



# HRSA SOUTH AUSTRALIA

Volume 27 No.5 Apr-May 2018

## From the President



My fellow collectors, Radio & TV enthusiasts,

I hope you have been enjoying the club activities so far this year. Our June meeting will be a visit to the National Railway Museum at 76 Lipson Street Port Adelaide. There will be a special discounted entrance fee of \$7.

As there are no suitable facilities we will not be having a meeting at the museum or our usual coffee and cakes for afternoon tea. While there was a mention of food and drink vending machines, however Port Adelaide has a number of places close by that you can meet after the visit and have some refreshments and continue chatting.

We plan to meet at 12:45pm at the entrance for a 1pm start. It has been almost a year that I have been the President. This is my first experience and I have gained a great deal from this experience. We have introduced new activities such as the sale day and hands on technical meetings, and the visit to the Aviation Museum.

In this time I have had a chance to get to know all of you better and have enjoyed my role. This has given me a chance to see the club from a new perspective.

Yours Sincerely

*Chris Ratcliff*



## Coming Events

24<sup>th</sup> June

29<sup>th</sup> July

26<sup>th</sup> August

A visit to the National Railway Museum

AGM and auction at the St Cyprian Hall

A visit to the Brewery

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It's time for another newsletter and I would like to include a mix of information to keep the newsletter interesting reading for wide variety of people. A great teacher once pointed out that teaching from what you have been taught is not the same as teaching from your own actual experience. I am sure that every member of our club has experiences that other members would benefit from. In this issue I am going to include something for the technically minded, something from my own experience and something that will make you think.

We have now had our sale day which can be credited to Chris who came up with the idea and from the feedback that I have received, has been very successful. I watched many items make their way from the tables to member's vehicles which is always a good sign. John advised me that we were able to cover the hall fee and make a little extra for the club, which in the end will find its way back to benefit the members and the cycle goes on.

Earlier this year, we discussed the idea of swapping unwanted items with AHARS in the form of "Swap a Box." I contracted Graham and asked him how his box was going and I was surprised when he responded with "*We are ready to trade.*" I looked at our box which was about 20% full and decided to fill it with items from my workshop, and we traded at the May meeting. I will bring his boxes (3 of them) to the July meeting as the June meeting will be the Railway Museum visit. I will place the contents on the give-away table.

**Below:** Our May Auction with Auctioneers Alan and Chris



There are usually one or two different or unusual items at the auctions and the item in the last photo fits into that category.

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## RECHARGABLE BATTERIES

Ever since the first NiCad batteries started appearing all kinds of interesting uses were being utilised. This was the first time a battery could supply a large amount of current on demand and that was used to perform work. My first NiCad drill was 4.8 volts and although it was slow and could only handle small drill bits, it made it easier to work where electrical cords would have made the job a lot more difficult and probably more dangerous. This was the first step in rechargeable batteries and the technology has been evolving ever since integrating itself into all areas our daily lives.

I have been buying, restoring, charging and experimenting with rechargeable batteries since my youth and have learnt a great deal about them. If I were to write everything I can remember, it would probably fill a book and you would be asleep well before you finished it. I thought it would be a good idea to share some of the things that would be useful to those of you who like to construct projects or use rechargeable batteries in your radios or test equipment. If this is interesting to you come and have a chat to me after one of the meetings or send me an email and I can go into more detail



### NICADS

The NiCad battery is the one with the dreaded memory problem where if you charged it before the level was low, and did not fully charge it, it could develop characteristics that would greatly reduce the battery capacity, which effectively gave you less usable power from the battery. This was rectified by charging and discharging the battery several times, even if the battery was new. These batteries could be charged very slowly (trickle charging) or high current for a short duration. The typical power tools used the 1200mAh cells and the charge time was usually three hours with the power pack being rated at 300mA. This means that the total charge would have only reached 900mAh.

