Occupied Bandwidth Measurements
(FCC Rule 73.317)
Construction Permit BPFT-20150409ABH
Special Operating Condition 3

K220IN
(Facility ID: 121763)
Portland, Oregon

Common Antenna and Combiner System

Skyline Tower, Portland, Oregon

August 28 and 29, 2017

On August 28th and 29th, 2017, Boyd Broadcast Technical Services made measurements of K220IN (91.9 MHz), Portland, Oregon, to show compliance with FCC Rule 73.317 and to comply with Special Operating Condition 3 on Construction Permit BPFT-20150409ABH. The measurements described here were made following the addition of K220IN to the common antenna and combining system at the Skyline tower facility in Portland, Oregon. Two other translators use this combiner and common antenna: They are K275CH (102.9 MHz), Gresham, Oregon and K283BL (104.5 MHz) Portland, Oregon. All stations using this common antenna system were operating with their authorized facilities at the time of the measurements.

There are other FM broadcast stations as well as FM translators at this site. They are KOPB (91.5 MHz), Portland, Oregon, KKRZ (100.3 MHz), Portland, Oregon, KINK (auxiliary site)(101.9 MHz), Portland, Oregon, KKCW (103.3 MHz), Beaverton, Oregon, KRSK (105.1 MHz) Molalla, Oregon, and KFBW (105.9 MHz), Vancouver, Washington. K228EU (93.5 MHz), Portland, Oregon, and K272EL (102.3 MHz), Portland, Oregon.

Also co-located at this site, are several television stations. They are KGW, Channel 8, Portland, Oregon, KOPB-TV, Channel 10, Portland, Oregon, KPXG-TV, Channel 22, Salem, Oregon, KPXG-LD, Channel 42, Portland, Oregon, KGWZ-LD, Channel 46, Portland, Oregon, KORS-CD, Channel 16, Portland, Oregon, KOXI-CD, Channel 20, Portland, Oregon, KORK-CD, Channel 35, Portland, Oregon, KKEI-CD, Channel 38, Portland, Oregon and KOXO-CD, Channel 41, Vancouver, Washington.

There are also numerous land mobile, microwave and wireless transmit and receive facilities at this site.

In addition, several other sites are near the Skyline site (within 5.5 km) hosting other FM and TV broadcast transmitters.

All measurements were made utilizing a Coaxial Dynamics 88535 line section fitted with a Coaxial Dynamics 87004 coupler element which was temporarily placed in line following the multi-station combining system and prior to the facility's common antenna system.
The coupler exhibits a rising output level versus frequency characteristic. The amount of increase is approximately equivalent to 20 X Log of the observed frequency divided by the carrier frequency.

An Agilent E4402B spectrum analyzer (Serial Number MY44221068), was used for the measurements in this report. An external 10 dB coaxial attenuator was used to make a reference measurement at carrier frequency. The amplitude calibration of the instrument was electronically adjusted to account for this attenuation. This reference data plot for K220IN is shown on page four. The attenuator was removed for all other measurements. This reduction in the amount of attenuation provides added dynamic range for all other measurements.

For measurements of the FM broadcast band (88 to 108 MHz), a double cavity notch filter tuned to 91.9 MHz, was used ahead of the spectrum analyzer to prevent signal overload and subsequent erroneous intermodulation products. The amplitude versus frequency response of the Microwave Filter Co. model 6367 filter is shown on page three of this report.

A Microwave Filter Company 3367 FM Bandstop Filter was inserted ahead of the spectrum analyzer to observe the spectrum from 30 to 90 MHz and from 108 MHz to 1100 MHz. The

amplitude versus frequency response of the bandstop filter (measured with an Agilent N9912A, serial number: MY49101678) is shown on pages three and four.

Data plots for the entire spectrum 30 MHz to 1100 MHz are shown on pages five through eight. A block diagram of the measurement setup is shown on page nine. Pictures of the combiner and test equipment are shown on pages 10, 11 and 12

Signals measured by the Agilent E4402B spectrum analyzer are digitized in the analyzer. Data was collected for a period of time using the instrument's peak-hold feature. The data for the reference plot 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.

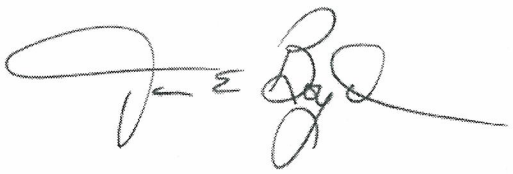
Although a number of signals were observed. Most of these signals were identified. The signals observed were from other broadcast stations at this site and other nearby sites and are believed to be coming back down the transmission line from the common antenna. When a signal could not be identified, the K220IN transmitter was turned off to show that the signal was not a product from the K220IN transmitter.

The reference plot established the absolute carrier level at 5.82 dBm sampled at the measurement location. The K220IN transmitter power output level (at the output of the three-station combiner) is 48 watts. Hence all spurious emissions must be 59.8 dB below the carrier level (43 + 10 X log of the power in watts).

No harmonic emissions, intermodulation products or other spurious emissions from K220IN at levels less than 59.8 dB below the fundamental carrier frequency were observed. It is believed that K220IN 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 13.

