



## The influence of the structure of useful signal on the efficacy of sensitive emission of laser printers



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### ABSTRACT

The article presents issues related to the development of sensitive emission when laser printer is in operation. The article describes the possibility to control the efficacy of the source of emission, which is the printer's laser, through various selections of quality of the printout. Various laser printer modes were tested. Each of these modes was the source of electromagnetic emissions. The operating modes of laser printers were assessed from the effectiveness of the electromagnetic infiltration process point of view. The operation of a printer with a toner save option, which generates useful signal with a high degree of susceptibility to infiltration, is of a great importance. The obtained results were presented graphically in the form of images recreated from registered signals of adverse emission. The results show that the level of electromagnetic safety or susceptibility to electromagnetic infiltration of laser printers depends on the mode of operation of the device.

### 1. Introduction

Currently, almost all information is processed electronically through the use of, among others, information technology devices [1]. The most popular are computer systems with laser printers as their essential elements. They allow to transfer electronic versions of editable data to a paper form. In this process, the available print quality options offered by a dedicated printer software may be used [2–5]. In order to save consumables, the toner save option (the “Eco” mode) is often selected for the printout. This impacts the form of the useful signal which forces

the operation of the printer laser system. It also impacts the source of electromagnetic emission which can be used in obtaining non-invasive information [8].

Due to the diversity of the performance level of sources of emission, three different laser printers of the same manufacturer were studied. This also allowed to trace changes of structures of useful signals introduced over several years by a single manufacturer of laser printers.

The useful signal it is an electric signal that force the operation of the dual diode laser system of printer. The signal has a distinctive features connected with processed (printed) information. Very often the

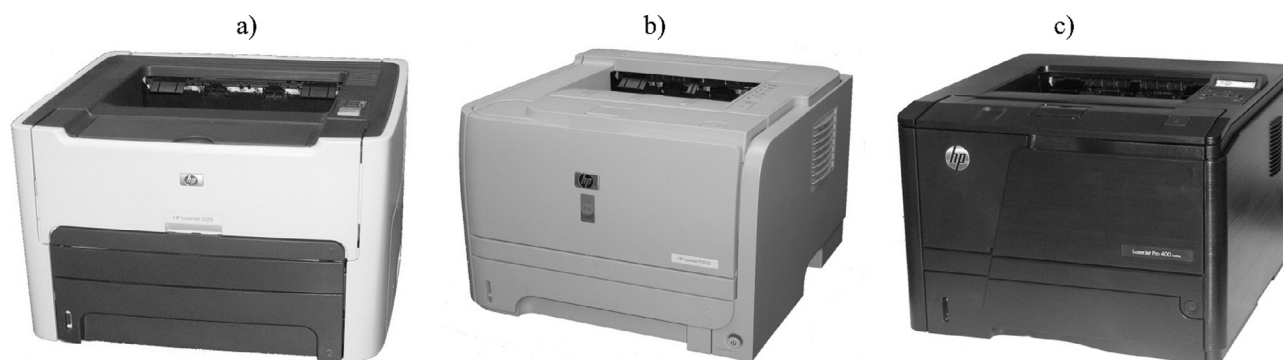


Fig. 1. Printers tested for efficacy of sensitive emission sources: (a) HP LaserJet 1320, (b) HP LaserJet P2035, (c) HP LaserJet 400.

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GHTTRYT	OLKI	YHFIYH	RFD	B
GHTTRYT	OLKI	YHFIYH	RFD	B
GHTTRYT	OLKI	YHFIYH	RFD	B
GHTTRYT	OLKI	YHFIYH	RFD	B
GHTTRYT	OLKI	YHFIYH	RFD	B
GHTTRYT	OLKI	YHFIYH	RFD	B
GHTTRYT	OLKI	YHFIYH	RFD	B

Fig. 2. Structure of data printed during testing.

