PART II. ANALYSIS

1. INTRODUCTION TO THE ANALYSIS

Part II of this Report is devoted to the analytical details of our statistical-physical interference models, where in particular we are concerned with the first-order probability density functions (pdf's) $w_1(E), w_1(\mathcal{E})$ and exceedance probabilities (PD's) $P_1(E > E_0)$, $P_1(\mathcal{E} > \mathcal{E}_0)$ of the envelope of the input noise process following the combined (linear) aperture - RF - IF (or ARI) filtering stages of a typical narrow-band receiver. As we see below, three principal classes of interference process are defined: Class A noise, where (in qualitative language) the input noise is spectrally narrower than the ARI-filter at the receiver's front-end; Class B interference, where the reverse is true - this input process is spectrally broad vis-à-vis the ARI filter; and a general Class C noise, which consists of the sum of Class A and Class B components.

For Part II the material is organized as follows: In Section 2 below we develop the various forms of the first-order characteristic function (c.f.) for the envelope after reception in the ARI filter of the typical receiver. Included here are the Class A, B, and C noise types, with their associated descriptive parameters, and the modifications introduced by the geometrical effects of source distribution and propagation law. Section 3 is devoted to the determination of the envelope exceedance probabilities, for Class A and B interference, and Section 4 gives the associated pdf's. In Section 5 we determine the moments $\langle \mathcal{E}^\beta \rangle$, $0 \leq \beta$, and the conditions for their existence; Section 6 provides procedures for estimating the basic parameters of the various noise models from empirical data; and finallly, in Section 7, we give quantitative, practical conditions for the applicability of our Class A or Class B models.