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

Respectfully Submitted,



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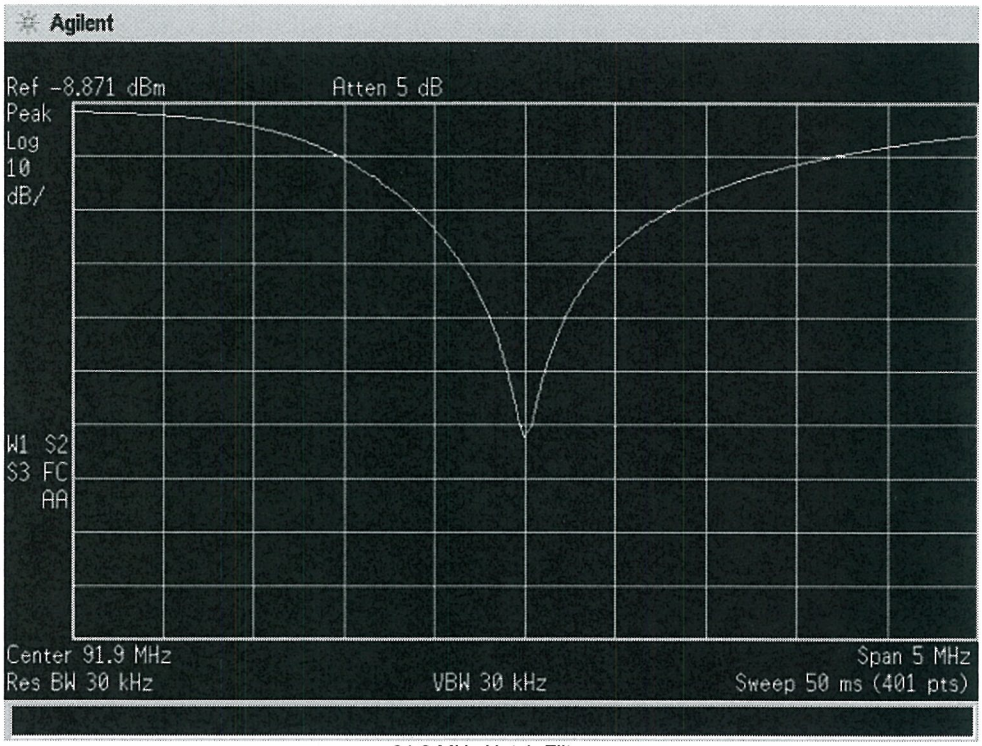
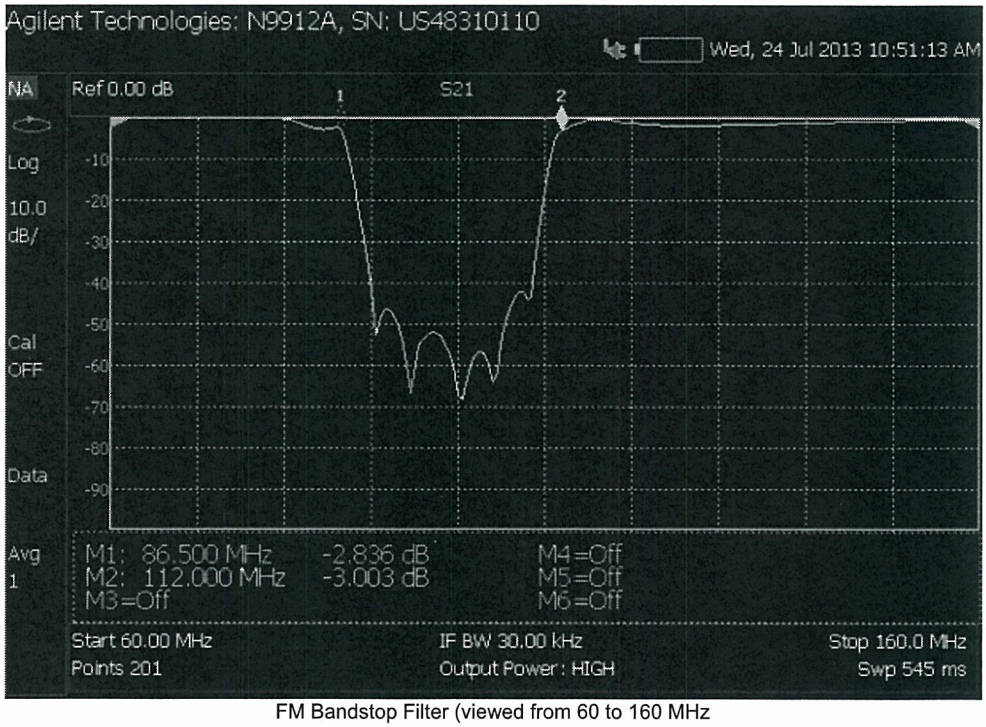
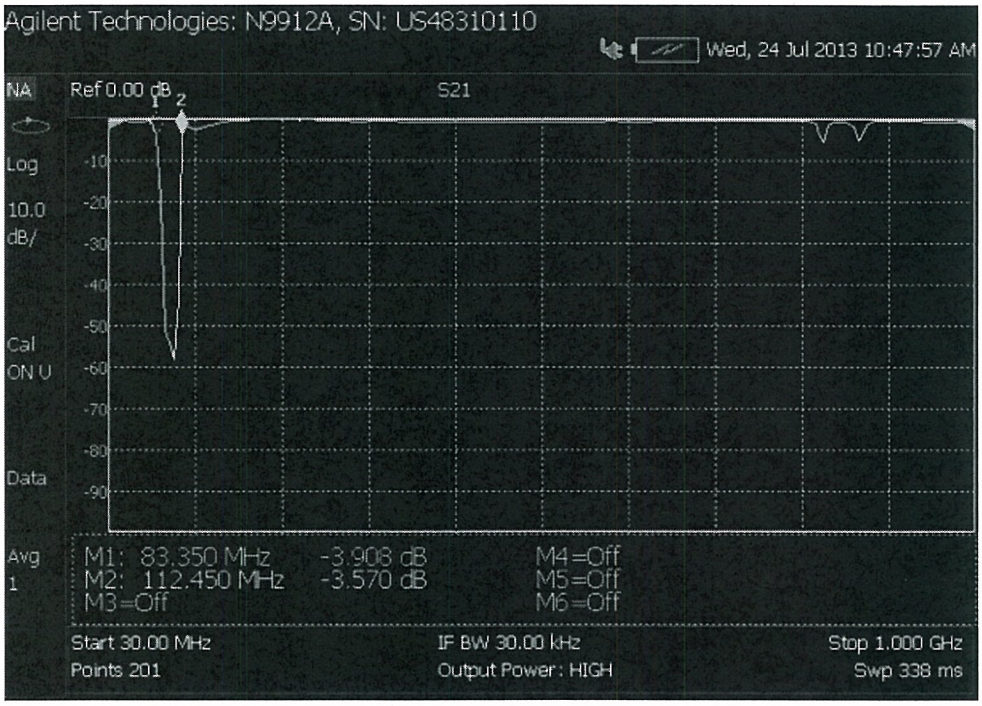


