SiCO
The Complete Science World

Scientific Instruments & Technologies

Manufacturer & Suppliers

An ISO 9001:2015 Certified Co

Anderson Bridge Experiment

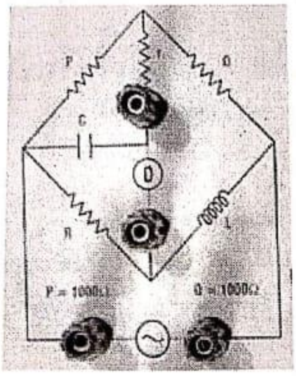
Aim of the experiment: Measurement of Unknown self inductance by using Anderson Bridge (AC & DC Balance)

Apparatus Feature`s..

- C =Two fixed standard capacitors having value 0.1μf & 0.2μf (loss free)
- R =Three decade resistance dials having value 10×100Ω, 10×10Ω and 10×1Ω
- L=Three Unknown inductances.
- P=Q= Fixed standard resistance having value 1000 ohms.
- S=Single decade resistance dial having value 10×0.1Ω.
- r =Three decade resistance dials having value 10×1000Ω, 10×100Ω and10×10Ω
- Inbuilt AC supply frequency 1 kHz,
- DC supply 6 volts,
- Unknown inductances :- **L= 50mH, 100mH and 150 mH.**
- Galvanometer .
- Head Phone.
- Patch Cords.

Formula Used:- $L = CR(Q+2r)$

Circuit Diagram :-



Procedure with readings

- DC BALANCE

Connect DC supply 6 Volts with the terminals marked supply, unknown inductance with the terminals marked unknown and a galvanometer with the terminals marked detector. Now adjust the decade resistance dial R to find out balance point in galvanometer and also use resistance dial s for fine adjustment.
Note the value R.
Note :- during DC balance resistance r should be at zero position.

Sr. No.	Unknown Inductance (L) mH.	Measurement Resistance at Null Position. (Ω).

- AC BALANCE

After DC balance without disturbing the position of the bridge, Connect the AC supply 1 kHz instead of DC supply and head phone instead of galvanometer.
Now adjust the resistance dial r to minimize the sound in the head phone.
Note the value of r and calculate the value of unknown inductance by using above given formula.
Repeat the experiment with another value of C.

Sr. No.	C (μF)	S (Ω)	r (Ω)	Exp. **L= CR (Q+2r)**	STD Value L (mH)	Error.

INSTRUCTIONS MANUAL
FOR
ANDERSON BRIDGE

EXPERIMENT --- Measurement of an unknown self inductance using Anderson Bridge.

MAIN FEATURES OF THE BRIDGE

C ---- Two fixed standard capacitors having value 0.1μf & 0.2μf (loss free)

R ---- Three decade resistance dials having value 10×100Ω, 10×10Ω and 10×1Ω

L---- Three Unknown inductances.

P=Q ---- Fixed standard resistance having value 1000 ohms.

S----- Single decade resistance dial having value 10×0.1Ω.

r ---- Three decade resistance dials having value 10×1000Ω, 10×100Ω and 10×10Ω

Inbuilt AC supply frequency 1 kHz, DC supply 6 volts, unknown inductances and galvanometer are provided which eliminate the use of external accessories.

4mm sockets are provided for external or internal connections to connect unknown inductance(L), supply and head phone and galvanometer(D).

FORMULA USED

$$L = CR\,(Q+2r)$$

Where **Q, R** and **r** are known standard resistances and C is a standard known capacitance.

PROCEDURE

DC BALANCE

1 Connect DC supply 6 Volts with the terminals marked **supply**, unknown inductance(connect any one unknown inductance) with the terminals marked **L** and a galvanometer with the terminals marked **D.** in the circuit diagram.
2 Switch on the instrument.
3 Now adjust the decade resistance dial R to find out balance point in galvanometer and also use resistance dial s for fine adjustment by using press key
4 Note the value R.

Note: - during DC balance resistance **r** should be at zero position.

