

**Occupied Bandwidth Measurements  
(FCC Rule 73.317)**

**Common Antenna and Combiner System**

**KRSK, Molalla, Oregon**

**January 13<sup>th</sup>, 2004**

On January 13<sup>th</sup>, 2004, Boyd Broadcast Technical Services was contracted to make measurements of KRSK (105.1 MHz), Molalla, Oregon, to show compliance with FCC Rule 73.317. These measurements were made to accompany the filing of an application for license with a changed facility. KRSK is one of six FM broadcast stations using a common antenna and combining system at the "Skyline Tower". The other five stations are KOAP-FM (91.5 MHz), KKRZ (100.3 MHz), KINK (101.9 MHz), KKCW (103.3 MHz) and KRVO (105.9 MHz). All stations were operating with their authorized facilities at the time of the measurements.

All measurements were made at the forward port of a Shively directional coupler located in line following the multi-station combining system and prior to the two-branch power divider feeding the facility's common antenna system. At this point attenuators were inserted ahead of the Tektronix 2712 spectrum analyzer (Serial Number B033975), which was used for the measurements. A total of 33 dB of external attenuation and 26 dB of internal attenuation was used to make a reference measurement of KRSK. The amplitude calibration of the instrument was electronically adjusted to account for this attenuation.

10 dB of external attenuation was used for all other measurements. And again, the amplitude calibration of the instrument was electronically adjusted to account for this attenuation. This smaller amount of attenuation provides the necessary dynamic range for the spectrum analyzer to observe any spurious signals. Also double cavity notch filters, one for each of the five stations, were inserted in cascade following the attenuators and ahead of the spectrum analyzer to prevent signal overload and subsequent erroneous intermodulation products. The amplitude versus frequency response of each of these filters is shown on pages 3, 4 and 5 of this report.

The filters, Model 6367-2, are manufactured by Microwave Filter Company, Inc. Attenuators are precision devices manufactured by Coaxial Dynamics. All cables are constructed of high quality, 100% shield coaxial cable with premium connectors. Adapter connectors used are also premium quality. A photograph of the complete test setup is shown on page 12 and a block diagram of the measurement setup is shown on page 13.

Signals measured by the Tektronix 2712 spectrum analyzer are digitized in the analyzer. Data was collected for a short period using the instrument's peak-hold feature. The data for the reference plots was collected over an approximate 10 minute period. Other measurements were collected for approximately one minute each. This is done to observe possible short duration peaks.

A laptop computer using software to display, tabulate and save for analysis (and to provide the plots shown in this report) was connected to the Tektronix analyzer via GPIB. The peak-hold plots gathered were then downloaded into this computer. The

Tektronix analyzer collects 512 points over the instrument's selected frequency span. These 512 individual data points, when downloaded into the computer, provide the capability via software to quantify specific points of interest.

The reference plot for KRSK (105.1 MHz) shown on page 6. This measurement shows compliance with paragraph (b) and (c) of section 73.317 of the Commission's rules.

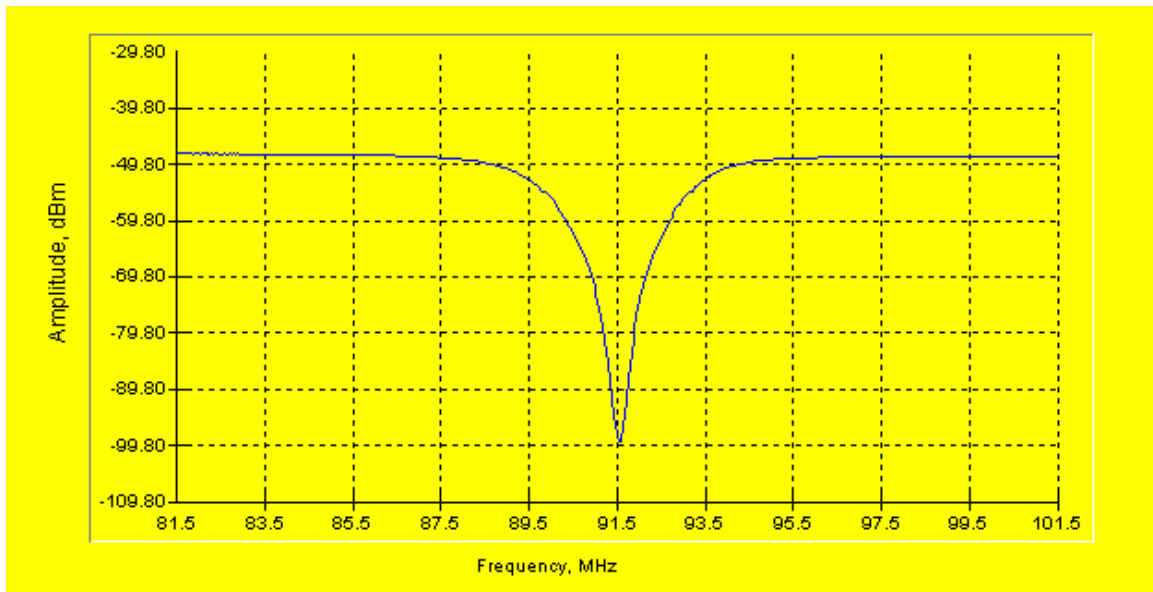
A computer program was used prior to making the measurements to determine possible intermodulation products. Particular attention was paid to products that could occur in the FM broadcast band (88 to 108 MHz), below the FM band into television channels 2, 3, 4, 5 and 6 and immediately above the FM broadcast band. Some signals were discovered, but were well below the FCC limit of -80 dB referenced to the peak carrier level of the station being studied. Spectral plots of signals found through 1050 MHz, are shown on pages 6 through 11. No harmonic emissions or other spurious emissions from KRSK were observed.

It is believed that KRSK is in full compliance with section 73.317 of the commission's rules. A copy of the pertinent sections of this rule can be found on page 14.

