

What is this thing we call an alignment?

By Larry Snyder, Colorado Radio Collectors Club

Alignment is an electrical term which refers to the process of adjusting the tuned circuits of a radio to resonance, or to the maximum response of the signals which pass through them.

After parts have been replaced, or to counteract the effects of deterioration due to age, a radio's circuits may need to be "tuned-up" or peaked for maximum response. The basic equipment needed for this job include a SIGNAL GENERATOR, an AC VOLTMETER, jumper wires, two small capacitors, an insulated adjusting tool and occasionally a small resistor. It is always best to consult the manufacturer's alignment specifications and procedures for any particular radio. The alignment specifications are generally included with the schematic and technical information found in the

[Riders Perpetual Troubleshooter's Manuals](#) covering radios from 1920 to 1954 which can be found online or in major libraries.

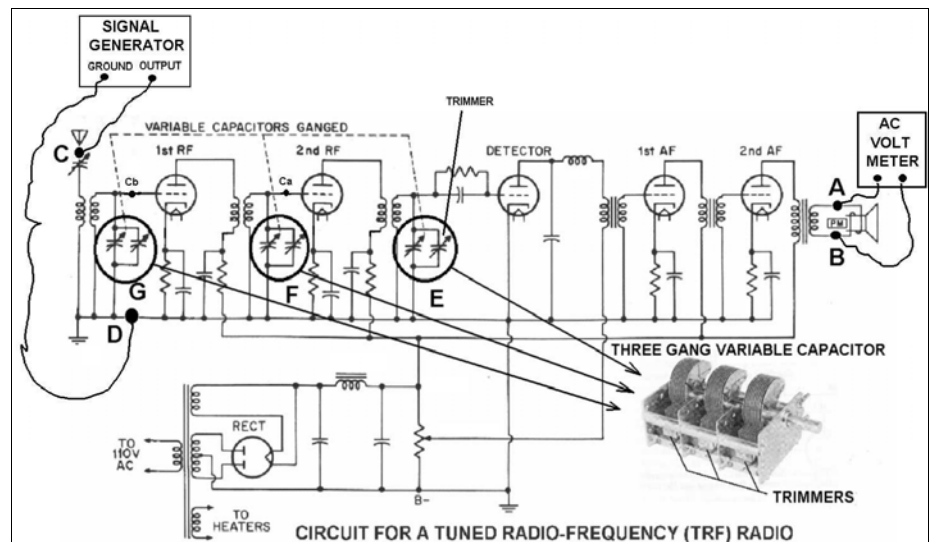
Alignment of a Tuned Radio Frequency (TRF) radio is the easiest to describe since it has just a few tuned circuits. A typical TRF radio with 3 tuned circuits is shown below. One (G) is next to the secondary of the antenna coupler, another (F) is next to the secondary of the first RF transformer, and the third (E) is adjacent to the secondary of the 2nd RF transformer. The three trimmer capacitors G, F, & E are physically located on a ganged capacitor (as shown on the right) and adjusted during the alignment procedure to peak the antenna, 1st RF, and 2nd RF circuits.

The alignment procedure for this TRF is as follows:

- 1) The radio and signal generator should be warmed up for a few minutes before starting the alignment process. Plug the radio into an isolation transformer for safety.
- 2) The AC voltmeter is connected across the voice coil of the speaker at points A & B. These tabs can be found on the speaker and usually have the fine wires leading to the voice coil or speaker cone. The output reading will be in the millivolt range.
- 3) The Signal Generator *Output* is set to 1100 kc (mid-range of the broadcast fre-

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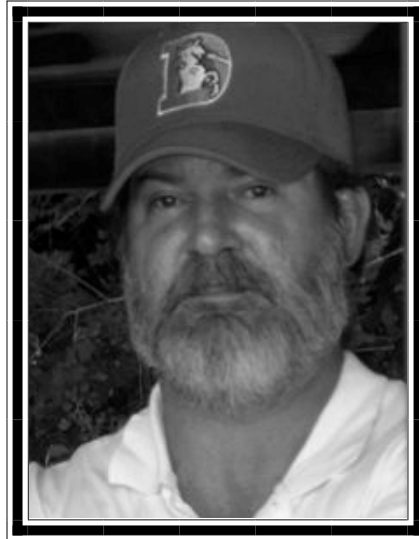
COLORADO RADIO COLLECTORS ANTIQUE RADIO CLUB

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Message from the President

Summer is finally here, and I hope you all escaped the flu season better than I did

The May meeting was great. A very nice turnout and a wonderful video of our spring show thanks to Larry Weide and Rich Kuberski. The talent of our members never ceases to amaze me.



fall Bar-BQ and auction scheduled for September 20th. Good food, good company and a chance to clear out some clutter, give it a second life, and put a few bucks in your pocket.

