



# BEHIND THE SCENES AT WLW

THE NATION'S



STATION



**TO OUR GREAT NATIONAL AUDIENCE  
WHO HAVE EXPRESSED AN INTEREST  
IN KNOWING MORE ABOUT  
THIS GREAT STATION  
WHICH SERVES  
THEM.**



—Courtesy of Johnny Hamp and his "Kentucky Serenaders."  
*In the WLW studio —an orchestra prepares for a half hour's broadcast. We will follow through with their music from the studio until it comes from the receiving set in your home.*

## BEHIND THE SCENES AT WLW



WLW, the Crosley broadcasting station at Cincinnati, is a vast system of highly coordinated effort. Prompted by the initiative of Powel Crosley, Jr., and carried to its present status as the most powerful broadcasting station in the world, the operation of WLW represents the thinking of many minds, the working of many hands, the faultless operation of complicated electrical machinery.

WLW is a mirror of the public taste. The Nation's Station changes from church to theatre, music hall, newspaper, university, night club, or any one of a hundred other phases, in its role of universal entertainer and educator—and this, in but a moment's notice! This Crosley

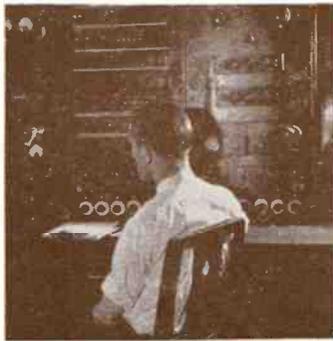
station gains the attention, daily and nightly, of an audience incomparably larger than that ever brought together for any single event in the history of the world.

The casual visitor to the Nation's Station cannot fail to realize the magnitude of this undertaking. So smoothly is the machinery of broadcasting run, that there is little appearance of rush or excitement. There is no wasted effort. Program after program is broadcast without a moment's delay.

At WLW there are five studios ranging in size from small rooms accommodating a group of five, or less, to an auditorium seating a full symphony orchestra. These studios are especially designed and constructed for broadcasting purposes. Their walls are made of material which absorbs sound. This eliminates echo effects.

Before the program at the studios is reborn as music or speech, coming from your loudspeaker, it travels many miles and passes through one transformation after another. These changes, and the miles of travel, require but a fraction of a second of time.

It is in the studios that the mechanism of broadcasting begins. There, that small instrument, the "microphone," responds to the sounds of the program and creates an electric current fluctuating in accordance with these sounds. The microphone is an interpreter. It translates sound impulses into electrical fluctuations.



*This is the central control room at the WLW studios. Through this control-board all programs are regulated and cleared to the WLW transmitter located at Mason, Ohio.*

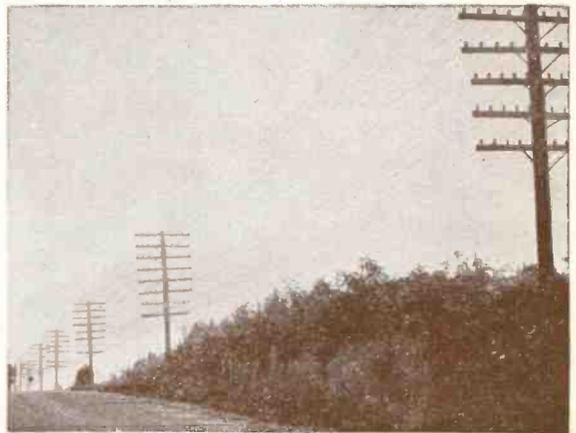
This first link in the chain of broadcasting is a very important one. The quality of broadcasting programs depends to a surprising extent upon how well the microphone accomplishes its task.

The Technical Supervisor of WLW has designed a special microphone far superior to others. The complete unit consists of the instrument itself and a very compact amplifier, which multiplies the effect of the currents produced by the microphone. Together they are so sensitive that they may even be made to respond to heart beats. The mellow notes of the bass singer, roll of the kettle drums, high pitched melodies of the violin—all are reproduced accurately. Disturbances from electrical circuits, which might interfere with the quality

