. This saved the day and the BNZ was able to continue operating (we could have used him in the late 1980s when the BNZ failed again!)

> *For my important share in this I received mostly lying abuse, but that is the way of the world, and all in a day's work, so is not to be minded. I did the work, not for thanks and applause, but because it came my way and was my duty.*

In 1895 John made a trip to South Africa with his wife and daughter Helen. Frances must have been there already for she and her father returned to Sydney and while his wife and Helen went on to Europe. Sydney now became the focus of the Murray family. Donald was already there. John set about building an estate at St Leonards that he called Morven. When this was later sold it was described as a "Gentleman's Residence' with seven bedrooms set in grounds of 12 acres - he certainly had done very well from his job as banker. In addition, he had three eligible and attractive daughters, aged 29, 25, and 20.

Description of Morven on its sale 1914

Murray sisters in Sydney, in descending order, Isabella, Frances, Helen.

In 1896 Donald wrote that Isabella and Frances were visiting Alexander (called "Stewart" by the family) at Hafton. These were the three children who were born there. Perhaps they were having a final visit before it was sold. There is a nice photo taken at this time. The family never returned to

live in New Zealand though John was called back from retirement in 1895 in order to absorb the Colonial Bank into the BNZ.

So, the end of the century had the Murray family living palatially in Sydney in full form. John was enjoying his retirement. He read widely, studying history and philosophy, catching up on his missed education.

Frances, Isabella, Alexander at Hafton. 1896?

The 20th century would see the family gradually migrate northwards. Donald left for the northern hemisphere in 1899. Frances married and lived in South Africa, having two sons there, but soon moved on to London.

John predicted his demise in 1905:

> *Now the end for me is at hand. My Whilom contemporaries are nearly all but a row of ghosts. The few exceptions are like myself right in front of Father Time's scythe, a fact that gives me no concern, except perhaps for the trouble of dying. I trust the grim mower won't fumble over his work.*

But he lasted another 10 years, dying in 1915 at Bathurst where he was living for his health. Morven had been sold the year before. It seems that the grim mower might well have fumbled!

His wife Frances, often in the company of Isabella, who never married, did much international travel but eventually settled in England. Helen seems to have been a teacher, in the US for some time, but also ended up in England, also remaining a spinster. By the mid 20s the entire surviving Murray family was living in Britain, apart from Alexander who remained an engineer in Sydney until he died in 1940. There is no impression of Donald being isolated - his mother, three sisters, and two nephews were close at hand.

Donald's Mother Frances

This period of stability in England was broken by Donald's retirement to Monte Carlo, in 1926. There must have been many visits back and forth by his family. Donald seems to have also had a *pied a terre* at Montreux (Territet) as his mother died there in 1933 in his care. Isabella lasted until 1940. Donald until 1944. Frances 1949. Donald's wife Patricia until 1958. Helen until 1965 (possibly 1959).

Frances married James Hamilton and had two sons. They were Robert, known as Robin, and James, known as Alastair. Both married, Robin having son Charles who died in 1997, apparently unmarried, the last of the John Murray direct descendants. Alastair was the family solicitor and handled the Murray wills. He led an adventurous life, working behind the lines in WW2 in the south of France. There is correspondence between him and his Uncle Donald in 1940, discussing the Philosophy of Power. Although with no children himself, Alastair has a step-daughter, so there are still living links, albeit indirect, in the chain of descendants.

Perhaps we can leave the last word for John Murray himself:

> *"God" is the name in English for that unsearchable and inscrutable power behind all phenomena and which we reverently call Divine. To be a co-worker with God in the work of his Universe; to aid in the development or evolution of the best and highest ideals therein, is the work of a true man, ...*

There seems little doubt that Donald Murray's family, particularly his father, had great influence on his character.

3. Murray's technology

This section is intended as more-detailed back-up about Murray's technology. The reader will probably need a smattering of IT to understand. We expand upon matters introduced in section 1 but would have made that section less approachable if handled there.

Murray-Baudot & carriage return character

Why do we say Murray "introduced" the carriage return character, rather than straightforward "invented"? We are picking our words carefully here. At the beginning of the 20th century most printing telegraph systems printed a message on to a continuous paper tape which was cut-up and pasted on a sheet of paper before being given to a customer. Less usual systems, with a carriage return character, were said to be "page printing". In his 1905 paper Murray called the carriage return character "LINE". A similarly named character was used in the earlier American Rowland system, but, after a period of popularity, this system quickly became obsolete. Murray was probably the first to use a carriage return character in a high-speed synchronous system with minimal encoding of 5 bits per character.

But others may possibly have done so earlier. In his groundbreaking 1905 paper "Setting Type by Telegraph", where his carriage return character seems to have first appeared in public, Murray states:

> *In the United States alone over four hundred printing telegraph patents have been issued since the invention of the electric telegraph. These patents embrace about 150 distinct telegraph instruments or systems; ...*
> (STT p. 555)

Rather than going to the effort of scanning all of these arcane patents it just seems easier to just accept that Murray was the first to implement the carriage return character in modern high-speed telegraphy. Murray himself would likely be bemused by our picking his carriage return character as being significant – he did not claim the concept as his own and his other inventions were of much wider importance until the 1970s, though they have all been superseded nowadays.

One problem with a carriage return character is that, if it is in a stream of characters being printed, it must be dealt with in the same time delay as for any other character that is printed (e.g ¼ second for 40 words per minute). But the carriage return action is difficult to make fast because of the weight of the carriage itself. Aficionados will know that carriage return action is now split between two characters, LF (line feed) to move to a new line and CR to move typing to the left. This split was seemingly introduced because

the CR/LF combination allows twice as long for the carriage to return before the next character has to be printed. (Aside: Possibly introduced by Krum?) Murray did not make this split, though he would have needed some such trick for his later 20-characters-per-second printer, which needed 3 character delays for the carriage return. (Aside: One possibility is that the printer *always* waited for 3 character times after the return and the two characters following the return were always discarded and could be anything at all.)

We first see details of the Murray-Baudot code in his 1899 patent:

First Murray Code

Here we can see him assigning the codes with the least holes to the most frequently-used characters, following the "etainosrhdlu" typesetter pattern. Minimizing the number of holes punched reduced wear-and-tear on the equipment. The carriage return is not here yet, perhaps showing that it is not as obvious as one might think. At this stage he was serious about operating linotypes remotely so his code allows for both upper and lower case characters. Note that the space character was here as 00000 – no punch holes.

The 1905 code introduced the CR/LF that he called "LINE". He removed the lower-case mode and introduced the non-zero space 00100 and letter-shift and figure-shift control characters – the letter-shift also doubling as "erase". The actual allocation of the control codes varied over time but any 5-bit code of this type became known as a Murray-Baudot code and was eventually

used as the asynch telex standard. The following example is from Arthur Crotch's book of 1907:

Fig. 129.—Murray alphabet.
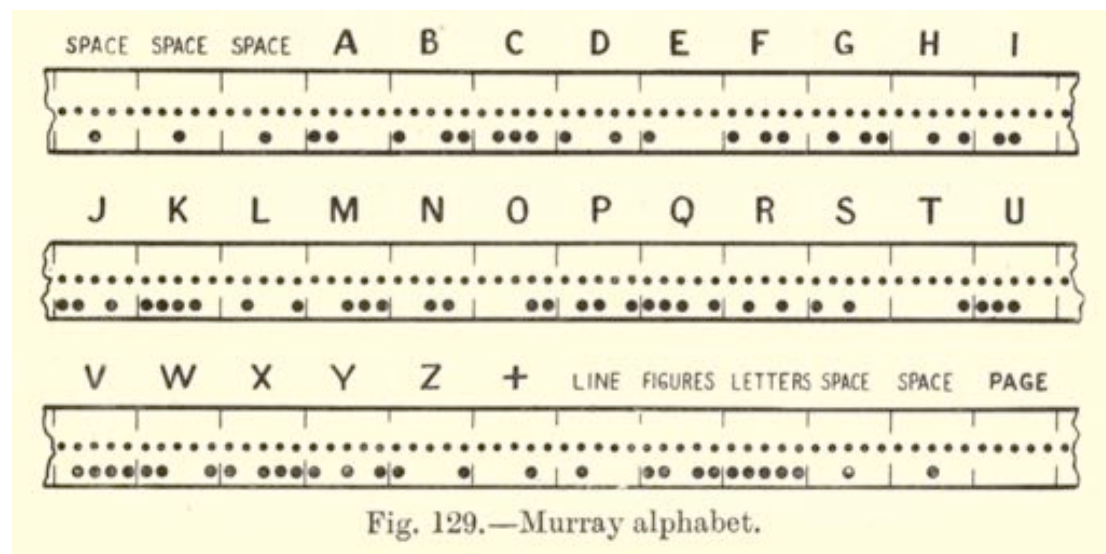
The Murray Automatic

In the matter of his choice of the 5-bit code, Murray maintained that he thought of it independently, though he acknowledged that Baudot thought of it much earlier and he had extremely high regard for Baudot and his accomplishments. :

> *The clear, logical French mind of Baudot adopted the five-unit alphabet as a matter of course. I adopted it because I had studied logic and knew nothing whatever about telegraphy.* (PBT p. 55)

> *I got it from a study of logic and particularly from Jevons' logical alphabet in his* Principles of Science. (PBT p. 29)

This is quite reasonable as Murray embarked on telegraphy with little or no knowledge of northern hemisphere developments. Baudot needed a non-zero space character and its absence in Murray's early systems support his not merely copying Baudot.

Two further patents assigned to the Postal Telegraph Company described some of the changes that were made while passing through New York. One notable change was the punching characters horizontally on the tape, rather than vertically. This is certainly simpler and not too negative in that competing Morse-based systems used tape with two holes per column (and Murray's tape could be used again by turning it over!)
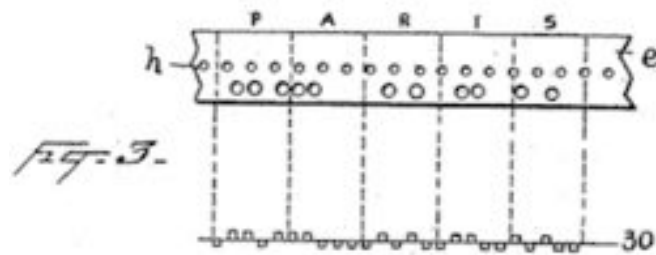
Figure 1 Linear punched tape

Murray's system was the fastest so far because it was the first to be fully synchronous – characters were transmitted one after the other with no gap – he devised a very clever method of using a "phonic" motor with correction of speed derived from the signals received. The established 5-bit synchronous system of Baudot used synchronizing signals between characters. The effect was that Murray's system, as well as being usable by less-skilled operators, was potentially about 15% faster than Baudot's. Murray, at the time, considered this to be very significant because of the high cost of telegraph cables and skilled labour.

Murray's introduction of the carriage return character in 1905 was reasonable in his system because received messages were punched to paper-tape, which was later listed on a printer – delay for carriage return was not a problem as the tape could be stopped and restarted instantly. (Aside: Though it appears that Murray's printer's carriage return was adequately fast to not need to pause the tape.)

It could well be the case that he borrowed the "line" character from Rowland – as we have said, he never claimed it as his invention. This illustrates a difficulty with discussing Murray's accomplishments. He was quick to take advantage of the ideas of others, though he was always willing to acknowledge where the ideas originated (for example, he always called his 5-bit codes "Baudot codes"). He would assimilate, integrate and improve, making many changes that were important enough to patent and to be of practical value to others. But it is hard to pin down major conceptual advances that were made by Murray himself.

