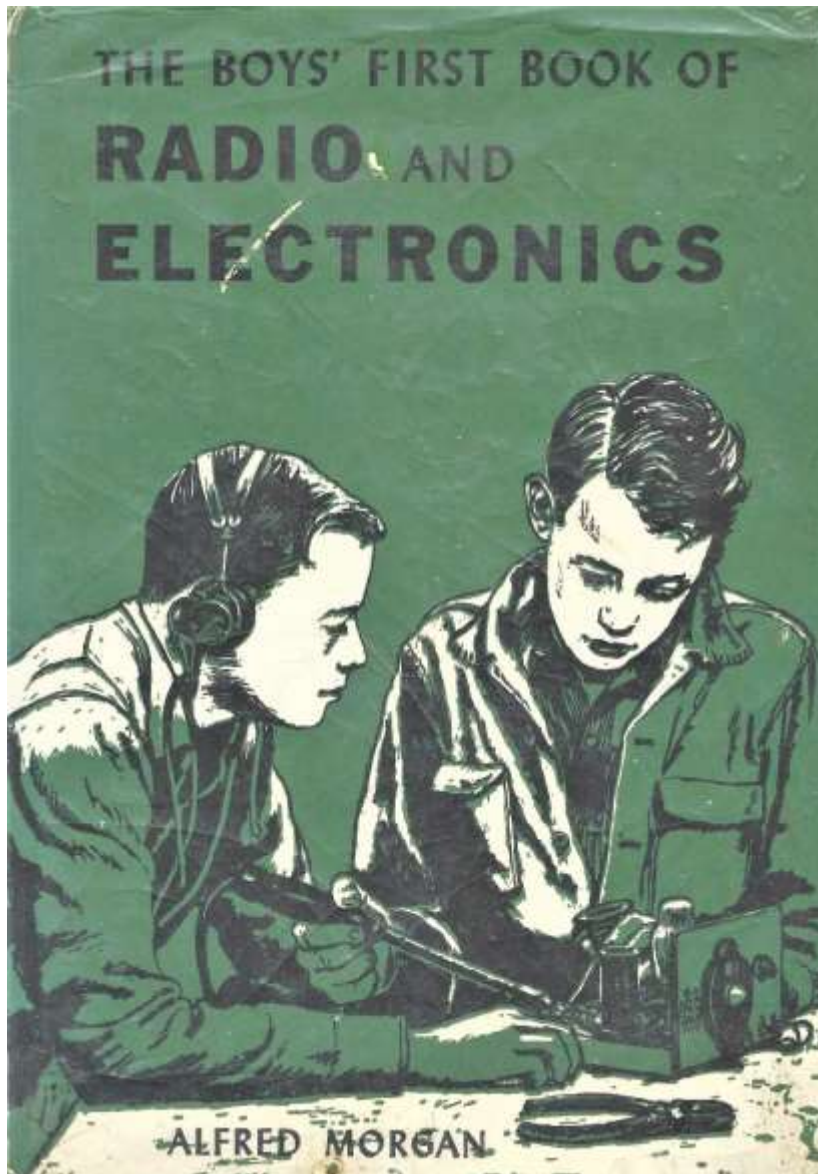


Book Review: The Boy's First Book of Radio and Electronics

Gord Rabjohn, July 2019

"The Boys' First Book of Radio and Electronics" (and the subsequent second, third and fourth book), by Alfred P. Morgan, was a pivotal book in my childhood. I visited the public library weekly and gravitated to the "621" section (Applied Physics, which is where the subject of electronics was placed). My favorite books were the ARRL handbooks, the Morgan books, as well as a couple of books with long forgotten titles. 40 years have passed, and I thought it was time to revisit this book.



Alfred Powell Morgan was born in 1889 in Brooklyn, but grew up in New Jersey. He formed the Adams-Morgan Company circa 1910, a mail order wireless components business. Mr. Adams was a silent partner, and I was unable to find anything about him. In 1915, Paul Foreman Godley, an experimenter

working on various forms of tuners for regenerative receivers, bought into Adams-Morgan so that they could commercialize his tuner. This tuner was dubbed "The Paragon". Thru the 1920's, the Adams-Morgan Co. marketed Paragon Radio Products (which may be familiar to some collectors), from simple tuners to complete receivers. Like many companies of this era, it did not survive past 1928. Apparently, Mr. Morgan and Mr. Godley did not get along very well, and I refer the interested reader to Alan Douglas's book for some of the drama surrounding this company. With the collapse of his company, it was just as well that Alfred Morgan had a "Plan B". Morgan was a prolific author of "How-to" children's books on topics as varied as electricity, electronics, chemistry, mechanics, aeronautics, tools, wood working, and even pets. Though his books varied in topic, his heart seemed to be in electrical and electronic technology, as he was educated as an electrical engineer, and had several electrical patents.

