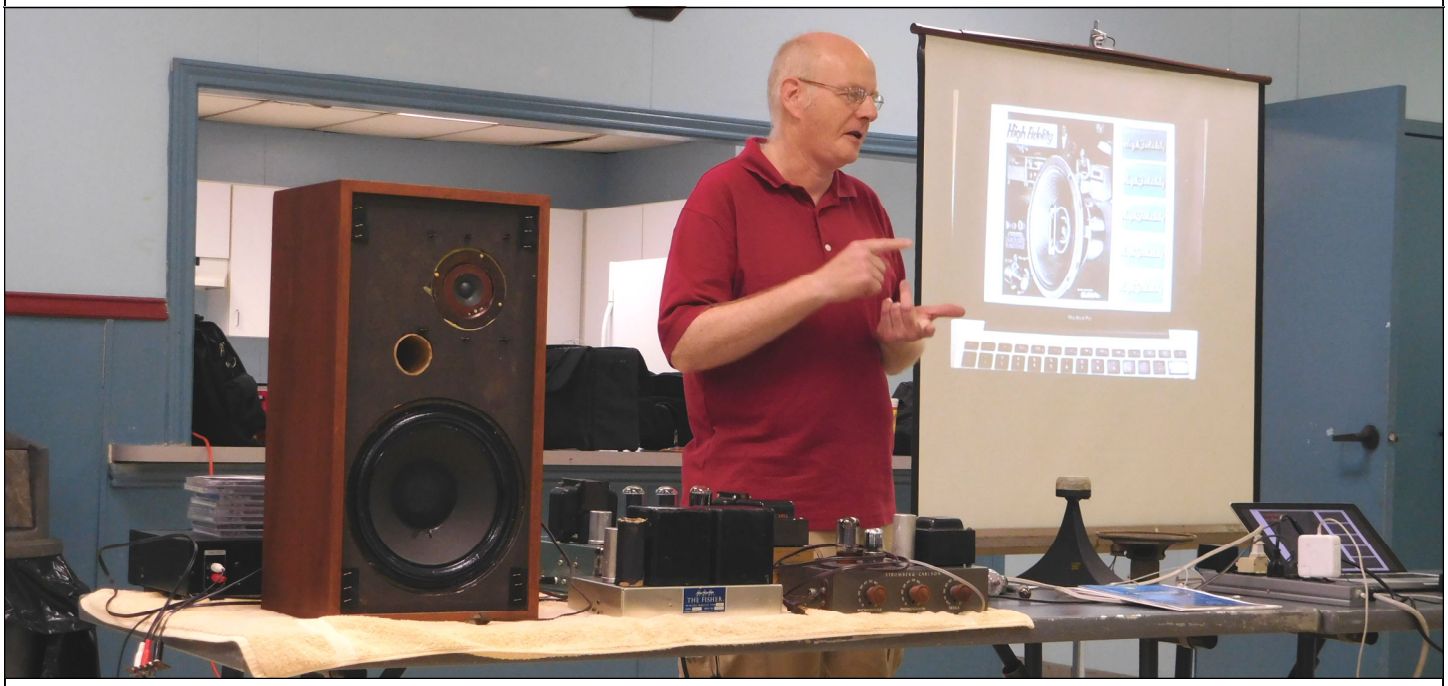
SoundWaves

VRPS Fall 2016

From the President

In case you have not checked your calendar or whatever techie type thing you use to determine where we are in the year…ya better not wait too long to find out or you will find yourself in 2017. Hard to believe we are pressing towards October at a very fast rate. Someone once said that the only thing that truly flies is time…you cannot stop it. Sometimes we may want to savor the moment, but even that will vanish quickly into yesterday. Enough of that philosophy stuff!! What we have here is another opportunity to gather in Mesquite to celebrate our 42nd anniversary, the oldest old radio and phonograph club in the Southwest part of these United States. Now that is something to take a moment to savor! But, typical of time, we have to move on with the savoring and get to the doing. Elsewhere in the convention packet you received, there is a registration form that will beg for your completion and return so that we can count you in the multitudes we expect in Mesquite in November this year. Not a lot has changed as far as the procedures and location of this year's event. We are definitely looking forward to a great time. For many of us, it is the one time each year we get to see old friends from afar and meet new friends who continue to come into our hobby. This year we want to thank Mr. Tom Edison for his contribution to our every day lives. Hard to imagine what our lives would be like without the inventions courtesy of this great American. Banquet entertainment this year is one you will not want to miss…how often have I said that line? Well, this time, we have contracted for the Sorta Sisters…a local act that is a cross between the McGuire and the Andrew Sisters. Some of you old timers will remember those names. No matter your age, you will surely enjoy the upbeat songs performed live by this awesome trio. Yep, meals at the banquet are $30 a plate, but that is a small price to pay for the camaraderie and entertainment, not to mention the opportunity to win some great door prizes. Hey, the food ain't so bad either!! Be sure you check the banquet box and join us this year! One more thing before closing - we have picked up several new members this year whom I expect will be making their first trip to our annual event. If you see someone you do not recognize, take a moment to say hi…if they are a new person, they will appreciate it…if they are a long time member and you did not recognize them, introduce yourself again. We all have a common bond in our love for the radios and phonos …thanks in large part to Mr. Edison.

