I N T E R F E R E N C E S O N T V's

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The interference on TV sets by HF transmitters, the so-called TVI, is well known by the hamradio community, in special those using common antennæ for the normal VHF channels (open TV's).

To eliminate such interferences, many times the process is arduous and the problem is difficult to fix. That is why we need to discover how and why the interference is occurring.

TVI TYPES

There are many types of TVI as to its source:

1 – The most obvious is that resulting from the harmonics of the transmitted that fall into the reception band of the TV set. Legally, there is a maximum permitted level for those harmonics. Many times, however, although within the legal limits, the power of those harmonics is sufficient to interfere, especially where the TV signal is weak.

2 – Another one, similar to the first, results from eventual spurious signals within the TV reception band, normally generated by parasitic oscillations at the final stages of the transmitter. There is also a legal limitation for those spurious radiations.

3 – When the transmitter signal is perfect pure, but there is a great proximity between the transmission and the TV antennæ, it is possible that the TV VHF input circuits don't reject enough the HF signals, saturating those circuits and creating non-linearities that mix the TV and transmitter signals in a irreversible manner. This is, indeed, a TV design problem that let HF signal to enter it with great intensity.

4 – Transmitter harmonic generation but out if it, that is, by non-linear elements in the surroundings close to the TV set or to antennæ.

As to the mode by which the signal reaches the TV set, there are two processes:

1 – By conduction, where the interfering signal in some manner is lead by the AC power wirings to the TV via its AC cable.

2 – By radiation, where the interfering signal is radiated from some point to the TV antennæ.

SOLUTION OF TVI PROBLEMS

The solution for the referred interferences just depends on the source and mode and by which they reach the TV set. Let's see each one.

We will start by the mode.

1 – In the conduction case, the use of filter chokes put on the TV AC cable is many times enough. We can try to wind (two or more turns) that AC cable on a fly-back TV transformer core. This absorbs the eventual higher frequencies present on that cable. We can also separate the two conductors of the AC TV cable, winding, with each one, two coils on the same fly-back ferrite core.

As many times the transmitter is itself connected to the AC supply, the use of such a filter on its AC cable may be very efficient.

2 – In the radiation case, the solution is always in the introduction of some filtering in the path of the interfering signal or in the elimination of its generation.

As to its source:

1 – The existence of harmonics may be attenuated by the use of low-pass filters at the transmitter output. There are commercial filters that strongly attenuate the frequencies above 30MHz, but the user himself without great problems can assemble them. Normally it is a very efficient process for the solution of the problem with that source of interference.

2 – The generation of spurious signals must be researched carefully and totally eliminated from the transmitter circuits.

These signals are not normally conducted by the transmission line of the transmitter in a conventional mode, that is, internally in the line, but on a 'transmission line' formed by the antenna cable and the ground of the surroundings A choke made by winding some turns of the transmitter line on a ferrite for low frequencies can solve the problem.

Another interesting solution is simply to pass the transmitter antenna cable (normally we do that with coaxial cables) through a cardboard tube (and centered on its axis) of about 20 or 30cm long by about 4 or 5cm in diameter (tubes used to pack diplomas or other documents are fine), filling the empty space with fine steel wool, that produces a great loss at those high frequencies eventually being conducted externally by the line.

3 – When the TV input circuit saturation occurs, the use of a high-pass filter on it normally solves the problem. This filter must be put at the input connection of the antenna on the TV set, or within the latter, at least as close to it as possible to avoid pick-up by the wires after the filter.

4 – I consider this the most complicated TVI situation.

Poor contacts, especially on copper wires that oxidize, generate non-linearities similar to that of diodes.

So, it is fundamental that all transmitter antenna connections are welded and not simply twisted. RF currents passing through those 'diodes' generate harmonics that can be the interference source.

But is necessary to remember that, in the transmitter neighborhood, there may be conductors that have nothing to do with the transmission, like telephone lines, AC supply lines, metallic clothes lines (I, particularly, had a serious problem on 20m band because of an oxidized wire clothes line, a problem that took months to be fixed because the great difficulty to discover the source). So, it may be hard to discover and/or to solve the problem because we don't know where it is generated. Anyway, it is advisable to verify all AC supply connections as to oxidize and loose contacts. TV antennæ with oxidized cables, screws and elements are an invitation to that TVI type.

Here we can see that every solution we apply to the transmitter may be implemented without great operational difficulty.

The same is not true when the interference source is at the TV set residence. Firstly, it is necessary that a good relationship between the TV set and transmitter owners to be possible filters insertion, TV antenna improvements, etc.

Moreover, the transmitter is only one, but interfered TV sets may be several and, when the transmitter is perfect, to fix TVI problems for more than one set may be very troublesome, if not impossible.

Also remember that, in all cases, as smaller is the transmitter output power, as weaker will be the interferences, independently of the type or mode by which they reach the TV set. This is a very rare problem in the QRP operations.

Finally it is important to say that all exposed here about HF transmitter interferences on TV sets can be use in cases of interference on other devices, like audio amplifiers (normally with long speakers cables), telephone sets (due the non-linearity of the overload protection components), etc.