Technical Correspondence

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RADIATION HAZARDS

☐ Dr. Ian White, G3SEK, and Roger Blackwell, G4PNK, have drawn attention to the paper presented by Henryk Cichon, SP9ZD (a member of the IARU Region 1 EMC Working Group) and Hubert Trzaska (of Wroclaw Technical University) at the fifth EMC Symposium at Zurich a few months ago, "RF Hazards and the Radio Amateur." White and Blackwell, whose work in this field is well known, write:

"The Polish authors have measured E fields around a number of typical amateur HF stations, and their conclusions agree rather well with our own (*Rad Com,* Feb. 1982), which were based on VHF/UHF measurements. At HF you are likely to be in the near field of your antenna, so E-field RF exposure limits are an appropriate basis for comparison. The present or proposed limits in Western countries are currently about 500 V/m at 3.5 MHz, decreasing as (1/f) to about 60 V/m at 28 MHz, and staying at that lower value through 144 MHz. SP9ZD's measurements are as follows:

"1) On 14-28 MHz, 500 W into a three-element trap tribander 5 m above the roof ridge produced E fields of 1-2 V/m in the attic and 0.5 V/m upstairs. Fifteen centimeters away from the transmitter, and all along the feeder, the E field was 25 V/m, dropping off rapidly to 0.5 V/m at distances more than 1 m.

"2) On 3.5-28 MHz, 500 W to a trap vertical on a flat roof produced 150-250 V/m on both lower floors. The shack was on the ground floor, and fields of 0.5 to 1 V/m on both the ground floor and the first floor were mainly from feeder radiation; up to 60 V/m was observed at 15 cm from the feeder or the rig. (So it seems that G6XN is right — it is very difficult to keep stray RF currents off the feeder of a 'ground plane' antenna with radials — G3SEK.)

"3) In contrast, 150 W on 3.5 and 7 MHz to a trap dipole fed with a balun produced only 2 to 5 V/m around the transmitter and feeder.

"4) The worst case reported by SP9ZD was that of a 42 m (138 ft) long-wire antenna strung between two five-story steel/concrete buildings. Part of the antenna was vertical, 1 m away from the wall, and led down to the shack on the first floor. With 100 W on 3.5-28 MHz, E fields of 20 V/m were measured in parts of both buildings. On 3.5 MHz, the transmitter case felt 'hot' when touched, and the E field close to the surface of the metal case was 1 kV/m.

"The situations reported by SP9ZD are representative of a wide range of amateur HF stations, so what can we learn from them? In most cases the E fields were well below the Western limits, and even below the much more restrictive Polish limits, so normally there seems little cause for concern about RF hazards from amateur HF stations, especially when the limited duty cycles of amateur transmissions are taken into account. However, severe symptoms of 'RF in the shack' (sometimes indicated by tingling sensations when touching supposedly grounded metal objects) ought to be eliminated. RF in the shack isn't contributing to the strength of the signal—except in TV and hi-fi sets—and it may be hazardous."

What could be a potential but seldom-recognized RF hazard has also been brought to my notice by Bill Hall, G6ZRB. He recently attended a local society meeting with someone who had just passed the Radio Amateur Examination and arranged for another amateur to demonstrate to him two-way operation on his 144-MHz, 25-W mobile equipment. While the demonstration took place, G6ZRB stood beside the car with his head only a few inches away from the antenna. That night he awoke with violent head pains above his right eye, which persisted until noon the next day. He wondered if this could have been induced by the RF radiation.

While it would be near to impossible to say definitely whether or not this was the case, undoubtedly it is unwise to stay with your eyes only a few inches from a 144-MHz, 25-W transmitting antenna. It is now usually recognized that hand-held transceivers with "rubber duck" antennas pose a potential hazard if the RF output is more than about 7 W because of the proximity of the antenna to the eyes, which are the most sensitive organs to nonionizing radiation.

I do not recall having seen any previous comment on potential risk to a spectator watching operation from a stationary vehicle. While the chances are that G6ZRB's head pains were not caused by RF, it seems worth warning people not to stand so close to a VHF antenna radiating more than a few watts. *—Adapted from the Dec. 1983 Technical Topics column of* Radio Communication, *the journal of The Radio Society of Great Britain.*

THE WINDOM J-L REVISITED

☐ A new version of the Windom J-L, which outperforms the original on the 30-meter band, has recently been developed and tested.[1] The original Windom J-L antenna was configured as a standard Windom (fed with a single-wire, horizontally polarized) for the 30-meter band. This newer version is a half-wave, inverted-J vertical radiator.

My major reason for experimenting with a different configuration was to improve communications with Africa, Asia and South America from my station. (The original Windom J-L at my location favored a bidirectional pattern aimed at Europe and Oceania.) Also, I was not pleased with the radiated signal in the favored directions. By comparison, the inverted-J section of the original antenna performed quite well on the 20-meter design frequency. I thought conversion of the Windom J-L into a vertical radiator on the 30-meter band would produce a lower radiation angle and omnidirectional radiation pattern. The difference with the change is spectacular, especially on 30 meters, but also on 80 and 160 meters.

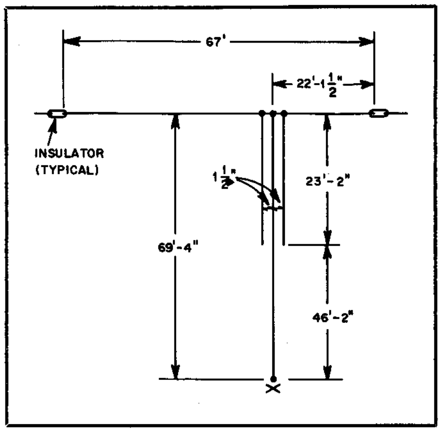

Fig. 1—The new Windom J-L antenna at full size, a configuration for mounting at a height of approximately 67 feet. The antenna is fed against ground at point X, where a Transmatch may be used (see Table 1).

Table 1
Approximate Feed-Point Impedances of the Windom J-L

Band	*Impedance (ohms)*	*Band*	*Impedance (ohms)*
160 m	30-40	30 m	1000+
80 m	1000+	20 m	600
40 m	600	15 m	600

Two formats for the new Windom J-L are presented. Both were assembled and tested with practically the same on-the-air results. Fig. 1 depicts a multiband Windom J-L at a height of approximately 67 feet. Fig. 2 shows the antenna configuration for mounting at 58 feet above ground. Both versions are fed directly by a multiband Transmatch connected at point "X" in each figure. An appropriate Transmatch is necessary because this antenna is capable of radiating on all HF amateur bands. Feed methods are left to the requirements of the individual. Table 1 shows the feed-point impedance for each band.

The Windom J-L now operates as a quarter-wave inverted L on 160 meters, a half-wave inverted L on 80 meters, a half-wave regular off-center-fed Windom on 40, 20 and 15 meters and as a half-wave inverted J on 30 meters.

Similar to the original Windom J-L, this version requires an effective ground system for efficiency and to prevent unwanted RF in the shack. My installation incorporates a remote Transmatch, well separated from the

[1]R. R. Schellenbach, "A New Antenna Twist —The "Windom J-L," *QST,* Jan. 1984, pp. 37-39.