

# Early Radio Designs

Crystal Radio(British)

TRF (Diamond T Radio)

Reflex (Sun Radio)

Pulsed TRF\*

Superhet and Regen (AK 944)

Regenerative Radios

Resistor (Tri-City W-1)

Coil Coupling (Crosley W-29)

Variometer (Trego Venus )

Capacitor (Radak R-4)

Single chip AM radio\*

My antennas

\*modern radio designs

# Early Radio Designs

High Frequency Labs  
Nine-in-Line(01A)  
Superhetrodyne



# Early Radio Designs

British Crystal Radio



# Early Radio Designs

British Crystal Radio



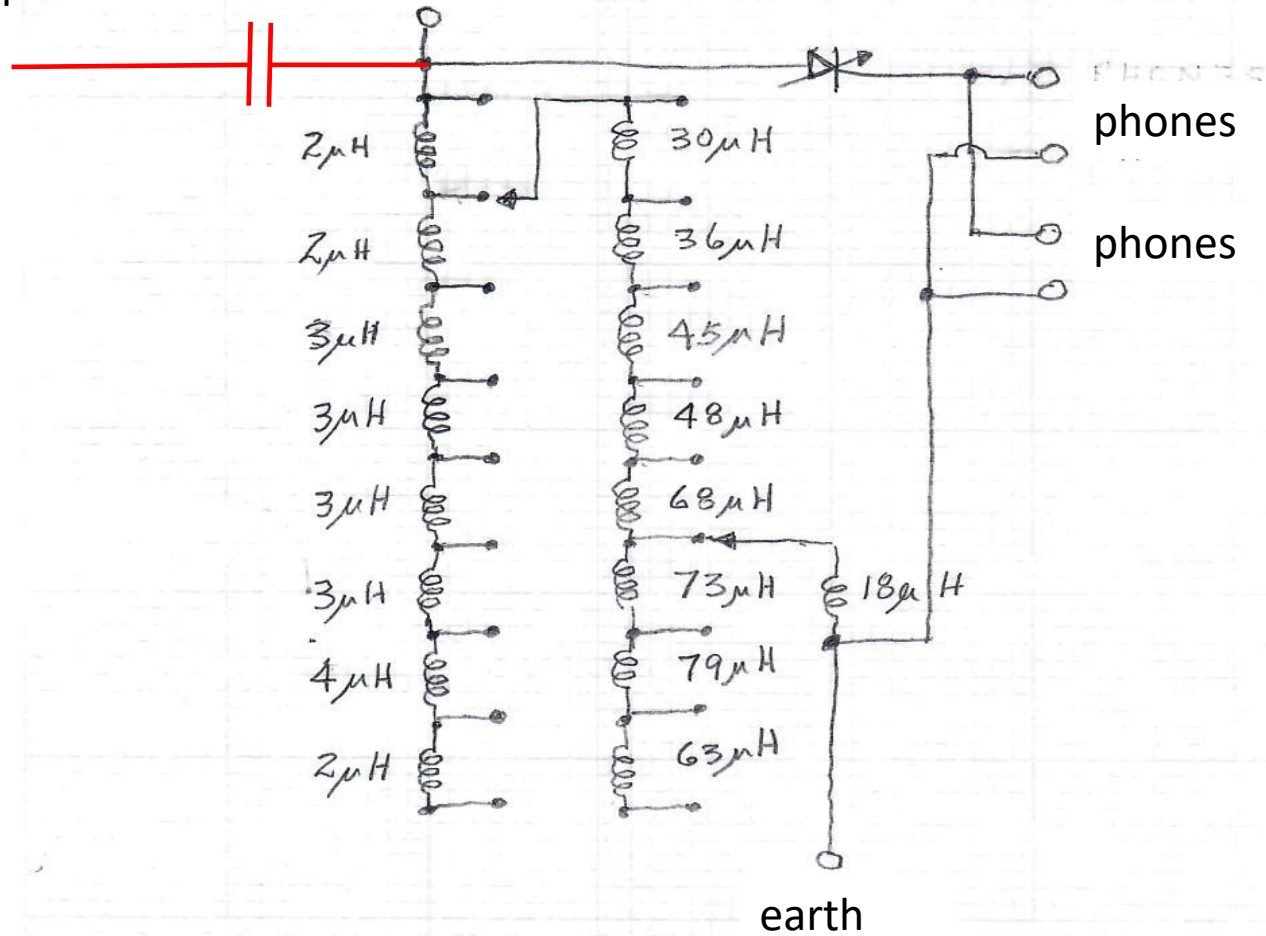


# Early Radio Designs

## British Crystal Radio

External antenna  
capacitance

aerial



# Early Radio Designs

A tuned radio frequency receiver (or TRF receiver) is a type of radio receiver that is composed of one or more tuned radio frequency (RF) amplifier stages followed by a detector circuit to extract the audio signal and usually an audio frequency amplifier

# Early Radio Designs

Diamond T  
Super Special Old  
TRF

Radio as found





# Early Radio Designs

Diamond T  
Super Special Old





# Early Radio Designs

Diamond T  
Super Special New



# Early Radio Designs



# Early Radio Designs

There appears to be a direct connection between the **Diamond T radio** manufacturer in South Bend, Indiana and the **Diamond T truck** manufacturer in Chicago. There is also the connection between the Diamond T radio manufacturers "Diamond T" of South Bend, **Indiana**, **Tillman Radio Corporation** "Tillman" & "Challenger" of Wabash, **Indiana**, and the **Guerrier Radio Corporation** "Guerrier" of Elwood, **Indiana**. All three radios **share the same instruction card layout and print, all of the components, and the same cabinets** but the dials and components vary slightly in arrangement between the four brands of radios. It's not known who made the radios but it appears that **Tillman** that made all of the radios for all three radio companies.



