

Alignment of AM superheterodyne radios

By CRC Member—Gregory Malanowski

When you acquire a vintage superheterodyne radio, its resonant circuits are almost always out of alignment and they badly need your intervention. This could be caused by several factors, usually a combination of a few of them. The most common is a result of past attempts to restore the sensitivity of the radio, which had usually been a crime committed by the former owner or by some unprofessional repair man, who had mindlessly turned back and forth all accessible trimming condensers and ferrite cores inside the coils. This is the most challenging situation, for the delicate ferrite cores had been often secured using a hard lacquer, and could have cracked as a result of careless employing a metal screwdriver. Also, the antique trimming condensers, with a mica dielectric or a layer of silver evaporated over delicate ceramic plates, sometimes break easily.

The less dangerous "natural" cause of misalignment could be a gradual change in the dielectric constant of capacitors or decrease in the inductivity of the ferrite-core resonant coils. The former cause is more common, though.

So, if you decide to align your receiver, attach an AC meter in parallel to the speaker. You may need to separate it from the DC potential using a 0.1uF capacitor. Do not use your ear to assess the signal level; the human ear cannot reliably detect variations in the sound level below 3dB. Then, connect the RF output of your 400Hz amplitude modulated signal generator with the antenna jack of the receiver via a 300-ohm resistor. Warning: if your superheterodyne radio is a "universal" AC/DC

type, there is a possibility that the chassis could be dangerously at or close to the power line potential. Therefore, install small capacitors, 1000pF/630V in series with the signal and the ground wires from the generator.

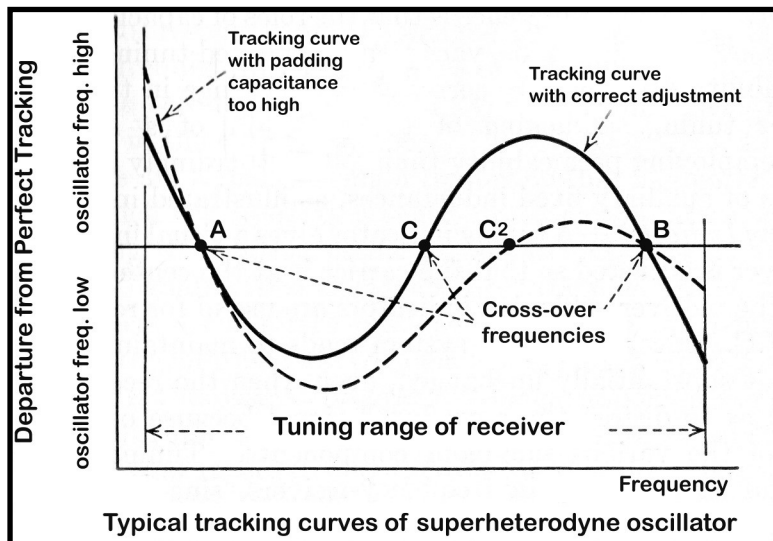
The first necessary step is tuning the intermediate frequency (If) filters to the

factory-recommended frequency of your receiver. Use a non-ferrite tuning tool, whether it is a screwdriver or a hex socket wrench.

Some manufacturers suggest connecting the signal generator wire to the anode of the mixer tube. That is usually neither safe nor easy. You can achieve the same results by applying the If signal to the antenna input while the radio is

tuned to the lowest end of the broadcast frequency range. But that will require a much stronger signal from the generator! Then, align the If filters for a maximum output level while going backward, i.e. beginning with the last (detector) filter, and ending with the mixer tube filter.

Be careful: sometimes you may find that alignment of an old If filter beyond the extreme position of the filter ferrite core, or its trimming cap, could result in a higher output level of the signal. However, never attempt to change the factory-recommended intermediate frequency to achieve a better output signal. We will discuss the implication later. Instead, disassemble and repair the troublesome If filter (cracked ferrite, defective capacitor?).



