



The

Broadcasters' Desktop Resource

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... edited by Barry Mishkind – the Eclectic Engineer

High Powered History Building the Sears (Willis) Tower Site



By Warren Shulz

[May 2014] Finding the best places for antennas has been important since the beginning of broadcasting. Perhaps as important is getting all the players to work together harmoniously. How do they do it? In Chicago that is the story of the Sears Tower (now Willis).

As they say, from the top of the building you can see for miles – over parts of Illinois, Wisconsin, Indiana, even over Lake Michigan to the state of Michigan itself.

Sound like a great place for an FM or TV antenna? Well, then, how about a dozen or two?

BIG BY DESIGN

Until the new One World Trade Center topped out last year, the tallest building in the USA was in Chicago. The new Number Two is the Willis Tower - known for most of its life as the Sears Tower.

Back in 1969, Sears, Roebuck & Company was the largest retailer in the world, with approximately 350,000 employees. Sears executives decided to consolidate the thousands of those employees who were in offices distributed throughout the Chicago area into one building on the western edge of Chicago's Loop.

With immediate space demands of three million square feet (the total building is some 4,477,800 square feet), and predictions for future growth necessitating more space, Sears commissioned architects Skidmore, Owings and Merrill (SOM) to produce a structure to be one of the largest office buildings in the world.

The Sears Tower was financed by Sears Roebuck & Co. at approximately US \$150 million.

BUILDING IT HIGH

Sears and the City of Chicago approved the design, and the first steel was put in place in April 1971.

The building structure was completed in May 1973. The Sears Tower observation deck, called the Skydeck, opened on June 22, 1974.

It is interesting to note that the original build-out height was right up to the FAA limit obtained, and Sears had no intention of adding any television broadcast antennas. However, pressure from retailers whose sales of TV receivers were suffering due to ghosting issues caused by the Sears Tower ended up being the motivation to provide a location for future television broadcast antenna development.

To accomplish that, two cylinder bases, 90-feet tall and 12-feet in diameter, were added to the initial design to permit such future development by the local television broadcasters.

An interesting fact: Sears took fire safety to a new level by constructing a fully-sprinklered building. Even though regulations of the time did not require a fire sprinkler system, the Sears Tower building was equipped with one from the initial build-out; there are about 40,000 sprinkler heads in the building.

TV'S MODEST BEGINNING

During the first two years, just WLS-TV-7 and WTTW-TV-11 were in operation from the Sears Tower site.

The stations used a side-mounted tower section added next to the west base cylinder so they could cover land mass (as opposed to the relatively unpopulated Lake Michigan) with directional VHF high band TV antennas. The stations operated from these "temporary" antennas from 1972, which remained useful until the DTV conversion.



The TV tower section on the roof in 1972

THE ORIGINAL FOUR FM TENANTS

While the TV folks could not decide what to do for more than 11 years, it was the persistence of RKO General Radio, licensee of WFYR-103.5,

that opened the door to a temporary FM antenna mast development in just two years.

Among the four original FM broadcasters which moved onto to the Sears Tower, RKO's WFYR and Robert Victor's WXFM had the worst antenna sites. Hence, George Capalbo Vice-President of RKO Radio took the lead in pushing Eric Pavel, the Sears Tower roof czar, to seal a deal.

Unfortunately, there still was no one wanted to bankroll the vertical real estate development above the cylinders.

Finally, after two years of meetings Sears gave in, during January 1974, and allowed for FM radio antennas because none of the television operators had joined to develop towers above the two base cylinders. The four FM leases were short term and the mounting was understood to be a temporary location.

Nevertheless, this finally opened the door for the original four FM broadcasters. They were: WLAK 93.9 (Sudbrink), WCLR 101.9 (Bonneville), WFYR 103.5 (RKO General), and WXFM 105.9 (Robert Victor). Staffing was John Bortkowski, Gary Schroeder, Warren Shulz, and Don Coleman (part-time contractor).



A recent photo of the late George Capalbo

George retired when RKO Radio was closed in the late 80's.

