

"The Nation's Station"

by John Price

Copyright 1979 - Reprinted by Permission

You can tell when a man owns a powerful radio station. There's a bit of a swagger at the NAB convention, which means either a 1-A clear channel or four years at West Point. There's a tendency to drop little gems: "Son, I spill more watts than that on the floor just warmin' her up." And the habit of referring to lesser licenses as "coffeepots."

What follows is a fond recollection for the power trippers of kilocycle avenue — a look back at a station located at that bend of the river where Kentucky, Ohio and Indiana meet. It was called "The Nation's Station," a true statement in an industry prone to superlatives.

It boomed out with enough watts (500,000) to literally dim the street lights. In an age free from layers of man-made hash, it got requests from the royal family of Britain, not to mention loyal families from Portland to Portland.

It was a one-station network with a rate card like the NBC Red, a cast of thousands, a Who's Who alumni club, a 750-acre farm and a heart as big as the buzzing, arcing giant out at the Mason, Ohio transmitter site.

Powel Crosley, Jr. never intended to be a broadcaster. Son Powel, III, in the very early twenties, pestered Dad for one of those wireless outfits. When they went shopping for what the elder Crosley considered a toy, they found only rich men's playthings.

Instead of spending \$100 for a wireless, they bought "The ABC's of Radio" for 25¢.

The next step involved parts for a crystal set. Then came a \$200 receiver, and soon a 20-watt transmitter.

And Powel Crosley playing such records as "Song Of India," thrusting his head down an

eight-foot morning-glory horn to ask for listener reports, then playing the record again.

The first Crosley radio receiver, the "Harko," was only \$9.00. A ready-to-use crystal set, it was not too aware of the ether floating by. Nor were the models that followed. Inexpensive, but not sensitive. There was a simple solution: Make the ether stronger. And power-minded Powel did just that:

- Summer, 1921: Department of Commerce issues license for 8CR as a "special land station." Power is 20 watts, transmitter by the Standard Precision Instrument Company, of Cincinnati at 710 kc.
- March, 1922: Call letters WLW assigned by the new Federal Radio Commission. WLW is 65th licensed radiotelephone station to go on the air. Letters are received from Colorado, Maine, Michigan, Wisconsin, Connecticut.
- June 1, 1927: WLW moves to 700 kc, sharing time with WMAF, Dartmouth, Massachusetts, and KFBU, Laramie, Wyoming. Former operates summers only, soon disappears. Latter moves to another frequency, leaving WLW with a clear channel.
- January, 1925: WLW orders 50 kw Western Electric transmitter.
- October 4, 1928: WLW starts 50 kw operation from new transmitter site at Mason, northeast of Cincinnati. Longwire antenna puts "local" signal into Jacksonville, Florida, and Washington, D.C. WOR, Newark (710 kc) complains of co-channel interference. Federal Radio Commission station list dated November 11, 1928 shows four other 50 kw stations:

660 kc - WEAJ, New York
790 kc - WGY, Schenectady, limited time.

800 kc - WBAP, Ft. Worth, sharing time with KTHS, Hot Springs, Arkansas.

980 kc - KDKA, Pittsburgh

- KFI, Los Angeles; WSM, Nashville; WCFL, Chicago; WFAA, Dallas and WTIC, Hartford, have 50 kw construction permits.



Here Powel Crosley, Jr. is holding in his hand one of the smallest audio transformers formerly in use for WLW. Behind him is seen a portion of the huge audio transformer used in connection with the 500,000 watt transmitter. It weighs over 35 tons and is, by far, the largest in the world.

And Crosley's radio business is booming. By 1927, The Crosley Corporation grosses \$18 million with a profit of \$3,605,973. It has added patent medicines, scalp massagers, tire patches, the Shelvadoor refrigerator, the Cincinnati Reds and WSAI, a second station for local listeners.

The power of Positive Powel did not end with a mere 1-A clear channel and fifty thousand watts. Harold Vance, of the Engineering Products Division, RCA Manufacturing Company, remembers conferences about a 500 kw transmitter in May of 1932. While RCA, General Electric, and Westinghouse had experimented with up to 300 kw, there were no commercial designs for such an animal.

