Inside Story:

Does this face ring any bells? He was an experimental physicist who helped turn theory into working hardware and won the Nobel Prize for Physics in 1956

He used nothing more than foil, a razor blade, and some wire…… His contributions were technical, precise, and foundational to one of the most important inventions of the 20th century. - Who was he?

See inside for the full story……

Vale – Elizabeth Cox – "The Tea Lady"

In 2019, Elizabeth and John Cox were both awarded Life Membership of the HRSA for their outstanding service, dedication and leadership to the club in SA since it was founded.

Elizabeth will be long remembered by all HRSASA members for her fabulous sense of humour and fun as the "tea lady" at our meetings!

Some background about Elizabeth:

Elizabeth came to Australia in January 1956 at the age of 17 from Leeds in Yorkshire, UK. Upon arrival, she lived for a while in Angas Street in the city at a Salvation Army Hostel. Soon after, she moved out to Gawler to begin a traineeship with the Post-Master General's Department (P.M.G) as a switch-board operator. Elizabeth had to take classes at the Gawler Institute as part of her training to learn how to speak Australian!! Back then…… when you lifted the handpiece (no dialling in those days out at Gawler) the Exchange would answer and the operator would ask "Number please", so you may have had Elizabeth as your connection operator at the exchange!

After a year, because of the awkward train timetables between Gawler and Salisbury for Sunday shifts in particular, Elizabeth handed in her resignation.

Her next adventure began (while still living in Gawler) was at Gerard Industries where she stayed until 1961, learning soldering and working with printed circuit boards,.

Elizabeth moved to the Weapons Research Establishment (WRE) at Salisbury where she worked on radio manufacturing until she was moved to the Apprenticeship Training School and had to leave. ***Why did she have to leave??*** It was because she was engaged to be married to John, and in those days, married women were regarded as unreliable. Many companies and government departments had policies about female employees in those days. Women had to resign when they were engaged or married - because family duties were bound to follow!!

Elizabeth then went on to become an employee of Medibank where she worked as a switchboard operator. She finally retired from the workforce in 1986.

They met in Prison!

During the early to mid 1960's the Yatala Labour Prison used to have regular dances at the prison and often, people from outside were invited to attend these social gatherings! One Saturday night, unbeknown to both Elizabeth and John, friends took them to the dance where they were introduced to each other. John and Elizabeth were married on 20th September 1969, so in 2019 when they were awarded their HRSA Life Memberships, they celebrated their Golden Wedding Anniversary – 50 years together!!

Elizabeth passed away in June after a battle with dementia and was cremated on Tuesday the 24th of June and will be laid to rest with John.

Historical Radio Society of Australia Inc. – S.A. Group

Web Site: www.hrsasa.asn.au
All correspondence should be addressed to the Secretary, HRSA-SA Group, 2-13 Chester Street, Glenelg South, S.A. 5045.

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Newsletter Editor:	Ian Smyth	0488 488 776	sec@hrsasa.asn.au
Website Editor:	Ian Smyth	0488 488 776	sec@hrsasa.asn.au

Planned meetings for the next few months:

Sunday 27th July
1:00pm to 4:00pm
A.G.M. and AUCTION
This is member's opportunity to re-shape the management and direction of the HRSASA with the election of a new Management Committee for 2025-26. Several members of the current committee will not be standing for re-election this year. The AGM will be followed by a traditional Club Auction.
To be held at:
St. Cyprian's Church Hall
70, Melbourne Street, North Adelaide, 5007

Sunday 31st August
1:00pm to 3:30pm
HOME VISIT
After a six-or seven-year break, we will be returning to visit one of the largest and best curated collections in the SA Group. Les Janes is one of the stalwarts of our membership who is recovering well from a major health setback last year and would love to see as many of us as possible at his home.
To be held at:
Address to be confirmed to members by email closer to the date.

