

# KSD THE ST. LOUIS POST-DISPATCH

FIRST STATION IN THE UNITED STATES  
TO BE LICENSED FOR BROADCASTING  
ON 400 METERS ~ ~ ~ ~

HEARD, IN ONE NIGHT, IN ALL 48 STATES  
OF THE UNION AND BY SHIPS ON THE  
ATLANTIC AND PACIFIC OCEANS



451



# ST. LOUIS POST-DISPATCH

PUBLISHED BY THE PULITZER PUBLISHING CO.

ST. LOUIS, MO.

## RADIO STATION



DEAR RADIO FRIEND:—

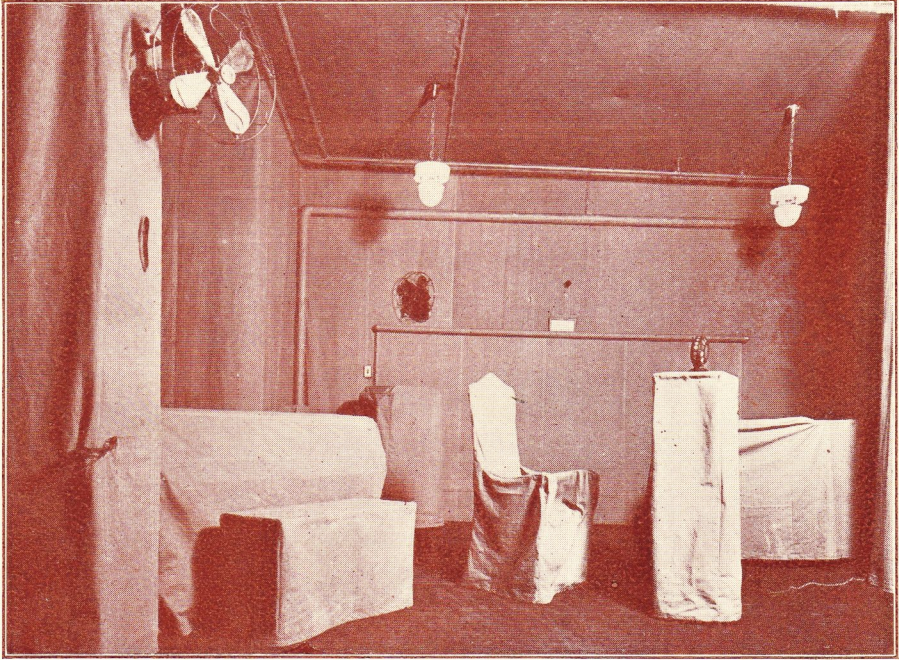
It is possible that the St. Louis Symphony, this winter, will be willing to have station K S D broadcast the weekly performance if the managers can be convinced that there is sufficient interest among radio enthusiasts around the country. The St. Louis Symphony, as you probably know, has a national reputation for the excellence of its orchestra and soloists. There would be one evening performance each week, lasting until about 11 o'clock at night.

If you would like to hear these symphony concerts broadcast may we not suggest that you send a letter at once to S. E. McMillan, Manager of the St. Louis Symphony, University Club Building, St. Louis, Mo., and give him your ideas on the subject as one of those who hears K S D.

Best 73s,

Station K S D





A corner of K S D studio. One novelty about this room is that every bit of furniture in it, the musical instruments, chair, adjustable pedestal for microphone—even the radiators—have their individual, tailor-made kimonos of soft cloth to eliminate even the slightest reverberation of sound waves. Similar soft cloth protects the ceiling and the walls. Under the velvet carpet are two layers of felt. A red light on each of the four walls warns those in the studio when the antenna is on.

**S**TATION K S D, the St. Louis Post-Dispatch, was the first broadcasting station in the United States to be authorized by the Department of Commerce to transmit on a wave length of 400 meters.

This priority in the new "Class B" radio field, we feel justified in believing, was merited by the record K S D had made in July and August in the transmission of news bulletins and market reports by day and varied programs of a high order at night. As all radio enthusiasts know, those hot summer months provide the severest test of the efficiency of a broadcasting station.