Evidently both parties were doing their homework, for RCA had a completed design by late that year. And in either December, 1932 or January, 1933 Crosley Broadcasting signed a contract for the beast.

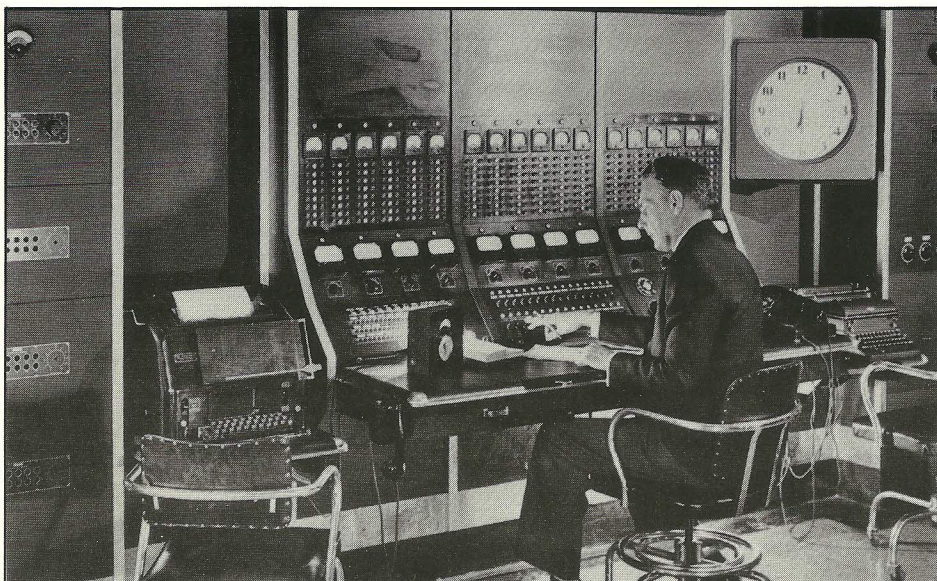
And, in early 1933, the on-site installation did commence at Mason.

Some questions go unanswered at this point. Was Powel alone in his journey up the power tower? Was his application for "special authority" one of several? Many? Why was WLW singled out for the grand experiment?

Up went an 831-foot Blaw-Knox diamond-shaped "vertical radiator" next to the WLW longwire. It would be a half-wave antenna, end-fed, and the fat middle's purpose was to handle the point of highest RF current. The downward pressure of the tower and its pre-stressed bridge-cable guys was over 200 tons, and one giant insulator took it all. The station's call letters twinkled in neon across the mid-section, which was as wide as a four-story building is high.

To carry a predicted ninety amperes of RF current, a coaxial line about ten inches in

(Continued on Next Page)



Master Control — This control center fed programming down a bank of phone lines to the transmitter site. During 500 kw years, WLW program listings appeared in up to seventy-six newspapers from Texas to Connecticut. Programs were routed to WLW, WSAI, W8XAL, the "New York Line" and various national networks.

diameter was mounted on concrete pilings across the grassy lawn of the site. The outer conductor was of aluminum, with spring-loaded expansion joints every twenty feet or so. A mica material suspended the heavy center conductor.

But the big job was at the transmitter building. The back wall was torn out, and a new room about twenty by forty feet was added, complete with an extension on the basement. Out front, a pond 75-feet square was excavated and lined with cement. A crane on the side of the building could swing large loads into garage doors on either floor.

Up at Camden, a lot of original research would soon get a test. The 500 kw would act as a power amplifier, using RF generated by the Western Electric 50 kw rig. Since only low-level modulation was used then, it would have its own modulator section. Imagine the look on the engineer's face who calculated the final weight of the double modulator transformers: 35,700 pounds each, including 725 gallons of oil!

The final power amplifier would actually be three PAs in parallel, a decision which was to prove most fortunate. Each PA would house four UV-898 RCA tubes — that's twelve. Add to it four more in each of the two modulator sections. Then there was the power supply, sort of a DC Incredible Hulk. The tubes required DC for their filaments. This would be supplied by several big generators. Cincinnati Gas & Electric ran two 33,000-volt lines toward Mason and a special substation on the WLW property. There was an automatic switchover out there, assuring power from one line or the other. 2,300 AC volts actually entered the building.

