MAGNETIC FIELD SENSOR (Ḃ)
(Free Field)

MODEL B-90

DESCRIPTION

The PRODYN Model B-90 Sensor is a B-Dot loop equivalent to the AFWL Model MGL-9. This sensor was developed for scale model testing and is the smallest of the free-field type B-Dots developed by the Air Force Weapons Laboratory. The sensor is a full cylinder loop that measures the time rate-of-change of a magnetic field. It is a portable device designed for making free field measurements. For this type of measurement and because the sensor is fragile due to its size, it should be supported by dielectric materials and placed a minimum of two sensor diameters from conducting surfaces. The latest version comes equipped with a protective cover over the sensing area.

The sensor consists of a conducting cylinder which contains four equal-spaced gap structures. The geometry and loading configuration of the MGL-9 sensor is different from that used on previous MGL full loop B-Dots. This was dictated by the small physical size of the probe. The voltage developed across each gap of the sensor is carried on a 100 ohm biconical transmission line, which at opposite gaps are connected in parallel to 100 ohm cables. These cables in turn are connected to the small 50 ohm output cables which make a transition to larger cables for a total length of 15.8". This design is effectively a half-turn loop driving the output connector. The gap and wiring configuration used causes any responses to electric fields to be cancelled and the sensor's output signal to result from only magnetic fields. The equation relating to the sensor is:

$$V_o = \vec{A}_{eq} \cdot \frac{\vec{dB}}{dt} = \text{sensor output (in volts)}$$

where

$\vec{A}_{eq}$ = sensor equivalent area (m^2)

$\vec{B}$ = magnetic flux density vector (teslas)

The sensor is a passive device; therefore, an external power source is not required. Its output is a radial configuration, Model B-90(R).

ELECTRICAL SPECIFICATIONS

Equivalent Area (A_{eq})	2×10^{-5}
Frequency Response (3 db point)	~ 10 GHz
Risetime (t_r 10-90)	≤ .035 ns
Maximum Output (peak)	± 150 v
Output Connectors	SMA, Female

PHYSICAL SPECIFICATIONS

Mass: 28 grams