COLORADO RADIO COLLECTORS ANTIQUE RADIO CLUB

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Message from the President

Here we are in the heat of August, when a lot of us go on vacation or travel around a bit more and maybe find a radio for sale out there at a garage or estate sale. If you haven't found any "new" things for your collection, you will soon have the opportunity to find them at the upcoming Barbeque/Auction in September. So August is always a good time of the year to go through that collection of radios and see what you want to bring to the auction.

We had a great turnout for the last meeting in July, with lots of good show and tells and preliminary discussion about our upcoming Barbeque/Auction on September 18th. We also had a new member Mike Knospe show up in his Model T (did not have a radio in it) and join the club.

The raffle was fairly decent with lots of unique items there and as a result we filled the treasury a bit. Even though we have an auction coming up, you can still bring that weird stuff to the next meeting's raffle that is not so "auction worthy". Keep it coming. It helps the coffers!

The show and tells were very impressive as you can see from the photo spread in this issue. Thanks to all who participated. Merrill showed some of his typically amazing restorations that included a Bakelite radio that looked like new and a plastic one whose hinges he had cleverly repaired. Tom Pouliot shared with us some more of his museum-quality constructions of early spark-gap transmitters. Not one but two complete functioning units in different bands that he has used to make actual amateur contacts with. Quite impressive!

We will finalize the planning for the

BBQ/Auction at the upcoming meeting. It will be at the same place as always. Thanks to Rich. We now have a new Auctioneer-in-training, Cliff Shelby, to help out Tom this year. Also at the last meeting Merrill said he would be able to help Tom and Cliff with this. Thanks guys! Wayne will help out to get all the supplies as Dave won't be at the auction this year. Don



Andrus will get the drinks as usual. Remember that YOU need to bring a dessert or side dish item. And Alexis and Larry will be supporting the auction data base and software as usual. So to help out please email your lot items info to Alexis ahead of time. There is more info in this issue with all the details.

Thanks to all that help make this a special event!

And last but not least, we have a new *Flash* Editor! At the meeting Alan Burch stepped up and said he will take over from Rich. Special thanks to him for volunteering. This is great! And thanks to Rich for the many years of excellent work in putting together the *Flash*.

And as far as *Flash* articles, we have a few but will need some more. So think about an article or even just a small "restorer's tip" with a photo!

Please note that our next meeting that we normally have the week after Labor Day weekend is now on August 28th. We are doing this to avoid the art show conflict at the Castle Rock Library. I look forward to seeing you all at the August 28th, 2016 meeting in Castle Rock!

Tom Zaczek



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Upcoming Events

8/15	1969—Woodstock Opens
8/24	79AD—Mt. Vesuvius erupts
8/28	CRC Meeting in Castle Rock
9/1	1939—Hitler invades Poland
9/5	Labor Day
9/11	2001—Attack on America
9/22	Fall Begins
9/25	1789—Bill of rights Passes
9/28	CRC Annual Auction

Meeting Locations

(Unless noted otherwise)

Littleton	Castle Rock
March	January
July	May
November	September

CRC MEETINGS

Meetings are held on the 2nd Sunday of every other month starting in January (except May is 3rd Sunday) at 1:00 pm. The meetings consist of business, "show & tell", raffles, auctions, swap meets, technical discussions and other subjects of interest

CRC MEMBERSHIP

Annual membership in the CRC runs from July to June. Dues entitle members to attend meetings, "The Flash!" our newsletter, discount book prices, participation in our spring show and Fall auction. Current annual dues are \$20. New memberships will be prorated to the following June.