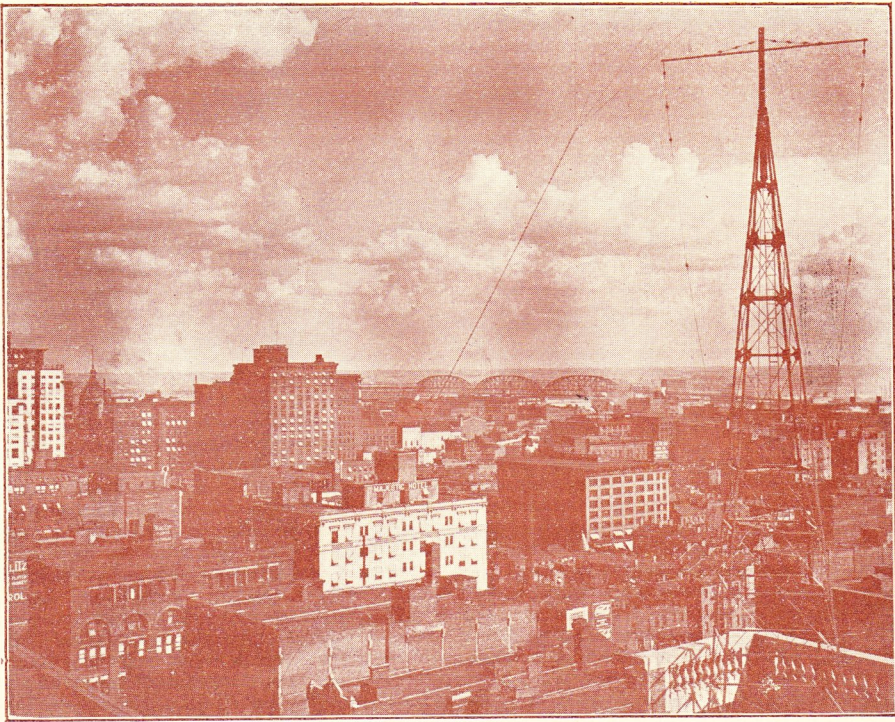
In August, 1922, the huge radio map in the studio of Station K S D showed that Post-Dispatch programs had been picked up in 42 states.

In addition to these 42 states, reports had been received from Cuba, from four provinces in Canada—some of the stations well up towards the Hudson Bay country—and from Mexico. The most southern report in August came from Yucatan, 630 miles from New Orleans straight down across the Gulf.

This record is all the more remarkable because at no time during August was any attempt made, by putting on midnight programs, to get long-distance records. As a matter of fact, during this month, evening programs beginning at 8 o'clock rarely lasted much after 9 o'clock. During that hour of transmission broadcasting stations all over the country, except on the Pacific Coast, were sending at the same time. On the Pacific Coast the population had scarcely finished the evening meal when station K S D had signed off for the night.

Curiosity to determine how great is the range of K S D under better conditions, prompted the station to put on a midnight test, during the night of Sept. 12, 1922. A program of music, by exceptional talent, was broadcast between the hours of 11 p. m. and 1:27 a. m., without any general announcement. The following day telegrams were received from cities and towns in Washington, Oregon, California, Utah, Idaho and Nevada announcing that the program





How the radio towers of K S D, on the roof of the Post-Dispatch Building, dominate the sky line of St. Louis. These towers are 80 feet high (to tip of wooden mast) and 14 feet square at the base. The four legs go through the roof of the building to be anchored upon the steel framework of the structure itself. A powerful winch at the base of each tower makes it possible to stretch the phosphor-bronze aerial as tight as a violin string.

had been heard with remarkable clearness. There had been no expectation that cities on the eastern coast would report, owing to the lateness of the hours of broadcasting, yet messages came from New Hampshire, New York, Philadelphia, Baltimore and many other points bringing the same news. Not only was that one midnight concert heard on the Atlantic and Pacific coasts, but it was reported from New Orleans and cities in Texas and other Gulf States, and from as far north as Alberta, Canada. A survey of the mail, which followed the telegrams, revealed that the midnight program of Sept. 12 was heard in all 48 states—and this, as stated before, without any effort to get the co-operation of amateurs over so widespread a territory. The total number of cities and towns reporting was close to seven hundred.

The most notable achievement of K S D, in the summer, was the sending out, three times a week, of the entire operatic performances of the series of light operas given in the open-air Municipal Theater, Forest Park, by the organization of public-spirited citizens of St. Louis who guaranteed the expenses of the season.

The Municipal Theater in Forest Park seats more than 9000 persons. The stage, 150 feet wide is between two giant oaks. Naturally, a very large orchestra and chorus is necessary to produce opera on so magnificent a scale.

The perfect broadcasting of these operas by wireless from Station K S D was an achievement not expected by even the most sanguine. As a matter of solemn fact, however, and as can be attested by thousands of hearers, these performances—orchestra music, dialogue, solos and chorus singing—were sent out so exquisitely that those listening on radio sets heard everything as well, and often better, than those seated in the auditorium. As a radio fan in a neighboring State wrote in: "I had a seat in the fifth row of your Municipal Theater last evening, listening to 'The Spring Maid.'" Only those in the



very front seats, in the open-air theater, heard the dialogue as well as those who formed the radio audiences.

The broadcasting of these operas was accomplished by the use of a single microphone on the stage in Forest Park, with a speech-amplifying panel just off stage. From here the circuit ran through cables of the Bell Telephone Co. to the roof of the Post-Dispatch Building, into the speech input panel for further amplification, and then into the transmitter.

These operas, three times a week for six weeks, were broadcast over a large area of the United States. One was even heard on a steamer in the harbor of Tampico, Mexico. Reports were received from provinces across the Canadian border and from all along the Atlantic Coast.