AC BALANCE

1 After DC balance without disturbing the position of the bridge, Connect the AC supply 1 kHz instead of DC supply and head phone instead of galvanometer.
2 Set the capacitor C at 0.1μf
3 Now adjust the resistance dial **r** to minimize the sound in the head phone.
4 Note the value of **r** and calculate the value of unknown inductance by using above given formula.
5 Repeat the experiment with another value of C. and unknown inductance

Note: - the value of unknown inductances 50mh, 100mh and 150 mh.

Anderson's bridge

Aim : - To measure the self - inductance of a given coil by Anderson's bridge method.

Apparatus :- Inductor, standard capacitor, resistors (fixed resistances and variable pots as given in the circuit) signal generator, head phones and connecting terminals.

Formula :- Inductance of given coil $L = C\,[\,(R_1 + R_2)\,R_5 + R_2R_4\,]$ mH

Where C = Capacity of the standard capacitor (μ F)

R_2, R_3, R_4 = Known, fixed and non – inductive resistances ($K\Omega$)

R_1, R_5 = Variable resistances ($K\Omega$)

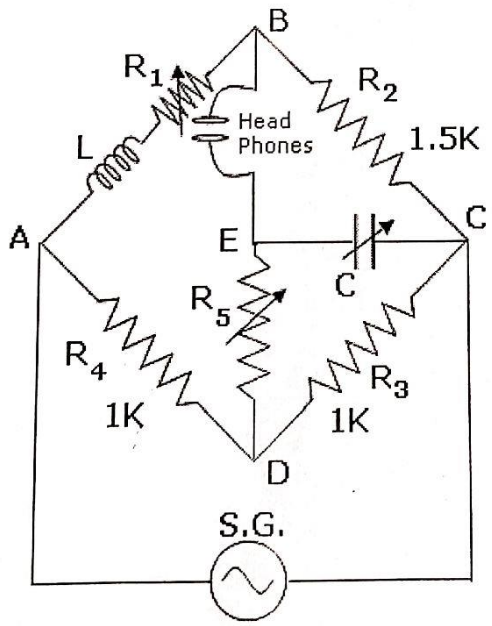
Description :- Anderson's bridge is the most accurate bridge used for the measurement of self – inductance over a wide range of values, from a few micro-Henries to several Henries. In this method the unknown self-inductance is measured in terms of known capacitance and resistances, by comparison. It is a modification of Maxwell's L - C bridge. In this bridge, double balance is obtained by the variation of resistances only, the value of capacitance being fixed.

Procedure :-The circuit diagram of the bridge is as shown in the figure. The coil whose self-inductance is to be determined, is connected in the arm AB, in series with a variable non-inductive resistor R_1. Arms BC, CD and DA contain fixed and non – inductive resistors R_2, R_3 and R_4 respectively. Another non - inductive resistor R_5 is connected in series with a standard capacitor C and this combination is put in parallel with the arm CD. The head - phones are connected between B and E. The signal generator is connected between A and C junctions.

Select one capacitor and one inductor and connect them in appropriate places using patch chords. The signal generator frequency is adjusted to audible range. A perfect

Table

S.No.	Capacity (C) μF	Resistance (R_1) Ω	Resistance (R_5) Ω	Calculated value (L) $C[(R_1+R_2)R_5+R_2R_4]$ mH	Standard value of L mH
1.					
2.					
3.					
4.					
5.					
6.					



* * * * *

Scientific Instruments & Technologies

Manufacturer & Suppliers

SiCO
The Complete Science World

An ISO 9001:2015 Certified Co

Anderson Bridge Experiment

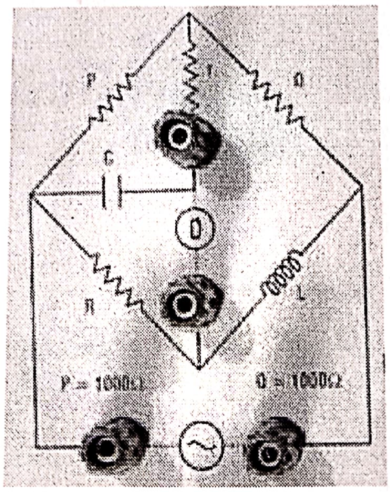
Aim of the experiment: Measurement of Unknown self inductance by using Anderson Bridge (AC & DC Balance)

Apparatus Feature`s..