—Jim



June 18, 2016 Meeting Notes

Jim introduced our meeting program presenter Kurt Ehrlich, who spoke on the topic of audio amplifiers. First, Kurt pointed out the fact that there really wasn't any need for "Hi-Fi" until the microgroove record came out – with RCA and its 7 inch 45 RPM players and many others developing players and changers for 10 and 12 inch records. For the movie industry Altec Lansing competed with RCA and Western Electric for theater equipment. In December 1957, the first stereo LP's came out, and by 1960 everyone had gone to stereo recording. As Kurt pointed out, the advent of high fidelity stereo provided a lesson in "How to complicate an audio amplifier". Because of the relatively high output impedance of the vacuum tube, an output transformer is needed to drive each speaker. To deliver good, clean sound this transformer and the tubes driving it become the critical parts of the amplifier. As a result, special tubes were developed, having the ability to produce more and more power with lower distortion. The first pentode tube was the early number 47 tube, which provided better sound, but the beam power tube was much better. Although the beam power tube is actually a pentode, that name was never applied to it, so as to avoid a patent infringement suit from Philips. (Your tube manuals will confirm this fact). To get the best result, there is almost always a pair of tubes connected in a "push-pull" circuit arrangement to an output transformer having a center-tapped primary winding. A number of early high-end radios, such as the Philco 65 used the push-pull arrangement to get better sound – along with bigger and better speakers. An additional requirement for push-pull operation is a phase splitter or inverter, often implemented with a "long-tail pair" of triodes. Kurt showed and discussed a Stancor output transformer data sheet. Stancor was a prominent supplier of OEM and replacement transformers of all types. There were many kits and ready-to-use amplifiers in the market place – ranging widely in price and performance. McIntosh, Fisher, Scott, Heathkit and Dynaco's "Dynakit" are examples. (There is now a new Dynaco company selling new Dynakits). Generally, performance and price went with bigger and heavier output and power transformers and bigger and better output tubes – sometimes with four output tubes arranged as a push-pull-parallel set. These high-end units were very heavy. Of course the pre-amplifiers were also of better and better quality and cost – some with very elaborate tone control systems. Most amplifiers used negative feedback all around the main amplifier to get a flat response curve over a wide frequency range, e.g. 20 Hz to 20,000 Hz. The most popular circuit design was the "Williamson" circuit, which used taps on the output transformer connected to each screen grid of the output tube pair. This provided a so-called "ultra-linear" response. The McIntosh MC-30 was (and is) a popular 30 watt amplifier from the '60's. Kurt discussed its circuit features. There are many users of old audio equipment and builders of their own amplifiers using vintage type 45 output tubes.

Continued page 7

Photo from the July Repair Session

Problems Addressed:

- Automatic 614X — No power
- Emerson 561 —Alignment
- G.E. G85 — No audio
- Crosley Fiver 53TF —No audio output
- RCA 86T —Garbled sound
- Silvertone 132896-1 — Bad 12BE6, filter caps, antenna wires
- Silvertone 6356 — DOA
- Silvertone 2014—Bad IF can
- EICO 369 Sweep Generator—How to align FM with this.