# Early Radio Designs



# Early Radio Designs





# Early Radio Designs

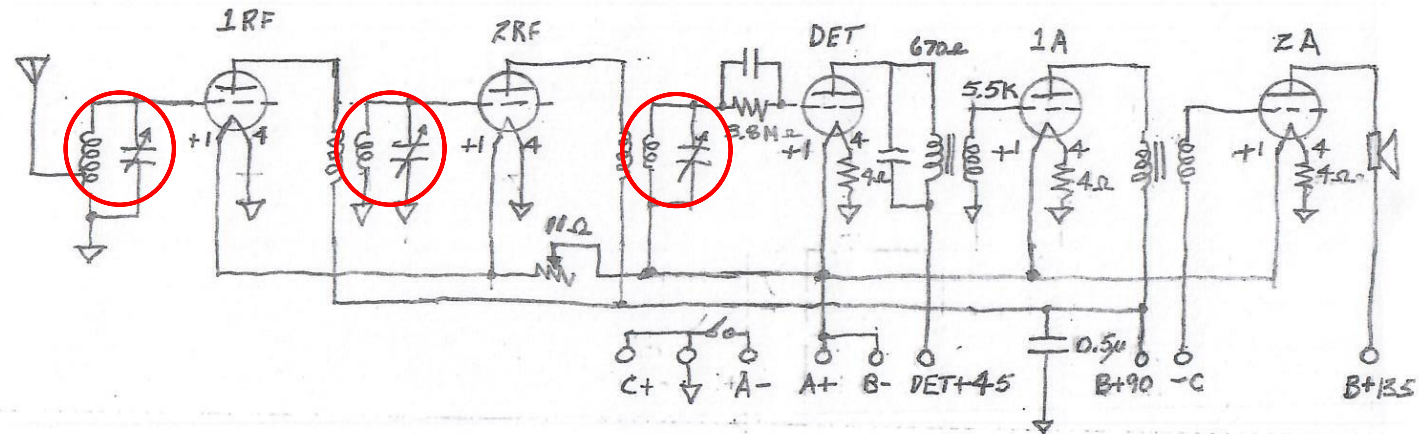




# Early Radio Designs

9/18/19

## Diamond T Super Special Old



Bottom View

2nd  
AF

1st  
RF

2nd  
RF

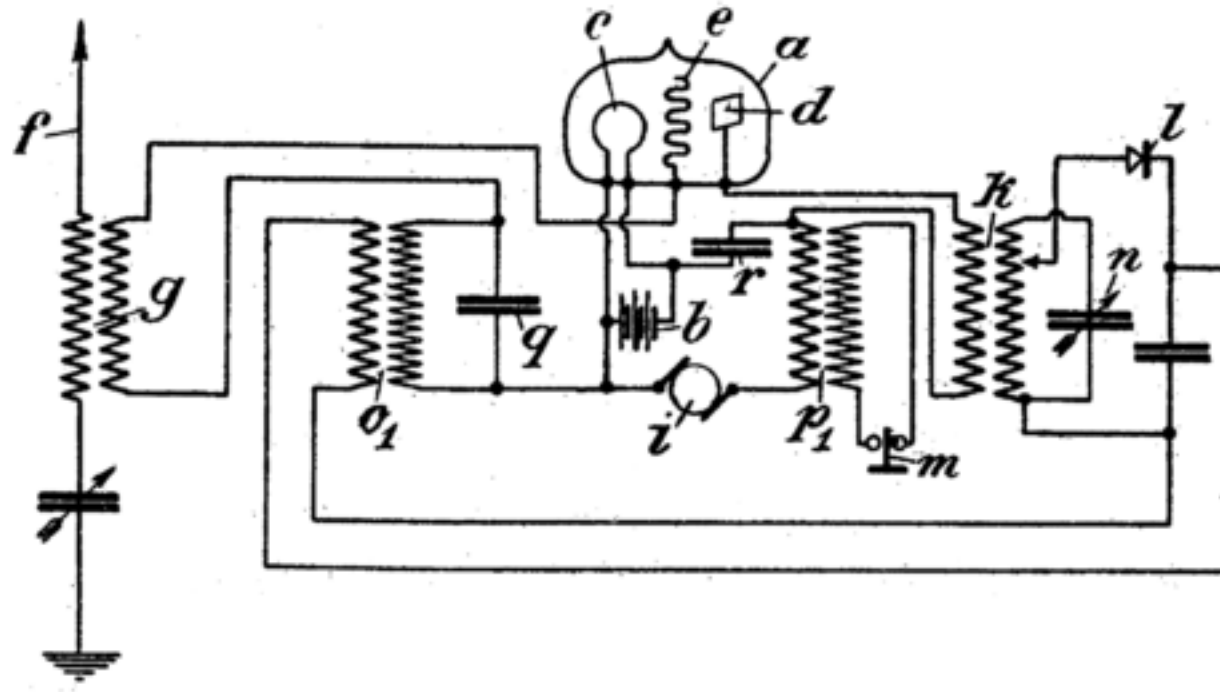
DET

1st  
AF

# Early Radio Designs

## Reflex Radio

A reflex radio receiver, occasionally called a reflectional receiver, is a radio receiver design in which the same amplifier is used to amplify the high-frequency radio signal (RF) and low-frequency audio signal (AF). It was first invented in 1914 by German scientists Wilhelm Schloemilch and Otto von Bronk, and extended to multiple tubes in 1917 by Marius Latour and William H. Priess.



