1-II B5

ACTIVE RECEIVING ANTENNAS FOR RADIO AND TELEVISION

H.H.Meinke, H.Lindenmeier, G.Flachenecker

Institute for High Frequency Techniques
Technical University of Munich

Munich, West-Germany

The sensitivity of a receiving system consisting of antenna and receiver is limited by the noise of the active elements and the noise of the outer space. It will be shown that with antennas the radiation pattern of which is similar to that of a small dipole, optimum sensitivity is obtained for a certain frequency band and smallest antenna height if an active antenna is used. In this case the first stage of the amplifier is integrated with the antenna in a way that there is optimum cooperation between this amplifier and its signal source which is the passive part of the antenna.

1. Active car antenna

In 1968 we developed an active car antenna which appeared on the market in 1969. It fulfills all wishes concerning signal-to-noise ratio, crossmodulation, dynamic range, stability against electric discharges and mechanical form. It is built in a rear view mirror as it is shown in Fig.1. The antenna itself is a printed board whereon all circuit elements are mounted and which is placed underneath the plastic shoft of the mirror. The metal hood of the mirror forms the top capacity of the antenna and is connected with the top end of the printed board. A scheme of the printed board in connection with the circuit diagram of the transistorized antenna is given in Fig.2. The antenna seperates the frequency range of the FM-band (87,5 MHz ... 108 MHz) from that of the AM-range (150 kHz ... 20 MHz). The AM-range is amplified by a low noise amplifier (T_1 and T_2 in Fig.2) with high linearity and in the FM-range the antenna forms a passband with a seperate amplifier (T_3 in Fig.2). Behind these amplifiers both frequency ranges are combined and are available at the cable output. In spite of the small antenna height (10 cm) the average noise limited sensitivity of the antenna in the FM-range is 4... 6 db better than that of a conventional car receiver with a standard whip antenna. In the AM-range the signal-to-noise ratio of the antenna is equivalent to that of a standard receiving system.

2. Active television antennas

In television active antennas are used to obtain small antenna size. By means of these antennas it is mostly possible to find appropriate spots under the roof of a house where a television picture is obtained that has no ghosts and has a good signal-to-noise ratio. We have developed many

types of active dipoles from the lower VHF-band up to the whole UHF-range. The performance and the design of these antennas will be shown.

Besides of under roof antennas we shall present models of active antennas for the living room, two of which are built in television lamps.

A further very important application in television is the active directional antenna. In this case a transistorized dipole with optimum signal-to-noise ratio is built in a Yagi-structure. We developed two antennas of this kind the one of which covers the upper VHF-band (170 MHz ... 230 MHz) and the other covers the whole UHF-range (470 ... 860 MHz). Theory and design will be presented. Both antennas appeared on the market this year. The active dipole of the UHF-Antenna is shown in Fig. 3 and Fig. 4.

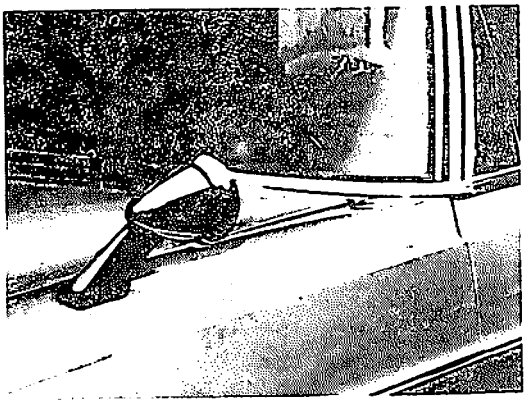

Fig.1

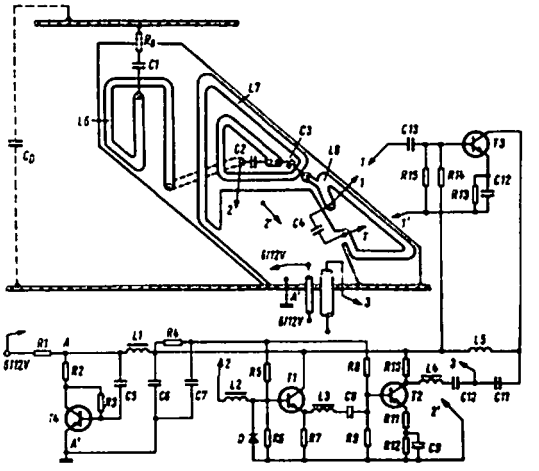

Fig.2

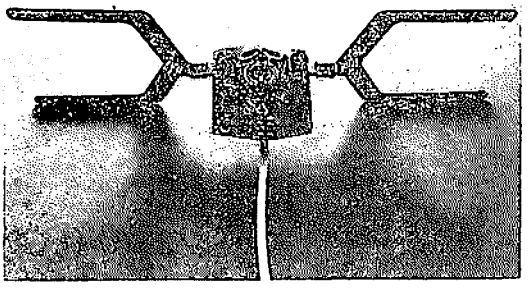

Fig.3

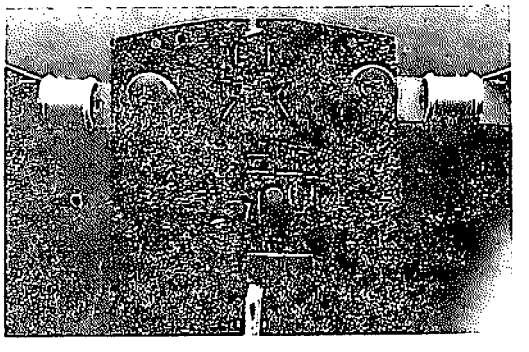

Fig.4