Wednesday 10th. September
12 noon for 12:30 start
MEMBERS LUNCH
Our bi-monthly lunch is open to all members, partners and guests. This month we return to the southern suburbs.
To be held at:
The Earl of Leicester Hotel
85 Leicester Street, Parkside, SA, 5063

Sunday 28th September
1pm to 3:30pm.
USING OSCILLOSCOPES AND SIGNAL GENERATORS
A practical workshop for members, led by two experienced colleagues who use these tools for analysis and fault finding in radio equipment servicing. No previous experience needed! We will have several sets available in the Hall to practice with. You do not need to buy your own!
To be held at:
St. Cyprian's Church Hall
70, Melbourne Street, North Adelaide, 5007

Sunday 26th October
1:00pm to 3:30pm
"OPTIMAL CRYSTAL RADIOS AND OPTIMAL CRYSTAL SPEAKERS"
Talk & demonstration by Mr Warwick Kemp, a "Radio Archaeologist" and explorer of the electromagnetic aspects of radio, radar and sonar.
To be held at:
St. Cyprian's Church Hall
70, Melbourne Street, North Adelaide, 5007

Wednesday 12th November
12 noon for 12:30 start
MEMBERS LUNCH
Our bi-monthly lunch is open to all members, partners and guests. This month we're back in the Northern suburbs…
To be held at:
The Hampstead Hotel,
143 North East Rd, Collinswood, SA, 5081

Sunday 30th November
1:00pm to 3:30pm
AUCTION
This is your chance to clean out the shed/workshop and get rid of extra spare parts and radio equipment that is surplus to your requirements. Book your table today!
To be held at:
St. Cyprian's Church Hall
70, Melbourne Street, North Adelaide, 5007

Saturday 20th December
12 noon for 12:30 start
CHRISTMAS LUNCH
All members and their partners are invited to join us for our annual Christmas Lunch, and our wrap-up of the year's events. As in previous years. The cost of the lunch will be subsidised by the HRSASA.
To be held at:
The Maid of Auckland Hotel,
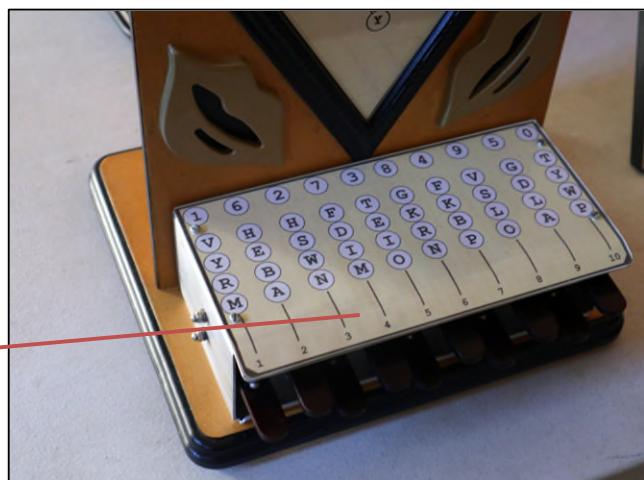**926 South Rd, Edwardstown, SA, 5039**

Early Black & White TV – 1969 (U.S.A.)

Photo Gallery 1 – From our May 2025, "History Month" Presentation by Tony Bell.

Tony gave our small but fascinated group an excellent introduction and demonstration of some very early telegraph equipment. *(Photos by courtesy of Stephen Parker.)*

Above: Cooke and Wheatstone "5-Needle Telegraph"

Above: Closeup of the keyboard of the 5-needle telegraph

Above: Cooke and Wheatstone "single needle" telegraph *(left and right needles make a slightly different note when hit.)*

Above: Receiver box (wooden sound amplifier) for the single-needle telegraph.

Above: A Birmingham (UK) "Linesman" in the early days of telegraphy. He was prepared for any emergency with his "top hat tool chest" and spare cable.

Above: Closer view of the dial of the 5-needle telegraph and keyboard.

Australia was a relatively early adopter of electrical telegraph technology in the middle of the nineteenth century, despite its low population densities and the difficult conditions sometimes encountered in laying lines. From 1858 onwards, the major capitals were progressively linked, culminating in the addition of Perth in 1877. Australia was linked to the rest of the world for the first time in 1872, through the Overland

Telegraph which ran some 3,200 kilometres from Adelaide through to Darwin. The network continued to expand in size and sophistication until 1959 and in heavy usage until 1945, after which time telephone usage began to erode public patronage of telegraphy services. The final publicly provided telegraphy service was closed in 1993.