What I actually found was that the charging power packs were never accurate and often charged at lower rates than marked. How I solved this is to make a variable power supply with a current meter. I would plug in the battery and turn up the voltage until it reached the correct current on the meter (300mA) and charged it for 4 hours until it reached the 1200mA rated on the battery. This gave my equipment much more life per charge. I also found that I could charge it at 1000mA for 1.2 hours and reduce the charging time. When fast charging you can check how the battery is going because it gets warm when it is close to full capacity. Some equipment came with a thermal switch to automatically turn the battery off when it was fully charged.

As the battery ages the battery does not charge properly and can either be replaced or the tools were often thrown out. I worked out that as the battery ages, its ability to accept a charge is reduced. I compensated for this by increasing the voltage on my charger until it would reach the required current (which standard chargers cannot do) and extended the battery life. One of the tricks used by the tool repairers was to build a power supply using a 40 volt high current transformer, a rectifier and a large capacitor, usually around 10,000uf. This was used to zap the battery, extending the battery life, however there were limitations and you would need to do the cells individually, when meant dismantling the pack.

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If you are planning to charge your batteries without the charger that came with the equipment, the simplest way is to use a series resistor with a power supply. The supply does not need to be regulated, but needs to be rectified, and the voltage needs to be higher than the battery that you are charging. You can calculate the resistor value using ohms law and make sure that the wattage rating of the resistor is large enough to handle the current (volts x amps = watts). You need to be aware of the battery capacity and typically you would charge at one tenth of that if you want to get good life from the battery. Another way to limit the supply current is to use a three pin voltage regulator as a current limiter and there lots of circuits if you use Google images.

## NICKEL METAL HYDRIDE

These are similar to NiCad's without the memory problem, or at least not as bad. I won't go into details as you can Google them yourself and read the technical information that is on the net. I use a lot of these in instruments, torches, MP3 players and radios and usually the AA or AAA version. There are two aspects to consider, the current capacity and the shelf life while the battery is not being used. I have bought these batteries from a variety of sources including EBay and China. When I get a new brand, I will test the performance by charging them as written on the battery or at one tenth of the rated capacity for ten hours and see how it performs.

Most of the batteries do not even come anywhere near the performance that is advertised and some as low as 20% of the rated capacity. Only the popular brands such as Eveready or Duracell seem to perform well and you are paying significantly more than their EBay cousins. I have recently come across the Turnigy brand sold by Hobby King with has good reviews and are reasonably priced (postage considered).

## LEAD ACID or GEL CELLS



The small 12 volt 7.5Ah sealed wet cell batteries are very popular for use in radio equipment. They are usually in 6 or 12 volt and come in a variety of sizes. Unlike NiCad's, these batteries should be charged by a regulated power supply and not the cheap chargers that are sold by the auto parts and hardware shops.

The 12 volt battery is the most commonly used so I will reference this one. The charging voltage varies from 13.6 to 14.2 volts and most chargers are set to 13.8 volts. Charging these batteries with excessive current will damage them so you need to look at the recommended charging current written on the battery. If your charger is not current limited, something that I found works well is to use a car brake or indicator globe in series with your supply to limit the current. This will work with most of these batteries.



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## LITHIUM ION & LITHIUM POLYMER

Lithium Polymer is very dangerous is mainly used for radio controlled models. I have about 30 of these and they can deliver unbelievable current for their weight and size which makes them suitable for model planes. The downside is they sometimes catch fire and the warning states that charging must be supervised at all times. They are balance charged, which means that each cell is charged individually at the same time and voltage needs to be the same for each cell. I use a purpose designed voltage checker that monitors this and ensures that the cells are in balance.

