

Appendix E

Measured Spectrum at the FedEx Field Washington, DC

The following figures show the spectrum from TV channels 21 to 51, as observed at FedEx Field on a spectrum analyzer with a ground plane vertical antenna having a gain of approximately 0 dBi. The ESPN microphones are shown in red. The other frequency labels indicate NFL microphones, spectral components of NTSC or DTV television stations, or signals of unknown origin.

Figures E-1 to E-14 show the spectrum on the home team sideline of the playing field, Figures E-15 to E-28 show the spectrum at the “Tailgate” area, Figures E-29 to E-42 show the spectrum on the upper deck, and Figures E-43 to E-56 show the spectrum in the press box. The ESPN microphones were turned on and off at each location.

Although the NFL was not expected to begin setting up and testing their microphones until 5:00 PM, when making spectrum measurements on the upper deck starting at about 3:00 PM, many new signals other than ESPN microphones appeared as shown in Figures E-29 to E-42. It was assumed that these were the NFL microphones for which the frequencies were unknown. Therefore, only the ESPN microphones were identified by frequency labels in Figure E-43 to E-56, which show the spectrum with the ESPN microphones turned on.

Figures E-57 to E-63 show the spectrum in the press box at about 6:20 PM, less than one hour before the start of the game, and after the ESPN microphones had been turned off permanently. Except for amplitude, the spectrum is virtually the same as the spectrum observed earlier in the day with the ESPN microphones turned off, as shown in Figures E-43 to E-56. Figures E-64 to E-70 show the spectrum during the first quarter of the game.

When analyzing the data, be aware that the indicated frequency on the spectrum analyzer is only an approximate value, and that there was a time delay of as much as one and one half hours between measurements taken with the microphones off and on at a given location.

The ESPN wireless microphones were operated on the following frequencies: 513.05, 525.3, 548.350, 576.2, 584.8, 594.5, 646.85, 653.15, 659.65, 670.15, and 682.3 MHz.