# Early Radio Designs

## Sun Radio Reflex



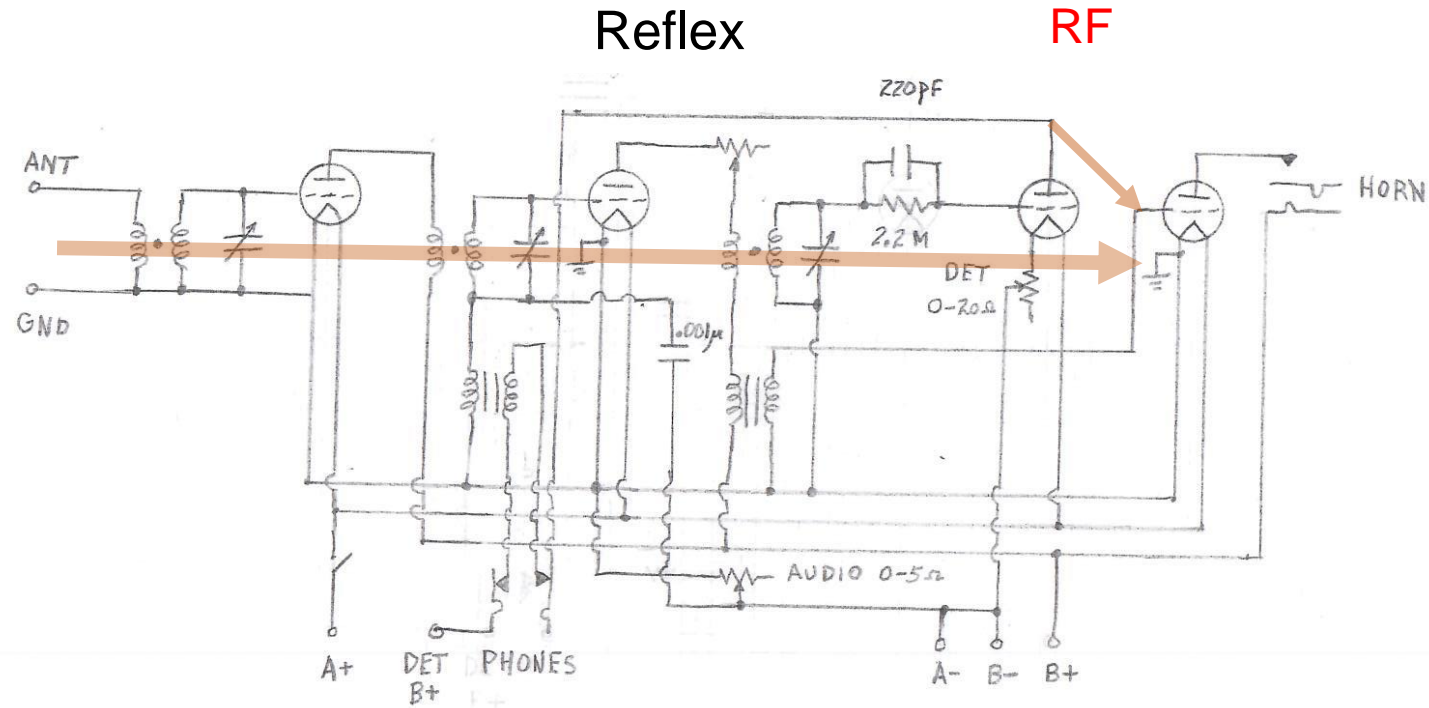


# Early Radio Designs

**SUN MANUFACTURING CO.** -- This company began making radios in 1925 and appears to have continued production until 1927. Bold ads in the Courier-Journal in 1925 proclaimed "**Made in Louisville!**" and described five models ranging in price from \$75 to \$237.50, with "**beautiful panels and artistic cabinets.**" All used the same four-tube chassis, with three tuning dials. In a 1925 newspaper article, the company claimed that its plant was equipped to produce 1,000 sets per day, but it seems unlikely that such a production figure was ever reached. The 1926 City Directory lists the address as 722 S. 26th St., but by the next year it had relocated to 2829 Grand Ave. Unlike most of the other companies listed here, Sun apparently focused exclusively on the radio business.