August 20, 2016 Meeting Notes

Our club president Jim Sargent introduced Mike McCarty, who presented his informative program "Schematic Reading". Mike had prepared much material to help everyone understand how schematic diagrams evolved and how they eventually (for the most part) became standardized in format and symbology. He showed examples from the early days of radio manufacture, when the factory information showed pictorial diagrams of the actual wire routing and the connections to components, such as tube sockets. The diagrams might have come from their assembly manuals. They also provided schematic diagrams using their own symbols or different representations for the same part. For example, the diagram might show the elements of a vacuum tube without a circle around the group and with the order of the elements sometimes from cathode to plate and sometimes reversed or left-to-right. The elements were sometimes zigzag lines, sometimes dashed lines, in a second level of abstraction. Mike showed an Atwater Kent model 20 schematic, which was arranged to follow the signals left-to-right through the diagram. This became the standard practice. Some manufacturers showed both wiring diagrams and schematics in their repair manuals – sometimes very helpful for troubleshooting. Mike showed examples of the various ways used to convey information by the design of each symbol. An arrow struck through a capacitor or resistor symbol indicates that it is adjustable. An arrow adjacent and parallel to a coil indicates that it is adjustable and also whether it is accessible from the top or bottom of the coil, such as for an R.F. or I.F. transformer. Two different symbols are used for chassis ground vs. circuit ground (or circuit common). The method of showing wiring connections has changed over time, but you may see the old style in early diagrams. The early ones are drawn with a jump over other lines that are not connected. Later these "jump-overs" were eliminated by using a dot at the intersection, if the wires actually connect. This saved a lot of clutter in the diagram and incidentally made the task of creating the drawing a lot easier. The only problem is that too-small dots get lost on diagrams that have gone through many copy or scan cycles. Early diagrams have resistance abbreviations using the letter "M" to indicate a multiplication factor of 1000 and Meg to represent 1,000,000. The circuit application can often tell you which convention is being used (which one makes sense). Sometimes the Greek letter omega (Ω) verifies that the resistance is simply the whole number of ohms. To eliminate confusion, the letter K has come into use, instead of M. Meg is still used for Megohms. Eventually, heater strings were shown off to the side from the main part of the diagram, further reducing clutter.

Continued page 8

The Case of the Taxing Tele-tone
By Mike McCarty

I was working on a vintage AC/DC Tele-tone radio recently, and came across a little problem I haven't encountered before.

When I opened it up, I was heartened to see all original tubes. They were all marked "Made in USA for Tele-tone by RCA", and barely had any dust on them. This is a good sign that the set hadn't been visited by the "phantom". However, when I looked under the chassis, I saw that it had been partially recapped. The two section filter had been removed, and two small electrolytics scabbed in, floating in space. The reservoir is 47uF, which is good, but the filter was 22uF, which is just a tad small. I was prepared to encounter a slight hum problem.

I finished recapping the set, replaced the out of tolerance resistor, and on first power on, I got good reception all over the band, but as I had feared, there was unacceptable hum. "Just needs a little more filter capacitance" I thought.

HAH!

I paralleled that 22uF cap with a 100uF 450V cap I had on the bench, and powered on again, and there was the hum problem, big as life. I moved the additional capacitance to the reservoir, and no change. Hmm. The 'scope showed about 1/2 V P-P ripple on the hi B+, and literally millivolts on the low B+. Removing the extra capacitance increased the ripple somewhat, but had no influence on the hum. Inadequate B+ filtering is not the problem.

I've got no model number or chassis ID or anything, so I just start poking around with the 'scope. The audio on the volume control is clean, both on hot and slider terminals. There are several tenths of a volt of hum on the grid of the 1st AF (12AV6) and about 5V P-P sine wave on the plate. The plate of the power amplifier (50C5) has 50V P-P near sine wave on it. Things are worse than they seemed. The little four inch speaker just can't reproduce the enormous hum. A larger speaker might be destroyed.

My first thought for hum problems is heater to cathode short, but in an AC/DC set, that usually results in some dark heaters. I pull the tubes anyway, and put them on the tester. They all test like brand new, which I expected. I trace the heater wiring to see if it's correct, and it is. The 12AV6 has its cathode tied to one end of the heater, which is also B- ground, and the other tubes are in correct order. Along the way, I see that the 50C5 has its cathode directly to ground.

Usually, there is a 120 ohm or more commonly 150 ohm resistor from the cathode to ground, to develop -7.5VDC bias on the grid. Looking at the grid shows a nice -7.5VDC relative to ground. Hmm. There is a long wire going from the grid all the way across the chassis to a 390K resistor end poking up from the oscillator grid of the converter (12BE6). I'd heard of getting PA grid bias from the oscillator, but this is the first time I've encountered it. When the local oscillator of a 12BE6 is operating properly, it develops -7.5VDC by rectifying its own signal, and this just happens to be the same voltage needed by the 50C5 on its grid, so there you go. Just connect the PA grid leak to the oscillator grid.

If the hum is coming from "air pickup" on the two inch long leads of the audio coupling cap to the grid of the 1st AF, then the hum introduced by this long wire would be opposite phase to that; maybe the engineer counted on this "cancellation"? To check this, I stuck a 200pF or so ceramic I had from the AC hot to the grid of the 50C5 to

Continued page 6

The Case of the Taxing Tele-tone (cont.)

add a little more "cancellation". The hum certainly went down, but the interference went up.