E.1 RF Spectrum Plots measured on the Field

Spectrum on Field
ESPN Microphones Off

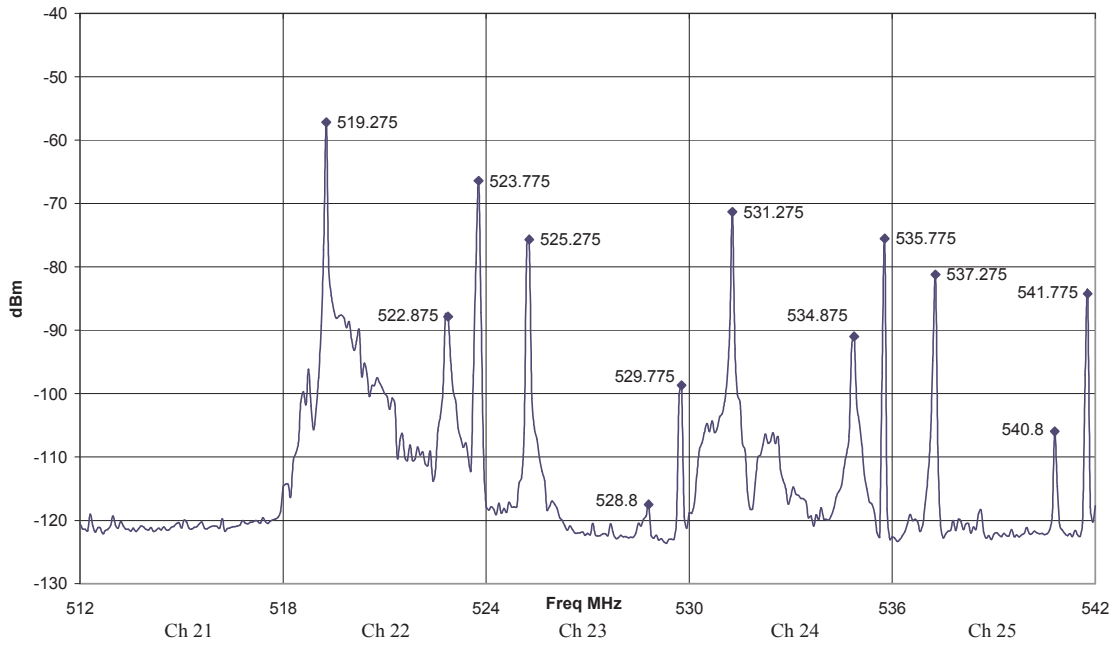


Figure E-1

Spectrum on Field
ESPN Microphones On

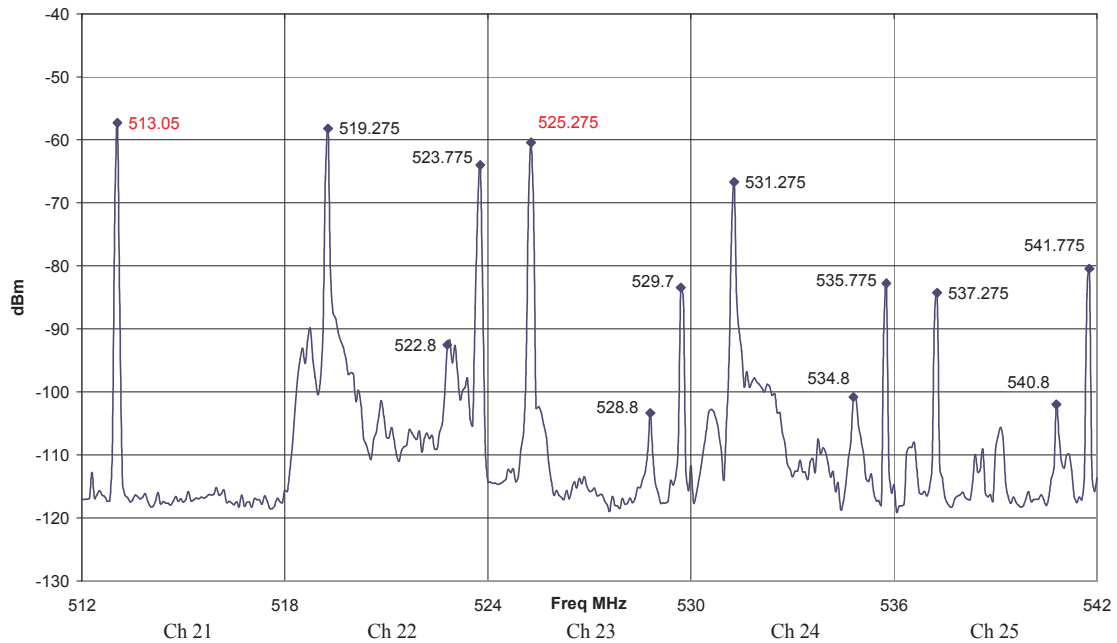


Figure E-2

Spectrum on Field
ESPN Microphones Off

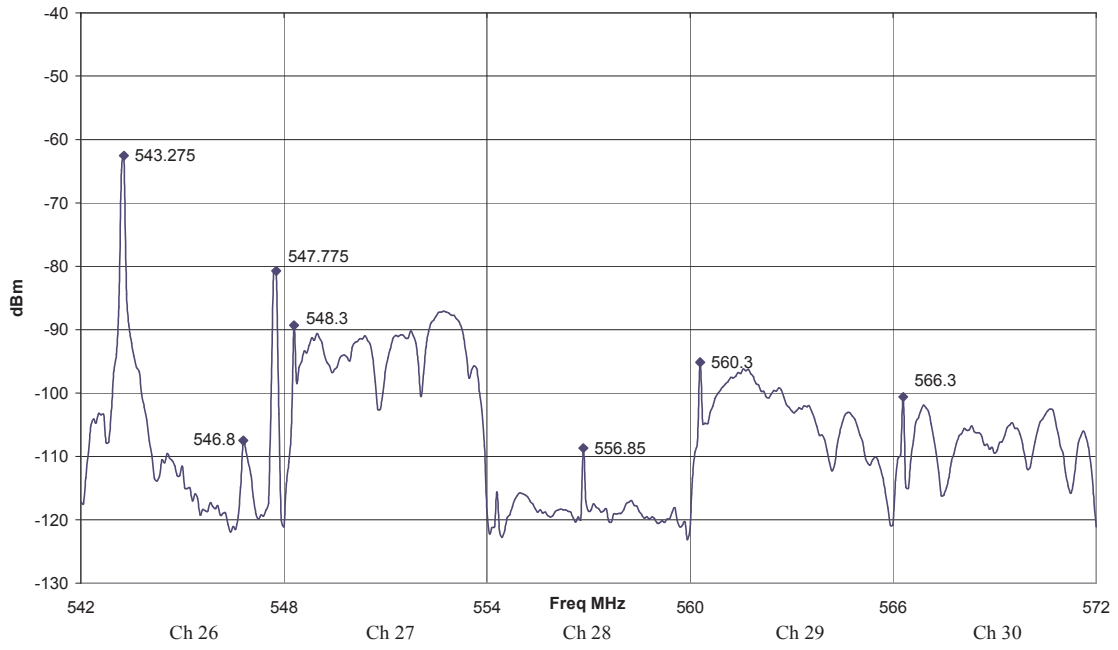


Figure E-3

Spectrum on Field
ESPN Microphones On

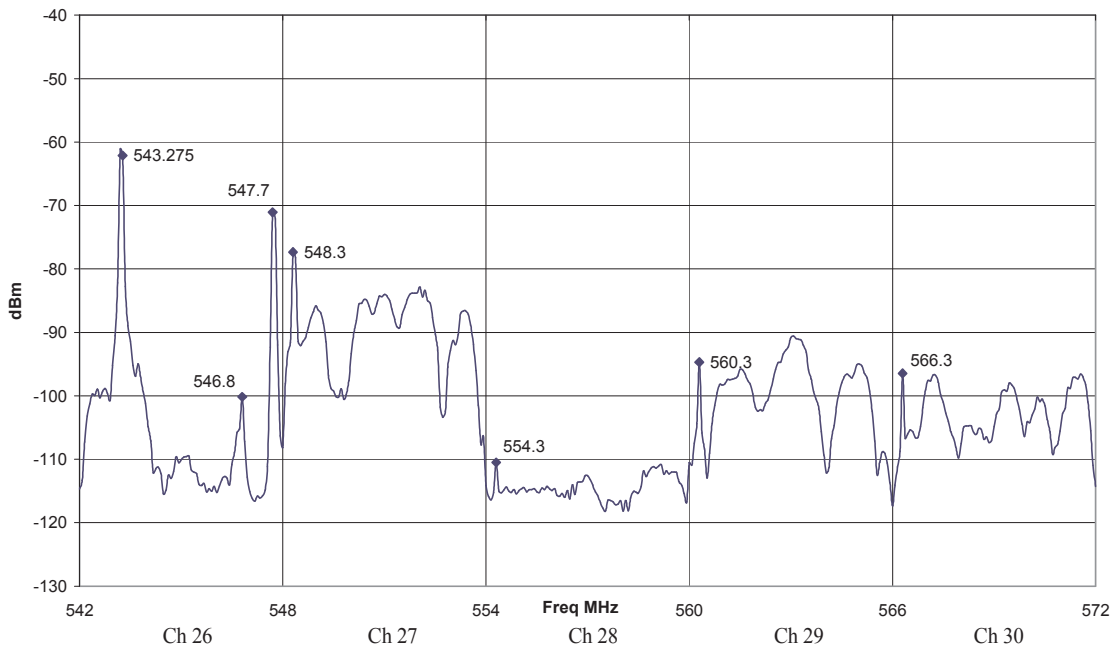


Figure E-4

**Spectrum on Field
ESPN Microphones Off**

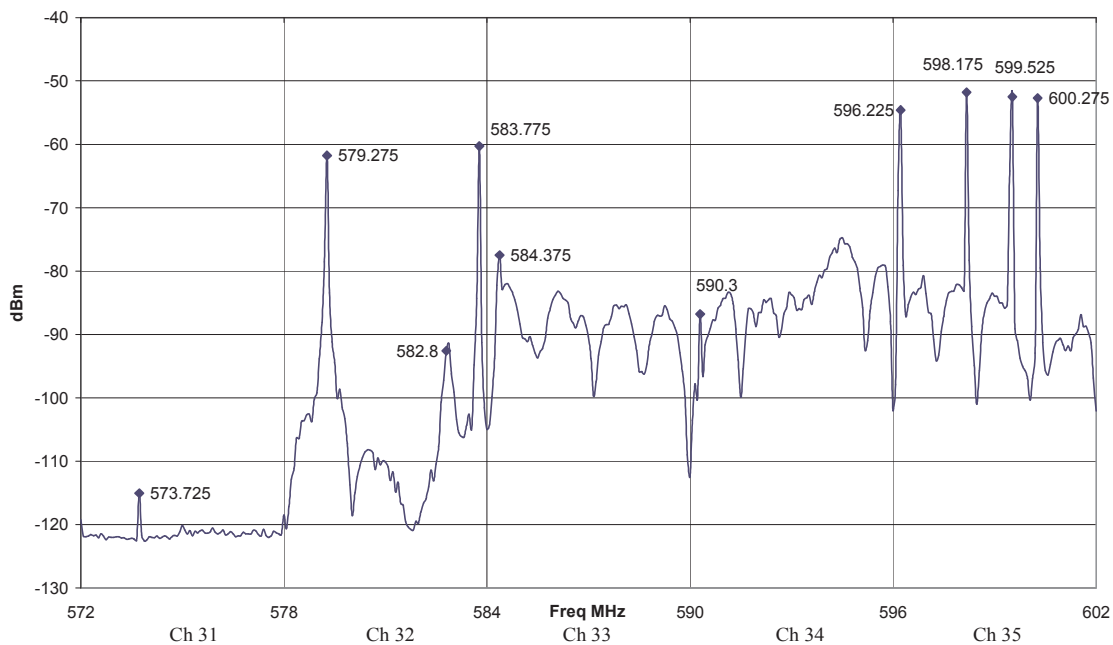


Figure E-5

**Spectrum on Field
ESPN Microphones On**

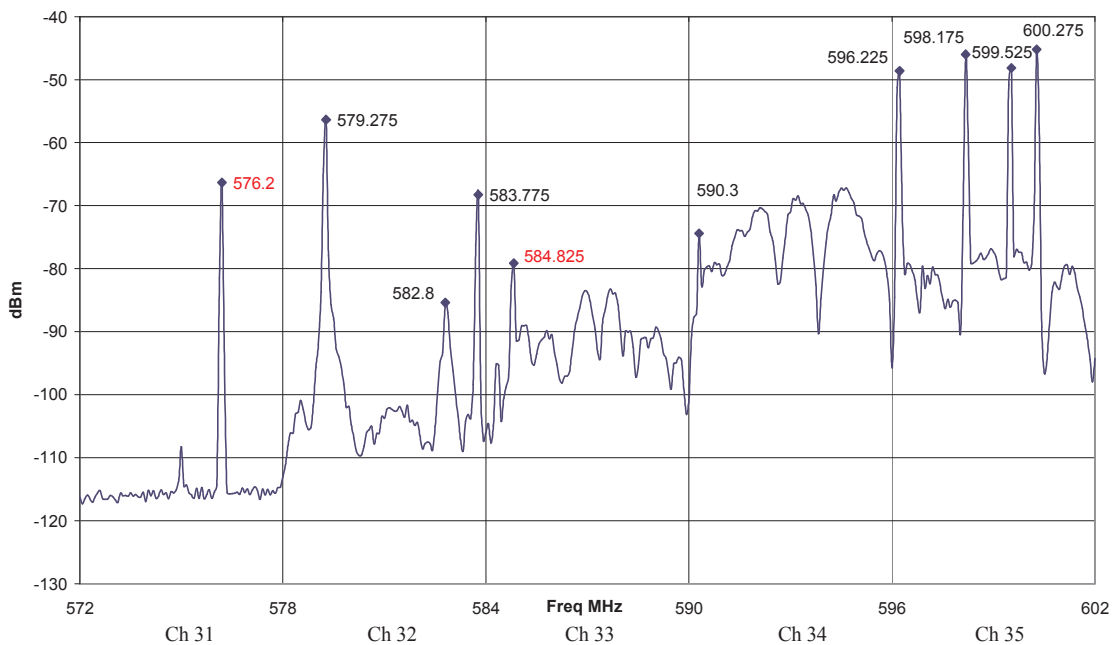


Figure E-6

**Spectrum on Field
ESPN Microphones Off**

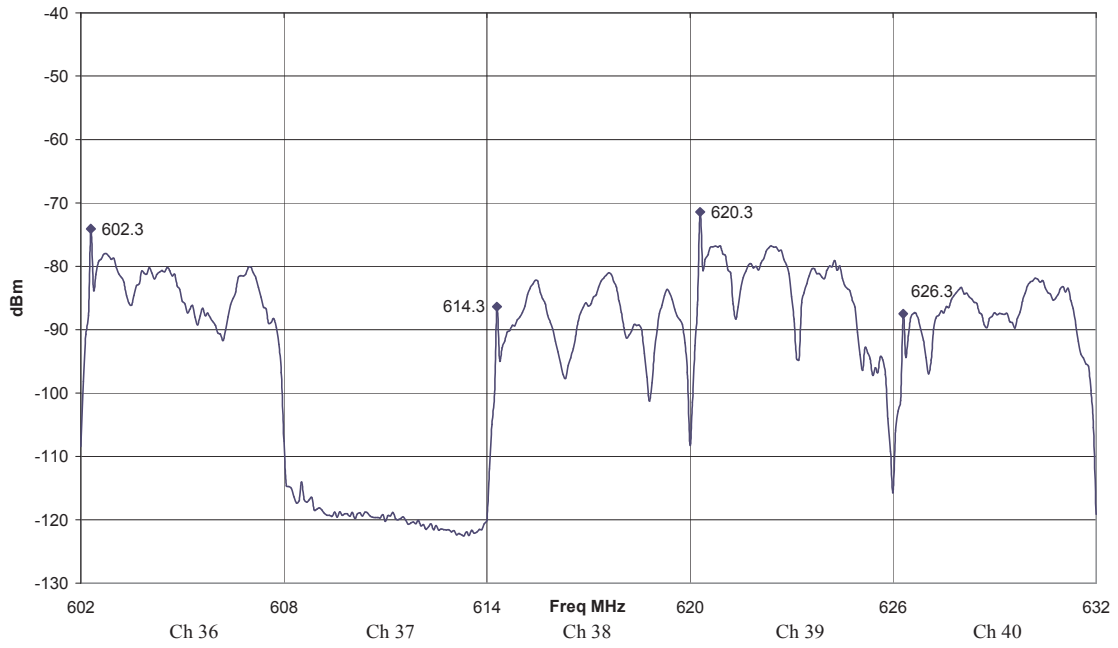


Figure E-7

**Spectrum on Field
ESPN Microphones On**

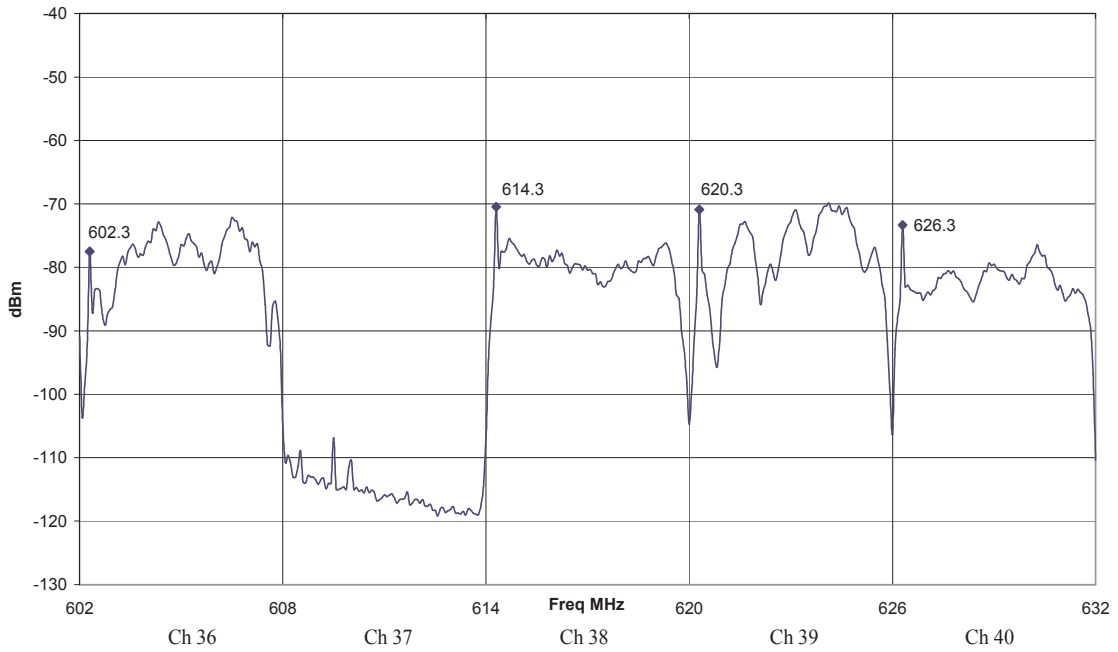


Figure E-8

Spectrum on Field
ESPN Microphones Off