He published the very successful "Wireless Telegraph Construction for Amateurs" in 1910 at the age of 21; this book ends with a mention of the "Audion" (vacuum tube) as a promising new form of detector. "Boy Electrician", another well-known book, was first published in 1913. He published many more books on the topic of electricity and wireless, particularly from 1910-1920. The differences between these books seems minor, but at that time, the science of radio was changing rapidly, and this was a great "bandwagon" to be on. The first edition of "The Boys' First Book of Radio and Electronics" was published in 1954 (when Morgan was 65 years old), and it was reprinted numerous times. The "Boys' Fourth Book..." was published in 1969 (when Morgan was 80 years old, 3 years before his death). Note that there was at least one revision of "The Boys' First Book..." in 1961 (not to be confused with "The Boys' Second Book..."), and I will discuss the differences. The book was republished as "The First Book of Radio and Electronics" (girls are now allowed) posthumously in 1977, at which point it was hopelessly out-of-date. Morgan is an efficient author, he reuses illustrations, paragraphs and even entire chapters throughout his collection of published works.

In case you are unfamiliar with it, "The Boys' First Book of Radio and Electronics" is about 200 pages, and written at about a grade 10 level (Grade 10 according to www.readabilityformulas.com, but I would have guessed more like grade 7, and Morgan himself talks about 12-year-olds). It starts with the history of radio and inventors, some basic theory about electricity, radio waves, and electrical parts, then goes into crystal radios and regenerative sets. The book includes very detailed instructions on building your own simple radios and amplifiers. It ends with a section about Morse code and amateur radio. Although it was written in the '50s, I believe this book would have appeared dated even then. The transistor was mentioned in passing. There was no mention of computers at all, until a brief mention in "The Boys' Fourth Book ...". By the time the fourth book came out, Morgan had shifted the emphasis to transistors, and tubes were a footnote. My local library always had the first book, and sometimes the second and third book. I was quite old before I even realised that there was a fourth book. The subsequent books duplicate some aspects of the earlier books, but have mostly different projects. The four books nicely illustrate the evolution of the art of electronics. These books, and most other books mentioned in this article, are available in .pdf format on line, for example at:

https://www.americanradiohistory.com/Archive-Bookshelf/Bookshelf_Hobbyist.htm

Until I did this research, I was unaware of the 1941 "First Radio Book for Boys", also by Morgan. It is similar to "The Boys' First Book of Radio and Electronics", with almost identical crystal radio, regenerative receiver and amplifier projects (these using a "30" triode). However, "First Radio Book for Boys" included several more radio projects for operation directly from 110V household current, with a live chassis, and without a word about safety. It had less theory and less about inventors, but more

construction projects. It included a preface that reads like a small autobiography. Also remarkable is that this book included photographs, as opposed the line drawings used exclusively in the "The Boys' First Book...". Some of the errors and design deficiencies visible in the later books were also present. This book is predated by (and is based upon) the more technical 1940 "Getting Acquainted with Radio".

I have fond memories of "The Boys' First Book of Radio and Electronics", so when a copy was available at auction, I bought it. Reading it now, I see that it does a wonderful job of covering a variety of topics related to electronics and electronic history in an interesting way, but that it is full of errors!

The preeminent regenerative receiver project is, simply put, poorly designed. For example, Morgan uses a 500000 ohm "regeneration control" in series with the plate. When this control is set "half way", it will look like a 125000 ohm resistor in series with the plate and in series with the 2000 ohm headphones. The huge resistance in series with the plate will drop the nominal 45V plate voltage to about 6V. The low voltage on the plate will result in very low current and gain, and the voltage division (resulting from the regeneration control and headphone) will cause a large drop in output voltage swing. The regeneration control will not be smooth. Many people have reproduced some of his construction projects, particularly this iconic 1 tube receiver, but have found that a few simple changes make the receiver much more useful. For example, Google "Morgan One Tube Regen Part 2" (by Mikrowave1). This experimenter corrects some of the design flaws in Morgan's original circuits.

Other errors include mismatches between the pictorial and schematic representations (notably on the crystal radio). Errors like this are unforgiveable. Authors of books like this must understand that children do not have the skills to recover from such errors, or troubleshoot inoperative circuits. Errors can turn enthusiasm into frustration, and possibly abandonment of a rewarding hobby and career.