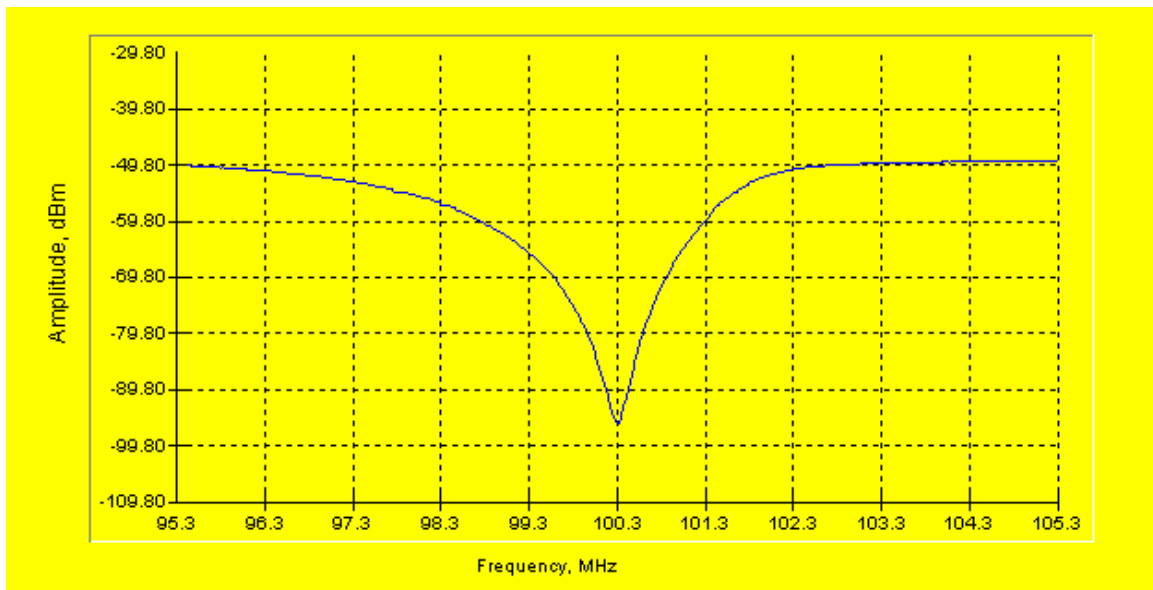
All information contained in this report was gathered by James E. Boyd, who has experience making these kinds of measurements and whose qualifications are a matter of record with the Federal Communications Commission.

Respectfully Submitted,

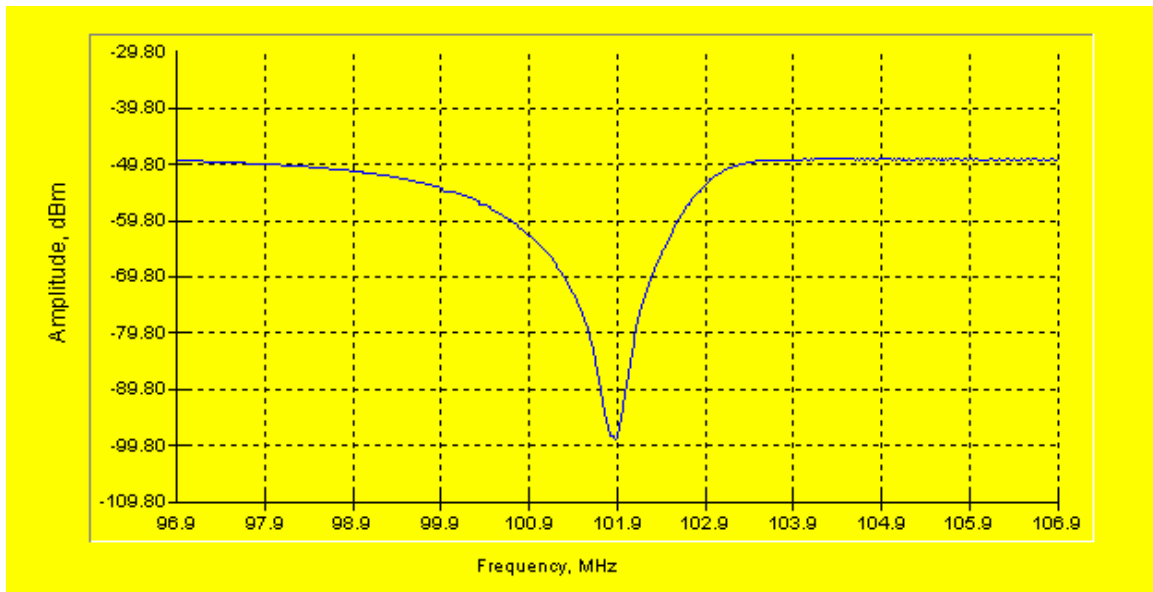
James E. Boyd  
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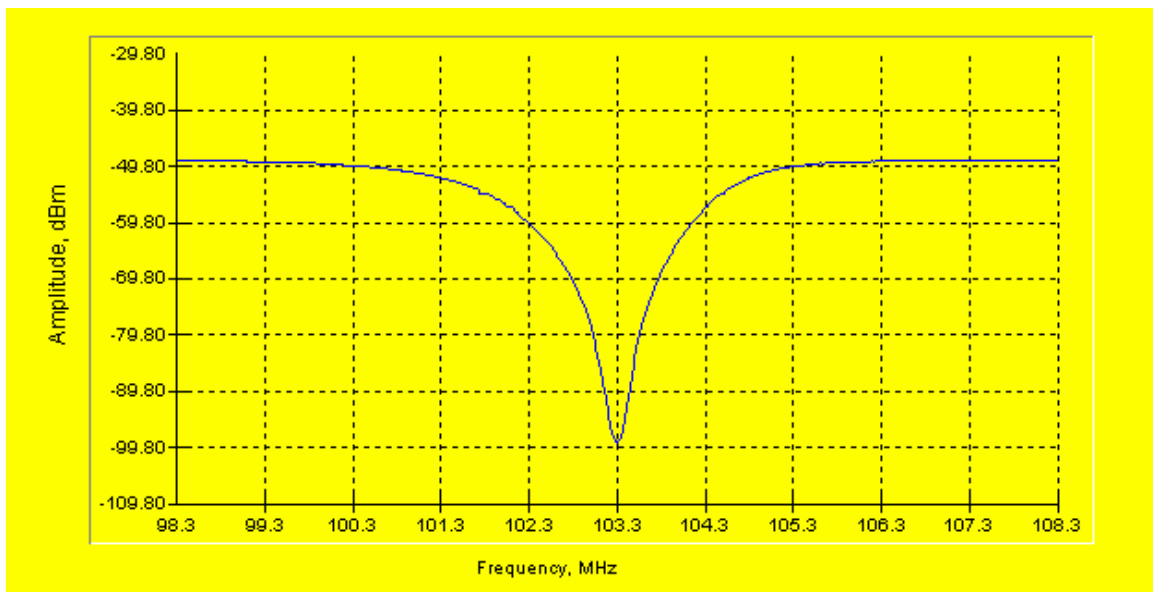
Center Frequency 91.5 MHz  
Insertion Loss 0.5 dB



