

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

KTRO

Common Antenna and Combiner System

Stonehenge Tower, Portland, Oregon

January 30, 2006

On January 30th, 2006, Boyd Broadcast Technical Services made measurements of KTRO (93.1 MHz), Gladstone, Oregon, to show compliance with FCC Rule 73.317. KTRO is one of eight FM Broadcast stations operating from a common antenna and combining system at the "Stonehenge Tower" in Portland, Oregon. The other seven stations are KBOO (90.7 MHz), KGON (92.3 MHz), KPDQ-FM (93.9 MHz), KXJM (95.5 MHz), KKSJN-FM (97.1 MHz), KWJJ (99.5 MHz) and KFIS (104.1 MHz). A ninth station (KNRK, 94.7 MHz) has an antenna mounted on the Stonehenge tower structure but it is not part of the combiner and common antenna.

These measurements were made following the installation of a combiner for KTRO (and sign on of this station) and the change in frequency of KPDQ-FM from 93.7 MHz to 93.9 MHz. All stations at the site were operating with their authorized facilities at the time of the measurements.

All measurements were made at a forward port of a Shively directional coupler located in line following the multi-station combining system and prior to the facility's common antenna system. At this point attenuators were inserted ahead of the Agilent E4402B spectrum analyzer (Serial Number MY44221068), which was used for the measurements. A total of 20 dB of external attenuation was used to make a reference measurement of KTRO. 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. 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 eight stations (plus one filter for the eighth station), 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, 5, 6 and 7 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% shielded coaxial cable with premium connectors and high quality RG-214 with premium connectors. Adapter connectors used are also premium quality. A block diagram of the measurement setup is shown on page 12 and a photograph of the complete test setup is shown on page 13.

Signals measured by the Agilent E4402B 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 several minutes each. This was done to observe possible short duration signals.

Data from these plots was saved in the analyzer's hard drive, then converted to .GIF files and downloaded into a computer for viewing and analysis (and to provide the plots shown in this report). The Agilent analyzer collected 401 data points over the instrument's selected frequency span for these measurements.

A reference plot for KTRO is shown on page 7. With notch filters for the nine Stonehenge stations in line to the spectrum analyzer, the FM band and the spectrum from 25 MHz through 1100 MHz was examined. Data plots for this part of the spectrum are shown on pages 8 through 11.

Several signals were discovered, many were identified (mostly land-mobile, cellular, and paging systems and all, including those not identified, were below the FCC limit of -80 dB referenced to the peak carrier level of the station being studied and taking into account the rising response characteristic of the directional coupler. It is believed that most of these signals were coming back down the transmission line from the common antenna and some were perhaps the result of instrument and/or cabling pickup in the room. Other broadcast stations from nearby sites were also seen at this directional coupler port. No harmonic emissions or other spurious emissions from KTRO at levels higher than 80 dB below the fundamental carrier frequency were observed.

The directional coupler has the following response characteristics (as plotted by Shively Labs, the manufacturer of the directional coupler).

| | |
|--------------|---------------------------------------|
| 73.5 MHz | -38.5 dB (below any single frequency) |
| 88 – 108 MHz | -36 dB |
| 159 MHz | -30 dB |
| 468.5 MHz | -22 dB |
| 813.5 MHz | -23 dB |

It is believed that KTRO 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.

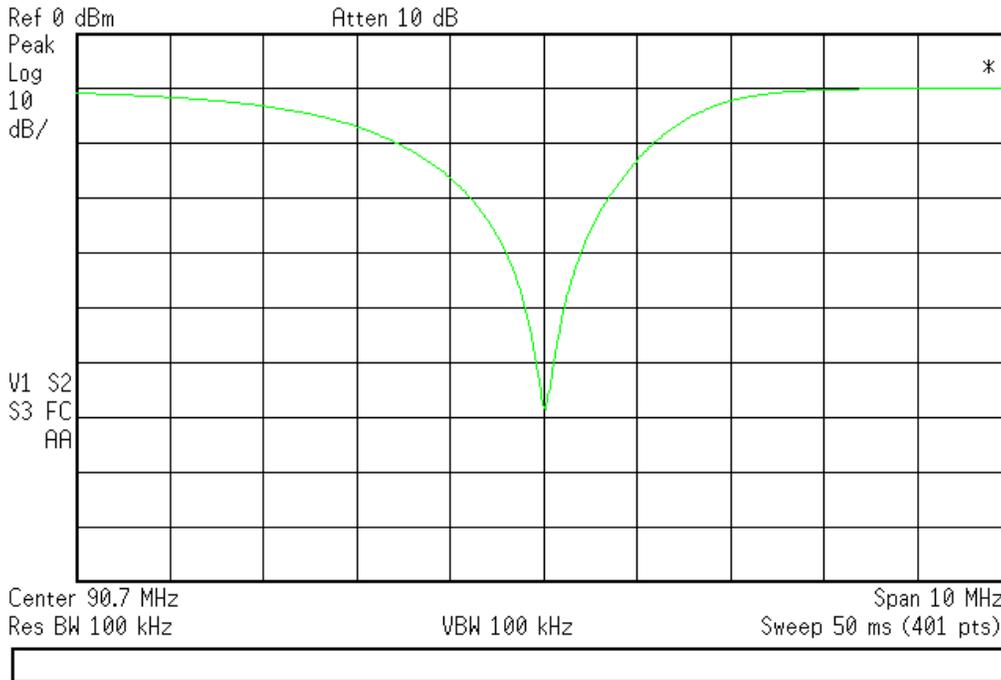
All information contained in this report was gathered by James E. Boyd, who has experience making these kinds of measurements and whose qualifications are a matter of record with the Federal Communications Commission.