What happened was that the 60 cycle indeed was reduced, but the resultant was no longer sinusoidal, and the speaker could reproduce the harmonics. So, that was out. Perhaps shielding the audio coupling cap (0.001 uF ceramic), the one from the volume control to the grid of the first audio tube, would do the trick. I wrapped some electrical tape around the coupling cap and its leads, and then covered it all in aluminum foil, which I grounded at the nearby socket terminal. The hum continued unabated.

Ok, how is this hum getting in there? I unsoldered the audio coupling cap from the 12AV6 grid socket terminal, and powered up again. The hum continued unabated. I grounded the grid terminal, and the set became quiet. I tried moving the 10 Meg grid leak a little closer to the chassis, but that didn't help.

Ok, I've proven that the hum is coming OUT of the grid, not going into it. Time to swap tubes. I pulled an NOS 12AV6 from stock, and swapped it in. Powered the set up, and HUM!

AAACK!

It's time to turn off the soldering iron and oscilloscope, and turn on the brain. Somehow, the grid of the first audio tube is getting a fairly pure 60 cycle sine wave on it, from inside the tube, not outside. The only source for such a signal is the heater. The tube has been verified not to have shorts, so this must be capacitive coupling. There is a capacitor on the grid, going to the volume control, which has no hum on it. This capacitor is pretty small in my experience. Perhaps the volume control isn't able to exercise enough influence on the grid voltage through such a small capacitor?

I pulled out my trusty RCA RC-23 tube manual, and turned to the reference circuit in the back. The audio coupling cap is shown as 0.02uF 400V paper. I grabbed a 0.02uF 50V ceramic from stock, and bridged it across the audio coupling cap. The hum magically disappeared!

I replaced the audio coupling cap with the one from stock, secured the filter caps with a nylon wire tie, and now the set works great (for an acky-dacky).

Case Closed!

One other thing I tried, though I didn't mention it, was that the scabbed in filters used the original wires. The ground return went to the grounded pins on the 1st audio, and from thence to the power switch. So, the ripple current through the filter caps flowed through a common wire with the cathode current of the 1st AF tube, possibly injecting millivolt level signal on the cathode. I disconnected them and used a jumper to go directly to the star ground on the back of the on/off switch, but that had no effect. I didn't think it would, because first I couldn't see any signal on the cathode, and second the ripple current wouldn't be sinusoidal.

SoundWaves is published quarterly by The Vintage Radio and Phonograph Society, Inc.

President—Jim Sargent (972) 742-8085 bsargent @swbell.net

Vice President—Randy James (817) 881-0974 randy-jeannine@sbcglobal.net

Newsletter Editor—Mary Ann Caruth mcaruth@att.net

Webmaster—Mike Grimes k5mlg@verizon.net

VRPS Website WWW.VRPS.ORG

June 18, 2016 Meeting Notes (cont.)

Some prefer amplifiers using triodes for their output stages because they like the different type of distortion that they produce.

Of course a good amplifier needs good speaker performance. Horn speakers were naturally limited to delivering only high frequency sounds. Cone speakers need a baffle to isolate the sound coming out the back, because at low frequencies it cancels that from the front. A so-called "infinite baffle" absorbs the sound from the back of the speaker and is sealed with sound-absorbing material. This type requires more amplifier output power. The most common configuration, called bass-reflex, is more efficient, although it tends to have a "boom" at one frequency. There were some expensive speaker systems developed and sold by Klipsch, Altec, Acoustic Research and others. The AR enclosure uses a speaker with a very low natural frequency and brings it up by sealing the enclosure and adding material that brings the natural frequency back up – sometimes called "acoustic suspension". This configuration has become very popular because the enclosure can be much smaller.

Jim Sargent showed a typical response curve for a speaker. He reminded us that speaker impedance is higher that its resistance – typically 6.5 ohms for an 8 ohm impedance speaker measured at a point just above its acoustic resonant frequency. Jim mentioned a magazine Vacuum Tube Valley that has a lot of tube-type amplifier design and building information. (You can download the entire 20 volume set at www.enjoythemusic.com). At the end of the meeting, there was a lot of free discussion about vacuum tubes.

Bill McKeown

Early Radio Stations in the Dallas-Fort Worth Area

WRR was the first radio station in Dallas and one of the earliest stations in the country. It began broadcasting as a sort of early police radio in 1920 and received its official broadcasting license in 1922.