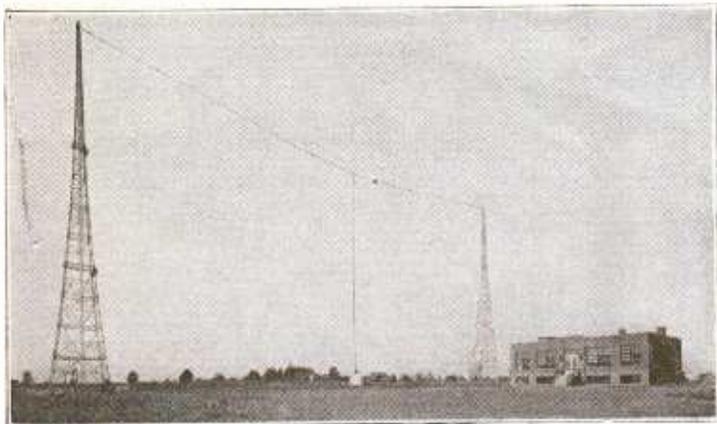
of the program, are minimized by building the amplifier and microphone together, without long leads. The program leaves the studio in the form of a fluctuating electrical current, traveling through wires to the station many miles away. If there were but one studio and but one set of lines to the station this journey would be quite a simple one. Actually, however, there are five main studios, a studio in a downtown hotel for prominent visitors, actors and the like, and countless "remote control points."

The "remote control" points are places other than studios, such as ball parks, racing tracks, amusement parks, ballrooms, dance gardens, both in the city and in other cities, from which programs are broadcast. These are connected to the main studios by special wire circuits, over which the programs are carried.

There must be some arrangement for connecting the proper studio, or remote control points, with the station at the appropriate time. This is taken care of through an elaborate switchboard at the main studios, housed in the main control room. This switchboard is the nervous system of WLW. The operator in charge of it



*The special WLW circuits carrying the program from the studios to the transmitter—25 miles distant.*



*The WLW transmitting plant as seen on entering the grounds.*

must ever be on the alert. No delays or mistakes are countenanced.

The operator can connect instantly any one of the studios or remote control points to the station. He has the choice of six lines over which to send the program to the station. These travel by different routes, so that in the event of a storm, service will continue uninterrupted. If a program is being broadcast from a baseball park, he may call the operator at the park at will by means of a special "order line." In a similar way, he may talk to any of the other remote control points, or to the station itself.

While each program is being broadcast, the one to follow it is being made ready. An announcer—waiting in one of the studios for his turn to broadcast—may listen through a pair of earphones, up to the very last moment, to the program preceding him. When his turn comes he will hear: "This is John Doe announcing"—his cue to start. He will turn to the microphone and say, "Station WLW, The Crosley Radio Corporation, in Cincinnati. We now present—"

There is no delay. The instant one program is finished, another commences.

From the operator's control board the program starts on a long journey. It must travel twenty-five miles, over special long distance lines, from the studios in Cincinnati to WLW,—the giant, super-power station at Mason, Ohio. At both ends of the line, it is boosted in strength by special amplifiers.

You may wonder why the station is located so far away from the studios.

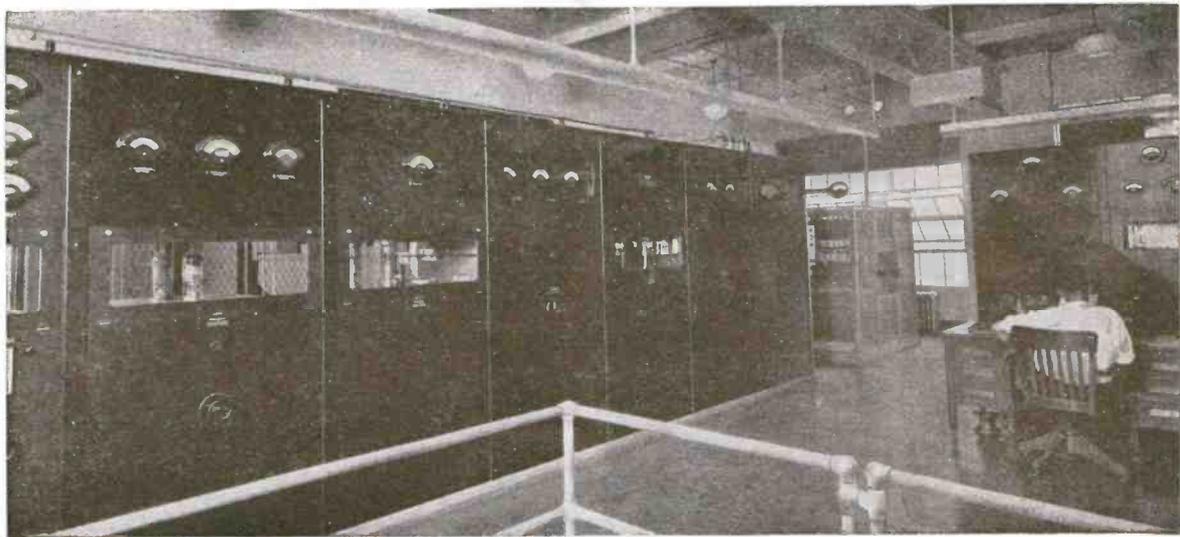
In a large city, such as Cincinnati, there are high tension lines, steel buildings, power systems, and many other sources of interference to radio broadcasting. WLW's transmitter, twenty-five miles from the city, is far removed from such disturbances. WLW is a pioneer in locating broadcasting stations in this way.