Don't forget our July 12th meeting at the library in Castle Rock.

Hope to see you all there.

It's not too early to start thinking about our annual

Brian Hagrman



Quickie Tech Tips from the Of's

Does a replacement potentiometer not have the right length/type shaft?

Cut off the old pot shaft, trim and super glue it to the new pot shaft with a piece of 1/4" thin wall tubing.

CRC CONTACTS

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Upcoming Events

7/12—CRC meeting in Castle Rock
9/13—CRC meeting in Littleton
9/20—CRC Auction in Wheat Ridge

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 \$12. New memberships will be prorated to the following June.

CRC MEETINGS

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

(Continued from page 1)

- quency range) and connected to the antenna input at point C
- 4) The Signal Generator *Ground* is connected to the chassis ground at point D
- 5) The radio dial is tuned to 1100 kc and rocked back and forth for maximum volume
- 6) The radio volume is set at mid-range
- 7) The Signal Generator *Output* volume should be adjusted, as needed, so the 400 kc generator tone is just audible
- 8) The trimmer at E would be adjusted first, then F, then G. These trimmers are adjusted one at a time. With an insulated screwdriver turn the adjusting screw very carefully, forward, and backward, until the voltmeter is at the highest reading, and then go to the next. Unless the as-found alignment was way off, less than a quarter of a turn should be all that is required.
- 9) If the trimmers are way out-of-adjustment you may have to attach the signal generator output to point Ca to adjust point trimmer E, then Cb to adjust F and then to C to adjust G.

Repeat as often as desired.

Note: The radio and the signal generator output could be set to any frequency, but since the main tuning ganged-capacitors have a capacity range of 20-350 pF and the trimmers are in the range of 5-35 pF it would seem desirable to have the ganged-capacitors partially disengaged so the effect of the trimmer is more pronounced. However, I have found that tuning at the extreme disengagement of 1600 kc caused poor selectivity in the lower frequencies. Try it for yourself and see if you get the same results.

The Superheterodyne Radio Alignment

Hetrodyning is a radio term which refers to the production of beat currents by the mixing of two alternating currents of different frequencies. A super-

het radio will generate a beat frequency by mixing the selected station frequency with a higher frequency generated by the oscillator coil. The beat frequency, also called the Intermediate Frequency (IF), will be the difference of the two. (There is also a beat frequency generated that is the sum of the two frequencies but that frequency is beyond the designed response range of the IF transformers so it is not amplified and is generally not considered.)

If the radio is tuned to 1000 kc the radio oscillator should be generating a frequency of 1455 kc. The beat frequency will be the difference of the two = 1455-1000 = 455 kc. If the radio is tuned to 1600 kc then the oscillator should generate 2055 kc for a beat frequency of 2055-1600=455 kc. In fact, for any selected station frequency the radio's oscillator must produce a frequency that is always higher by the magnitude of the desired beat frequency. That is why the antenna tuning capacitor and the oscillator tuning capacitor are ganged together and stay synchronized with each other.

By heterodyning and always creating the same beat frequency, which is then fed into the IF transformers, the amplification of the radio signal can occur at maximum efficiency regardless of which station is selected. This is a major improvement over TRF radios.

A super-het radio will have at least 6 trimmers which will need to be adjusted for maximum performance. One will be located next to the ganged antenna capacitor, another will be next to the ganged oscillator capacitor, and there will be one each in the primary and secondary of the two Intermediate Frequency (IF) transformer coils. If the radio is an AM/FM/SW radio there could be more than 16 trimmers that need adjusting.

I will use the GE model 628 AM broadcast band radio as an example. This schematic can be found in Riders GE v14-57. This schematic indicates, in the lower left hand corner, that the IF peak of the radio is 455 kc. This means the IF transformers should be adjusted to resonate at 455 kc and the oscillator should produce a frequency that is always 455 kc higher than the selected

station frequency. The specified IF peak frequency can vary from radio to radio. Usually broadcast band tube receivers employ an IF frequency of 455 kc but this is not always true. Some early super-het radios were designed to be peaked at 175 kc or some other frequency.