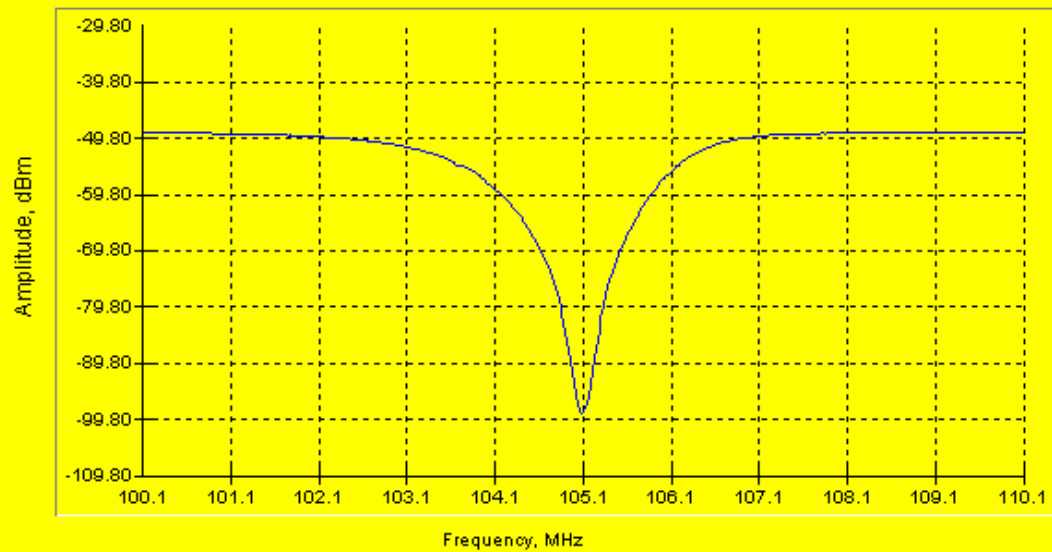
Center Frequency 100.3 MHz  
Insertion Loss 0.66 dB



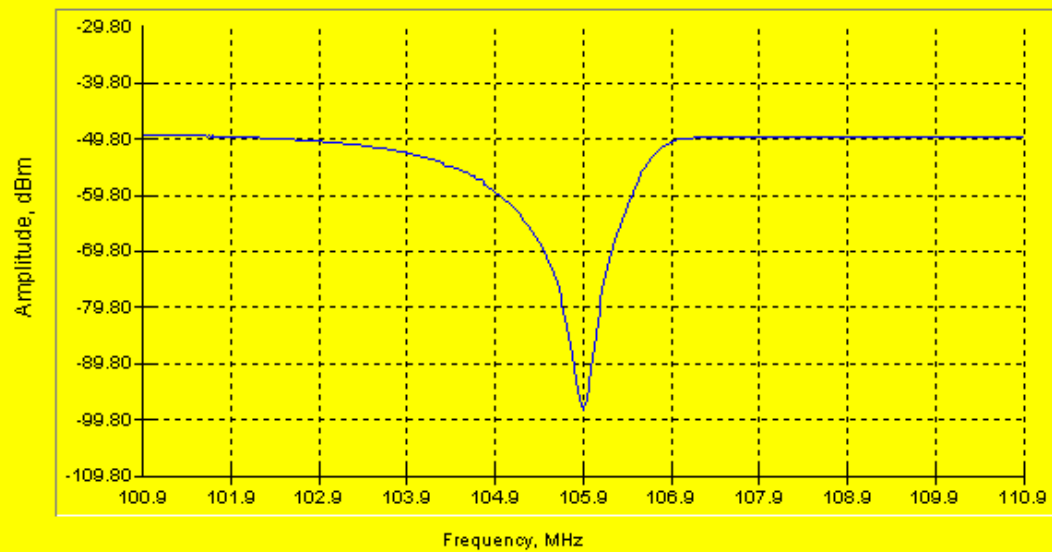
Center Frequency 101.9 MHz  
Insertion Loss 0.56 dB



