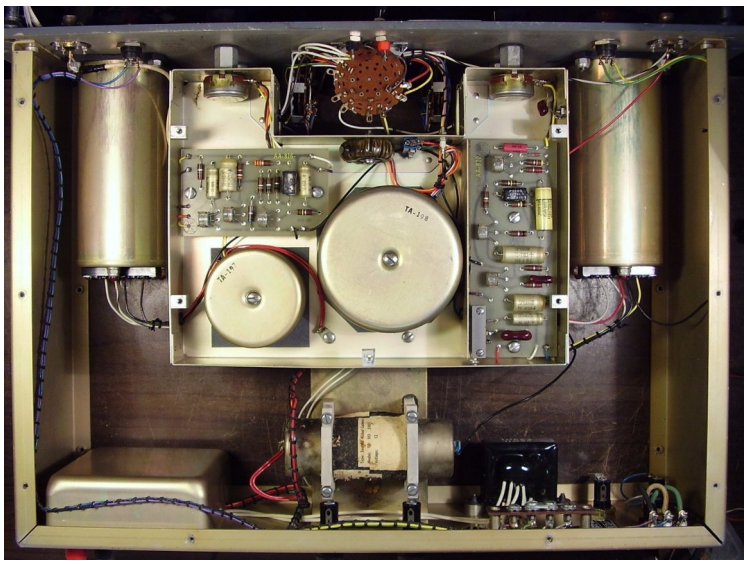
Gertsch CRB-4 - Complex Ratio Bridge



Transformer ratio bridge used to calibrate synchro resolvers. Solid state, self-contained rechargeable battery supply.

The bridge includes an internal oscillator with two outputs in quadrature. Outputs are compared with the signals present across the two windings of the synchro resolver under test.

This set uses two ESI Dekatran precision transformers.



Solid State Complex Ratio Bridges

Gertsch

Catalog Sheet CRB



Model CRB-4R

Features

- Self-contained (no auxiliary detector needed)
- Small size
- Ruggedized models
- Measures both in-phase and quadrature voltage ratios
- High accuracy
- Operating frequency range: 380-420 Hz

General Description

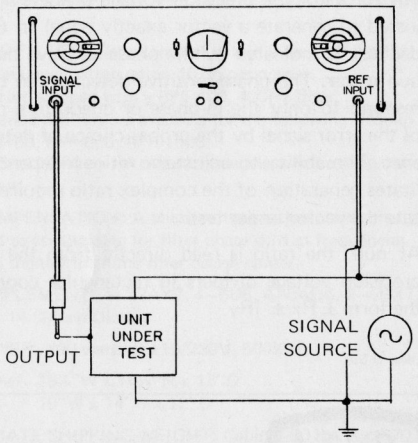
Models CRB-4, CRB-4RS, and CRB-5 are fully transistorized AC complex ratio bridges providing a highly accurate means of measuring in-phase and quadrature voltage ratios of any 3- or 4-terminal network.

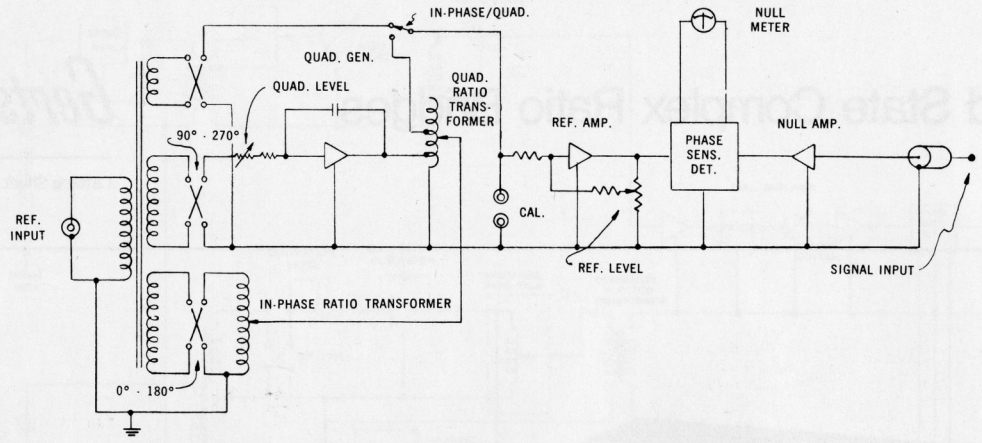
Models CRB-4, CRB-4RS, and CRB-5 are similar in design. Model CRB-4RS is distinguished by a front-panel BNC connector, permitting the use of an external oscilloscope to observe nulling signals.