Instrument connections for the IF alignments are shown

The IF Alignment

- 1) The radio and signal generator should be warmed up for a few minutes before starting the alignment process. Plug the radio into an isolation transformer for safety.
- 2) Connect an AC voltmeter meter across the voice coil (Points A&B)
- 3) Rotate the volume control on the radio to maximum
- 4) Set the signal generator output to 455 kc.
 - a. During the alignment adjust the signal generator output to a volume level that will provide a good meter reading
- 5) Through a .05 mfd. capacitor connect the signal generator output to Point (C), the control grid of the first 12SK7 RF amplifier tube. (Point C can be on any wire connecting to pin 4 of 12SK7)
 - a. Connect the signal generator ground to B- or any point on the chassis (Point D)
- 6) Using an insulated tool adjust the 2nd IF transformer trimmers for maximum reading
- 7) Using an insulated tool adjust the 1st IF transformer trimmers for maximum reading on the voltmeter
- 8)

The RF Alignment

Instrument connections for the RF alignments are shown

- 8) Remove the .05 uF capacitor from step 5. Through a 250 pF

(Continued on page 5)

Photos from the May 17th CRC Meeting in Littleton



Bill Dial describes 1970's Japanese tube radio



Gerald Knievel describes new nano tube radio



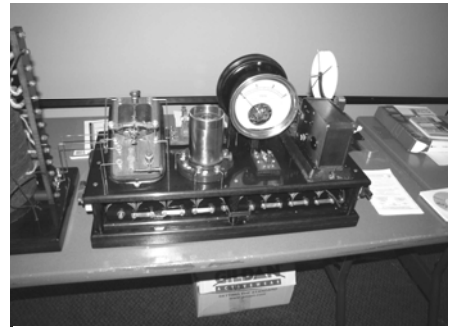
Tom Pouliot describes Marconi type receiver



