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# RADIO

## VACUUM TUBE WHEN USED AS AMPLIFIER

It Will Function Thus for Either Radio Frequency or Audio Frequency.

Starting today we shall give a detailed description of the vacuum tube when used as an amplifier. This section, as in the past, is continuous and if clipped out and saved will be convenient for reference.

When the three-electrode vacuum tube was used as a detector, the circuits associated with it were such that where a symmetrical alternating difference was applied to the grid, a symmetrical change in plate current resulted. That is to say, the vacuum tube acted as a rectifier. In addition to rectifying, the tube also amplified. The variation in plate current was "K," where "K" is the amplification constant of the tube, times what it would have been in a two-electrode tube, for the same potential impressed on the grid.

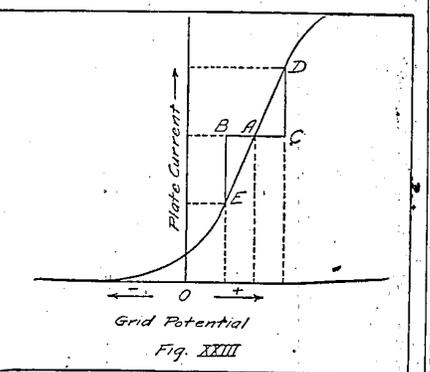
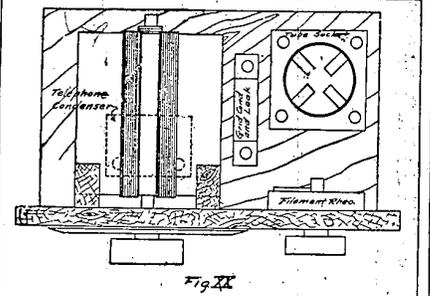
By properly adjusting the electrical constants of the circuits associated with a three-electrode tube, symmetrical variations of grid potential can be made to produce symmetrical variations in plate current, which are "K" times the amplitude of the plate circuit variations of a similar two-electrode value with the same applied grid potential.

straight line, then OD will equal BE, or so long as the working range falls within straight line portion of the characteristic curve, symmetrical changes in grid potential will cause symmetrical changes in plate current. From this it can be seen that if the working point "A" be selected near the bend of the characteristic curve, symmetrical changes in grid potential will not cause symmetrical changes in plate current. Since the plate current variation in such case would bear only slight relation to the grid variation in potential, the output of the tube would be distorted.

In applying amplifiers to receiving sets used to pick metropolitan stations, distortion is one of the greatest difficulties to overcome. Too strong signals will result in decreased amplification. In Figure 23, if the applied variation in grid potential were 10 times that shown in the example, the plate current would not change 10 times as much, because of the bends in the curve, due to saturation. Finally, a condition can be reached where the use of an amplifier tube will decrease the signal strength because of the saturation of the tube.

The rectified incoming signals would be louder without the use of the amplifier tube, because of the inability of the plate current of the tube caused by saturation to increase in proportion to the signal strength.

There are, in general, two factors that can be taken from the characteristic curve and the second is the length of the straight portion of the curve. The slope of the straight por-



tion of the curve determines the amplification of the tube. The more nearly vertical the straight portion of the curve is, the greater will be the change in plate current for a given change in grid potential, or in other words, the louder will be the response in the telephone receivers corresponding to a given received signal. The length of the straight portion of the curve determines the maximum variation in grid potential that will cause the tube to function properly without distortion.

Returning again to the characteristic curve of the three-electrode vacuum tube, shown in Figure 23, notice its shape. Suppose that a positive potential was applied to the grid by means of a "C" battery so that the tube would function at a point represented by "A" on the characteristic curve. If now the applied grid potential from the "C" battery be reduced by an amount represented by A-B in Figure 23 the corresponding reduction in plate current will be represented by B-E. On the other hand if the grid potential be increased by an amount represented by A-C, where A-C equals B-C, the corresponding increase in plate current will be represented by C-D. If the portion of the characteristic curve in the region of E-A-D is a

# Lots for Your Money Should Not Tempt You USE CALUMET

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Shave With Cuticura Soap And double your razor efficiency as well as promote skin purity, skin comfort and skin health. No razor, no stinky soap, no germs, no waste, no irritation even when shaved twice daily. One soap for all uses—shaving, bathing and shampooing.—Advertisement.

**STORK MADE LONG JOURNEY**  
Bird Flew From Africa to Germany With a Message From Exile to the Fatherland.

The population of Lixiai, Germany, noticed one day recently that one of the many storks which annually return to the neighborhood from distant southern zones to rebuild their nests was carrying something about its neck which only human hands could have fastened there. Repeated efforts to approach the bird had failed, but one of the villagers, finally lured the stork into his barn and then there learned that the bird carried a little leather case in which a note was inclosed. The note revealed that the stork had come all the way from East Africa, where a German colonist, Wilfrid Rha, has his little farm near Victoria lake. Buchta must have anticipated that the bird spent his annual visit in his beloved fatherland, so he wrote "Just a greeting to the fatherland," and used the stork to convey his message.

People who are guilty should never verdi innocence.

Life is made up of trifles—take heed of the trifles.

**Important to Mothers.** Examine carefully every bottle of CALUMET, that famous old remedy for infants and children, and see that it bears the Signature of *Dr. H. Fletcher*. In Use for Over 30 Years. Children Cry for Fletcher's Castoria.

**Now Peddle Flowers.** Nothing more pathetic can be seen in the Near East today than the splendid upstanding Russian officers in their badly worn greatcoats selling flowers on the street. "They would do anything," these Russian men and women, exiled from their own country," says Doctor Bestor, president of Chautauqua. Doctor Bestor spoke recently at the national board headquarters on his three months' tour of the continent. "The wife of a former Russian ambassador is a cook in a family. The doorkeeper of the embassy is a former admiral of the Russian fleet. These Russians have lost their relatives, in fact everything in the world except their grit and courage, and the only organization in the Near East administering to the women and girls among them is the Y. W. C. A.