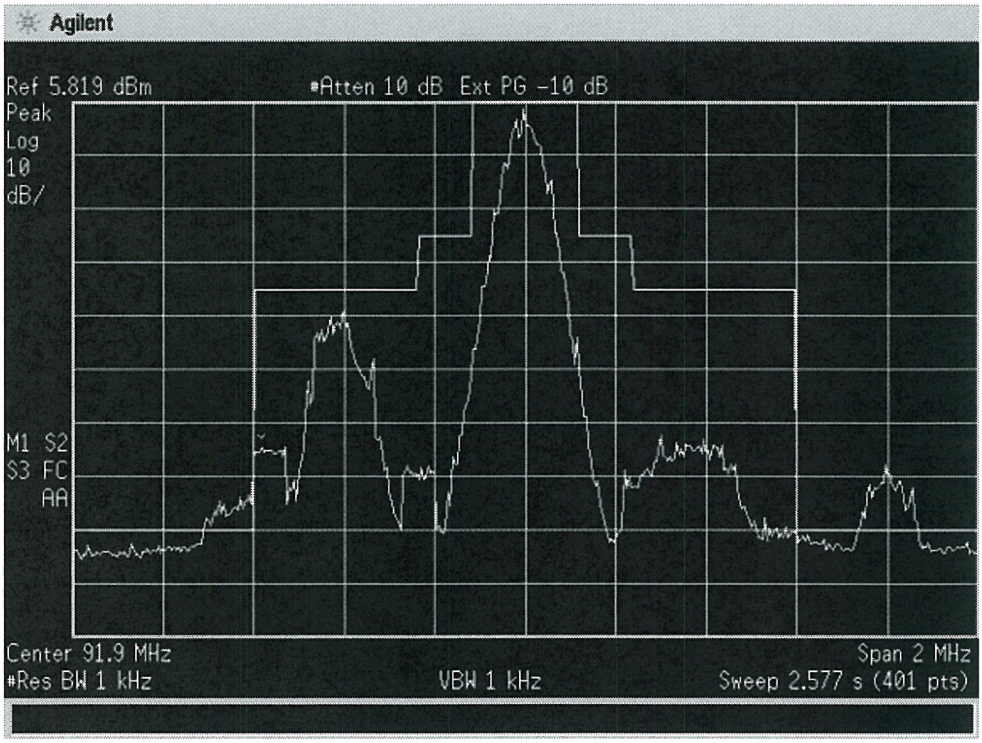
91.9 MHz Notch Filter



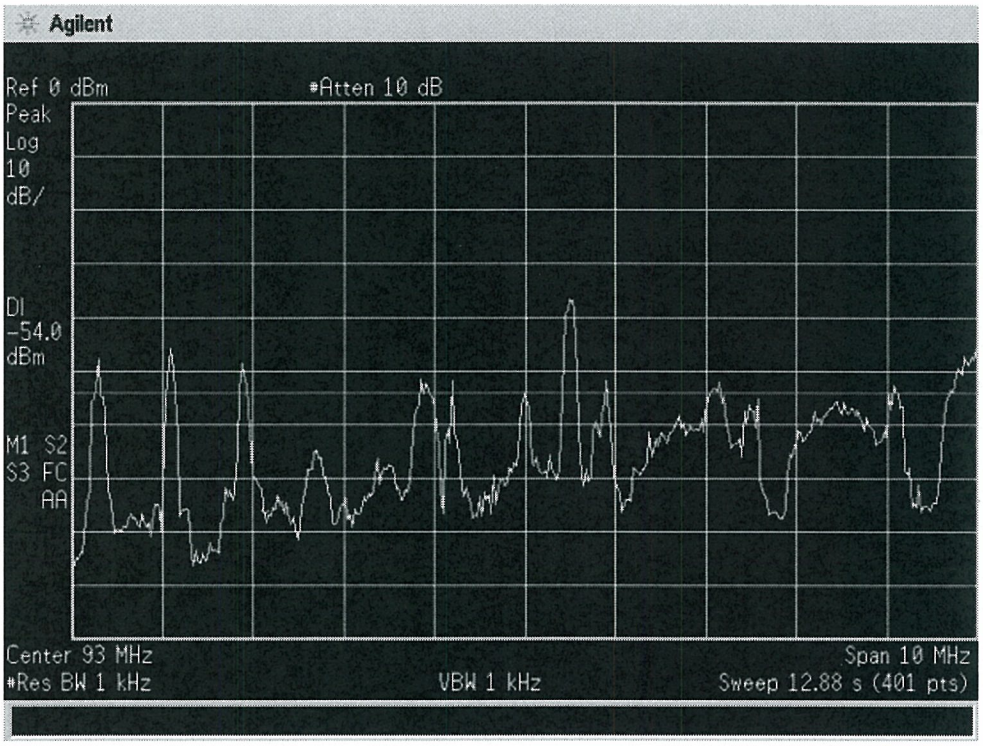
FM Bandstop Filter (viewed from 60 to 160 MHz



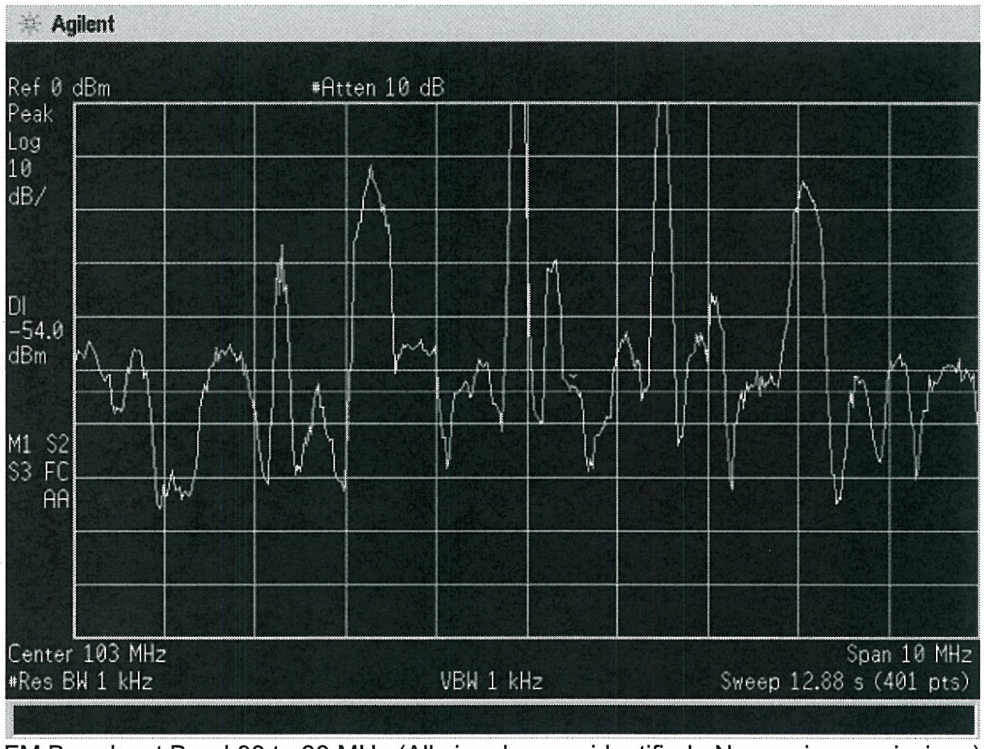
FM Bandstop Filter viewed from 30 to 1000 MHz