# Early Radio Designs

## Sun Radio Model 50 Reflex

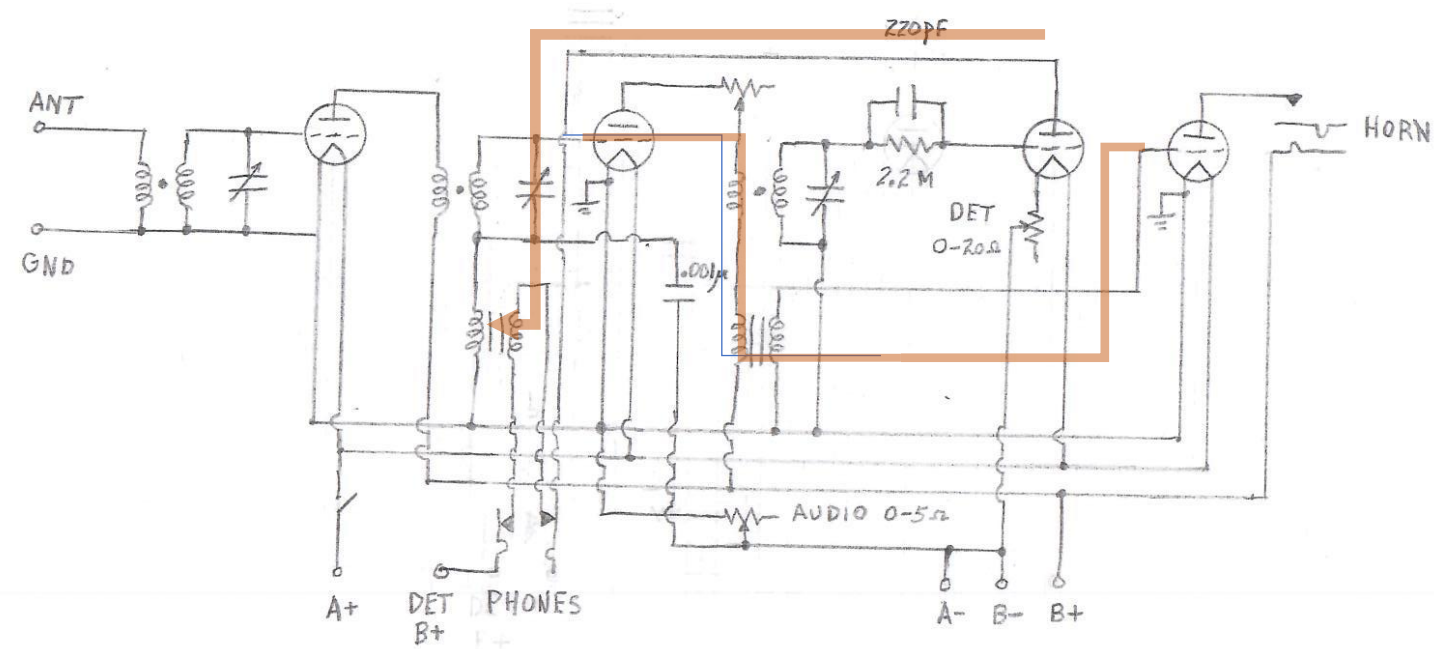


# Early Radio Designs

## Sun Radio Reflex

### Sun Radio Model 50

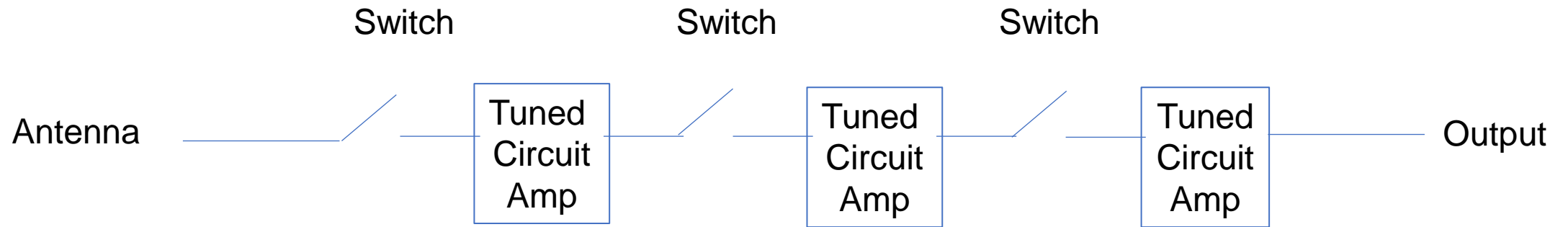
Audio





# Early Radio Designs

Pulsed TRF  
modern radio design



# Early Radio Designs

A superheterodyne receiver, often shortened to superhet, is a type of radio receiver that uses frequency mixing to convert a received signal to a fixed intermediate frequency (IF) which can be more conveniently processed than the original carrier frequency. It was long believed to have been invented by US engineer Edwin Armstrong, but after some controversy the earliest patent for the invention is now credited to French radio engineer and radio manufacturer Lucien Levy. Virtually all modern radio receivers use the superheterodyne principle.

# Early Radio Designs



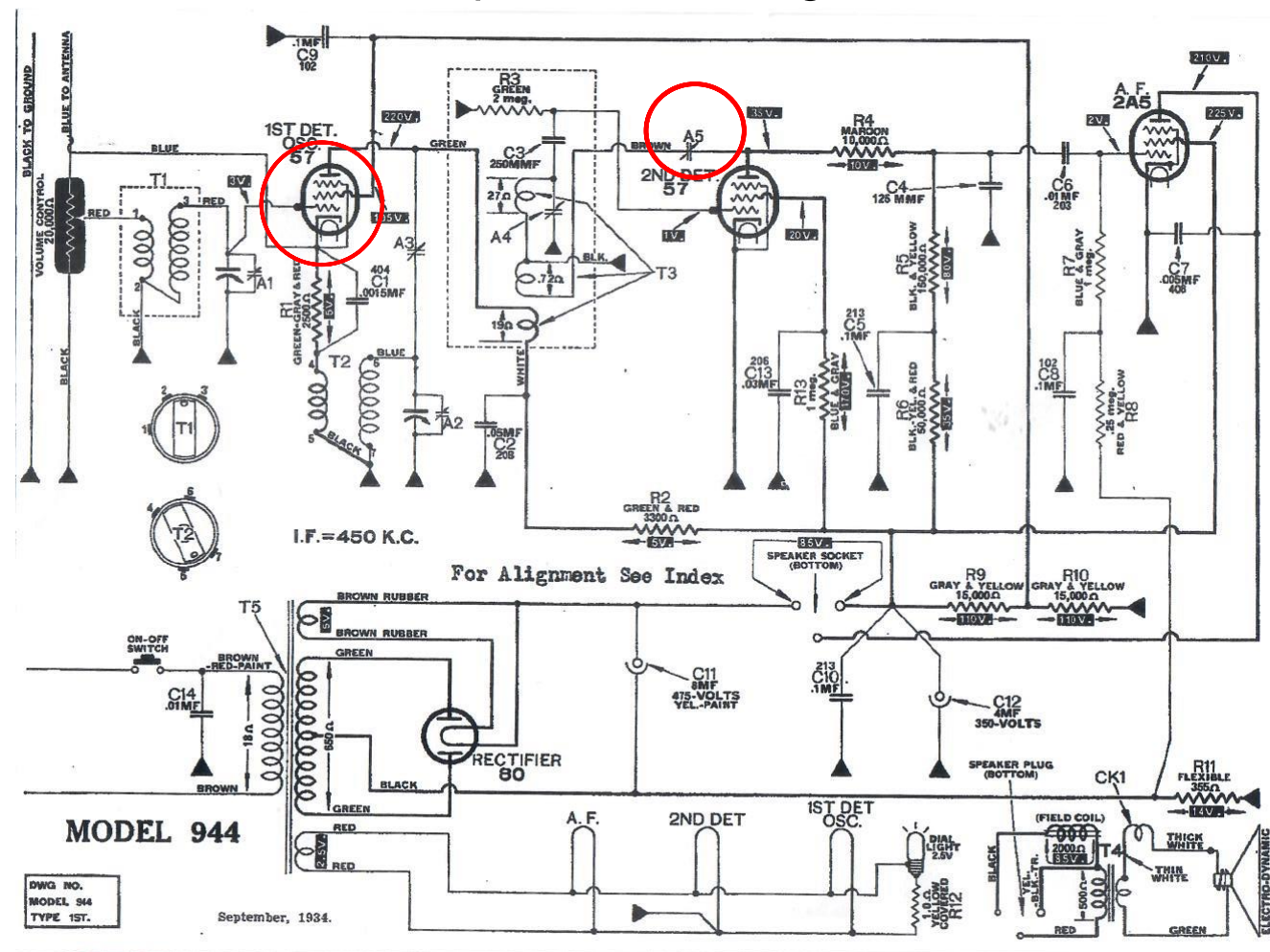


# Early Radio Designs

Atwater Kent entered [Worcester Polytechnic Institute](#)'s freshman mechanical engineering class in the fall of 1895. He was elected treasurer of the class of 1899, but only remained in the position for one semester, because he did not attend recitation classes after the mid-year exams in January. Kent excelled in mechanics and drawing, but was weak in chemistry, algebra, and language, and had no interest in these subjects. He was already running a small business and that was his top priority. His business was called the Kent Electric Manufacturing Company, which he began in the back room of his father's machine shop, and from which he sold small electric motors, generators, fans, and later automobile ignition systems. The Unisparker Ignition systems became the automobile industry standard for almost 50 years, until the advent of the HEI systems.