All of this original design was fitted into a cabinet about fifteen feet high and thirty feet wide. A catwalk about three feet from the floor led to tube compartments. Five double, shielded wooden doors, complete with interlocks, granted access to the rear.

Enough dials and meters for a small Boeing covered the front panels.

And several unusual bits of apparatus took their place here and there: a water still, which would manufacture all the distilled water for the inside cooling system. To isolate the high-voltage B+, this water would circulate through Pyrex tubing instead of metal pipes. A heat exchanger in the basement would warm a secondary system using tap water. This was routed through more big Westinghouse pumps to the outside cooling pond, where fountains helped lower its temperature before a return trip.

And oil-filled transformers would turn sour eventually, so acidity-testing and removal equipment was ready. (This may be the first transmitter in your memory which needed an oil change.)

Finally, there was a big brass nameplate. It credited the rig to RCA, although it was actually the joint effort of RCA (design), GE (RF) and Westinghouse (control). It also proclaimed a digit often quoted: "Serial Number 1."

Although Harold Vance told the FCC that installation chores were completed early in 1934, this was not the sort of thing that plugs in and plays. There were many hours of testing that winter and spring, and we can only sur-

mise what sights and sounds the farmers just west of Mason may have heard and seen during the wee hours of a Depression spring. Diplomatically, Vance stated only that "special problems" had to be solved during both the design and installation. The test periods continued, using a test call of W8XO. Down in Cincinnati, Mr. Crosley undoubtedly waited with a certain air of impatience.

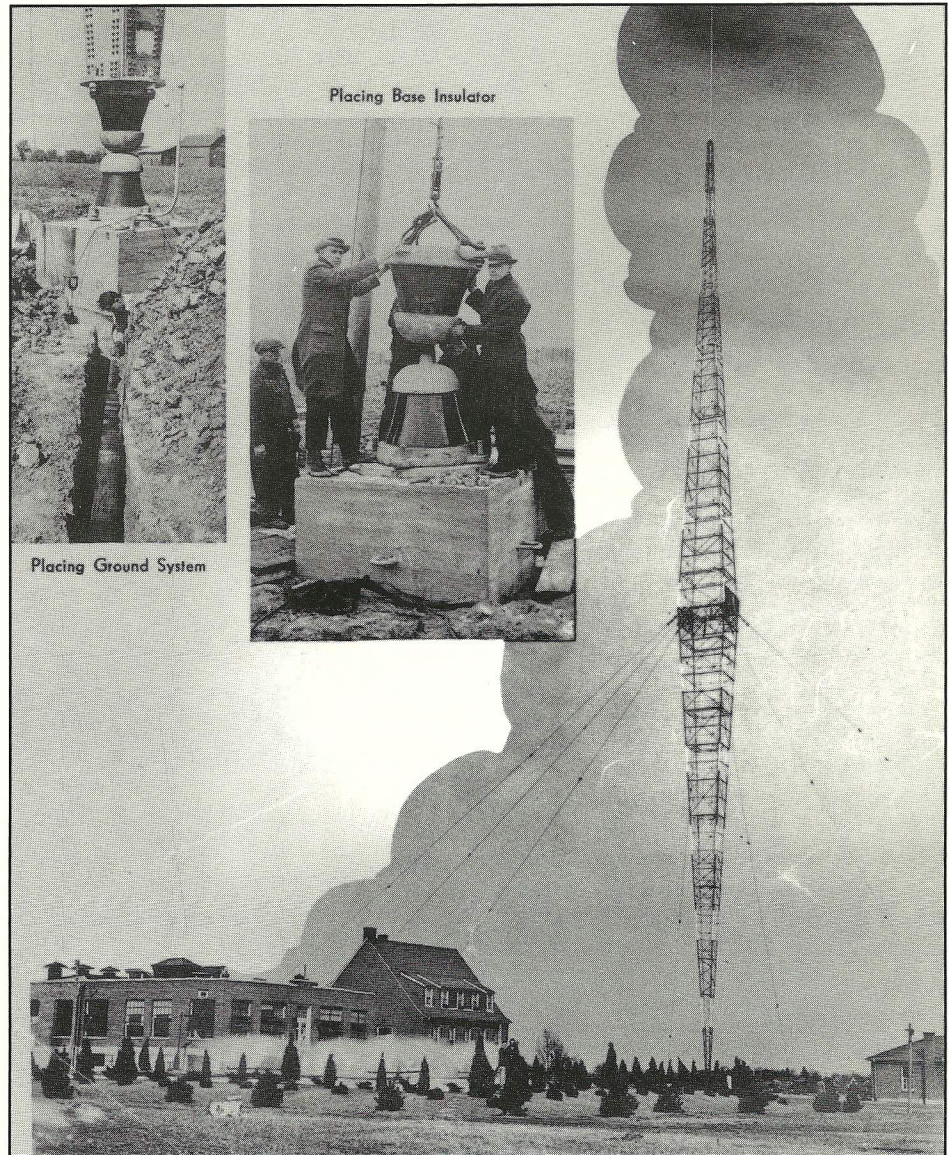
On April 17, 1934, the FCC granted Crosley Broadcasting authority to use 500 kw experimentally, during regular hours, with its regular WLW call.