Center Frequency 103.3 MHz  
Insertion Loss 0.33 dB

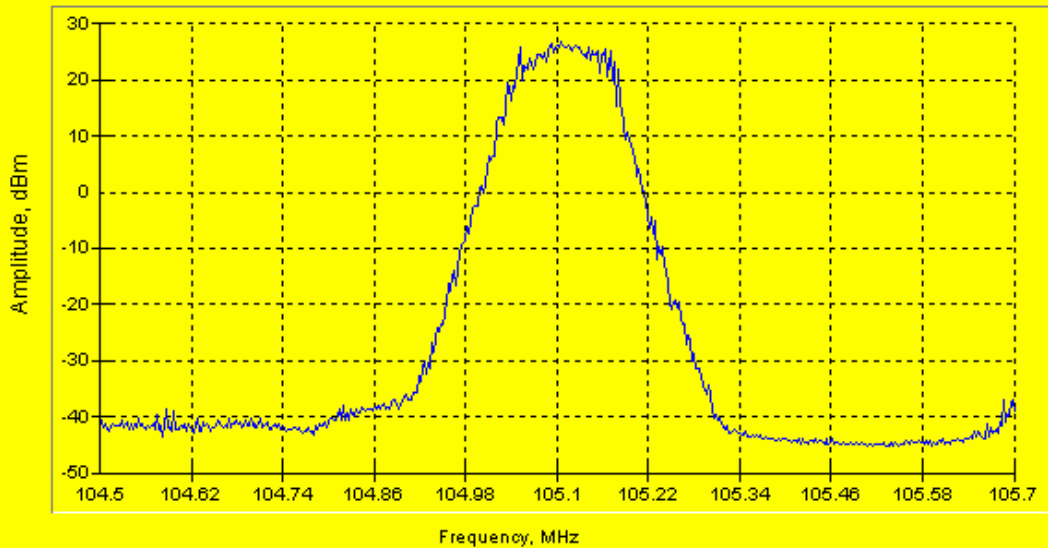


Center Frequency 105.1 MHz  
Insertion Loss 0.33 dB



Center Frequency 105.9 MHz  
Insertion Loss 0.66 dB

## Carrier Reference Plot

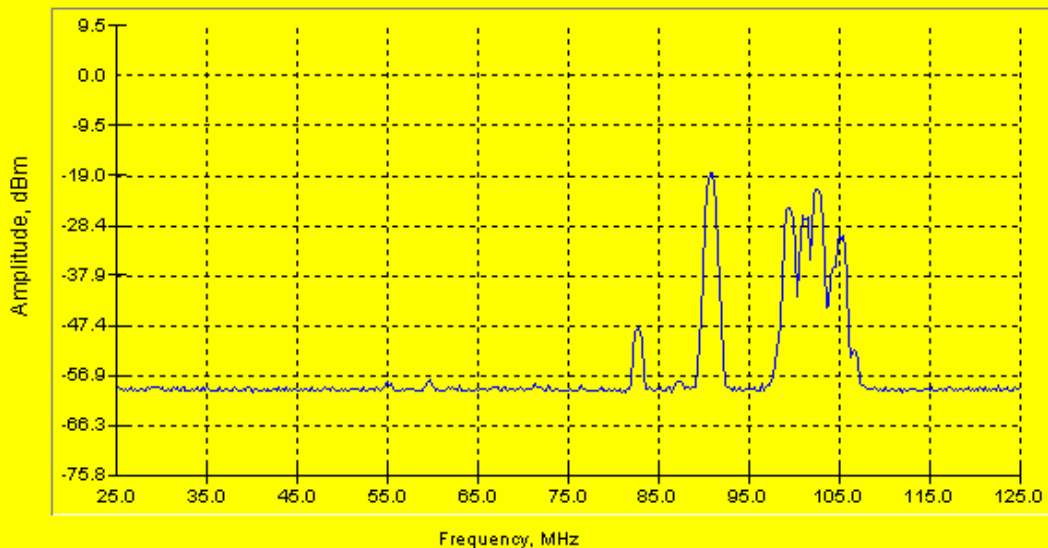


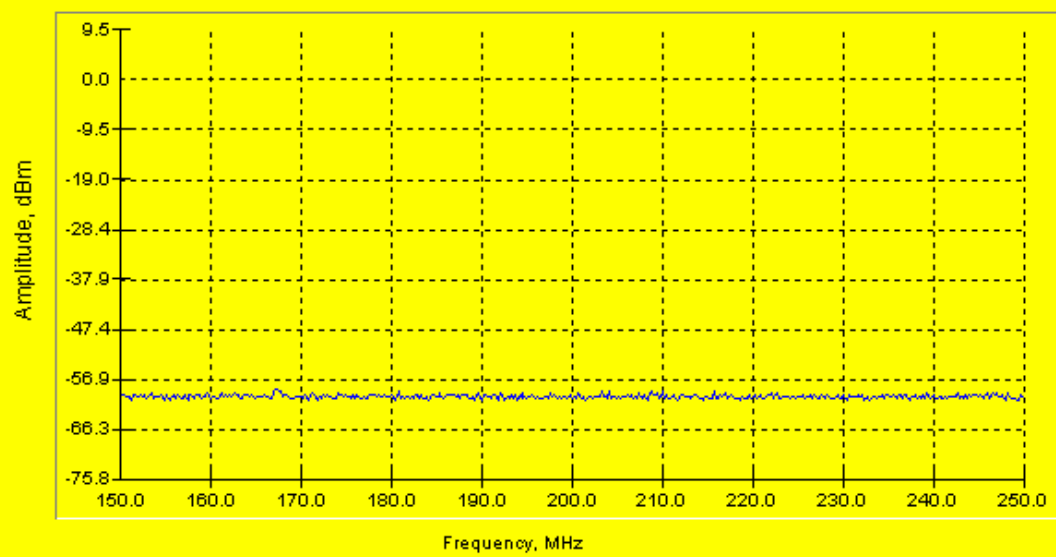
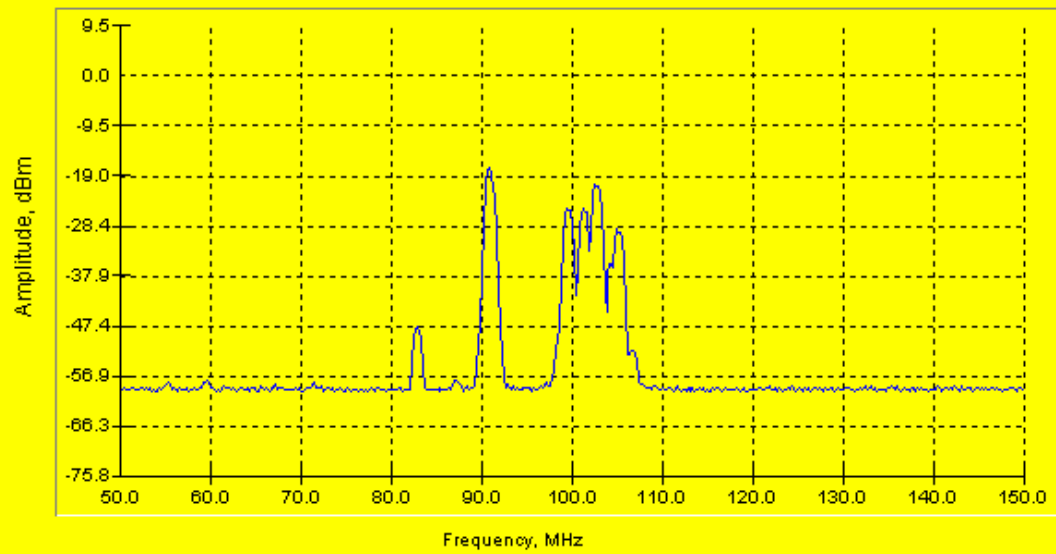
Center Frequency 105.1 MHz  
 Frequency Span 120 kHz per division  
 Sweep Speed 200 ms per division