ITEMS For SALE, and/or HELP STILL WANTED BY FELLOW MEMBERS:

1. **WANTED TO BUY:** (Submitted by Phil Flaherty.)
I am doing up a Mark 32 Type Japanese transmitter and chasing some missing parts. The radio came from Adelaide and at some stage was modified. I am chasing the 200mA antenna; RF ammeter; the 2 Variometers/ Variocouplers, and the 2 variable capacitors. The variometer No.8 is connected to a 900pf variable capacitor and the No. 17 variometer, and the other capacitor are separate.

ALSO WANTED TO BUY: (by Phil.)
The plugin band coil for a WW2 Japanese Model 94 ground to air Mark2 (type 2) receiver. [Picture, right] The receiver already has a no.4 band coil plug in, 820 to 1500Kcs
Contact: Phil Flaherty - Email: pflaherty3@bigpond.com – Phone: 0411 707 176

2. **WANTED TO SELL:** (Submitted by Warren Lane.)
Downsizing sale of radio, audio and general electronics. Included are quality 1920s radios, plus many components. Quite a lot has already gone, but here is a broad sample of bigger items still for sale:

Above: Freed Eisemann 5-valve battery radio with Amplion horn, Philips B- battery eliminator and dual 6-Volt SLA A-battery. *Offers?*

Above: Pilot Super-wasp battery short-wave receiver with plug-in coils and documentation. *Make an offer*
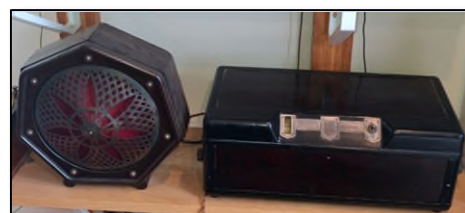
Above: Philips model 2510 table-top radio (1930) with classic Philips Sevenette speaker. *Make an offer*

Many other items at next to nothing prices as well. Save them from becoming landfill. Tell me what you're looking for, or make a time to come and take a look.

Contact: Warren Lane – Phone: 0400 272 556 or email: warren.lane@internode.on.net

3. **WANTED TO SELL:** (Submitted by Greg Lamey)
   1. Impedance Bridge by Transmission Products Ltd.
      (restored by Andy Gluis) in a polished wooden cabinet - $70
   2. Wayne Kerr Universal Bridge (ex Codan), appears to be working - $70
   3. Muirhead Universal Bridge (restored by Graeme Cohen) in polished wooden cabinet - $70

(Photos of the above 3 items on the next page)

Contact: Greg Lamey Email: gnjlamey@gmail.com - Phone: 0455 349 304 – Pickup from Cudlee Creek

Above: Impedance Bridge by Transmission Products Ltd. - $70

Above: Closeup of badging on Transmission Products Bridge

Above: Muirhead Universal Bridge in polished wooden case.

Above: Polished wooden case for Muirhead Bridge.

Left: Wayne Kerr Universal Bridge – for sale by Greg Lamey.

4. **WANTED TO BUY - Magazines** (any condition is OK): Revised list, submitted by Peter Field:

Does anyone have any of these that they'd like to sell – or give to a good home?

RADIO & HOBBIES/ ELECTRONICS AUSTRALIA	ELECTRONICS TODAY (INTERNATIONAL)
1940 Apr, Dec	1979 Apr, May
1945 Sep, Oct, Nov, Dec	1980 Jul
1947 Jan, Feb, Mar, Jun, Jul, Sep	
1948 Jan, Feb	
1972 Jul	
1973 Jan, May	
1974 Jan, Mar, May	
1975 Apr	
1976 Jul, Sep, Nov	
1980 Dec	
1981 May	
1982 May	
Also wanted by Peter:	
AEGIS (Manufacturing Co.) PTY. LTD. catalogues/publications/ephemera.	

Contact: Peter Field, Phone: 8362 5161 after 2pm. - Or by email at: petergfield@yahoo.com

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Component Corner

Many new members are probably wondering where to obtain components and valves. The following is a list in order of preference:

HRSA-SA Group Shop: We now have a new arrangement for our store. Please contact our Liaison Officer, Alan Taylor on 0417-859-074 to enquire, or place an order. Alan's email address is: shop@hrsasa.asn.au

AZTRONICS, 170 Sturt Street, Adelaide. Houses the HRSA-SA Group valve bank and modern components. They will source components for members. Great supporters of the HRSASA.

