

And the Knee Bone's Connected to the...

(How the MXGM station will work)

The first and most important part of every station (which is unfortunately not pictured in the diagram) is the DJ! Everything relies on a person in the On-Air studio to bring the radio in people's homes to life. The DJ talks into a Microphone, conducts an interview with other people in the studio, hits play on the CD player or Cassette, puts a record on the Turntable, or plays back an MP3 on the computer - this generates the sound that then gets fed into the Console. There is a Telephone interface or hybrid that allows the DJ to put callers on the air. There are extra inputs on the console to plug in extra devices - a Laptop or Minidisc player - so the DJ can bring in whatever material they may have recorded themselves.

A console is just a fancy mixer to the rest of us: it adjusts the levels and mixes the sounds together under the DJ's control. The output of the console can go many places: back to a cassette deck for recording, to the Headphones, and to the Studio Monitors (another fancy term for speakers). The signal is split using a Distribution Amplifier, which allows for adjustment of the audio level going to the various output points. There is a Radio Receiver somewhere in the studio as well, with a switch that flips the audio the DJ hears in the headphones or monitors between the output of the console and the over-the-air signal. This is sometimes called a 'confidence check', and lets the DJ know that everything is A-Okay at the transmitter, and replicates what listeners out in Radioland hear.

The Production studio is similar to the On-Air studio, but smaller and more basic. There is a small mixer instead of a larger console, and fewer Microphones and other sources. The Production studio does have one feature the On-Air studio doesn't have: a fast computer with audio recording and editing software on it. It can be used to edit together documentary or news pieces, station identifications, or whole shows for later playback.

Once the DJ starts up their show, an audio signal is generated out of the console, and is then passed through the Emergency Alert System (EAS) unit. The EAS unit is a special piece of hardware that relays signals from Federal, State and Local government officials in times of emergency. It can also be used to relay severe weather warnings and alerts. If there were such an alert, the EAS would cut off the audio from the studio, play back a message, and then resume the audio coming from the studios.

After the EAS, the main output of the On-Air studio goes to a simple audio processor. An audio processor can change the sound of the audio going out, but the main purpose is to keep the peaks and loudest parts of the audio from overloading the Studio Transmitter Link (STL). An STL transports the audio from the studio to the transmitter site, which is nearly three miles away! The STL encoding hardware is just a computer - it takes the audio at its inputs and converts it into digital audio data. If the audio level overloads the input of the STL device, the digital audio will become distorted and sound really bad, but the audio processor prevents that. The STL sends the encoded audio data over a computer network to a Wireless networking bridge - a dedicated WiFi network dealie for those that know the lingo. This WiFi bridge converts the data into radio signals that are fed into a directional antenna on the roof of the MXGM center where the studios are located. A directional antenna focuses the radio wave energy in a single direction, while reducing the energy in every other direction. This lessens the interference that other radio signals may have on the STL, and makes the link stronger. There is a directional antenna at the transmitter site up on the tower that is receiving this signal sent out from the studio location.

Once the WiFi radio signal is received at the Transmitter site, it is converted back into digital data by another wireless bridge, and sent on its way to the audio decoding device - another computer. This computer takes the digital audio data and converts it back into an analog audio signal, which comes out of its audio outputs. The audio has been sent from the studios to the transmitter site - three miles without wires!

The output of the STL is fed into the input of another processor. This processor is a bit different from the one that preceded the STL encoding computer, but serves the same function. It protects the Transmitter from high audio levels that may still be present in the signal. This keeps the transmitter from over-modulating on the high audio levels - preventing the transmitter from generating signals outside of the station's allocated bandwidth (space) on the FM band. The Transmitter changes the audio signal into radio frequency energy, which is then sent out over a large, heavy coaxial cable to the Circularly Polarized antenna on the top of the tower. This antenna radiates the radio frequency energy out into the air, sending the signal through space and time to the listener's receiver. The receiver changes the FM audio back into sound waves that the listener can hear!