Carrier Peak Reference Level +26.87 dBm  
 Resolution Bandwidth 30 kHz  
 Vertical Scale 10 dB per division

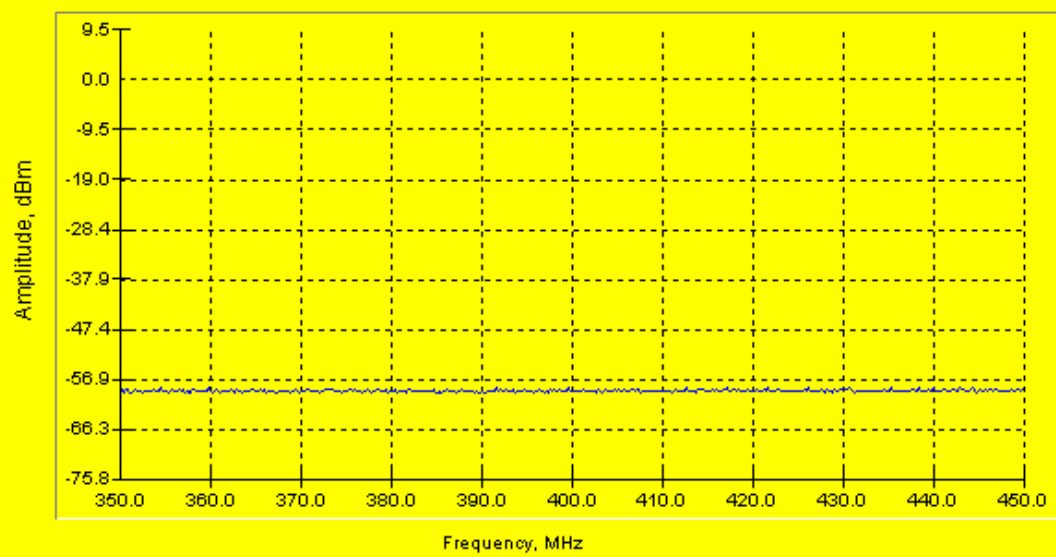
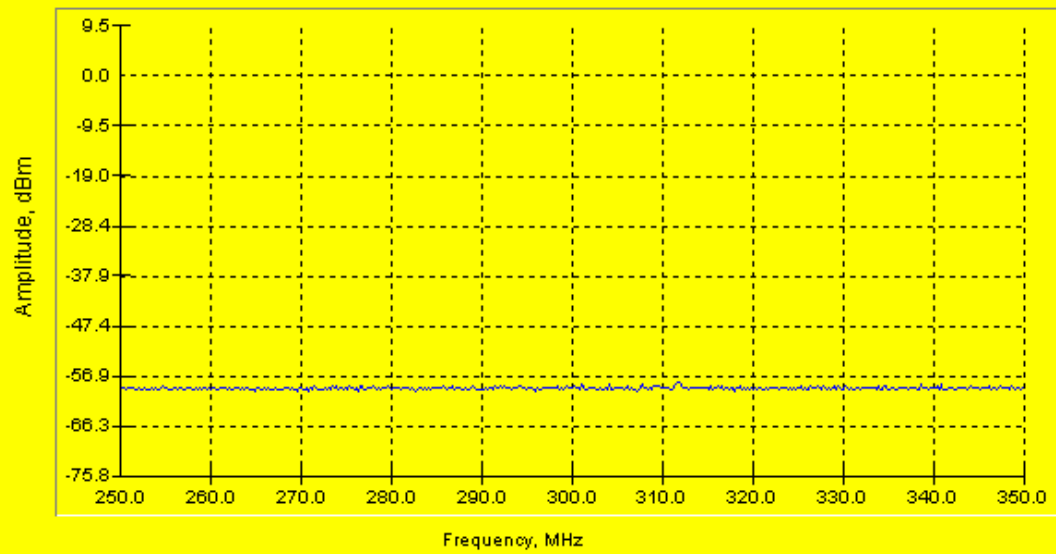
120 kHz below carrier frequency -8.8 dBm (35.67 dB below carrier level)  
 120 kHz above carrier frequency -3.8 dBm (30.67 dB below carrier level)