The efficiency and power of the Post-Dispatch radio plant makes a detailed description worth while.

The first broadcasting of the Post-Dispatch was done in the middle of last winter. Experiments made with a small set met with so much appreciation that it was determined to install the latest type of apparatus and as powerful as any other in the United States.

And this new station—what is it? Compared with the station K S D has been using, the new apparatus is like the latest battleship alongside a tug boat. It can be stated in another way.

On the set just abandoned, the power tubes used as oscillators had an output of 15 watts; the tubes in the new transmitter have an output of 500 watts.

The same figures are true of the tubes used as modulators. In other words, while the old transmitter has a total output of 30 watts the new one has an output of 1000 watts. That, however, is showing far greater points of superiority, which will be explained later.

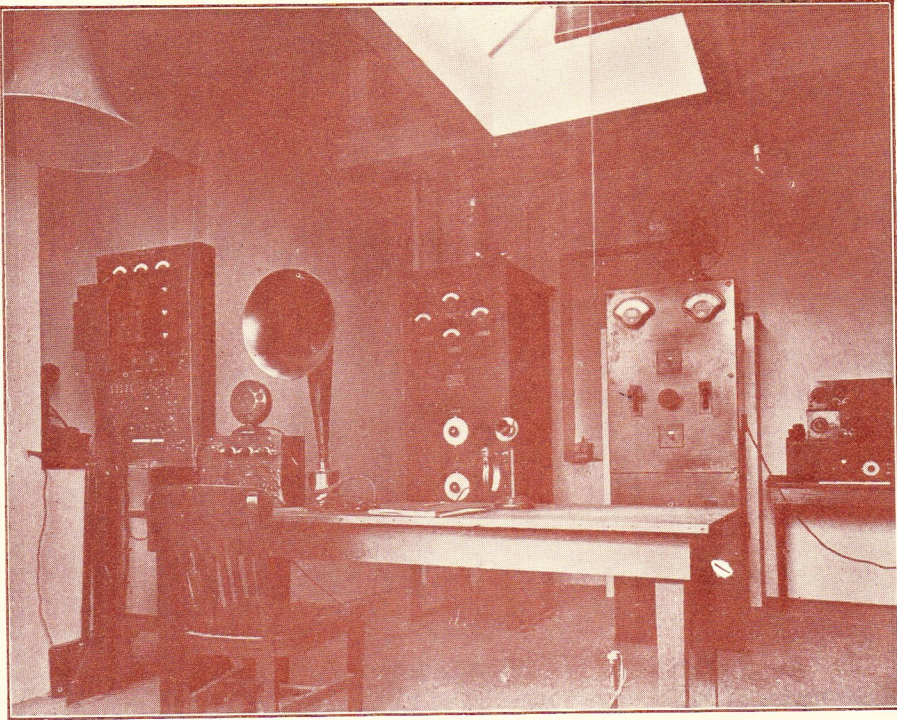
Let us first, however, visit the radio station on the second floor of the Post-Dispatch Building while a test is being made.

One leaves the elevator and steps into the office directly fronting the visitor. This is a reception room only, where those who are to take part in the evening's program can await the call to the studio.



Brick structure on the roof of the Post-Dispatch Building erected to house the transmission apparatus, motor generators, etc. The studio is on the second floor. Metal conduits to the roof are grounded every few feet to prevent the possibility of picking up strays.





General view of the operating room in the brick structure on the roof of the Post-Dispatch Building. To the left, the speech input panel. In upper left corner can be seen a part of the horn on the monitor which enables the operator to hear perfectly what is being produced in the studio, and before it goes into the transmitter apparatus. On table is receiving set, loud speaker, and standing on top of small cabinet (two-stage amplifier) is the microphone used when market reports and news bulletins are sent out during the day. Behind the table, on left, is the transmitter set containing four 250-watt tubes and other necessary apparatus. To its right is the power panel. On table in rear are different receiving sets for emergency use. The electric generators are in adjoining room.

A door between the reception room and the studio shortly opens and an attendant gives the signal to a singer and an accompanist that the time for their number has arrived. They walk into a room the like of which cannot be found in St. Louis.

First of all, it will be noticed that the voice has a most strange quality, so unusual, in fact, as to be uncanny. This is due to the fact that every inch of hard surface in the studio has been treated so as to prevent any reflection of sound waves. Strike one note on a piano in your home and you hear the true sound wave followed by countless reflections—reverberations—from walls, floors, ceilings, windows, doors. Strike a note on the piano in the studio and you hear just the true sound wave—that is all. Not only are the walls and ceiling in the studio made reverberation-proof, but on the floor under the thick carpet, are two layers of felt.