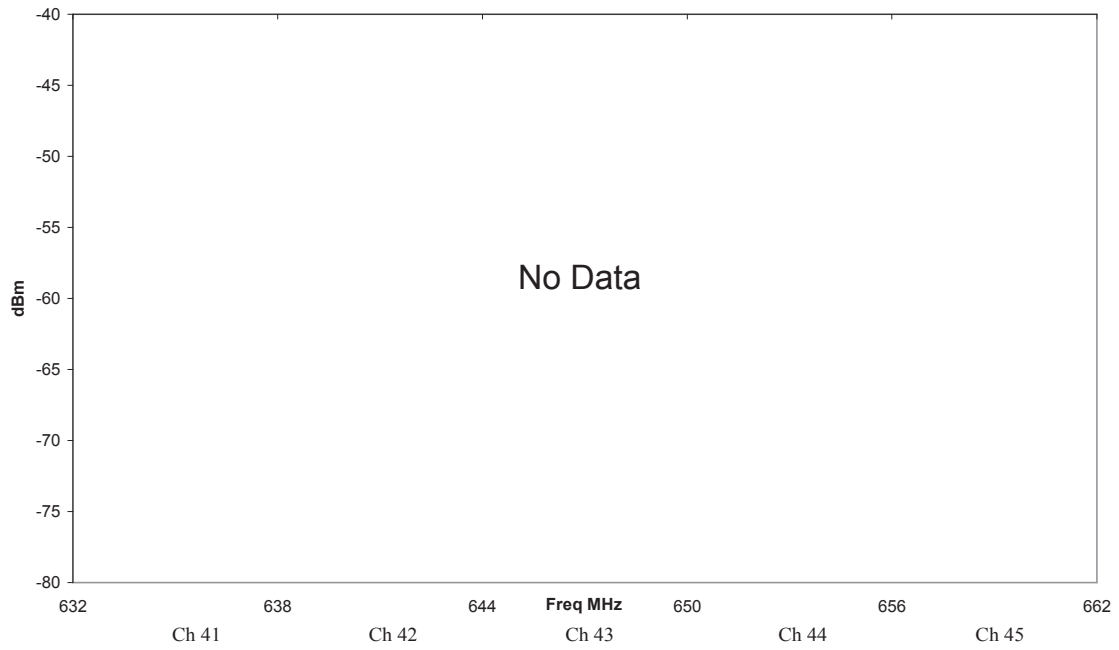


Figure E-9

Spectrum on Field
ESPN Microphones On

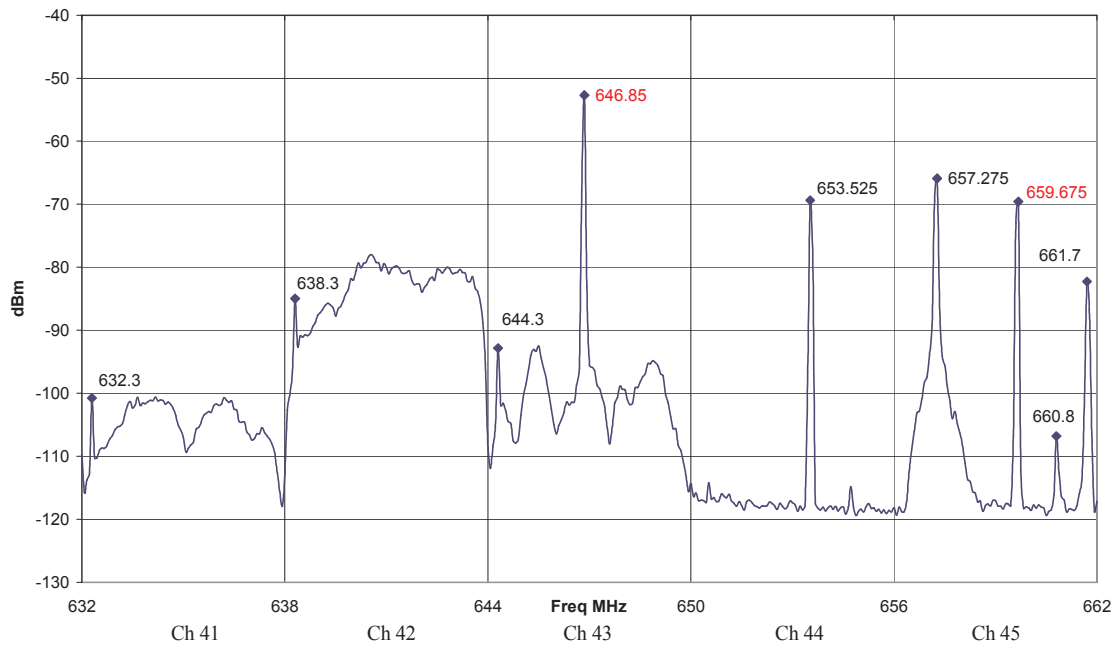


Figure E-10

**Spectrum on Field
ESPN Microphones Off**

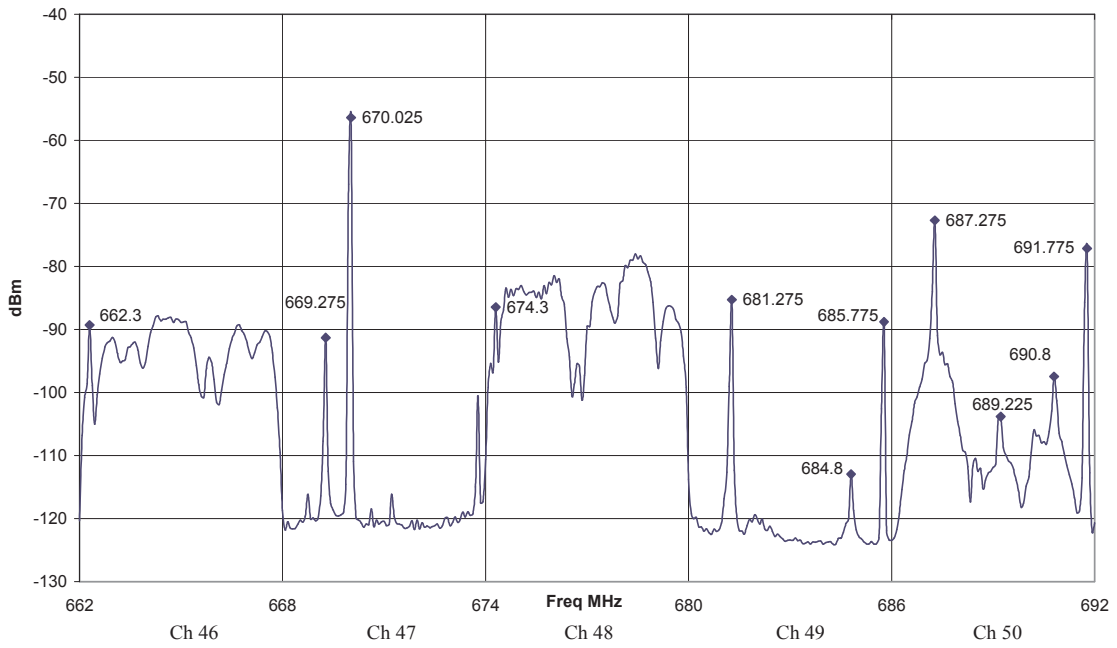


Figure E-11

**Spectrum on Field
ESPN Microphones On**

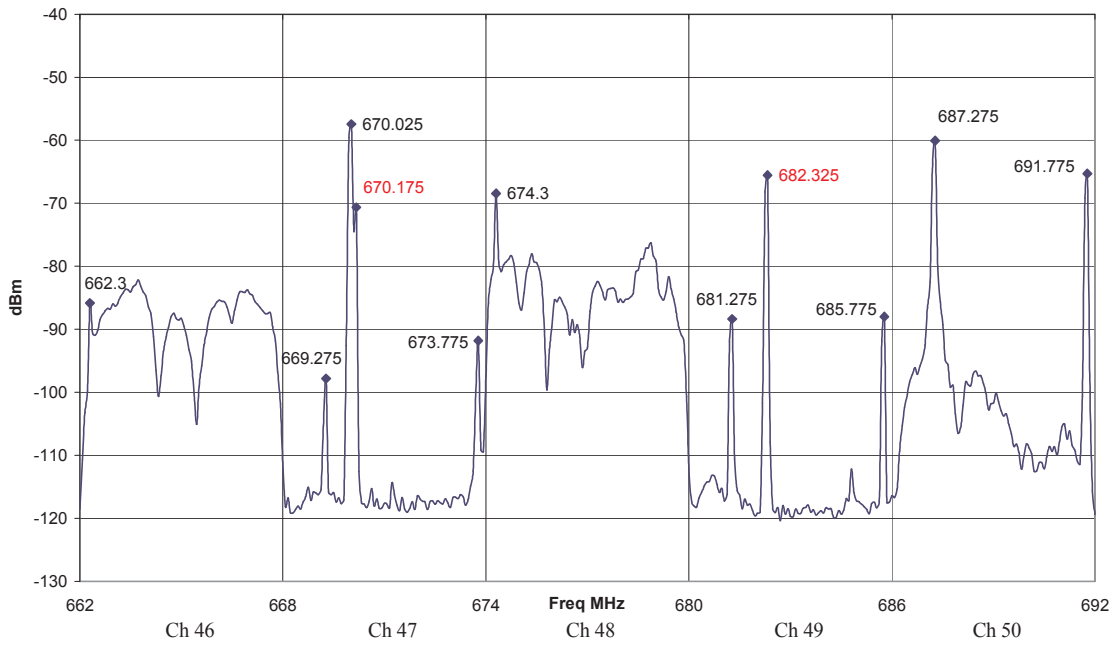


Figure E-12

**Spectrum on Field
ESPN Microphones Off**

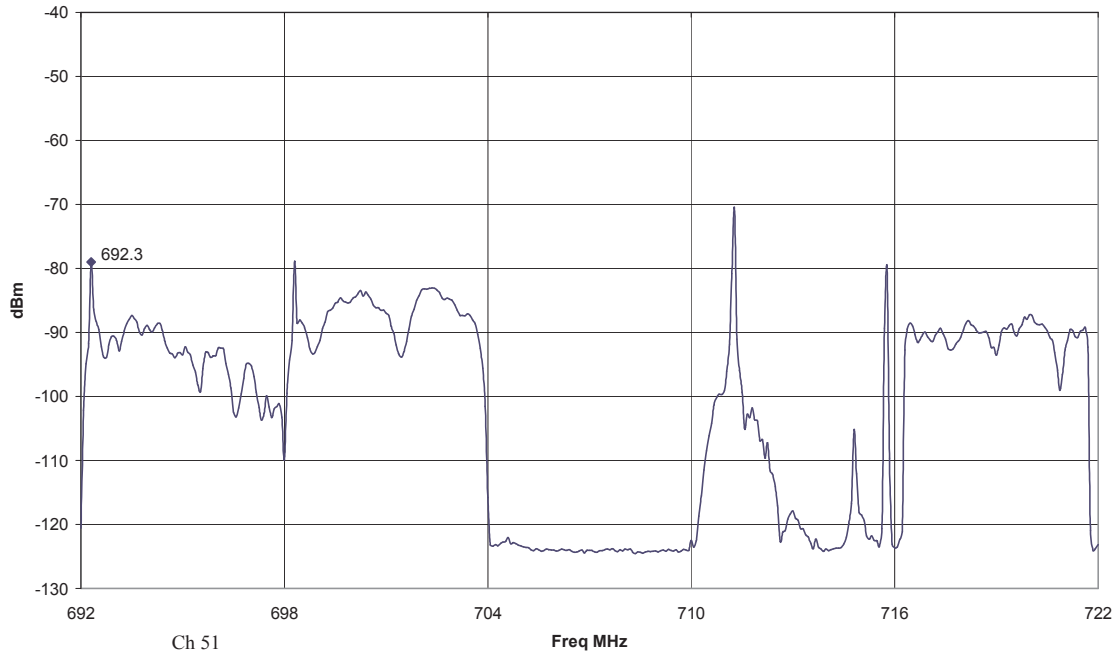


Figure E-13

**Spectrum on Field
ESPN Microphones On**

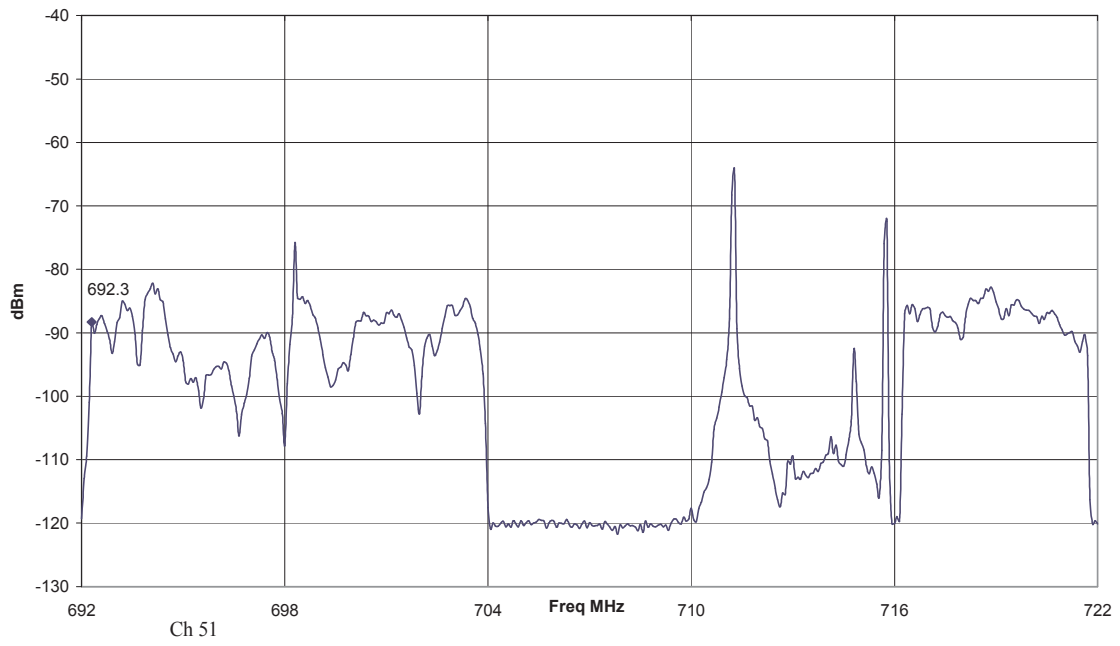


Figure E-14

E.2 RF Spectrum Plots measured in the Tailgate Area

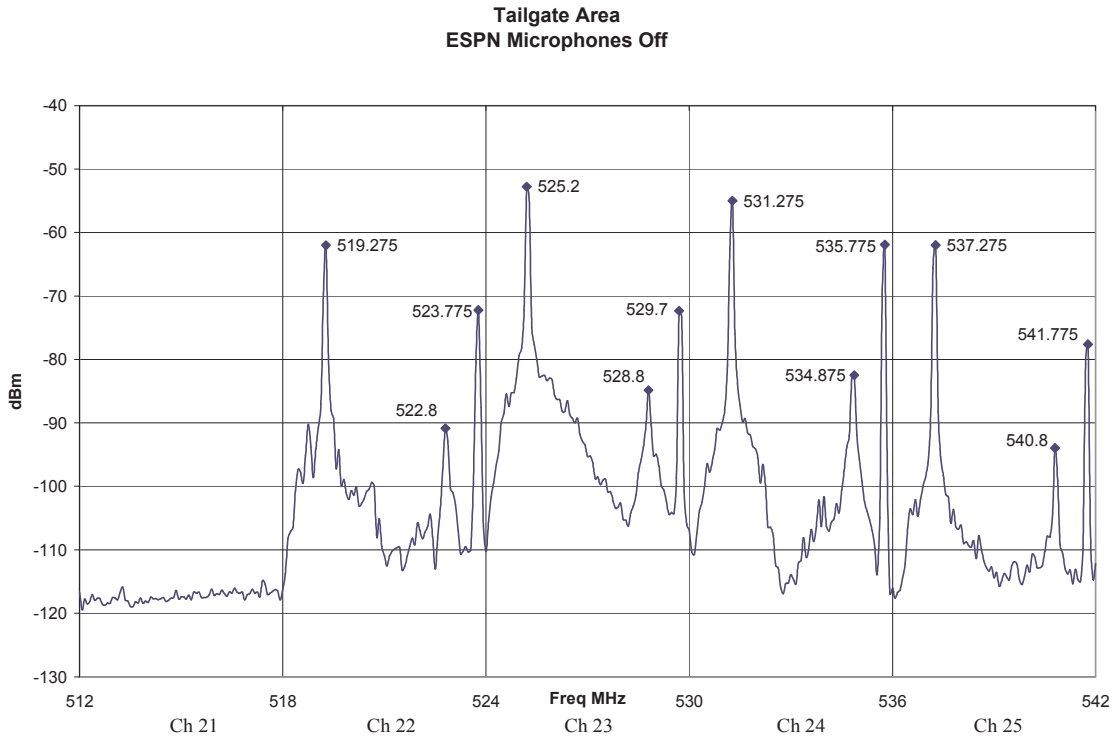


Figure E-15

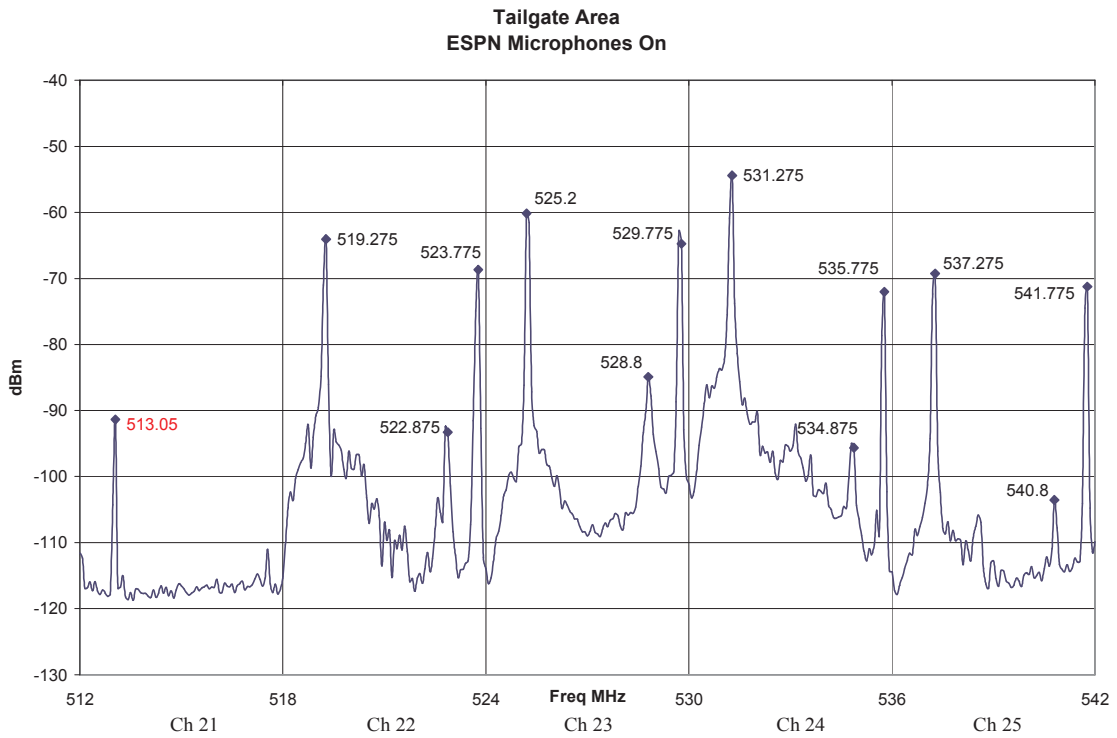


Figure E-16

Tailgate Area
ESPN Microphones Off

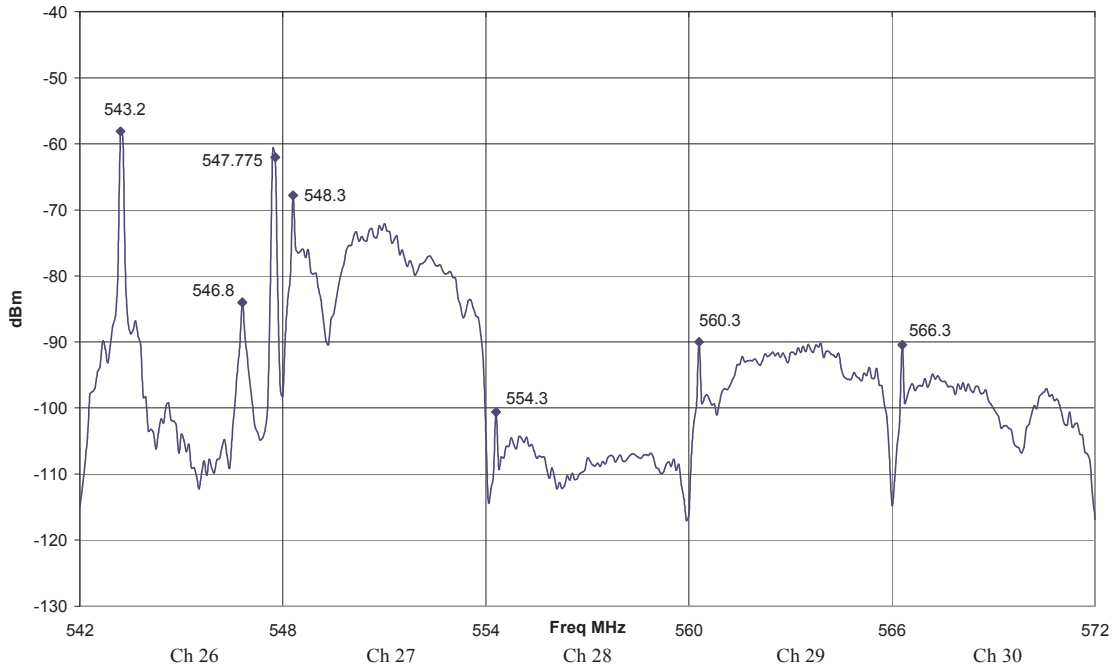


Figure E-17

Tailgate Area
ESPN Microphones On

