

FM Tuner Specs. *What do they actually mean?*

Fanfare Electronics. Ltd.

Practically everything we use, from toilet tissue to trucks has a specification. In fact, physical differences aside, it is sometimes the only tangible way by which we can distinguish the differences between similar products.

In the case of FM tuners, unless you are quite familiar with the characteristics of radio frequency, electronic gear, the specifications are not easy to translate into tangible terms. However, to those who would like to pursue the meaning of these specifications, this will serve as a start.

To help place these characteristics into some sort of context for you within the Fanfare tuner design philosophy, there is a disciplined approach to the three main characteristics that result in performance excellence. We call them the three S's. While they comprise Sensitivity and Selectivity, it is a balance of these two important characteristics within the design that contributes significantly to the third 'S', which is 'Sound'.

In order to simplify things, it would make some sense if we establish the main categories of concern, and then fill in those categories with the appropriate specifications.

Finally, it is important to note that the specifications provided with any instrument may not be definitive or truly accurate. Why? Because test samples may vary due to internal component change, setup or any one of a number of reasons. Therefore, anyone using a specifications comparison alone to make a decision between different brands or models may not be availing themselves of all the information available. There are test reports, which may prove, or disprove the specifications presented. There are also reviews, testimonials and the recommendations of a dealer whose judgement you trust ... all of which, when compared, can establish whether or not a product does what it says it can do. But more important than anything else, is your own evaluation of a product's merits.

Sensitivity

It is, by definition, the characteristic that indicates how much signal is required in order to receive an intelligible signal from a given FM station. However, with no attention given to this characteristic, it would be very difficult to receive a radio signal at all, let alone reliably. The sub-categories for the 'sensitivity' characteristic are;

Usable Sensitivity - mono - is the amount of signal required to receive an intelligible signal in monaural that is marginally noisy. A typical level here is 11dBf. (lower number value = better)

Usable Sensitivity - stereo is the amount of signal required to receive an intelligible signal in stereo that is marginally noisy. The signal requirement for stereo will be somewhat higher than mono. A typical level here is 13dBf. (lower number value = better).

Sensitivity for 50dB quieting - mono is the amount of signal required to receive a fully quieted monaural signal. A typical level here is 16dBf. (lower number value = better).

Sensitivity for 50dB quieting - stereo is the amount of signal required to receive a fully quieted stereo signal. Note this figure is considerably higher than that required for mono. This is because with the stereo pilot signal opening the tuner's stereo multiplex circuitry, the tuner's circuitry itself will continue to generate noise if the received signal is not strong enough. *Note:* The stereo multiplex circuit is not on when in mono mode. A typical level here is 35dBf. (lower number value = better).

Selectivity

This is the characteristic that creates a window for the signal, thereby disallowing interference from sources outside the tuned frequency. Selectivity is primarily established in the IF (intermediate frequency) stages, following the rf front end.

However, selectivity levels are not infinitely adjustable. While a higher selectivity value may be obtained through 'tweaking' the circuitry, too high a selectivity value could actually cause distortion to rise into the audible range. The sub-categories for *Selectivity* are;

Adjacent Channel Selectivity - This characteristic deals with stations immediately adjacent i.e.(200KHz away) that might intrude on the station you have tuned. If the tuner is equipped with switchable IF bandwidth, this position would be known as 'wide'. It offers the widest bandwidth through which the signal must pass through to be decoded. A typical level is 8dB. (higher number value = better).

Adjacent Channel Selectivity (narrow) - Like the characteristic preceding, this also deals with stations immediately adjacent. However, the term 'narrow' relates to a tuner that has a switchable 'wide/narrow' IF bandwidth control. Like the designation implies, 'narrow' offers the narrowest bandwidth through which the signal must pass. A typical level here is about 20dB. (higher number value = better).

Alternate Channel Selectivity - This characteristic deals with stations adjacent (400KHz away) that might intrude on the station you have tuned. If the tuner is equipped with a switchable IF bandwidth, this position would be known as 'wide'. A typical level is about 50dB. (higher number value = better).

Alternate Channel Selectivity (narrow) - As in the preceding characteristic, this characteristic also deals with stations adjacent (400KHz away). The term 'narrow' relates to a tuner that has a switchable 'wide/narrow' IF bandwidth control. Like the designation implies, 'narrow' offers the narrowest bandwidth through which the signal must pass. A typical level is about 70dB. (Higher number value = better.)

Spurious Response Rejection - This deals with signals that might intrude from other sources beyond 400KHz from the station tuned. A typical value is about 70dB. (Higher value number = better.)

Image Rejection - An 'image' signal is from a station at a frequency of approximately 10.7 MHz (the value of the IF) up or down the band from the station to which you are

tuned. i.e. An image frequency to 97.1MHz could be 107.9MHz. A typical level is about 60dB. (Higher number value = better.)

AM Suppression - This characteristic deals with FM signals that have become amplitude modulated enroute. This is often the result of multipath interference. A tuner equipped with a 'multipath meter' is usually reading the amount by which the FM signal is being amplitude modulated. However, few have the sensitivity required to read high frequency distortion (sibilance, screechy violins, etc). A typical value is about 60dB. (Higher number value = better.)

SCA Suppression - The SCA (subsidiary carrier authorization) is an AM frequency that is transmitted within the FM signal at 57KHz and 92 KHz above the FM carrier frequency. Suppression of this signal is important to clean reception of the FM stereo signal. A typical value is 60dB. (Higher number value = better.)

Signal to Noise Ratio (SNR)

Referred to by some as the 'noise floor', SNR indicates how far the noise level is below the modulation (music, etc.) at full quieting. In other words, this characteristic tells you just how really quiet the received signal can be when sufficient signal is received to fully quiet the tuner. A typical value is about 60dB. (Higher number value = better.)

Capture Ratio

Expressed in dB of signal strength, this is the amount by which an FM tuner can differentiate between two separate station signals that are on the same frequency. i.e., if the Capture Ratio of your tuner is 1.5dB, and two signals on the same frequency differ in strength by more than 1.5dB, the weaker of the two would not be heard. A typical value is 1.5dB. (Lower number value = better.)

Stereo Separation

It is measured as the amount (in dB) by which the signal level on one stereo channel would be less than that of the opposite channel, if only the opposite channel were being fed a signal. This characteristic will be quite telling when listening to live broadcasts. A typical value is about 35dB. (Higher number value = better.)

Total Harmonic Distortion (THD)

Indicated in millivolts(mV), this is the level of distortion exhibited by the tuner when a 1KHz signal is applied at 100% modulation. A typical value for mono is about 0.2%, and stereo about 0.4%. *Note:* An untrained ear is usually incapable of discerning distortion levels less than 1%. (Lower number value = better.)

Audio Frequency Response

This is the frequency response (in Hz) of the tuner. It is totally independant of the frequency range transmitted by the station. Therefore the frequency range exhibited by the tuner is only of value if it is matched in range by the transmitter. A typical value is 50Hz - 14,000Hz. A broader range (lower bottom end and higher top end) will be of value for most 'fine arts' FM stations.