Larry Synder gives radio class



Jerry gets some loot too



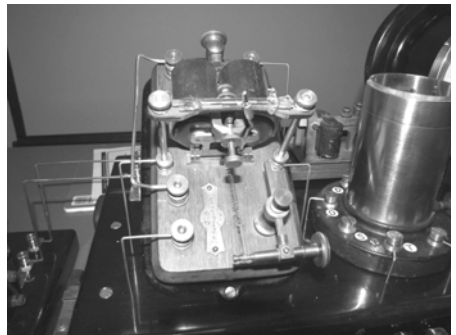
Tom's radio above and below



Brian shows raffle items



Mike Cook with T.O. from raffle

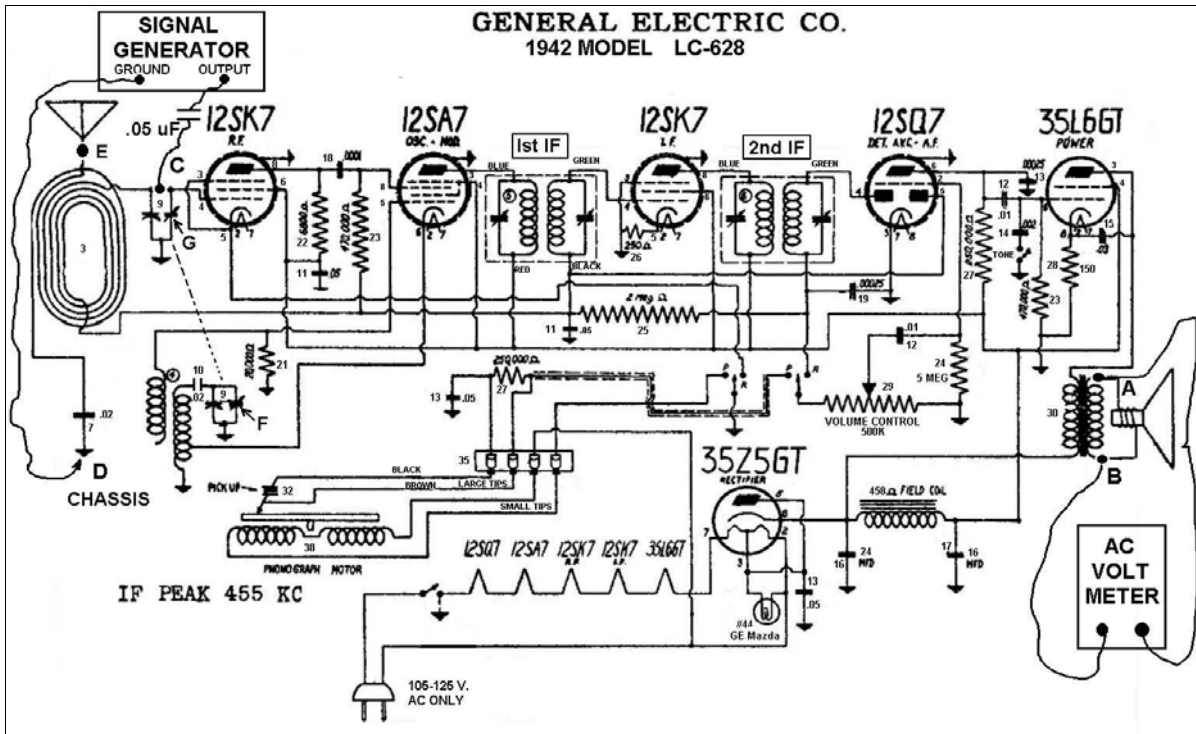


Charlie hauls in a new speaker



Tom Kelly: New Vice President





on the voltmeter Repeat the alignment procedure as desired but **be cautioned** that a super-het radio can be tuned to be too selective. What this means is that the sides of the broadcast band width may be cut off and therefore some of the high or low notes of the audible signal will not be heard. If the radio sounds too bass or too tinny, adjust the trimmers so the radio is slightly

(Continued from page 3)

capacitor connect the output of the signal generator to the flexible lead extending from the rear of the chassis. (Point E is the attachment point for an external antenna)

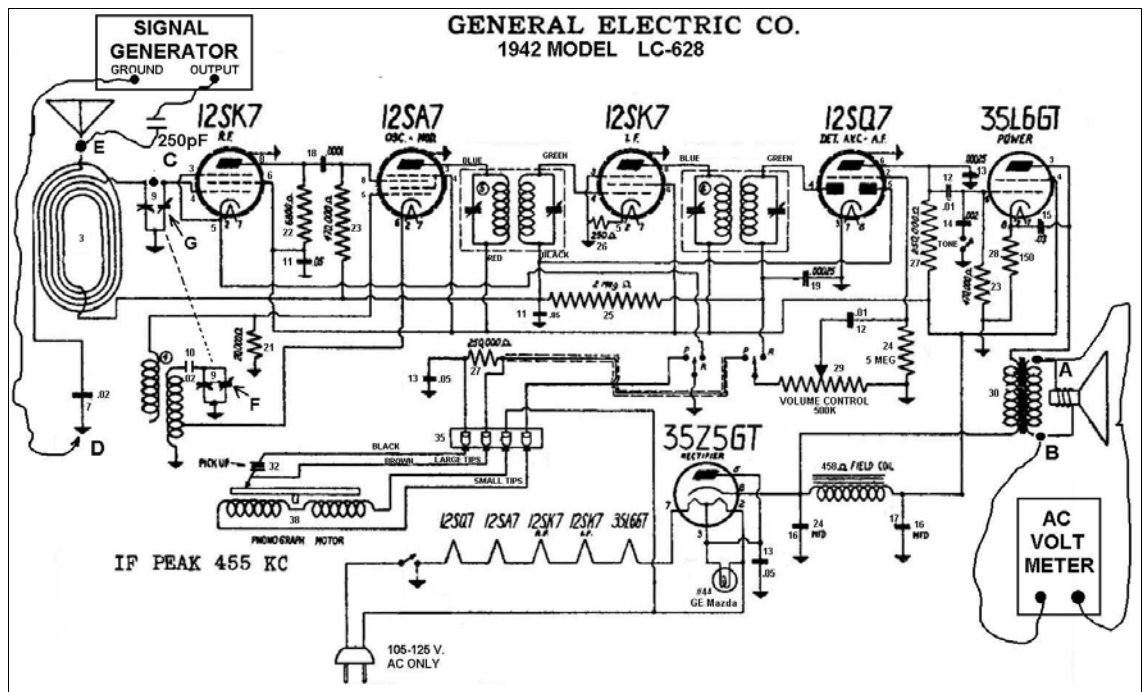
a. Connect the signal generator ground to B- which is the chassis (Point D)

- 9) Set the signal generator output signal to 1700 kc
- 10) Tune the radio to 1700 kc
- 11) Using an insulated tool adjust the oscillator trimmer located on the gang capacitor (Point F) for maximum output

- 12) Set the signal generator output to 1400 kc
- 13) Tune the radio to approximately 1400 kc
- 14) While rocking the gang capacitor, use an insulated tool to adjust the antenna trimmer located on the gang capacitor (Point G) for maximum output

