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MAGNETIC DEFLECTION YOKES

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MAGNETIC DEFLECTION YOKES

To many CRT display system designers a deflection yoke represents a vital but troublesome component. The yoke is vital because it is an in-line component directly related to key system performance parameters. It is troublesome because there seems to be an air of mystery surrounding the yoke selection process. The fact that a yoke performs a vital role cannot be changed. However, the air of mystery surrounding the yoke selection process can be removed, and in its place a logical, orderly selection process may be substituted. The result being a much more effective means of optimizing the overall performance of the CRT display system. The following paragraphs, provide the information and guidelines necessary for a user to predict the basic performance characteristics of a deflection yoke during the planning or design phase of a CRT display system.

TWO BASIC TYPES OF DEFLECTION YOKES

The majority of all deflection coils fall into one of two basic categories: (1) parallel (toroidal) coils where each winding contributes an equal share of the total magnetic flux, (2) series coils where each winding shares the same magnetic flux. Parallel coils have no "ears" giving the advantage of lower resistance for equal current sensitivity. However, the external field equals the useful internal field doubling the inductance. This external field can be troublesome and usually results in poor settling for graphic displays. The flux configuration requires tighter tolerances for equal geometry. Of the two basic types, the series coil provides greater flexibility and is more adaptable to present day applications. A typical series coil having a distributed winding is illustrated in figure A, and is commonly referred to as a saddle coil. Figure B illustrates a series coil having a semi-distributed winding, and is commonly referred to as a stator coil since it is most often used with slotted or stator cores. As can be seen in figures A & B, both the saddle and the stator coils have bent-up portions, normally referred to as "ears" in both the front and the rear.

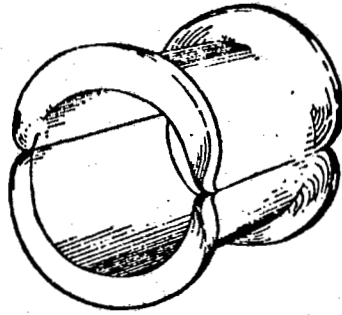


FIGURE A

DISTRIBUTED "SADDLE" COIL

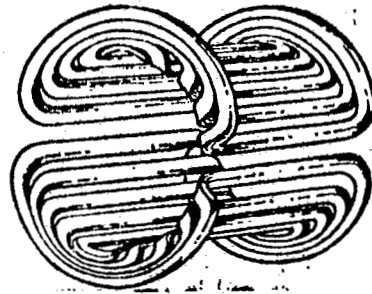


FIGURE B

SEMI-DISTRIBUTED COIL

The advantages of saddle yokes vs. stator yokes are indicated as follows:

SADDLE YOKE ADVANTAGES

- (A) higher inductance-to-resistance ratio
- (B) lower crosstalk from horizontal to vertical winding

STATOR YOKE ADVANTAGES

- (A) more efficient (lower energy constant)
- (B) better spot growth performance repeatability
- (C) better geometry performance repeatability
- (D) more flexibility in impedance choice for custom design

In general, the stator yoke is more often used for current high performance display systems because of the advantages indicated.

YOKE RELATED PARAMETERS

First of all a few comments are in order with regard to why the overall role of the deflection yoke is vital in a CRT display system. The following key system parameters are briefly discussed with respect to their relationship to the deflection yoke.

RESOLUTION

Resolution is of course, an all important parameter for any CRT display system. It is dependent upon two primary factors: (1) the spot size at the center of the CRT, (2) the center-to-edge spot growth characteristics of the system. The first is independent of the yoke. The second is determined almost entirely by the center-to-edge spot growth performance of the yoke.

BRIGHTNESS

Brightness and resolution are closely interrelated in that the greater the brightness required the greater the burden on both the yoke and the CRT to produce the specified resolution.