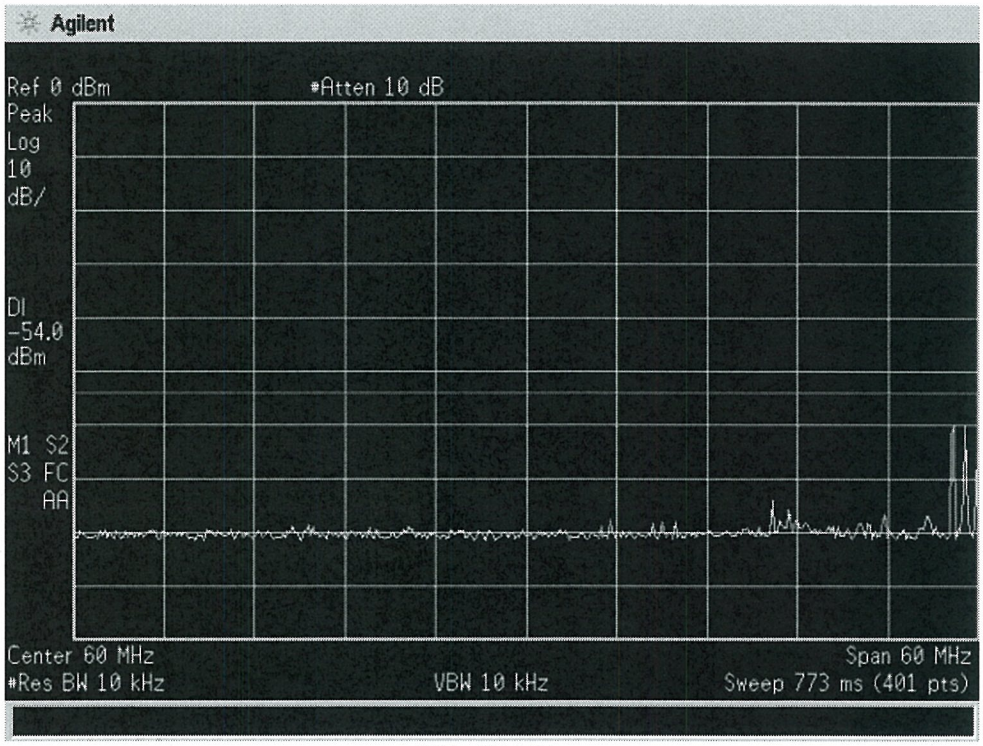
K220IN Reference Plot. Nearby stations, KOPB (91.5 MHz, KGON (92.3 MHz) and K224DL (92.7 MHz) can also be seen.



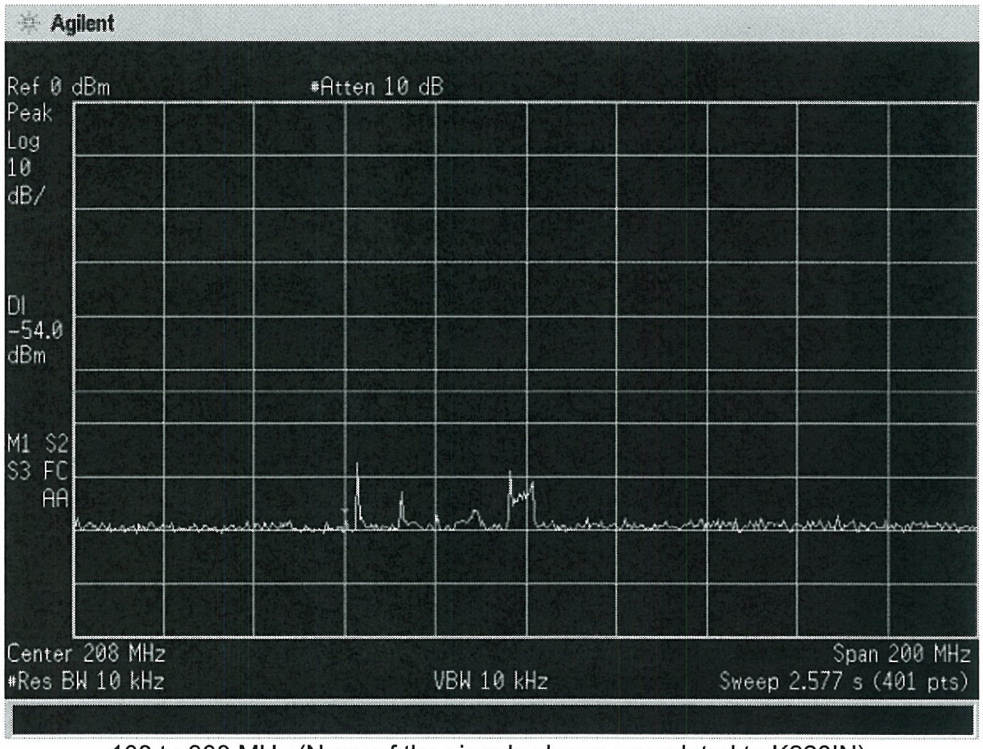
FM Broadcast Band 88 to 98 MHz (All signals were identified. No spurious emissions)