An interesting 1905 feature was the adoption of 00100 to represent a space character. Presumably, as synchrony came from the character signals, a long sequence of spaces could cause trouble if they were represented as 00000. Note that Murray, and Baudot, represented 0 and 1 with negative or positive currents – there was no gap between bits – there would be no change in current if there were a sequence of 0s, or a sequence of 1s. The use of a non-zero, single 1, character for space was in Baudot's code and has come down

to ASCII but now as 0010000. Murray included spaces at the start of messages for getting the character alignment correct before printing from a tape – another reason for space being non-zero.

Another Murray innovation was the use of 11111 to represent a deleted character. So, any character already punched could be erased, just by over-punching with the character of all holes. Murray's keyboard had a backspace lever to realign the tape to erase mistakes. It would have been important for sequences of erased characters to not be too lengthy to avoid losing synchronism. "Erase" is a character that has come down to ASCII unchanged but extended to 1111111. Erased characters must have been transmitted, as characters were processed bit-by-bit – the erased characters must have been ignored at the printing stage.

(Aside: Murray's keyboard perforator had 33 keys for 32 characters. It seems that the extra key was labeled "start" – we do not know why that was necessary and what it was used for.)

The Murray Multiplex

Baudot already had a "multiplex" device that would transmit (using time division multiplexing) up to four (or more) messages simultaneously over the one line, but at a slower speed, about 30 words per minute.

Much use was made in telegraphy of "duplex" operation, sometimes called the "duplex balance". This sounds as though it is time division multiplexing of two messages, but, in British Telegraphy, it always refers to simultaneously sending two messages in different directions on the same line. At the time of its invention in the 1850s, by the American Joseph Barker Stearns, this was considered almost miraculous and of great commercial significance, immediately doubling the capacity of telegraph lines. Later, most practical telegraph circuits (except Baudot) were duplexed as well as multiplexed – for example, a 4-way TDM multiplex circuit, or quadraplex, might also be duplexed to give an octoplex – 4 messages in each direction simultaneously. In a rather heated exchange in The Telegraph & Telephone Journal, Murray makes the good point:

> *It is of course well known to telegraph engineers that any telegraph system can be worked with the duplex balance because* it is not the system that is duplexed but the telegraph line and the mainline relay connected with the telegraph line*. The rest of the apparatus comprising any telegraph system is essentially local, and there is nothing whatever about it that is duplexed, The transmitting apparatus of some systems is less favourable for the duplex balance than others .....* (TTJ, Vol 4. P10)

His Automatic system had the defect that it was difficult to operate printers at the same high speed as the data transmission. Murray tried to address this problem by developing a rugged high-speed printer that could type 200 words a minute (20 characters per second!) When trialed, this involved high levels of maintenance so was abandoned. An advantage of multiplexing was that the slower transmission of individual messages imposed less stress on the supporting machinery, particularly the printers. So Murray moved on to develop his own multiplex system. (Aside: After Murray had retired, Creed introduced a 60 words per minute printer to work with the Murray multiplex.)

The Murray multiplex used much of the ancillary equipment from the Murray automatic but its main feature was its *distributor*, which was modeled on Baudot's. This takes four (or more or less) streams of 5-bit characters at up to 40 words per minute and interleaves them on the one circuit operating at 160 words per minute. On the transmitting end the signals come from paper tape but the tape transmission may be started before the typing and tape-punching is complete. The tape may be fed directly from the keyboard perforator to the transmitter which has a mechanism for detecting tightness/slackness in the tape and automatically stopping then restarting transmission. (Aside: The first version did not have this feature.) The keyboards are fitted with "start" and "stop" keys - some of the 5-bit codes had to be changed, but his keyboard remained essentially the same. At the receiving end, the message may be printed directly, punched to a tape, or both.

The nature of the European market was a serious roadblock to the development of printing telegraphy:

> *In Western Europe there are two very serious handicaps on telegraphy, and therefore on printing telegraphy. These are : (1) The comparatively small areas over which undivided authority exists, and (2) the differences in language. The prime conditions for extensive use of telegraphy are a large and well-educated population speaking one language and spread over a continental area. These conditions exist to a high degree in the United States of America, and in the United States telegraphy is making remarkable progress, in spite of the competition of the telephone. In fact, the telephone assists. There is also one language and a continental area in Canada, Russia, Australia, Brazil, the Argentine, and South Africa. When these new giant world States have grown up, telegraphy will take on a very different aspect from what it has now. Telegraph traffic will be enormous; printing telegraph inventors will come into their own, and there will be printing telegraph*

millionaires in those days. Meanwhile the printing telegraph inventor has to wear the mended shoe, because the growth of the telegraph service is cramped by the smallness of European States like England, France, and Germany, and by the differences of language, and by the division of authority. (PAPT p. 483)

In his 1915 paper Murray discussed recent improvements to the Murray Multiplex.

> *... I have adopted cross-perforated tape for the Murray multiplex, and, acting on my recommendation, the Western Union has done the same.* (PBT p. 97)

He raised the transmission rate for each quadrant to 45 words per minute, being more in line with the capabilities of *young girl typists* (PBT p. 97)

He partially apologised for delay in delivering his system by pointing out for Printing Telegraph systems that

> *In practically every case they have gone through two distinct stages of development.* (PBT p. 99)

In the Telegraph and Telephone Journal he had a minor dispute with "J.B." regarding the rôle of Gauss and Weber in developing 5-bit codes. He might have been responsible himself for the belief (still repeated today) that Baudot got his ideas from Gauss & Weber. But he shows that their alphabet was, like Morse, in the variable-width class, and that the originator of the 5-bit code was Francis Bacon, absolutely British – this is in the middle of WW1 so it was important to clear that up! It is an amusing correspondence in which Murray gets to show off his knowledge of Latin, and German. (TTJ Dec 1916 pp. 34/35).

Another dispute in October 1917 was initiated by Major A. C. Booth in a letter to the "Annals des Postes, Télégraphes & Téléphones" claiming the invention of the Baudot duplex. Murray complained:

> *Major Booth in his letter says that the Murray multiplex, the Western Electric multiplex and the Siemens duplex automatic are all three "really modified duplex Baudot systems". That is incorrect. Certain elements of these systems are taken from the Baudot, but the great bulk of the work in each of them is original or taken from quite other sources than the Baudot. The inspiration was largely Baudot. That is quite a different matter.* (TJJ, October 1917 p. 12)

This was a grave slight and was not concluded as it had "become a subject of official correspondence between Mr Murray and the Secretary of the Post Office".

Synchronization

Perhaps Murray's most important technical contribution was in perfecting synchronization. This has two aspects. *Bit-wise synchronization* to ensure that the receiving station receives the same sequence of bits as were transmitted. *Character synchronization* to ensure that the bit stream was split correctly into 5-bit characters to be punched or printed.

With the Murray automatic only bit-wise synchronization was needed between stations – the bits of successive characters were read from tape, one at a time, and transmitted, with no gap between characters and punched at the receiving end also with no gap. The character synchronization was achieved by always preceding messages with spaces - 00100 - that could be set manually in the correct position before commencing printing. It seems that Murray was the first to have this style of message and synchronization that would be widely used later for electronic data communications.

Achieving bit-wise synchronization was Murray's big invention, which was revealed in 1905 and described in "Setting Type by Telegraph". He described in detail how it worked in the paper so there is no need to elaborate here. Murray made use of a "phonic motor" driven by a vibrating reed relay (the invention of the Dane Poul la Cour) that could control the speed very precisely. However, not precisely enough to avoid synchronizing errors building up. His solution was exceedingly clever and made use of mismatch between marks received and local clock signals. The receiver was always set to run faster the transmitter (so the receiver had only to be slowed, not sped up) and the mismatched signals caused the current to the reed relay magnets to be reduced until the match was again perfect. This is what led Murray to introduce a non-zero code for blank – a long sequence of zeroes would give no reference signals to check synchronization.

In contrast, Baudot's synchronous system made use of a special mark signal inserted between each character. He also had the receiver run faster than the transmitter (probably where Murray got the idea) but used a mechanism to cause the drive to the receiver to skip if there was a mismatch between the local reference and the synch mark received. As mentioned before, Murray was proud of his technique that was potentially of greater capacity than Baudot.

In "Push the Button telegraphy" he discussed at length the problem of synchronization and introduced terms for two approaches, regarding the distributor as a clock – "shift the hands" as used by Baudot to cause it to skip in order to match the input. The other (as used in the Murray Automatic) is to automatically change the speed of a phonic synchronous motor, based on the data signals received – he called this "pendulum control" but other terms were used. He extolled the combination of the two approaches, used in the current Murray multiplex, as being by far the best.

He described his multiplex's use of *securing synchronism from the signals themselves*, with the use of an idle signal, being adopted by others including the *French Government on the Baudot across the Mediterranean between Marseilles and Algiers*. (PBT p. 97)

And he had … *received an order from the Indian Telegraph Administration for two phonic motors fitted to two Baudot distributors.* (PBT p. 97)

Murray was awarded a nice "bouquet" in a news item in August 1917:

> *In season and out of season Mr Donald Murray, with the sure eye of the prophet that* knows *to guide him, has advocated the superiority of the phonic wheel motor for driving Baudot and kindred telegraphic distributors. In "Press-the-Button-Telegraphy," in debates in our now vacated home on the Victoria Embankment and before the High-Speed Telegraphy Committee he has not failed to voice his belief and give reasons for the faith that is within him regarding the absolute efficacy of this type of synchronizer. He has now the satisfaction, not always accorded to men in their lifetime, of seeing his ideas fully adopted and his views accepted as correct. Now that the device is in actual use one can scarcely realize that there should have been any need for a lengthy struggle over the matter.* (TTJ, August 1917, p. 146.)

He sees a market opportunity for upgrading existing Baudot systems to use his "pendulum control".

> *The war has interfered a good deal with progress, but the British Post Office has given an order for a complete quadruple duplex installation (8 channels on one wire, 45 words a minute per channel). Two similar installations are being made for New Zealand, and other orders are pending. A number of Administrations using the Baudot, including Russia and India, are also showing much interest in the improved phonic drive for the Baudot distributor and Baudot printers ….*

> *This enables the speed of the Baudot circuits (of which there are about 400 in use all over the world) to be increased from 30 to about 45 words*

a minute, and the addition of the Murray cross-tape keyboard perforators and transmitters … gives the Baudot circuits, at moderate expense, practically all the advantages of the Murray multiplex, …. It is estimated as the result of experience with the Murray multiplex and the Western Union multiplex that increasing the speed of the Baudot circuits to 45 words a minute per channel, and adding keyboard perforators and tape transmitters will increase the efficiency of the Baudot circuits by 50 per cent. (PBT p. 215)

(Aside. The NZ installation of the Murray multiplex did not take place until 1922. This was initially implemented with a strip printer. See appendix 2.)

Later Developments

We are lucky to have found an Australian training manual for the Murray multiplex, called "Telegraphy II". It is evident that there many modifications were made over the years and it has been interesting to read about the operation of the mature system.

Although Murray did talk about his multiplex combining both his and Baudot's method of retarding the clock, the model described in Telegraphy II does not seem to use his pendulum control to change the clock rate. In designing the Multiplex, which could have up to, say, 4 messages being transmitted simultaneously, Murray must have accepted that any particular channel could be idle and just transmit a sequence of nulls 00000. Indeed, all of the messages could be idle so that mark signals from the messages could not be used for synchronization.

As described in Telegraphy II, the Murray multiplex used a disc plateau with marks corresponding to 4 characters of 5 bits and 2 extra marks that were used to send a synchronizing pulse. Murray must have thought that the loss of only 10% per character was a reasonable price to pay for synchronization. The method that is used (we do not yet understand it) was to disconnect the drive to the rotating brush assembly when there was a mismatch between the local and received synchronization signals.

Telegraphy II details the procedures that were necessary to get two stations in synchrony. One was designated the *correcting station* and operated at constant speed. The other was called the *corrected station*, set to rotate slightly faster, and corrected continously by the marker signal mismatch. Once synchronization was achieved (a complicated set of procedures) it would be retained perpetually unless something was amiss with the line. Note that if synchrony was achieved between the correcting and corrected

stations it implied automatically the messages could be sent, duplex, in the other direction.