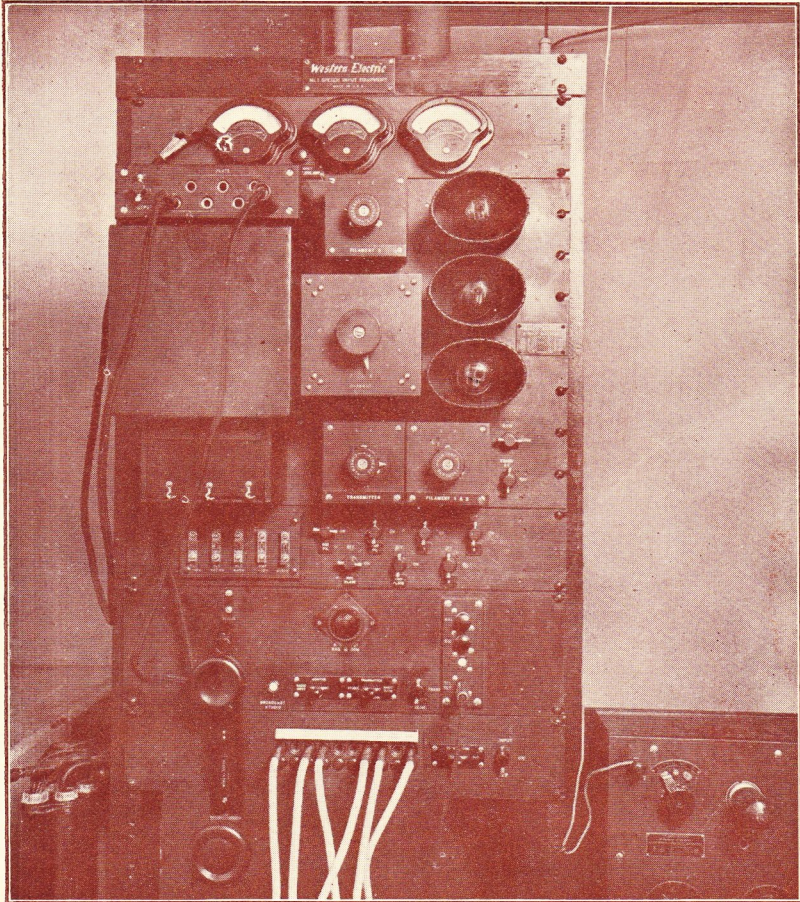
But that is not all. Every musical instrument, every bit of furniture in the studio has its tailor-made kimono of soft cloth to prevent sound reverberation. The radiators, chair for speaker, even the adjustable pedestal upon which the microphone is placed, has its own jacket so that there will be nowhere in the room a hard, flat surface to reflect unwelcome sound waves.

The next thing to attract attention, probably, will be four red lights—one on each wall. Under each red light is a neatly framed warning which says:

When the red light is burning any sound of any kind in this studio goes out broadcast by radio.

At this particular moment the red lights are turned off. The program director gives a few suggestions to the vocalist, places a microphone on a





The front of the speech input panel, where the feeble though perfect electric waves coming from the microphone may be amplified up to as much as one million times.

little stand, and touches a button. This gives a code signal to the radio operator in the building on the roof, the red lights are turned on, the program director announces to an audience of many, many thousands who the singer is, the name of the selection, and the name of the accompanist, and the entertainer proceeds. Concluding, another button is pressed, the red lights are turned off, conversation is permissible again, and then the same procedure is followed for the next entertainer.

But how does the singer's voice get to the roof and go out by wireless? That little microphone provides the first stage of travel. It is a small affair, about the size of a round mantel clock and perfectly helpless in appearance. It is unbelievably delicate, however, in picking up sound waves. These sound waves, no matter how feeble, are translated, so to speak, into electric waves of absolutely identical character and these travel an electric circuit to the roof. So carefully must these electric waves be guarded that the wires are incased in a conduit all the way to the top of the building, and this conduit is grounded every 20 feet.