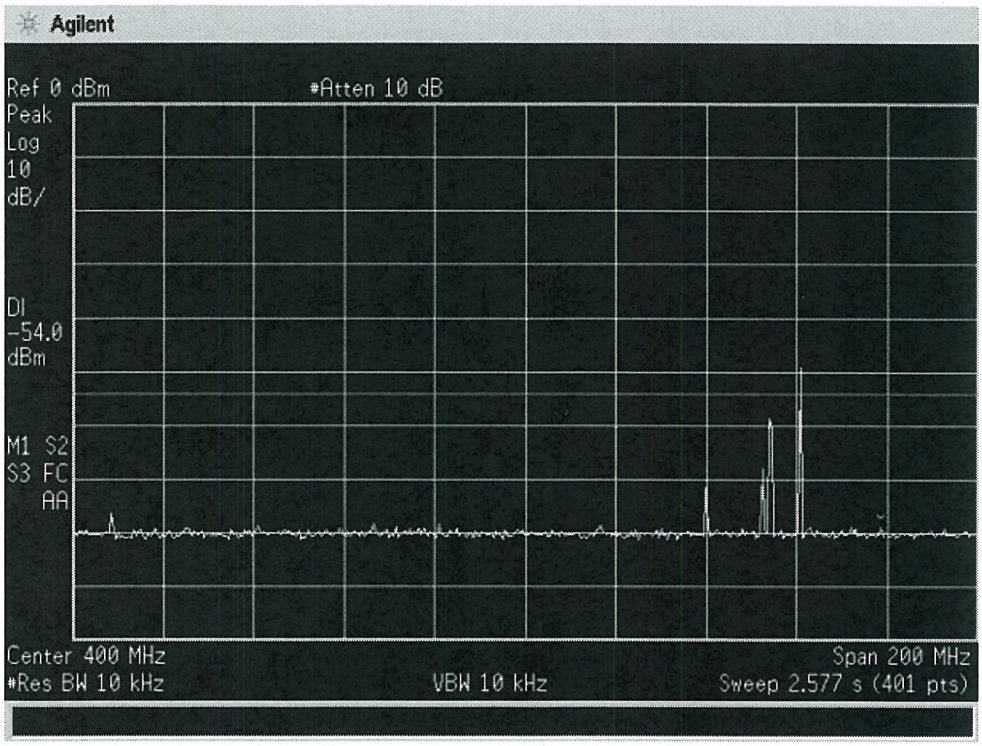
FM Broadcast Band 88 to 98 MHz (All signals were identified. No spurious emissions)



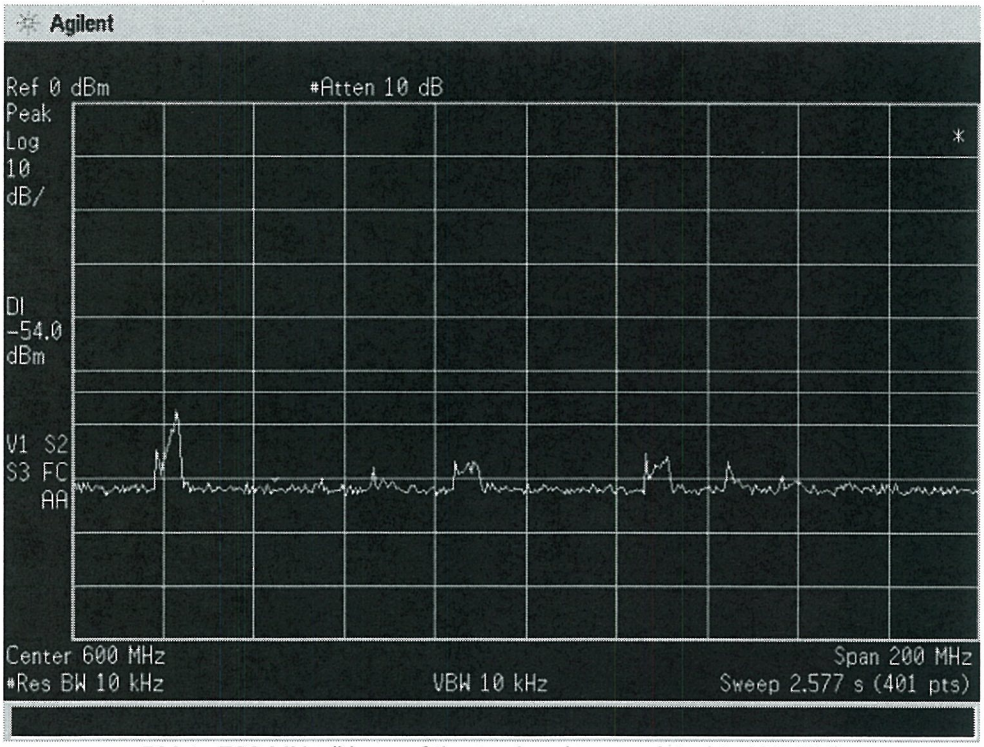
30 to 90 MHz



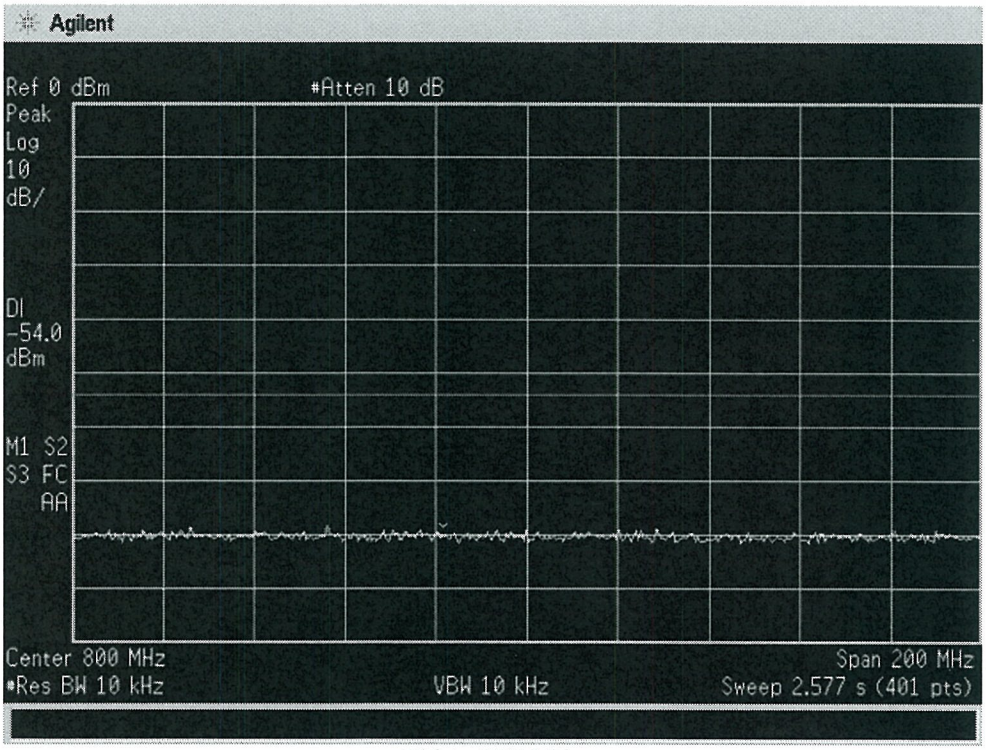
108 to 308 MHz (None of the signals shown are related to K220IN).