Washington. President Roosevelt: "I have just pressed the key to formally open Station WLW . . ."

Far from the downtown festivities, I'll bet quite a cheer went up at the transmitter house. Bill made his entry in the log. Over in Mason, the street light dimmed just a bit. And around the world, folks found a new friend on their radios: *The Nation's Station*.

If WLW was a one-station network, it jolly well acted the part:

1 - There were no recordings on the station. None, except for sound effects. Later, some ET



Blaw-Knox Vertical Radiator (Guyed Type) Broadcasting Station WLW, Cincinnati, Ohio. 831 ft. high. The most powerful broadcasting station in the United States.

Bill Schwesinger remembers the night of May 2, 1934 well. The Crosley transmitter log remembers him well, too — his handwriting is all over it. A signal pair had been ordered to terminate at 1600 Pennsylvania Avenue, where a man whose fireside chats had made him well aware of the power of radio was prepared to assist. The golden key which Woodrow Wilson had used to open the Panama Canal was connected.

That log shows a final high-power test from 5:15 to 6:30 p.m.

9:02 p.m. Cut to remote line from

[electrical transcription] programs began to creep in. (In fact, a point of controversy during that time was the "transcribed" announcement which the FCC required between sides of a continuous half-hour ET show.) But nobody played the phonograph on *The Nation's Station*.

2 - The only thing the eighth floor of the Crosley Building may have lacked was privacy. 40 to 50 "legitimate" musicians, about 75 hillbilly-western ones, and a dramatic staff of 25 to 30 made sure of that. At an FCC hearing

(Continued on Page 26)

in 1938, station manager James Shouse set the payroll at 159 full-time, 31 part-time in the production department alone.

3 - From 1927, when WLW started originating "The Crosley Hour" for the NBC Red network, the station became a growing source of network programming. During one season, twenty-two shows per week were sent to various nets. The station's own affiliation was something of a grab-bag, however: the nets needed it more than it needed them. Consequently, WLW took its pick from several. The 1936 *Broadcasting Yearbook* shows it as an affiliate with the Red, the Blue and Mutual. WCKY, WSAI and other Cincinnati stations evidently picked up what WLW couldn't fit into its schedule.

4 - Perhaps the most famous WLW program of all was called "Moon River," and it wasn't the Audrey Hepburn or Andy Williams variety at all. It began in 1930 to showcase the three-manual seventeen-rank Wurlitzer dedicated to the memory of Powel Crosley's mother.

Cue the Clooney Sisters with "Deep Purple." Cue announcers like Jay Jostyn and Don Dowd and Ken Linn with poems such as "The Roses," by John Smith, or "The Shooting of Dan McGrew."

"Dan McGrew! Who read Dan McGrew? Fire the bastard!" "But sir, it was a request from a regular listener." "No listener is going to dictate..." "The Duchess of Edinburgh, sir. She cabled us last night..."