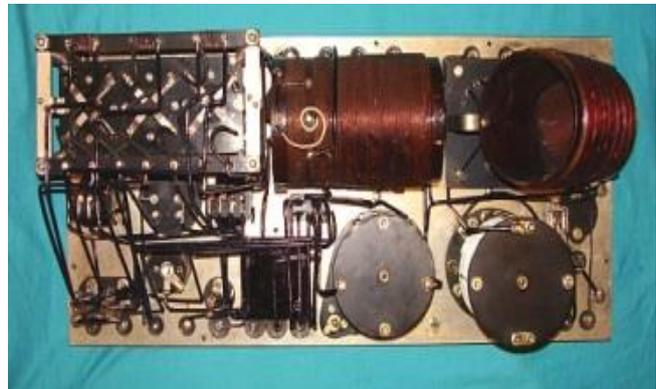
The batteries that most of you would use in your laptops, torches and appliances is lithium ion. As all the items described would already come with a charger I will just point out something that is little known. If you charge the batteries to full capacity the battery life is reduced, so if you tend to leave the charger running on your computers and appliances, you will notice a drop in performance of the batteries. The optimum is around 80%. Have you noticed this with your mobile phones when they are topped up overnight every night, then you see that the battery level drops faster than before.

## COMMERCIAL SHIPBOARD RECEIVER

With permission from the Western Historic Radio Museum

IP-501-A MW & LF Receiver Amplifier

From 1923 (40kc – 1000kc



"Listening on longwave with a 1923, battery operated, regenerative receiver? You gotta be kidding!"

One has to remember, the IP-501-A was the commercial shipboard receiver that was built to the highest standards of the day. It was well-known for its superior performance and reliability. It is the "R-390" of the 1920s.

The initial versions of this receiver were built at Wireless Specialty Apparatus, a company that was part of the cross-licensing "Radio Group" headed by General Electric and included Westinghouse, AT&T, RCA and the United Fruit Company (who owned Wireless Specialty Apparatus (WSA.) WSA built a few broadcast radios for RCA in 1921 and 1922 but by 1923 they had become part of RCA. Soon WSA became Radiomarine Corporation of America and was building shipboard radio gear for RCA.

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This three tube receiver uses a three-circuit tuner with a regenerative detector and two transformer coupled audio frequency amplifier stages - not exactly the norm for a lot of radio receivers in 1923. What really sets the IP-501-A apart from the other three-circuit tuner regen sets is its incredible Antenna Tuner section that is entirely shielded from the main part of the receiver (which is also entirely shielded.) The Antenna Tuner allows exact tuning of the antenna's impedance so the load remains the same on the Secondary circuit. It's like having a built-in pre-selector. The only transference of signal happens by way of the small variable coupling coil located inside the Antenna coil. The fact that the receiver cabinet and front panel are entirely shielded results in no hand-capacity effects when the receiver is operated as an autodyne detector. This makes tuning CW super-easy.

The Secondary Tuner has six frequency ranges from 1000kc down to 40kc and the dial is calibrated in meters. The Tickler coil is actually a variometer built into the Secondary coil form and includes load windings from the Secondary inductance to improve regeneration on the lower frequencies. The audio amplifier section is standard and uses two RCA interstage transformers. The audio gain is more-or-less controlled by the filament voltage and the operator can also select how much gain is required by using one of the phone jack outputs. The phone jacks also control the filament voltage to the tubes and only the tubes needed are in operation when that jack is selected.

Maximum audio is from the AF2 jack which provides Det + 2 AF stages. In high noise level conditions or for very loud signals, AF1 saves the operator's ears by using just one audio amplifier. If the DET jack is used, only the detector tube is in operation - this would be for receiving local transmissions. Intended audio output is to Hi-Z earphones but the IP-501-A will drive a horn speaker loudly from the AF2 jack. To power the receiver up requires 6vdc at .75A for the filaments, 45vdc and 90vdc for the B+ requirements and -4.5 for C bias. The filament adjustment pot controls the A battery into the receiver and is used to turn off the receiver. Pulling the phone plug from one of the jacks will turn off the tubes but the meter will still show A battery voltage unless the filament pot is turned off. The tubes normally used in the IP-501-A were UX/UV-201A triodes. Operating any radio receiver that uses batteries for its power source can be a hassle and expensive unless you are all ready set-up to run battery receivers. Usually highly-filtered power supplies provide "close to pure" DC voltages to operate these types of receivers.

## SIGNIFICANCE OF 432Hz

There are a number of members who like to listen to music and have built some interesting sound systems to enjoy it. Music plays an important role in our lives. Listening to music can change our mood when we feel down, it can give us confidence when we need to say or do something and it can make us feel relaxed after a hard day.