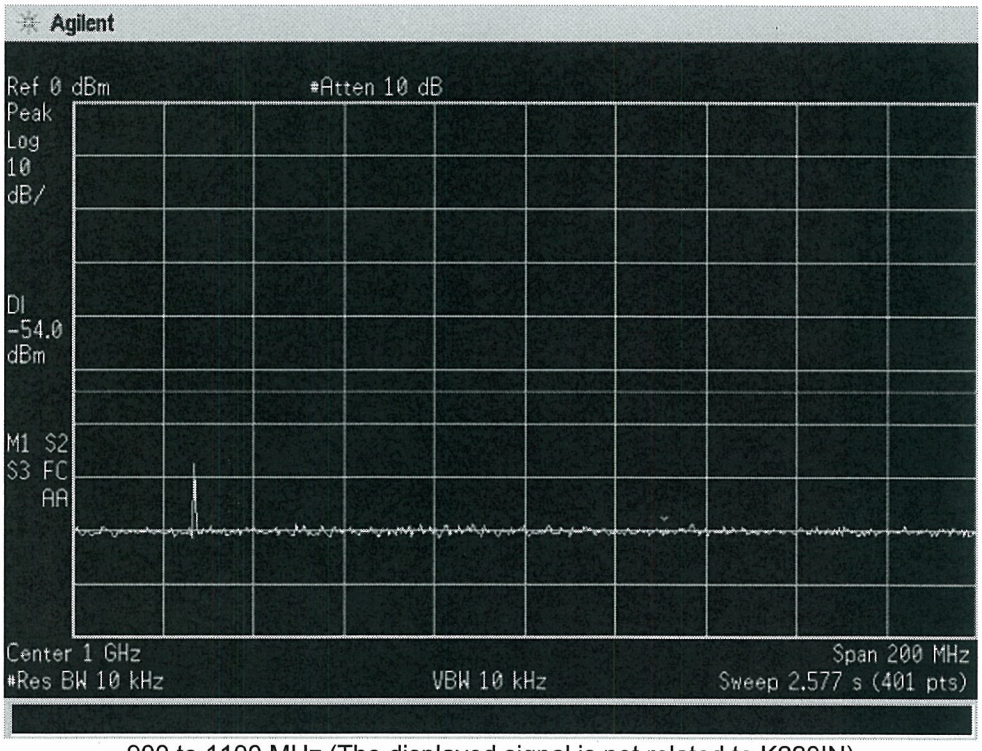
300 to 500 MHz (Signals displayed are in the land mobile bands. None are related to K220IN)



500 to 700 MHz (None of these signals are related to K220IN)