*The control board at the transmitter connected with six circuits to the control board at the studios.*

Long before one reaches Mason the towering masts of WLW appear above the horizon. As one approaches, a concrete structure comes into view. This is the transmitter, which sends radio waves to far corners of the earth.

Lines bringing programs from Cincinnati enter this building and connect to a control board similar in appearance to that in the main control room at the studios. The program enters the station in the same form as that in which it left the studios—as a fluctuating elec-

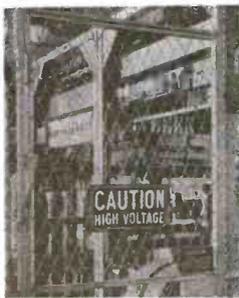


*The giant 50,000 watt W.L.W. transmitter—the most powerful in the world.*

trical current. To send this program out through space in the form of radio waves it is necessary to make use of very elaborate and complicated equipment.

In the basement of the station are seen devices called “transformers” and “condensers.” In a separate room there are four large generators used for lighting the giant radio tubes upstairs. On the main floor the majority of the apparatus is housed behind long rows of large panels, resembling switchboards in a power house. Steel cages, automatically locked when the power is on, guard all dangerous wiring and equipment. Extraordinary precautions are taken to insure the safety of those operating or visiting the station.

How does this elaborate equipment function? It is difficult to explain it in simple language, and at the same time be technically correct. Radio broadcasting is an every day experience to most of us, but the technical complications in-



*A safety gate back of the transmitter. If this gate is opened while transmitter is in operation, all current is automatically shut off.*

olved are by no means simple. Briefly, however, this is what happens:

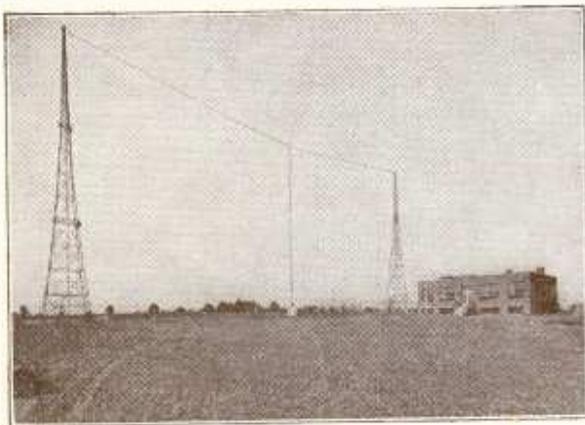
If a stone is dropped into a pool of water, waves spread out in all directions in the form of ever-widening circles. If an Indian beats his tom-tom, waves of sound travel forth through the air. If an electric current is sent through the wire in your light bulb, heating it to incandescence, light comes to you from the bulb and enables you to read, behaving much like ever-spreading waves. If a rapidly reversing electrical current is sent through a wire, invisible disturbances travel out through space from the wire. Such rapidly reversing currents are called “high-frequency-alternating currents” and the disturbances they send out are often called “radio waves.”

What a broadcasting transmitter has to do, is to generate powerful, high-frequency electrical currents, which send out radio waves, and in

some way impress upon these high-frequency current and radio waves the program coming over the lines from the studio. The radio waves act as the carrier of the programs. They travel from the station with the enormous speed of light, 186,000 miles per second, fast enough to circle the earth at the equator seven time for every tick of the clock.

The high frequency current has its origin in a crystal, the heart of the broadcasting station. This radio heart beats 42,000,000 times per minute, steadily and regularly, never hesitating or missing a beat. Its regularity must be almost perfect, because it is the rate, or "frequency," of its "beat" that determines where the station will be received on the dial of a radio receiver. A variation in the frequency would cause the station to be received at a different setting, perhaps at a setting used by some other station.