Murray provided a "repeater" that would enable a message from one multiplex to be relayed on to another. What is required is some kind of memory. From some discussion in the Telephone & Telegraph Journal it appears that this involved the use of punched tape, though special memories involving iron rods or ball-bearings were tried unsuccessfully.

Here are some extracts, without discussion, from "Speeding Up the Telegraphs", Murray's last telegraphy paper.

> *We must type as well as talk. We must "teletype" as well as "teletalk".* (SUT p. 245)

> *The machine that has made this new telegraphy possible is the start-stop telegraph printer – provided with a typewriter keyboard and requiring only momentary synchronism.* (SUT p. 245)

> *Some years before the war when I was in Moscow, I was told that "Time is not money in Russia." I was also told that "The Lord God has plenty of time". However, the Russians are adopting modern habits, and all over the world "mañana" is giving way to "pronto".*

> *The explanation for this modern haste lies in the fact that a profit of a shilling an hour is better than a profit of a shilling a day. In other words, the faster one does business the more business one will be able to do and the greater will be one's annual dividend. Every businessman knows that, and every businessman knows how profitable it is to use the telephone and telegraph.* (SUT p. 247)

> *The patient's condition may be diagnosed as "excessive circuit facilities and defective terminal facilities".* (SUT p. 251)

> *No doubt this will provoke a smile, and people will say that I, as a telegraph machinery merchant, am using the shoemaker's argument that there is nothing like leather.* (SUT p. 252)

> *The era is beginning when typewriter keyboards in the offices of businessmen will not merely type letters, but will type and transmit telegrams direct to correspondents in any part of the world.* (SUT p. 252)

> *... printing telegraph inventors and manufacturers are a conquered race of helots who have made no particular profit up to the present out of printing telegraphy, or at least no profit in proportion to their efforts*

and to the service they have rendered. This has resulted in telegraph development work being starved and stunted. (SUT p. 253)

The teletype can be left ready for receiving messages at night. (SUT p. 254)

4.0 Murray's Philosophy of Power

This is where it gets difficult! Let's follow Murray's unconventional lead - if he can deploy the perpendicular pronoun promiscuously, then why not I? It is certainly a lot more honest than torturing one's prose to avoid it.

I *had* to read the Philosophy of Power to see if there was any information pertinent to Murray's biography, as there indeed was. Having gone to the trouble of wading through it twice, it seemed worthwhile to at least describe the work – that might inspire others to also read it, or to save them the effort of having to do it themselves.

I cannot write a critique of the Philosophy of Power. I don't know much about Philosophy, Theology nor Political Economy and I know very little about Thermodynamics. So, all I can do is describe the books, outline the contents and give some advice on how to approach the task of reading them.

Why read The Philosophy of Power?

Murray wrote it for our benefit and perhaps he deserves the respect of being read. The copy of Philosophy of Power that I had tracked down was last borrowed from its library in 1952! He was integrating all aspects of his background and all he has read about philosophy and science – how it all ties together. He had lots of little insights to go with his profound philosophy. One might learn something worthwhile. There might be some parts of his prose that are interesting enough to preserve. For Antipodeans there is also the possibility of insights into our local history.

> *I have supplied a magnificent background for human destiny in* the two Laws of Thermodynamics, Growth and Decay, which have been expanded from laws of heat into the two most fundamental laws of the Universe*, from which all other laws of Nature,... , are deductions or aspects.* (POP p. 67)

> *People on the coral islands of the Pacific do not toil for their living, so why should people do it anywhere else? Animals and the gods do not toil for their living, so why should men? "Consider the lilies of the field, how they grow; they toil not, neither do they spin." Why not imitate the lilies, and let the Sun-god toil for us? I want people to stop toiling for their living*. (POP p. 91)

I have learned much from reading the *Philosophy of Power*. I did not know about the six "classical machines". I was intrigued by Murray regarding the wheel as the limit of a set of levers, by his distinguishing between the machine wheel and the transport wheel. He stated that there are only two

dimensions, time and space, though space has many directions – an interesting way of looking at it. I had never heard of a "swingle tree" before. I now know that a gyro-compass depends on the Earth's rotation. And there is much more.

What we have to bear in mind

Murray was not insane or in his dotage when he wrote the books – we cannot dismiss his writing as geriatric ramblings. He had a purpose in the strange way that he wrote. He deserves to be looked-at seriously. He did not have silly misunderstandings of Science and Technology. Whenever I have thought him wrong, he is either correct, on looking deeper, or he meant something different than what I understood. (One exception is the benefit of superiority in battle (TOC. P. 207) but that was not understood in Murray's time.)

Murray was broadly educated in Science, Mathematics and Philosophy. He was widely read. He had a remarkable breadth of knowledge in Literature and current developments in Science. He had a unique range of experience – farming, journalism, technology, and business. He was in a good position to be an integrator, to see similarities between disparate fields.

Murray was a Victorian, with common Victorian attitudes. He regarded the role of women to be home-makers and child-bearers, for example. His Physics was classical. He was writing during a period of ferment in Science, with relativity and quantum mechanics being recent developments. He kept up-to-date. He read *Nature.* Although he protested that the mathematics is beyond him, he accepted special and general relativity. He probably understood quantum mechanics as well, though not the mathematics, and accepted the results though was vehemently opposed to anything happening by chance (he was in good company – Einstein's "God does not play dice"!) He was raised in horse-and-buggy days:

> *Perdition take aeroplanes and motor-cars. They are stupid and we shall substitute cheap, good, and easily accessible* Communal Transport *at high speed in the great centuries to come, when coal and oil will all be gone.* (POP p. 50)

Although his conclusions may seem strange, he was not alone. As with his telegraphy, he based his work on others whom he respected. He mentioned and credited those whose ideas he adopted. His primary mentor was Herbert Spencer, but he also acknowledges Ernst Mach, Wilhelm Ostwald, Max Planck among others (he also listed those whom he doesn't like at all.)

The essential feature of The Philosophy of Power *is the thermodynamic aspect, which is taken throughout. It is Herbert Spencer's Philosophy in modern costume, and it is a wonderfully unifying concept. Everything falls into place and receives its explanation simply and convincingly.* (TOC p. 15)

Although he was no fool, he fooled around with his readers. Another mention of the "method of outrageous assertion":

This Method of Outrageous Assertion is of great practical importance, not only for the advancement of science and philosophy, but also for the advancement of the wisdom of the reader. A particularly outrageous assertion jars the reader and stimulates his attention, makes him angry and eager to confute the outrageous assertion; in short, makes him go through the laborious and distasteful process of thinking. Even in the case of a placid-minded reader, an outrageous assertion rouses an amused smile and a desire to see how the philosopher will develop his outrageous theme. Readers will find the Method of Outrageous Assertion freely and frequently used in "The Philosophy of Power" *But I may be serious. You can never tell.* (TOC p. 17)

We mentioned before that his work was for "laughing philosophers". He went out of his way to write in an amusing style, to be as non-academic as possible. He discussed the importance of a good style in writing:

Writers with the gift of fresh, gay, buoyant prose, can charm readers by their shimmering style in spite of poor material. I have no such gift; but I have great material, and my ragged regiments of Tommy words from the trenches of everyday life are fine fighters of journalese nationality, handy with the bayonet that they use for writing, and fond of prodding idealists with facts. (POP p. 87)

Even the prose symbolism of The Philosophy of Power *is poor; but I hope that the clarity of presentation will compensate for this weakness. … This apology for poor style raises an important question, because it is failing that occurs among most of the scientists and would-be philosophers of the present day. There are many brilliant exceptions; but the average scientific prose is often so vile that mine, poor as it is, coruscates by contrast.* (POP p. 86)

Words are little sharp bright needles in a great haystack of talk. (TOC p. 45)

His language was mainly simple. He did not use many words that send you running to consult Uncle Google, though *coruscates* is an exception. One feature of his writing that is unusual is his use of invented catch-words:

> *Robert Louis Stevenson said: "Man is a creature who lives not upon bread alone, but principally by catch-words." I have therefore made free use of "The method of Catch-Words" and I have sprinkled catchy phrases all through* The Philosophy of Power. *It is good advertising, because men are like processional caterpillars; they follow each other blindly ....* (TOC p. 18)

> *The fate of Mankind is largely determined by slogans, good and bad.* (TOC p. 45)

He used "Rock of Ages" to refer to the law of conservation of energy (I think, sometimes, this seems to mean energy or God.) The Universe was "dancing weights and springs". His work was about "the feeding and breeding of men". Humanity were "my cattle". Then there was "The Lone Gorilla":

> *A few words of explanation are necessary about two symbols used from time to tie in the Philosophy of Power.* The Lone Gorilla *is the symbol of the Realist and of Actuality, ... a living beast, a vivid picture of extreme Individualism... At the other extreme of Communism is* the Termite *or* White Ant *... which is used ... as the symbol of social organization with complete sacrifice of the individual to the society.* (POP p. 82)

He often used "The Lone Gorilla" as a catch-phrase for himself.

> Geld regiert die Welt*, in English, "Money makes the mare go." ... The feeling has been cultivated that there is something indelicate about money, and it is considered bad form to refer to it. That is why I, the Lone Gorilla, mention it all the time – rub their denoses into it. I hate hypocrites.* (POP p. 94)

(Aside: The Philosophy of Power is remarkably free from syntax and spelling errors. I have searched widely for a meaning to "denose" and am beginning to think it might be an example, though "Denose" is a surname and he might just be referring to someone.)

He was a Christian and used some Biblical quotes but this side of his Philosophy was not well developed in the work he completed. He was a firm believer in God in some form:

> *In using the word 'God' in the Philosophy of Power, it may be well to say that I employ it as a symbol in the Spencerian sense of the Inscrutable*

and Unknowable Power or Intelligence at the back of all things. (POP p. 13)

This raised the question of God versus Chance, and as this goes down to the root of existence, I have had to deal with it at length and fight without gloves, because the existence of something that we call God is the fundamental basis for the well-being of men, and Chance is denial of the existence of the thing called God. (POP p. 63)

Chance is a mere expression for our ignorance. If we knew, *there would be no Chance.* (POP p.72)

He did not like long detailed arguments and preferred the obvious big picture:

It will be found that the Philosophy of Power is original in its outlook, which is intensely realistic, that it disdains ear-logic and argument, and relies largely on eye-logic, on shock and identification and illumination. It regards truth as a useful device, but expensive, and to be economized as much as possible. Truth is overrated, except to make us free. Only God can tell the truth, and it would take Him a long time. .... Instead of Ear-Logic, the chief intellectual weapons employed are Eye-Logic, Identification, Herbert Spencer's 'Inconceivability of the Opposite." (POP p. 69)

This down-rating of Truth is of some concern but he seemed to be mainly talking about long logical arguments to prove that things are true. The ear-logic vs. eye-logic distinction seems to be one of serial vs. parallel processing of data – the parallel eye can perform miracles compared with reasoning. Although he gives no indication that he knew and understood, Murray would have felt vindicated by the (new at his time) results of Gödel that there are mathematical facts that we cannot prove formally.

It is interesting how much his writing resembles a blog. He paid to have the work published himself and he was his own editor. Although the work is structured, some sections just pour out because some current event prompted him. This may be partly because he used the latest technology of dictaphone and a personal typiste/secretary. One big section in *The Theory of Control* is inspired by construction taking place outside his window - "A Thumb-Nail Sketch of Modern Industry. Villa Waitemata, Monte Carlo, November 15, 1928" (TOC pp. 239–350)

What we have to forgive or overlook

We might nowadays regard Murray as having many faults. But what is interesting is that he recognized most of his faults himself and discussed them. Let's consider some.