- C =Two fixed standard capacitors having value 0.1μf & 0.2μf (loss free)
- R =Three decade resistance dials having value 10×100Ω, 10×10Ω and 10×1Ω
- L=Three Unknown inductances.
- P=Q= Fixed standard resistance having value 1000 ohms.
- S=Single decade resistance dial having value 10×0.1Ω.
- r =Three decade resistance dials having value 10×1000Ω, 10×100Ω and10×10Ω
- Inbuilt AC supply frequency 1 kHz,
- DC supply 6 volts,
- Unknown inductances :- **L= 50mH, 100mH and 150 mH.**
- Galvanometer .
- Head Phone.
- Patch Cords.

Formula Used:- **L = CR (Q+2r)**

Circuit Diagram :-



Procedure with readings

- DC BALANCE

Connect DC supply 6 Volts with the terminals marked supply, unknown inductance with the terminals marked unknown and a galvanometer with the terminals marked detector. Now adjust the decade resistance dial R to find out balance point in galvanometer and also use resistance dial s for fine adjustment.
Note the value R.
Note :- during DC balance resistance r should be at zero position.

Sr. No.	Unknown Inductance (L) mH.	Measurement Resistance at Null Position. (Ω).

- AC BALANCE

After DC balance without disturbing the position of the bridge, Connect the AC supply 1 kHz instead of DC supply and head phone instead of galvanometer.
Now adjust the resistance dial r to minimize the sound in the head phone.
Note the value of r and calculate the value of unknown inductance by using above given formula.
Repeat the experiment with another value of C.

Sr. No.	C (μF)	S (Ω)	r (Ω)	Exp. **L= CR (Q+2r)**	STD Value L (mH)	Error.

INSTRUCTIONS MANUAL
FOR
ANDERSON BRIDGE

EXPERIMENT --- Measurement of an unknown self inductance using Anderson Bridge.

MAIN FEATURES OF THE BRIDGE

C ---- Two fixed standard capacitors having value 0.1μf & 0.2μf (loss free)

R ---- Three decade resistance dials having value 10×100Ω, 10×10Ω and 10×1Ω

L---- Three Unknown inductances.

P=Q ---- Fixed standard resistance having value 1000 ohms.

S----- Single decade resistance dial having value 10×0.1Ω.

r ---- Three decade resistance dials having value 10×1000Ω, 10×100Ω and 10×10Ω

Inbuilt AC supply frequency 1 kHz, DC supply 6 volts, unknown inductances and galvanometer are provided which eliminate the use of external accessories.

4mm sockets are provided for external or internal connections to connect unknown inductance(L), supply and head phone and galvanometer(D).

FORMULA USED

$$L = CR\,(Q+2r)$$

Where **Q, R** and **r** are known standard resistances and C is a standard known capacitance.

PROCEDURE

DC BALANCE

1. Connect DC supply 6 Volts with the terminals marked **supply**, unknown inductance(connect any one unknown inductance) with the terminals marked **L** and a galvanometer with the terminals marked **D.** in the circuit diagram.
2. Switch on the instrument.
3. Now adjust the decade resistance dial R to find out balance point in galvanometer and also use resistance dial s for fine adjustment by using press key
4. Note the value R.

Note: - during DC balance resistance **r** should be at zero position.

AC BALANCE

1. After DC balance without disturbing the position of the bridge, Connect the AC supply 1 kHz instead of DC supply and head phone instead of galvanometer.
2. Set the capacitor C at 0.1μf
3. Now adjust the resistance dial **r** to minimize the sound in the head phone.
4. Note the value of **r** and calculate the value of unknown inductance by using above given formula.
5. Repeat the experiment with another value of C. and unknown inductance

Note: - the value of unknown inductances 50mh, 100mh and 150 mh.

Anderson's bridge

Aim : - To measure the self - inductance of a given coil by Anderson's bridge method.

Apparatus :- Inductor, standard capacitor, resistors (fixed resistances and variable pots as given in the circuit) signal generator, head phones and connecting terminals.