The feeble, high-frequency currents from the crystal\* must be enormously multiplied in power.



*A full 50,000 watt signal is broadcast from WLW's three hundred foot aerial.*

For this purpose large, water-cooled radio amplifier tubes are used, together with their accessory equipment. These giant tubes cost \$650 each. They must be cooled by constant streams of distilled water. Tube after tube multiplies the current in intensity, until high frequency currents are obtained of sufficient strength to create radio waves received easily thousands of miles away.

So much for the generation of radio waves?

How are they made to carry the programs with them? This is accomplished by the "modulation system," an arrangement of circuits which takes the program as it comes to the station and impresses it upon the high-frequency currents generated at the station. If the modulation is good, there is but little loss in the quality of the programs and in efficiency of transmission. Careful study at WLW has enabled its modulation to be perfected to an extent heretofore be-

lieved impossible, approximately 100 per cent.

High in the air, overlooking the surrounding country for miles on every side, WLW's aerials bid goodbye to the programs starting on their way.

Behind them they see a mighty institution. There is costly apparatus, elaborate equipment, large buildings. There are orchestras, singers, lecturers, sportsmen, men and women of every profession. There are announcers, operators, technicians, engineers, business people. And, finally, there are those behind the scenes who direct the policies and shape the destiny of the Nation's Station.

Before them they see a multitude of smiling faces.



*When your set is tuned to 700 kilocycles, WLW is invariably coming in strong, clear and uninterrupted.*

\*The output of the crystal is about 1 watt and is amplified to a peak power of 50,000 watts for WLW.

# PLANNING THE PROGRAM

Now that we have taken the program from WLW's microphone to the loudspeaker in your home, let's again look back of the scenes into the organization which makes possible the tremendous variety and volume of WLW's daily entertainment.

Here we find a great staff of people—specialists in the new and important profession of radio broadcasting. All of the activity revolves around the Director of Broadcasting, who is responsible for WLW's programs of nearly nineteen hours daily. The director is supported on the creative side by continuity writers, musical directors and writers and interpreters of musical scores; on the technical side by a radio engineer and a staff of skilled operators—some stationed at the studios—others at the transmitter.

## Variety is Demanded

Radio broadcasting is a calling all of its own bringing into play a tremendous assortment of talents. One minute a newspaper man reports on important phases of live news; the next, finds us deep in the score of some famous opera; the next, in the lighter patter from some song and dance show; the next brings us a character actor of backwoods parts. Nearly every day brings new demands for versatility through the new medium of ear entertainment.

Into this scene marches an endless stream of performers — musicians — singers — lecturers — starting in the morning as early as six and continuing well past midnight.

## The Many Departments at WLW

There are many established permanent departments at WLW, such as a newspaper or magazine would have. For instance, there are the Woman's Hours, WLW Radio Club, Musical and Literary Research, Merchandising Con-

tact, Program Plan, etc. Each of these departments has a director who keeps an active contact through thousands of letters with the likes and dislikes of the station's great audience. In addition a whole battery of announcers is necessary for one day's broadcasting, taking their accustomed places before the microphone as each WLW day rolls around.

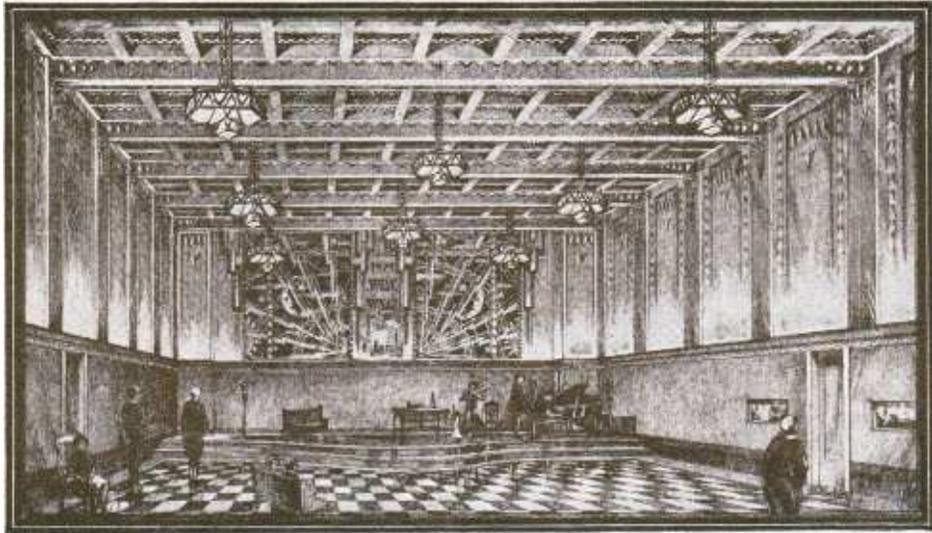
The one thing held paramount by this entire staff is summarized in this question: "What appeals to our listeners." To please you and provide you unfailingly day in and day out with programs of interest, education and amusement, is their sole function.