(Continued from page 1)

An often-overlooked problem is a minute change in the capacitance of the so-called padding capacitor. When two identical, single-shaft tuning condensers are installed in the superheterodyne radio, one for the antenna circuits and the other for the local oscillator, it is theoretically and practically impossible to maintain a constant difference in their resonant frequencies (equal the intermediate frequency If) over the entire AM broadcast or shortwave band. That results in a drastic reduction in sensitivity at a certain position of the tuning dial, and you are certainly familiar with this effect. The manufacturers alleviate that inconvenience by using the tuning condensers of a different profile, or by a less-expensive, common method of installing a precise "padding" capacitor in series with the oscillator coil. Its capacitance for each frequency band (broadcasting or short wave) had been carefully calculated for the given inductance of the oscillator coil and for the chosen intermediate frequency If , or (more often) it was selected empirically by the designer of the radio.

With a properly selected capacitance of the padding capacitor the correct tracking, resulting in the highest sensitivity, occurs at 3 "crossover" frequencies A, B, and C, equally spaced along the tuning dial. Frequencies A and B are usually listed in the factory alignment recommendations or are marked as dots or little squares on the glass dial of the receiver. These are the frequencies of the signal that you shall apply from a signal generator to align your radio. Then, the resulting middle crossover frequency C would fall at the center of the dial, and that makes the tracking and sensitivity almost uniform through the entire tuning range, as shown on the drawing. The padding capacitor tolerance is usually 1%, for example, 482 pF $\pm 1\%$ for the broadcast band. Should the actual capacitance deviate from the original, correct value, the middle crossover frequency C will shift up or down (shown as C2 on the drawing). Then, the tracking error will be higher causing a significant loss of sensitivity in some areas of the tuning dial. This happens often when the old padding ca-



pacitor changes its capacitance over time, or when the If filters have been tuned to an incorrect intermediate frequency.

To align a superheterodyne radio in which a constant value padding capacitor is used, align the If filters first and then tune the dial to the recommended higher crossover frequency B (usually around 1400kHz). Apply the signal from your generator. Adjust the oscillator shunt trimmer for a maximum reading on your AC voltmeter. Repeat that at the low crossover frequency A (usually around 600kHz) by adjusting the ferrite core of the oscillator coil. Then, return to the higher crossover frequency. Reduce the signal level from the generator as low as possible to eliminate the automatic gain control (AGC) action and adjust the trimming capacitor of the antenna tuning circuit for the highest reading on the voltmeter. Repeat it at the lower crossover frequency by adjusting the inductance of the antenna circuit coil.

If your signal generator provides a constant output voltage over the selected band, it would be easy to check the tracking i.e. the deviations in sensitivity over the tuning range of the radio. Does the middle crossover frequency C fall really close to the center of the dial? If yes, you are lucky. If not, there could be something wrong with the padding capacitor.



Some pre-1945 American radios might not have adjustable ferrite core oscillator and antenna coils. If this is your radio, alignment at the lower end of the broadcast band (around 600 kHz) can be usually accomplished by adjusting the trimmer condenser serving as a variable padding capacitor. When you do that, try to swing a few times between the higher end alignment mark (around 1400 kHz) and the lower end one, and attempt to adjust the trimming condensers for an optimum setting.

Unfortunately, in these old radios, you do not have the luxury of a three-point adjustment of the tracking curve by changing the inductance of the oscillator coil, and the departure of perfect tracking may be larger.