MOUNTING UP

It was just two months later, in April of 1974 those four FM original stations started broadcasting from Sears Tower.

The nominal 12-inch mast was made up of four 10-foot flange sections stacked and mounted on two I-beams welded to the inside walls of the West cylinder.

We then stacked the four antennas - from top to bottom - 93.9, 105.9, 101.9, and 103.5, using a temporary single Harris (ERI) circular-polarized ring per station, to reduce cross-coupling and require as few notch filters as possible.

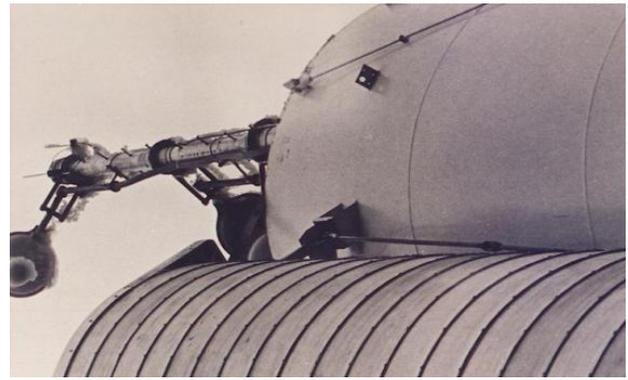


The antenna for WLAK 93.9 being mounted at the top of the 40-foot pole. Note the top of the East cylinder was open, with TV 7 and 11 side-mounted on the base.

Sherwin Asrow designed the pole and attachment beams. The contractor was the late Don Hudella (dba Lightning Deterrent). However, the Local One of the Iron Workers' Union controlled the job, so progress was intermittent.

It definitely was a slow go with erratic progress. Hudella had labor difficulties in working with the crew and actually spent all his time in the Sears lobby because the Iron Workers did not want him on the job site. They wanted to be seen as doing all the high work.

Furthermore, although this work was done at a time before RFI exposure regulation issues, I do recall that the price of the job changed along the way and more funds were needed. I also recall the discussion of a cash payment to move things along, but so far as I know, that never occurred. Finally, after weeks of delay the 40-foot pole was completed and antennas mounted.



Looking up from the 110th floor roof level at the temporary FM mast atop the west base. This shows some ice buildup on the antenna radome.

The city of Chicago required all antennas at the Sears Tower site be in a radome enclosure to control the build-up of ice. As I recall this was a condition of permit for antennas to be installed atop the Sears Tower.

All of the stations were running full Class B ND antennas except 105.9 which used orientation and reduced power to fit a tight spacing against WLNR 106.3 in Lansing IL. As best that I can remember, WLNR held WXFM to a 30 kW ERP limit to the south.

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COPING WITH NATURE

As one can well imagine, lightning was a problem for the FM antennas at the top of a structure 1,530 feet above ground.

As noted above, the mast was in four segments and was shop painted with many coats, the top coat being an acrylic paint. At first, the bolted flanges did not make positive electrical contact and lightning was making its way down the 3-inch feed lines.

DAMAGE CONTROL

Later we tack-welded each flange and added a purposeful ground conductor from the rod to the building steel. These actions help to reduce any lightning damage.

Nevertheless, over time, we had to deal with various puncture holes in the feed line (along

tower section run), radome destruction, and more.

In fact, severe lightning resulted in a fire causing some severe transmission line fire damage sometime in 1979. The Chicago Fire Department even had to be called out to manage the event.

There is a lot more to tell about the Sears Tower and the progression of broadcast facilities over the years. So, stay tuned, a second part of this history will be posted to the BDR soon to continue the story.

Warren Shulz is enjoying the retired life now, after being Chief Engineer at WLS AM-FM for 22 years after 15 years at WFYR-RKO. Now, he is out RVing and riding his eBike. When he is in, you can contact him at wshulz@cs.com

If you would like to know when Part 2 of the Sears Tower history is posted, be sure to sign up for the one-time-a-week **BDR Newsletter**. It only takes 30 seconds [if you click here](#).

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