Respectfully Submitted,

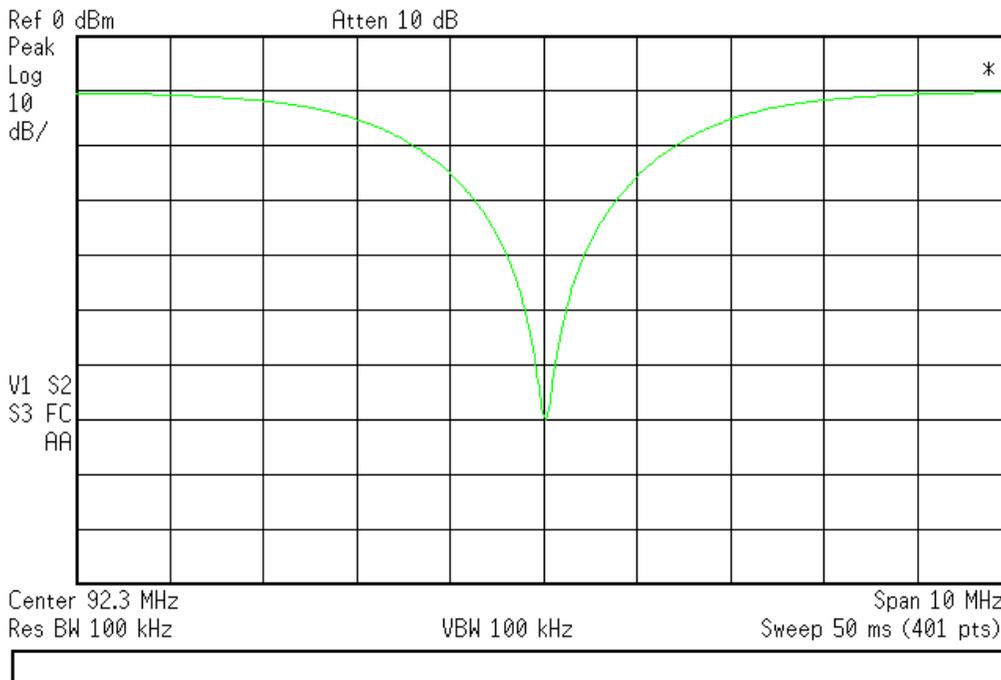
A handwritten signature in black ink, appearing to read 'James E. Boyd', with a long horizontal flourish extending to the right.

James E. Boyd
Boyd Broadcast Technical Services
21818 SW Columbia Circle
Tualatin, OR 97062
(503) 692-6074

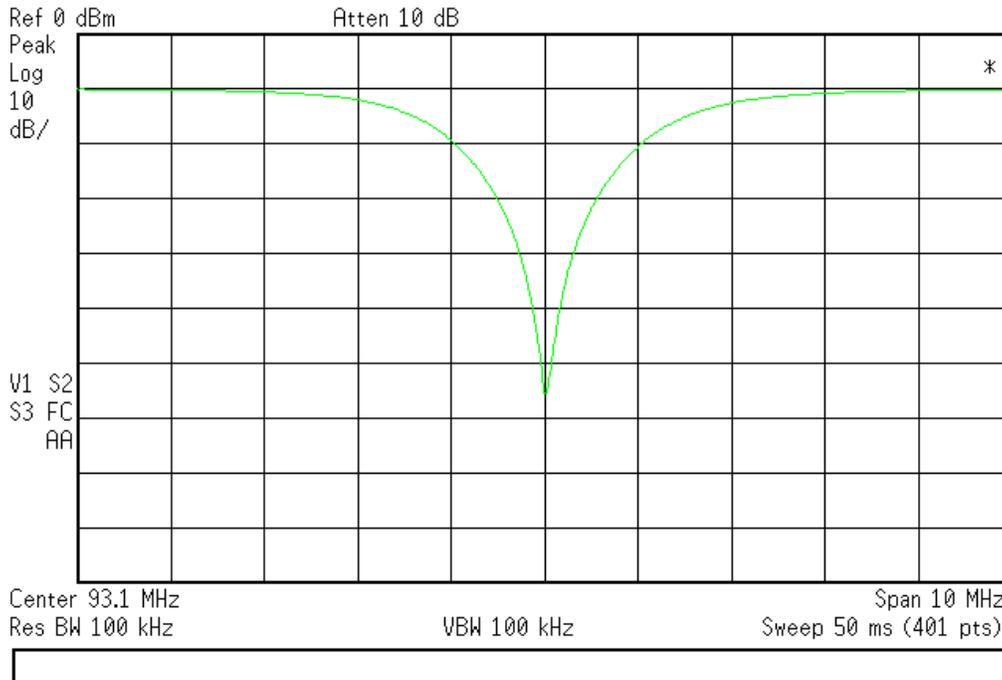
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* Agilent 11:26:07 Feb 6, 2006