Meanwhile, back at the transmitter, the "special problems" to which Mr. Vance had alluded did not go away by themselves. Director of engineering Jim Rockwell, who had replaced Joe Chambers, told the FCC that WLW had 63 engineers and operators. Jim

unbelievable as it seems in this day of multi-stage audio processing, there was no limiter amplifier — they just weren't used until the late thirties. Couple this with the sudden peaks that are bound to sneak through from 100% live programming.

Somebody would let fly with one, and the big rig would call "power!" all the way back to CG&E. During a moment of overmodulation, an AM carrier all but loses its negative side, so there you were, all powered up with no place to go. Something had to give, and it did.

WLW had a "transmitter control room" with an operator who acted as the final gain rider, and who typed a running log of what did and didn't get on the air. These are fascinating documents, for they not only show the program schedule for the station, but show the problems that continued, more-or-less, through the 500 kw period:

May 4, 1934. . .

"...Ma Perkins OK. 500 kw Ann OK. Muldowny - Refrigerator Adv-off-on 2:12:12, PA #7; same one again 2:12:55; — closing ann peaked 30. Low Down - off-on 2:29:30, PA #7 again. Sputter And Whine - off-on 2:33:40, PA #7 and PA #8 — off-on 2:40:53. Took couple seconds 2:45 to isolate PA #2, and #1 PA isolated shortly after. #2 PA rushed back in service 2:47:30, neutralizing condenser in #1 PA blew..."

"...6:57:50 ten secs lost due antenna gap holding arc..."

"...7:01 transmitter off to find trouble in coupling house, thinking it was a fire there..."

The wisdom of foresight caused each power amplifier to have an "isolate" circuit, which would power it down after so much internal trouble. It left the station with some, if not all of its superpower.

Bill Schwesinger recalls especially eerie happenings when angry amperes teamed up with mother nature. Lightning loved the big Blaw-Knox, and would let loose with enough power to not only arc across the arrester gap at the base, but around the guy wire insulators, too. Once started, the RF energy would keep the arcs alive until the transmitter was shut down. Nighttime time-exposure photos exist of this sight.

Finally, a photocell device was mounted in a box, with a lens trained on the arrester gap. Wired into the interlock system, it gave the transmitter an off-on to break the arc.

Inside the building, flash-overs sounded like pistol fire. Bill remembers the huge mercury-vapor rectifiers "rattling the place" when they arced.

And not all the fireworks came from the transmitter farm. Foes cried "foul" for both technical and economic reasons. Loudest of all were WOR, Newark, (at 710 kc) and CFRB, Toronto, (at 690). Since CFRB was 375 miles distant compared to Newark's 500, it was decided that The Nation's Station would go directional to protect the maple leaf.

In fact, CFRB howled so loudly that on December 21, 1934, WLW returned to 50 kw at local sunset until the directional could be completed.

Two quarter-wave self-supporting towers were erected across the road to the south, in

the middle of Everybody's Farm, which was also owned by Crosley Broadcasting. An open-wire transmission line made from streetcar trolley wire rambled across the fields. No phasing equipment was used — the line length was adjusted to that job. When it was finished, WLW had a nice null to the north-northeast. Power tripper note: radiation in the null direction was only 50,000 watts!

The WOR problem wasn't so easy to solve. Ed Dooley, now the chief at WLWT, was in the Crosley propagation department. He describes a team, armed with portable ET cutters, receivers and signal-strength meters. The team traveled from Alabama to New England, cutting discs of the first quarter of each evening hour: alternate four-minute segments of WOR, then WLW, then WOR. The discs are still extant, and give a wonderful overview of what radios were receiving as we climbed out of the Depression.

The kitchen got hotter and hotter, but Powel Crosley was committed to stay for the duration. He was not alone: by May 1, 1938, *Broadcasting* was able to report fifteen other applications for superpower, from KDKA, KFI, KNX, KSL, WBZ, WGN, WGY, WHAS, WHO, WJR, WJZ, WOAI, WOR, WSB and WSM. And apparently every six months, the Crosley counsel battled through another six-month extension of that 500 kw "special authority."

And no wonder.

Romance of the superpower aside, the business of WLW required lots of black ink. It's silly to assume that the fiscal reward to be derived from ten times the power of anybody else's radio station never crossed Powell Crosley's mind.