1. His egotism. He stated:

> *In spite of Bernard Shaw, 'I' does not always stand for Intelligence, or good taste, and the fact that the letter 'I' is so freely used in* The Philosophy of Power *demands an explanation, because it is an offensive thing, far removed from the old graciousness of self-abnegation; but it is a question of relativity. ....*
>
> *The copious use of the perpendicular pronoun has been wittily described as 'I' trouble. Old fashioned authors always say 'we' or 'the author,' never 'I'. It is one of the Victorian conventions inherited from ancient Rome, excellent in its way, but in many cases it interferes with directness and clearness of statement. The flood of modernism, headed by Bernard Shaw, has swept away this gracious old convention; but it was strictly observed by the Romans, the Greeks, the Red Indians, the Samurai of Japan and all the Oriental cultures, it seems to be preferable to follow this venerable custom, and we shall therefore suppress the glittering eye wherever perspicuity permits.*
>
> *Along with the glittering 'I' goes unpleasant self advertisement which is even worse than the perpendicular pronoun in violation of the traditions of good taste. Unfortunately it is a contest between Modesty and Publicity, and the latter has won, as it usually does in these vulgar days.* (POP p. 84)

Every so often we encounter statements such as:

> *I am one of the great seers in direct line of apostolic succession from Kant and Spencer.* (POP p.77)

My impression is that Murray believed that he had discovered some great truths. He was excited about this, thought he was very important, and that everybody should be told. There are not many such outbursts – better to ignore them.

2. Telepathy: Murray regarded telepathy and the paranormal as not yet disproven and allowed for it in his scheme of things, just in case. This is not a big issue.

3. Repetition: Murray repeated the same points over and over. This was deliberate.

*"There is, perhaps, more repetition than elegance demands; but one has to hit a nail often to drive it into hard wood." (*POP p. 86, quoting from Monsignor Kolbe's booklet *A Catholic View of Holism)*

In any case it is an advantage for teaching to have bulk and repetition; provided there is clearness of presentation, and in that one respect I think The Philosophy of Power *will be found beyond criticism.* (POP p. 88)

"It is only by treating a subject from many points of view, and by frequent repetition, that it gets any hold on the general mind. Effective exposition cannot be done crisply and compactly." (POP p. 88, quoting Sir Oliver Lodge)

... repetition. It is the refrain in poetry, the motif in opera, the secret of the hammer. I learned the trick of reiteration as the result of twelve years of newspaper work. It is the only way to force an idea into the public consciousness. Don't say it with flowers. Say it with a club. Use apt reiteration's artful aid. Only a succession of high-explosive shells landed one after another on the same spot can blast a way for a new idea into the mentality of some people. (POP pp. 88,89)

"But repetition is not argument." Of course not. It is much better. People are convinced and the intellectual reflexes are conditioned by repetition and not by argument. Symbolists argue, I cannot. I see and know *and I point out identity, which does not permit of argument. I never think. Indeed nowadays, Thinking is not respectable. It is one of the things that are 'not done.' Only silly people think. My readers are wise. They don't think either. They also see and know because I point out identities to them. Seers never argue; they repeat. A steam-hammer does not think. It repeats; the rhythm of the steam-hammer is the music of success.* (POP p. 89)

5. Lack of structure:

Still another sad deficiency is lack of orderly presentation. Some classification has been attempted, but it is unsatisfactory. The Philosophy of Power *has been a growth based on a life's experience, like Luther Burbank's* Harvest of the Years*. Thus of necessity it meanders in an undisciplined, unclassified, and formless way. But there is advantage in meandering, as long as we can then chew the cud of reflection, and absorb the ideas gently and well diluted with plenty of words to facilitate digestion. There is no Bovril in this book, not even condensed milk. Besides, rich meaty sentences strain the reader's attention. "For 'tis with*

words as with sunbeams, the more they are condensed the deeper they burn." (Southey) Who wants to get burnt? How absurd! (POP p. 87)

There is actually a great deal of structure in what he wrote – the first 100 pages describe the structure. But he did ramble on and even contradicts himself:

> *Finally, a word about inconsistency; there is nothing like inconsistency for stimulating readers. In any case this Philosophy has grown, evolved gradually as I have day by day absorbed the ideas of other men and woven them along with my own, into* The Philosophy of Power. *While thinking things out and dictaphoning them, step by step, inevitably there have been developments and changes in points of view. Why conceal that growth? Why eliminate the vestigial organs, why cut out the appendices, to meet the demand for consistency made by rectangular city dwellers? Shall I, the Lone Gorilla, enslave myself to a silly convention about consistency? The branches of the trees in my jungle home grow in opposite directions and clash and interlace. Shall my thoughts be less free that the branches of a tree?* (POP p. 99)

6. Low level of material:

> *... the American federal Bureau of Education says: "Present your speciality on the level of thirteen-year olds. Do not overrate the intelligence of your audience. Use anecdotes."* (POP p. 88)

> *Catering for the thirteen-year-olds introduces certain limitations and exclusions, including mathematics. A reviewer in* Nature *said, "The temptation to swamp his hypotheses and proofs in a whirlpool of higher mathematics has been nobly resisted by the author." There is no such temptation in the present case, because I have not even lower mathematics.* The Philosophy of Power *is free from mathematics because I don't know any.* (POP p. 92)

> *The question has been asked: "For whom are you writing this best seller, this popular treatise on Thermodynamics?" ...* The Philosophy of Power *does not aim to be a best seller; but it has many new ideas and remarkable extensions of old ones, and is designed to attract students with young and fertile minds caught by the intriguing title and by the ideas ... if* The Philosophy of Power *serves as an Aufklärung, an Enlightenment to a few thousand young disciples of Lucifer, who will spread the light, ... then I shall have succeeded greatly.* (POP p. 90,91)

He actually had a good education in Mathematics but did not want to alarm his readers.

7. Vituperation: To modern eyes the extent that Murray lashed the opposition is noteworthy. Nietzsche got both barrels:

> *Nietzsche. Another name for a bad smell. He was an effeminate weakling, deficient in male sex hormones, thus suffering from an inferiority complex. Hence, realizing his weakness, he worshipped the strong masculine man, the 'big blond beast.' He went insane, which is not surprising. No German of any standing seems able to write a book without dragging in something about or from Nietzsche, a poor effeminate lunatic. The German adoration of Nietzsche is incomprehensible. I loathe the creature.* (POP p. 323)

Most of his protagonists got off more lightly. Perhaps this was all a hangover from Victorian journalism where, it seemed, there was little fear of libel. Murray thought that insulting the opposition was quite justified:

> *There is no greater peril to mankind than to have fools in high places, and the only remedy is to point out that they are fools. We must attack their prestige as well as their false doctrines, because their prestige supports their doctrine. André Metz, one of the leading French authorities on Relativity, says,* "Un nom célèbre, n'est pas forcément la marque d'un esprit infaillible." *In English that is, "A celebrated name is not necessarily the mark of an infallible mind."* (POP p. 95)

> *Unfortunately, in these degenerate days, one of the curses afflicting mankind is politeness to fools, the desire to avoid hurting other people's feelings. It preserves many evils – from religious superstition onward to individual and national vanity. … Abuse (that is to say, labeling them what they are, so that all men may know and be on guard) is the one great fresh-air daylight weapon that we have against such creatures.* (POP p. 96)

> *In the long ago of the Maori War in New Zealand, General Sir George Whitmore was leading his men for weeks through the bush pursuing the Maories. They were verminous, and complained. "Men," he said, it is honourable to be lousy when you are in pursuit of the enemy."* (POP p. 97)

> *No wonder that* in The Philosophy of Power *I stamp on the toes of the Socialists, Communists, Capitalists, Individualists, Workers, Loafers, Protestants, Catholics, Reds, everybody and everything. I am sick of Vanity Fair, and I am trying to convert it into Donnybrook Fair with its great war-cry – "If you see a head, HIT IT!"* (TOC p. 20)

8. Racialism: Murray has been accused of being a fascist and racist. He had some early sympathy with the way that European fascists got things working but he hated the idea of dictatorship. He thought that racial purity was a stupid goal, knowing, as a farmer, about hybrid vigour. However, he was an avowed *racialist* – the term that he used. This does not *per se* imply that he thought that some races were superior to others, rather that he believed races should be kept separate; it seems to be more the clash of cultures that is his concern. I would not be surprised if he harbored Victorian attitudes to race, though the only such mention that I can find is *High-grade races will never agree to be ruled by inferior races.* (POP p.44)

There does not seem to be any anti-semitism present. He promised to explain *Why the Jew is a Jew* (POP p. 41) but never got to elaborate. He was horrified by the Nazi slogan *Deutschland erwache, Juda verrecke* (TOC p. 44, p. 387).

He outlined his proposals for a new world political order with the globe divided into regions each dominated by one particular race. The Nordic race, The Mongol race, the Hindu race etc. - about a dozen in all - peace seemed to be guaranteed by some form of Mutually Assured Destruction (though his time was before atomic weapons,) all held together by tariff and trade agreements.

However, racialism leads on to:

9. Eugenics. Which is important to Murray. He believed in it sincerely, describing the purpose of the second half of his work as the breeding of men. It seemed self-evident to someone with farming background where stock are consciously bred for improvement. His eugenics involved the full range of atrocities, selective breeding, sterilizing the unfit etc. All we can say in his defence is that Eugenics was a widely-held belief at the time of writing, around 1930, held by people much more well known than Murray, including George Bernard Shaw, John Maynard Keynes, Sidney Webb.

Perhaps the best way to treat Murray's racialism and eugenics is to just ignore it. By the time that he would have expanded this part of his work, World War II and its aftermath would have made it all seem quite ridiculous and maybe would have called for one of his changes of opinion – who knows? Anyway, it is easy to skip over as most of it is in the overview section in the first volume. In the rest of the work it is only occasionally that one needs to avert one's eyes to avoid eugenics and its implications.

Volume 1. First Principles

By overlooking the faults and understanding his style it is possible to read Murray's Philosophy with some wry enjoyment. He himself stated:

> *I therefore advise readers to go through the volumes three times; first skim through* for amusement; *second, read carefully* for education*; third, study deeply* for Religion*.* (TOC p. 400)

Having read it all twice, perhaps a third reading is getting to the stage of self-inflicted "cruel and unusual punishment". I do not understand it, really. All I will do is pick out what seem to be the main points and some of the interesting writing. Anybody who is deeply interested in the arguments (and understands Philosophy, Theology etc.) is most welcome to go through the books in detail.

Volume 1 has 108 pages of overview. The remainder of the book is an introduction to *The Vision Splendid* (POP p. 109) followed by two large chapters.

The first chapter is *The Realization* (POP p. 113.) Men are not suited for toil. This can be avoided by accumulating then distributing wealth. So, the major theme of this chapter was the definition of wealth. He refutes Karl Marx strongly – wealth is not produced by labour. Rather,

> *Wealth is useful active (super-atomic) energy seized and controlled by man, together with the passive (sub-atomic) energy or matter employed by man to seize and control the active energy* (POP pp. 149-150).

Which is summarized by the catch-phrase:

WEALTH IS ENERGY CONTROLLED BY MAN

(In this is he following Ostwald.) He did regard "Spiritual Wealth" as being very important as well but this volume is concerned only with material wealth. He regarded the meaning of "Control" to be so significant as to demand a volume of its own. Farmers came in for particular consideration because of their importance and their current conditions of toil for little reward:

> *Farming is intensified and improved hunting.* (POP p. 194) *All profits come, not from the workers, but from the sun by farming.* (POP p. 197.)