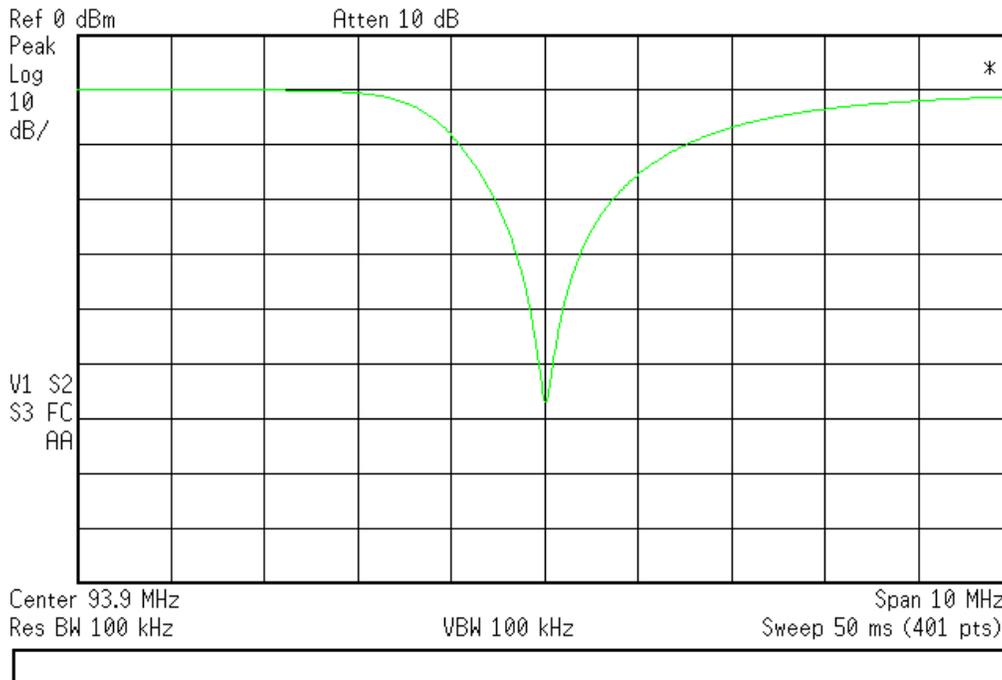


* Agilent 11:29:44 Feb 6, 2006



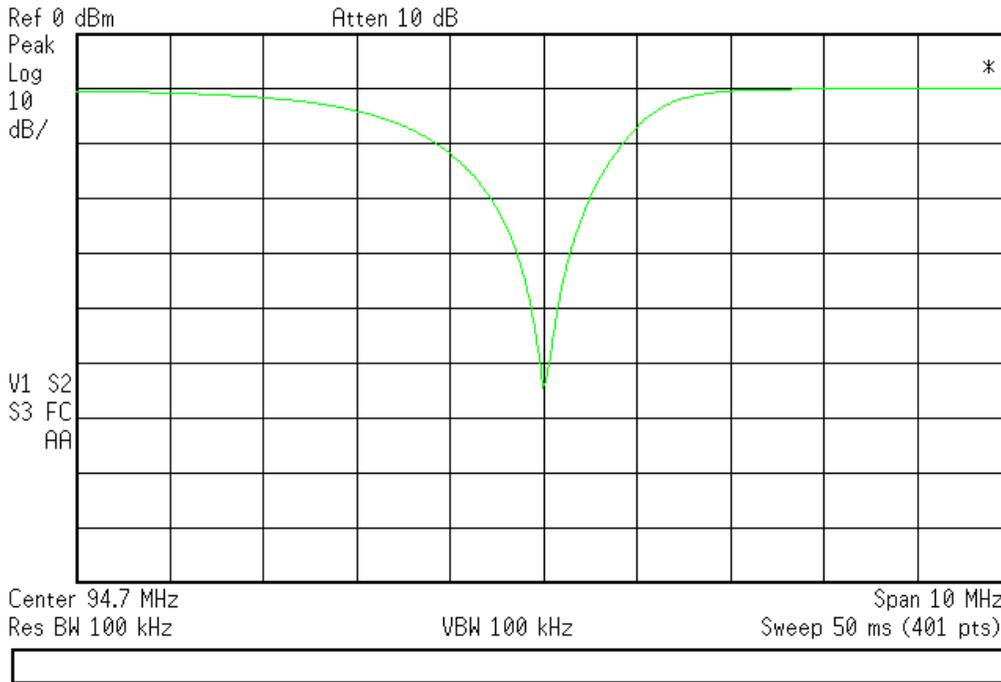
93.1 MHz Notch Filter

* Agilent 11:31:02 Feb 6, 2006

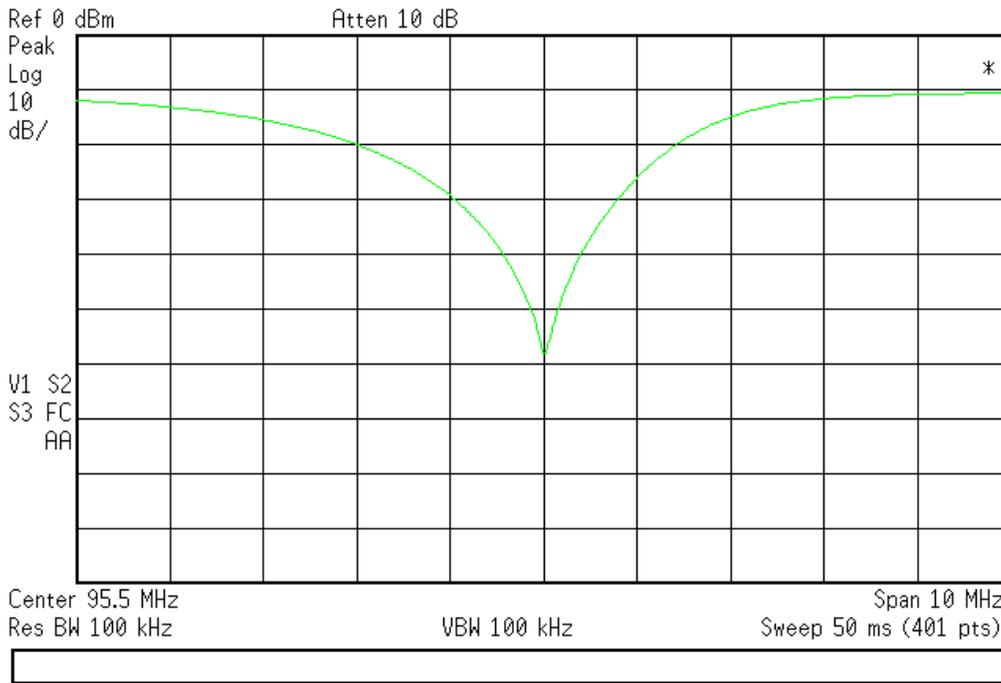


