RADIO

ALL ABOUT VACUUM TUBE AS AMPLIFIER

Connected Up to Furnish Rated Filament Current and Maintain Plate Potential.

Figure XXIV shows a three-electrode vacuum tube connected with the "A" battery to furnish the rated filament current and a "B" battery to maintain rated plate potential. In the plate circuit is a current meter to

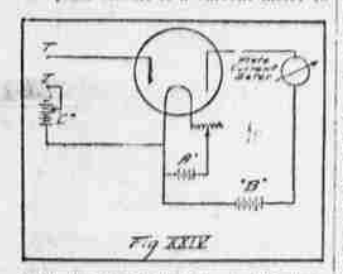

Fig XXIV

read the plate current. A "C" battery is connected in the grid circuit to maintain the grid at the positive potential O-A in order to have the tube operate at the point A on the characteristic curve. To T-T will be connected the alternating difference of potential having a maximum positive value equal to A-C' and a maximum negative value equal to A-B.

The resulting variation in plate current is shown in Fig. XXV. Inserting the tube functioning as an amplifier, with an amplification factor of K, between the supply of alternating difference of potential at T-T, was just K times what it actually is.

All these considerations have been based on the assumption that the total impedance (resistance to the flow of an alternating current) of the entire plate circuit existed internally in the tube between the filament and the plate, and that the external electrical circuit from the plate to the filament had zero impedance. Of course, this condition never exists in practice. The external plate circuit always has impedance in it in the form of telephone receivers, resistance choke coils, or transformer primaries, depending upon the means that is employed to couple the successive tubes together.

It is only where the external plate circuit of a vacuum tube has zero impedance that the plate voltage is equal to that of the "B" battery. As soon as an impedance is introduced into the external plate circuit, part of the total potential of the "B" exists as a drop across the external impedance, so that only a portion of the total "B" battery is available at the plate.

Fig. XXVI represents the characteristic curve of the tube as we have been discussing it, with no impedance in the external plate circuit. This curve is called the "static" characteristic curve, to differentiate from the others. Suppose that we introduce into the external plate circuit an impedance in the form of a resistance as shown by R in Fig. XXVII. When the current flows around

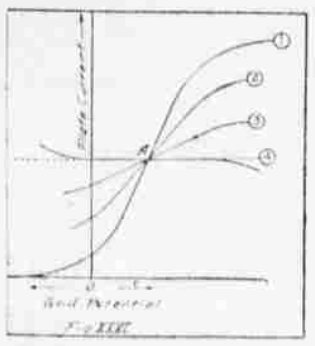

Fig XXVI

through the plate circuit, there will be a voltage drop across the resistance R equal in value to R times I, where I is the plate current in amperes. If the internal impedance of the tube be denoted by Z, then the drop in voltage from the plate to the filament inside of the tube is ZI. The sum of these two voltage drops, ZI plus RI, is always equal to the applied voltage of the "B" or plate circuit battery. The voltage of the "B" battery is constant.

As the plate current increases, the value of RI increases because R, the external plate resistance, does not change in value. So if the sum of ZI plus RI is always equal to a constant

when RI increases, ZI must decrease. This means that when a constant "B" battery potential is applied to the plate circuit of a vacuum tube, containing external resistance, an increase in plate current causes a decrease in the potential existing between the plate and the filament.

The "static" characteristic curve was drawn on the assumption that the difference in potential between the plate and the filament remained constant, obviously then, when the external plate circuit has other than zero impedance, the static characteristic curve no longer holds true.

The characteristic curve of a tube having other than zero impedance in the external plate circuit is the "dynamic" characteristic. The greater the variations in plate current, the greater the variation in the voltage existing between the plate and the filament. If the value of R, the external plate impedance, is increased, the greater will be the variation in the plate to filament voltage for the same variation in plate current.

In Fig. XXVI (2) is represented the dynamic characteristic of a tube with a certain definite value of R in the plate circuit. Curve (3) represents the dynamic characteristic of the same tube with a larger value of R in the plate circuit. Finally the extreme condition is reached, in which R is made infinitely high and the dynamic characteristic becomes parallel to the grid voltage axis as in (4). This shows that variations of grid potential would produce no variation of plate current, but maximum variations of plate variations of plate potential. These would be amplified variations of grid potential variations.

This last condition of having the variations of plate potential amplified variations of grid potential variations is the ideal condition sought for in vacuum tube amplifiers.