Music affects more than your psyche. It is also known to affect internal functions like blood pressure, speed or slow down your heart rate, reduce anxiety and even help with digestion, amongst many other things.

What most people don't know though is how it does this. What properties make up the landscape of sounds that create a song?

Well in short, it's all about frequencies and, the way we feel, the way the brain responds when we listen, depends on the combination of frequencies in the track. This is known as the frequency response

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The American Federation of Musicians accepted the 440 Hz as the standard pitch in 1917.

Then, in 1940, the United States introduced 440 Hz worldwide. London followed suit, and in 1953 440 Hz was approved as the general tuning standard for musical pitch there. Was this a good decision?

To understand the importance of 432 Hz, we need to first learn about the Schumann Resonance, which will ultimately explain this number's importance.

German physicist Winfried Otto Schumann documented the Schumann Resonance in 1952.

He understood that global electromagnetic resonances exist within the cavity between the Earth's surface and the inner edge of the ionosphere and are excited and activated by lightning.

He determined that the frequency of these electromagnetic waves are very low, ranging anywhere from 7.86 Hz to 8 Hz.

This frequency is essentially the Earth's heartbeat; the frequency the Earth beats at.

Now, 432 Hz resonates with the frequency of 8 Hz. And here's how...

On the musical scale where A has a frequency of 440 Hz, the note C is at about 261.656 Hz.

On the other hand, if we take 8 Hz as our starting point and work upwards by five octaves (i.e. by the seven notes in the scale five times), we reach a frequency of 256 Hz in whose scale the note A has a frequency of 432 Hz.

This frequency, which is at the top end of the Theta range and at the start of the Alpha range, makes us feel very relaxed but conscious and open to intuitive learning.

Listening to a concentrated recording of music at this frequency, like a binaural beats track, will synchronize (entrain) the brain to this state and induce the aforementioned effects.

Think for a moment about all the frequencies that travel through your brain in a given day: cell phones, Wi-Fi, radio and microwaves.

All these exist at different frequencies and pull our brain from one frequency to the next.

The brain is on a constant yo-yo, being pinged at by different frequencies: it's no wonder these devices emitting artificial electromagnetic radiation have been linked to cancer, depression and insomnia.

## **Historical Use of 432 Hz: Ancient Greece, Egypt & Tibet**

Further evidence of a 432 Hz preference is found in ancient Greece, where instruments associated with Orpheus – the God of Music – were tuned at 432 Hz.

According to international researcher and musician Ananda Bosman, the majority of instruments unearthed from ancient Egyptian sites are tuned to, yes, you guessed it, A=432 Hz!

# HRSA SOUTH AUSTRALIA

Sound researcher Jamie Buturff discovered that many CD recordings of Tibetan monks' singing bowls were tuned at 432 Hz.

If this interests you on the internet there is a large amount of information about this, and there are free converters where you can convert your own music to 432 Hz. If you go to You Tube and type in 432 Hz, you will find a selection of music recorded in this frequency that you can listen to for free.

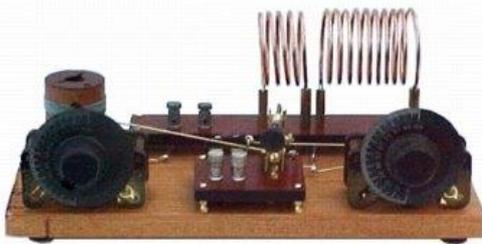
## FROM THE HENDON FILES

### Tony and the wobble girls:

Tony was a rather shy young bachelor whose main job was to maintain the wobblers on the TV production line. The wobbulator was a large piece of test equipment that was mounted at an upwards angle under the test bench so that the screen protruded through the bench for the operators to see. Replacing a wobbulator could only be done from below the work bench with one's head at knee level of the female operators. The operators would normally take a rest break while Tony replaced their test equipment but occasionally the girls set out to embarrass Tony and remained at their bench. On this particular occasion the girl gave Tony a view of what he was not expecting to see! He leapt up and ran from the production line blushing like a lighthouse as the entire line of girls roared with laughter.

