Description of Circuits to Suppress Emissions

A fixed frequency L.O. operating on 220 MHz is mixed up to the desired output frequency by a doubly balanced mixer made up of L322, U301, and L321. The 220 MHz signal is passed through a low pass filter before being applied to the mixer to prevent any harmonics from leading to any undesired products that could lie within the pass band. The pass band for the U.S. version (Band A) is 614-662 MHz and for the export version (Band B) it is 774-865 N4hz. The 21 L.O. operates 220 MHz above the output frequency. The output of the mixer is amplified by Q317, then fed through a pass band filter which is tuned to pass only the low side product of the conversion. Any undesired products are to be greater than 60 dBc below the desired signal at this point. The desired signal is then fed to an amplifier chain composed of Q316, Q315, and Q324. After amplification, the signal is passed through a low pass filter to remove any harmonics generated by the amplifiers.
In addition, the processor monitors the PLL for an out of lock condition of either synthesizer. The processor, with the aid of Q12 and Q321, provides power for the last two stages of final amplification only if both loops have been locked for a predetermined amount of time. This reduces the possibility of transmitting off frequency and also prevents transmitting upon power up while the synthesizers acquire lock.

Description of Circuits to Limit Modulation

Each channel is limited independently by both a hard limiter and a dynamic limiter. The dynamic limiter functions as an AGC once full modulation is reached. If additional audio is applied, the limiter will reduce the gain of the audio path by overriding the compressor. This maintains legal modulation with little if any noticeable distortion. There is an optional jumper that will cause both limiters to be activated whenever either one is triggered. This feature is designed to maintain a specific balance between the two channels regardless of which channel has excessive audio apllied. Since each dynamic limiter is designed to ignore transients, the hard limiters are present only to limit anything the dynamic limiters allow to pass.
Audio is fed through the compressor (U5), then pre-emphasized by U40(left channel) or U41 (right channel). Q200 and Q20 I (left channel) or Q203 and Q204 (right channel) provide the hard limiting. At this point the audio is amplified byUI4 (left channel) or UI3(right channel)
and rectified by CR7 and CR8(left channel) or CR5 and CR6(right channel). The resulting DC voltage is applied to a comparator formed by Q9, Ql 5, and Ql 6(left channel) or Q8, Ql 3, and
Q 14(right channel). Once a preset voltage is exceeded at the input of the comparator, the output of the comparator overrides the feedback loop in the compressor and reduces the audio path gain as needed to maintain legal modulation. The top bar graph LED indicates whenever any dynamic limiting is being employed.