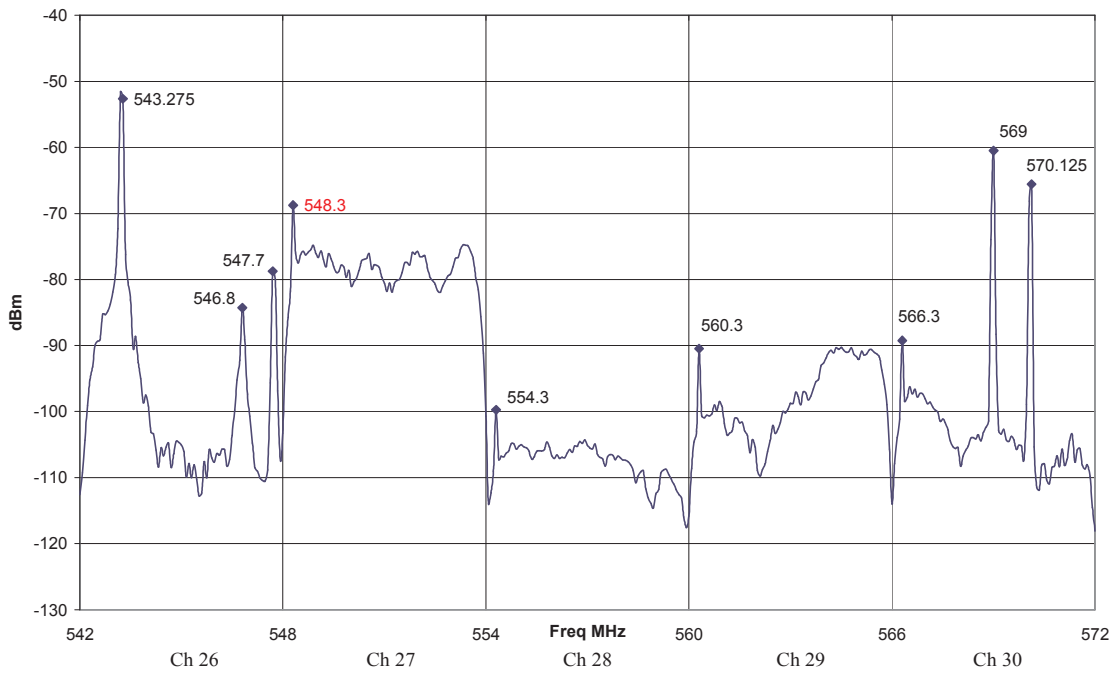


Figure E-18

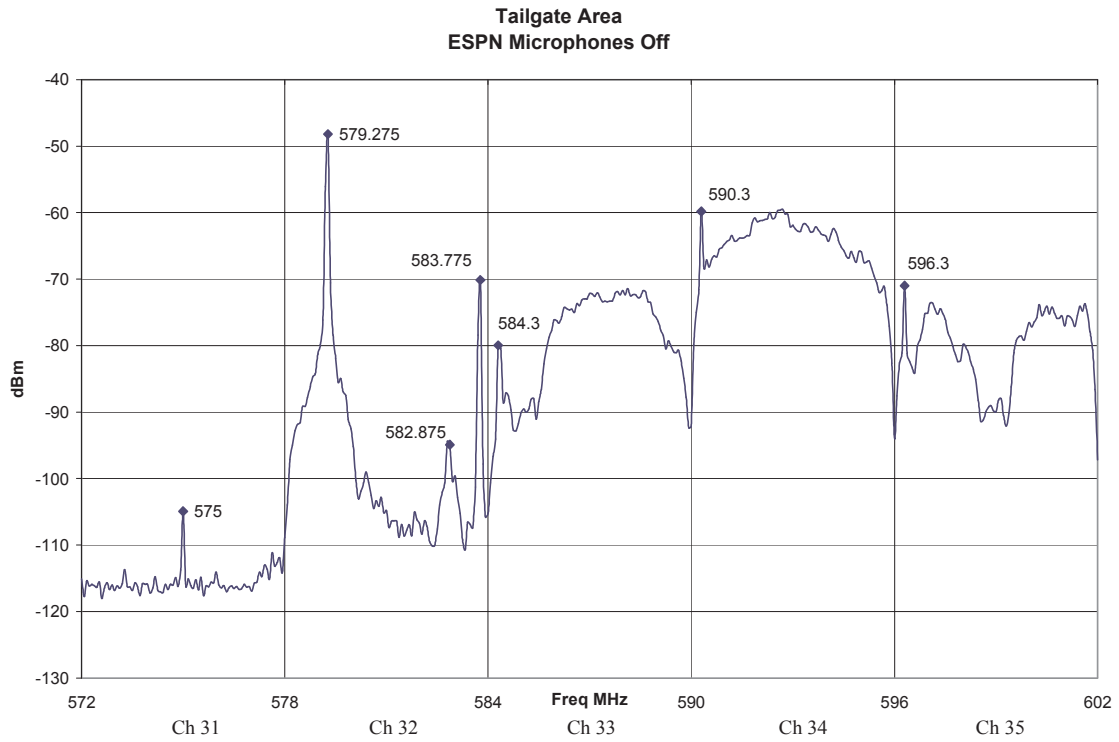


Figure E-19

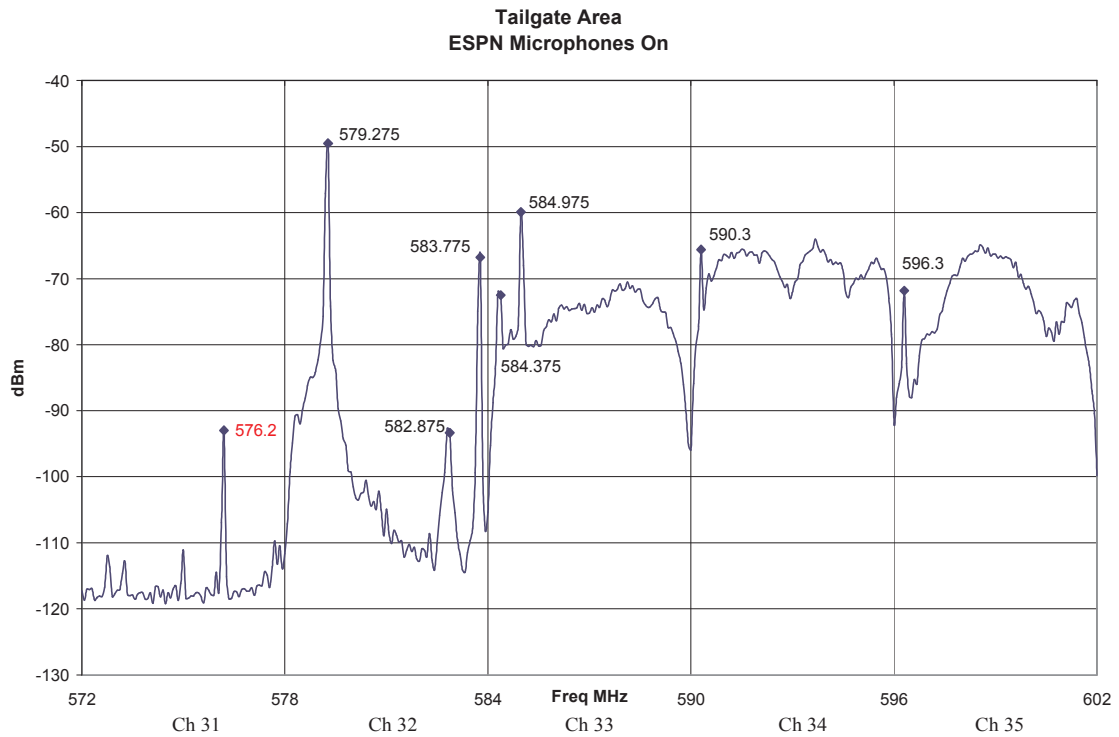


Figure E-20

Tailgate Area
ESPN Microphones Off

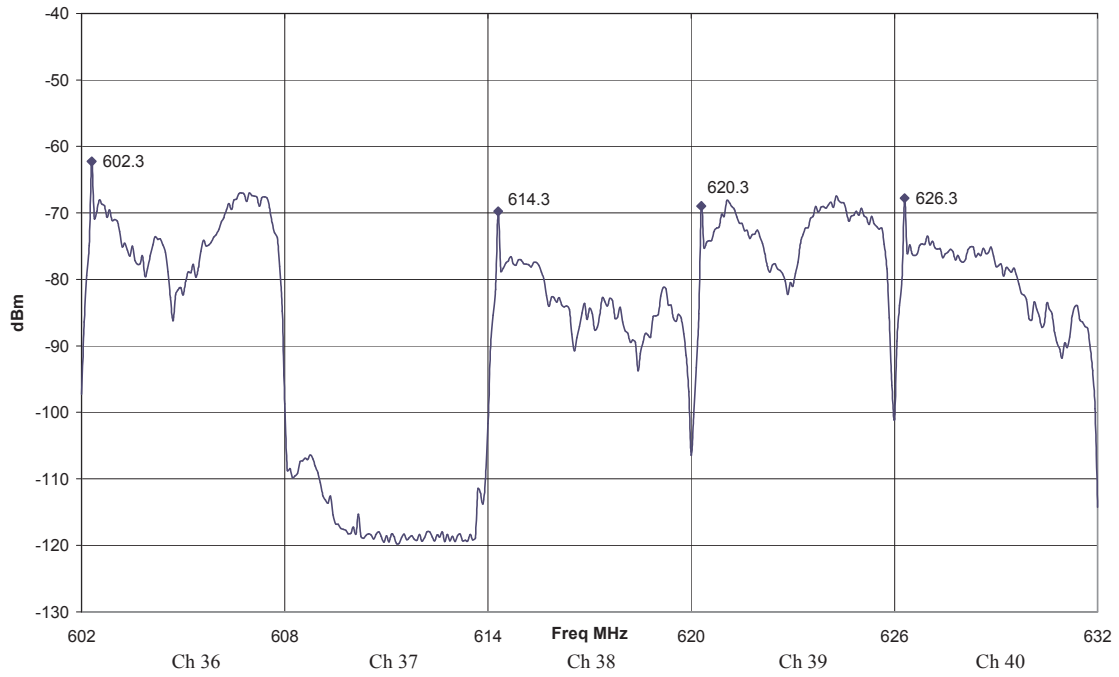


Figure E-21

Tailgate Area
ESPN Microphones On

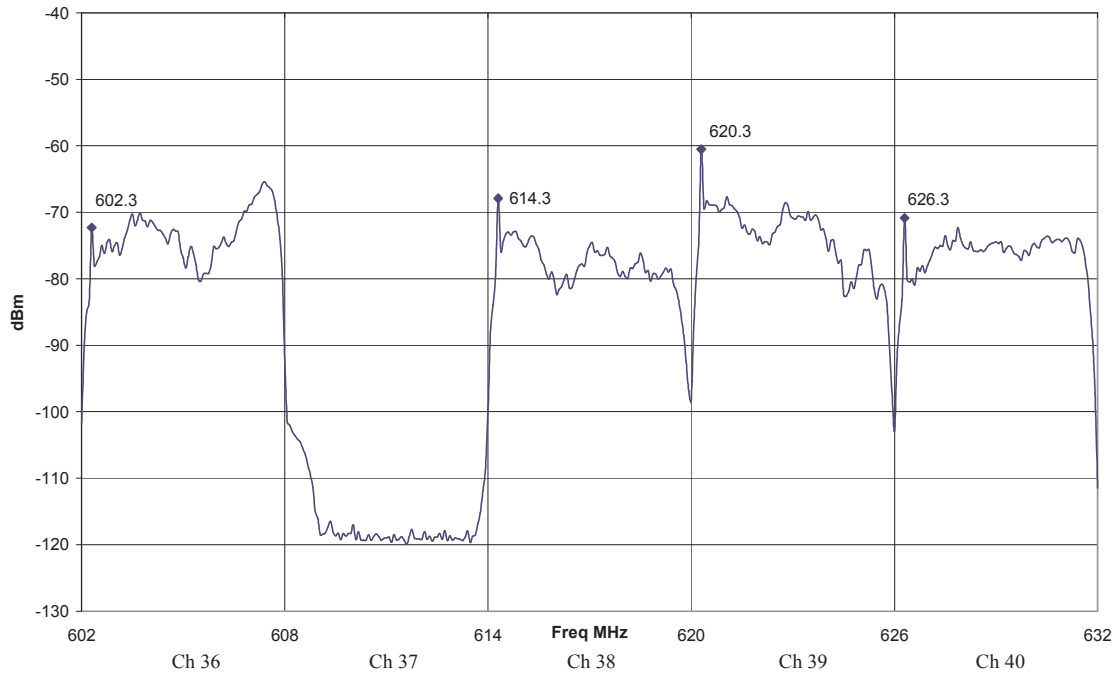


Figure E-22

Tailgate Area
ESPN Microphones Off

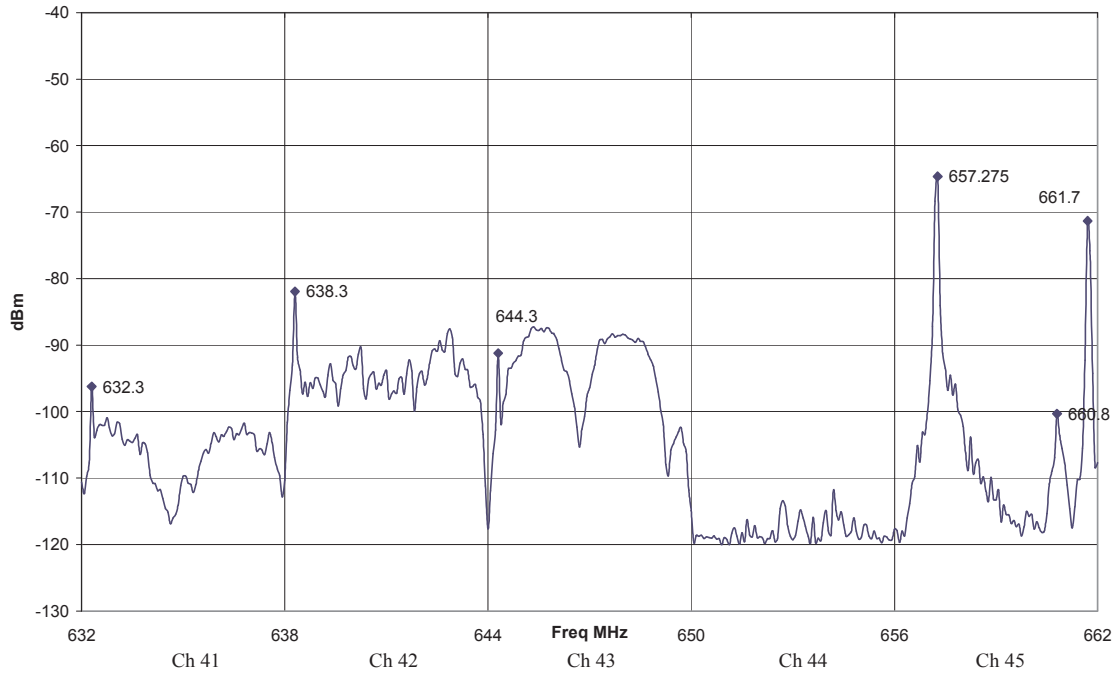


Figure E-23

Tailgate Area
ESPN Microphones On

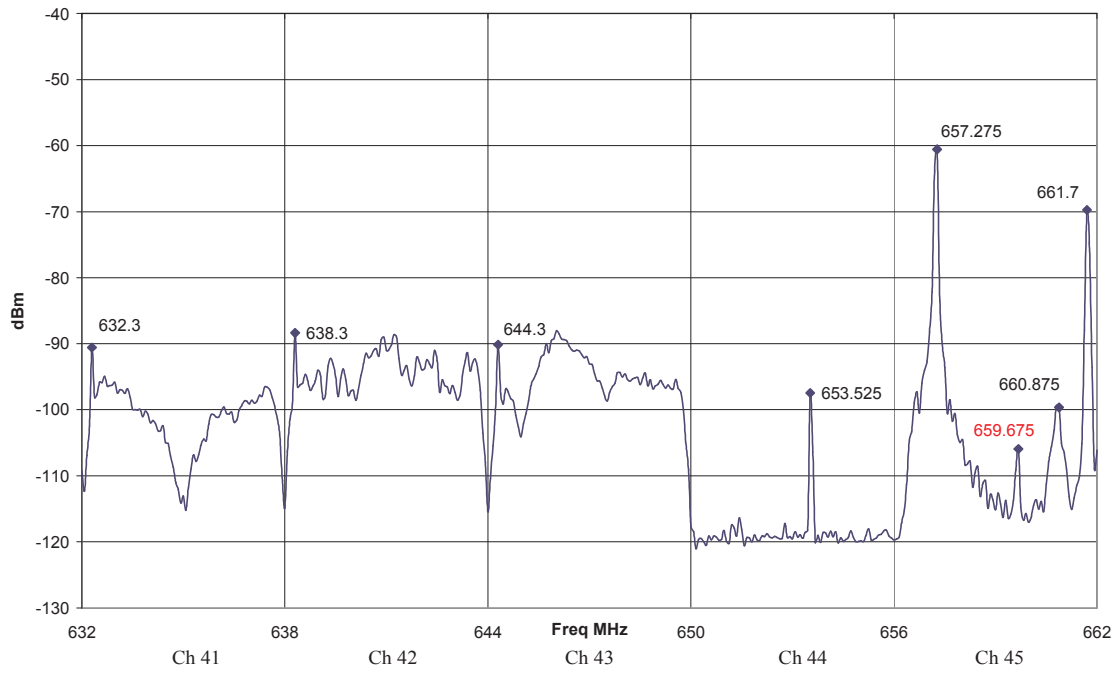


Figure E-24

Tailgate Area
ESPN Microphones Off

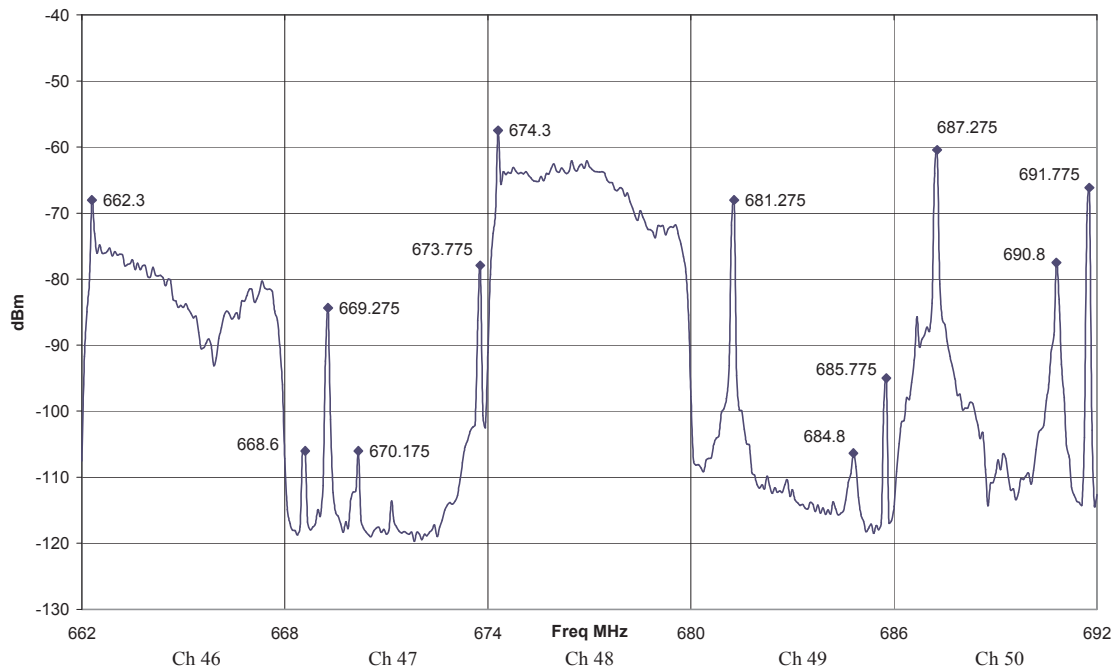


Figure E-25

Tailgate Area
ESPN Microphones On

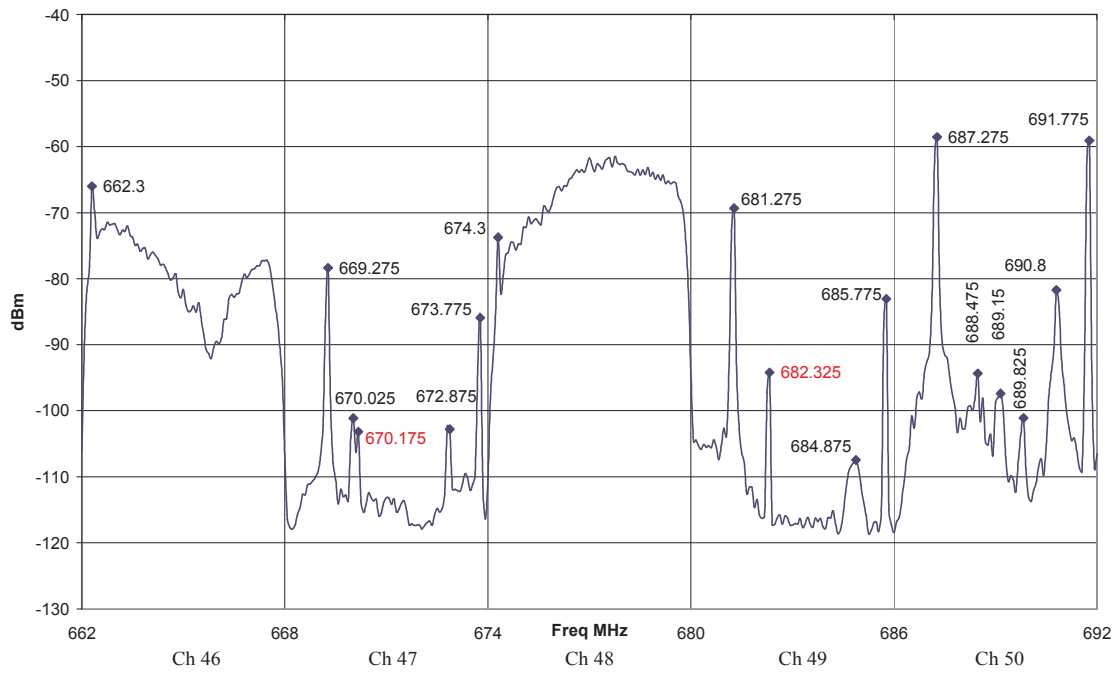


Figure E-26

Tailgate Area
ESPN Microphones Off

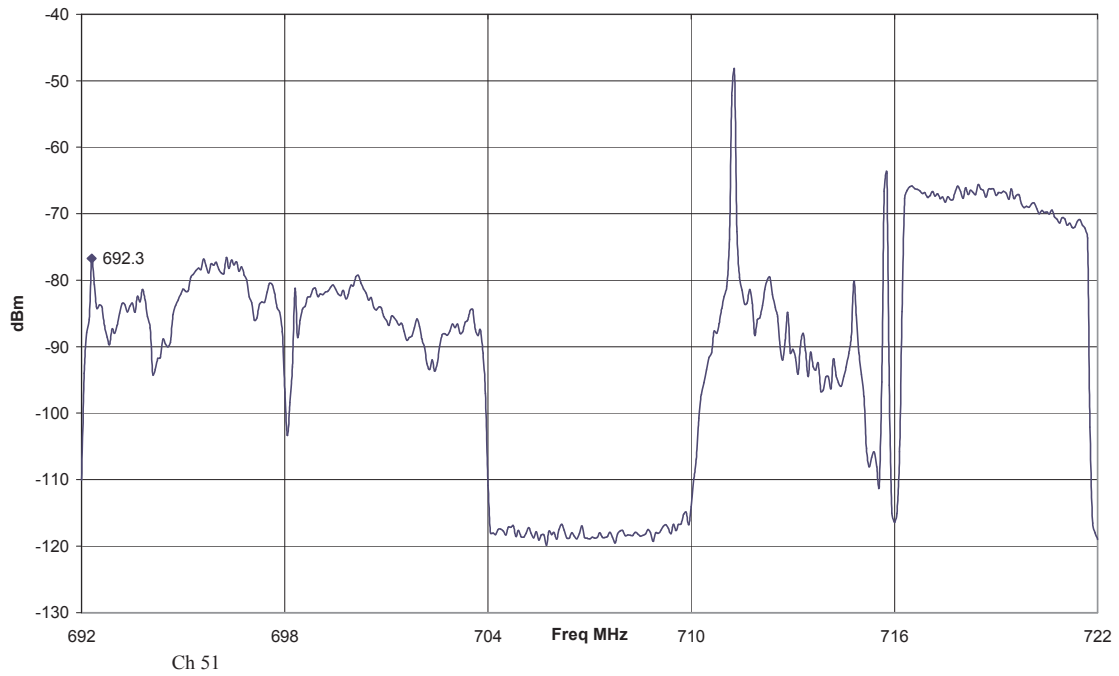


Figure E-27

Tailgate Area
ESPN Microphones On

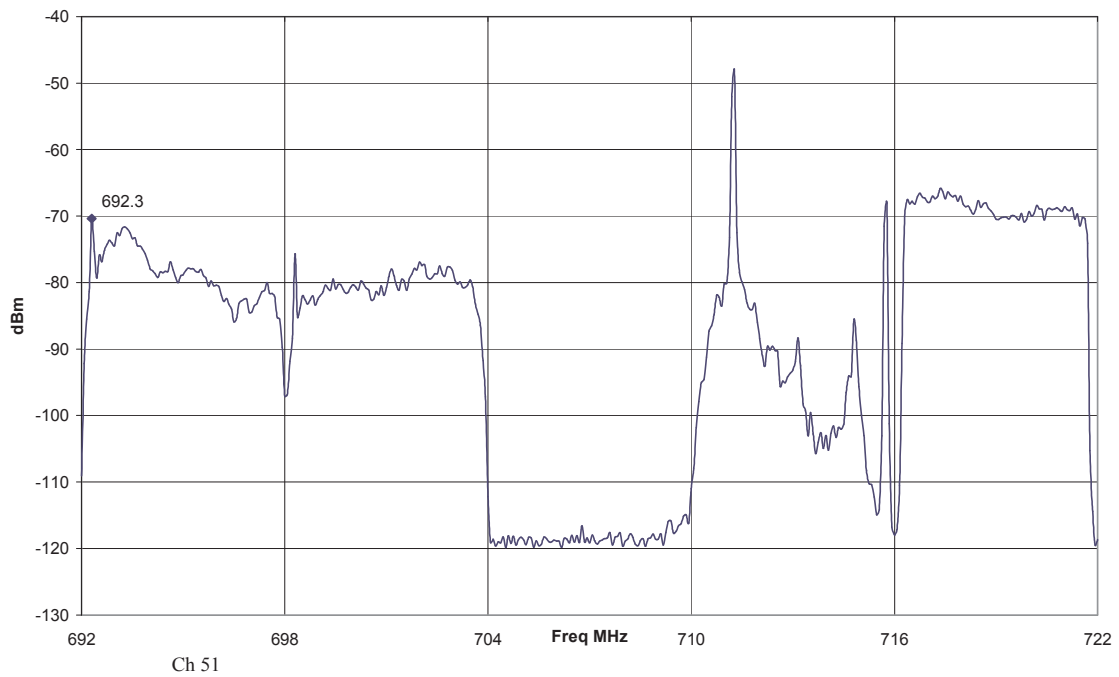