## WSAI

WSAI, one of the oldest and most popular broadcasting stations in the United States, is owned and operated by The Crosley Radio Corporation. This station is remarkable for the following it has built up in its years of service. Thousands of WSAI fans united in protest to the Federal Radio Commission when that body considered withdrawing it from the air, and thus this popular Crosley station was saved and continues to delight a large audience. WSAI broadcasts programs that are distinctly meritorious, with an appeal slightly different than that of WLW. WSAI broadcasts on a wave length of 1330 kilocycles and is licensed to operate with 500 watts power.

## W8XAL, The Crosley Short Wave Transmitter

W8XAL, the Crosley short wave transmitter, located in Mason, Ohio, is licensed to operate with 250 watts power on a frequency of 6060 kilocycles (49.8 meters). One hundred per cent modulation insures a signal strength of the full 250 watts. W8XAL broadcasts WLW programs with the object of reaching foreign listeners who are eager to participate in WLW programs.



*(From the architect's drawing.)*

*Beauty, utility, convenience combine to insure comfort for artist and audience in the new studios of WLW. They will be the most modern and complete in the broadcasting world.*

## THE NEW STUDIOS OF WLW

TO make its studio and control room equipment as modern and efficient as the 50,000 watt transmitter of its station, WLW, The Crosley Radio Corporation will construct five studios, six control rooms and complete offices for its broadcasting staff in the new eight-story building now being added to its main plant.

Except for the offices of the president and vice-president of the corporation, the studios, controls and broadcasting offices will occupy the entire eighth floor of the new building. They are expected to be ready for occupancy by the first of October.

### NO WINDOWS

The program in each of the five new studios will be monitored from its own control room in which a control operator will face the studio through a small window. Each of the studios

also will have a small adjoining room from which commercial sponsors may view the presentation of their programs.

These rooms will be the only ones from which the studios may be watched since all possible reflection from glass is to be eliminated.

Radio entertainers will await their appearances in a lounge which gives on an outside corridor, entirely separated from offices and connecting passageways:

### ENTIRELY SOUNDPROOF

The studios will be entirely surrounded by corridors so that no outside walls may transmit vibrations or extraneous sounds to them. Double walls, floors and ceilings of heavy building construction will enclose them. For additional protection against noise and vibration, the five studios will be floated in felt.

In constructing the studios the designers have to deal with microphones more delicate than the human ear. Architects' versions of sound-proof construction have nothing to do with the type of construction that must be used where microphones are concerned, for if the signal from a microphone is amplified sufficiently, a sound that the human ear could not possibly detect would make a most annoying noise.

Only one in 10 million parts of sound will penetrate from one studio into another or from the outside in when the studios are completed.

### NEW SOUND TREATMENT

New ideas have been incorporated into the inner sound treatment of the studios. Reverberation will be cut down at all frequencies by the special sound-treated material used to line the walls. Heretofore, sound treatment has not created equal absorption at all frequencies; in some cases, absorption of sound has been eight times as great at high frequencies as at low frequencies thus creating a monotonous effect in tonal qualities.

In the WLW and WSAI studios, the echo will be deadened without attendant lifelessness.

Programs in each studio will be monitored by a studio engineer in the adjoining monitored control rooms. These monitoring control rooms each will have a fading panel to blend and control the output of the microphones in its studio,

and the input from microphones at remote control points that are to be controlled and announced from that studio.

### MASTER CONTROL

The monitoring rooms also will be in communication with the master control room and with remote control points. An intricate arrangement of signal lights and switches will indicate to the monitoring engineers when this studio has the control and when it is on the air.

All amplifying equipment, including a microphone amplifier, monitoring amplifier, volume indicators, and plate supply for each of the studios will be located in the large master control room. In addition, there will be two complete emergency sets of spare amplifying equipment which can take the place of that in regular use.