HRSA Melbourne (see *Radio Waves*) Houses the Victorian HRSA valve bank and odd passive components and kits, plus resource books written especially for members.

WES Components, Sydney. The catalogue is viewable on-line, and orders can be placed through the Shop Keeper/Secretary, as the SA Group has an account, through which we get "trade discount". Go to: https://www.wes.com.au to see all their products.

Photo Gallery2: Sunday 29th June "MADE IN SOUTH AUSTRALIA". A "show and tell" meeting at which members were encouraged to bring radio-related items that were locally made. Brands such as *Scharnberg Strauss, Philips, National Radio* and *Bland* were heavily featured. Some were showcased at the State Library during our "Centenary of Broadcasting" exhibition, but there were quite a few that were not. John Crawford showed some "alternative" Philips products that were made at Hendon during his time at the "Special Projects" division. *(Photos by courtesy of Stephen Parker.)*

Above: Very rare Scharnberg Strauss wooden tabletop model from 1936 (from Don Hosking's collection)

Above: Rear view of the radio on left, showing 6A7, 6D6, 6B7,42 & 80 valves.

Above: Scharnberg Strauss Model 29T (1948) – Case partly French-polished – Rescued from a farm at Tanunda.

Above: Chassis of the T29 is in excellent condition EXCEPT for the 9v Vibrator AND an apparent 240v AC mains cable in there together!

Above: The Philips "Skipper" Model 196 valve portable radio, made when transistor portables were coming onto the Australian market. Many manufacturers at this stage produced both valve and transistor models to try for full market coverage.


Above: The Operatic Model TP-7 transistor portable (1960) - Made by Bland Radio in Adelaide at their factory at South Road, Edwardstown. It was styled after the Philips 196 to 199C of the same era.

Above: The model AKP Portable valve radio was manufactured by National Radio Corp. in Adelaide (1946-48.) Whilst not very attractive, it was a good performer with a larger speaker with better tone than later transistor radios of a similar size.
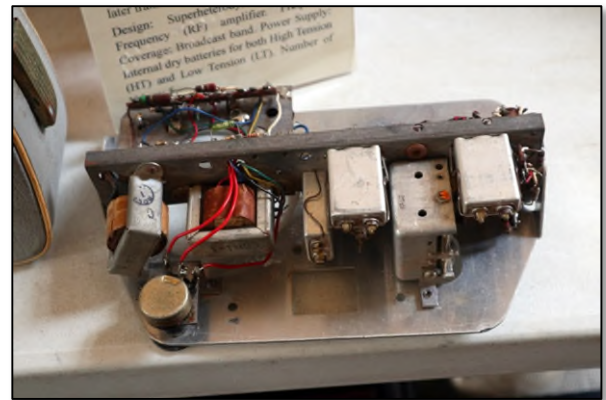
Above: The chassis of a parly restored Philips "Skipper" Model 196 showing how tightly packed the components were.

Above: Reg George started making 6-volt vibrator radios using two-volt heater valves with a tuned RF stage, in metal cabinets with the "Standard" name plate fixed on the back,
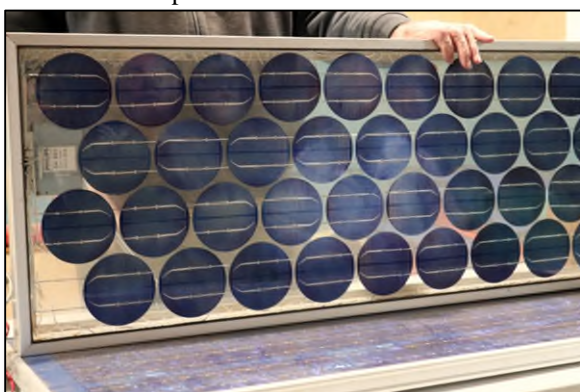