Figure E-28

E.3 RF Spectrum Plots measured in the Upper Deck Area

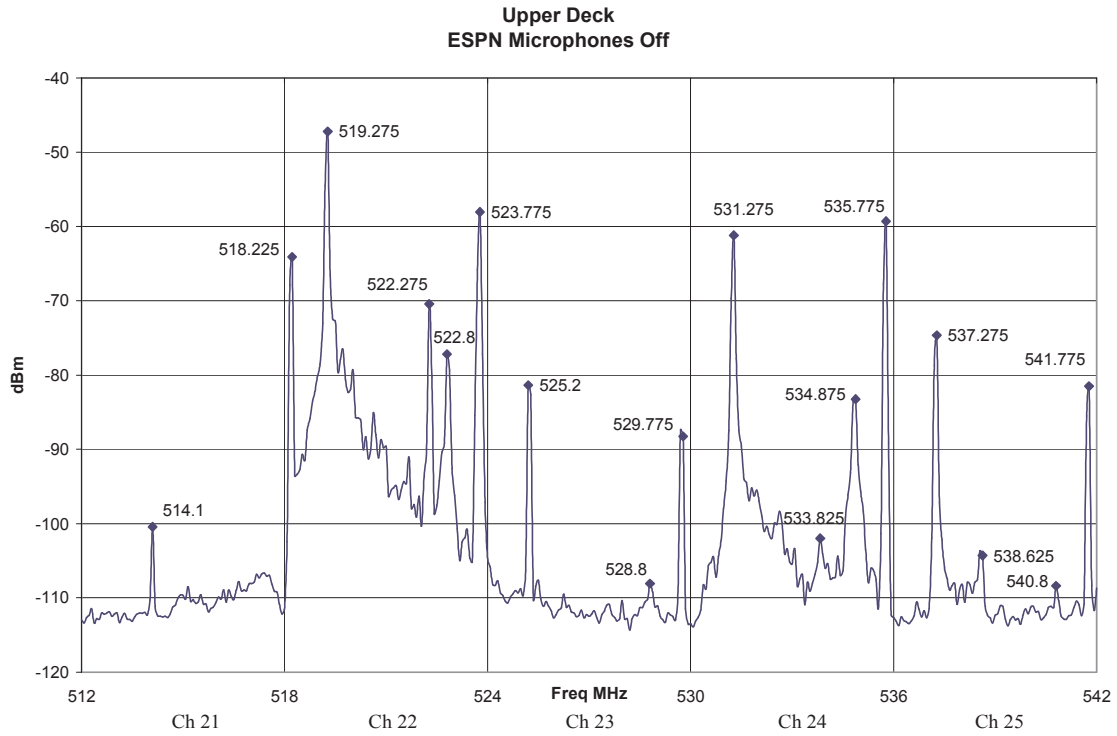


Figure E-29

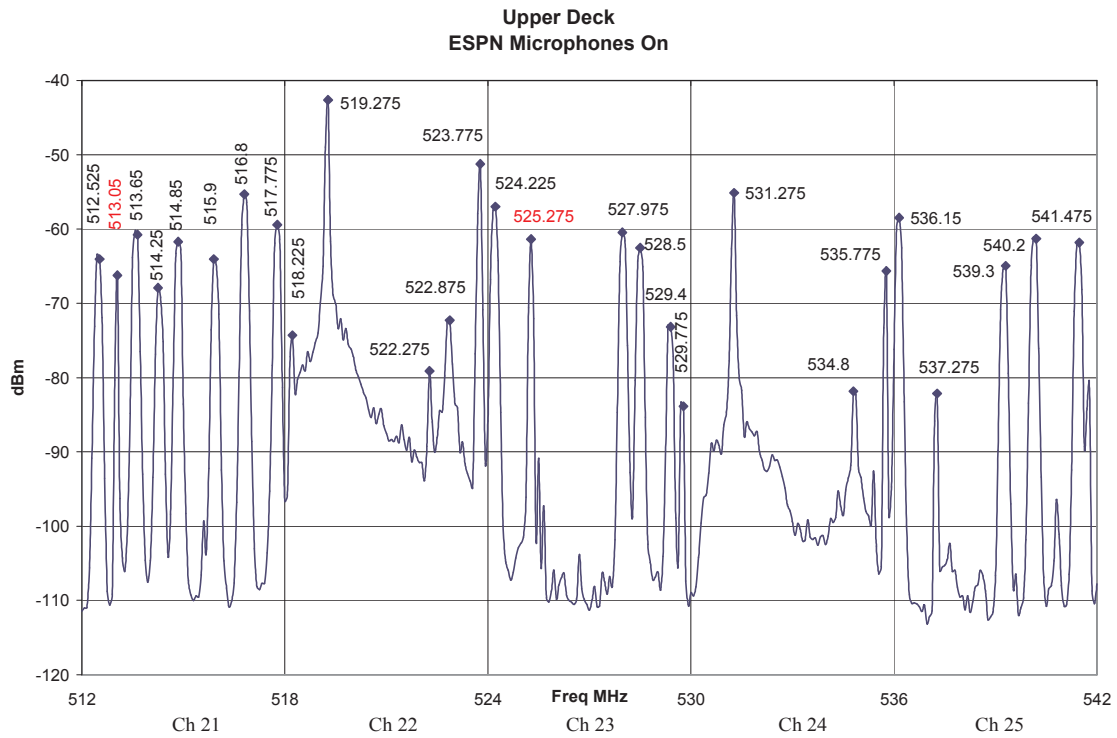


Figure E-30

Upper Deck
ESPN Microphones Off

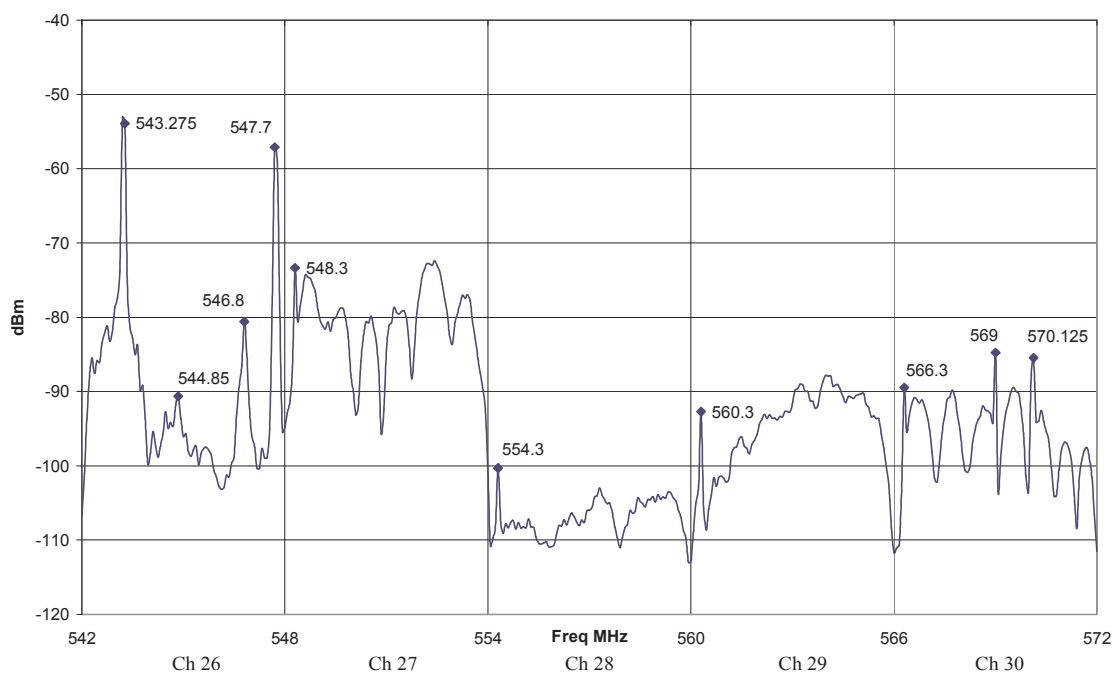


Figure E-31

Upper Deck
ESPN Microphones On

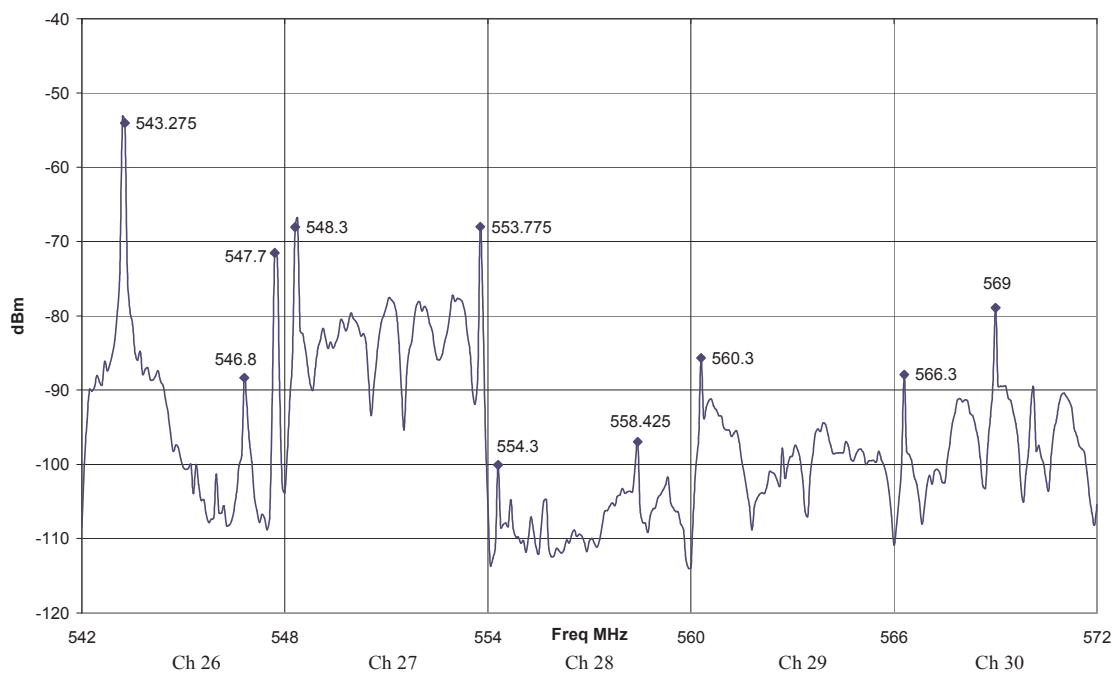


Figure E-32

Upper Deck
ESPN Microphones Off

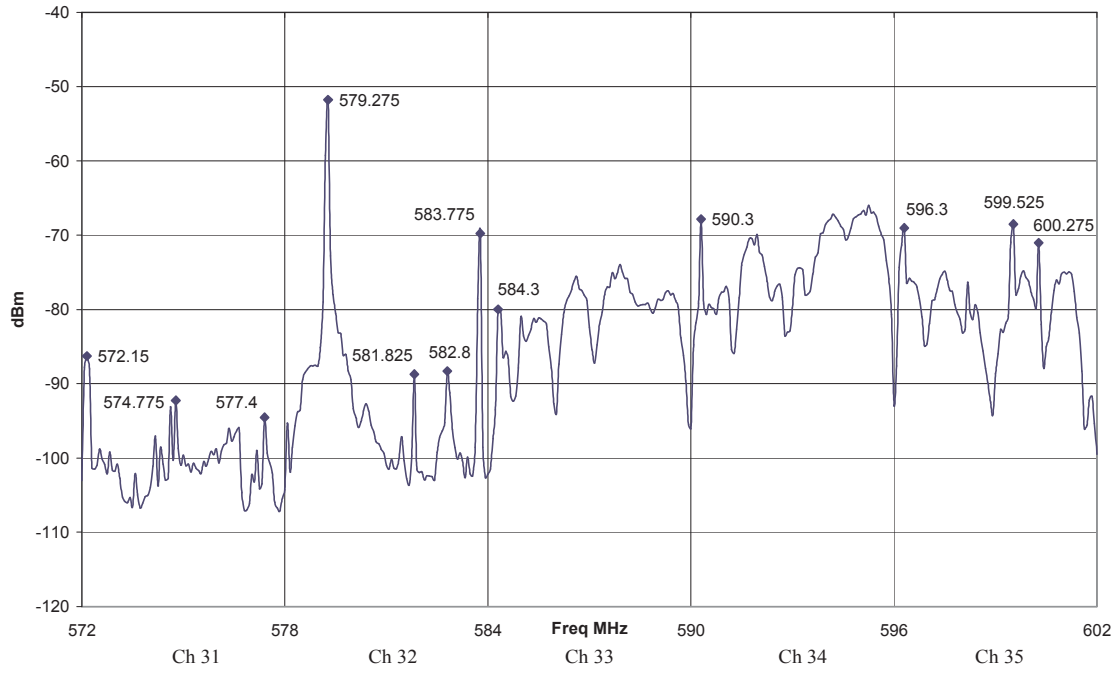


Figure E-33

Upper Deck
ESPN Microphones On

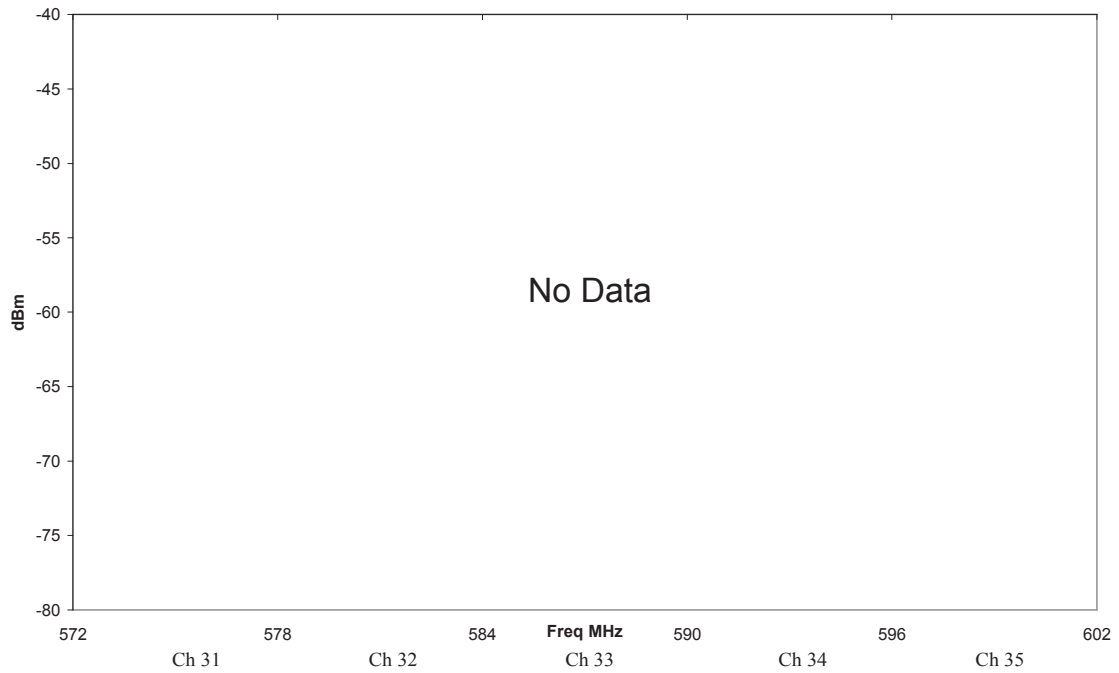


Figure E-34

Upper Deck
ESPN Microphones Off

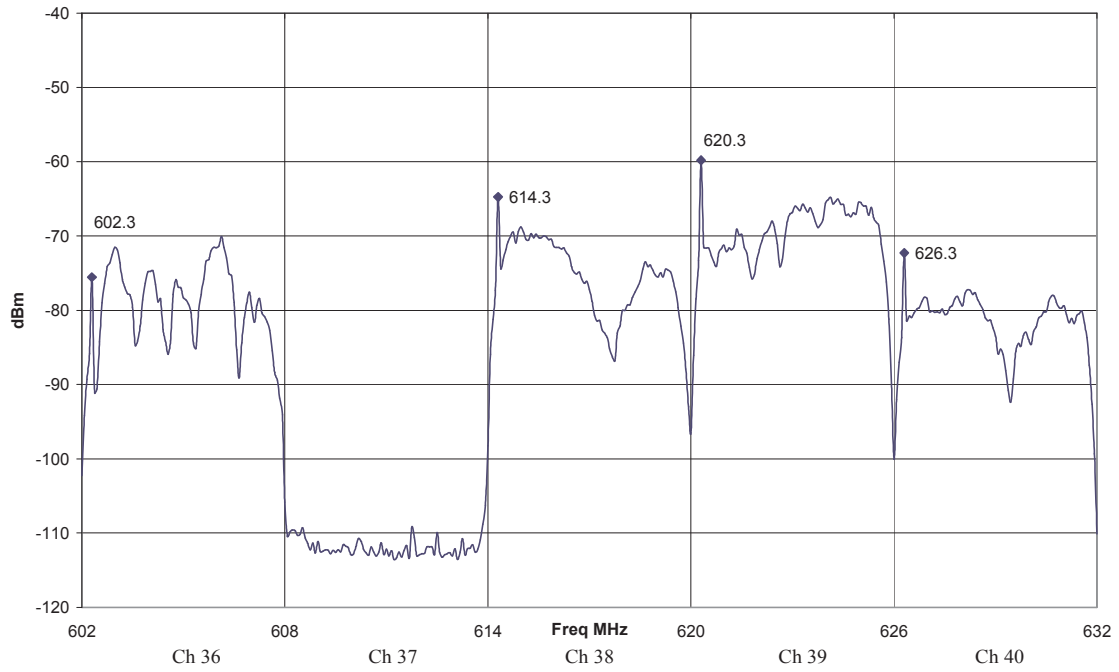


Figure E-35

Upper Deck
ESPN Microphones On

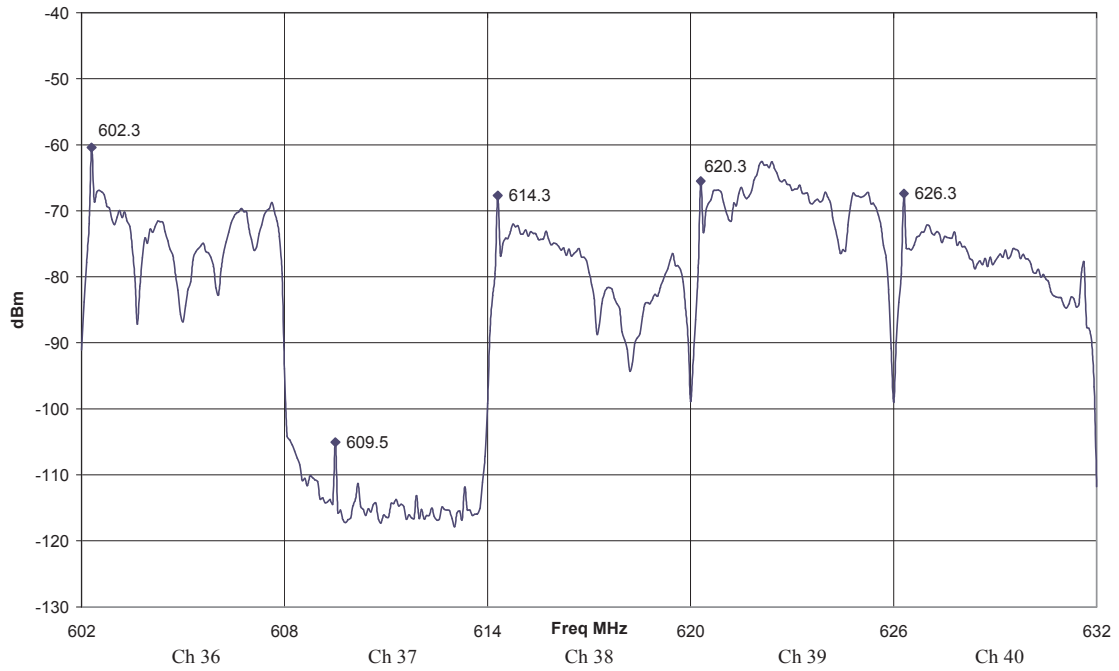


Figure E-36

Upper Deck
ESPN Microphones Off

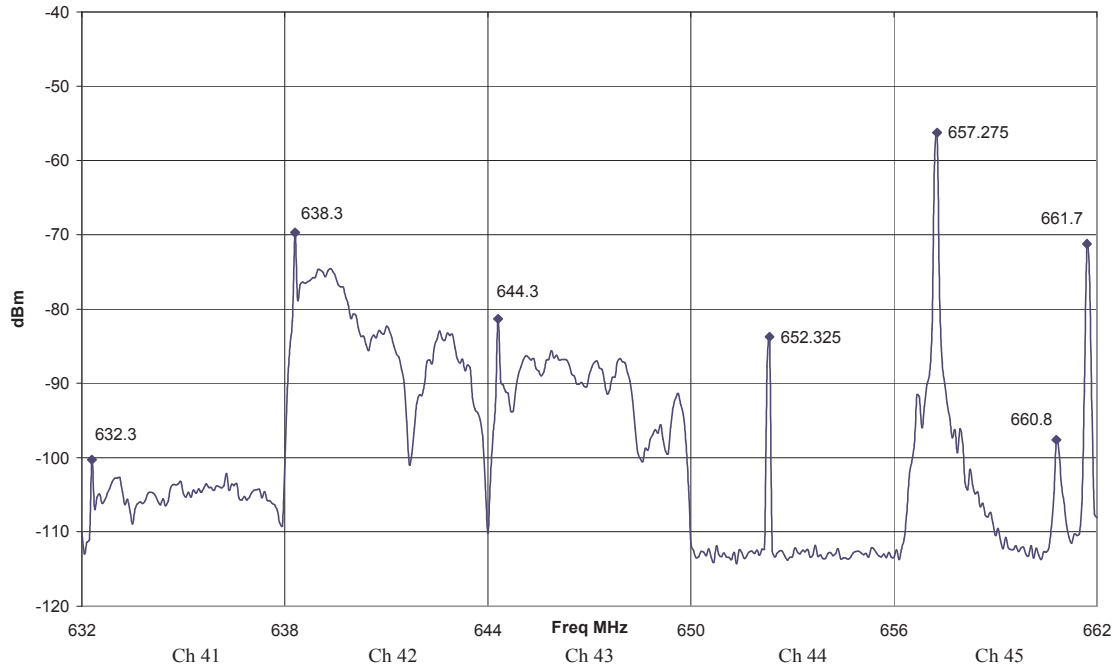


Figure E-37

Upper Deck
ESPN Microphones On