The EKKO company had some competition in the PM Bryant Co. Bryant stamps required no "verification" — you just sent them your dime and got a stamp.

WFAA signed on in 1922 and was part of the nascent Dallas Morning News media empire.

WBAP, a Fort Worth station, also signed on in 1922. Someone thought it might be cute if "WBAP" stood for "We'll Be At the Party." More serious-minded station people went with "We Bring a Program" .

KFJZ (another Fort Worth station) came along in 1923. Its founder sold the station five years later for a good chunk of change and then went to work for WBAP.

KRLD began broadcasting in 1926 and was acquired by The Dallas Times Herald a year later.

Citation: Bosse, Paula. "Early Dallas Radio & "Verified Reception Stamps"." Flashback Dallas. 2014. Accessed August 30, 2016. https://flashbackdallas.com/2014/04/18/early-dallas-radio-verified-reception-stamps/.

August 20, 2016 Meeting Notes (cont.)

Test or alignment points are illustrated by a hexagon with a letter inside it. In discussing this, Mike reminded us that early measurements were often specified to be made with a meter having an internal resistance of 1000 ohms per full-scale-volt. (They were built around a 1 milliampere meter movement). Some manufacturers provided two sets of voltage readings – one for 1000 ohm-per-volt meters and a different set for 20,000 or more ohms-per-volt. A vacuum tube voltmeter can read slightly higher than the latter.

Tubes are designated by V1, V2 etc. from the word *valve* used by the British and others (*valvola* in Italian). This distinguishes them from transformers T1, T2 etc. Tube base diagrams show a key, for octal (or Loktal) tubes, placed between pins 1 and 8. Early tubes having 4, 6 and 7 pins have two larger pins, pin 1 being the one at your left as viewed from the tube base end, and counting clockwise for the remaining pins. The 5-pin tubes used a unique pattern, with uneven spacing between pins. If you look at the base and place the isolated pin at the top, the lower left pin is pin 1, followed clockwise by 2, 3 and 4.

Mike discussed changes to radios that are not always shown on schematic diagrams. During production, there may be improvements that come to light and call for changes to the design to eliminate problems or improve performance. If you run across them, they are probably changes that are needed. (You can mark up your diagram to incorporate them). Over time, the industry created "standard values" for design and production – differing from the early ones that are no longer available. For example a 500K resistor is replaced by the standard 470K value, and 5,000 by 4,700 etc. These values are close enough, considering that the old radios were built with resistors having a $\pm$ 20 % tolerance.

Program organizer Larry Lindsey presented the meeting's "puzzler" to reveal the "smartest person in the room". What did John P. Thomson invent? Answer: The Phillips head for screws. He sold the invention to Henry Frank Phillips, who refined the invention, formed the Phillips Screw Company and promoted the adoption of the idea. General Motors began using it in the production of its 1939 Cadillac. Eric Kirst knew the answer and won the award. Jim Sargent also received his award for knowing who invented Bakelite at our last meeting.

Author's notes: I always use very heavy dots to show schematic diagram connections. Small ones sometimes do not survive the copying process. Some old diagrams that have been scanned are poor at showing the original small dots. Many times you have to trace the circuit to determine by context whether a connection should be indicated or not. It is a good idea to "heavy-up" the dots on your copy, if there is any doubt. — Bill McKeown

MONTHLY MEETING PROGRAMS 2016

NOTE: Programs will be held at various locations in Irving, Texas. Make note of the location as they may change from time to time. Senter East, 228 Chamberlain St.; or Garden and Arts, 906 S Senter Rd. Maps are located on the WEB site, www.VRPS.org EVENTS page. Programs start at 2pm. unless otherwise noted. Call us on the cell tellie if you get lost: 972-898-7251 or 972-742-8085.

- September 17, About 7 am 'til noon: *Tail-gate Swap Meet*. Senter East, Irving, TX
- October 15, Program 2 pm: *Radio Components & Where They Came From*, Senter East, Irving TX
- November 18, 19 & 20: ***VRPS Annual Convention***, Mesquite, TX
- December 3, 6pm to 11pm: *Christmas Party*, Garden & Arts Building, Irving TX

Programs are subject to change, contingent on scheduling conflicts. As always, your suggestions for programs/ content are welcome. If the programs do not fit your needs and you want something different, let me know. I need volunteers to organize other programs, so consider presenting a program yourself. Call anytime or send an email: Larry Lindsey email: pipilindsey@tx.rr.com telephone: 817-312-8761.