Above: Closeup of the badge on the back of the metal case of the 6 volt "Farm Radio" on the left, stating Made in South Australia.
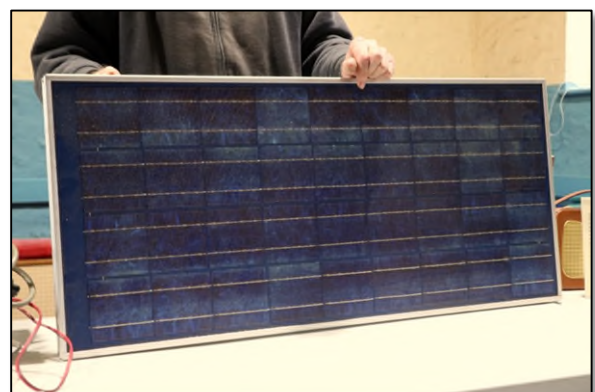

Above: "Operatic" Model 38P (1954) 5 valve portable radio with plastic case and clear handle.

Above: Dial glass of the Operatic 38P

Above: John told the story of early solar panel development at Philips Hendon – Model OA-801 Peak power: 17v @ 1.95amps

Above: This is a later model with much more efficient collection technology and higher output.

The First Stereo Radio Broadcasts in South Australia

By Ian Smyth and Peter Field

During the "Centenary of Broadcasting in S.A." Exhibition at the State Library earlier this year, a couple of us were discussing (during those long hours on duty) when were the first stereo broadcasts in SA? Was stereo first on the FM band, or on the AM band? Our first stereo experimental broadcasts pre-date the introduction of FM Broadcasting between 1974 and 1976. But when was stereo ever tried on the AM band in SA?

Ian Smyth, as a child of 9, remembers helping his dad (who was a bit of a Hi-Fi fan) set up for a long anticipated experimental broadcast one evening in May 1959. They borrowed Nanna's Philips 132 (1950) and set it up opposite their Philips 3362 (1947) in the living room and got ready to listen…….

Peter Field remembered reading about this experiment, and found the following information leaflet issued by the ABC in 1959 in the lead up to this event:

FIRST STEREOPHONIC BROADCAST

IN S.A.

The Australian Broadcasting Commission will present the first broadcast

in stereophonic sound in S.A. on Friday, May 8th, from 11 p.m. to 11.30 p.m.

Stereo sound is regarded by technicians and music lovers as the most outstanding development in music reproduction since long playing records were introduced 10 years ago.

Its exciting illusion of realism has never before been achieved in sound recording.

A sound engineer recently described the difference between monoaural sound (as we receive it on present day radios) and stereophonic sound as a comparison between listening to music through a hole in the wall and being present in the room where it is actually being played.

Two separate and different sound tracks will be broadcast from 5CL and 5AN transmitters, and only the merging these two sounds in your room will produce the stereophonic effect.

It will therefore be necessary for you to have two radio sets in your lounge or living room – one tuned to 5AN and the other to 5CL.

Householders who do not possess two sets could perhaps make arrangements to borrow one from a neighbour.

For best results, the sets should have speakers of similar size or quality but, but this is not absolutely essential.

The radios should be placed about 6 ft apart and should be tuned to the same output in tone.

They should be turned slightly towards each other so that the two sound "streams" from each speaker converge at a point about 10 ft into the room. Your chairs should be placed behind this point.

These distances cannot be fixed definitely as stereo sound may be affected by the great differences in acoustic properties of the room.

Listeners should be prepared to manipulate the sets by slightly varying the distances between the speakers or their angle towards the centre of the room. Generally speaking however the amazing effect of the stereophonic sound will be heard if the radios are tuned correctly to both stations and placed in the recommended positions.

Being only 9 years of age at the time, Ian remembers that it did sound "a bit different" but not that amazing!

Further research shows that this experiment by the ABC was conducted only twice and then abandoned.