In Fig. XXVII as the current of

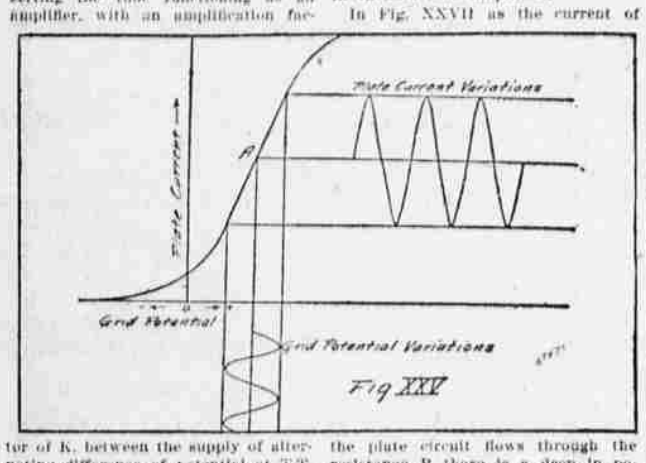

Fig XXV

the plate circuit flows through the resistance R there is a drop in potential across R between the points X and Y that will be proportional to the current flowing. If the value of R and the plate potential are high enough this potential variation between X and Y will be exactly proportional to and K times that applied to the grid of the tube at T-T.

To amplify a signal from a radio receiver then, it is only necessary to

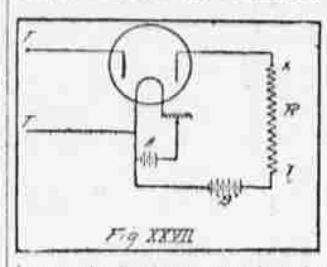

Fig XXVII

have a circuit whose output is to be amplified connected to T-T and the amplified output taken off at X and Y. If greater amplification is desired the output from X and Y is run through another circuit similar to that shown in Fig. XXVII.

SPARKS

The "Totemites," a society of radio fans at Seattle, decided that receiving code signals during broadcast programs is inevitable, and instead of registering complaints, opened a free school to its members for instruction in the code.

People living in isolated sections are getting great satisfaction from radio, as it is a cure for loneliness. They not only feel that they have friends within "speaking distance" but that entertainers of the highest grade are next door neighbors.

Major General Squire, chief signal officer, U. S. A., told the graduates of the Camp Vail signal school there had been greater developments in radio in the past decade than in any other science. Also that in future wars barrages and bombardments would be laid down by radio.

The British have developed a two-purpose vacuum tube for use in conjunction with radio. The new tube, or valve, as it is called in England, is the Mullard Ora. The plate voltage is given as 30, and the filament voltage at 3.6 to 4. The base of the tube is of the four-prong type. It is said to combine efficiently the qualities of the rectifier and amplifier, which make it possible to use one tube for all purposes.

Red Haired Girls More Alert.

The manager of one large exchange claims to have discovered that girls with red hair are more alert than their blond or brunette sisters, and consequently make the best telephone operators.

Both Are Right.

Men are always saying that they are going to do something grandly if called to show example; but when it comes to the pinch, really bad men are just as rare as really good ones.—Bernard Shaw.

Churches

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All church notices must be in the hands of the editor by 4 p. m. Friday afternoon.

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LATTER DAY SAINTS—Regular services at the Tabernacle. Sunday school commences at 10:30 a. m. Sacramental services at 12:15 o'clock p. m. Mutual Improvement Association, Sunday at 7:30 p. m. Priesthood and Relief Society meeting at 7:30 p. m. Primary association at the tabernacle Tuesday, for children, 4 p. m. Primary association on north side at the little chapel, for children, Thursday at 4 p. m. Religion class at tabernacle Thursday at 2:30 and 4 p. m. Religion class at the chapel on north side at 2:30 and 4 p. m. Tuesday. Regular choir practice at the Tabernacle Thursday at 7 p. m. The public is cordially invited to attend any or all of our services.—David I. Steddard, Bishop.

First Church of Christ, Scientist.—Corner of First and Washington. Sunday morning service at 11 o'clock. Subject, "Mind."

Sunday school at 9:45 a. m. Wednesday evening meeting at 8 o'clock. Reading room open to the public every Monday, Wednesday and Saturday from two to four. All are welcome to attend our services.

