

Interference to DTV Reception and Other Technical
Problems with the DTV Changeover on June 12, 2009.
Prepared for Tektronix Radio Amateur's Club
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What “Hams” and Broadcasters can do to help out in this impending scheduled emergency?

- What emergency? The emergency on June 13th when NTSC TV Transmissions by Broadcasters will end.
- Portland, OR has the largest percent of homes in USA which receive TV directly from Local Stations.
- CATV and DBS served homes will not experience any change on June 12th.

Portland Stations Channels After June 12, 2009

Full Power Broadcast Stations which will be digital on 6/13/09

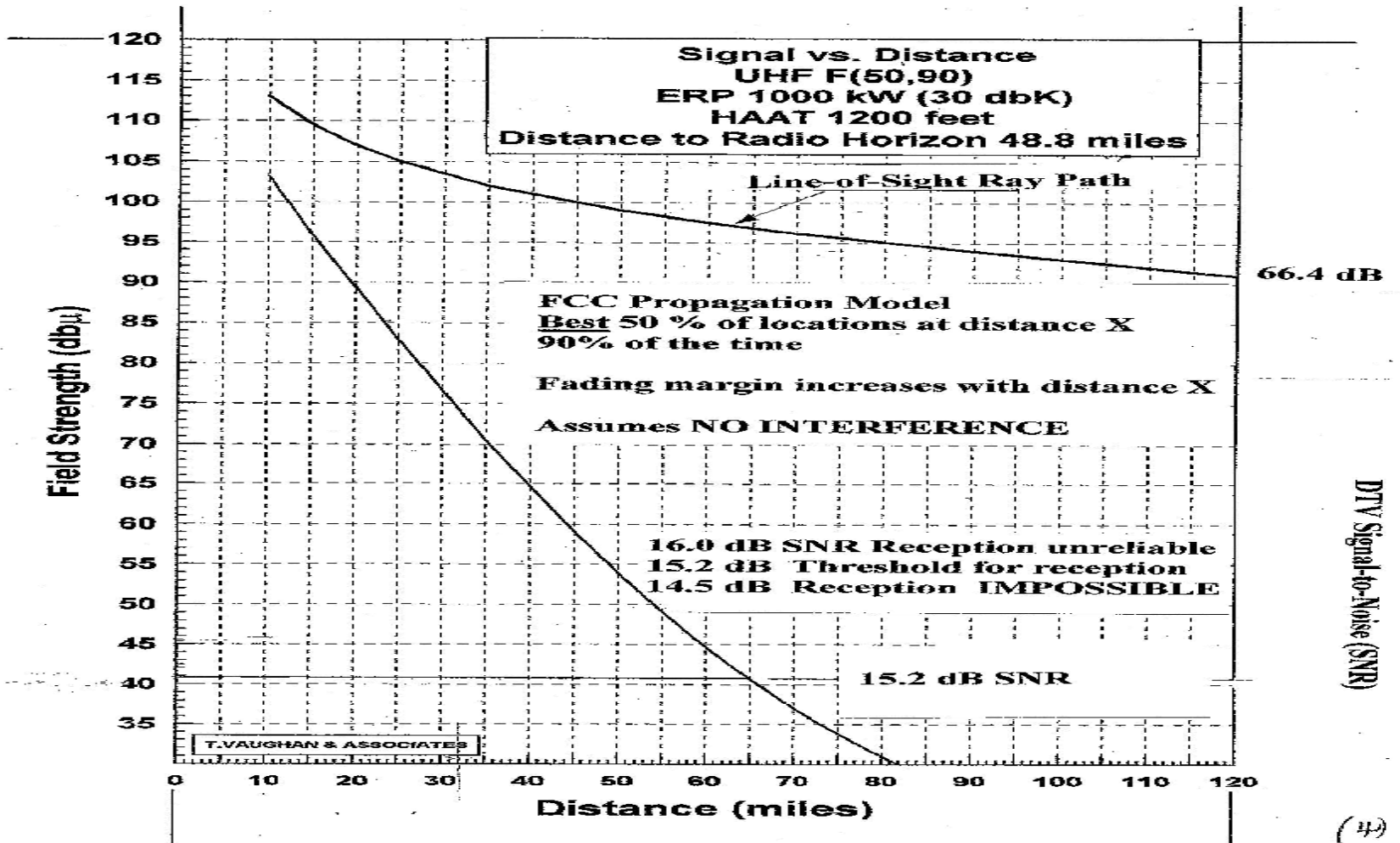
STATION	FORMAT	CURRENT RF CHANNEL	FUTURE RF CHANNEL
KATU-DT	720p	43	43
KGW-DT	1080i	46	8
KGW-WX	480i	46	8
KNMT-DT	480i	24	24
KNMT-DT	480i	24	24
KNMT-DT	480i	24	24
KNMT-DT	480i	24	24
KNMT-DT	480i	24	24
KNMT-DT	480i	24	24
KOIN-DT	1080i	40	40
KOIN-DT2	480i	40	40
KOPB-DT1	1080i	27	10
KOPB-DT2	480i	27	10
KPDX-DT	1080i	48	30
KPTV-DT	720p	30	12
KPXG-DT	480i	22	22
KPXG-DT	480i	22	22
KPXG-DT	480i	22	22
KPXG-DT	480i	22	22
KWBP-DT	1080i	32	32

480i is Standard Definition

720p and 1080i are High Definition TV (HDTV)

Stations changing DTV channel after 6/13/09 in blue

FCC Calculations of Minimum Usable DTV Received Signal.