An interesting story is how butter from Jersey cows is brought to Jersey:

> *Milk is one of the few substances requiring no modification before use; but the complexity of the network of modifications between the New Zealand cow and the London consumer of New Zealand butter is*

astonishing. The milk is pumped out of the cows by machinery, and the cream is whirled out of the milk by separators revolving at enormous speed. The cream is sent by rail or boat or motor-car to one of the many central New Zealand butter factories, where along with the cream from two hundred or more other farmers, it is graded, tested, mixed, neutralized, pasteurized, churned into butter, washed, salted, worked, packed into boxes, and sent to the nearest port for shipment to London, and to shops in Jersey, the home of the Jersey cow. (POP p. 155)

Some comments on industry and his role in it:

In London in my factory I employed a number of highly-skilled engineering workmen. They got good wages, substantially above the trade union rate, and there was a good demand for their services. A manufacturer will never get good men into his employ if he only pays trade union wages, and it is impossible to run a factory profitably with poorly paid workmen. (POP p. 172)

It is the managers that gather in the surplus value for the benefit of the company, including the workers. Again and again I must repeat that I am not defending parasitism, If a man uses his capital or his position to extort unfair profit from his employees, or from his employers, then he is a parasite ... and his greed should be restrained.; but to say that modern industry is based on human greed and on unscrupulous exploitation of unfortunate workmen is childish nonsense. There is a fair line throughout life, and the capitalist is entitled to his wages just as much as the workmen. (POP p. 176)

Chapter 2 is *The Rock of Ages and the Nature of Energy* (POP p. 219) This starts with an enjoyable Bunyanesque parable of Science and Religion.

In the wilderness of this world, there is a hill called Rock of Ages or Mountain of God. On the western side and on the eastern there are many paths leading to the top of this huge massif. From the west, innumerable men who feel *climb the mountain by religious paths. As they reach the top they see the majesty of the sunrise in the East and it fills them with hope and joy.*

Up the eastern side, long processions of men who know *climb the mountain by scientific paths. At the top the see the majesty of the sunset and they are filled with despair. They see Nature sinking to rest, and they talk strangely about the Second Law of Thermodynamics and entropy and the running down of the Universe. Thus their souls are enveloped in the night of pessimism.*

At the top of the Mountain of God, all these men who feel and know, find an immense golf course called the Field of Philosophy, which is the meeting place of Religion and Science. Like all mankind, the men from the east and west who arrive at this field of philosophy are so conditioned that they cannot turn round. In accordance with Newton's First Law of Motion, they have to go straight on; thus they cannot see the point of view of the men who have come up the other side of the great hill. When these pilgrims meet they engage in furious games of golf, and with their clubs they deliver terrific blows at the little golf balls known as philosophical doctrines. The hardest hitters are known as D.D.s and D.Sc.s. As the D.D.s cannot move west and D.Sc.s cannot move east, they play north and south till they lose their balls over the great northern precipice of the Unknown, or the great southern precipice of the Unknowable. (POP. p. 220)

This chapter concerns the nature of Energy. We now seem to accept that there is such a thing but its existence was one of the greatest scientific breakthroughs of the 18th and 19th centuries.

… it was only in quite recent times that we managed to excavate the idea of 'Energy,' and even when we had got hold of that great conception, it took us many years to recognize that energy is interchangeable without loss or gain in all its many manifestations. When we had at last succeeded (less than a hundred years ago) in chasing our immortal grinning friend, Energy, through all his protean shapes and tricks, we were at last able to formulate in words with full understanding, the great discovery … (POP p. 238)

He mocked the usual circular definitions of energy but left us with the feeling that Energy is unknowable. He did classify energy into two types. What he called space-energy or pressure energy:

… it is the word 'potential' that is silly. Potential means powerful and also 'possible' … 'Pressure-Energy" is therefore better … (POP p. 254)… Pressure-Energy is storage of power. (POP p. 255)

And its other form was time-energy or velocity energy that involved movement. But these definitions are very generalized, coal has pressure-energy, for example. But the main point of this chapter is that the Law of Conservation of Energy is *the* fundamental law of the Universe.

The Continuity of Nature is fundamental to our experience and to our thinking faculties. (POP p. 223)

The general reader who is prepared to accept my assurance that the Continuity of nature, the Conservation of Energy, the Law of Cause and Effect, Newton's Laws of Motion, and the Second Law of Thermodynamics, are all different names for the same thing that we have called Rock of Ages, will save time and escape a certain amount of brain fog and vascular excitement, by skipping over several pages at this point. (POP p. 240)

Although I do not understand, I certainly have the impression that he knew what he was on about!

Volume 2 – The Theory of Control
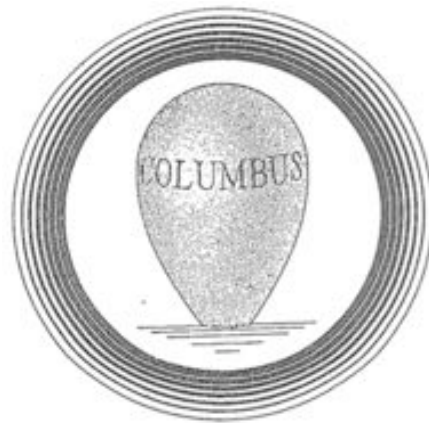
It is somewhat of a relief that the second volume is a lot more straightforward than the first. There is a much shorter preface, most of which we have already covered. The emblem of this volume is the Egg of Columbus (TOC p. 15):

… the Egg of Columbus is used as a symbol on the cover of this book. Columbus was told it would be impossible to sail West to the Indies as it would be to make an egg stand on end.

"Bring me an egg!"

Columbus tapped it on the table and it stood up on its chipped end.

He immediately made the claim which the rest of the volume elaborated in detail:

Control results from the Combination of Stable and Unstable Equilibrium (TOC p. 16)

Followed by a little joke:

Mention of the Egg of Columbus illustrates the remarkable fact that Philosophers always start ab ovo, *and also* de novo. *Everything does, including plants. We eat the eggs of wheat as well as the seeds of hens.* (TOC p. 16)

The first chapter is then "Introduction" (TOC p. 23). This kicks off with a delightful parable where Murray poked fun at others but accepted some stick himself.

Speaking to the Devil the other day about Money, the root of all evil, including the present Depression, I happened to make some ill-informed remarks about editors and publishers, when he interrupted me and said these people were decent fellows and his very good friends. There were a few black sheep amongst them who had gone to Heaven, but the vast majority were in Hell.

He had no patience with authors and people of that kind, as for reviewers and critics he could not tolerate them at all. They used the words 'format' and 'definitive,' 'foreword' and 'décor,' 'values,' 'infinitely' when they meant much and 'lesser' when they meant less. He consigned them to the lowest depths; but he reserved the most exquisite tortures of Hell for people who 'blazed trails' and 'explored possibilities'.

I hastened to assure His Majesty that I agreed with him.

He had an intense repugnance to politicians, and as these disgusting creatures were also barred out of Purgatory and Heaven, their souls drifted in interstellar space, and slowly disintegrated under continual bombardment of the cosmic rays. He was also fed up with 'Noted Publicists,' 'Famous Editors,' 'Great Thinkers' and 'Significant Voices that Count.' They are a nuisance in Hell, both to himself and to his other guests, and he proposed to drive them into outer darkness. They could go to Heaven for all he cared. In fact that would be a good place for them, as Heaven had fallen behind in the March of Progress, and they would no doubt inaugurate Great Improvements there.

"But," he said, "you are an author?"

"Oh no, Sire, I am manufacturing a technical treatise on Power."

"You are a manufacturer!" he snorted. "They work harder than common labourers!"

I explained that I hadn't always been a manufacturer, and that I had been a newspaper man for many years.

At that his face broke suddenly into a sunny smile, and he shook me warmly by the hand.

"What! A newspaper man! Then I'll see you later. Good-bye!" (TOC p. 24)

At this point there is elaboration of one of his themes that our Universe is shot-through with *diphases*, which have two extremes that need to be in balance.

> *… I gradually began to realize that all our present miseries are caused by upset of the 50-50* Balances *of the great Diphases, animal and plant, male and female, aristocrat and democracy, the individual and the nation, industrialism and militarism, quantity and quality, production and consumption, the State and the Church, and thousands more diphases that arise from the Fundamental Diphase of Pressure Energy and Velocity Energy about which we have spoken so much in the first volume of* The Philosophy of Power. (TOC p. 25)

> *Thus, as the chief aim of philosophy is to give gay and good advice, the wisest and gayest advice that the* Philosophy of Power *has to give is* Keep your Balance, *including your bank balance, and if you lose it* Go Back and get It. (TOC p. 25)

> *Balance gives control.* (TOC p. 165)

> *Great injury is done when the 50-50 balance of a diphase is upset and there is usually a strong reaction, which is equally destructive.* (TOC p. 27)

This led him to consider that "Universe" was not a good term:

> *A word or two may be said here about our Dualistic Diverse. A Diverse can be regarded as two Universes in collision. That collision, something like what we call Creation, may be supposed to have begun at some time in the past, and may perhaps end at some time in the future. The future ending has been poetically described by Tennyson as "One far off divine event to which the whole Creation moves."* (POP p.70)

> *…. I am a thorough-going dualist, and believe that we live in a Dualistic Diverse and not in a Monistic Universe.* (POP p. 245)

Chapter 2. (TOC p. 63) The Welfare of Men. This seems to be repetition of earlier material

Chapter 3. The Rise of Man to World Dominion. In this, Murray shows that he really understood the complexities of advanced life.

> *As a teacher, I repeat. Man is not a* machine, *but a* nation *of somewhere about 18 trillion living cells, according to estimates, and he is full of machines, levers, motors, electric wires, telephone exchanges, pumps, electric batteries, hammers, lenses, chemical laboratories, digesters,*

boiling-down establishments, kadaververwertungsanstalten, testing machines, seeing machines, and, at the back of it all, the Ego, the Soul, the Something that we know nothing about, and the we call Ego or I, one of the three great mysteries, Energy, Ego and God. (TOC p. 91)

… it is doubtful if civilization will ever faintly approach the amazing network of balances and controls in the human body. Taking only one department, the endocrine glands – with their remarkable chemical secretions and their complicated interacting effects on the body – are like nothing else in Nature, and in face of that strange chemical jazz-dancing on the tight-rope known as the endocrine balance, it is difficult to conceive the stupidity of talk about the man machine. (TOC p. 173)

Chapter 4. The Lever and Mechanical Control. This made some nice points:

Wheels are special levers and the spokes of a wheel are of great significance. They are levers. A wheel is really an infinite number of levers which successively take the place of the previous ones. (TOC p. 102)

The machine wheel does work. The transport wheel does no work. (TOC p. 115)

At last we have discovered the great Secret of Control. *It is a question of* a reservoir of available energy held back by a dam or trigger. (TOC p. 129)

He gave a great example of control taken from his early youth on the frontier:

> *An interesting example of static control suddenly converted into dynamic control was employed in the north of New Zealand some sixty years ago for conveying kauri pine logs from forests to sawmills to be cut into boards. … In those days of my childhood there were magnificent kauri pine forests with great trees as large as six feet in diameter. They were felled with axe and cross-cut saw, and afterwards sliced into planks by hand with rip-saw in saw-pits; the only capital being the tools and human labour. Then the method was invented that I am about to describe on account of its illuminating application of Power. The plan was as follows: The trees in thousands grew on hillsides, mostly of yellow clay and bracken-clad ranges. There were small streams and gullies. The trees were sawn into logs and jacked and rolled down into the stream which was dammed with planks and clay, the water accumulating as a reservoir.*

When a number of logs had collected in the reservoir, perhaps ten or twenty, a key plank would be knocked out and the dam would burst. The logs swept roaring down the valley in a raging torrent of water that gouged out the clay gullies and destroyed the protecting undergrowth of small trees and bracken as the logs were carried down to the harbour and towed to the nearest sawmill to be cut into boards. The dam was then rebuilt and the process repeated. The gully grew larger and larger, and the reservoir more formidable, with many more logs, Finally the forest in the valley was exhausted, and the greedy destruction of beauty ended.