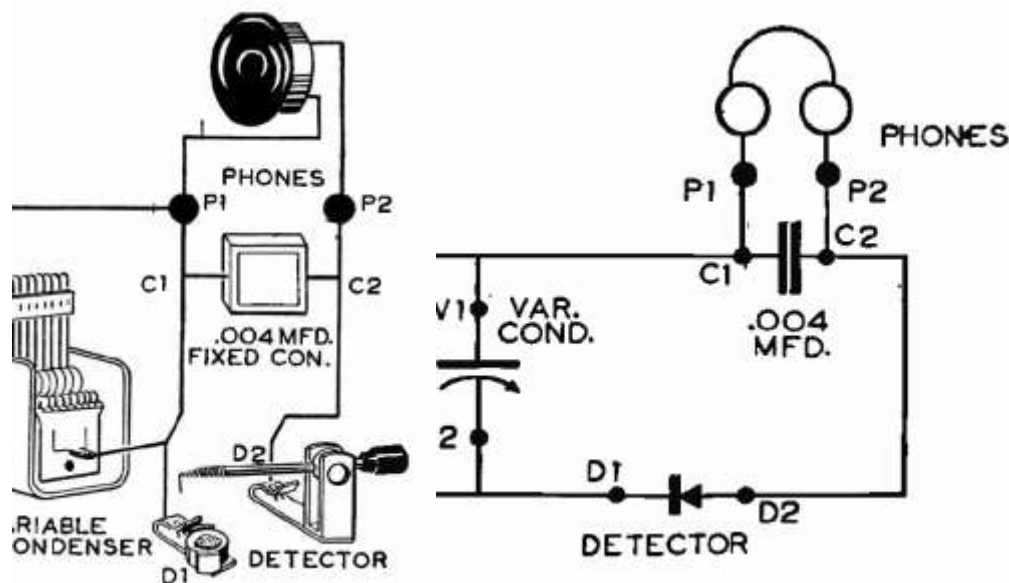


Figure 1: Can you spot the error?

What is a 2.5MEG radio frequency choke? What is a 100000 ohm 3:1 resistor? What does this resistor, in the single stage amplifier, do? Morgan recommends connecting the 2-stage amplifier to the output of the regenerative receiver. The input of the 2-stage amplifier is AC coupled, but the regenerative receiver

needs a DC path for plate bias, so this will not work at all. Morgan suggests that you buy the plug-in coils for the receiver, but specifies nothing further. He also gives instructions for winding your own, but gives no indication of the frequency that will be received. I did not analyze the other three books for errors, but I do see questionable designs in the fourth book.

The first revision used the octal 1G4GT or 1H4 triode tube for all projects. He is almost apologetic, telling the reader that this tube is considered old-fashioned but that your local dealer should be able to get it for you. Personally, I think it's a great tube: it requires low power (economical on batteries), and the tube elements, even the grid, are clearly visible without extra "stuff" in the tube envelope. In the revised edition, he updated to the 7-pin miniature 6BF6 (because the older tubes were becoming difficult to get), a somewhat uncommon triode/dual diode akin to the 6AV6. More cluttered inside, it is not as obvious how it works. I wondered why he selected this tube, however upon perusing the RCA tube manual of the day, I see that it was the only triode with an amplification factor similar to the 1G4GT. These projects were designed to be run from batteries, and the 6BF6 heater requires 300mA at 6V; over 20 times the power consumption of the 1G4GT, and a sizeable load for flashlight batteries! If you are paying for batteries from the proceeds of your paper route, this is a big deal. I would have urged him to use perhaps a 1T4 connected as a triode (as he did in his third book). Or even a 6C4, which uses less filament current, is commonly available, and is simple inside.

Morgan suggests using a filament transformer for the 6BF6 heater, but the illustration shows the transformer connected incorrectly, resulting in only 3V applied to the filament! Furthermore, there is nothing warning the young electrician about the hazards of working with mains voltages. It just shows the power cord wrapped with electrician's tape. I suppose young lives were less valued back then! In the second, third and fourth books, few safety warnings are given for the numerous projects that run directly on line voltage, and exactly none are given for the 3 tube AC/DC "live chassis" amplifier!

Under the general category of "oddities": for most of the book (both revisions), Morgan uses the term "Condenser". However, on page 163, there is a tiny footnote that states "Let's call condensers by their accurate scientific name from now on", and from there on he uses the term "Capacitor" exclusively. I am glad he discusses the equivalence between capacitor and the archaic condenser, but dividing the book is an odd way to do it! A reader who missed that footnote might wonder what a capacitor is!

As a kid, I mostly missed the errors. I think the allure of the book was that it was written in a language accessible to a young audience (however, I also loved the ARRL handbooks that were written at a significantly higher level as well). The theory presented is highly simplified and without math, and explanations use metaphors. He discusses inventors and personalities in a manner that allows the young reader to imagine he (or she, though he never acknowledges the existence of girls until his last books) is there. He encourages the young inventor. The projects were described in such detail that you could almost build them vicariously.

I really wish "The Boys' First Book of Radio and Electronics" was written more carefully, however the errors didn't stunt my education or discourage my love of electronics. So, Morgan must have done some things right; even though I did not follow thru on any of the projects, I repeatedly withdrew his books from the library and read them, and remembered them 50 years later. I have looked for contemporary electronics texts written at this level, but I have not found any that I like. Some would say that electronics has become far too complicated for a 12-year-old to understand, and too diverse to cover in a single textbook. Reading the book now is a nostalgic look at a simpler, pre-internet time of high

voltages, tube heaters, and Heathkits. A world that still feels familiar to me but is very foreign to younger generations.

Morgan stated "... I still remained an amateur at heart, a "kid" with a spark coil and a crystal detector. I have never lost a sense of awe for radio science or a fellow-feeling with the lad who likes to putter with antennae and oscillators." Hats off to you, Mr. Morgan, I share these sentiments. Whether or not you grew up with these books, I do recommend them as a time capsule of the playful art of electronics from the 50's; just don't build the projects!

References:

All of the Morgan books, available on:

https://www.americanradiohistory.com/Archive-Bookshelf/Bookshelf_Hobbyist.htm

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"Radio Manufacturers of the 1920's, Vol. 1" by Alan Douglas, 1988.

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