Feedback from the public, and from the ABC's own staff reported that there were just too many variables that could not be adequately controlled by transmitting in this way, so we had to wait a few more decades until the introduction of specific AM Stereo broadcasting (very short lived) and the first FM radio stations between 1974 and 1976. The drawback to both AM Stereo and FM broadcasting of course was the need to purchase a completely new radio set at considerable cost at that time.
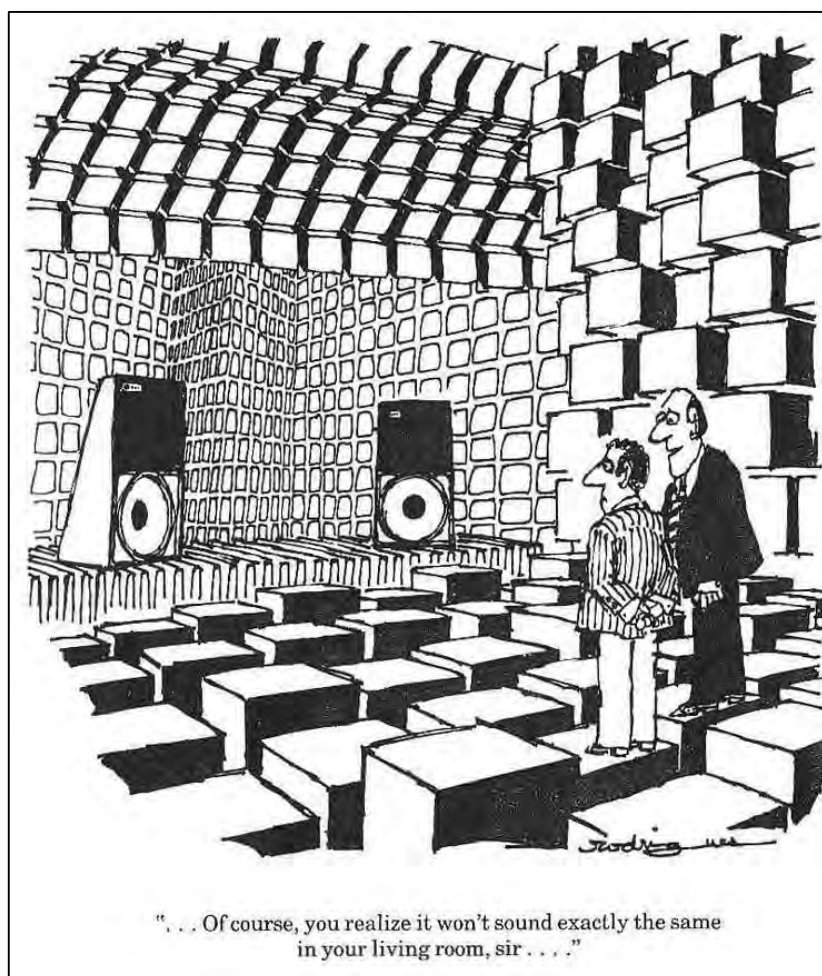
". . . Of course, you realize it won't sound exactly the same
in your living room, sir . . . ."

FRONT COVER STORY:

Walter H. Brattain, the Experimentalist Who Helped Build the Transistor
(Reproduced from the "All About Circuits" website - Written by Luke James, May 14, 2025)

At Bell Labs, Walter Brattain turned theory into hardware through precise lab work, earning him and his colleagues the Nobel Prize in Physics in 1956.

Although Walter Brattain didn't invent the transistor on his own, it was his hands-on work as an experimental physicist that helped turn theory into working hardware using nothing more than foil, a razor blade, and some wire.

Walter H. Brattain. Image (modified - used courtesy of National MagLab)

His contributions were technical, precise, and foundational to one of the most important inventions of the 20th century.

From Ranch Work to Quantum Physics

Walter Brattain was born in 1902 in Amoy, China, but grew up in rural eastern Washington. His parents moved back to the U.S. shortly after his birth, and he spent most of his childhood working on a cattle ranch. Later, he commented that managing researchers was a lot like herding cattle.

He attended several high schools before graduating from the Moran School for Boys. In 1920, he started at Whitman College, where he studied physics and math. According to Brattain, he wasn't drawn to these subjects by ambition, but rather that they came easily to him. His professors noticed his potential and encouraged him to continue.

He earned a master's from the University of Oregon and a Ph.D. from the University of Minnesota. While there, he studied under John Van Vleck and took some of the earliest quantum mechanics courses available in the U.S. While that experience gave him a strong grounding in theory, Brattain was more interested in how things worked in practice.