It was a wasteful method of exploitation, as the gully grew large and bare with erosion of the yellow clay, causing much damage. (TOC pp. 144,145)

Chapter 5. The Vast Importance of Classification (TOC P. 177). Murray was careful to distinguish between "classification," which is creating classes, and "classing" which assigns things to classes. He was adamant that Science is not measurement but is fundamentally a process of classification:

The human mind arranges classes, and then endeavours to fit the external world into these classes, modifying the classes until there is a satisfactory fit between the external world and our mental edifice of classes. The congruence between the objective world and our subjective world is what we call truth. (TOC p. 194)

Rural or nostalgic readers will be amused by the many examples using sheep or horse-drawn vehicles. Given that the most powerful control involves unstable equilibrium, he makes an interesting observation about the ascent of man:

How did man reach this remarkable position? Simply by rising up on his hind legs. *When he rose to the upright position he adopted the extreme point of instability and thus secured control.* (TOC p. 234)

Chapter 6. Army and Mob (TOC p. 251.) This is an easy discussion of rigid centralised control vs. distributed control.

To me there is something alien and remote about Fifth Avenue and its hard clear-cut architecture and its sharp precise shops. It is too much like the cathedrals of religion and the temples of science. They are all crystalline. I love the thatched cottage with its lack of crystalline form. The thatched cottage fits in perfectly with the jungle. About it there is something multiplex and not simplex. It has complexity and richness.

There is no richness about a crystal; even a snowflake makes me cold.
(TOC p. 289)

In passing he made an observation that has relevance to the extreme claims of forthcoming doom today:

'the running down of the Universe' is one of the nightmares to which scientific men are prone. Another is 'eternal recurrence.' Another was 'the nitrogen famine,' and recently we had 'the potash famine.' Scientific men have evidently learned the Jeremiah trick, that men are moved by fear of adversity, and not by prophesies of prosperity. (TOC p. 255)

Chapter 7. Relativity (TOC p. 293.) This discussion shows that he was up to date but he did not think Relativity of much practical importance:

When the scientists deduce valuable money-making results from Relativity, we shall gladly use them, but for the Feeding and Breeding of Men the value of Einstein's theory, so far, is nil, except for one point to which we will come presently, (TOC p. 296)

Not sure what the "one point" is but he made a great deal of fuss about the Universe being radial, not linear.

Chapter 8. The Direction of Motion (TOC p. 316):

Energy seems to occupy space as well as time. When matter falls radially inward, super-atomic energy must flow out in the form of radiation to make room for the matter. (TOC p. 317)

There is a lot of discussion that draws on atomic knowledge of the time. He understood nuclear fission and fusion, that the heavy elements must have been created inside stars. An interesting comment on nature at the atomic level:

There is a strange lack of vision or comprehension of the size of space and the size of matter. Atoms are as far apart in proportion as the stars in the sky. The vast size of smallness is not realized. *There are gulfs of smallness as great as the gulfs of starry space. We live in a Universe that is practically empty of stars and atoms.* We live in a Universe of one pinhead per mile, moving at terrible speeds. (TOC p.358)

Chapter 9. The Utilization of Power by Man (TOC p. 365.) This is a discussion of the importance of the intensity of an energy source in order for it to be economic. Interestingly, having started the Philosophy of Power with the importance of windmills, he ended with the caution regarding low-intensity sources - they are not technologies for the near future:

Hence they require thorough investigation before any man invests his money in them. The horse for the wise investor to put his money on is Intensity owned by Mr Regularity; but when high-grade horses, like coal and oil, are not available, we have to content ourselves with low-grade animals like water, wind, and sun. (TOC p. 384)

Appendix 1. The Magnificent Cosgraves

In searching for Murray documents it was necessary to find out more about the family of Patricia Cosgrave to see if there are any living descendants. The answer seems to be no. However, the family is interesting in its own right, a great example of how a family of a modest background can rise to significance.

Patricia Cosgrave's parents came to New Zealand from Ireland via Australia. Her father John Cosgrave was a draper. The family spent a short time in Hokitika before moving to Auckland. The two eldest children John O'Hara Cosgrave (1864, though often stated as 1866) and James Kirby de Leslie Cosgrave (1865) were born in Australia. The next 4 were born in Auckland – Patricia (1870), Charles O'Malley (1874), Millicent Mary (1875), Desmond Murray (1877).

John Cosgrave Sr. had a very successful drapery on Queen Street. John seemed to participate fully in the life of the city. He was a steward at the racecourse at Ellerslie, involved with establishing Catholic churches, was appointed as a Justice of the Peace, and was made a member of the Auckland Club (though there was some controversy as to whether a draper was of a suitable class to be a member of such a prestigious club!) He was elected a city councillor in 1872 and again in 1878. He was a candidate for Mayor in 1876 and in 1878 – he ran a close second – there was talk of block voting by Protestants to keep a Catholic out of power.

But something was amiss. It was said that he intended moving to England and his house was advertised for sale early in the year. In March 1883 he sold his business and the household effects were advertised for sale and auctioned in August.

In fact, he was not well – it is as if he felt ill, gave in, then doubled-down to start again. He purchased a huge stock from a failed business, opened a new store on Queen Street and embarked on extensive renovations to cost £2,000. In September he sailed to Australia, partly for his health but at the same time taking the opportunity to purchase more new stock. On his return he suffered a cerebral stroke on Nov 1st 1883.

The business seemed to be beyond his control.. In April 1884, he opened a new branch at Thames, trying to offload stock. There was a small fire in the Queen Street store on November 16th and he took the opportunity to declare a huge fire-sale. Unfortunately, it was to no avail and he was forced to declare bankruptcy on 6th Feb 1885, with a net debt of £2693.

The family decided to quit Auckland and start afresh in San Francisco – friends helped them pay the cost of the voyage. John's personal library of 500 books was placed on the block on 12 March. But the family's friends in Auckland would not let them leave impoverished. They set up a fund for donations and on 29th April held a ceremony in the Council Chambers, in the presence of the Mayor (W. R. Waddel, Esq.,) the Bishop of Auckland Luck and Father W. McDonald, where the Cosgraves were awarded a testimonial and a purse of 334 gold sovereigns. The testimonial said:

> *To John Cosgrave, Esq. – Dear Sir. – We cannot allow you to leave Auckland without testifying our warm regard for you personally and our appreciation of your public service, extending over many years, as an active member of the City Council, the Harbour Board, and other public bodies. Mrs. Cosgrave will also be long remembered by those who have enjoyed her cordial hospitality. We join in wishing you a pleasant voyage and great future prosperity. In doing so, we beg your acceptance of the accompanying souvenir of our esteem. – We are, dear sir, yours sincerely [here follow forty-one signatures as representative of a total number of ninety-five subscribers]*

The family shipped out on the *S. S. Zealandia* shortly thereafter. We do not know what John Cosgrave achieved in San Francisco but his family became well-established. A sad event was their youngest child Irene, dying of diphtheria in 1891 aged 14. Mrs Cosgrave (Mary, née Kirby) died on 4 September 1892 followed by her husband on 26 April 1895. They were buried in St Mary's cemetery in Oakland.

So our interest turns to the careers of the Cosgrave children. The eldest - John O'Hara Cosgrave, known as Jack – was educated at Auckland Grammar School. He started in the US as a reporter for the *San Francisco Call* before purchasing and becoming co-editor of a magazine called *Wave.* This was a literary weekly aimed at educated society. He began a history of fostering important writers by discovering Frank Norris.

He then moved to the east coast gaining the position of editor of *Everybody's Magazine* which he filled from 1900 to 1911. This was very successful, concentrating on left-leaning investigative journalism but continuing to promote the work of the established and emerging literary elite. He published work by Rudyard Kipling, Arthur Conan Doyle, Ambrose Bierce, George Bernard Shaw, H. G. Wells, Upton Sinclair, Jack London.

He had a brief tenure as managing editor of *Collier's* but moved on to *The New York World* (Pulitzer's legacy) where he was literary editor with

emphasis on the Sunday edition. He continued in this position until 1927 when he retired.

He was absolutely at the centre of the New York cultural and society scenes. In 1924 he became Chairman of the Board of Governors of the elite "Dutch Treat Club" a position that he occupied for 19 years. His was the responsibility of arranging the agenda for the club's weekly luncheons. He was so central to the scene that after he died in 1947 the club initiated a "John O'Hara Cosgrave Memorial Medal" for outstanding accomplishments in Journalism that was awarded annually. (The club still exists and awards annual medals but they are no longer connected to Cosgrave.)

Jack Cosgrave developed an interest in Western Esotericism and came under the influence of George Ivanovich Gurdijeff and his British disciple Alfred R Orage, also the editor of literary journals. In 1931, after he retired, Cosgrave published a novel "The Academy of Souls" (apparently regarded partially as Science Fiction). After the war he published a more-serious book "Man: A Citizen of the Universe".

Jack Cosgrave married three times but had no descendants.

VII John O'Hara Cosgrove, Editor The Sunday World
Ulmann, Doris, b.1882-1934
A Portrait Gallery of American Editors, 1925
15.5 cm X 20 cm
Photogravure

The next son, James Kirby De Leslie Cosgrave, was also involved with journalism. After having jobs in pharmacies he went into the business office of the San Francisco *Evening Post* as a bookkeeper. He advanced quickly to

become business manager of the newspaper. He never married and died from pernicious anaemia in January 1904, aged 39.

Patricia Cosgrave, we know, married a successful and wealthy entrepreneur. She worked as a private secretary prior to moving to England. She was the last of the immediate family, surviving until 1958.

Next in the family is Charles O'Malley Cosgrave, born in Auckland 18 Dec 1874. He led an interesting career and was heading for a life in politics as described in a 1910 biography:

> *Of the numerous young men in politics, there are few as well known as Deputy Recorder Chas. O'M Cosgrave. Although not an American by birth, Mr. Cosgrave has spent the greater part of his life here and has been so identified with public affairs as to stamp him thoroughly American.*
>
> *Mr. Cosgrave was born in Auckland, New Zealand on December 18, 1874, but owing to his father's impaired health, he left the colonies with his parents at the age of ten.*
>
> *On his arrival in San Francisco he entered the public schools and secured a good education at the government institutions. He commenced his business career as a clerk in a broker's office and, having acquired the most necessary rudiments for the strenuous life, allied himself with the Scottish Union and National Insurance Co., with which concern he remained several years.*
>
> *Having always a yearning for the mummer's life, and proving himself good in strong parts as an amateur, Mr Cosgrave accepted an offer from a high-class dramatic company which was touring the Pacific States. As an actor Mr. Cosgrave was a decided success and played leading roles until the company disbanded in Seattle, Wash.*
>
> *Seattle suited him so well that he determined to remain there for a period, and identified himself with a prominent hotel, which he successfully managed for some time. Just then a boom was started in Trinity county, Cal. Having staked a claim there some years previously, Mr. Cosgrave determined to be on hand if there was any "color" showing, as he humorously states, "the claim was there all right but it was only a mine when I was standing on it, and when I stepped off it became a claim again."*
>
> *Mr. Cosgrave then returned to San Francisco and in 1898 received his first political appointment as a deputy in the Assessor's office. The year*

following he was appointed Deputy Recorder and is now performing the duties of that office.

In politics Mr. Cosgrave is a staunch Democrat, a prominent member of the Iroquois and Monticello Clubs, and has always been an active figure in the political campaigns.

Possessed of much personal magnetism, a brilliant, witty mind and superior physical qualifications, he is regarded as a "strong man" in a fight and a valuable acquisition to the forces he allies himself with.

Mr. Cosgrave, through his strong individuality and keen knowledge of politics, has won scores of votes for his party and it may be justly said that as Deputy Recorder he has made hosts of friends. His presence in the Hall of Records adds greatly to the general popularity of the office.