### The power operated drawer:

When the same foreman had a day off, Barry spent some hours attaching a washing machine solenoid and micro-switch behind his desk drawer and wiring it up so that when the draw was opened more than an inch the solenoid was activated to snap the drawer shut again with considerable noise and force.



## SHORT WAVE CRYSTAL SET

I found this advert. from PV Scientific Instruments.

Experience the pleasure of operating a classic breadboard crystal radio set: our Shortwave Crystal Radio Receiver.

Listening to short wave signals with a crystal radio requires the highest Q circuitry, and we are convinced that our Shortwave Crystal Radio Receiver offers the highest selectivity and sensitivity in the 30m-50m short wave band. A product of years of careful refinement, and based on a classic circuit of the 1920s, this crystal radio is inductively coupled and has an impedance wave trap/antenna tuner. It features antique dials and top-quality original variable tuning capacitors and handsome original binding posts (brass or nickel-plated brass) mounted on a "breadboard" base of pattern-grade mahogany.

Crystal detection offers 100% distortion-free representation of the received signal and thus superior shortwave listening, and many of our customers have enjoyed adding this classic radio to their stereo systems. The radio's headphone output can be connected to an audio amplifier's 47k ohm phono input.

This radio comes completely assembled and ready for use for countless hours of radio enjoyment. Must be used with an (easy-to-construct) antenna system. Complete set-up and operating instructions are included.

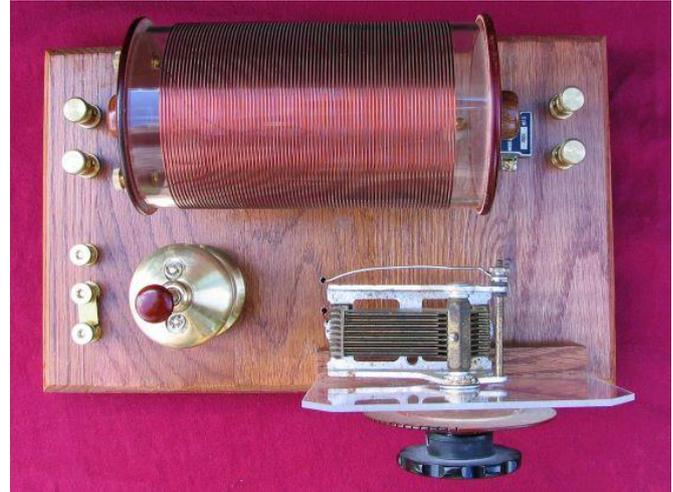
Dimensions: 15 x 8 x 7 inches.

Price: \$245.

Sorry, we do not offer a kit for this radio.

To get answers to your questions or to place an order, please call us at **607-387-6752** or email us at [pvsci@arcsandsparks.com](mailto:pvsci@arcsandsparks.com).

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The standout item of this crystal set is that cats whisker detector.

The coil has two taps. One is about 15% from the bottom and that is where the antenna connects. The other tap is about 50% of the 240 uh coil and that is for the detector tap. The coil is space wound for higher performance.

There is a brass link switch to select either the detector stand or a 1N34A diode hidden under the base.

The base is made with white oak with a stain finish. The size is about 11 by 7 inches (28x18 cm).

How does it work? It works fairly well. This circuit is prone to a lot of night time shortwave interference. You can put an inductor in series with the antenna to reduce the 49 meter broadcasters.

## **MORE FROM THE HENDON FILES: The public address system:**

The Hendon works employed over 2500 people spread over many acres during my time. To keep everyone in touch, a telephone and public address system covered the entire area and one would hear people being paged every few minutes. Amongst the many names that were frequently paged there were some like "Mr. Ken Airy" that always raised a smile.

### **Committee**

*Members of the public are requested to direct all enquiries, including those regarding membership, information on radios (wireless sets) and the estimated value of radios (wireless sets), to the Group Secretary please.*

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