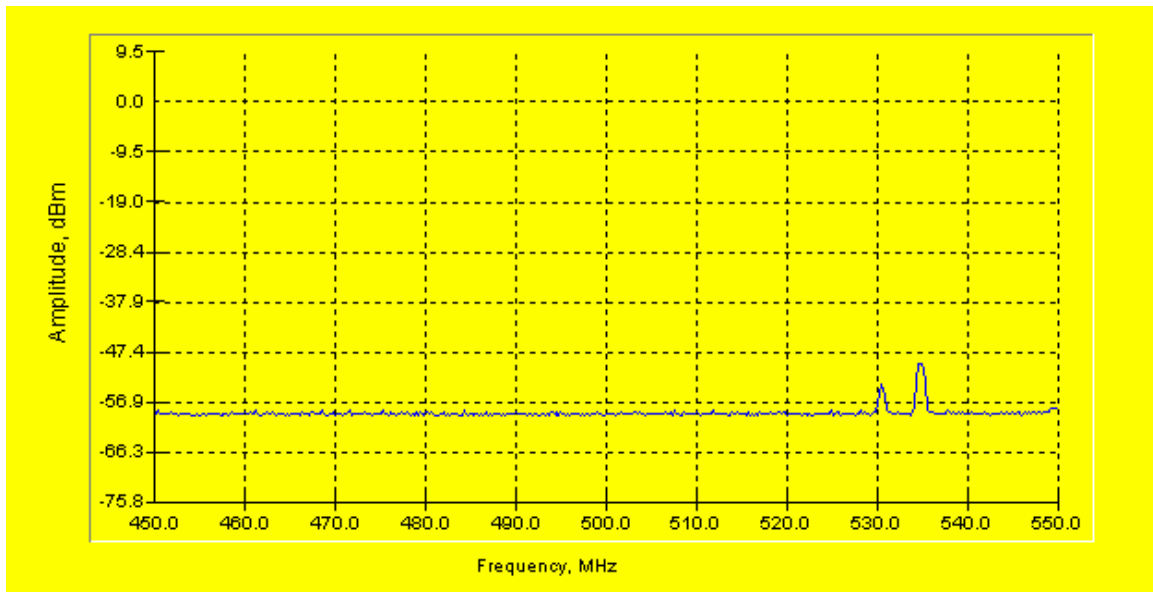
**All measurements plots on the following pages were made with 10 dB of external attenuation and 24 dB of internal attenuation and with cavity notch filters for each station in line to the spectrum analyzer. The resolution bandwidth is 1 MHz, the frequency span is 10 MHz per division, the vertical scale is 10 dB per division, and the sweep speed is 50 milliseconds per division.**