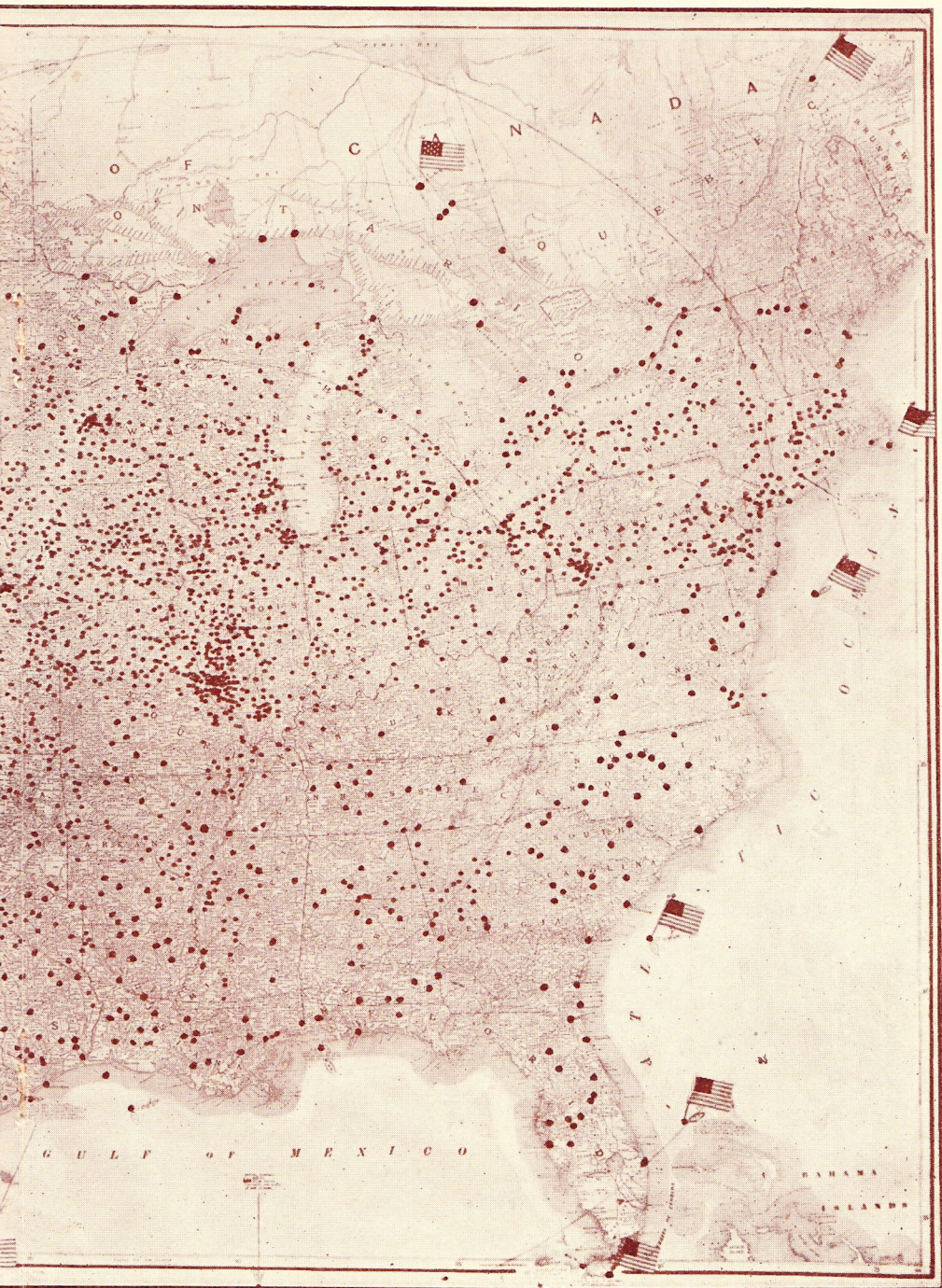
It is now necessary to go to the building on the roof to see what happens to these electric waves. The path takes them directly to a "speech input" panel where they are amplified several hundred thousand times, passing through various devices which preserve the original purity of tone and perfect mod-





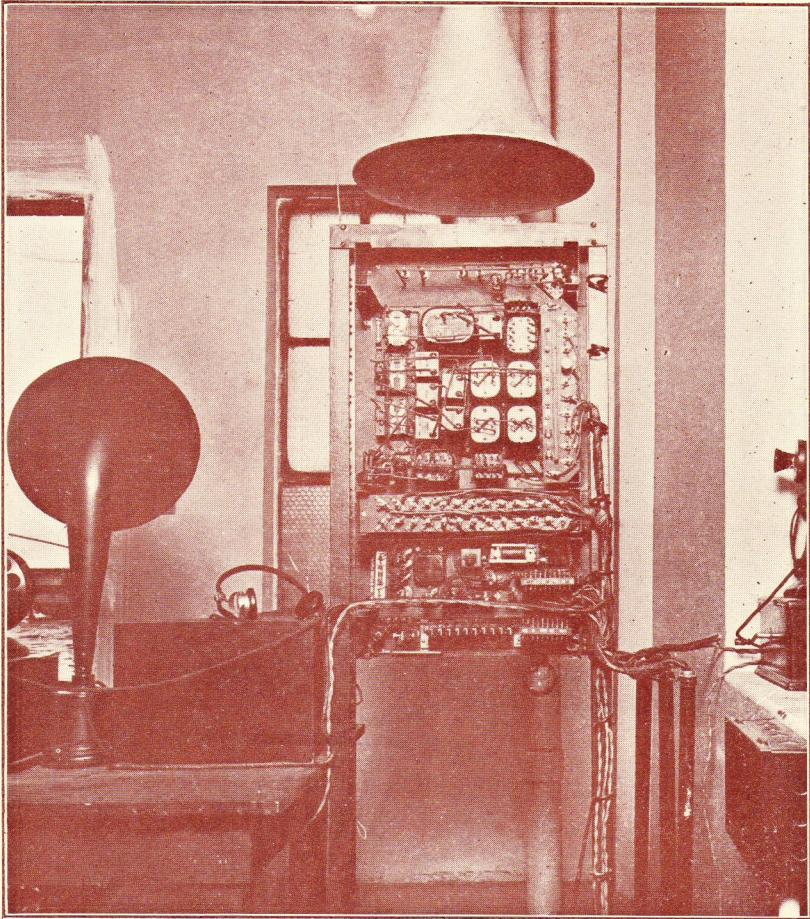
Here is a photographic reproduction of the huge map hanging in the reception room of K S D station from June 26 to September 20, 1922. Flags indicate farthest points on land and sea from which letters written by amateurs have been received. Nor can this map indicate the hundreds of summer in estimating air line distances, being spaced 500 miles apart and with the center at St. Louis. This map also does not show the farthest south distances reached by this station—to wit, Tampico in Cuba where K S D has been heard.





