Application Note
AN-5a

rev. a - Sept. 2019

P5 - TV Signal Quality Reporting

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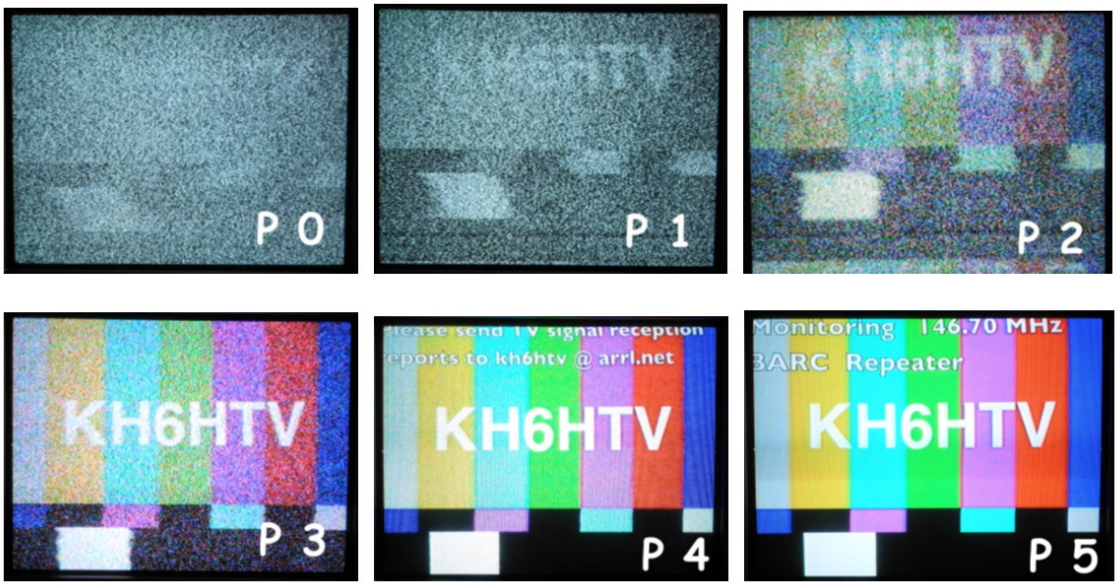
In ham radio, we hams are always reporting to the other ham a set of numbers conveying information about the signal strength and quality. For cw, we use the R-S-T code, where R stands for Readability, S stands for signal strength and T stands for Tone quality. For voice communications, we typically only report R and S. The Readability definitions are: R1 = unreadable, R2 = barely readable, R3 = readable with considerable difficulty, R4 = readable with practically no difficulty and R5 = perfectly readable. For the S number, we report the actual numerical value indicated on the S or Signal Strength meter. The range for S readings is from 0 to 9 where each S unit corresponds to a 6 dB increase in signal strength with S9 being defined as 50 µV. An S0 signal is thus down at the typical SSB receiver noise level of 0.1 µV. (note: not every rig's noise level nor S meter calibration adheres closely to this definition) For very strong signals, we report the dB over S9. An example would be a report of "5 by 9 plus 20 dB". Unfortunately, far too many hams give every report as "5 by 9", which then becomes meaningless to the recipient.



In amateur TV (i.e. ATV), we use a similar reporting system called the P or Picture report. We don't typically give S reports because our TV receivers normally do not include an S meter readout. Our P reports are similar to the R reports for cw and voice. Most hams

use a P rating from 1 to 5. I personally have added two more of P0 and P4.5. Our definition for ham TV P reports is:

P0 Extremely weak signal. At the threshold of the receiver noise. Can only detect the presence of possible sync. No useable image.

P1 Very weak signal. Can detect presence of video buried in the noise. Mostly snow. Receiver often times has difficulty sync locking. Only very large block letters are barely readable, such as in a camera view of only the call sign on a stationary, automobile license plate. OK for DX reporting only.

P2 Weak signal. Lot of snow present in image. Usually Black and White only with no audio. Can detect presence of people in the image and movement. Not a useable picture for routine, pleasurable viewing. Note: some excellant receivers might show color with a P2 signal. Then instead of white "snow", you will experience a shower of colorful confetti !

P3 Moderate signal. Still has snow present in image. Color lock. Audio is present, but noisy. Acceptable picture for people living in very rural areas watching analog broadcast TV.

P4 Strong signal. Very good color and audio. No snow or confetti. Some defects noted in picture quality. Almost full quieting on the FM audio.

P4.5 Strong signal. Only a very few, minor picture defects. A border line P5.

P5 Very strong signal. Perfect, noise-free, picture and audio.

It should be noted that most newer production TV receivers on the market now all include a built-in video squelch. The squelch threshold is typically not adjustable, nor is one able to disable the squelch. Thus, newer TV receivers oftentimes will not display weak, signals below a P3 or maybe a P2 level.

I have made many controlled TV picture measurements using a calibrated step attenuator (1 dB steps) and a spectrum analyzer in my ham shack and have come to the following conclusions. For VUSB (or AM) TV transmissions, to obtain a P5 picture requires an RF signal to noise ratio of S/N > 40 dB. For each P unit from P0 to P4, there is an increase in signal strength of 6 dB, i.e. the same definition as used for S units. For FM-TV, the FM quieting effect kicks in earlier and results in a considerably lower required S/N for good to excellant pictures. For comparison, modern digital TV receivers will either give you a perfect, P5, picture - or no picture at all. The have the "Cliff Effect". All or nothing, i.e. you fell over the cliff. The cliff edge is very sharp. If you see any picture defects, such as pixelization, losing another 1dB or less of signal strength, the picture is totally lost. The table and graph on the next page vividly show these results.

"P" Units	VUSB-TV RF S/N	FM-TV RF S/N
P0	0 dB	0 dB
P1	6 dB	5 dB
P2	12 dB	7 dB
P3	18 dB	10 dB
P4	24 dB	13 dB
P4.5	30 dB	16 dB
P5	40 dB	20 dB