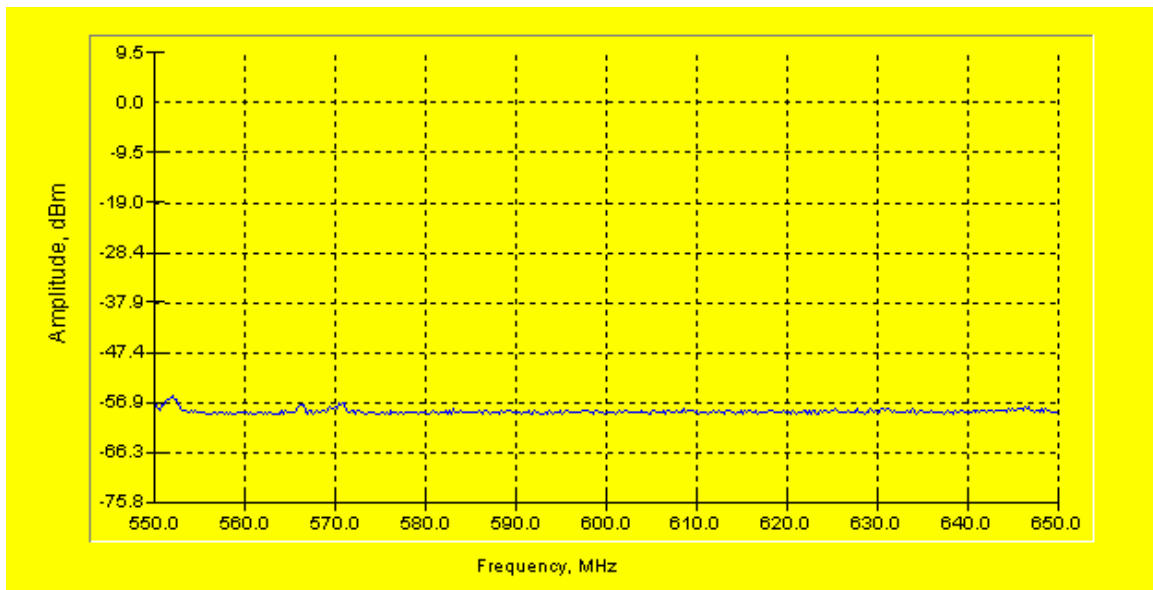




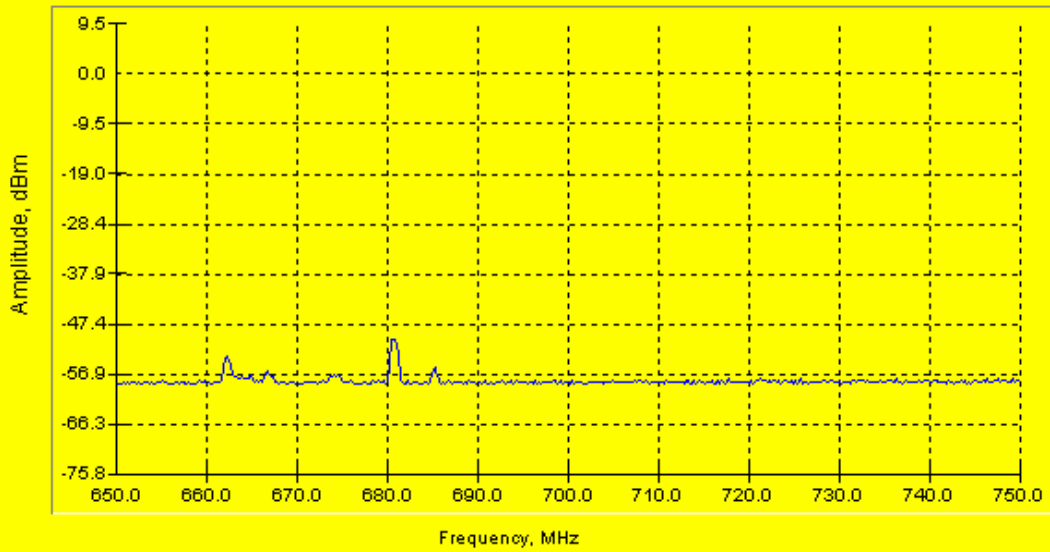




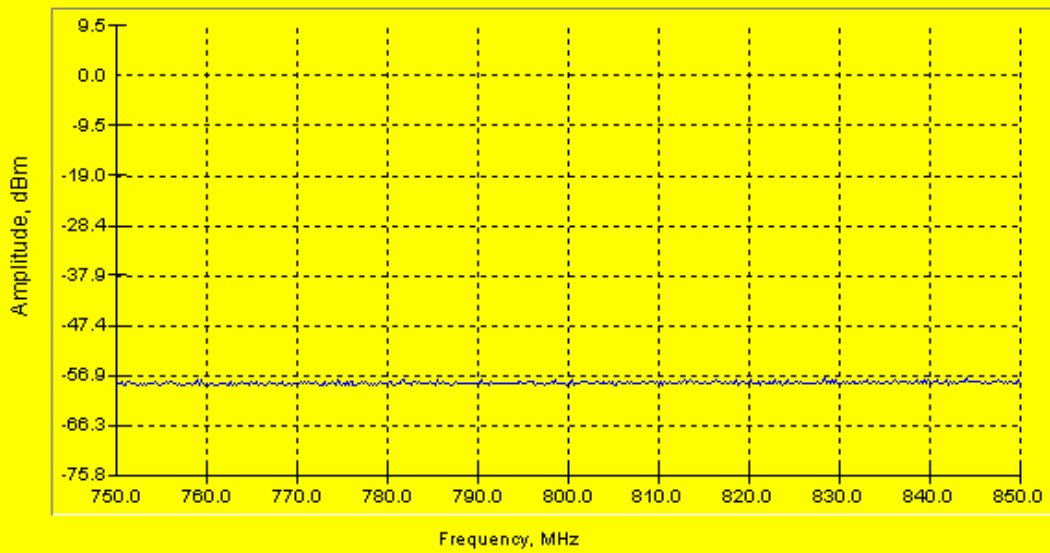
The signals at approximately 531 MHz and 535 MHz are coming from a nearby television station (KNMT, Channel 24).

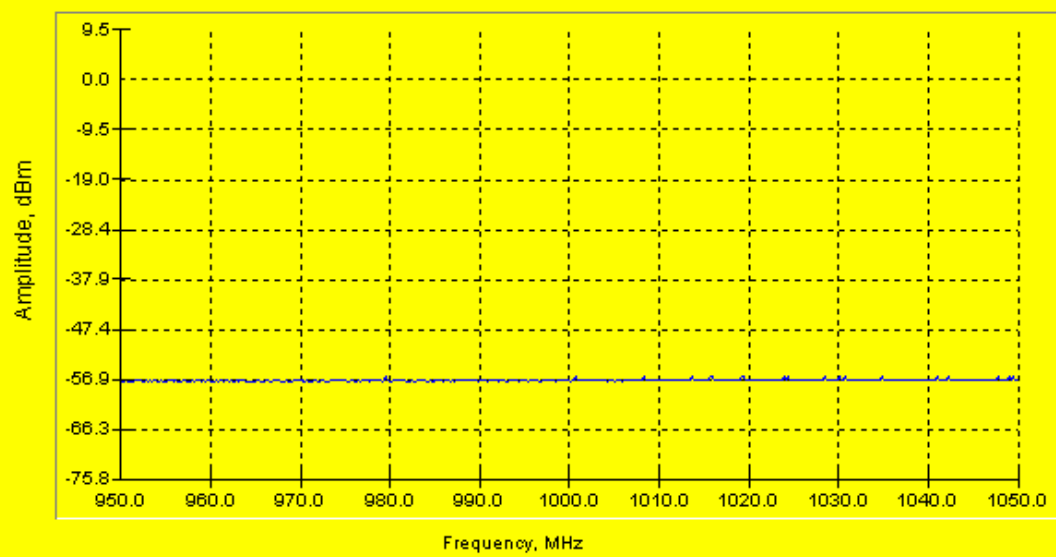
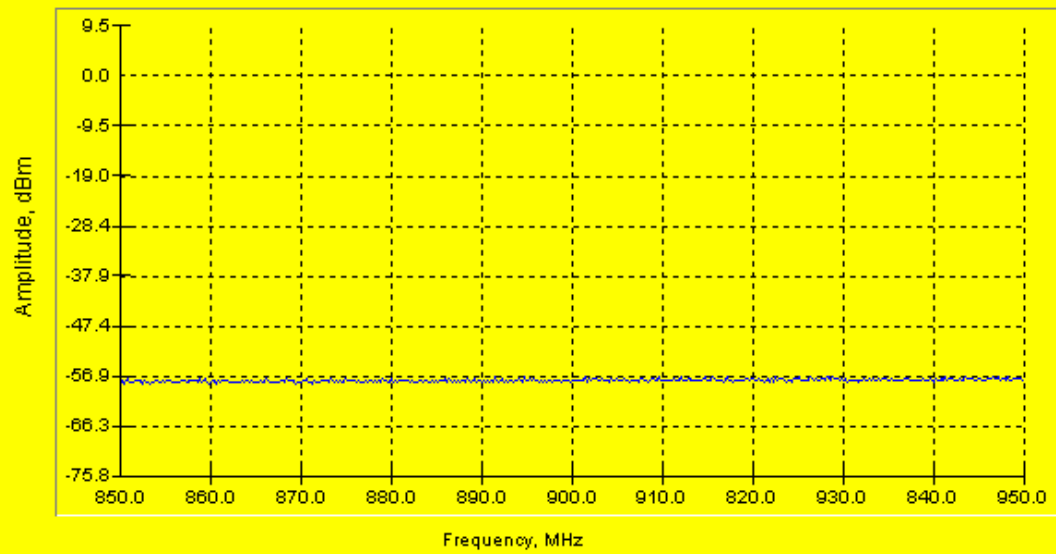


The signals at approximately 552 MHz, 567 MHz and 570 MHz are from nearby television stations (KOPB-DT, Channel 27 and KPTV-DT, Channel 30).