Testifying before the FCC, one E. J. Ellig, comptroller for the Crosley Corporation, charted these figures for their fiscal year 1937: Gross Revenue, \$2,662,704; Net Income, \$702,954 and a Net Profit of 26.4%.

Not bad for a business "recovering" from the Great Depression.

Broadcasting for June 1, 1934, carried an item to be the effect that WLW's rates would be increased by ten per cent on July 1, and another ten per cent or so in October. The current evening rate was listed at \$990 per hour, \$660 per half and \$440 per quarter. After the second increase, that hour would cost about \$1,200.

Opponents of WLW (and of superpower in general) were sure to have made notes in their little black books.

The business of broadcasting descended on Cincinnati that year as the NAB's annual convention got rolling September 16th — the Chesapeake and Ohio Railway taking space in the trades to advertise air conditioned comfort via its George Washington, Sportsman and FFF runs.

Meanwhile, across the street, WCKY, Cincinnati, ran a series of double-trucks using the brave line "Doing the real job" of radio in Cincinnati. L. B. Wilson, WCKY's owner, signed a somewhat caputatory effort in December, 1934, which read:

We are proud that our neighbor, WLW, is the greatest broadcasting station in the world. We are happy in the tribute that WCKY is accepted as the next choice for covering the Cincinnati market.

(Continued on Page 27)

THE CROSLY RADIO CORPORATION WLW - WSAI - WXAL TRANSMITTER RECORD												
Operator	J. W. S. Date: May 2, 1934											
TIME	6:00	6:30	7:00	7:30	8:00	8:30	9:00	9:30	10:00	10:30	11:00	11:30
LINE VOLTAGE	230	230	230	230	230	230	230	230	230	230	230	230
FLUORENCE VOLTAGE	132	132	132	132	132	132	132	132	132	132	132	132
M.P.A. GRID BIAS	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
P.A. GRID BIAS	320	320	320	320	320	320	320	320	320	320	320	320
ANTENNA CURRENT	11	11	11	11	11	11	11	11	11	11	11	11
M.V. RECTIFIER	11	11	11	11	11	11	11	11	11	11	11	11
P.A. PLATE CURRENT	64	65	64	65	64	65	64	65	64	65	64	65
D.C. GRID CURRENT	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
P.A. TUBE CURRENT	35	35	35	35	35	35	35	35	35	35	35	35
L.V. RECTIFIER	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
CRYSTAL IN SERVICE	2	2	2	2	2	2	2	2	2	2	2	2
CRYSTAL TEMP	60.6	65.6	65.6	65.6	65.6	65.6	65.6	65.6	65.6	65.6	65.6	65.6
P.A. PLATE VOLTAGE	67	68	68	68	68	68	68	68	68	68	68	68
P.A. PLATE CURRENT	800	800	800	800	800	800	800	800	800	800	800	800
LINE CURRENT	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
CRYSTAL IN SERVICE	2	2	2	2	2	2	2	2	2	2	2	2
CRYSTAL TEMP	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5
P.A. PLATE VOLTAGE	82	82	82	82	82	82	82	82	82	82	82	82
P.A. PLATE CURRENT	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
LINE CURRENT	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
CRYSTAL IN SERVICE	2	2	2	2	2	2	2	2	2	2	2	2

An Era Begins — Transmitter log for May 2, 1934, shows 500 kw testing from 5:15 to 6:30 p.m., official superpower operation starting at 9:02 p.m. by remote control from the White House. Antenna current (circle) jumps from 19½ to 72 amperes. Bill Schwesinger's notes also show effects of unlimited audio peaks during dedication program. (Note: WSAI was co-owned by Crosley Broadcasting, as was shortwave W8XAL. Latter simulcast with WLW, later programmed Spanish-language fare beamed to South America.)

Wagner understands that up to seventeen men manned the transmitter site at times.

Why? Well, this was all virgin territory, and there had to be some measure of design deficiencies. For one, the massive power supply seemed to be both good and bad news:

Undoubtedly, number two was trying harder.