Many Local Stations will change DTV Channels on June 13th.

- Receivers and Down-converters must Re-Scan TV bands to find these new DTV channels.

KGW 8 from UHF

KOAP 10 from UHF

KPTV 12 from UHF

KCRW 32 from Ch. 33

- Many viewers do not know how to make their RX or Converter SCAN.

The Cliff Effect of DTV

- Studio quality above Signal-to-Noise above 16 dB.
- No picture, no sound at 15 dB.
Public will be confused, call stations.
- Signal-to-Noise ratio can change. Fading or multipath or interference.
Will affect some stations, proving receiver is not at fault.
Suggests station is at fault.

How to determine if any signal is near the edge of the DTV Cliff?

- Attenuate signal to Receiver or down-converter.
Obtain a 75 Ohm attenuator with 'F' connectors, 0 to 40 dB in 1 dB steps.
Obtain fixed 75 Ohm attenuators with "F" Connectors, 1 dB, 2 dB, 3dB, 6 dB
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12 dB.

Adequate signal level for a station,
0 to 40 dB attenuation

- Inadequate signal level

Needed:

New antenna and possibly Low Noise Pre-Amp

Inadequate Signal Level on One or More Desired Stations

- Less than 5 dB signal power margin
- Need new antenna and downlead
- **RG 6 U with foil and braid (double-shielded)**
- Low Noise Pre-Amplifier can add up to 10 dB to signal power margin.

Signal too Strong on 1 or more Channels.

- Receiver may work on such a channel only if signal is attenuated.
- Homes having a “Distribution Amplifier” (D.A.) to feed multiple receivers may find this D.A. is overloaded.

Attenuation needed at D.A. input.

- Apartment Houses usually have Distribution Amplifiers, but Manager may not know this.

Interference and Multipath.

- Unlike NTSC, Interference or Multipath results in loss of picture and sound.
- Public can be confused, blame receiver or station.

Interference and Multipath (continued)

- If interference is to blame, signal attenuation may allow reception.
- If multipath is to blame, attenuation is not the remedy.
- If the antenna is at fault, try rotating it.
- Replace an indoor antenna with a rooftop directional antenna, experimentally aimed.

Interference and Multipath (continued)

- FM signals cause interference by overloading the receiver or down-converter.
- Attenuating the antenna signal should help.
- However, this may cause loss of some DTV signals due to Cliff-effect.
- FM interference can best be cured with a High Pass filter, 75 Ohm

Pass High VHF channels 8, 210, and 12

Pass all UHF channels, 14 – 51.

Reject FM signals, 88 to 108 MHz.

Future Interference by “White Space Devices”

- These are unlicensed low power transmitters the FCC will allow on “vacant TV channels” after June 12, 2009.
- Such operation will be legal unless Hackers defeat power limits set by the FCC or Hackers defeat prohibited operation on TV channels or channels adjacent to Local TV channels.
- Interference to wireless microphones is also likely.

Pi Attenuator

	Shunt Resistors (2)	Series Resistor (1)
• 1 dB attenuator	1305 ohms each	8.6 ohms
• 2 dB attenuator	654 ohms each	17.4 ohms
• 3 dB attenuator	439 ohms each	26.4 ohms
• 6 dB attenuator	226 ohms each	56.0 ohms
• 10 dB attenuator	144 ohms each	107 ohms

These are the mathematically derived values. Use 1% resistors ¼ watt if available. Suitable DPDT miniature switches and “F” connectors for chassis mounting and boxes are available at Radio Shack or NORVAC Electronics 7950 SW Nimbus Av Building #8 tel: 503-644-1025

As the signals will be in the 180 – 680 MHz range, use the smallest switches and resistors available and keep all leads as short as possible.

Test your finished project with a 75 ohm load resistor at one :F” connector and connect your ohmmeter at the other F connector. You should see a reading very close to 75ohms when just one attenuator is in-circuit, and if you do, then every possible attenuation must also yield about 75 ohms in this test.

In selecting 1% resistor values, use the nearest higher value available for all three parts for a given attenuator or all should be the nearest lower value for all three resistors for a given attenuator.

1% parts are not essential but today they are readily available. Use 5% ¼ watt parts if 1% values not available.

Questions?