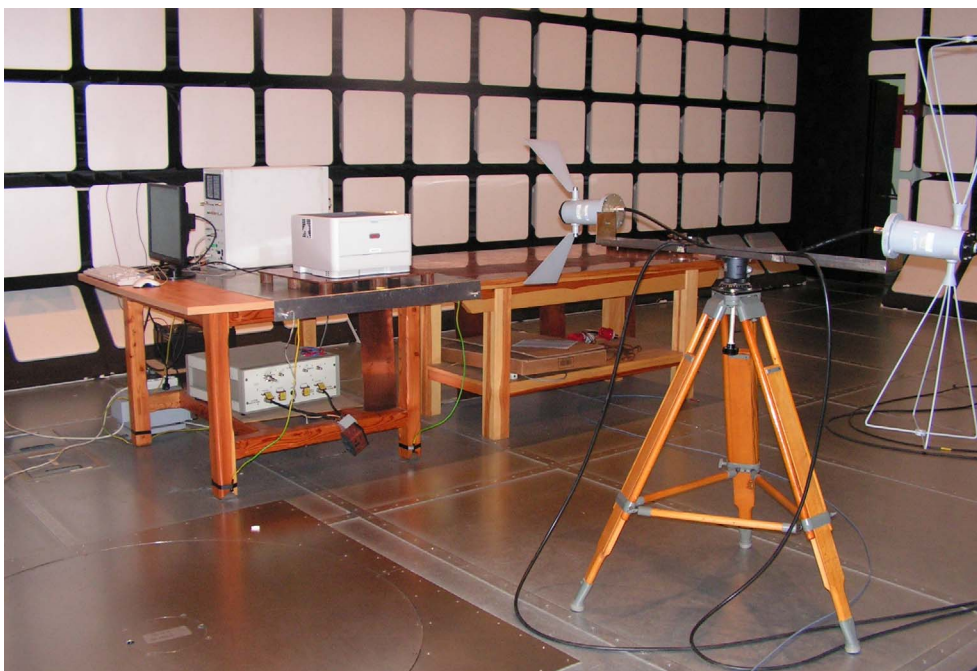


Fig. 3. Actual measuring system.

signal could be a source of sensitive emission [6–8].

The studied printers were:

- HP LaserJet 1320 (Fig. 1a);

- HP LaserJet P2035 (Fig. 1b);

- HP LaserJet 400 (Fig. 1c).

Each printer is equipped with a laser system with two diodes. The

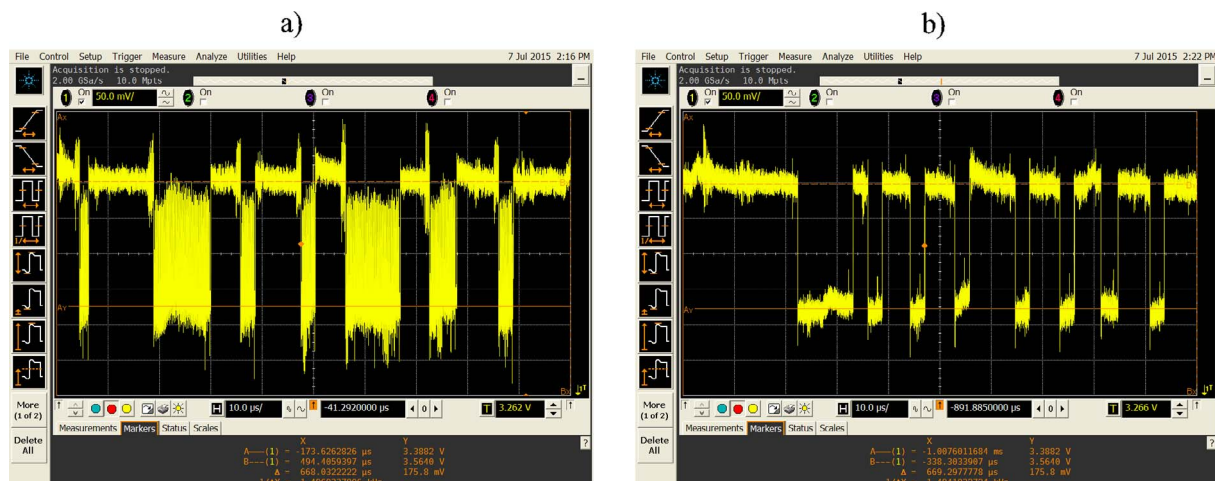


Fig. 4. Laser printer HP LaserJet 1320 with a dual laser diode system; 600 dpi operating mode: (a) without toner save, (b) with toner save.

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