St. Peter's Episcopal Church.—Corner Fourth street and O avenue. August 27th will be the 11th Sunday after Trinity. There will be the usual regular services: Holy communion, 8 a. m.; church school, 9:45; morning prayer and sermon, 11:00, but no evening service. In the evening we join in the Union service at the Christian church, which will be closing one of our summer community services. This will be at 8 p. m., with Rev. Mr. Sitton as preacher. Our Sunday morning topic at St. Peter's will be "Sitting Together in Heavenly Places." All are cordially invited. Jos. W. Gunn, rector.

First Baptist Church — Sunday school at 10 a. m., G. B. Horan, superintendent. Sermon at 11 a. m. Subject, "How do we know that we are saved?" A full attendance of the choir is requested. Mrs. C. E. Happersett, pianist; Mrs. Frank S. Jester, director of music. The last service of the union meetings will be held at the Christian Church Sunday evening at 8 o'clock. Rev. Jones will have charge of the service and the pastor of this church will bring the message. Subject, "Salvation By Grace, a Gift, Not of Works."—A. R. Sitton, minister.

The Salvation Army—Ad. and Mrs. C. A. Petersen, officers in charge. Residence, 1312 W; phone 295-W. Sunday morning at 11 a. m. the subject will be "What Hinders Prayer?" Sunday school at 2 p. m. Send the children—we have classes for all ages. Sunday evening at 8 p. m. the subject will be "A Great Face—Four Horses Entered." Week night services are held Tuesday, Thursday and Saturday at 8 p. m. The public is cordially invited to attend all these services.

First Methodist Episcopal Church.—"The Last Step" will be the subject presented in the sermon in the forenoon service. The evening service will be union in character and will be held in the Christian church, the sermon being preached by the Rev. A. R. Sitton, the pastor of the church presiding. The pastor of this church will preach in Baker Sunday evening at a union service to be held in the Presbyterian church of that city. Sunday school at 9:45, Claude Cooper, superintendent.—G. H. Quigley, minister.

Seventh Day Adventists.—Elder J. H. Lumper of Union will preach at the Seventh Day Adventist church tomorrow morning at 11 o'clock. Subject, "Which is the True Church?" All are cordially invited.

Lutheran Church.—Services in Zion English Lutheran church tomorrow at 11 a. m. Sermon subject, "The Pharisee and the Publican in the Temple." Sunday school at 10 a. m.—R. A. Bogstadt, minister.

RELICS OF DEAD TO BE SHOWN

(By Associated Press.)

STOCKHOLM, Aug. 1. (By Mail).—Costumes and other relics of the two Swedish nightingales, Jenny Lind and Christina Nilsson, will be displayed along with a collection of other treasures of theatrical history in Sweden's first Dramatic Museum which will be opened during the latter part of August. The collection is being installed in the historic old Royal Theater in the Castle of Drottingholm, which was patronized nearly 200 years ago by King Gustaf III, a famous protector of drama and the arts.

Among the interesting stage "props" that delighted the gallery gods of the 18th century, and have been stored away ever since in the mouldy vaults of the castle, are a dog-eared set of ocean waves and a couple of chariots, with clouds attached for the exclusive use of the gods of Olympus. The picture collection, which includes stage settings, costume plates, portraits, etc., covers the theatrical history of various countries and with respect to certain periods of French history is the most complete in the world. The theater itself and the stage machinery will be restored to its original character.

Just Thirty Years Ago in the Grande Ronde Valley

August 26, 1892.

One of the questions now agitating the minds of La Grande's officials is that of compelling prisoners to work on the streets. To board prisoners in the jail is considered too much of a luxury and a needless expense. The plan of working prisoners works well in some places and in others it is a signal failure. The matter is yet to be tested in La Grande.

The triumphant return of Charles Adolphus Melquist, the mighty hunter, was duly heralded on the arrival of the Elgin train Wednesday morning. After the festivities had ended the hide of an eight-foot cougar was exhibited. The animal was captured by Melquist near Elgin and within twenty-four hours after it had taken an overdose of strychnine from the carcass of a farmer's colt in Indian Valley.

Married in La Grande, August 21, 1892, Edward Hooper and Miss Effie Hale, both of La Grande, J. W. Knowles, Justice of the peace, officiating.