Radio's Who's Who could be written from the WLW pay records. True Boardman, of "Famous Jury Trials." Jay Jostyn, who would later protect our life, liberty and the pursuit of happiness as Mister District Attorney. Jane Froman sang on "Moon River," and so did the Clooney Sisters — Rosemary and Betty.

When Mrs. Crosley's Wurlitzer in Studio A wasn't providing music for Ma Perkins, one Thomas "Fats" Waller used to experiment with it. He was fired when discovered playing one of his jazz tunes on it. . . ironically, one he called "Ain't Misbehaving."

And Doris Kappelhoff (later Day) sang with Jimmy Wilber's Little Band.

Red Skelton originated his "Avalon Time" from the studios for one of the networks. (Anyone remember Avalon cigarettes?) There was Singin' Sam, The Lawnmower Man, before Harry Frankel moved to New York and Barbasol.

Little Jack Little. The Mills Brothers ("Four boys and a guitar"). The King, The Jack and The Jester: that got shortened to The Ink Spots.

Red Barber did a mean play-by-play. Durwood Kirby did a smooth anything. Later there was Rod Serling, Eddie Albert, Dick Noel, Andy Williams, Frank Lovejoy — and don't forget the McGuire Sisters.

to ride the waves of the big transmitter.

And there was Smilin' Ed McConnell, all three hundred pounds of him. Has reality dimmed to legend, or did Smilin' Ed pitch the first radio per-inquiry deal for the Olson Rug Company that Sunday morning? And did so many listeners hear and follow this pied piper that the Olson Rug Company nearly went through receivership for one program that cost what a 13-week schedule did on the rate card?

Radio frequency power can do funny things, if there is enough of it. There was, and it did. Some of the WLW "resonance" stories are hard to believe, but you want to believe them anyway.

Of course, the lights in farmhouses and barns near Mason burned without the aid of CG&E. Of course, the tin roofs — indeed almost any length of wire (water pipes, fences, bedsprings) — could talk at you on a humid summer night. And the little old lady who heard voices in her head. They probably did go away after the dentist adjusted her bridgework.

There is an elderly employee of CG&E who used to man the substation which fed one of WLW's two 33 kv industrial lines. He could tell, he says, when the station was on his line at 500 kw. The final voltmeter would dance ever so slightly in time to the music. Wow!

There were too many foes crying "foul" with ferocity. There may (or may not) have been a

claiming "Stay Refused, WLW Returns to 50 kw," *Broadcasting* announced the end of The Nation's Station. "WLW," stated the article, "announced the power reduction February 28 to its audience with a simple news statement."

The street light in Mason would dim a few more times during the war years, and Der Fuehrer would be heard to curse "those bastards in Zinzinnati."

Last January 19th, the warm and well-lit studios at 3 East Fourth Street sent a well-modulated Dolly Parton through solid-state program amplifiers, but the eighth floor of the Crosley Building at 1329 Arlington was dark and damp.

The play-by-play was smooth and professional, but there was no sound in the studio where the Crosley Organ used to paint its lazy stream of dreams.

