

**MAGNETIC FIELD ( $\dot{B}$ ) & SURFACE CURRENT ( $\dot{J}$ ) SENSOR  
MODEL B-S80**

DESCRIPTION

The PROLYN Model B-S80 sensor is a B-Dot loop equivalent to the AFWL Model MGL-S8. This sensor is the smallest of the B-Dot series of sensors developed by the Air Force Weapons Laboratory. Although this sensor was designed for use in a laboratory environment, it has been upgraded to include a weather cover for some protection. The sensor can be used as a B-Dot sensor or it can be used to measure the time rate-of-change of surface current density since the magnetic field over a conductive sheet is related to surface current density. The sensor consists of a half-cylinder loop on a base plate that when mounted to a conducting surface produces a voltage output in response to a time variant B field. The B-S80 is basically identical to the Model B-80. The B-S80 version has a surface mounted connector while the B-80 has the connector located below the base or ground plate.

This sensor has a parallel-series wiring configuration that cancels the electric field induced signals and makes the sensor's output signal the result of only the magnetic field. The equation pertinent to this sensor when used as a B-Dot sensor is provided on the Model B-80 Data Sheet. The equation relating to surface current density measurements is:

$$V_o = A_{eq} \mu_o \frac{dJ_s \sin \theta}{dt} = \text{sensor output (in volts)}$$

where

- $A_{eq}$  = sensor equivalent area ( $m^2$ )
- $\mu_o$  = permeability of free space ( $4\pi \times 10^{-7}$  H/m)
- $J_s$  = surface current density (Amps/m)
- $\sin \theta$  = angle between sensor axis and  $J_s$  vector

The sensor is a passive device; therefore, an external power source is not required. The sensor output is a radial configuration, Model B-S80(R).

ELECTRICAL SPECIFICATIONS

Equivalent Area ( $A_{eq}$ ) . . . . .	$1 \times 10^{-5} m^2$
Frequency Response (3 db point) . . . . .	> 5 GHz
Risetime ( $t_r$ 10-90) . . . . .	< 0.07 ns
Maximum Output (peak) . . . . .	$\pm 100v$
Output Connector . . . . .	Female SSMA

PHYSICAL SPECIFICATIONS

Mass: 15 grams