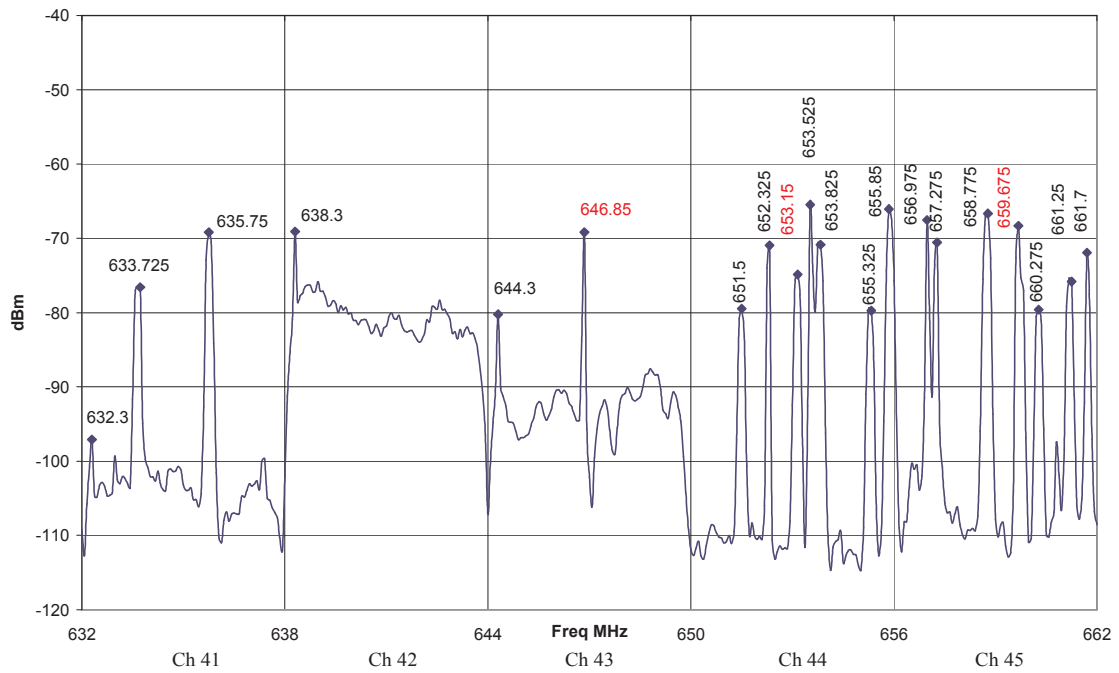


Figure E-38

Upper Deck
ESPN Microphones Off

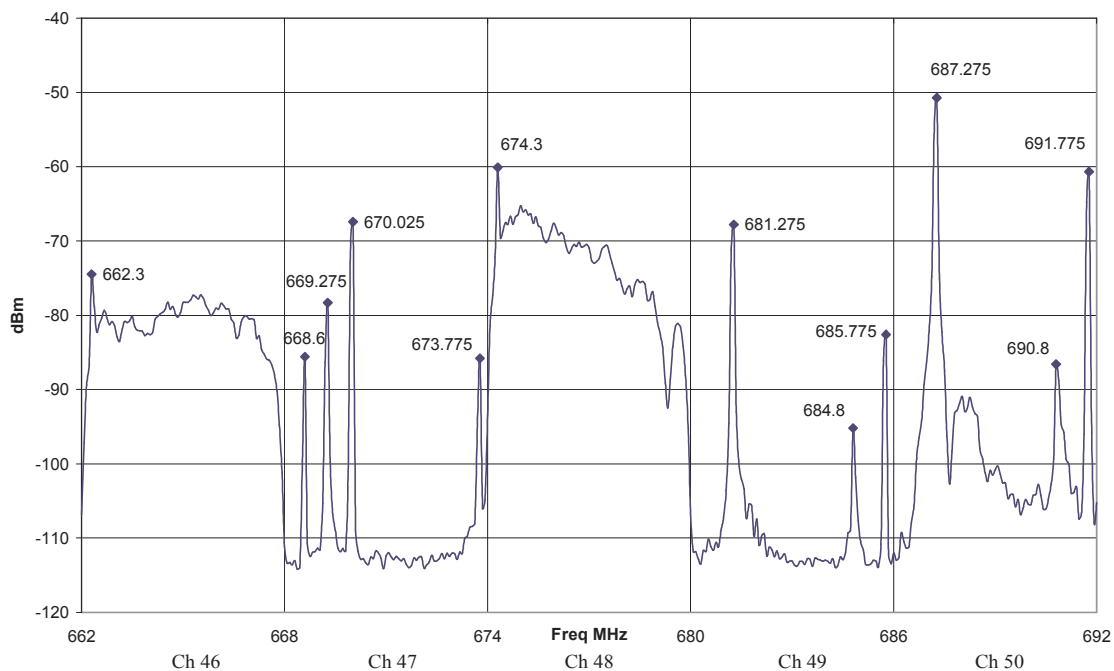


Figure E-39

Upper Deck
ESPN Microphones On

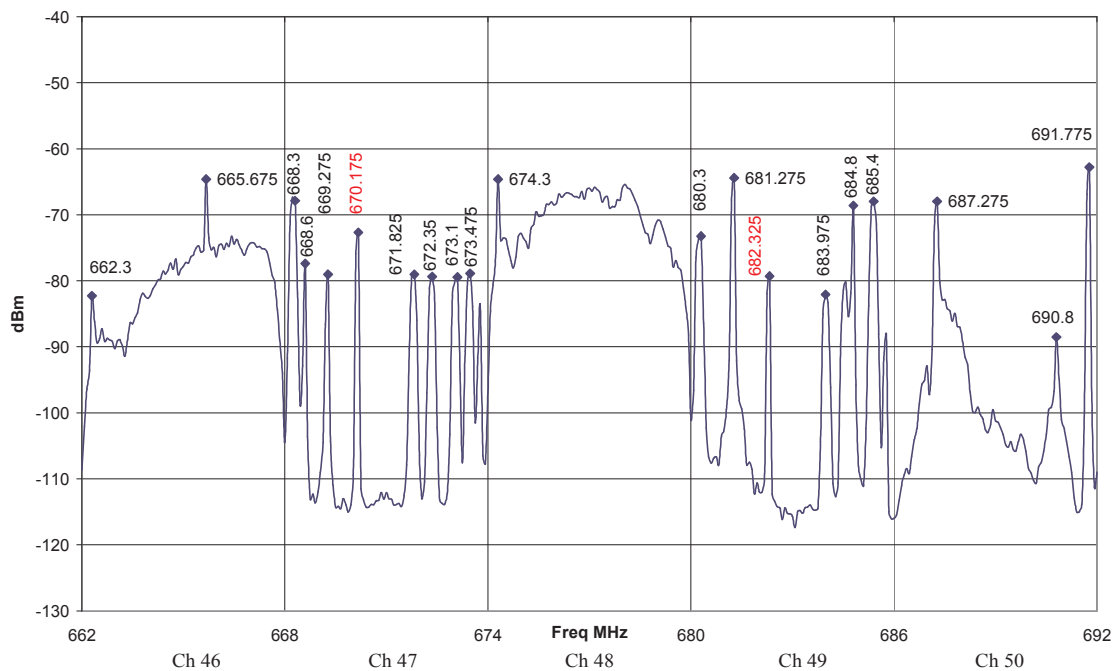


Figure E-40

Upper Deck
ESPN Microphones Off

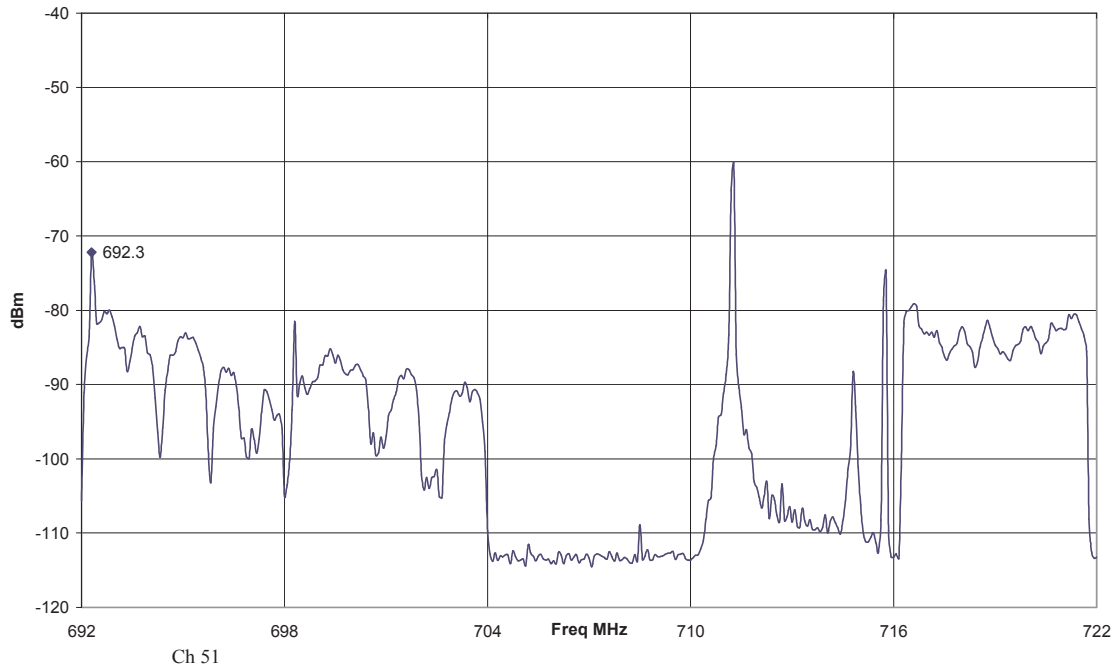


Figure E-41

Upper Deck
ESPN Microphones On

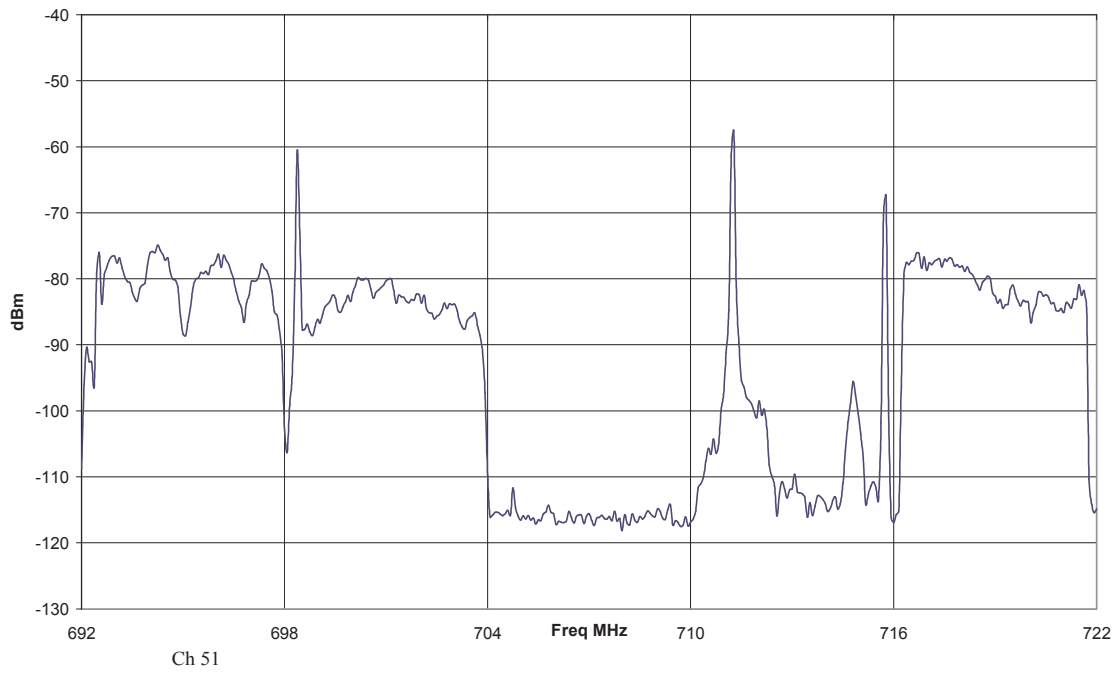


Figure E-42

E.4 RF Spectrum Plots measured in the Press Box

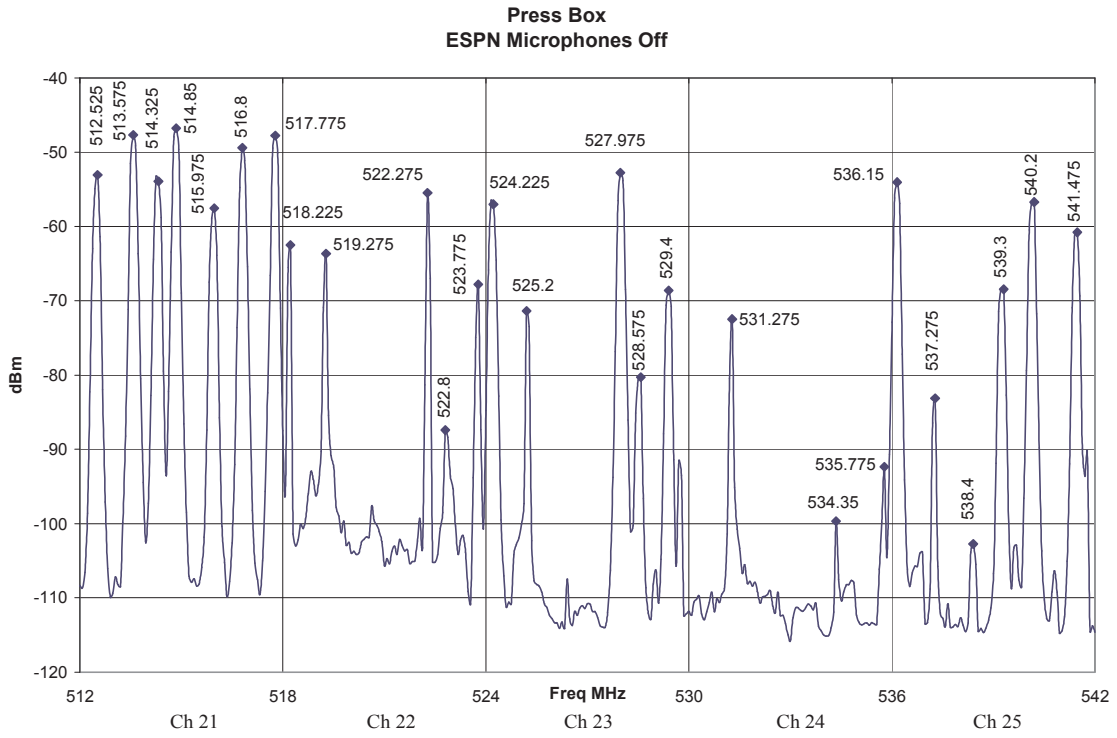


Figure E-43

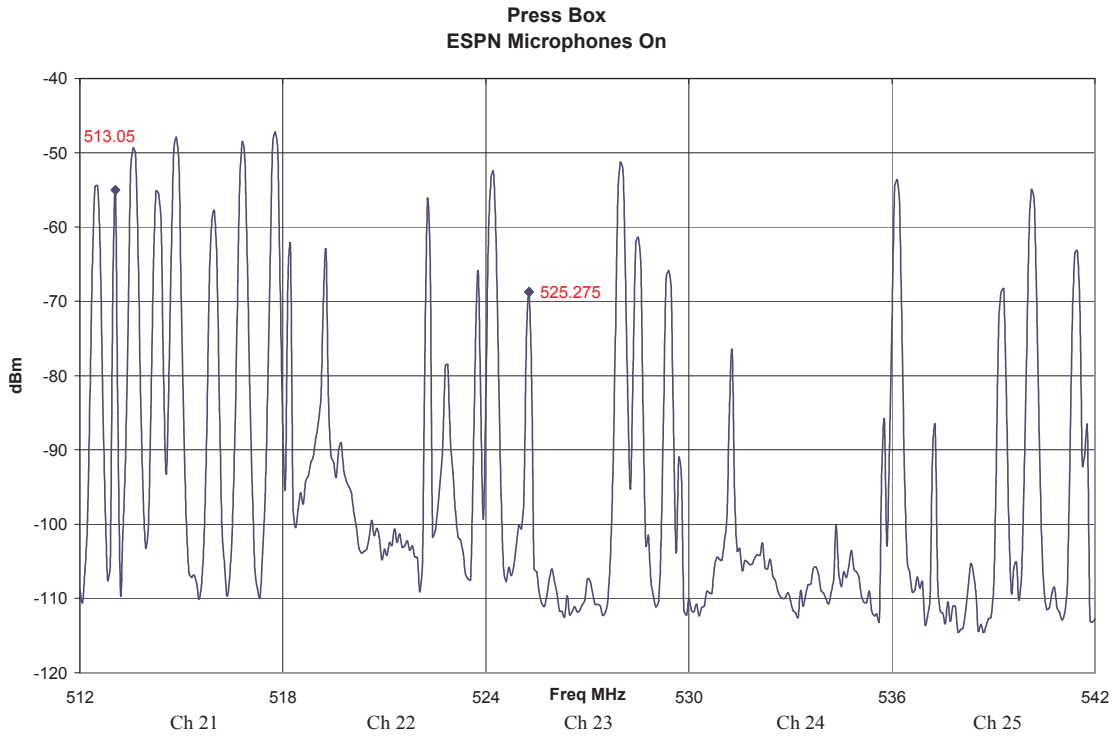


Figure E-44

Press Box
ESPN Microphones Off

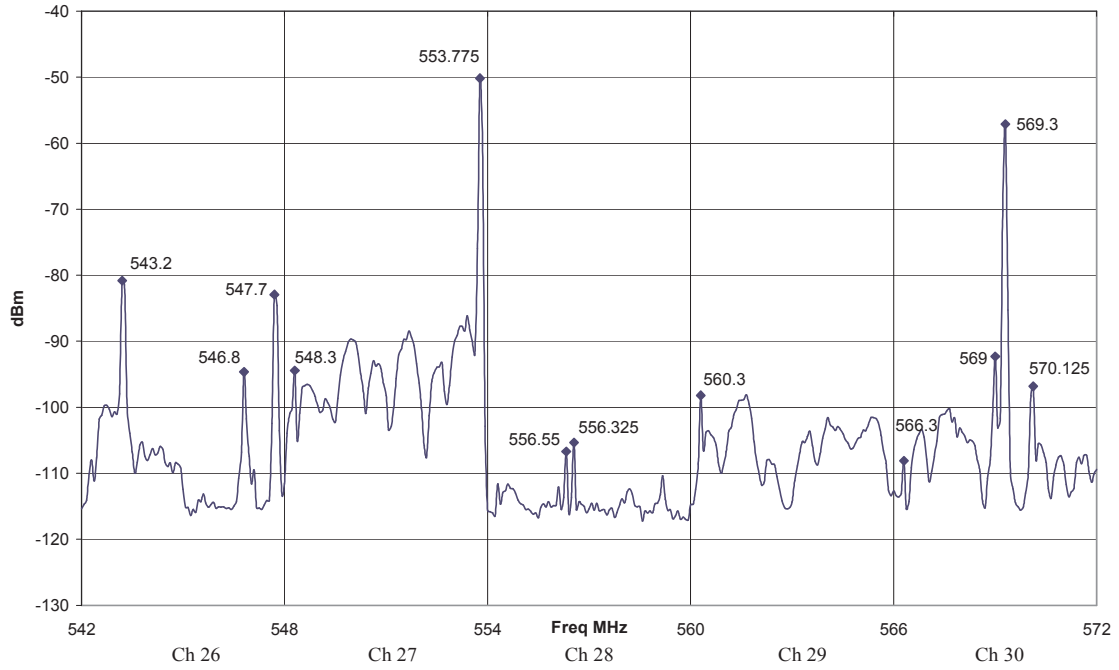


Figure E-45

Press Box
ESPN Microphones On

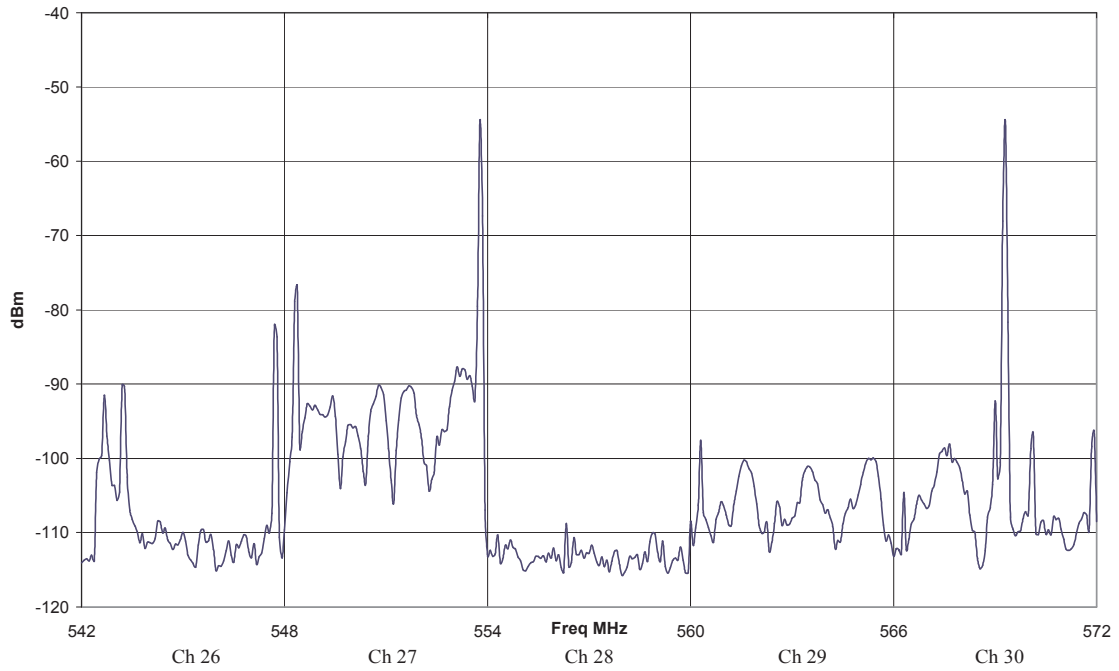


Figure E-46

**Press Box
ESPN Microphones Off**

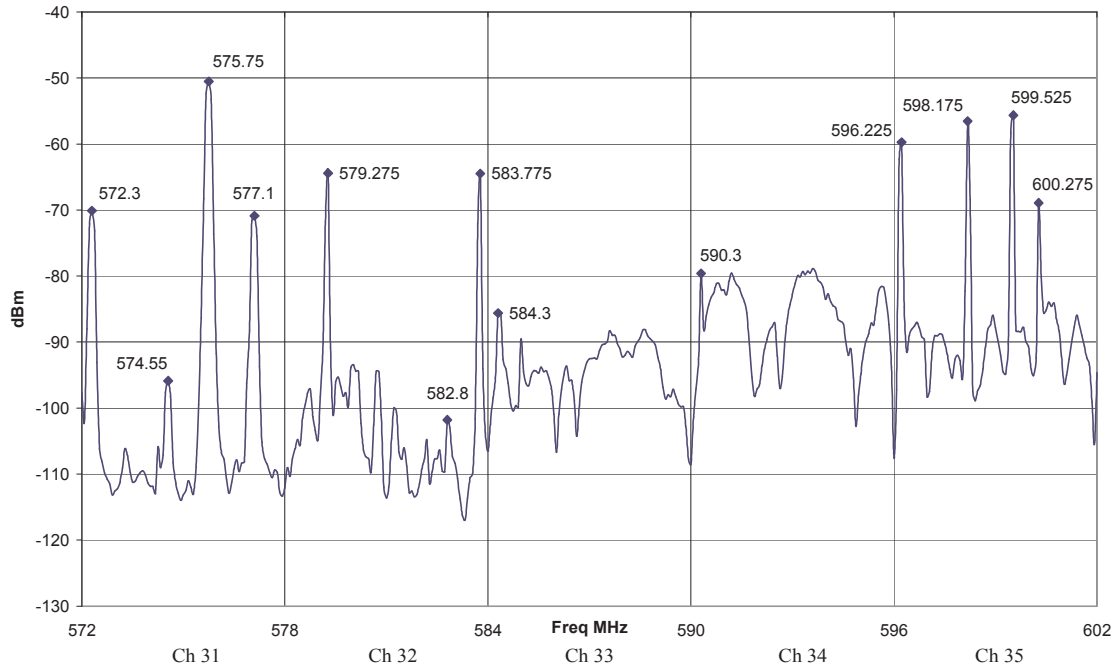


Figure E-47

**Press Box
ESPN Microphones On**