# Early Radio Designs

# Atwater Kent 944 Radio Superhet and Regen



# Early Radio Designs

A regenerative circuit is an amplifier circuit that employs positive feedback (also known as regeneration or reaction). Some of the output of the amplifying device is applied back to its input so as to add to the input signal, increasing the amplification. The regenerative receiver was invented in 1912 and patented in 1914 by American electrical engineer Edwin Armstrong when he was an undergraduate at Columbia University. It was widely used between 1915 and World War II. Advantages of regenerative receivers include increased sensitivity with modest hardware requirements, and increased selectivity because the  $Q$  of the tuned circuit will be increased when the amplifying vacuum tube or transistor has its feedback loop around the tuned circuit (via a "tickler" winding or a tapping on the coil) because it introduces some negative resistance.



# Early Radio Designs

## Armstrong Early Regenerative Concept

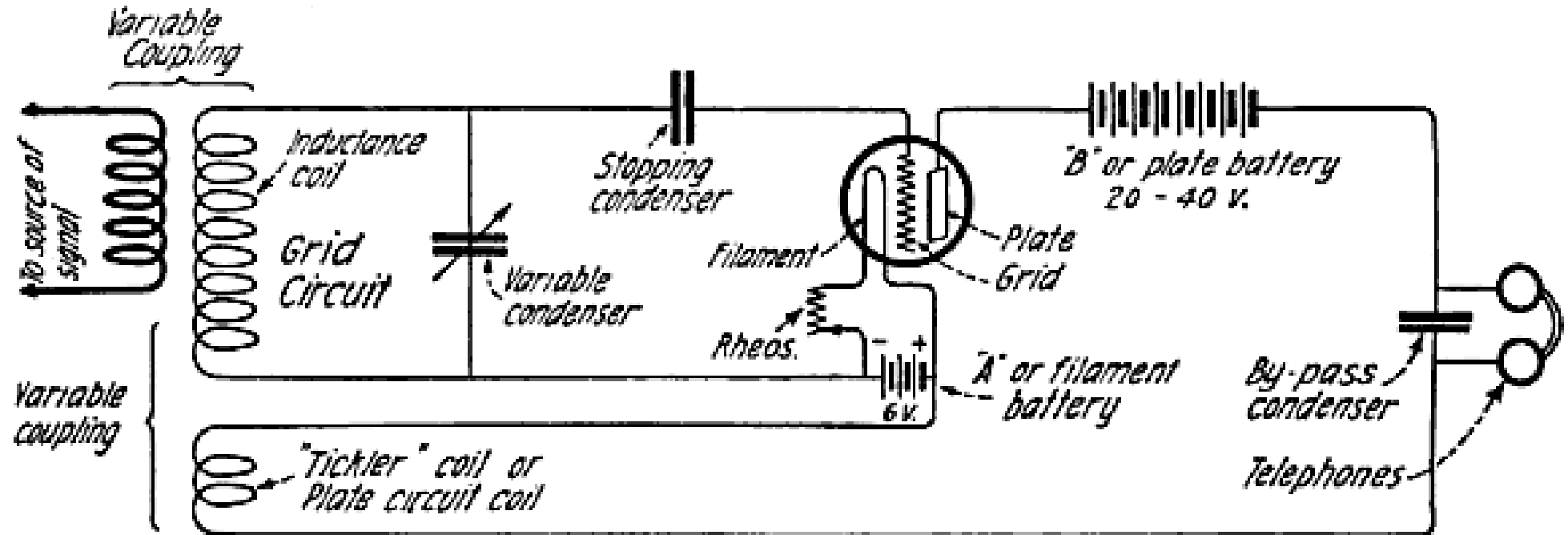


FIG. 1

# Early Radio Designs

Tri-City W-1  
Regen

Resistor



# Early Radio Designs

Tri-City refers to the three cities of **Davenport, Iowa**, and **Rock Island and Moline, Illinois**; the company later had a connection with **Clinton, Iowa** which was not far away. It was started by a couple of radio amateurs who liked to design and build radio equipment and started selling it to other amateurs. the name "Tri-City Radio Laboratory" first appeared in print in **June 1916** although it was later claimed to have dated from **1914**. The address was a ham station **9XR of Robert Karlowa** in the Best Building in Rock Island. His partner was probably **William Kirwan of Davenport, 9XE**.

In the November 1925 edition of The Radio Trade Directory on page 120, under the listing for manufacturers of crystal sets the Tri-City Electric company was still listed as a manufacturer. Trade Names: TRESKO, Trescola, Simple Simon

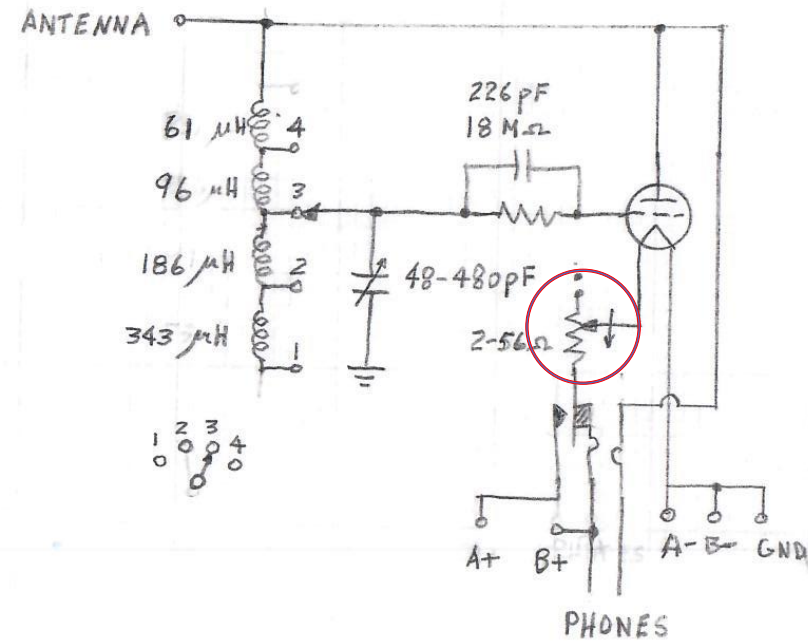
After WWI Tri-City began advertising a series of small tuner boxes and some complete receivers. After December 1919 the ads are signed "Tresko Sales Agency, Davenport" while the flyers give Clinton, Iowa as the location of the "Perfection Radio Laboratory" or later the "Manufacturing Department".

