

# Broadband Current Probe Series Operation Manual

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# INTRODUCTION

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## CURRENT PROBE SPECIFICATIONS

| Model Number | Frequency Range   | Nominal $Z_{\Omega}$ | Max Current up to 400 Hz (Amps) | Aperture (inches / cm) |
|--------------|-------------------|----------------------|---------------------------------|------------------------|
| BCP-610      | 20 Hz – 20 MHz    | 0.03                 | 400                             | 1.25" / 3.2cm          |
| BCP-611      | 10 KHz – 150 MHz  | 1,0                  | 450                             | 1.25" / 3.2cm          |
| BCP-614      | 10 KHz – 300 MHz  | 1,0                  | 350                             | 2.6" / 6.6cm           |
| BCP-615      | 10 KHz – 500 MHz  | 1 to 5               | 350                             | 1.25" / 3.2cm          |
| BCP-616      | 10 KHz – 150 MHz  | 5                    | 600                             | 1.25" / 3.2cm          |
| BCP-618      | 100 KHz – 500 MHz | 8                    | 350                             | 2.6" / 6.6cm           |
| BCP-619      | 100 Hz – 100 MHz  | 1,0                  | 300                             | 2.6" / 6.6cm           |
| BCP-620      | 10 KHz – 500 MHz  | 1 to 5               | 200                             | 1.25" / 3.2cm          |
|              |                   |                      |                                 |                        |

# GENERAL INFORMATION

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## INTENDED PURPOSES

This equipment is intended for general laboratory use in a wide variety of industrial and scientific applications, and designed to be used in the process of generating, controlling and measuring high levels of electromagnetic Radio Frequency (RF) energy. It is the responsibility of the user to assure that the device is operated in a location which will control the radiated energy such that it will not cause injury and will not violate regulatory levels of electromagnetic interference.

## GENERAL DESCRIPTION

The measurement of conducted currents may be accomplished with different sensing devices. Conducted currents can be measured without making direct contact with the source conductor or metallic surface by means of clamp-on current probes.

The BCP-6xx Current Probes are designed to permit field intensity meters, spectrum analyzers, and other 50Ω impedance instruments to measure quantitative magnitudes of current. Measurements can be made on single and multi-conductor cables, ground and bonding straps, shielded conduits and on coaxial cables.

## CIRCUIT

The BCP-6xx series of probes are inserted primary types of electromagnetic current transformers. When a probe is clamped around a conductor, the conductor is the primary winding and the probes winding's are the secondary. Current measurements are made by having the current carrying conductor pass through the aperture of the probe and the probe's output voltage measured with a calibrated field intensity meter or spectrum analyzer. The supplied Current Probe calibration is then used to convert the reading from the receiver as follows:

$$\mathbf{dB\mu A = dB\mu V (from Receiver) - Transfer Impedance (dB\Omega)}$$

# OPERATING INSTRUCTIONS

## GENERAL USE INSTRUCTIONS

In measuring the current in a single conductor, the probe is clamped around the conductor. In the instance of a two-conductor cable, the probe can be used to measure the effects of currents leaving and returning. A Current Probe will measure the resultant magnitude of current flow of all wires passing through the aperture. The balance of a twisted pair circuit can be determined by measuring each wire individually and then measuring both wires simultaneously. The ratio of the two measurements shows how well the balance has been achieved. A shielded multiple wire cable can be measured to show how much resultant leakage current is occurring. Measurements with and without the shield will identify the actual shielding effectiveness.

## INSTALLATION

Typical Current Probe installation is show in Figure 1. The probe should be placed over the cable and clamped shut. The cable connecting the probe to the receiver must have 50Ω characteristic impedance and matching cable connectors. The cable must be well shielded since any leakage will cause erroneous readings. The receiver must have 50 ohm input impedance.

Use precaution when measuring uninsulated conductors. If possible, de-energize the EUT during set-up. Also arrange to center the conductor in the aperture using additional insulation.