SELLERS

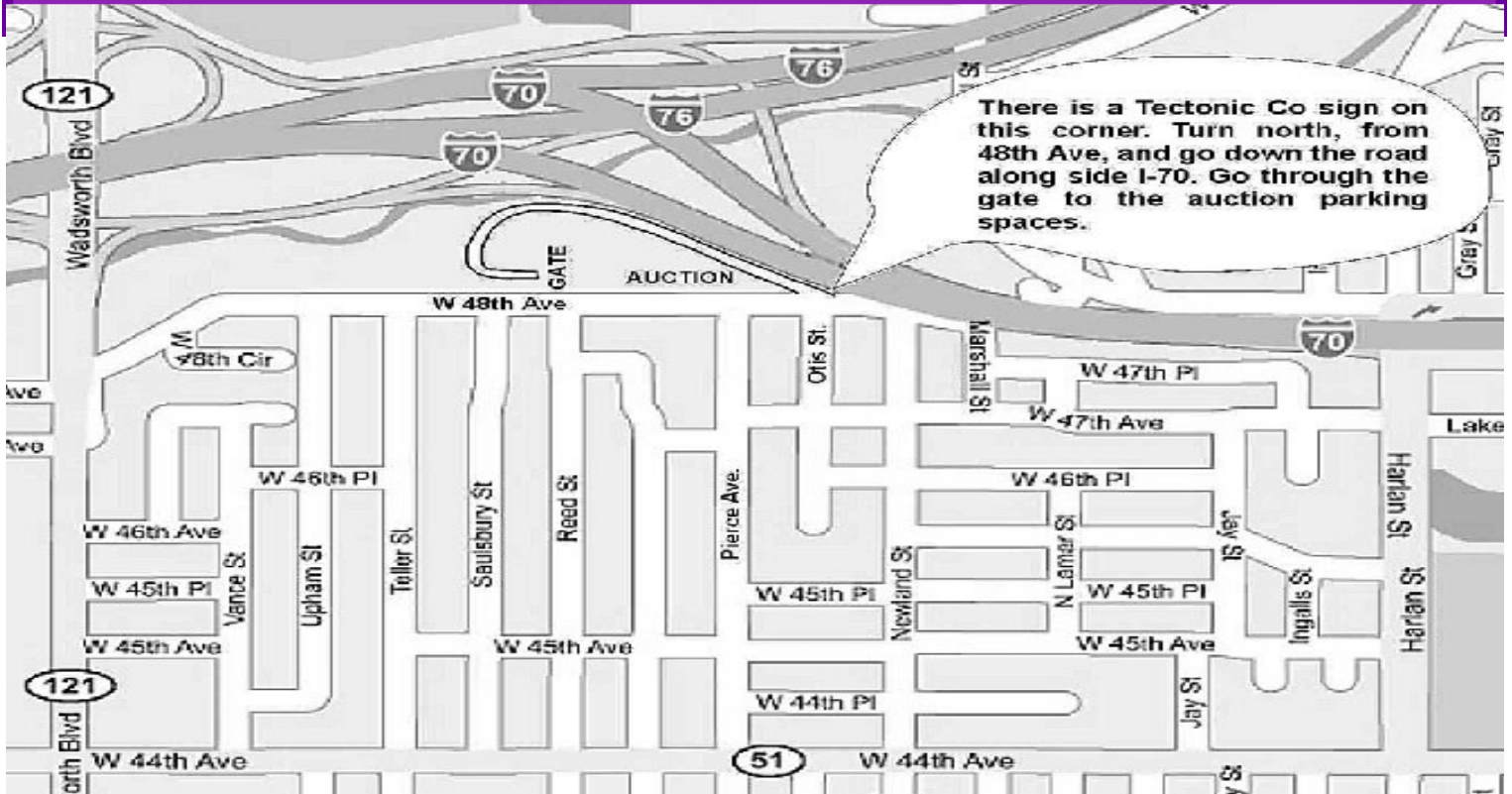
Be Prepared for the 2016 CRC Auction September 18th

Fill out this form and bring it along when you register!!!

NOTE: If you plan to have 10 or more items in the auction, you must pre-register them with Alexis Alexandridis NO LATER than September 13th. Send your registration information to:
[alekosalexand@gmail.COM](mailto:alekosalexand@gmail.com)

	<u>Brand</u>	<u>Model</u>	<u>Year</u>	<u>Reserve (optional)</u>
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<u>You need to pre register. (Okay to pre register with less than 10 items.)</u>				
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THE CRC 2016 ANNUAL AUCTION



Once again, through the efforts of club member Rich Kuberski, we are privileged to hold our annual action in a park-like setting. In addition, we will also be continuing our tradition of combining the auction with a pot luck barbecue.

That is, the club will provide the burgers, hot dogs, condiments, chips and soft drinks while the members bring side dishes to share with all.