In mid to late 1925 Steinite Radio acquired the remnants of **Tri-City Radio Electric Supply (Tresko)**. The operation was then taken over by Steinite Radio Co.



# Early Radio Designs

## Tri-City W-1 Regen



# Early Radio Designs

Crosley R-4  
Regen

Tickler  
Coil



# Early Radio Designs

In 1921 Crosley's young son asked for a radio, a new item at that time, but Crosley was surprised that toy radios cost more than \$100 at a local department store. With the help of a booklet called "The ABC of Radio," he and his son decided to assemble the components and build their own crystal radio set. Crosley immediately recognized the appeal of an inexpensive radio and hired two University of Cincinnati students to help design a low-cost set that could be mass-produced. Crosley named the radio the "Harko" and introduced it to the market in 1921. The inexpensive radio set sold for \$7, making it affordable to the masses. Soon, the Crosley Radio Corporation was manufacturing radio components for the rapidly growing industry and making its own line of radios.

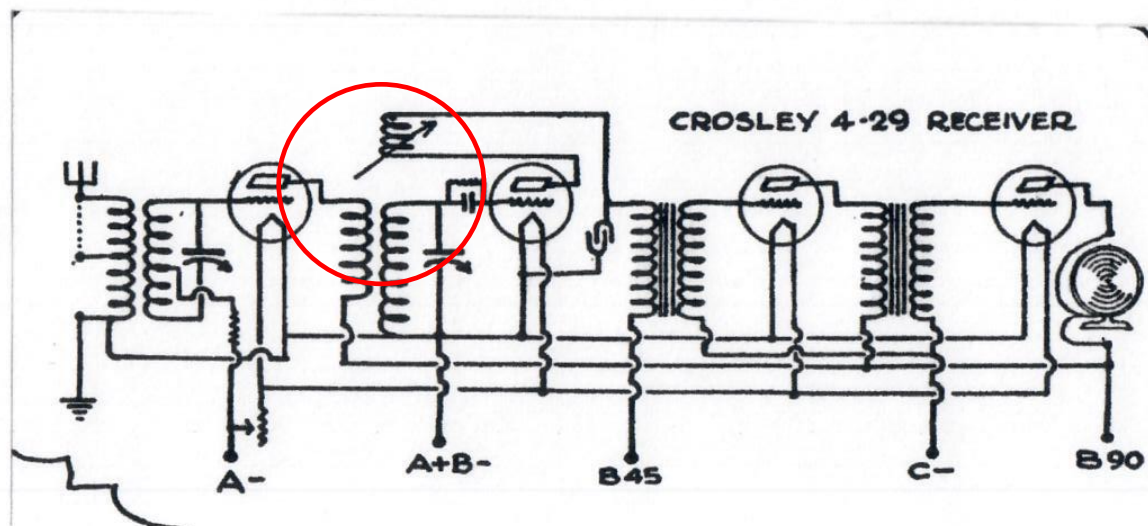
By 1924 Crosley had moved his company to a larger plant and later made subsequent expansions. The Crosley Radio Corporation became the largest radio manufacturer in the world in 1925; its slogan, "You're There With A Crosley," was used in all its advertising.

In 1925 Crosley introduced another low-cost radio set. The small, one-tube, regenerative radio was called the "Crosley Pup" and sold for \$9.75.



# Early Radio Designs

Crosley 4-29



# Early Radio Designs

Trego Venus  
Regen

Variometer



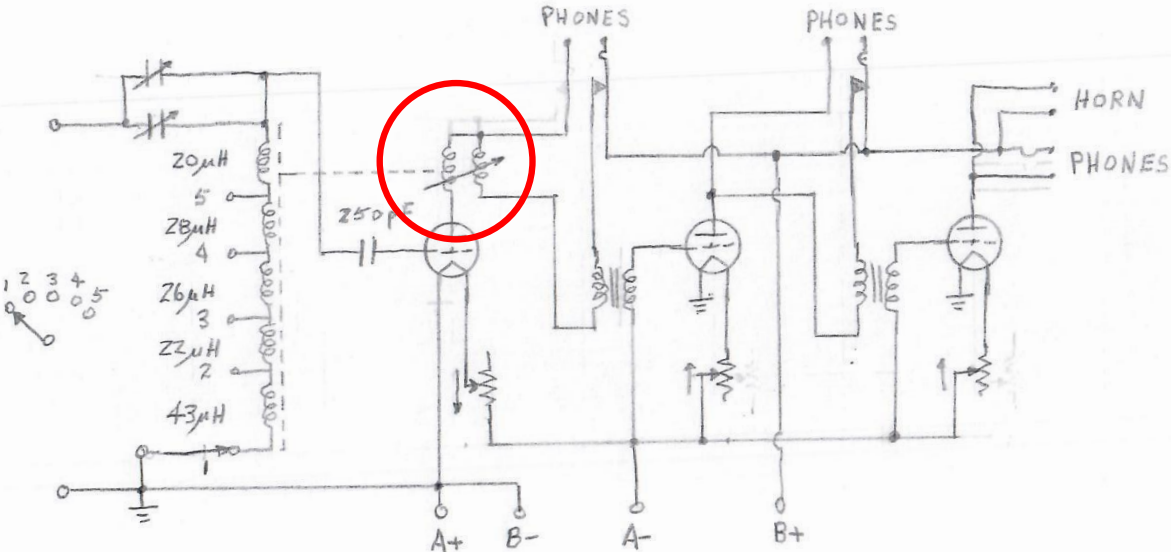
# Early Radio Designs

Nellie was left a widow when her husband, a hardware dealer in Humboldt, Kansas, died in 1915. Nellie, packed up her young daughter and a few belongings and headed for Kansas City, the nearest metropolis. She went to business college for a few weeks and then obtained employment with a rubber and tire manufacturer. Starting as a stenographer, she rose to success in the company and purchased company stock along the way, when a collapse of the market brought the concern to bankruptcy, (apparently the 1921 crash). She then mortgaged her small home for \$3000, spent \$2500 on advertising and with the remaining \$500, purchased equipment and started a small radio company on credit, using men as helpers, formerly with the tire company. The article states that the orders just kept rolling in and Nellie was now a well recognized Kansas City businesswoman with the plant covering an entire block and bringing in a “Million Dollars Annually”,