93.9 MHz Notch Filter

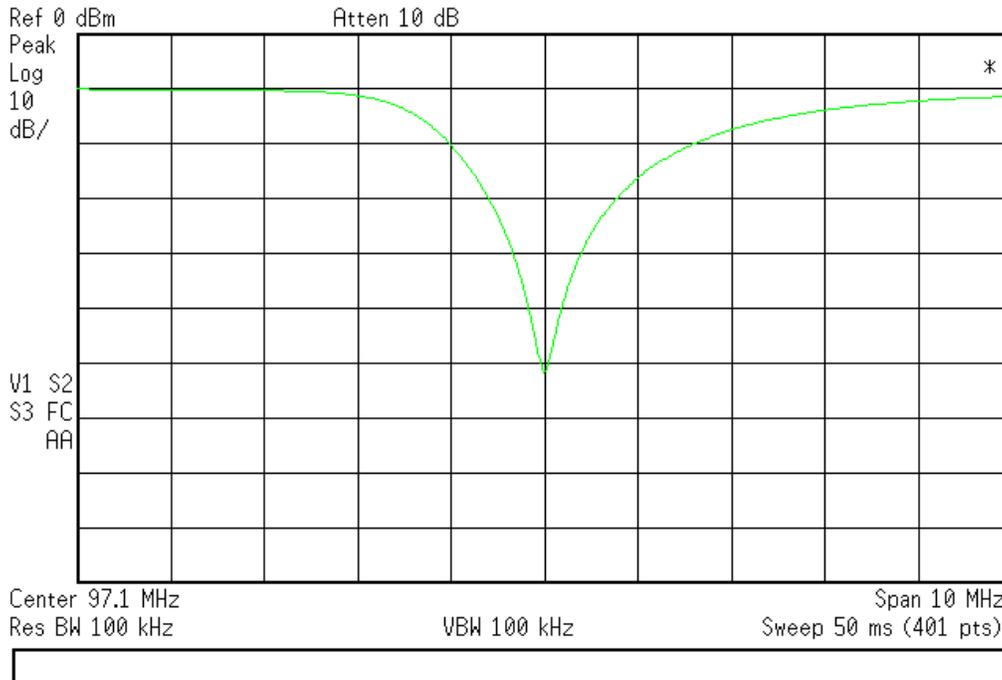
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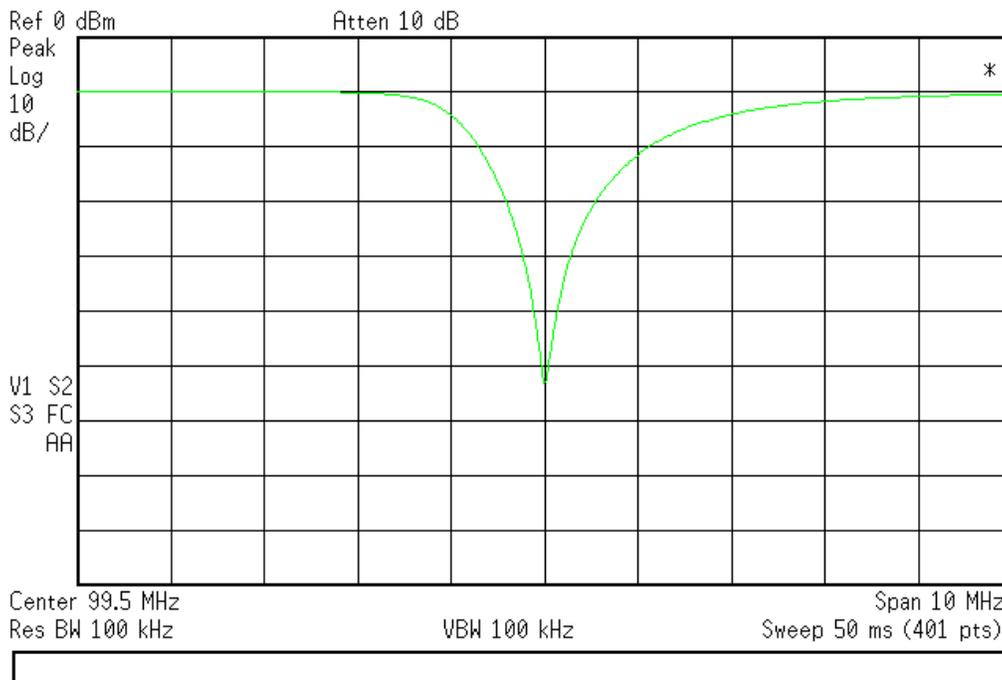
* Agilent 11:33:38 Feb 6, 2006