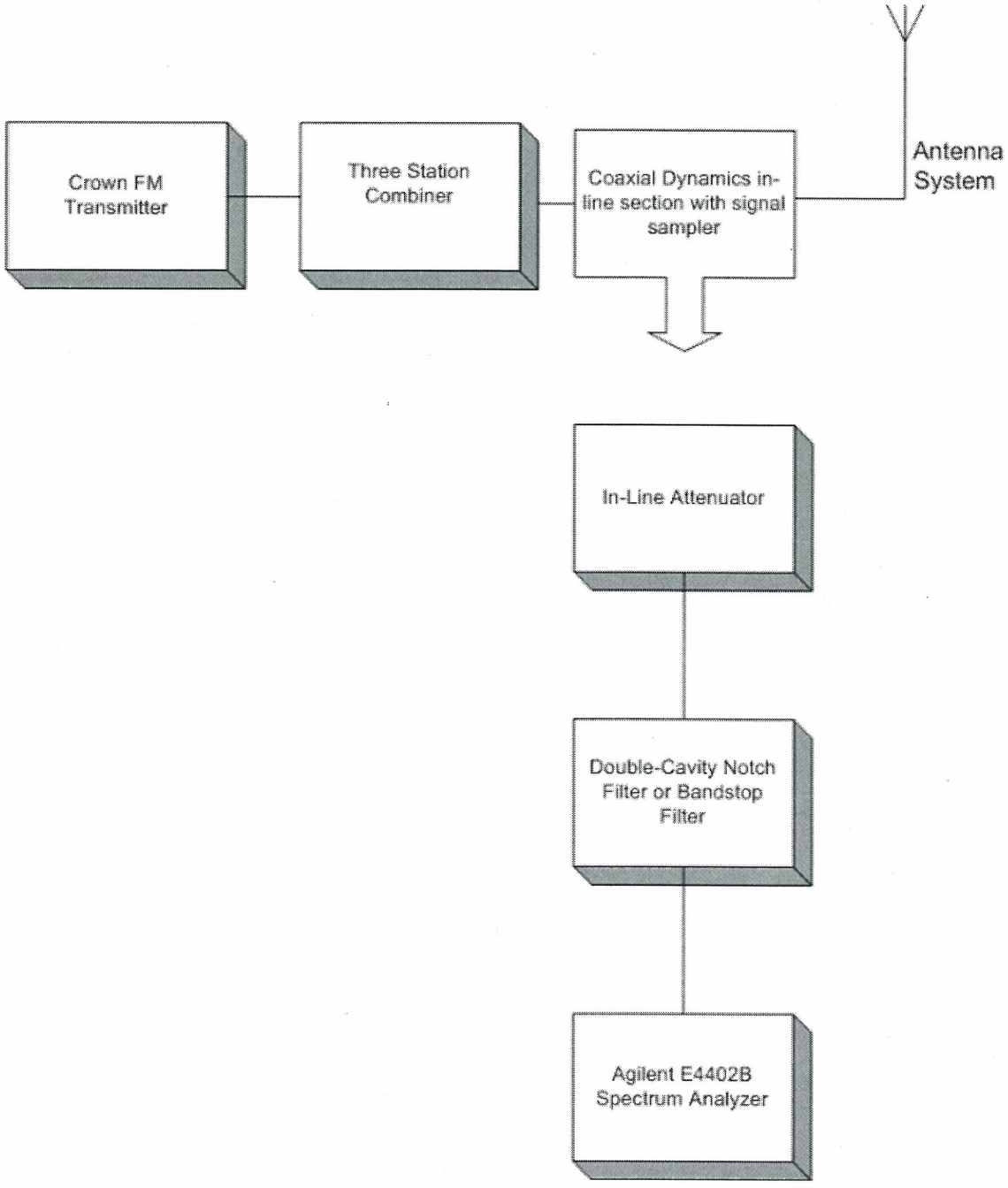


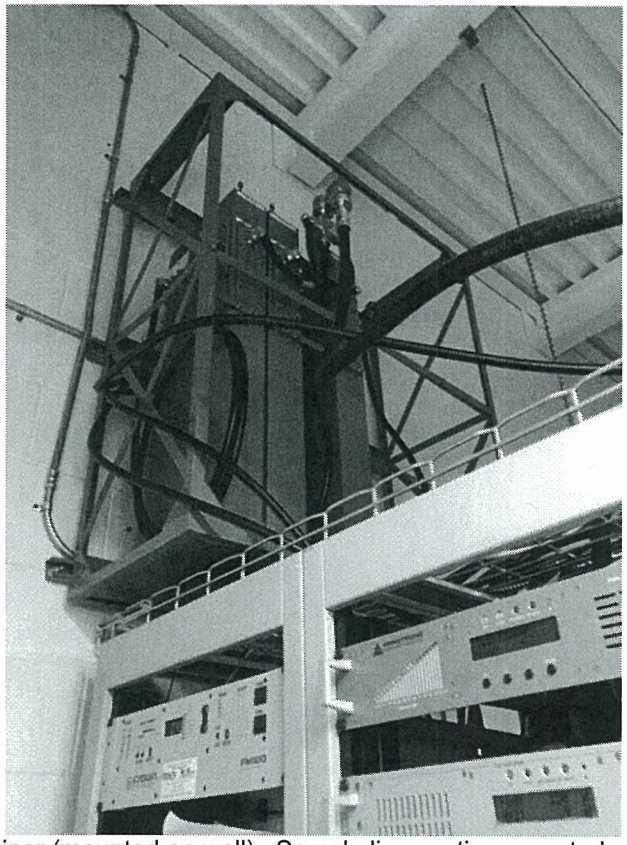
700 to 900 MHz



900 to 1100 MHz (The displayed signal is not related to K220IN)