Brattain's first job was at the National Bureau of Standards, where he worked on piezoelectric frequency standards. It was short-lived. In 1929, he attended a physics conference and mentioned to his advisor he was looking for work. His advisor introduced him to Joseph Becker from Bell Labs, who was hiring. Becker asked Brattain one question: Would he stand up to his boss if he disagreed? Brattain said yes and got the job.

Building the First Transistor

When Brattain joined Bell Labs, he started by working on copper oxide rectifiers and thermionic emission and focused on how the surface of materials affects electronic behaviour. Surface physics wasn't widely studied yet, but it became important later. During the Depression, Bell Labs cut pay and shortened workweeks. Brattain used the time to study quantum theory more deeply and attend lectures at Columbia. In 1940, he was brought in to help analyse a mysterious crystal that produced voltage when light hit it. He gave a quick explanation that turned out to be correct: it was a primitive p-n junction, something that got him noticed by Bell Labs leadership. During World War II, he worked at Columbia on magnetic detection of submarines, which gave him more hands-on experience with electronic systems.
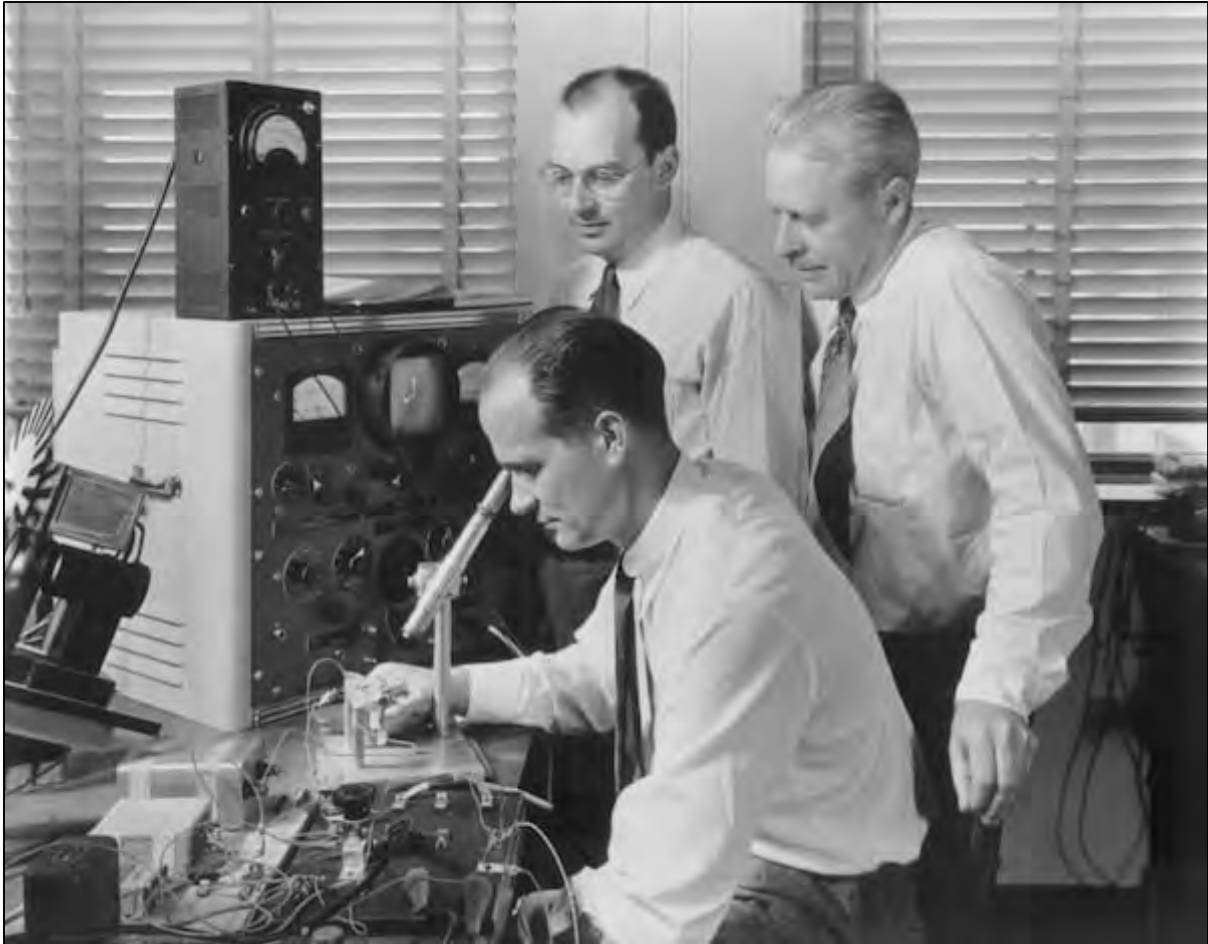
William Shockley (seated) is pictured with fellow Bell Labs engineers John Bardeen (top) and Walter Brattain (right). Image used courtesy of Nokia Bell Labs