studio, with colored tacks showing the location of the thousands of cities and towns which heard this  
 which reports have been received by the Post-Dispatch in the period mentioned.  
 of the larger cities like New York, Boston, Philadelphia, Chicago and Pittsburgh and from which  
 mer camps and boats on lakes which enjoyed K S D broadcasts during the summer. The circles aid  
 mpico, Mexico, Yucatan, which is 630 miles direct down across the Gulf from New Orleans, and towns





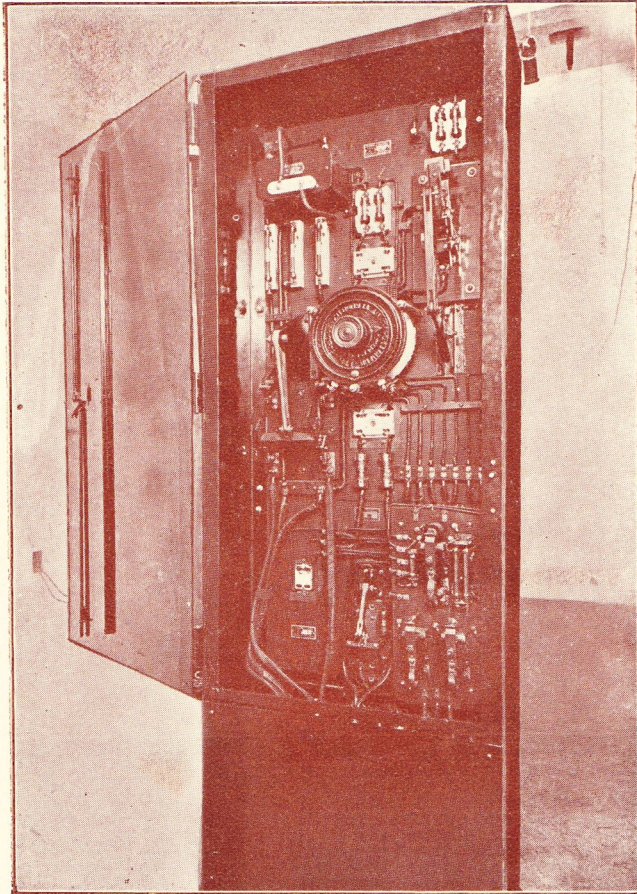
Rear view of speech input panel with protecting guards removed, revealing the multitude of circuits which provide for perfect amplification without the slightest trace of distortion.

ulation. It was this device which the small set lacked and which makes it possible, with the new set, to get absolutely true transmission of whatever goes into the microphone in the studio.

That was not a typographical error, by the way, in the last paragraph. "Amplified several hundred thousand times" is correct. Listen to a few notes played on a violin by Kreisler and then let the same notes be repeated by an amateur. So far as the string vibrations are concerned, both may have been the same and yet the trained ear would discern a difference—not measurable, but a real difference nevertheless. Now translate that difference into tiny electric waves; amplify those electric waves several hundred thousand times; send them out through the air, through rain and snow and sleet, through clouds, stone walls, windows, brick and steel; through trees, our bodies, and everything else; then hundreds, perhaps a thousand miles or more away pick up those wireless waves on your receiving set and turn them back into sound waves, and you could tell which was Kreisler and which one the amateur, just as if you had been in the room where they were playing—that indeed, is the marvel of wireless.

There are, moreover, certain controls on the speech amplifier for the different classes and volumes of sound.





The power switch panel and what you see when door—usually locked—is open. Here are the controls for all the high and low voltage from the generators.

From the speech input panel, just described, the elastic current, now much amplified, goes to the transmitter set. It first enters a 50-watt tube for further amplification, then into the circuit which leads finally to the antennae and out into the air—to be picked up in Texas, Florida, Minnesota, Pennsylvania—wherever within range an adequate receiving set is properly tuned in to pick up the K S D program.

When you first arrived on the roof your attention would surely have been attracted to the two steel towers. These are 14 feet square at the base and rise to a height of 70 feet. From the top extends a wooden mast 10 feet long. The legs of the towers go down through the roof to rest on the steel framework of the building itself.