The CRB-5 features a filter in the null amplifier to eliminate the effects of harmonics in the signal voltage.

The complex vector ratio is generated by summing an in-phase ratio (fraction of reference) with a quadrature ratio that is obtained by shifting a portion of the reference voltage by 90 degrees. Switches are provided to make the in-phase ratio 0 or 180 degrees and the quadrature ratio 90 or 270 degrees, all with respect to the reference input voltage. A complex ratio in any of the four quadrants can thus be duplicated and measured.

The indicated ratio is in rectangular coordinates of the form $\pm R_X \pm jRy$.





Model CRB-4 Block Diagram

A voltage at an angle with respect to a reference voltage is termed a complex ratio, and consists of the vector sum of two voltages in quadrature to each other. One voltage is 0 or 180 degrees with respect to the reference, and the other is 90 to 270 degrees.

Measuring such a complex ratio is accomplished in this instrument by generating a calibrated vector ratio to exactly equal the ratio under test. The equality of the two ratios is determined by a high gain, phase-sensitive null detector indicating the difference (null).

Referring to the block diagram, the basic system consists of a RatioTran* precision voltage divider driven from an in-phase (0-180 degrees) source . . . a RatioTran precision voltage divider driven from a quadrature generator (90-270 degrees), and a phase-sensitive-amplifier-detector.

The outputs of the two ratio transformers are summed with respect to the null amplifier common, and the complex ratio to be measured is applied to the amplifier input (probe). The precision voltage dividers are then adjusted to generate a vector exactly equal to the one under test as indicated by the phase-sensitive detector and null meter. The phase-sensitive detector can be made to respond to only the in-phase or quadrature component of the error signal by the proper choice of detector reference. The ability to adjust the ratios independently facilitates generation of the complex ratio required to duplicate the vector under test.

At null, the ratio is read directly from the RatioTran precision voltage dividers in rectangular coordinates of the form ± Rx ± jRy.

Litho U.S.A.

Specifications

Max. Signal Input Voltage	125 volts rms
Max. Reference Input Voltage	125 volts rms
Min. Reference Input Voltage	20 volts rms
Frequency Range	380-420Hz (others on request)
†In-phase Ratio Range	0-1.1110 (5-place resolution)
Quadrature Ratio Range	0-.11110 (6-place resolution)
Readout	Rectangular coordinates (Rx + jRy)
Sensitivity	200 microvolts
Input Power	(a) 1.5 watts at 115/220V (50 to 1000 cycles) (b) CRB-4 and -5 also operate from an internal rechargeable battery on trickle charge during AC operation. 20 hour operation on battery alone.
Accuracy	In-Phase: Reading ± .0001 Quadrature: (CRB-4, -4RS, -5) Reading ± .001 + calib. error (approx. .1%) + .0002 Rx (where Rx = in-phase ratio)
Probe Impedance	(a) At Null: 20,000 megohms shunted by .01 uuf (b) Off Null: 1 megohm min.
Reference Input Impedance	Greater than 50K ohms
Size	Rack Models (CRB-4R, -4RS, -5R) 5¼"H x 14"D Std. 19" rack panel Case Models (CRB-4, -5) 7"H x 20"W x 17"D
Price	CRB-4 $2500.00; CRB-4RS $2565.00; CRB-5 $2650.00

†Models CRB-4, CRB-4RS, also have additional ratio range 0.11110 (6-place resolution). Accuracy for this range: Reading ± .001

Prices and specifications subject to change without notice.

Gertsch
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