# Early Radio Designs

Variometer

Trego Venus  
Regen





# Early Radio Designs

Radak R-4  
Regen

Capacitor



# Early Radio Designs

Clapp-Eastham Company, 136 Main Street, Cambridge, Massachusetts was founded 1908 to manufacture C-ray equipment and wireless sets (from 1912). Clapp-Eastham moved to Brooklyn, NY about mid 1925. The company went out of business in 1929.

# Early Radio Designs



# Early Radio Designs

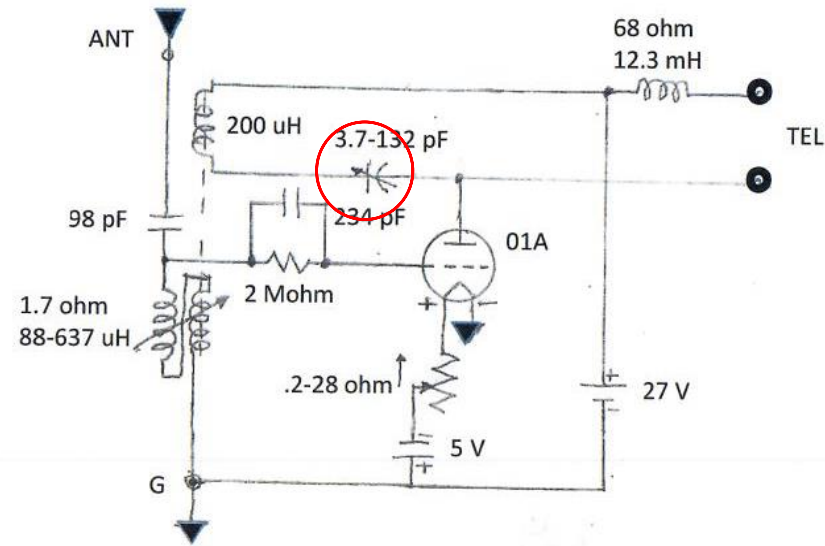




# Early Radio Designs

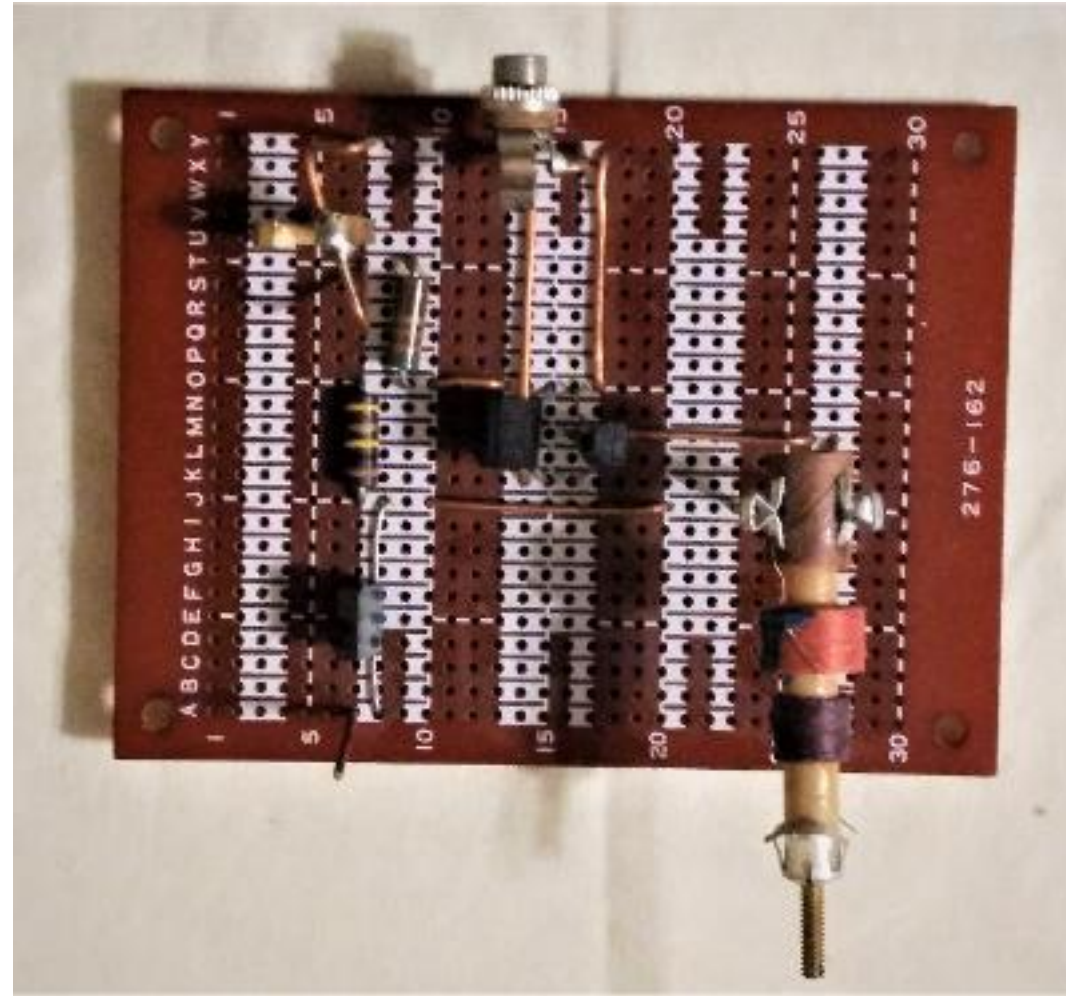
## Radak R-4 Regen

9/21/2020  
Djshy



# Early Radio Designs

## Single Chip Radio



# Early Radio Designs

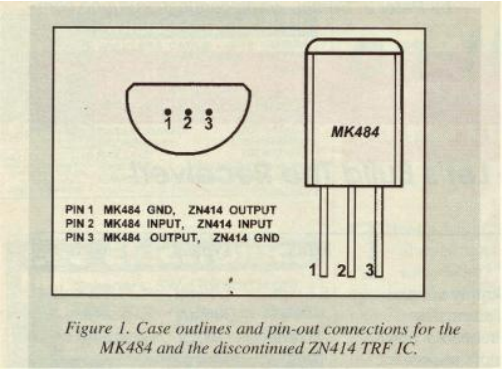


Figure 1. Case outlines and pin-out connections for the MK484 and the discontinued ZN414 TRF IC.

