Other things that you might like to add are RF amplifiers, RF filters, and RF measurement devices. A RF amplifier will boost the signal level coming out of the transmitter (this may or may not be needed depending on the design of the transmitter, and the coverage desired.) RF filters make sure that unwanted harmonics or radio waves generated by the transmitter or RF amplifiers are not radiated. Harmonics could cause unwanted interference with a number of different radio services including airplane guidance systems and public safety vehicles. A sure way to draw attention to yourself! A number of RF measurements devices from SWR/Power Meters to frequency counters to spectrum analyzers can be used to make sure that you are radiating an effective clean signal (though some is out of reach to the average clandestine radio operator.)

Figure 9 shows a possible radio station setup using some of the items discussed in this book. We have a mixing console with two tape decks, two CD players and two microphones feeding a Ramsey FM-10. The FM-10's output signal is being boosted to around 800mw using the 800mw amp. plans. The 800mw of power is then fed into a modified Ramsey PA-1 power amplifier which boosts the signal again to about 12 watts. The harmonics are then filtered down with a low pass filter and the cleaned signal is routed, through a length of coax, to our 1/4 wave groundplane antenna where it radiates to the world. A setup like this could have a range between 5 and 30 miles depending on the height of the antenna and the surrounding environment.

Figure 11 shows some useful items to connect everything together. A) converts an RCA connector to a UHF connector, this us useful to convert the RCA RF output to a UHF connector for use with CB/Amatuer Patch cables. B) is a UHF to BNC connector, some people (like me) use BNC connectors instead of UHF connectors. C) is a coax patch cord with UHF connectors. This is useful for connecting stages together. I have, during prototyping, forgone the connectors and have soldered the cable right to my amp/transmitter boards. This is reflected in my amplifier designs under the board layout section.

The BA1404 and Transmitter Design

The BA1404 is a monolithic FM stereo transmitter on a chip. It contains left and right channel AF amplifiers, a stereo modulator, a FM RF exciter, and a RF amplifier. The stereo modulator creates a stereo composite signal from a 38Khz quartz controlled frequency source (xtal.) The FM modulator oscillates a carrier in the FM broadcast band (76 to 108 Mhz) and modulates it with the composite signal. The RF amplifier creates energy to emit the modulated FM signal. It also functions as a buffer for the FM modulator. All this in a small 18 pin package with few external parts!

Before the advent of the BA1404, generating a stereo signal was a much more complex task and is beyond the scope of this book (see sources for information on these methods.) Although it is possible to generate a higher quality stereo signal using these methods, with more control over the stereo modulation and levels. The BA1404 is much easier to produce low cost, easy to assemble, high performance, designs.

The most frustrating thing about the new kits based around the BA1404 is the fact that they all use inductor/capacitor tanks to determine there operation frequency. This leads to frequency drift and no way to determine exactly what frequency you are operating on without constant retuning with a frequency counter. The solution is to use the BA1404 only for the composite stereo generation, and to digitally frequency synthesize the carrier with a phase lock loop. This is actually not as hard to do as it may sound. (See PLL design)