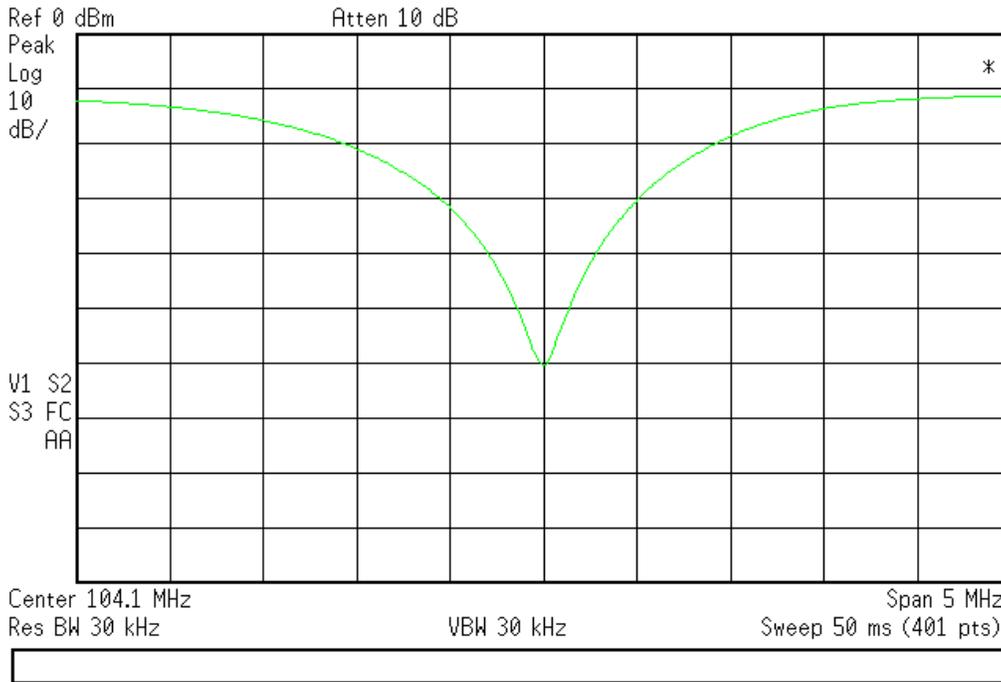
* Agilent 11:34:58 Feb 6, 2006



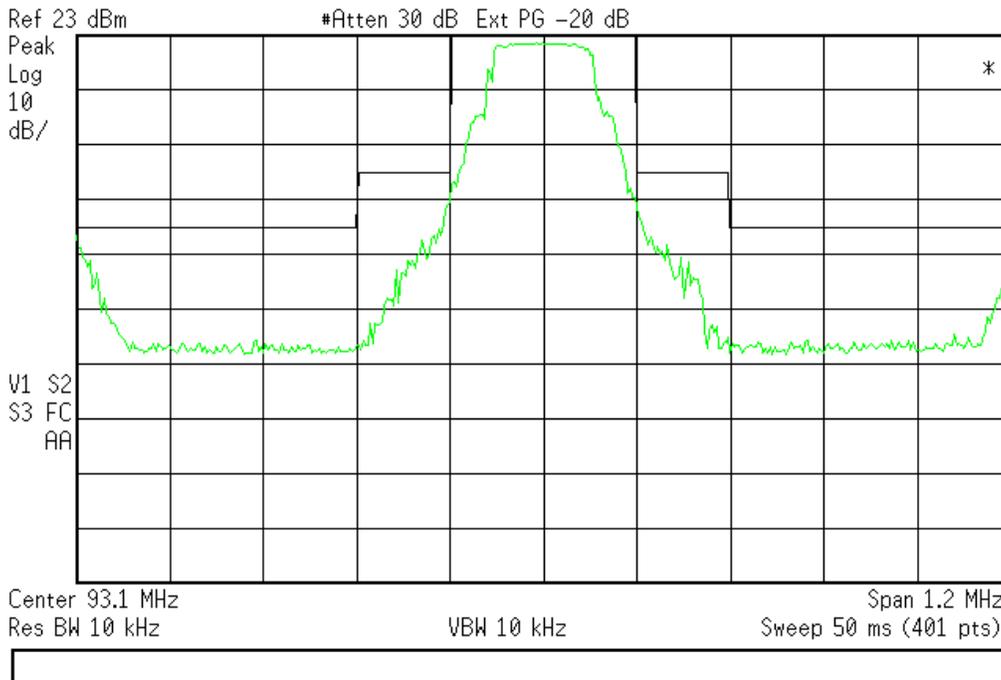
* Agilent 11:36:19 Feb 6, 2006



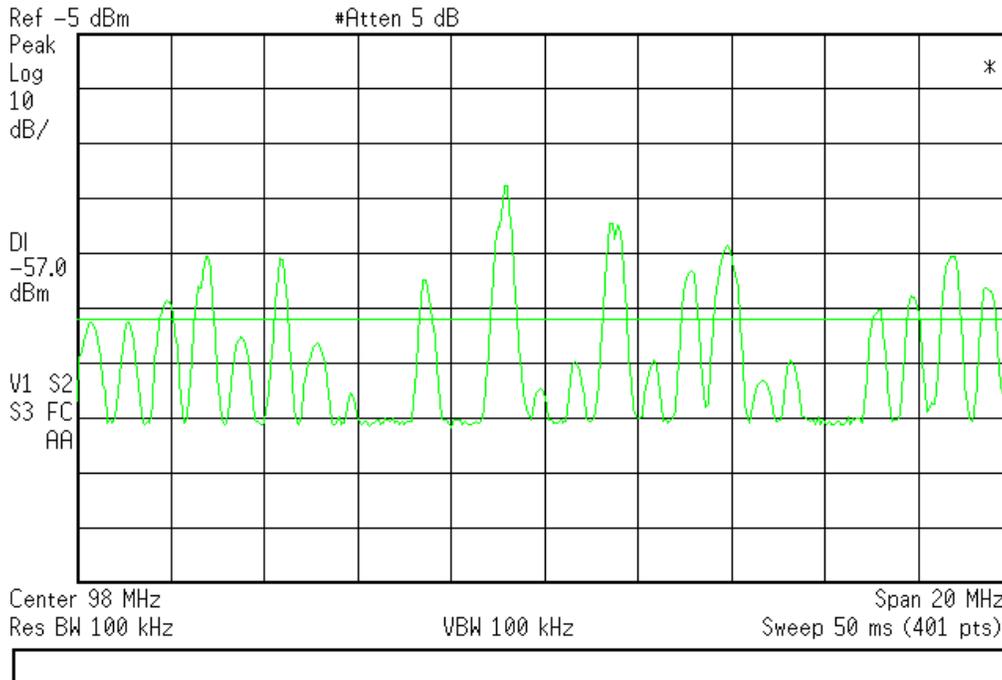
* Agilent 11:37:43 Feb 6, 2006



* Agilent 12:19:46 Feb 6, 2006

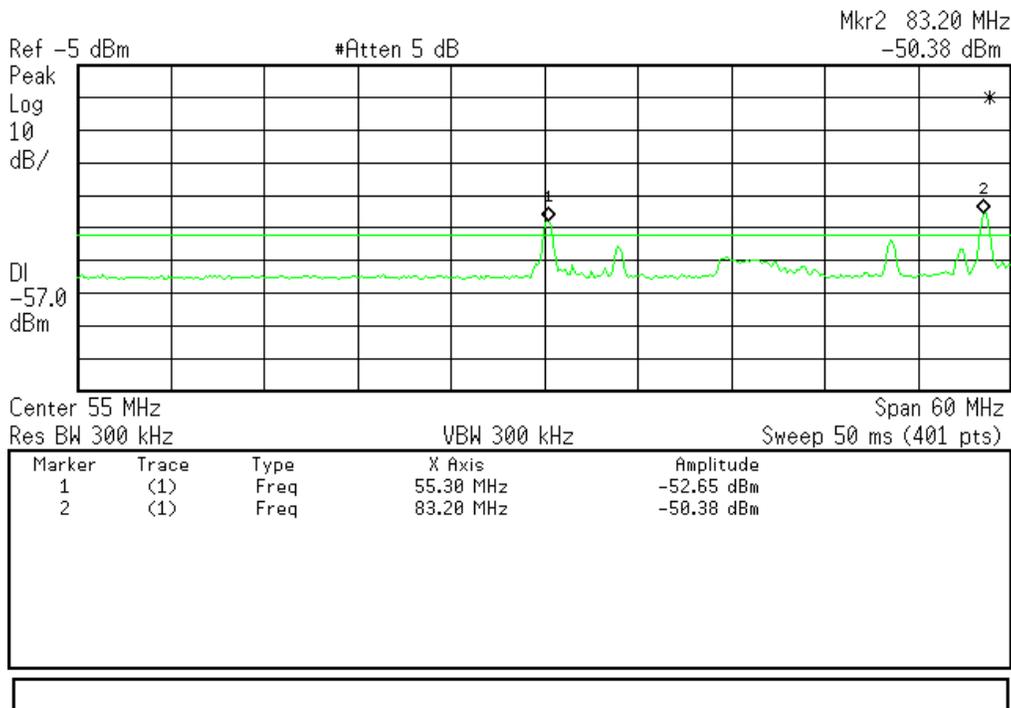


* Agilent 12:40:09 Feb 6, 2006



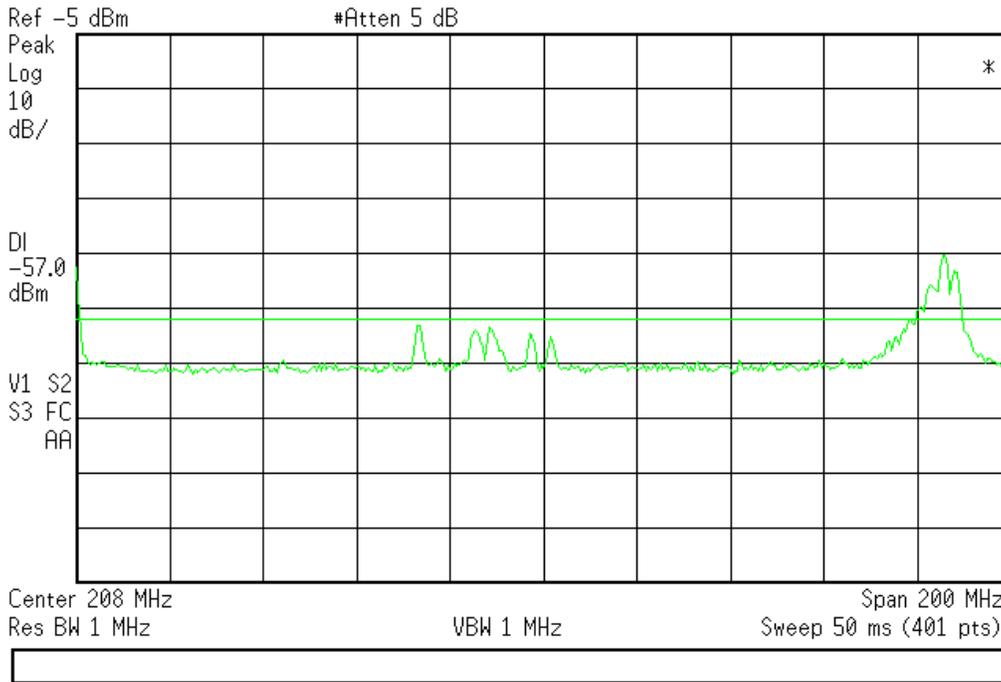