The antennae consist of phosphor bronze wires—four of them—spaced six feet apart. The length from mast to mast is 131 feet. The lead in comes from the center, giving a T aerial.

A look around the transmission room in the building on the roof is worth while. In a soundproof compartment, all by itself, is the motor generator set, a three unit design. This, weighing more than a ton, rests upon heavy felt so as to keep the vibration of the motor from affecting the amplifiers and transmission. The motor is of five horsepower. One generator develops 1600 volts for what is known as the plate circuit in the 250-watt power tubes—of



which there are four. The other generator develops 16 volts, for the filament circuit in the tubes.

In the operator's room you could not fail to hear, if a program was being given in the studio, exactly what was going out by wireless. Connected with the circuit from the studio is a monitor system, the principal parts of which are an amplifier and loud speaker. By use of this apparatus the operator knows exactly the perfection or defects of tone qualities before reaching the transmitter panel, and any imperfection can be immediately corrected.

For the information of advanced radio enthusiasts, and electrical experts, it is worth while to describe in detail other parts of the broadcasting station. The transmitter proper is a cabinet about six and a half feet tall.

The various pieces of apparatus that make up each unit are mounted on a black finished angle iron frame work, rectangular in shape, in order to provide a rigid and compact structure. The vacuum tubes, coils, filters, relays, resistances and other auxiliary apparatus which ordinarily do not require observation are mounted inside the frame.

The antennae relay is mounted on top of the framework.

The four ammeters which serve to indicate respectively the antennae current, the oscillator plate current, the oscillator grid current, and the modulator plate current are mounted on the insulating panel, at the top front of the radio transmitter.

The cases of the oscillator plate current milliammeter and the modulator plate current milliammeter are covered with a grounded guard, in view of the fact that these instruments are subjected to the full voltage of the plate circuit generator, whose voltage is 1600.

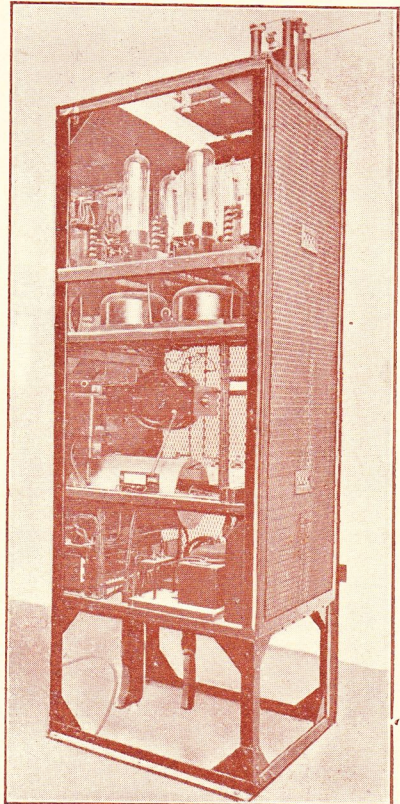
The radio transmitter is essentially a generator of radio frequency energy (an oscillation generator), with means for modulating the energy in accordance with current variations produced by the microphone operating in conjunction with the amplifier and certain other auxiliary equipment.

The oscillator comprises vacuum tubes, previously described, and a tuned circuit which includes the antennae system. This tuned circuit determines the frequency or wave length of the radiated energy.

The modulating system provides means whereby the alternating currents corresponding to speech or music are supplied in amplified form direct to the oscillator circuit. The operation of this system may be understood by considering that the plate circuit of the oscillator is supplied with speech currents directly from the modulator. The combined circuits provide a sort of mixing chamber in which the speech currents are combined with the steady carrier wave supplied by the oscillator to produce the modulated wave required.

The frequency of the transmitted energy (wave length) is controlled by the value of the inductance in the oscillatory circuit which includes the antennae. The inductance is adjusted by means of a variometer.

To provide this feature a portion of the oscillator coil included in antennae circuit is arranged to turn on an axis at right angles to its normal axis so that the inductance of the movable coil either aids or opposes the inductance of the remainder of the coil.



Side view of transmitter apparatus, with protective guards removed. The four 250-watt tubes are at the top. See text of booklet for complete description of this transmitter.



The movable coil also serves to vary the coupling between the antennae circuit and that portion of the coil system which is connected to the plates and grids of the oscillator tubes in a manner to insure satisfactory operating conditions throughout the frequency range for which the transmitter is designed.

A variable condenser connected across the plate coil controls the plate current through the oscillator tubes, and to a large extent the output of these tubes. This condenser consists of a variable unit in parallel with two fixed units which may be switched in or out of the circuit as required. The variable unit is controlled by a knob on the front of the set and is designated "Oscillator Adjustment."

Both the adjustable inductance and the adjustable condenser are provided with graduated dials so that after the transmitting set has once been calibrated in connection with its associated antennae, wave length adjustments can be made without a wave meter.