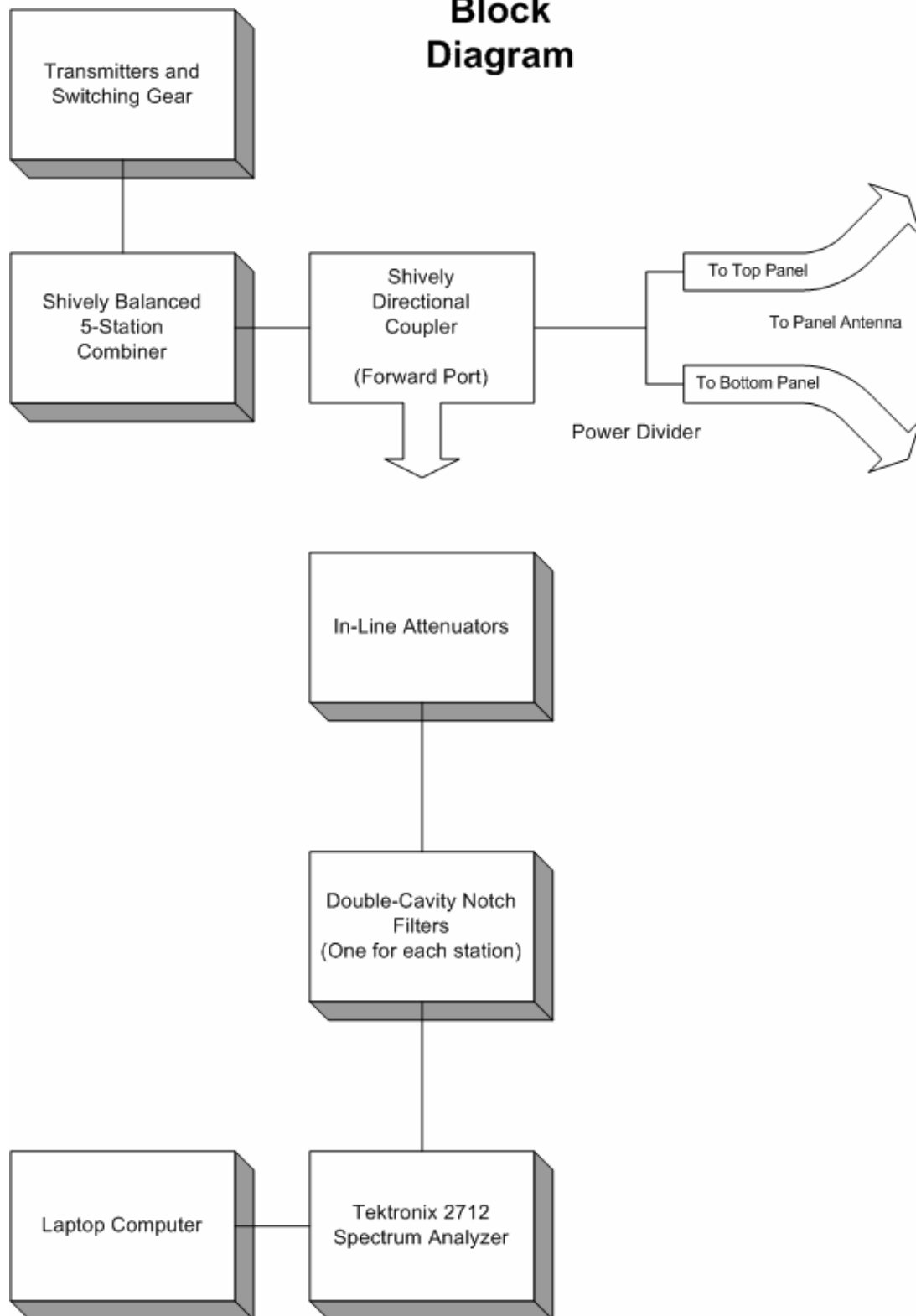
The signals from approximately 662 MHz to 686 MHz are from nearby television stations (KGW-DT, Channel 46, KPDX-DT, Channel 48 and KPDX, Channel 49).







## Equipment Block Diagram



### 73.317 FM TRANSMISSION SYSTEM REQUIREMENTS

- (a) FM broadcast stations employing transmitters authorized after January 1, 1960, must maintain the bandwidth occupied by their emissions in accordance with the specification detailed below. FM broadcast stations employing transmitters installed or type accepted before January 1, 1960, must achieve the highest degree of compliance with these specifications practicable with their existing equipment. In either case, should harmful interference to other authorized stations occur, the licensee shall correct the problem promptly or cease operation.
- (b) Any emission appearing on a frequency removed from the carrier by between 120 kHz and 240 kHz inclusive must be attenuated 25 dB below the level of the unmodulated carrier. Compliance with this requirement will be deemed to show the occupied bandwidth to be 240 kHz or less.
- (c) Any emission appearing on a frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz must be attenuated at least 35 dB below the level of the unmodulated carrier.
- (d) Any emission appearing on a frequency removed the carrier by more than 600 kHz must be attenuated at  $43 + 10\log(\text{Power in watts})$  dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.