E. W. Bartlett met with unusual success in combining business with pleasure. While on a business trip to Elgin Monday he accepted an invitation from Harry Patton to beguile the afternoon hours in search for bear. A short detour was made in the woods about three miles below town and in less than two hours the game was treed. Bartlett was assigned the duty of executioner and he filled the office with graceful effect. The bear was about a hundred pounder and will be stuffed and mounted by Professor Glazier.

An evident attempt was made to burn the Squires livery stable about two o'clock Sunday morning. The fire was fortunately discovered by Marshal McLachlin, and a force was at once rallied to squelch the flames. The match had been applied to rubbish by the side of the barn and next to the corral and the sill was considerably charred. Just above this place is a hay chute and how the premises escaped destruction is a mystery.

On Friday evening, August 12, Mrs. S. R. Reeves gave a most delightful dinner party in hono ror Mrs. A. L. Borie, who left Sunday morning for Portland. The dinner served was delicious and after the meal the evening was pleasantly spent in games and conversation.

Cheering reports concerning the grain yield continue to come in. It is settled beyond all doubt that the yield this year will exceed all former expectations. The quality is superb and the yield a great deal better than was anticipated.

The barn of E. D. Banton, of Ladd Canyon, was destroyed by fire a few nights ago. The fire is supposed to have been the work of an incendiary. A stallion that was kept in the barn was found tied to a tree near the scene of the destruction.

The herder at Snodgrass' sheep camp came down to town Wednesday for a line of supplies. A bear had made a raid on his camp the night before and this unexpected visit caused the culinary department to look very sick.

Nodine and Blacker sold Hamilton and Rourke, through their agent, B. F. Titcomb, 180 tons of feed barley, for September delivery.

Mayor Reeves was out yesterday with a paper to ascertain the feeling of the taxpayers in regard to the matter of erecting a brick building for housing the fire apparatus. The sentiment seems to be in favor of a building that will meet the needs of a city of this size.

Wild animal bounty payments during the quarter ending June 30 amounted to $4145, according to a report by the Washington state auditor.

The sugar beet crop in Idaho this year is expected to average between 12 and 14 tons to the acre, compared with 16 tons in 1921.

Two outbreaks of hog cholera were found last week by the state veterinarian, one in Boundary county and one in Nez Perce county.

RESUMES WORK ON MEMORIAL

Work on Confederate Memorial to be Completed Soon; Was Interrupted by World War; Gutzon Borglum, Sculptor, Has Returned to Work.

(By Associated Press.)

ATLANTA, Ga., Aug. 26.—Preparations are nearing completion for the resumption of work on the Confederate memorial monument on the east side of Stone mountain, an undertaking interrupted by the World war. Gutzon Borglum, the sculptor, who was engaged by the United Daughters of the Confederacy, under whose auspices the monument is to be hewn out of the face of the great monolith, has already returned to Atlanta and is shaping his plans to take up the work where it was left off when Uncle Sam's demands incident to America's entry into the World war temporarily halted completion of this memorial to the heroes of another day.

Mr. Borglum is having a specially designed lens ground for the projection of figures of increased size against the side of the huge mass of granite, by means of which with a powerful light, photographs of models may be thrown against the face of the mountain in great size.

Such methods have never been used before, according to the sculptor, who has gotten down to the actual work of drawing in the groups of heroic figures to be carved out of the side of the big rock. The work of projection has to be done at night, he said, but added that it is practicable. "Why I told the scoffers they could project on Mars, if they could get a powerful enough light," he said.

Carving will begin either at the head of General Robert E. Lee or that of President Davis, but it has not been settled which.

A crew of men has been at work for several weeks extending the scaffolding to the point on the mountain side where will rest the principal group and various electrical and compressed air apparatus also has arrived and is ready for installation, Mr. Borglum said.

The project calls for the carving in bas-relief on the nearly perpendicular side of Stone mountain of a colossal monumental panorama to commemorate the heroic deeds of the Confederate armies. This side of the mountain affords space for a mile or more of gigantic sculptured figures of men and horses, fifty or more feet in height, with all the paraphernalia of war.

The mountain side and an extensive tract of land on the plain at the base of the mountain to provide a national park, from which to view the achievement when completed, have been deeded to the Daughters of the Confederacy.

Stone Mountain is 15 miles east of Atlanta. It is said to be the largest solid granite monolith in the world, rising 686 feet above the surrounding plain and standing a dome-like mass of solid rock, seven miles in circumference.