The antennae relay is operated by means of push buttons and is used while the equipment is in operation to change connections from "send" to "receive" and vice versa. When the relay is in "receive" positions an auxiliary contact is opened which renders the transmitter inactive and prevents it from interfering with local reception.

In order that the vacuum tubes used for modulating and speech amplifying purposes may operate under the most favorable conditions to prevent distortion, the grid circuits of these tubes are given a negative bias by means of a resistance connected between the negative terminal of the high potential generator and the filaments of the tubes.

The plate circuits of the vacuum tubes are supplied with direct current from a high potential generator. A noise filter is used to eliminate commutator noises and is mounted on the framework of the radio transmitter.

Under certain conditions, if the plate circuit is closed before the filament circuit, a destructive rush of current through the tubes may occur. To prevent damage due to this cause, a delayed action relay is provided. This relay which is operated by the filament current requires approximately 20 seconds to operate and its contacts are so arranged that the full plate potential is not applied to the tubes until the filaments have been lighted for this period of time.

The motor of the motor generator set is started or stopped by means of momentary contact push buttons. The main push buttons are located on the power switchboard, but similar push buttons connected in parallel are located at the operator's desk.

The voltmeters are provided on the power switchboard. One of these is used to indicate the potential delivered to the filament circuit of the vacuum tubes; the other the potential of the high voltage generator.

The case of the high potential voltmeter is connected to ground, and it is not necessary, therefore, to use an insulated guard to protect the operator. The low potential voltmeter mounted on the power switchboard is not connected direct to the terminals of the low voltage machine, but is wired to the filament circuit on the radio transmitter. Under these conditions, the reading of the voltmeter indicates the actual voltage across the terminals of the tubes, and it is not necessary to make allowance for voltage drop in the wiring, etc.

A circuit breaker mounted on the power switchboard is provided for the plate current supply circuit. It is usually adjusted to open under an overload of about 25 per cent.

Field rheostats are included in the field circuits of both generators, but only the low voltage generator rheostat may be adjusted from the front of the panel. The rheostat of the high voltage generator is adjusted from the rear. This rheostat requires infrequent settings since when properly set and the potential of the low voltage machine is correctly adjusted, the potential of high voltage machine is established at the correct operating value.

Current to operate the microphone is supplied by an 18-volt storage battery, and is regulated by a rheostat on the input amplifier by a rheostat on the input amplifier panel. Filament current for the input amplifier is obtained from the same 18-volt storage battery that supplies the current to the microphone. Suitable provision is made for charging this battery.

Current for the circuit of the amplifier is supplied from dry cells. A total of 130 volts is required.



## **Post-Dispatch Radio Broadcasting Station**

**K S D**

### **Daily Schedule:**

**On 485 Meters**

**At 8:40, 9:40, 10:40,  
11:40 A. M., 12:40, 2:40  
and 4:00 P. M.**

Broadcasting of the opening prices, midsession and closing quotations of the St. Louis grain market, livestock quotations, supplied by Market Bureau Service, U. S. Dept. of Agriculture; Liverpool and New York cotton market; New York stocks, bonds and money market; poultry and butter market; metals market; U. S. official weather reports and forecast, and news bulletins.

**8 P. M.—400 Meters**

Special program by talented singers, musicians, short addresses and other features. Details announced daily in the St. Louis Post-Dispatch.

**General Program for the  
week printed in the  
Sunday Post-Dispatch.**

***Baseball Scores***

Every evening at 8, except Sunday (then at 8:15 P. M.) during the season.

Sept. 1, 1922



**T**HE St. Louis Post-Dispatch, published in the heart of the great Mississippi Valley, is more than a newspaper—it is an institution. It was founded by the late Joseph Pulitzer in 1878 when he purchased the mere shells of two printing properties and merged them into one daily publication which grew, in the space of a few years, through the editor's indomitable energy and genius, into a daily newspaper of commanding influence. With success won in St. Louis, Mr. Pulitzer went to New York and purchased the morning World, then a derelict on Newspaper Row. As the entire country knows, The World, under Mr. Pulitzer's guidance, achieved an international reputation for editorial independence and news enterprise. The Post-Dispatch in St. Louis shared with the World in New York the matchless direction of their founder until the day of his death and then the duties of management were taken over by sons whom he had trained for a life-long task.

From a pitiful circulation of some 2500 copies daily, when Joseph Pulitzer first took hold of the Post-Dispatch, it has grown to a position of supremacy, with which, population considered, there are but few, if any, equals. For the month of August 1922 its daily average was 186,557 and its Sunday average was 366,816.

It may be remarked, in closing this brief sketch of the Post-Dispatch, that it was the first newspaper in St. Louis to print half-tone illustrations; the first to print comics in colors; the first to introduce rotogravure printing, and the first to establish and operate its own radio broadcasting station.



**ST. LOUIS POST-DISPATCH**

September, 1922

St. Louis, Mo., U. S. A.