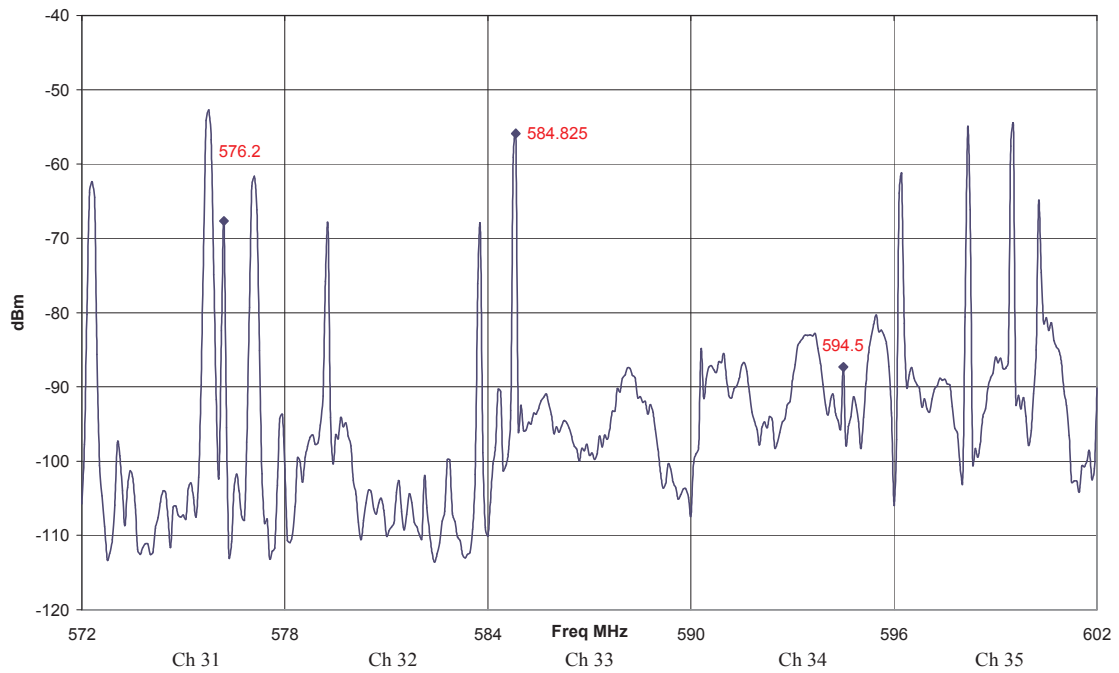


Figure E-48

Press Box
ESPN Microphones Off

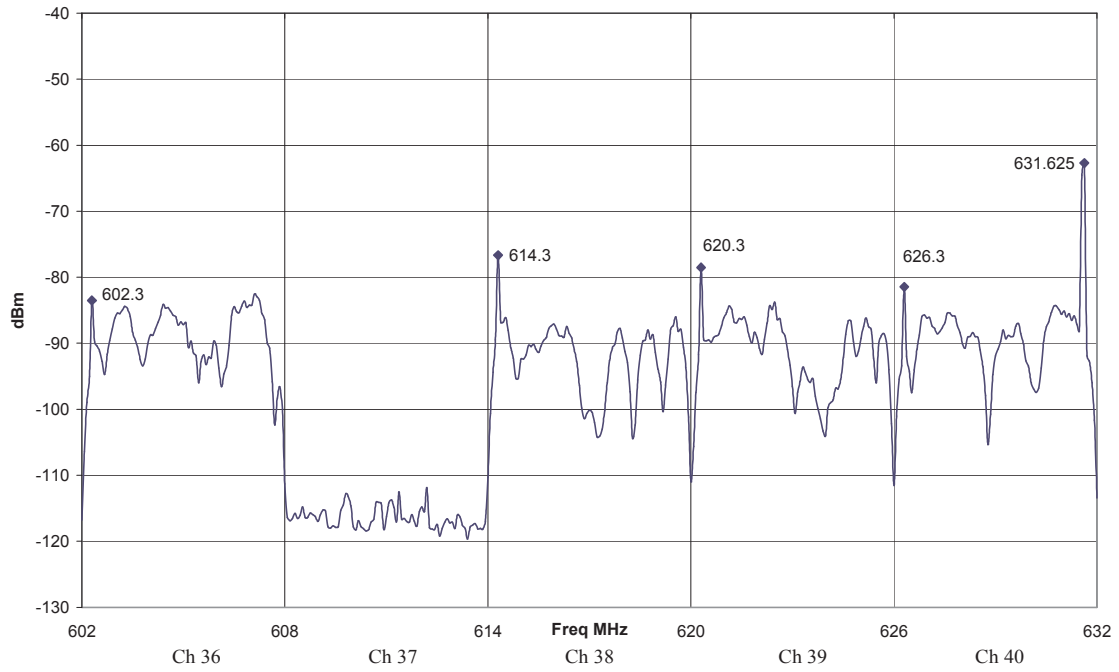


Figure E-49

Press Box
ESPN Microphones On

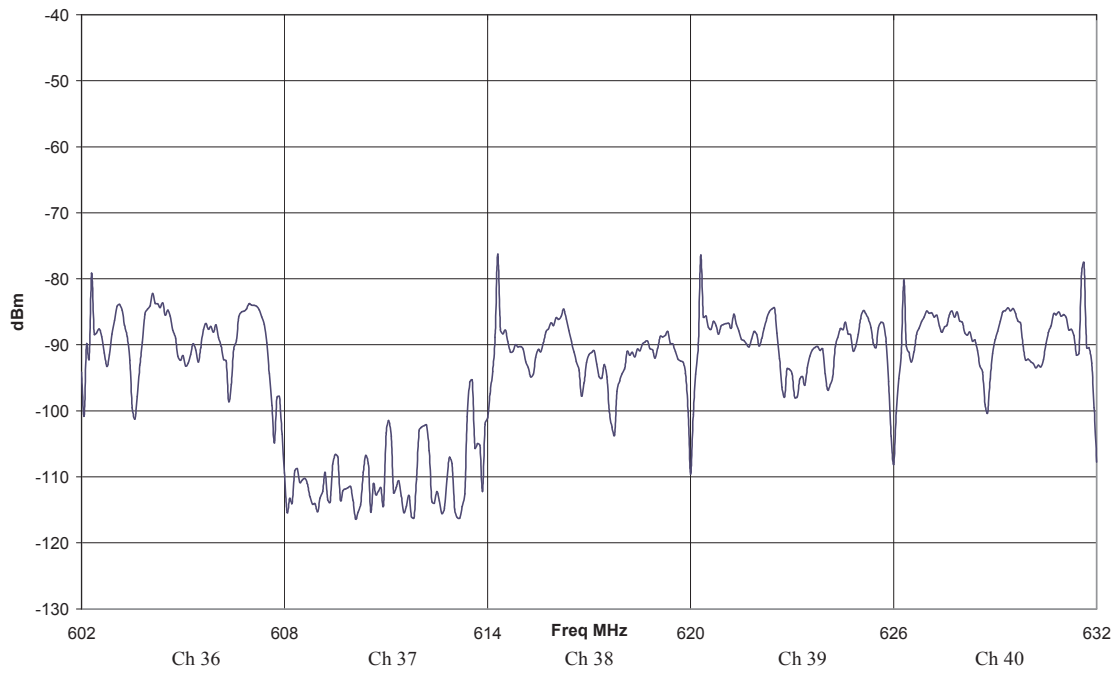


Figure E-50

**Press Box
ESPN Microphones Off**

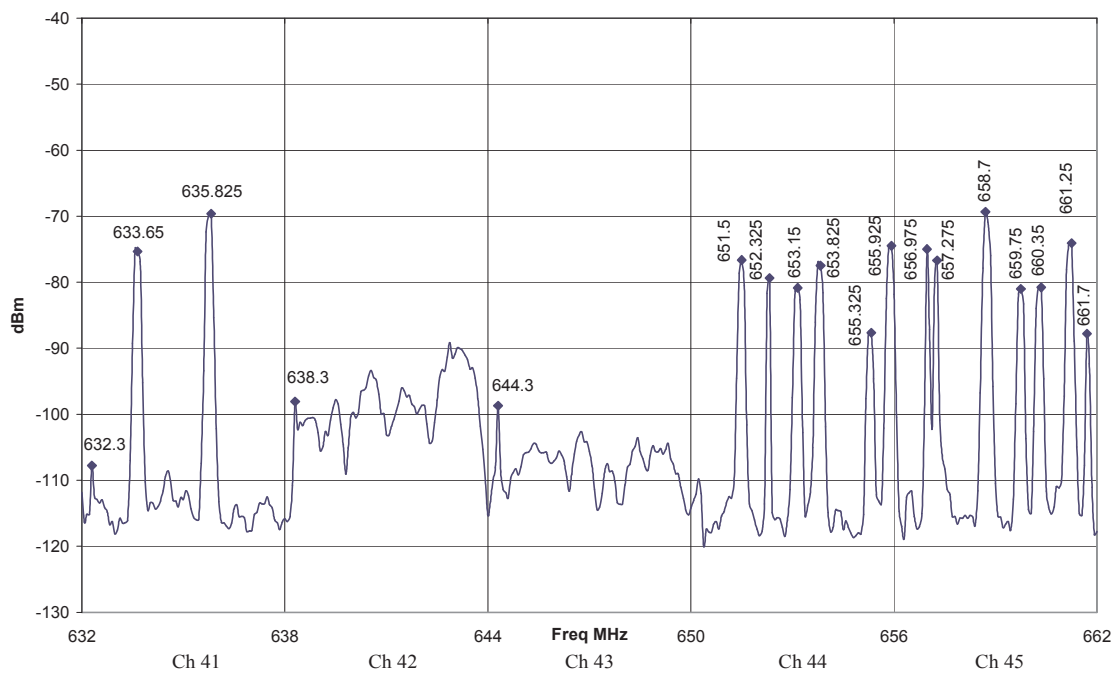


Figure E-51

**Press Box
ESPN Microphones On**

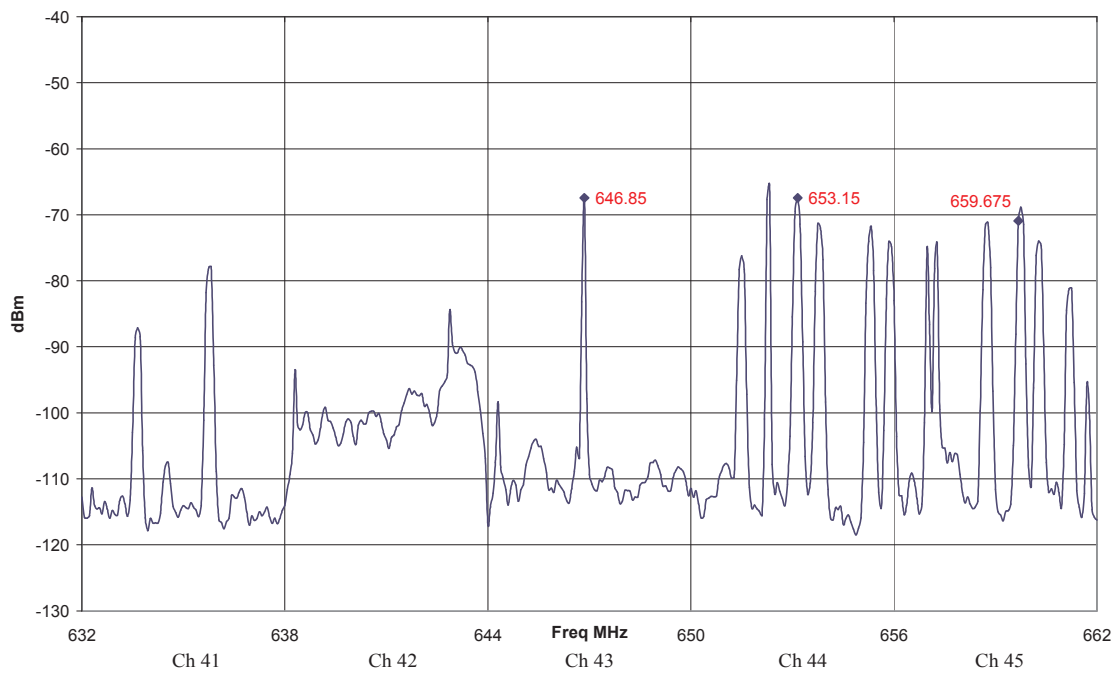


Figure E-52

**Press Box
ESPN Microphones Off**

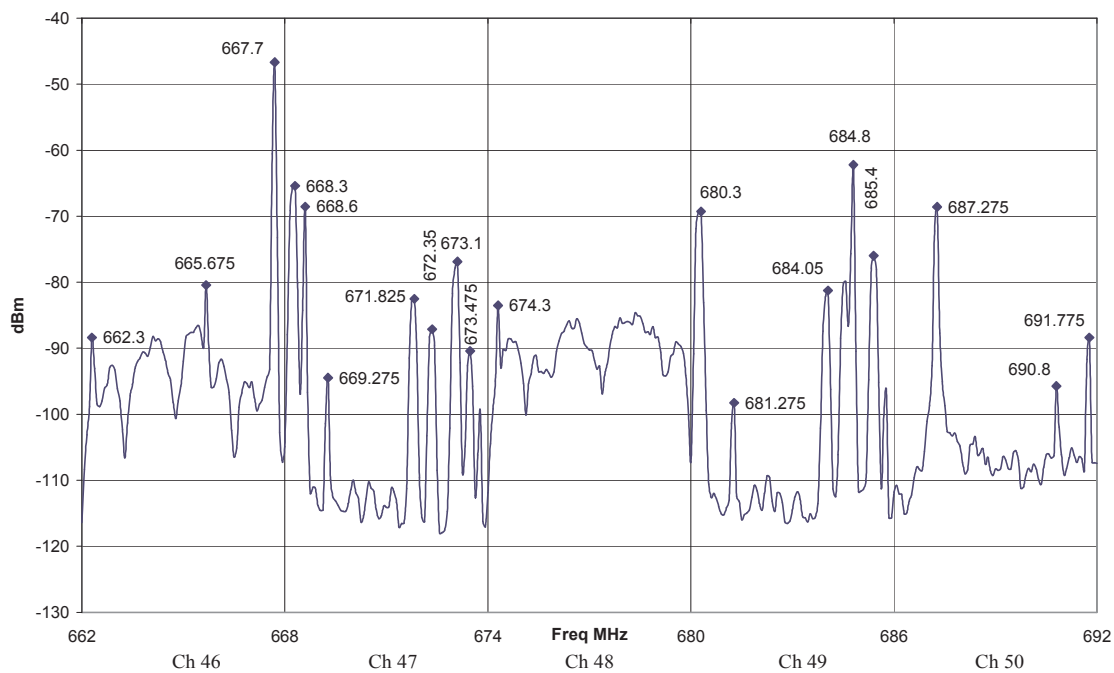


Figure E-53

**Press Box
ESPN Microphones On**

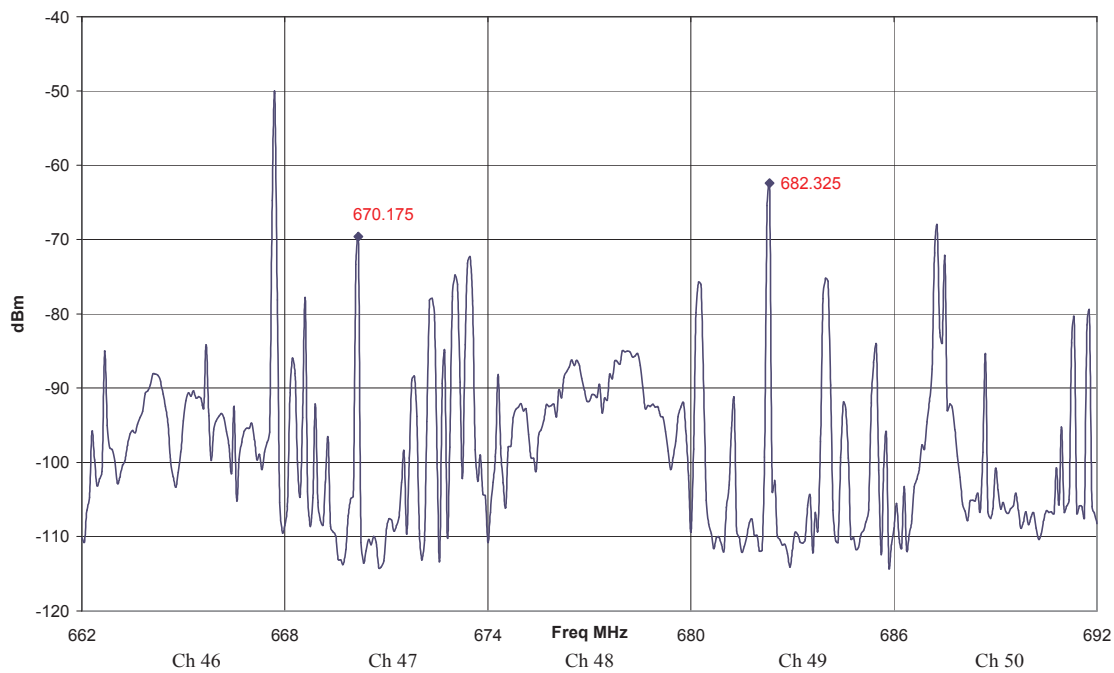


Figure E-54

**Press Box
ESPN Microphones Off**

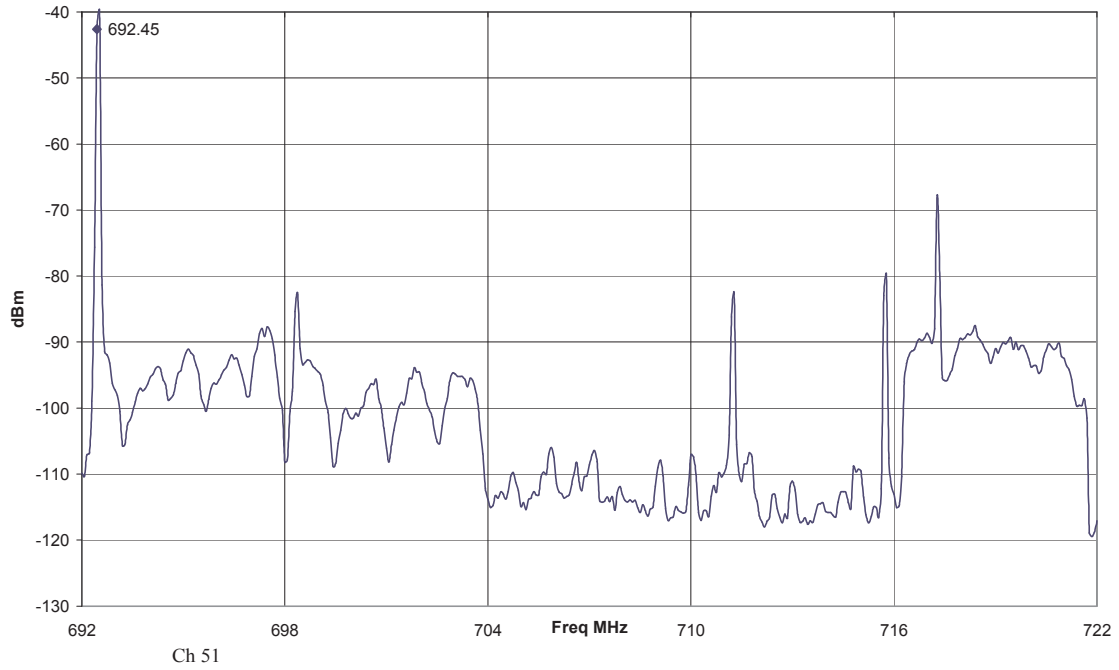


Figure E-55

**Press Box
ESPN Microphones On**

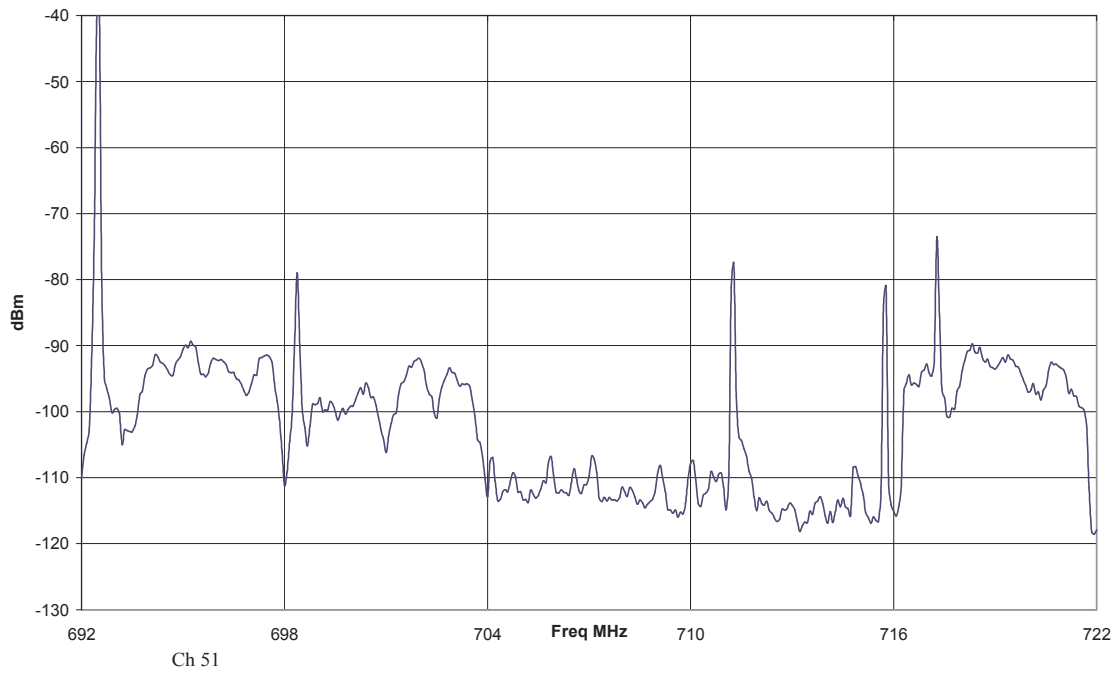
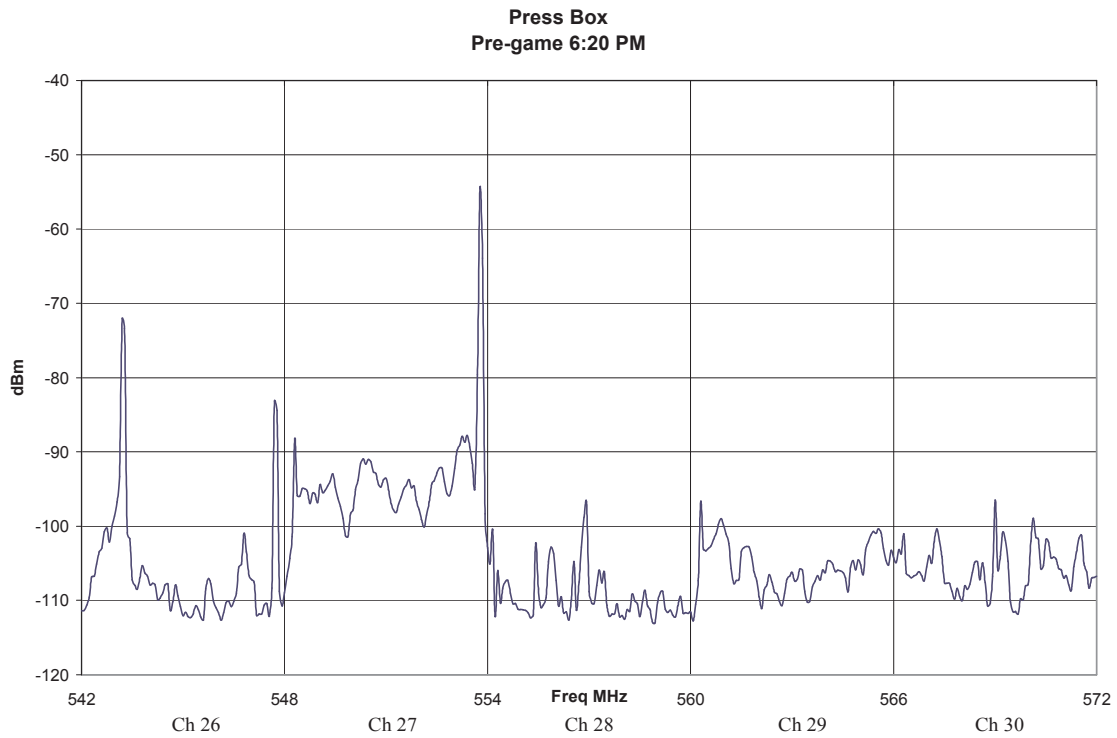
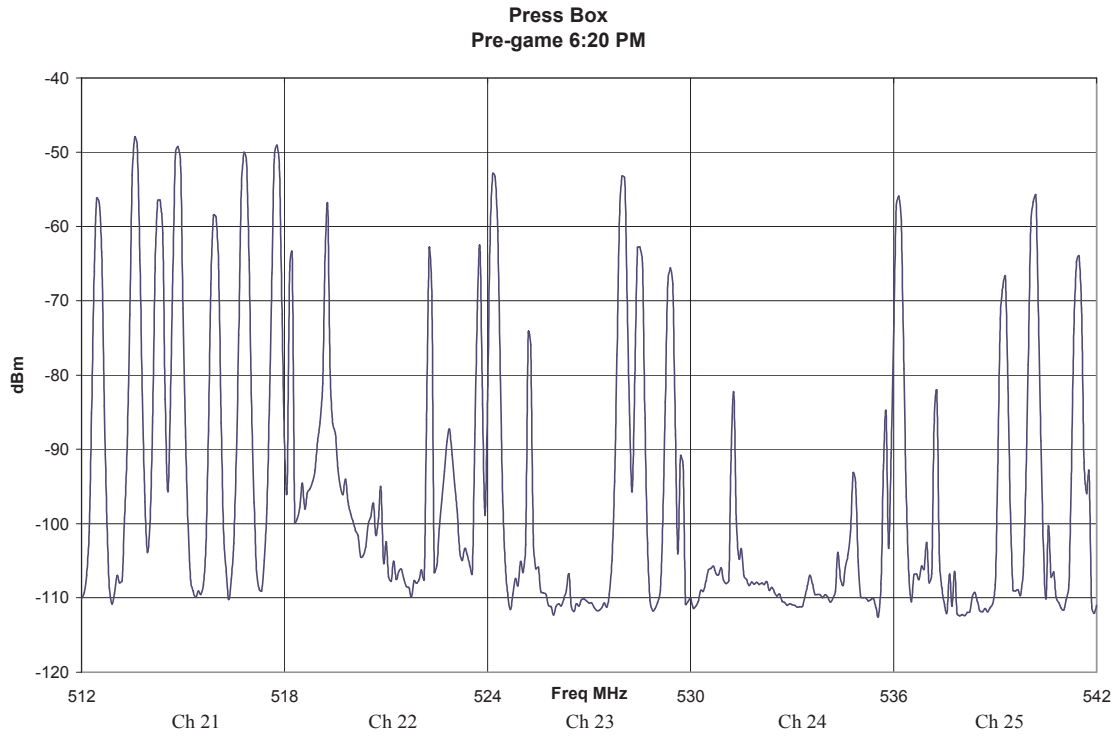