Charles O'Malley Cosgrave

Unfortunately his promising political career was brought to an abrupt end by his death on 15th July 1914.

He left behind his widow Margarite (Neé Mahoney) whom he had married in early 1908 and their son John O'Hara Cosgrave II, named after his uncle. He was born 10th October 1908.

John O'Hara Cosgrave II from UC Berkeley year book

Here we run into the most celebrated of the Cosgrave clan. John II was an artist. He was a graduate of UC Berkeley. He spent two years in Paris and eventually made a distinguished career as a book illustrator. A good account is at:

http://wetoowerechildren.blogspot.co.nz/search/label/John O%27Hara Cosgrave II

- there is no need to repeat it here. He also belonged to the "Dutch Treat Club". He married twice but had no descendants.
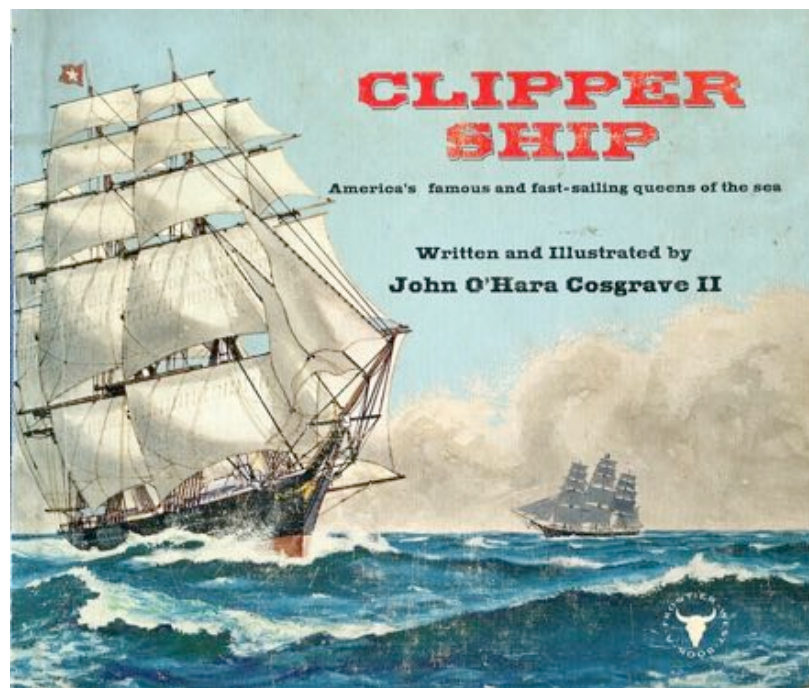
Next in line is Millicent Mary Augusta Cosgrave who was aged just 10 when the family arrived in San Francisco. She completed high school then went on to study medicine at Cooper Medical College, graduating 29 April 1902. Cooper was the Medical Department of the University of the Pacific – it later merged into Stanford University becoming Stanford's School of Medicine – remaining in the City until 1958. Dr Cosgrave became a General Practitioner and specialist in Obstetrics & Gynecology. She was on the faculty of Stanford and Finch Junior Colleges. She published a few papers, notably "Rheumatism in Children". Much travelled in her later years visiting her family. Never married. Died 24 June 1949 in New York.

Dr Millicent Cosgrave

The last of the Cosgrave family was Desmond Murray Cosgrave, born in Auckland 1877. He studied in San Francisco at Mark Hopkins Art Institute and exhibited at the S F Art association in 1900. He seems to have adopted the name Llewellyn. But, by 1904 he was working in advertising which became his career. We know little about him but he lived in Riverside Drive in New York, so he must have done well. He died 6 March 1930 in Stamford Conn.

However, he did marry Roberta R Robbins. They had a son Robert Desmond Cosgrave 2nd June 1920. After Desmond's death, mother and son moved to the SF Bay area. Robert, known as Bob, served in the US navy in WW2. He died on 13 Feb 2000 in San Lorenzo Ca. He seems to have had no descendants.

So, like the John Murray line, the John Cosgrave line petered out, in this case after almost having made it to the 21st Century.

Appendix 2. The Murray multiplex in New Zealand

This is a newspaper article transcribed from the Auckland Star of 27 August 1925, page 9. It describes in some detail how the Murray multiplex was being used in New Zealand at that time.

<p style="text-align:center">MACHINE-PRINTED TELEGRAMS</p>

<p style="text-align:center">THE MURRAY MULTIPLEX.</p>

<p style="text-align:center">ITS GREAT ADVANTAGES.</p>

<p style="text-align:center">EIGHT MESSAGES AT ONCE.</p>

Ten years ago, an article was published under the title, "New Zealander's Electrical Invention, the Printing Telegraph." The article informed its readers that there would shortly be installed in New Zealand telegraph offices an invention that would enable telegrams to be dispatched from one office to another by means of a form of typewriter at the sending end, and by a printer at the receiving end, which would cause the messages to be printed in Roman characters. The article stated that the machine was invented by Mr. Donald Murray, who was formerly a journalist engaged in Auckland.

<p style="text-align:center">First Installation.</p>

To the initiated, the name of Mr. Murray was, at that time, well known throughout the World as the inventor of other telegraph systems. But the system which had, in 1915, been perfected by Mr. Murray, appeared to justify the belief that in course of time it would replace all other systems, except in cases in which there was not sufficient traffic to warrant a Murray installation, and the old Morse system would still suffice. Owing to the exigencies of the war, Mr. Murray was unable to have his apparatus completed for some years, and although orders had been placed by the Post and Telegraph Department. it was not until 1921 that Mr. Murray was able to carry out his contract and supply the machines to the Government of New Zealand. The first installation was made on one of the lines connecting Wellington with Christchurch and on December 5, 1921, business men in the two cities no doubt observed with interest that telegrams received by them on that day consisted of printed slips of paper on which the messages were printed in Roman type, the slips of paper being pasted on to a white form.

<p style="text-align:center">A Wonderful Success.</p>

The new system proved a wonderful success right from the day of installation, and was of very great assistance during the Christmas period of 1921, in expediting the traffic between the two islands. Further machines had been ordered, and on July 13, 1922, an installation was opened between Auckland and Wellington. The usefulness of the system has since been greatly extended

Repeating Apparatus.

For instance, on October 23, 1923, what is known as "repeating" apparatus was installed at Wellington, enabling the Auckland telegraph ofice to work direct with the Christchurch office on one arm of the Auckland-Wellington and Wellington-Christchurch sets. On June 12, 1924, a set of instruments was installed at Dunedin, and by the installation of repeaters at Christchurch, Dunedin was enabled to work direct with Auckland, Wellington and Christchurch on separate arms of one machine over one line The Department intends to push on with installations at the more important of the smaller offices and arrangements are now being made for the installation of multiplex apparatus at Napier, Hamilton and Wanganui. Further extensions will take place from time to time as instruments can be obtained, and as the traffic between any two centres warrants the installation. Old officers who were engaged in the large telegraph offices ten or twenty years ago would not recognise their old haunts. There are now four multiplex sets installed at Wellington, three at Christchurch, two at Auckland and one at Dunedin.

The System.

In giving a brief description of the system, the more important technical points can only be touched upon inadequately, because it would take a lengthy article to explain the detailed working of the various instruments that go to make up an installation. The system in use in New Zealand is a combination of the Baudot (a French telegraph system that has been in use for over 40 years), and Murray inventions, and for the sake of convenience is known as the "Murray Multiplex." It may be of interest to the public to learn that the new system does not require trained telegraphists to work it. Any expert typist can, after a short experience of the keyboard, take up duty as a perforator operator. The duty of the receiving operator is to gum the tape on which appear the printed characters, to telegraph forms, to read each message carefully, check the number of words, see that there are no obvious errors and generally to see that the received message is correct in every particular. In addition to the operating staff there is required an expert mechanician, who must be able to correct any apparatus fault that has been located by the supervisor.

The Chief Operator

Owing to the large number of messages handled on one installation, it is necessary that there should be in charge of each set a senior operator whose duties are to attend to the circulation of the traffic. This officer is known as a chief operator, and on him devolves the responsibility of seeing that the traffic is in proper "time" order, that each operator is kept fully engaged, that the traffic is transmitted in the correct sequence, that the receiving operators are performing their duties efficiently, and the traffic is being handled expeditiously. The chief operator is also required to see that what is known as "RQ's" i.e., queries, repetitions, etc., are dealt with quickly, and replied to.

The Automatic System.

The Murray Multiplex is an automatic system which prints telegraphed messages in Roman type, and the apparatus includes a keyboard perforator (which is to all appearance a typewriter keyboard,) a transmitter, a distributor and a printer. In conjunction with these parts, various other appliances are required, but those mentioned are the most important. The system in use in the Dominion is known as the quadruple-duplex arrangement which provides eight channels over a single circuit between any two offices that is to say, there are four independent arms and each arm is duplexed. This means that on each arm a message is forwarded and one is received at the same moment, thus it is possible to transmit eight messages simultaneously, four in each direction.

Words Per Minute.

As each channel is worked at the rate of 40 words per minute one line is able to handle traffic at the rate of 320 words per minute, that is, 160 in each direction. An expert typist is able to perforate quite easily 50 to 60 messages per hour, and the number sometimes reaches 70 and even higher. Ordinarily the average capacity of the system in messages is approximately 500 per hour, but this may on occasions be increased. There are many factors to be considered, such as the efficiency of the operator, the length of the messages, the absence of mechanical and electrical faults, etc.

The Distributors.

The general principle of the system may be briefly described thus: Two distributors - one at each end of the line - divide the line time between the operators on each arm. The distributor may be likened to a clock, and if the hands of both clocks (i.e., distributors) keep correct time, the operator

at a certain position at one end of the line is enabled to signal to the operator at the corresponding position at the other end of the line at the same moment. Thus, with four Operators, one operator has the use of the line in turn for one quarter of each revolution. During the fraction of time the apparatus is allotted to each operator, it is so arranged that one letter is transmitted. Provided that the revolutions of the distributors keep exactly the same time, each operator will be connected to the line at the right moment. This is what is known as synchronism, and is a necessary fundamental of multiplex working. The various actions of transmitting a telegram are as follows:- The sending typist selects a message, and by means of his typewriter keyboard, punches on white tape a certain arrangement of perforations which, in the special Murray 5-unit code, represents the words in the telegram. This tape is then passed through a transmitter. The passing of the perforated strip of tape through the transmitter results in certain electrical impulses of current being sent along the line. These impulses operate what is known as a relay at the distant end. This relay, through the agency of the distributor, delivers electrical current impulses to the receiving instrument corresponding to those sent out at the distant station. The receiving instrument, by means of electro-magnets, operates certain levers called "selectors," and these by mechanical action cause the printing apparatus to impress the various letters and figures of the message on blue paper tape, which is gummed, to a telegram form and becomes the received telegram. The same actions are taking place at the same moment on all the other channels of the installation.

<center>Advantages of System.</center>

The two great advantages of the system are, first, economy in the matter of lines, and second, the flexibility of the system. The utmost economy in line plant results from multiplex working, and as a result of its introduction in this country, many lines that were employed for the purpose of telegraph transmission have now been delegated to the telephone service. One outstanding example is the telephone circuit between Auckland and Wellington. Prior to the introduction of the multiplex system all the available lines between the two cities were required for telegraph working during the day, and it was only during the night hours that subscribers in Wellington could connect with subscribers in Auckland, but with the introduction of the multiplex system more than treble the number of messages can be handled per hour than with the old quadruplex Morse system, and approximately one-third of the number of lines will carry the traffic if the new system is employed to its fullest capacity. Thus, soon after the installation at Auckland continuous telephone communication was

established between the two centres. As the system was extended other lines previously required for telegraph traffic have been released, and are now utilised for long-distance telephone service. This has proved of great benefit to the telephoning public. In addition to the Auckland-Wellington circuit, telephone service has been provided in this manner between New Plymouth and Auckland and between Napier and Rotorua. A second great advantage of the system is its flexibility. For example, on one through line from Auckland to Dunedin with one multiplex set at each of the four centres it is possible for Auckland to have two channels of communication to Wellington, one channel to Christchurch and one to Dunedin while intercommunication between the other centres is maintained.