So plan on not only on being part of the auction, by both buying and selling radio treasures, but also by bringing your family where they can enjoy the picnic and the surrounding park facilities.

WHAT:

An auction of radios, television, documentation, parts, test equipment and associated items. The public is encouraged to participate in **both** buying and selling.

WHEN:

Sunday, September 18th at 12:00 noon

Seller's Registration 10:00am - 11:45pm

Buyer's Registration 10:00am until end

Viewing As items are delivered

Auction Starts at 12:00 noon SHARP

Barbecue Lunch Served 10:30am-11:30am

Bring a side dish to share with everyone;

Slaw, Potato Salad, Fruit Salad, Desserts, Chips, Beans, Your favorite recipe, etc.

WHERE:

Tectonic Management Group Inc.

Office grounds and picnic facilities (see map.)

AUCTION RULES

There is no cost to register as a buyer or seller.

There is a seller's commission that will be equal to \$1 or 10% (which ever is greater) of the "hammer" price on each lot sold to any buyer - including the sellers who may elect to "buy back" their lots. **Minimum value of each lot to be \$5.00**

Sellers may optionally, **at registration time only**, set a secret minimum bid (reserve) on any lot.

No commission will be incurred on any lot that is not sold.

All seller commissions will be deducted from and before the payment to the seller, and these commissions will become the property of the Colorado Radio Collector's treasury.

Buyers can not take possession of any lot(s) until the total cost for all purchases are paid. Collection of buyers fees will commence at the conclusion of the sale of the last lot entered into the auction. A buyer's receipt is required for pickup of purchased lots from the lot/item display area.

Buyer fees will be collected before sellers are paid. Identification may be requested from those paying for their purchases by personal check.

* Sellers will be paid only by C.R.C. check and may, for a \$1.00 surcharge, elect to be paid by mail.

* This auction is limited to radio and electronics related items as described above. The CRC reserves the right to reject items deemed inappropriate.

* Any item registered for sale by auction may not be sold outside of the auctioneer's control, and can not be removed from the sale once the auction commences.

Photos from the CRC May 15th Meeting.



New Member Mike Knospe



Tom reminding everyone that next meeting is August 28th



Alan Burch volunteers to do the newsletter



Merrill Campbell shows off his Motorola 5A7A that he restored



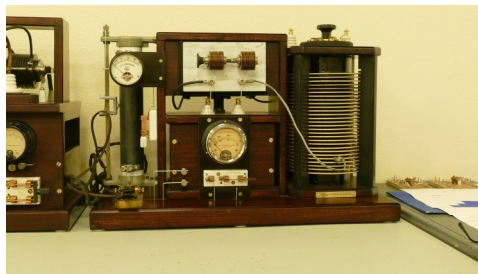
Merrill's beautifully restored Silvertone 6408



Detail of Tom Pouliot's Spark Gap Transmitter



Tom Poulito's beautiful spark gap transmitter



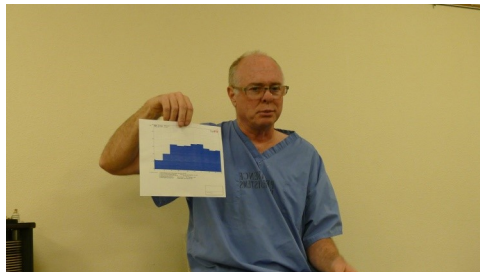
Tom's spark gap transmitter
Yes, it works.



He likes it so much he is giving
It a caress.



Cliff Shelby makes an amplifier software analyzer.



Data sheet generated by the software



Yuriy Yedidovich with rotating
Data display



Tom Zaczek shows chemical that changes
the color of solder.



Wayne Russert with large antique variable
resistor.



Change the year and get new information



The Open Trunk

Member submitted advertisements



REPAIR SERVICE:

Radio repairs for club members. Reasonable rates. Good references.