After the war, Bell Labs created a new solid-state research group led by William Shockley. John Bardeen handled theory, and Brattain focused on experimental work. Their goal was to replace vacuum tubes with a solid-state amplifier, though early efforts failed. Bardeen soon figured out why: surface states in the semiconductor were trapping electrons and blocking field effects. Brattain's job was to find a way around that.

He and Bardeen tried many setups. Some showed signal gain, then failed without warning. One experiment only worked after Brattain submerged it in water. That told him something about how the surface environment affected results. On November 17, 1947, they applied a voltage to a germanium crystal, and on November 21, Brattain used a metal point with electrolyte to probe the surface and observed weak amplification. Bardeen then calculated that using two contacts instead of one would help.

The point-contact transistor was developed by Brattain with Bardeen and Shockley. (Image used courtesy of Bell System Memorial)

Brattain solved the problem by gluing gold foil to a plastic triangle and slicing it with a razor blade to create two sharp points spaced about the width of a piece of paper. He added a spring to hold the contacts against the germanium. Then, during experiments in mid-December, the device amplified electrical signals by a factor of 100. They found that it worked reliably, and one week later, they demonstrated their invention—the first working transistor—to Bell Labs management.

Later Work in Semiconductors
Brattain didn't stop with the transistor. He continued working on surface effects in semiconductors, and he was the first person to show how the photoelectric effect worked on the free surface of a semiconductor. He started with copper oxide, then moved to silicon and germanium. He helped explain how light could release electrons from a surface, which matters in both solar cells and photodetectors. The Nobel Committee later cited this as one of his most important contributions.

Brattain, Bardeen, and Shockley received the Nobel Prize in Physics in 1956 for their discovery of the transistor. After that, things became tense; Shockley believed he deserved sole credit for the transistor and began excluding Brattain and Bardeen from new projects. Shockley later developed the junction transistor, which eventually replaced Brattain's point-contact version in most applications.

Brattain retired from Bell Labs in 1967 and returned to Whitman College as a professor. He taught until 1972 and stayed on as a consultant until he died in 1987.

REFERENCES:
1. https://www.allaboutcircuits.com/news/walter-h-brattain-the-experimentalist-who-helped-build-the-transistor/

2. https://www.nobelprize.org/prizes/physics/1956/brattain/biographical/
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HRSA-SA Group - Amateur Radio Call-Back Network

In 2020, when our HRSA-SA Group was unable to hold meetings due to Covid-19, a small group of licensed radio amateurs decided to hold a local call-back net.

The first broadcast was on the 26th of April 2020. Although the ban on meetings was soon lifted, the broadcasts have continued and as we approach the completion of our fourth year, we are still going strong.

While the aim is primarily for HRSA members, non-members are also welcome, the more the merrier. The group has a small band of listeners who either do not have the required licence or do not have transmitting facilities. Topics generally centre around historic radio, or activities coming at HRSA events, plus a range of widely varying content, can be heard.

For those licenced amateurs and those that would like to listen to the broadcast and have the correct facilities the details are:

Wednesday Nights (each week) – Starting at 2000 hrs.

On VK5RAD repeater (Crafers) on 147.0 MHz. (Note: We will remain with the Crafers repeater until the Houghton repeater is fully upgraded and operational.)

There are generally two full rounds and a quick "wrap-up" round.

New participants are most welcome.

So why not tune in and listen, or join in the conversation?

For further information, contact Tony Bell at home on (08) 8269 4095