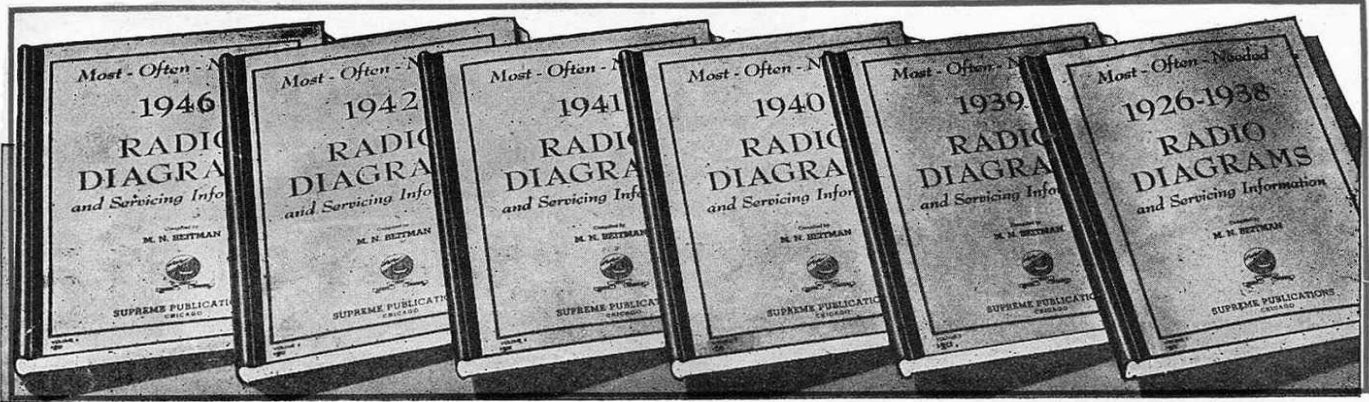
out of alignment.

This information was extracted from the first 100 pages of Marcus & Marcus, *ELEMENTS OF RADIO*, Fourth Edition, Prentice-Hall, Inc. 1959. And from [Riders Perpetual Troubleshooter's Manual, page GE v14-57](#)



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RADIO-CRAFT for OCTOBER, 1946

Kushnir Furniture Co. – Another Landmark Vanishes

by Steve Touzalin

On January 24, 2009, longtime CRC member Ray Kushnir passed away. A memorial service was held in Pueblo, Colorado. Ray was the subject of a July/August 1992 Flash article "Our CRC Collectors". It is reprinted below.

Introducing.....

RAY KUSHNIR
of Colorado Springs

Although a member of the C.R.C. for just over a year, Ray's been collecting old radios for a long time. He wants to make sure they don't just get thrown away and says it's the nostalgia that keeps his hobby alive.

For years, Ray and his family have run the Kushnir Brother's Furniture Store in Pueblo where more than a hundred old radios are on display. The total collection includes items from the 1920s to the '50s. With his uncle, Ed amassed a wide grouping of console tops. He enjoys restoring them. But Ray's more concerned



(Photo by Chris McLean for Pueblo Chieftan)

with their preservation than selling

A pride'n'joy of Ray's is a mono with its original remote control his favorites as it was the first ra-

dio in his collection.

Ray, who lives in the "Springs" works for Hewlett Packard. He they go back to a time when they "There's a lot of real nostalgia."

and has another hundred sets there, says when people come into the store, were kids and radio was very important.



Ray later retired from Hewlett Packard after inheriting the furniture store in 1994. He remained a CRC club member and also attended several of our annual shows and auctions.

I was fortunate to have been able to visit the Kushnir Furniture Co. store for the first time this last fall while in Pueblo. I was speechless when I first entered the store. I could not believe the radios, parts and manuals that were all around me. It was mind boggling to think that such a large amount of radio and electronic paraphernalia was all in one place. I wandered and snooped for probably an hour, while Ray watched from the back of the store from his radio repair shop area.



I finally introduced myself, and chatted with Ray for what seemed like an entire afternoon about different radios that were visible, the CRC club and the upcoming auction. I inquired about buying a couple of radios, but he wasn't

ready to sell them just yet.

I left empty-handed, but content to know such a place did indeed exist, and that someone else had the "radio bug" much worse than I did.

I will miss not being able to return to the Kushnir Furniture Co. store. Anyone who had visited his store in the past can attest that Ray's passion for radios and our entire hobby was totally extraordinary. His passing away is truly OUR loss!!

The Book Shoppe

Special CRC prices. Order at club meetings or contact: Charles Brett, 5980 Old Ranch Road, Colorado Springs, CO 80908
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WWII Vargas Girl—March 1943

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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 to Steve Touzalin, either by email at:

stevetou@comcast.net ,

or by postal mail to:

Steve Touzalin
417 So Queen Cr.,
Lakewood CO
80226 .

The July 12th, 1:00 pm meeting will be at the Philip S. Miller Library in Castle Rock

Directions

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.



**Colorado Radio Collectors
Antique Radio Club
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