Telegraph traffic between the two Islands is very heavy, and ordinarily it required seven submarine cables across Cook Strait to cope with the work. But with the increase in capacity of the lines due to the introduction of the machine-printing system it is not now necessary for the Department to go to the expense of contracting with one of the big cable companies to bring a cable repairing ship to Wellington to repair a fault in one of the cables. In the past this has been a very expensive item in the Department's balance sheet. Actually at one period since the introduction of the multiplex four out of the seven cables between the two Islands were interrupted, but the multiplex circuit between Wellington and Christchurch was able to handle the traffic without any very serious delay. The new telegraph system that is here described is used largely in Great Britain and in the United States of America, and is also installed on the more important long-distance circuits in the Commonwealth of Australia.

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http://oztypewriter.blogspot.co.nz/2012/03/new-zealands-donald-murray-father-of.html

John Youl. Video of Murray multiplex in operation. At:

https://www.youtube.com/watch?v=KlXXjqBtBQ8)

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July 29, 1893. "A New Printing Telegraph"

August 1901. "A successful printing telegraph", Maximilian Foster

September 8, 1906. "The Murray Automatic Page-Printing Telegraph – Its History and Progress"

Murray Archive

As well as detailed examination of Murray's published materials this account uses details from an archive preserved by Murray's family and now lodged in the Walsh Memorial Library at the Museum of Transport and Technology in Auckland. This material was preserved and donated by Elizabeth & John Ungley – Mrs Ungley is the step-daughter of Donald Murray's nephew Robin Hamilton.

Letters

> 1865: Donald Murray Sr. to Frances Murray
> 1868: David Stewart to Frances Murray
> 1870: Frances Murray from Invercargill
> 1871: John Murray from Invercargill
> 1883: Donald Murray to Uncle Robert Murray from London
> 1884: Donald Murray to Mary Stewart from Dresden
> 1886: Donald Murray to Robert Murray from Auckland
> 1896: Donald Murray to Robert Murray from Sydney
> 1899: David Stewart to Frances Murray
> 1922: Isabella Murray to Patricia Murray from Paris
> 1940: To Helen Murray on death of Isabella Murray
> 1940: Robin Hamilton to Donald Murray
> 1940: Donald Murray to Robin Hamilton
> 1940: To Isabella Murray re Estate of George Murray's widow

Longer documents:

> Journal kept by George Murray on voyage to NZ in 1863
> Letters written home by Mary Murray in 1865-67
> Letters written home by Alexander Murray in 1878-81
> Memoir written by John Murray in 1905
> Memoir written by Frances Murray in 1925

Murray's Publications

1902. HCUW. Murray, Donald. "How Cables Unite the World" in "The World's Work".

1905. STBT. Murray, Donald. "Setting Type by Telegraph". IEE Journal, pp. 555-597, discussion to p. 607, February 1905.

1911. PAPT. Murray, Donald. "Practical Aspects of Printing Telegraphy". IEE Journal, pp. 450-516, discussion to May 1911. Reproduced as a series of articles in Scientific American Supplement, July – September 1911.

1914. PTBT. Murray, Donald. "Press-the-Button Telegraphy". Telegraph & Telephone Journal.

1916. MST. Murray, Donald. "Printing Telegraphy – High Speed and Low Speed. Metal Storage Transmitters." Telegraph & Telephone Journal Vol 2. pp 91-96

1925. SUTT. Murray, Donald. "Speeding up the Telegraphs" A Forecast of the New Telegraphy". IEE Journal pp. 245-272, discussion to 280. March 1925.

1939. POP. Murray, Donald. "The Philosophy of Power. First Principles". Williams and Norgate Ltd', London. 1939.

1940. TOC. Murray, Donald. "The Philosophy of Power. The Theory of Control". Williams and Norgate Ltd', London. 1940.

1945. APP. Murray, Donald. "Australia: Poverty or Progress". Published by Henry George Foundation, Melbourne, 1945.

Murray Patents

Title	Publication	Date	Inventor(s)	Applicant(s)
PRINTING TELEGRAPH.	US498674	1893-5-30	D. MURRAY	D. MURRAY
ACTUATING MECHANISM FOR KEY-OPERATED MACHINES.	US638591 (A)	1899-12-05	MURRAY DONALD	MURRAY DONALD
IMPROVEMENTS IN ACTUATING MECHANISM FOR KEY-OPERATED MACHINES.	GB189911778 (A)	1900-03-10	MURRAY DONALD [AU]	MURRAY DONALD [AU]
PAGE-PRINTING TELEGRAPH.	US653936 (A)	1900-07-17	MURRAY DONALD [US]	POSTAL TELEGRAPH CABLE CO [US]
PAGE-PRINTING TELEGRAPH.	US653935 (A)	1900-07-17	MURRAY DONALD [US]	POSTAL TELEGRAPH CABLE CO [US]
PAGE-PRINTING TELEGRAPH.	US653934 (A)	1900-07-17	MURRAY DONALD [US]	POSTAL TELEGRAPH CABLE CO [US]
IMPROVEMENTS IN PRINTING TELEGRAPH APPARATUS.	GB190010142 (A)	1900-10-27	MURRAY DONALD [US]	MURRAY DONALD [US]
TELEGRAPHY.	US670964 (A)	1901-04-02	MURRAY DONALD [US]	POSTAL TELEGRAPH CABLE CO [US]
AUTOMATIC ACTUATING MECHANISM FOR KEY-OPERATED MACHINES.	US685427 (A)	1901-10-29	MURRAY DONALD [US]	MURRAY DONALD [US]
ACTUATING MECHANISM FOR KEY-OPERATED MACHINES.	US698845 (A)	1902-04-29	MURRAY DONALD [US]	MURRAY DONALD [US]
IMPROVEMENTS RELATING TO ACTUATING MECHANISM FOR KEYBOARD OPERATED MACHINES.	GB190121880 (A)	1902-07-17	MURRAY DONALD [GB]	MURRAY DONALD [GB]
IMPROVEMENTS RELATING TO ELECTRIC TELEGRAPHY.	GB190122219 (A)	1902-08-28	MURRAY DONALD [GB]	MURRAY DONALD [GB]
KEYBOARD-PERFORATOR.	US710163 (A)	1902-09-30	MURRAY DONALD [US]	MURRAY DONALD [US]
IMPROVEMENTS RELATING TO PERFORATORS FOR ELECTRIC TELEGRAPHS.	GB190122220 (A)	1902-10-02	MURRAY DONALD [GB]	MURRAY DONALD [GB]
IMPROVED ACTUATING MECHANISM FOR KEYBOARD OPERATED MACHINES.	GB190221149 (A)	1903-07-16	MURRAY DONALD [GB]	MURRAY DONALD [GB]
IMPROVEMENTS IN DRIVING PULLEYS, FRICTION WHEELS AND THE LIKE.	GB190317954 (A)	1903-10-15	HIGGINS CHARLES MURRAY DONALD	HIGGINS CHARLES MURRAY DONALD
IMPROVED AUTOMATIC TELEGRAPH TRANSMITTER.	GB190403385 (A)	1904-04-28	MURRAY DONALD [GB]	MURRAY DONALD [GB]
TAPE-CONTROLLED TELEGRAPHIC TRANSMITTING APPARATUS.	US794242 (A)	1905-07-11	MURRAY DONALD [GB]	MURRAY DONALD [GB]
IMPROVED ACTUATING MECHANISM FOR KEYBOARD OPERATED MACHINES.	GB190421064 (A)	1905-07-13	MURRAY DONALD [GB]	MURRAY DONALD [GB]
IMPROVED PRINTER FOR A MULTIPLEX PRINTING TELEGRAPH SYSTEM.	GB190826918 (A)	1909-06-24	MURRAY DONALD [GB]	MURRAY DONALD [GB]
IMPROVED TAPE TRANSMITTER FOR MULTIPLEX TELEGRAPH SYSTEMS.	GB190826916 (A)	1909-07-15	MURRAY DONALD [GB]	MURRAY DONALD [GB]
PHOTOGRAPHICALLY-RECORDING TYPE-PRINTING TELEGRAPH.	GB190922457 (A)	1910-06-05	MURRAY DONALD [GB]	MURRAY DONALD [GB]
IMPROVED KEYBOARD TAPE PERFORATOR.	GB191328557 (A)	1914-11-12	MURRAY DONALD [GB]	MURRAY DONALD [GB]
IMPROVED DRIVING MECHANISM FOR MULTIPLEX DISTRIBUTORS OF ELECTRIC TELEGRAPHS.	GB191403436 (A)	1914-12-10	MURRAY DONALD [GB]	MURRAY DONALD [GB]
AUTOMATIC PAGE FEED FOR PRINTING TELEGRAPHS OR TYPEWRITERS.	GB191421095 (A)	1915-10-14	MURRAY DONALD [GB]	MURRAY DONALD [GB]
PERFORATED TAPE DUPLICATOR.	GB191502950 (A)	1915-12-09	MURRAY DONALD [GB]	MURRAY DONALD [GB]

TRANSPOSING MACHINE FOR TELEGRAPH ALPHABETS.	GB116195 (A)	1918-06-06	MURRAY DONALD [GB]	MURRAY DONALD [GB]
PRINTING TELEGRAPH CUT-PAGE FEED	GB142596 (A)	1920-05-13		DONALD MURRAY
PAPER-FEED MECHANISM FOR PRINTING-TELEGRAPHS, &C.	US1352306 (A)	1920-09-07	DONALD MURRAY	WESTERN UNION TELEGRAPH CO
PHONIC MOTOR DRIVE FOR TELEGRAPH MACHINES	GB158413 (A)	1921-02-10		DONALD MURRAY
TAPE-TRANSMITTER	US1401917 (A)	1921-12-27	DONALD MURRAY	WESTERN UNION TELEGRAPH CO
TELEGRAPH TAPE TRANSMITTER	CA218177 (A)	1922-05-02	MURRAY DONALD	MURRAY DONALD
IMPROVED PAGE-PRINTING TELEGRAPH MACHINE	GB206169 (A)	1923-10-10		DONALD MURRAY
IMPROVED TELEGRAPH PRINTER	GB206975 (A)	1923-11-22		DONALD MURRAY
PLAITED CABLE SLING	US1473699 (A)	1923-11-27	CHARLES NYMAN	DONALD MURRAY
TELEGRAPH SYNCHRONIZING SYSTEM	GB209573 (A)	1924-01-17		DONALD MURRAY
TELEGRAPH SYNCHRONIZING SYSTEM	US1487691 (A)	1924-03-18	DONALD MURRAY	WESTERN UNION TELEGRAPH CO
PRINTING TELEGRAPH	US1501679 (A)	1924-07-15	DONALD MURRAY	WESTERN UNION TELEGRAPH CO
PLAITED CABLE SLING	US1524671 (A)	1925-02-03	CHARLES NYMAN DONALD MURRAY	
PAGE-PRINTING TELEGRAPH MACHINE	US1540727 (A)	1925-06-02	DONALD MURRAY	WESTERN UNION TELEGRAPH CO
PLAITED CABLE SLING	CA252874 (A)	1925-08-18	NYMAN CHARLES	DONALD MURRAY
IMPROVEMENT IN KEYBOARD TELEGRAPH MACHINES	GB239011 (A)	1925-09-03		DONALD MURRAY
PLAITED CABLE SLING	CA258068 (A)	1926-02-09	NYMAN CHARLES	DONALD MURRAY