Figure E-56

E.5 RF Spectrum Plots measured in the Press Box during the Pre-game



**Press Box
Pre-game 6:20 PM**

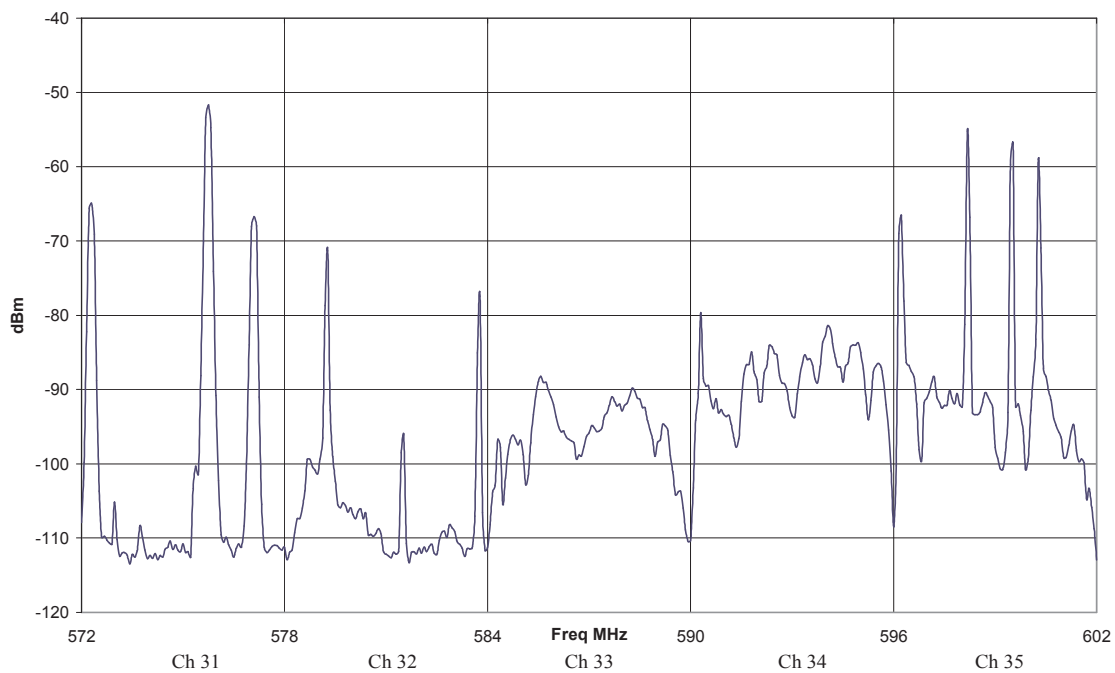


Figure E-59

**Press Box
Pre-game 6:20 PM**

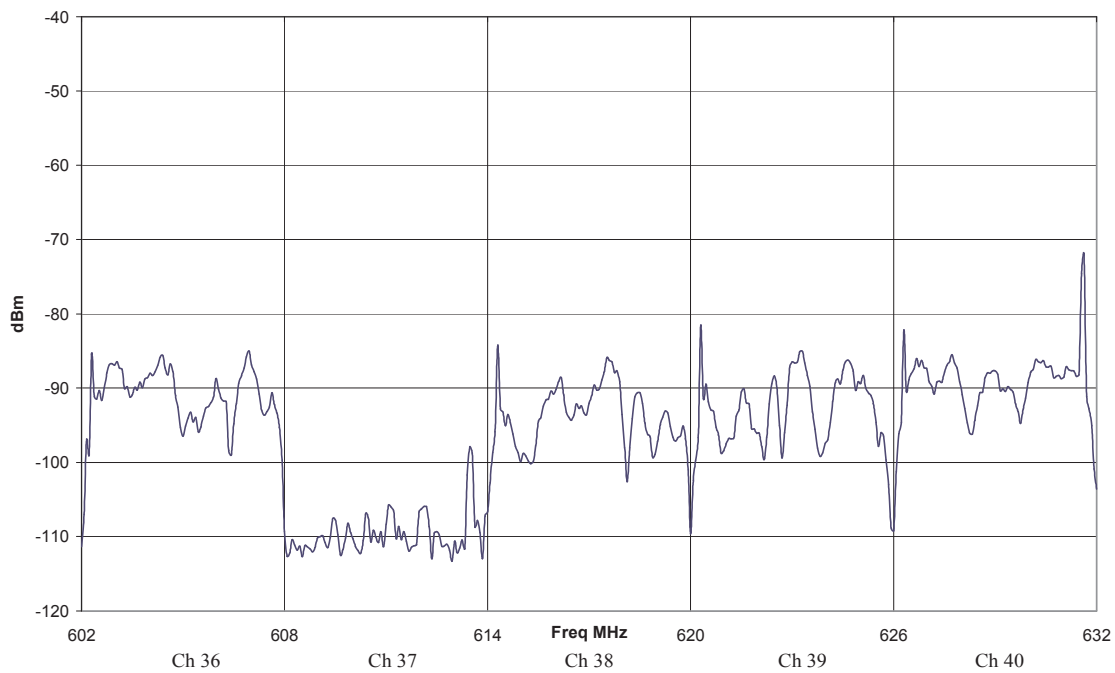


Figure E-60

Press Box
Pre-game 6:20 PM

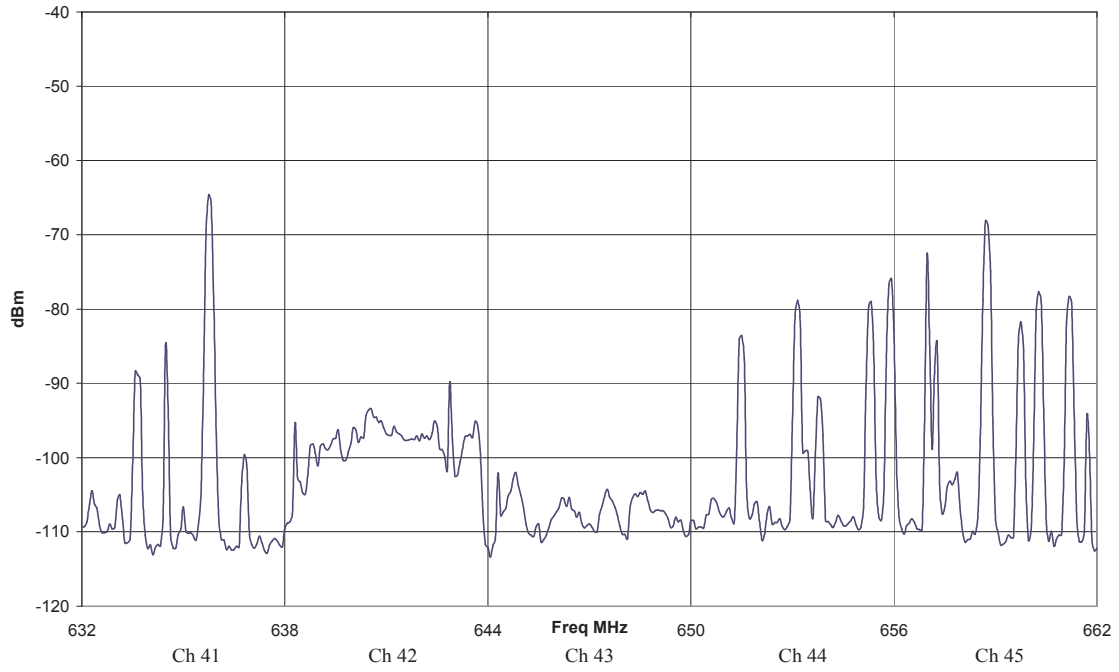


Figure E-61

Press Box
Pre-game 6:20 PM

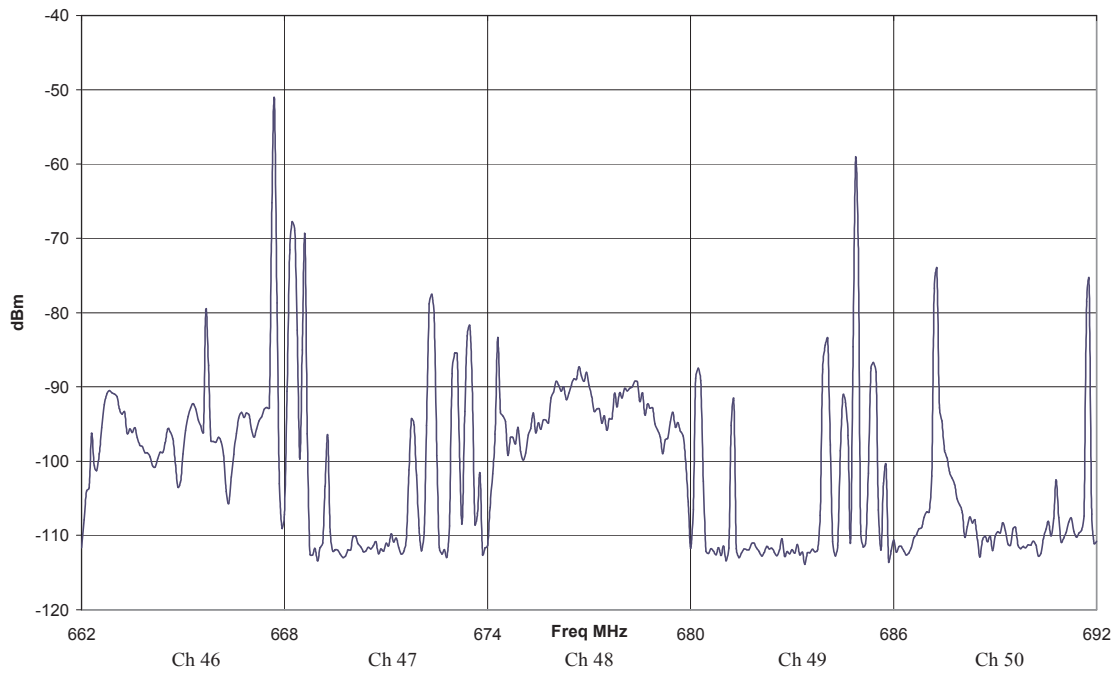


Figure E-62

Press Box
Pre-game 6:20 PM

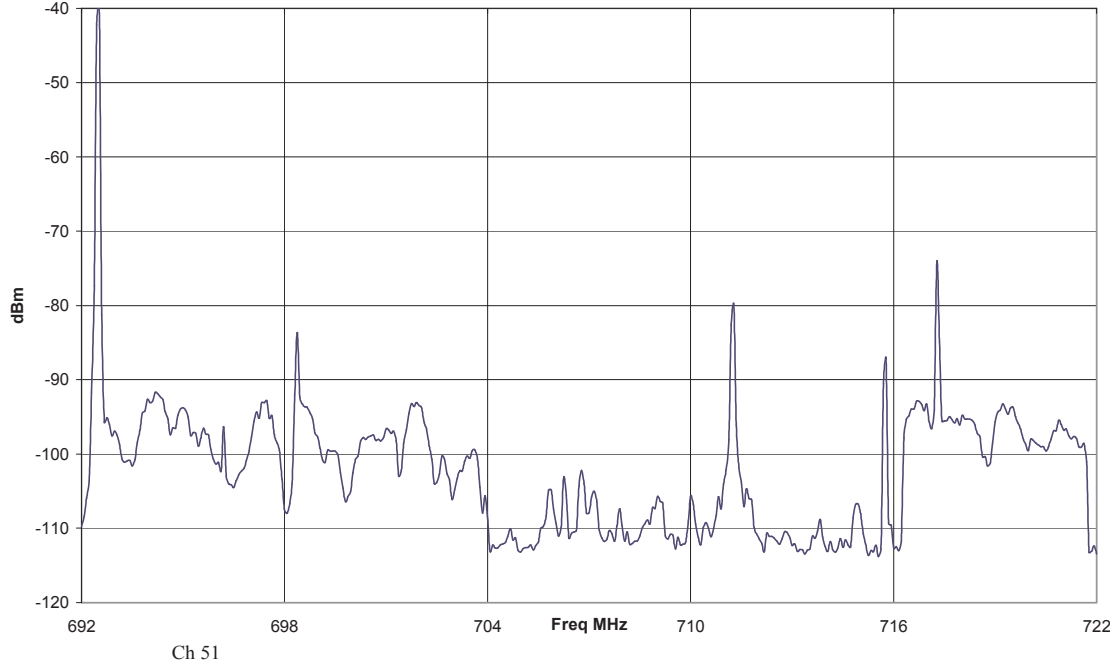


Figure E-63

E.6 RF Spectrum Plots measured in the Press Box during the First Quarter

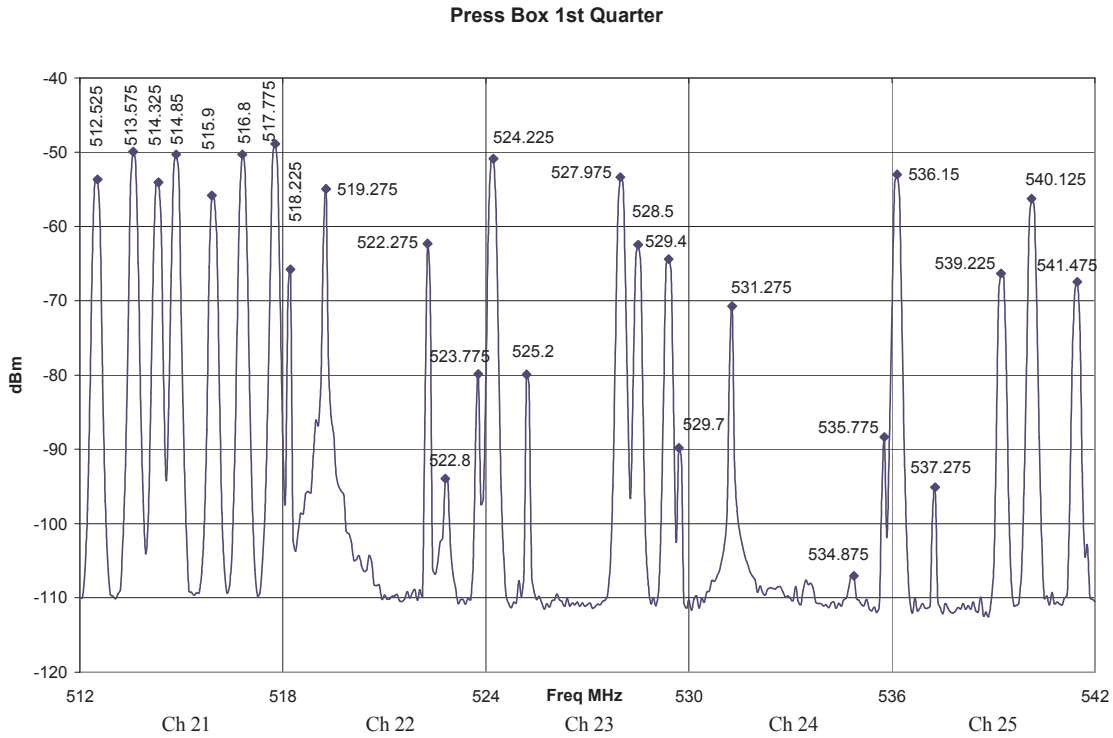


Figure E-64

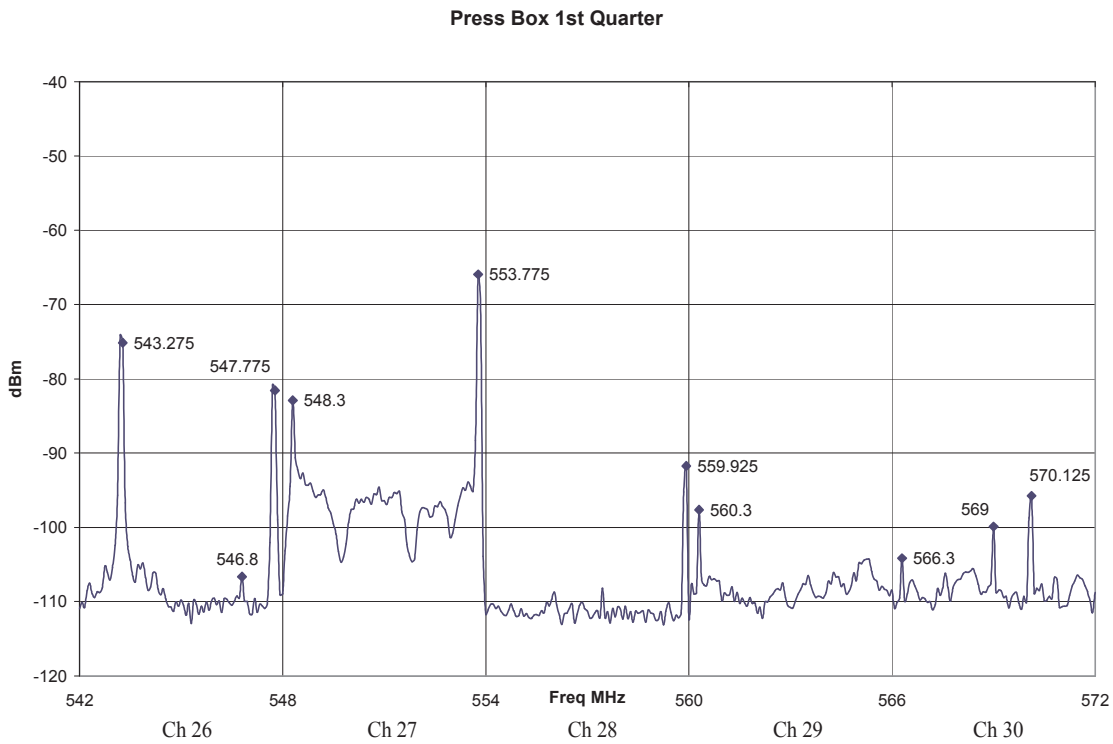


Figure E-65

Press Box 1st Quarter

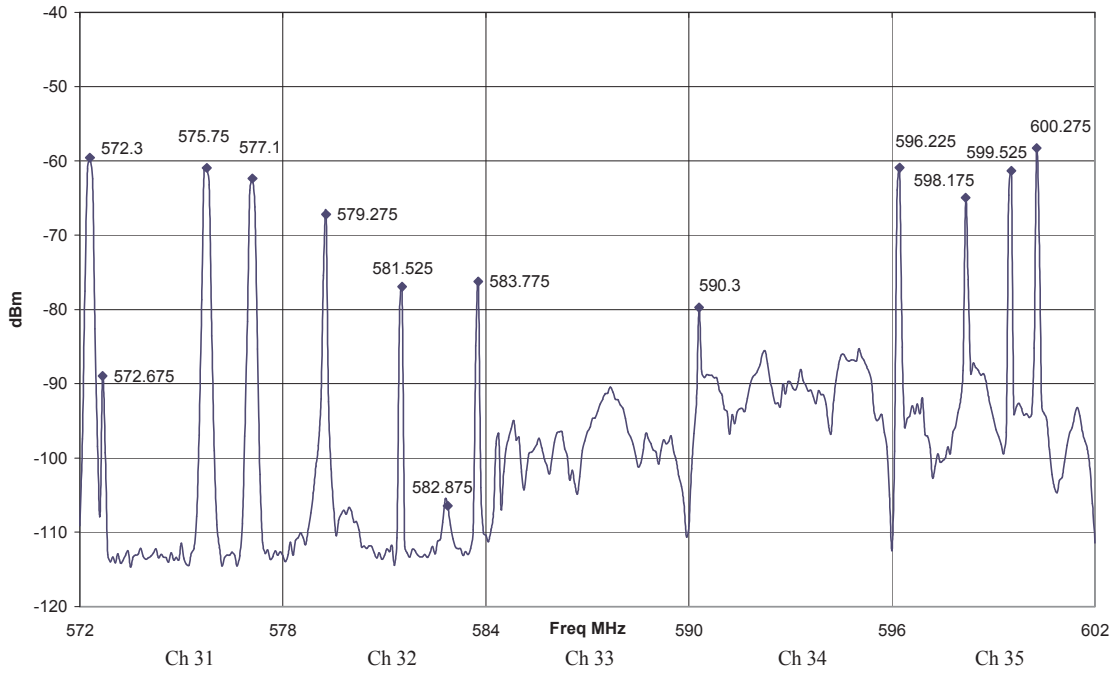


Figure E-66

Press Box 1st Quarter

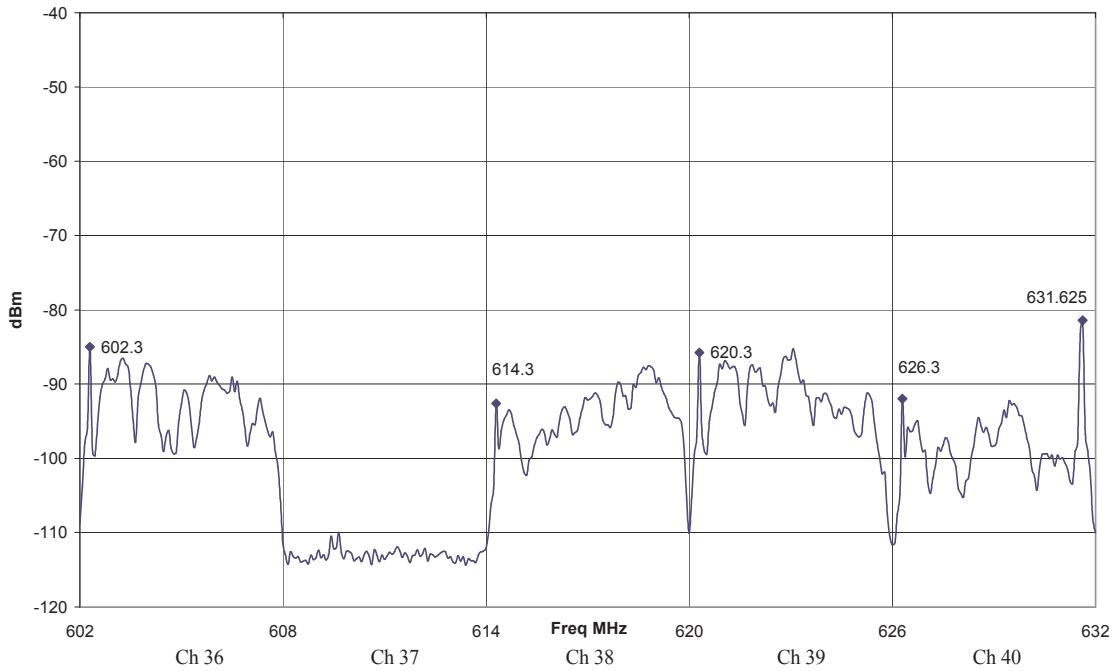


Figure E-67

Press Box 1st Quarter

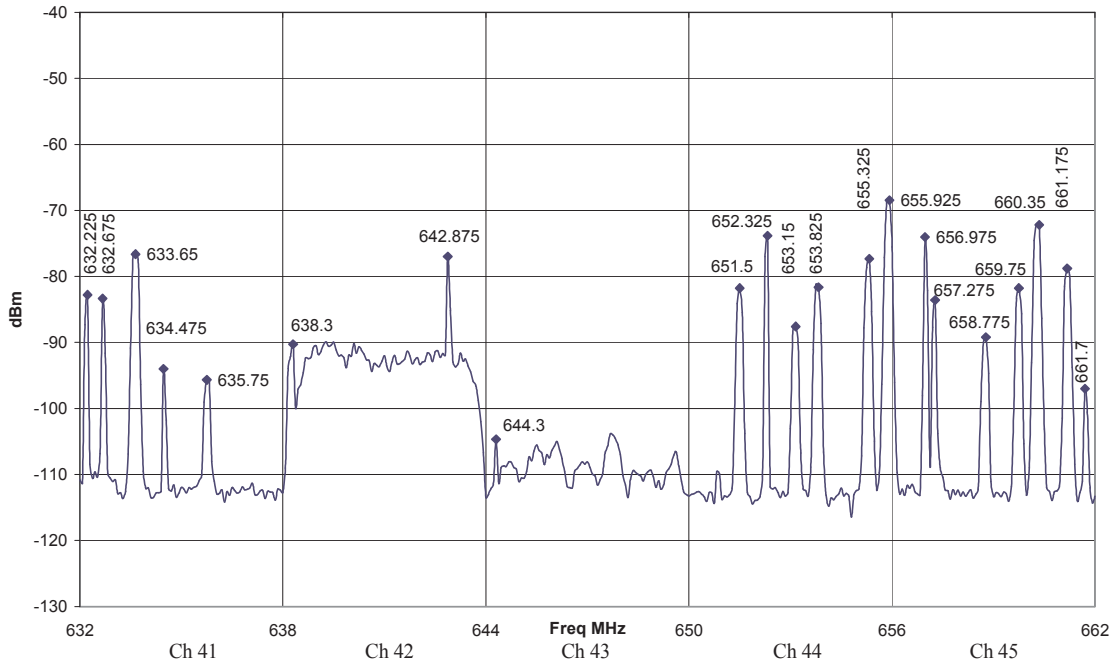


Figure E-68

Press Box 1st Quarter

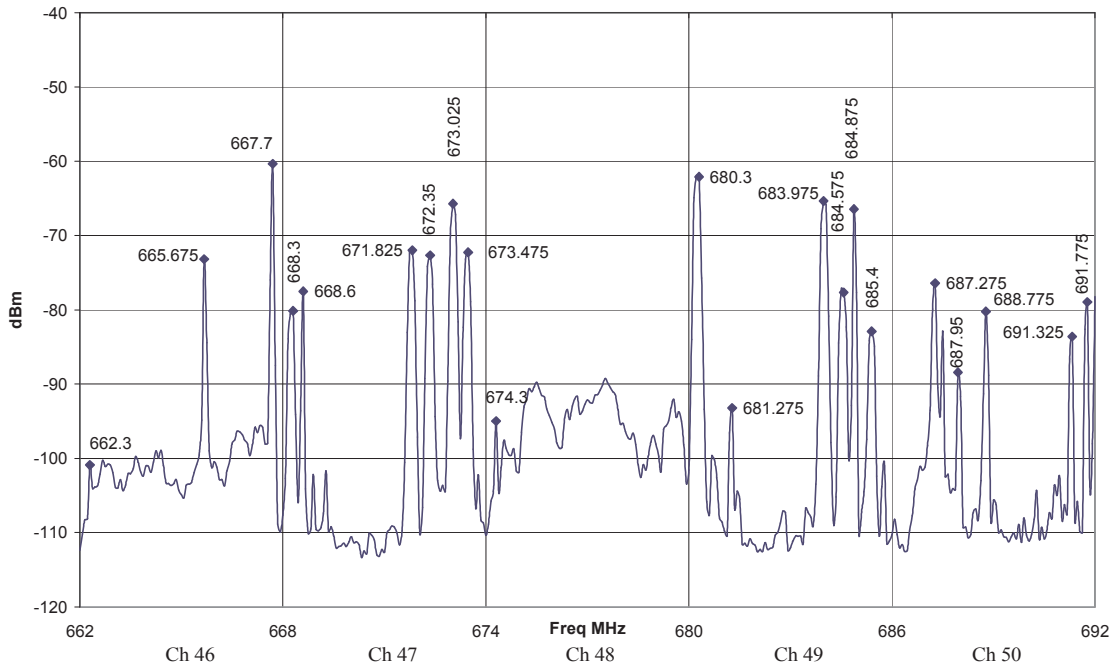


Figure E-69

Press Box 1st Quarter

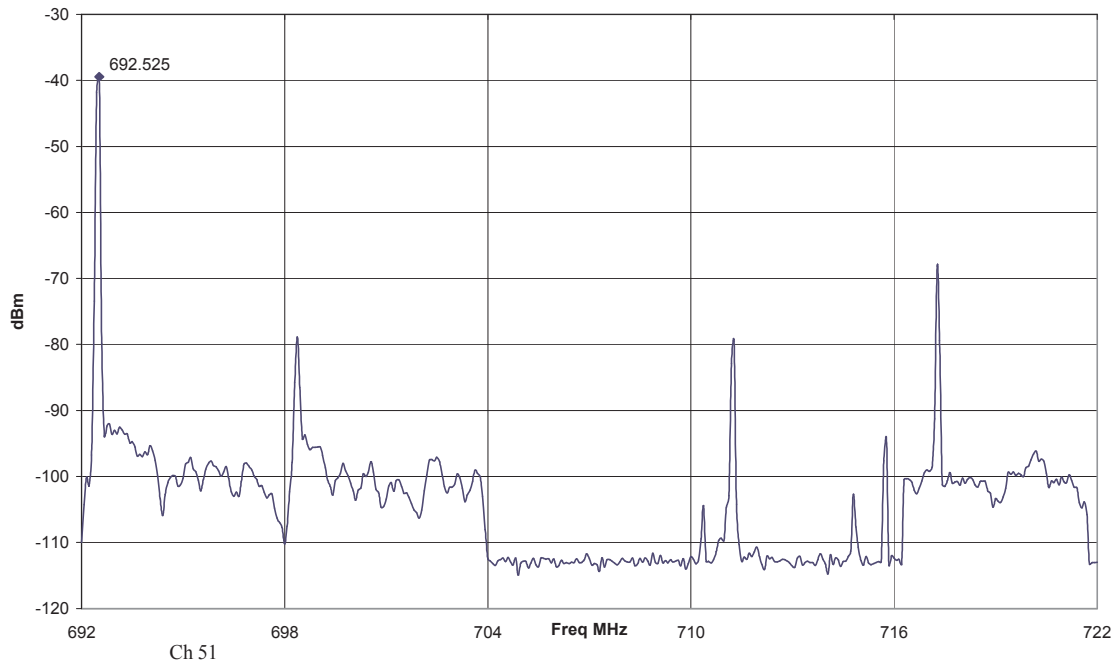


Figure E-70