	Min.	Typical	Max.
Supply voltage	1.1 volt	1.4 volt	1.8 volt
Current draw		300 uA	
Frequency range	150 kHz		3 MHz
Input impedance		4 megohms	
THD		4%	
AGC range		30 dB	
Power gain		70 dB	

Table 1. Technical specifications For the MK484.

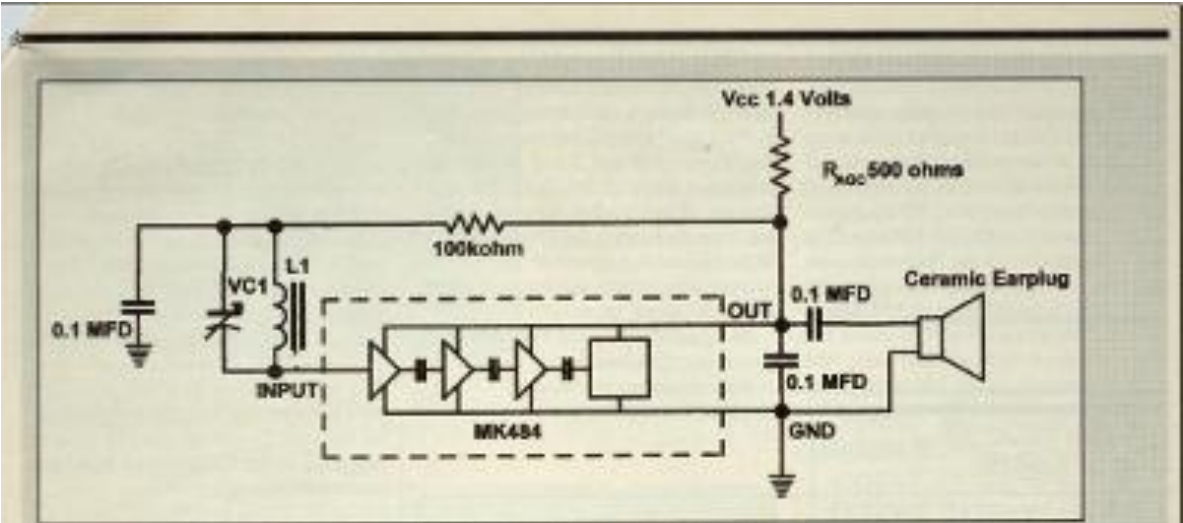


Figure 3A. Schematic for a basic TRF receiver using the MK484.

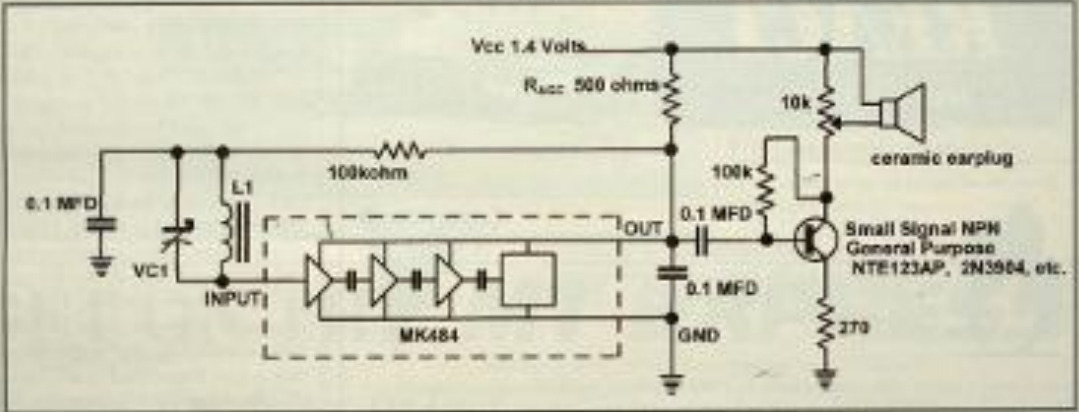


Figure 3B. Added audio stage using a single NPN transistor.

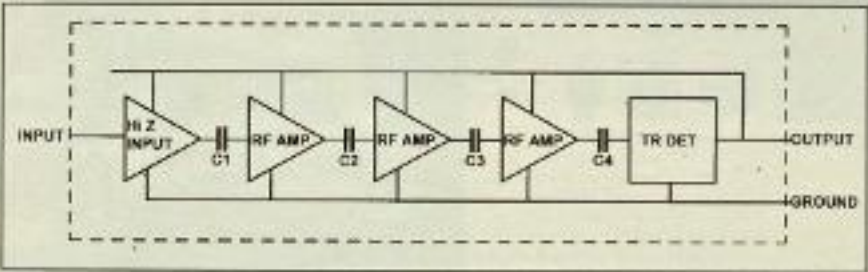


Figure 2. Block diagram for the MK484 and ZN414.

# Early Radio Designs

Ferrite Coil  
Antenna

Varactor

VGA

Mixer

Divider 2X

VCO  
2X F0

Divider 2X

Mixer

Low Pass  
Filter

Low Pass  
Filter

Low Pass  
Filter

Limiter

VCO  
Tune

FM

Tune

AM

## Single Chip Radio



# Early Radio Designs

Question and Comments

# Early Radio Designs



# Early Radio Designs





# Early Radio Designs





# Early Radio Designs