### FOUR PROGRAMS

In this master control room will be all connections with the transmitters, network headquarters, and other remote control points. All remote control points will be given preliminary tests in the master room on one of the spare amplifiers with properly equalized lines.

In connection with the studios there will be a large, magnificently appointed Green Room for the convenience of artists and entertainers; smoking rooms; check rooms; various control rooms, and a large audition room.



# HIGH-LIGHTS OF WLW



The only way to see a WLW program produced is to buy it. There will be no windows in the new WLW studios except two small glassed apertures: one through which the monitoring control operator will watch the broadcast; and the other to accommodate sponsors of commercial programs. Glass walls ruin the acoustics of a broadcasting studio so WLW engineers have eliminated them. No visitors are allowed.

\* \* \*

Broadcasting schedules for station WLW are worked out as carefully as those for a great railway system. Every program must start and stop on the exact second. Studio announcers and control room operators are assigned to each program days in advance. The WLW traffic manager does nothing but book programs for the station.

\* \* \*

To prevent any sound from entering the five new sound-proof studios of WLW, the studio doors will be electrically inter-locked so that they cannot be opened while the studio microphone is turned on.

\* \* \*

Enough electric power for a small city is used for the operation of the 50,000 watt WLW transmitter.

Four huge fans are required to blow off the tremendous heat generated by the WLW transmitter.

\* \* \*

One of WLW's most unusual broadcasts was that on July 16, 1929, when the station informed the listening world of the progress of the race between two Ohio River mail packets, the Betsy Ann and the Tom Greene. With a special license from the Federal Trade Commission, WLW engineers built and installed a 99 meter short-wave transmitter on the deck of the Tom Greene. A short wave receiver at the Coney Island Amusement Park, ten miles up the Ohio from down-town Cincinnati, picked up the broadcast which was then relayed to the regular WLW transmitter over the remote control lines used by WLW to transmit dance music from the Coney Island ball room.

One of the staff announcers of WLW, who holds a government license to pilot an 80-ton ship, was chosen to tell the boat race story because of his maritime experience.

Talking movies were made of the broadcast.

\* \* \*

Eight giant loud speakers mounted on the antenna towers at Mason, O., broadcast WLW programs to the countryside. Hundreds of cars line up at the fence along Maud's Road in front of the transmitter every night bringing people who do not own receiving sets and who get their entertainment direct from WLW's transmitters.

\* \* \*

New Zealand radio fans take their setting-up exercises at midnight. The difference in time between station WLW and the South Sea Islands brings the 7:00 A. M. Cincinnati broadcasts to New Zealand radio sets at midnight.

Wendell Lewis Whitehouse, the little son of the chief transmitter engineer of Station WLW, is a real radio baby. He was born in the living apartments of the station when the transmitter was located at Harrison, Ohio. Appropriately, his initials are W. L. W.

\* \* \*

The technical supervisor of the Crosley Radio Stations, developed the condenser microphone while with the General Electric Company at Schenectady, New York. The microphones now are used by most of the large radio stations because they are absolutely noiseless, and will pick up any sound no matter how small.

\* \* \*

Thirty miles of copper wire, buried ten inches below the ground in a giant spider web of which the 50,000 watt transmitter is the center, makes up the ground wire system of station WLW. The ground wire was laid with special plow which made furrows 18 inches apart, laid the wire in the furrows, and covered them again.

\* \* \*

A third as high as the Eiffel Tower in Paris, the two 300 foot antenna towers of WLW bear a striking resemblance to the famous Parisian structure. Their graceful shapes follow the same lines.

More than ten thousand pieces of mail are received each week by WLW. It requires a special force of ten secretaries and stenographers to take care of all this correspondence. Mail has been received from every state in the Union, every Canadian province, Alaska, the Philip-pines, Cuba, Australia, Germany, England, and all but two of the countries of South America.

\* \* \*

Radio impulses travel at the rate of 186,000 miles each second. At this speed it would take less than four minutes from the time a WLW program enters a studio microphone until it reached Mars. Or, it could go around the earth approximately seven times in one second.

\* \* \*

One of WLW's well known sports announcers, used to be a semi-pro baseball player himself.

\* \* \*

The famous recipes, broadcast over WLW on the Crosley Woman's Hour, are always tried out at home first. The authoress, by the way, averages around one hundred letters daily from the members of her woman's club.

\* \* \*

WLW's chief continuity writer got his dramatic and theatrical education writing plays and operettas at the University of Cincinnati. He has to his credit the book to a musical show which has been purchased by Messrs. Schubert.