**Pearl's First Venture.** Pearl's first North polar expedition lasted four years, 1908-1912, during which period he failed to get nearer than 315 miles to the pole.

A well-trained memory is one that never presents us with a disagreeable dream.

**Mitchell Eye Salve**

For SORE EYES

AS BOBBY HAD IT FIGURED

Quite Satisfied That Auntie's Appearance Must Have Undergone Considerable Change.

I am rather proud of my looks and always take pains to appear my best for company. One morning I was just finishing the sweeping when my brother and his family, whom I had not seen for a couple of years, drove in the yard. With them were a couple of well-dressed women, and I was naturally embarrassed to have them find me with hair disheveled and dust streaked face. However, I welcomed them graciously and we sat down to talk.

I noticed that Bobby, my small nephew, was studying me intently, and during a lull in the conversation he said: "Auntie, you must have been good looking when you were young." "Yes," I beamed, with my pleasant smile, scenting a compliment, "what makes you think so, dear?" "Because," answered Bobby, "uncle could never marry you the way you look now."—Chicago Tribune.

Epitaph! "Here Lies a Fisherman." They keep it up even when they are dead.—Richmond Times-Dispatch.

**USEFUL for all the little ailments—bumps, bruises, sores, sunburn and chafing. Keep a bottle in the house. It's safe and pure. It costs a very little.**

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**Vaseline**

**Piles**

are usually due to straining when constipated. Nujol being a lubricant keeps the food waste soft and therefore prevents straining. Doctors prescribe Nujol because it not only soothes the suffering of piles but relieves the irritation, brings comfort and helps to remove them.

Nujol is a lubricant—not a medicine or laxative—so cannot grip.

Try it today.



**Nujol**

A LUBRICANT—NOT A LAXATIVE

**ABSORBINE**

Reduces Bursal Enlargements, Thickened, Swollen Tissues, Carbs, Filled Tendons Soreness from Bruises or Strains; stops Spavin Lameness, always pain. Does not blister, remove the hair or lay up the horse. Only a few drops required at each yearling and season. 25¢ a bottle at druggists or delivered. Book & A free.

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offers to home seekers opportunities that cannot be secured elsewhere. The thousands of farmers from the United States who have accepted Canada's generous offer to settle on fertile homesteads of 80, 160 and 320 acre provinces have been well repaid by bountiful crops. These will avail you on every acre of wheat to the acre—also, barley, oats, alfalfa, clover, timothy and other crops. Hundreds of farmers in Western Canada have raised crops in a single season worth more than the whole cost of their land. With such success comes prosperity, independence, good homes and all the comforts and conveniences which make life worth living.

**Farm Gardens, Poultry, Dairying** are sources of income second only to grain growing and stock raising. Attractive climate, good neighbors, churches and schools, good markets, railroad facilities, rural telephone, etc.

For certificate entitling you to receive a complete description of farm opportunities in Manitoba, Saskatchewan, Alberta and British Columbia, etc. write

**J. M. MacLACHLAN**  
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**A TRUE RAT STORY**



Auburntown, Tenn., June 12, 1912.  
Stearns Electric Paste Co., Chicago, Ill.

Mr. Robert T. Donohoe of Auburntown, Tenn., writes: "I had a rat problem and wanted something to kill rats, so I bought Stearns Electric Paste. It was put some paste on six biscuits that I put out for the rats. The first rat came on them, and the second morning he found them more than he could eat. He found seventy-one rats in two nights, and there were lots more that did not die. This is some big rat take, but nevertheless, it is so fast thought would write to let you know that your rat paste is good."

Respectfully yours,  
KENNETH W. STEARNS.

**Buy a 35c Box of Stearns' Electric Paste Today**

Enough to Kill up to 100 Rats! Don't waste time trying to kill these pests with powders, poisons and other repulsive preparations. Ready for Use—Better Than Trap and General. Drive and General. Drive all STEARNS' ELECTRIC PASTE

### TIPS TO RADIOISTS

At Muncie, Ind., bacon was fried by means of a radio current. At last an explanation for that "frying" noise.

Gifford Pinchot, nominated for governor of Pennsylvania by the vote of the people, acknowledges his great indebtedness to the radio. A primary coil no doubt plays in an important part.

An inventor of Chicago claims to have invented radio apparatus that permits of successful communication with the spirits. We hope that the anti-prohibitionists will not misinterpret this claim.

The police department of Portland, Ore., has asked for an appropriation for radio receiving and broadcasting stations and to equip the police automobiles with radio apparatus. Copper wire, it is needless to say, will be used.

Lord Northcliffe, famous English editor, in speaking of the future of Journalism, recently predicted that radio would have an effect upon the publication of newspapers that will cause the invention of the linotype and high-speed press. He said that radio would undoubtedly come into general use of newspapers and newsgathering agencies.

# No heat with this summer meal

A DISH of crisp, delicious Grape-Nuts, with cream or milk (some berries or fresh fruit, too, if you like) is cooling to serve, cooling to eat and cooling to digest—with a charm of flavor and goodness that rouses appetite, enthusiasm. No preparation, no cooking—no heating of the body afterward, as heavy, starchy meals do—but well-rounded nourishment for every bodily need.

There's a noticeable feeling of lightness and comfort after such a meal. Try this way out of the heat, bother and uncertainty that usually goes with the midsummer food problem.

Order Grape-Nuts from your grocer today.

"There's a Reason"

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