FM broadcast band with double cavity notch filters in line for each station located at Stonehenge. No spurious emissions are present.

* Agilent 12:49:54 Feb 6, 2006



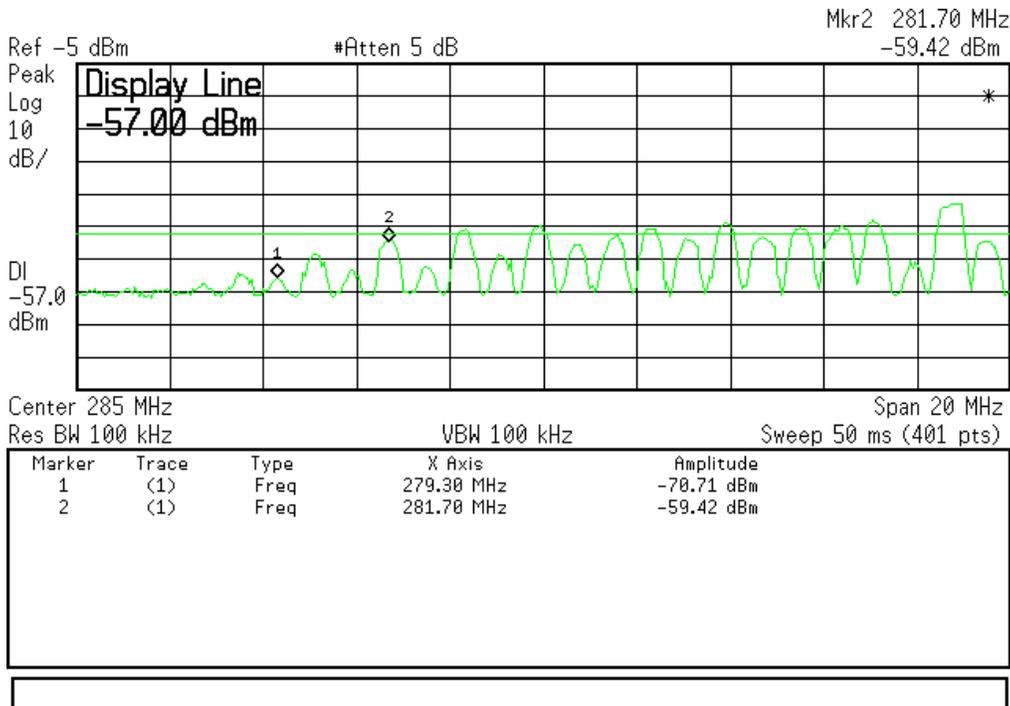
25 to 85 MHz. The marked signals are KATU-TV (Channel 2) and KOIN-TV (Channel 6), located 5.21 km and 4.26 km respectively from the Stonehenge Tower facility