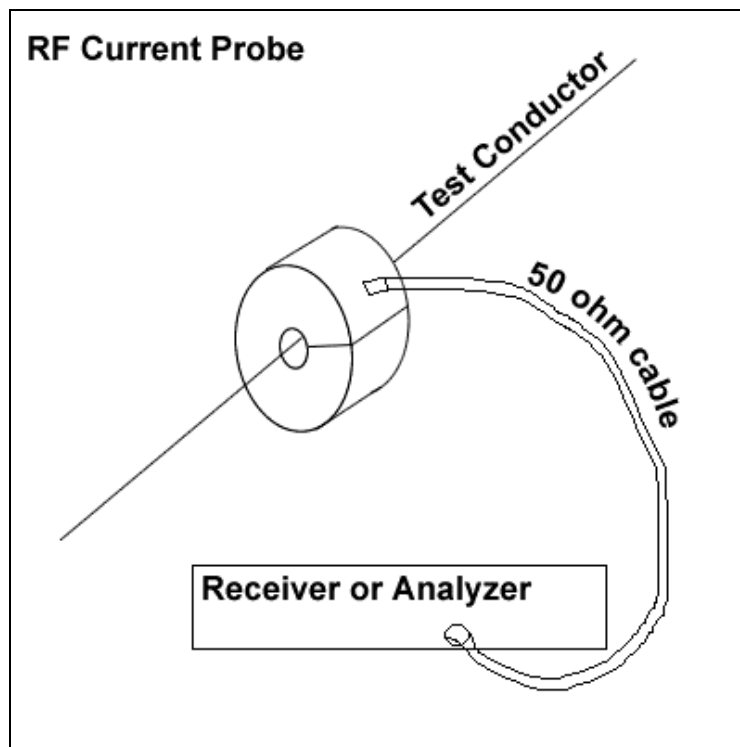


figure 1

## ANTENNA FORMULAS AND CALCULATIONS

A specific Transfer Impedance Factor is associated with each frequency. This number is to be subtracted from the receiver reading in order to convert to dBuA

$$\text{dB}\mu\text{A} = \text{dB}\mu\text{V (from Receiver)} - \text{Transfer Impedance (dB}\Omega) - \text{cable Loss (dB)}$$

**EXAMPLE:**

Assume that the frequency of interest is 80 KHz and we need to find the current at this frequency. Connect the probe per figure 1

Frequency: 80 KHz

Transfer Impedance: -2.76 dB ohms

Cable Loss: 0.1dB

Receiver Reading: -33.0dBuV

$$\text{dB}\mu\text{A} = \text{dB}\mu\text{V (from Receiver)} - \text{Transfer Impedance (dB}\Omega) - \text{cable Loss (dB)}$$

$$\text{dB}\mu\text{A} = \quad -33.0 \quad - \quad -2.76 \quad - \quad -0.1$$

$$\text{dB}\mu\text{A} = -30.14$$

# MAINTENANCE

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To ensure reliable and repeatable long-term performance, annual re-calibration of your current probe by A.H. is recommended. Our staff can recalibrate almost any type or brand of antenna.

For more information about our calibration services or to place an order for antenna calibration visit our website at <http://www.AHSystems.com> or call 1(818) 998-0223.

## WARRANTY INFORMATION

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A.H. Systems Inc., warrants that our Antennas, Sensors and Probes will be free from defects in materials and workmanship for a period of three (3) years. All other products delivered under contract will be warranted for a period of two (2) years. A.H. Systems' obligation under this warranty shall be limited to repairing or replacing, F.O.B. Chatsworth, California, each part of the product which is defective, provided that the buyer gives A.H. Systems notice of such defect within the warranty period commencing with the delivery of the product by A.H. Systems.

The remedy set forth herein shall be the only remedy available to the buyer, and in no event shall A.H. Systems be liable for direct, indirect, incidental or consequential damages.

This warranty shall not apply to any part of the product which, without fault of A.H. Systems has been subject to alteration, failure caused by a part not supplied by A.H. Systems, accident, fire or other casualty, negligence, misuse or normal wear of materials.

Except for the warranty set forth above, there are no other warranties, expressed or implied, with respect to the condition of the product or it's suitability for the use intended for them by the buyer.

For prompt service, please contact our service department for a Return Material Authorization Number before shipping equipment back to us.