Call David Boyle

303-681-3258

11/09

For Sale: by Dave Boyle

Most of the following instruments have been completely refurbished, repaired as needed, and calibrated. Most have manuals and test leads.

Prices are negotiable...please make offer.

- 1) Eico 5 inch oscilloscope. Model 425. Perfect for old radio repair work. Completely electronically rebuilt with **new CRT!** \$68.00
- 2) Eico "Professional" VTVM, 6 inch meter \$40.00
- 3) Ballantine Labs. Model 321 VTVM. True RMS and p-p measurements. 19 inch rack mounting \$25.00

Radio Chassis For Sale:

- 1) RCA Radiola Model, 80,82, 86 complete dual chassis and mounted speaker. VG condition, with tubes including 2ea VG 45 tubes. Make offer.
- 2) Philco Model 91. Complete *working chassis* with 12" good speaker. Working tuning meter too! Make offer.
- 3) Philco Model 37-610 complete chassis with tubes, good condition complete with bezel and glass. Make offer.

Call David Boyle,

303-681-3258

09/15

Wanted: 1920's Wooden Horn Speakers and a Crosley Musicone Speaker.

Also 1920's battery sets, especially Neutrodyne sets, Pre 1930 AC Radios and a Crosley Widget Console Radio

Michael O'Leary 602-354-7011
moleary9@cox.net

WANTED: To buy: 1948 Motorola 5A9B portable radio, Maroon color. Good condition only.

Dewey Reinhard 719-596-5516
deweyfly30@gmail.com

WANTED: Broadcast or recording mics, especially from 20's to 1950's.

Crosley Pup Info

NBC chimes, all eras.

Tom Keeton

303-797-8073

For Sale: Patterson PR-10, 1933 Amateur Radio Receiver.

10 tubes, fully electronically restored.

View on the internet.

Best reasonable offer.

David Boyle.

303-681-3258

I have collected radios of all types for 30 years and now it is time to let them go to new homes.

Please call me for an appointment to see if any of them would fit in your collection.

I have tube radios including Tombstone, Cathedral, and Novelty etc.

I also have a large collection of transistor radios both shirt pocket and Novelty type.

Please call
Thanks in advance,
Ron Smith

303-238-1384

RADIO4US@aol.com

WANTED to buy: 1980s Atari 520 or 1040 ST computer components (keyboard, monitor, etc.). I still need it for several specialized programs I wrote including a simulator for transistor and tube circuits. **Dave Laude** dlaudel@msn.com

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Judy Houser

303-771-3577

Castle Rock, Co.

Are you paying

ATTENTION?

**The September meeting
is**

August 28th

This year only

SUBMISSION OF ARTICLES & ADVERTISEMENTS

Classified Ads for The Open Trunk and articles of any radio/electronic or historical related subject to be published in the Flash are encouraged and welcomed. The article(s) should be submitted in Microsoft Word, RTF, or as text cut/paste into your email. Submit to Steve Touzalin by email at: stevetou@comcast.net or by postal mail to 417 So. Queen Circle, Lakewood CO 80226.

Formatting isn't necessary, but if you do, set the font to Times New Roman, size 10, left justified. If you have graphics (.jpg files) to be inserted, please name them and be specific about how you would like them placed. We will do our best based on space limitations.

The August 28th 1:00 meeting will be at the Miller Library in Castle Rock



Directions to Miller Library in Castle Rock

From I-25: Take the Plum Creek Parkway, exit #181.

Turn East onto Plum Creek Parkway.
Turn Left (North) onto S. Wilcox Street
and continue north 2 tenths of a mile.

The Philip S. Miller Library is on the east
side of the street at 100 S. Wilcox St.

The building is towards the back of the
parking lot, past the Dairy Queen.

Prepare for the Auction



Colorado Radio Collectors
Antique Radio Club
417 S. Queen Cir.
Lakewood CO 80226

FIRST CLASS MAIL

Regular September meeting is August 28th