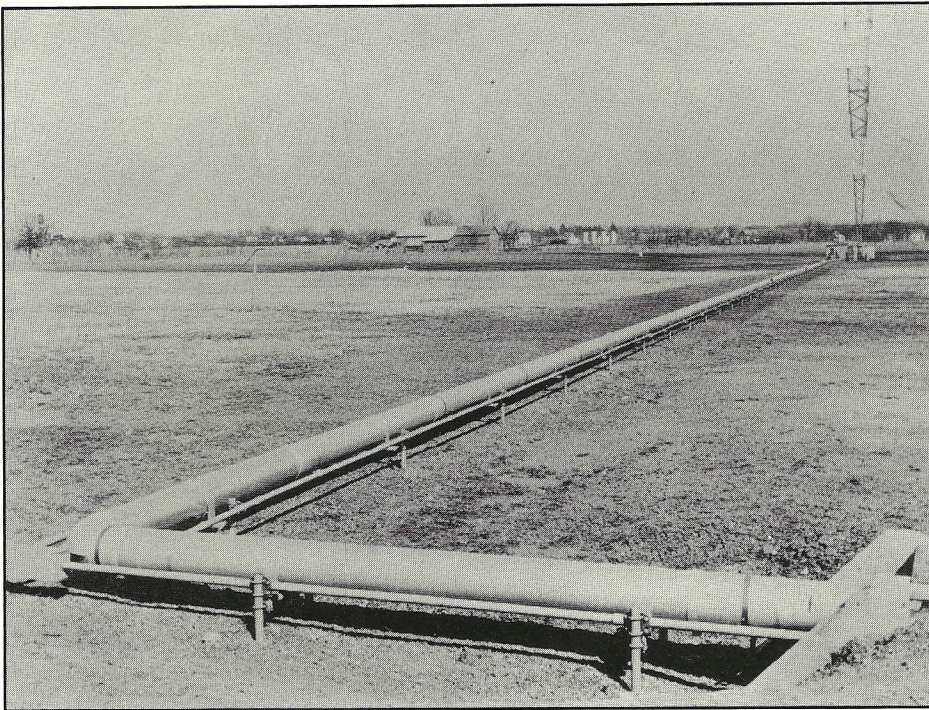
Out at Mason, a discriminant audio processor and a screen-modulated Doherty circuit created a maximum modulation envelope, but the big rig in the back room wasn't speaking to the Duchess.

The Nation's Station is from another time and place. 500 kw doesn't compute on a microprocessor. And yet, alone in the darkened back room, it seemed that the faintest of red glows came from deep within dusty glass.

Thanks go to Jim Hampton, WLW's current vice president/engineering, for permission to prowl the nooks and crannies of the big rig. And to Jim Wagner, his sidekick and unofficial tour guide, whose interest in The Nation's Station led to a job as engineer there. And to Bill Schwesinger and Ed Dooley, who were there when it happened, and can remember. To John Bruning, of WCET in the Crosley Communications Center, who let me and my camera in after hours to photograph the name plate for the 500 kw. And to Dick Perry, author of the delightful "Not Just A Sound: The Story of WLW" (Prentice-Hall, 1971) which should be on your shelf if you call yourself a broadcaster.

This article from 1979 is one of many the author hopes to put into book form. Do you have any interesting historical radio stories to contribute? If so, please send to: Real Radio, John Price, Dept. db, P.O. Box 1487, Richmond, IN 47375.

John asked us to note that during the Super Power era, in 1936, the FCC ran a survey wherein it was learned that WLW was the #1 station in 13 states and #2 in 6 more states.



The RF transmission line was 775 ft. long and had a surge impedance of 100 ohms. The outer tube had a diameter of 9.78 inches.

And the hills were alive with the sound of hillbillies: Minnie Pearl, Ernie Lee, pre-Grandpa Jones, Skeeter Davis, Margie Bowes, Cowboy Copas, Bonnie Lou, Shug Fisher, Merle Travis, Lulu Belle and Scotty, Red Foley, Whitey Ford ("The Duke of Paducah"), George Gobel and Kenny Price. And wonderful old Pa and Ma McCormick, who tended the flock.

The "legitimate" musicians, with their union cards, looked askance at the hillbillies with their fiddles, guitars and banjos. But the money for Western music rolled in from sponsors eager

station owned by FDR's son which lost business to The Nation's Station. Or, a sizable contribution made to the wrong party at the wrong time.

In any case, the regular application for another six-month superpower extension was set for hearing in 1938. Duke Patrick, former general counsel for the Radio Commission, waded into a hearing and presented WLW's case in the brou-ha-ha that took a good deal of that hot summer season.

On March 1, 1939, under a headline pro-

Illustrations, drawings, descriptions, measurements, weights and prices are subject to change without notice.

Leasing and financing are available in most states with approved credit, plus sales tax.

Allied disclaims any implied warranties of merchantability or of fitness for any particular purpose. Since Allied cannot control the manner of use of products after their sale, Allied will not be responsible for any consequential or indirect damages. Since Allied is only acting as a distributor of products manufactured by other companies, Allied expressly limits its liabilities to any warranty extended by the manufacturer. Allied will pass these guarantees through to the customer.

ALLIED BROADCAST EQUIPMENT
Printed U.S.A. ©1989

ALLIED