* Agilent 12:52:19 Feb 6, 2006



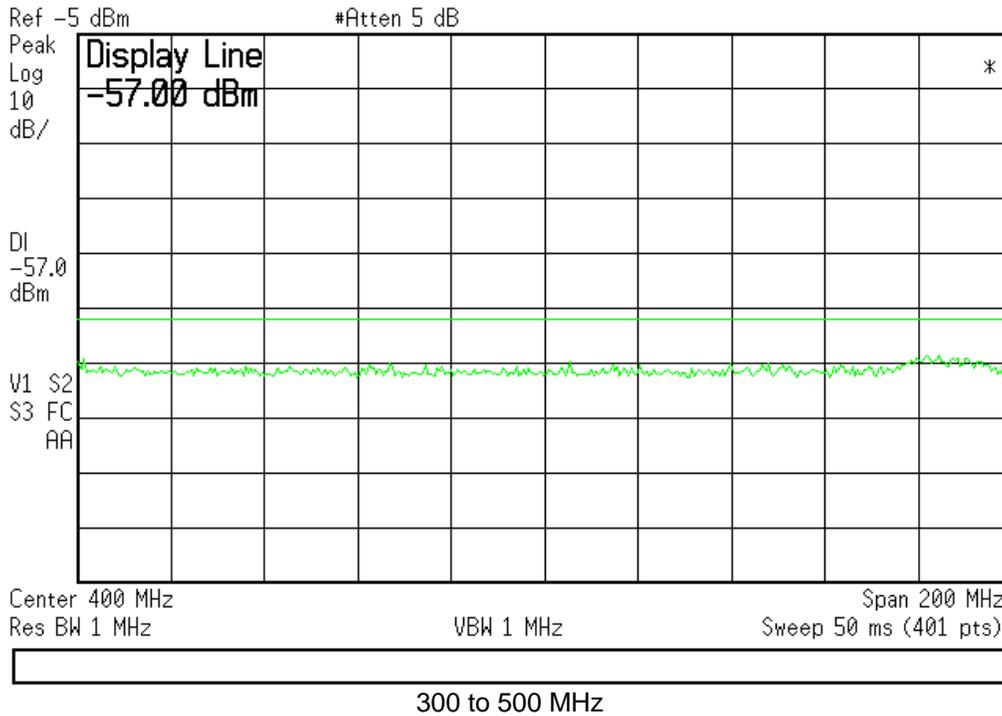
108 to 308 MHz

* Agilent 12:56:36 Feb 6, 2006

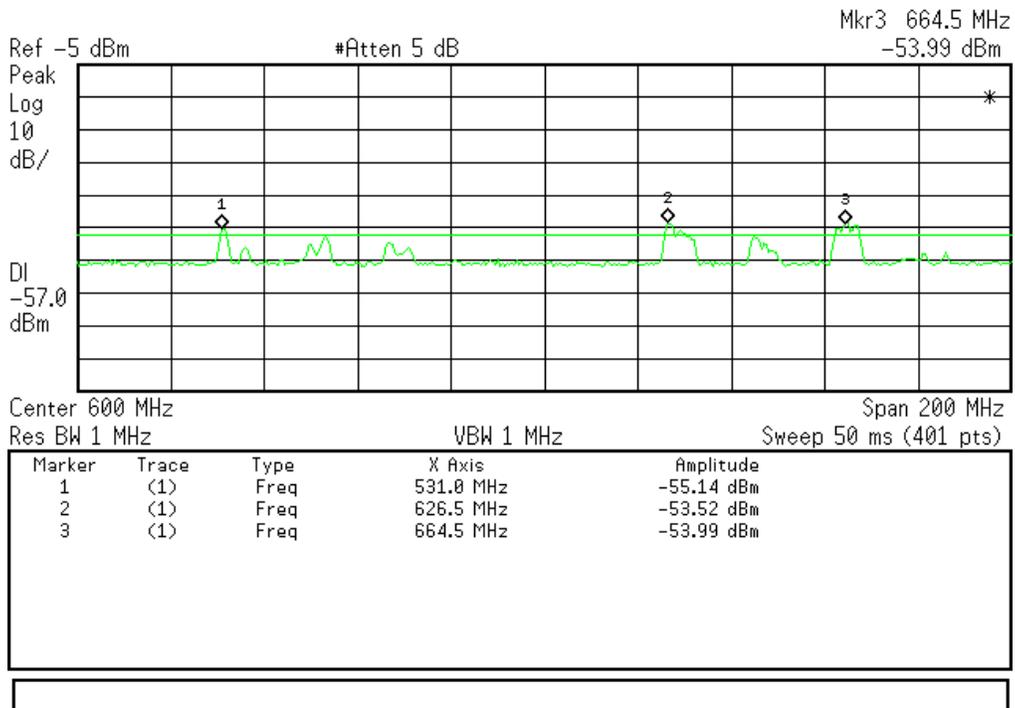


Spectra grouping is collection of 3rd harmonics from stations in combiner. All are well below fundamental reference levels. Marker one is KTRO 3rd harmonic.