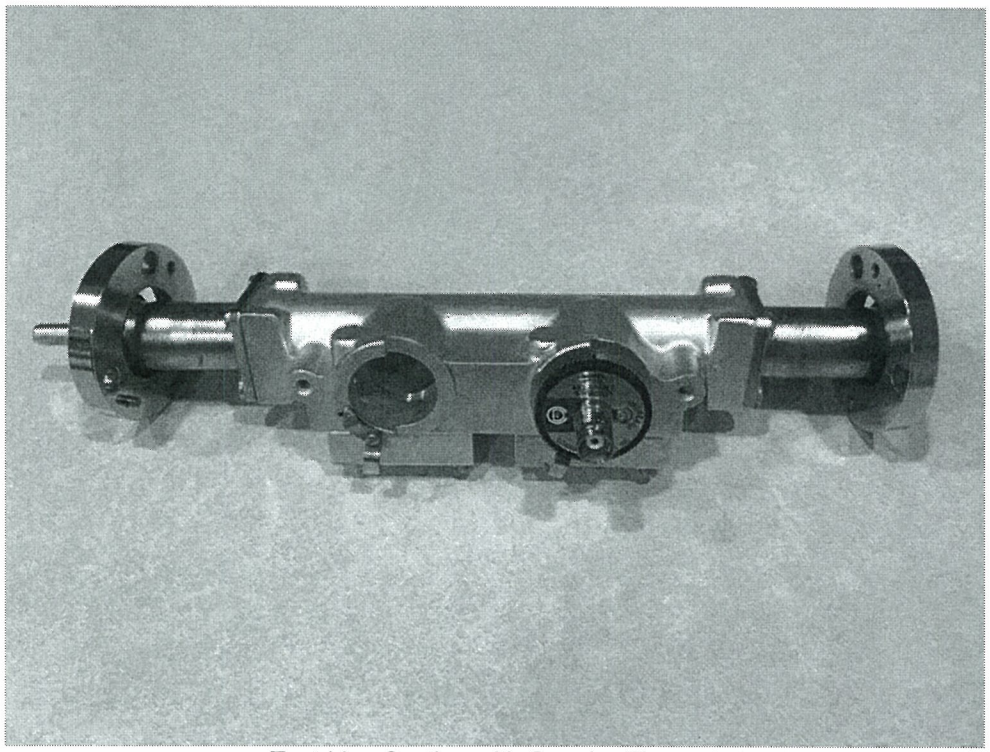
Equipment Block Diagram



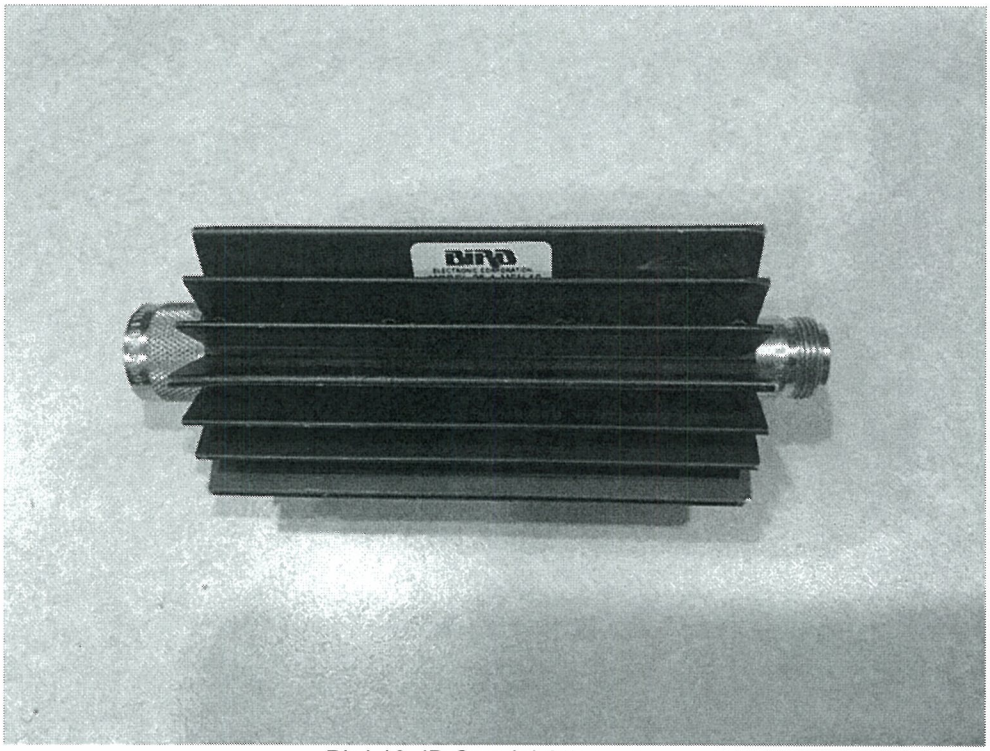


Three Station Combiner (mounted on wall). Sample line section mounted at output of combiner

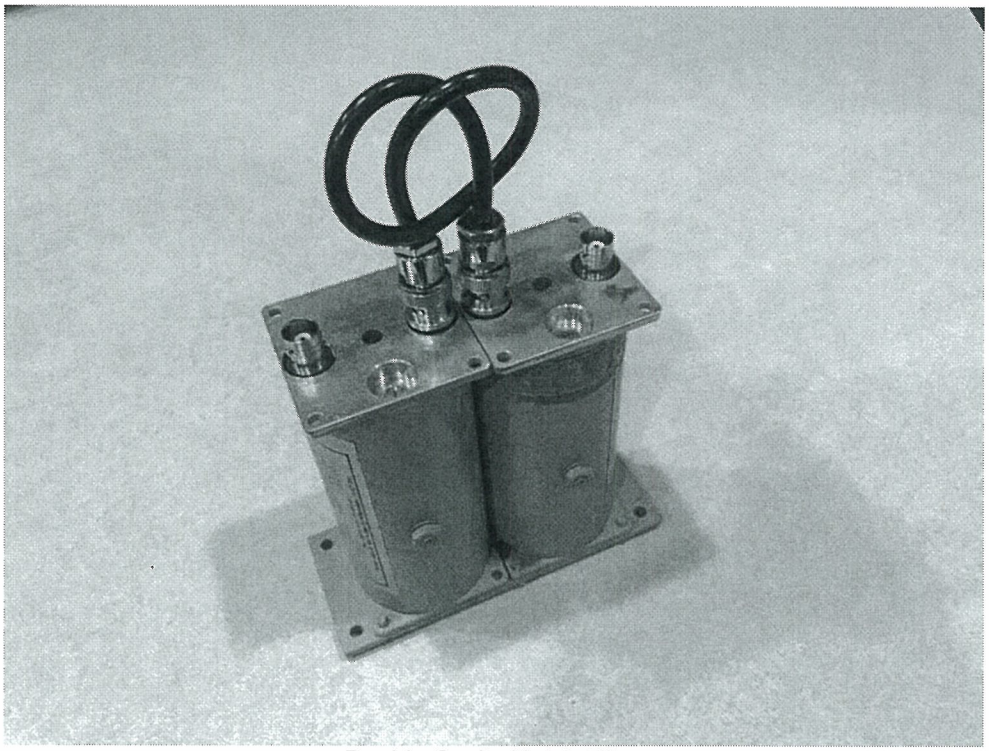
Agilent E4402B Spectrum Analyzer used for measurements



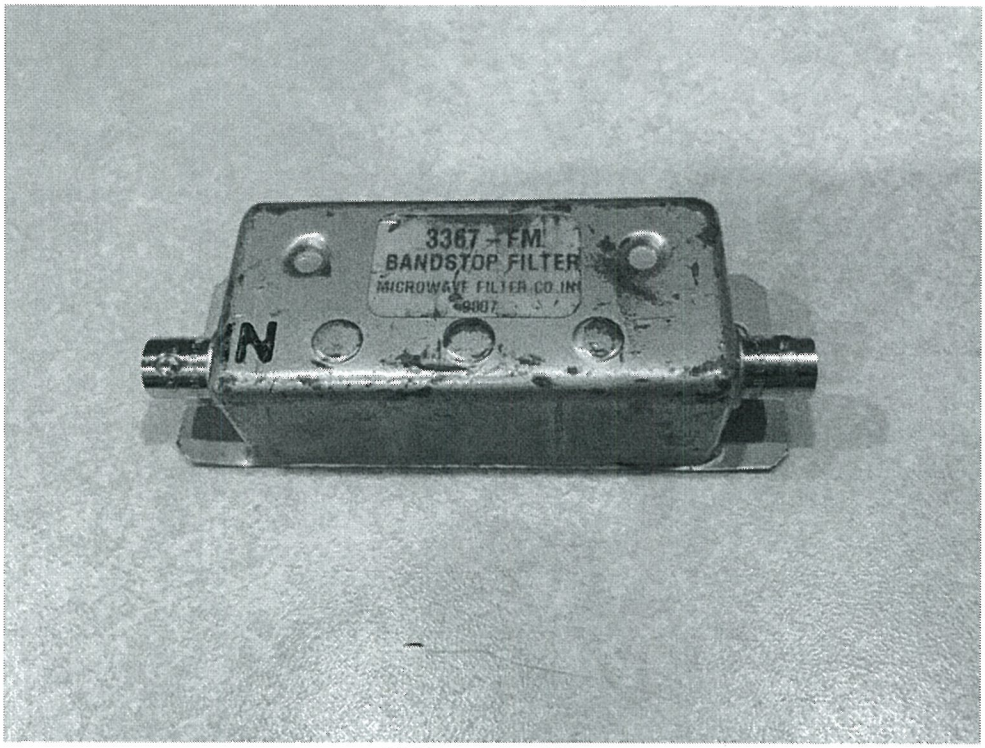
Test Line Section with Coupler Element



Bird 10 dB Coaxial Attenuator



Double Cavity Notch Filter



FM Bandstop Filter

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 from the carrier by more than 600 kHz must be attenuated at 43 + 10Log (Power in watts) dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.