* Agilent 12:58:43 Feb 6, 2006

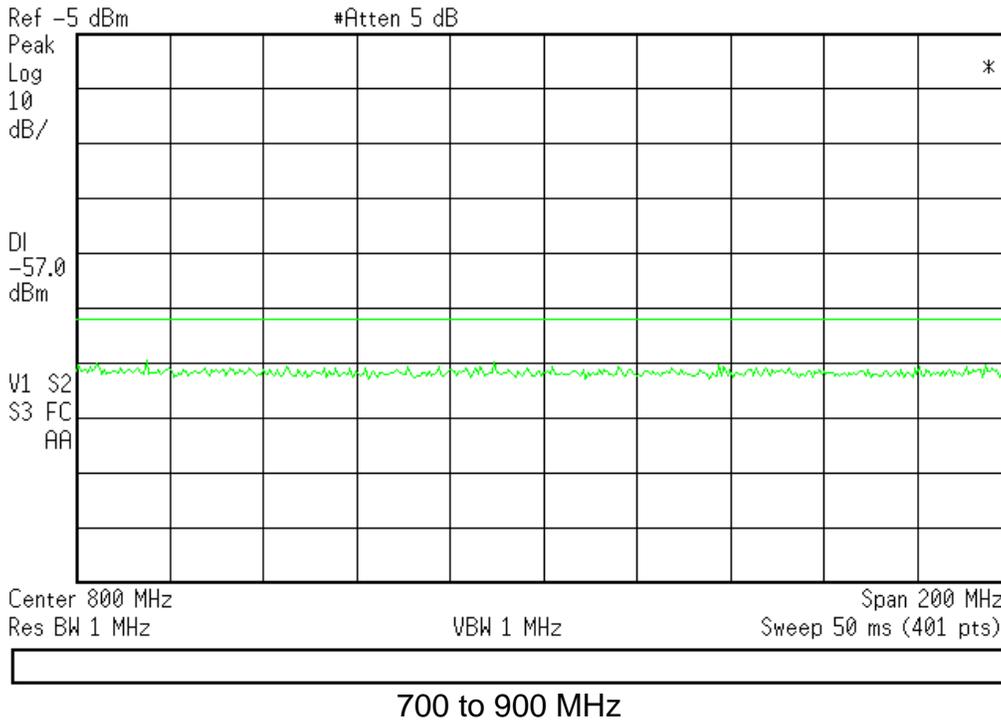


* Agilent 13:40:30 Feb 6, 2006

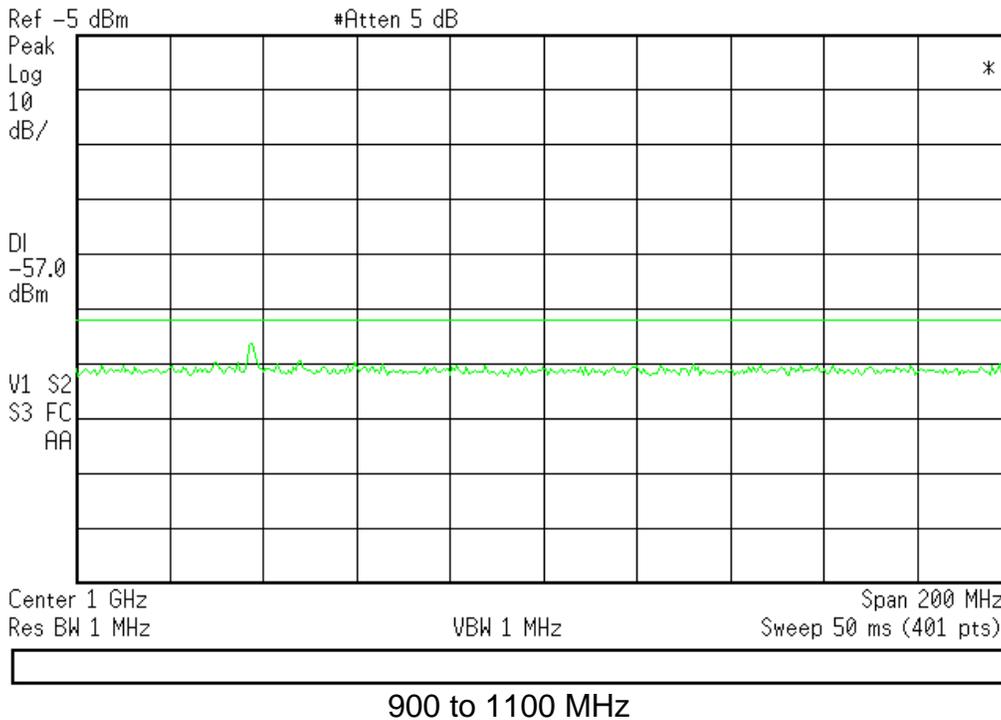


500 to 700 MHz. Markers (above -80 dB from KTRO) show KNMT-TV (Channel 24) and KOIN-DT (Channel 40), both 4.26 km away and KGW-DT (Channel 46) 5.5 km away.

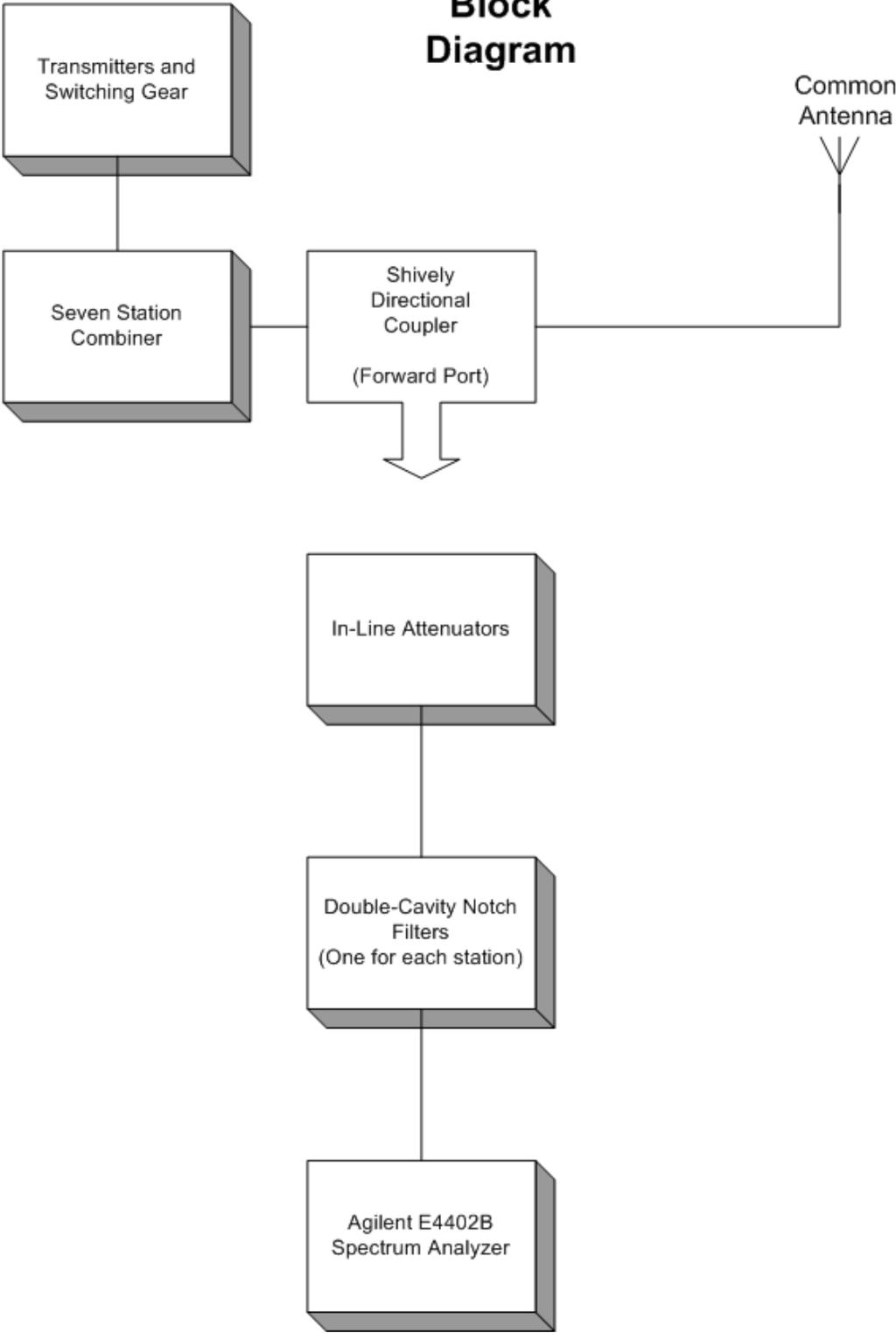
* Agilent 13:43:31 Feb 6, 2006



* Agilent 13:41:52 Feb 6, 2006



Equipment Block Diagram





Test Setup

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 $43 + 10\text{Log}(\text{Power in watts})$ dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.