Formula :- Inductance of given coil $L = C [(R_1 + R_2) R_5 + R_2 R_4]$ mH

Where C = Capacity of the standard capacitor (μ F)

R_2, R_3, R_4 = Known, fixed and non – inductive resistances (KΩ)

R_1, R_5 = Variable resistances (KΩ)

Description :- Anderson's bridge is the most accurate bridge used for the measurement of self – inductance over a wide range of values, from a few micro-Henries to several Henries. In this method the unknown self-inductance is measured in terms of known capacitance and resistances, by comparison. It is a modification of Maxwell's L - C bridge. In this bridge, double balance is obtained by the variation of resistances only, the value of capacitance being fixed.

Procedure :-The circuit diagram of the bridge is as shown in the figure. The coil whose self-inductance is to be determined, is connected in the arm AB, in series with a variable non-inductive resistor R_1. Arms BC, CD and DA contain fixed and non – inductive resistors R_2, R_3 and R_4 respectively. Another non - inductive resistor R_5 is connected in series with a standard capacitor C and this combination is put in parallel with the arm CD. The head - phones are connected between B and E. The signal generator is connected between A and C junctions.

Select one capacitor and one inductor and connect them in appropriate places using patch chords. The signal generator frequency is adjusted to audible range. A perfect balance is obtained by adjusting R_1 and R_5 alternatively till the head – phones indicate a minimum sound. The values of R_1 and R_5 are measured with a multi-meter(While measuring the R_1 and R_5 values, they should be in open circuit).In the balance condition the self – inductance value of the coil is calculated by using the above formula. The experiment is repeated with different values of C.

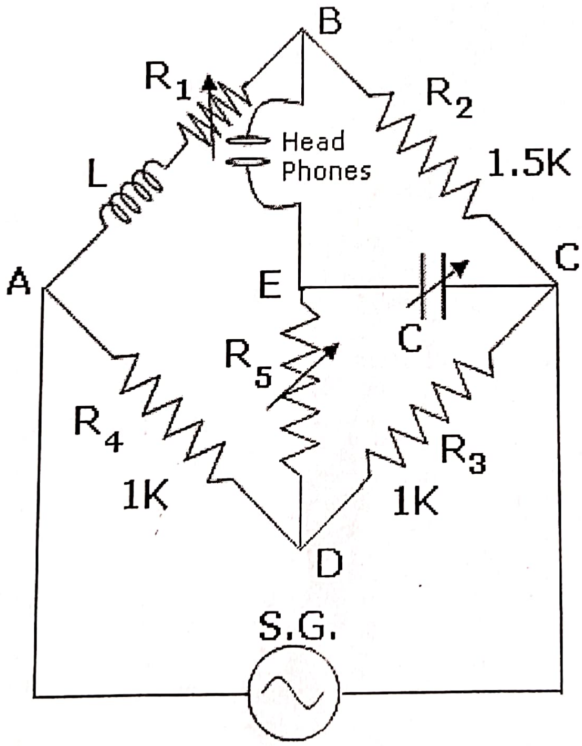
Precautions : - 1) The product (CR_2R_4) must always be less than L .

2) R_1 and R_5 are adjusted until a minimum sound is heard in head – phones.

Result :-

Table

S.No.	Capacity (C) μF	Resistance (R_1) Ω	Resistance (R_5) Ω	Calculated value (L) $C[(R_1+R_2)R_5+R_2R_4]$ mH	Standard value of L mH
1.					
2.					
3.					
4.					
5.					
6.					



* * * * *

INSTRUCTION MANUAL
FOR
BISTABLE MULTIVIBRATOR USING IC 555

Bistable Multivibrator using IC 555 has been designed to study the characteristics of Bistable Multivibrator.

The instrument comprises of the following builtin parts:-

1) IC 555 placed inside the cabinet & connections brought out at sockets.

2) DC regulated power supply of 5Volts available on sockets.

3) Various resistances & capacitors connected inside the cabinet & connections brought out on the sockets.

4) Two Push To ON switches are provided on front pannel, active low and active high for trigger input.

THEORY

With the monolithic integrated circuit 555 we can get accurate timing ranges of microseconds to hours, independent of supply voltage variations. This versatile device has a large number of interesting practical applications, especially for electronic hobbyists.

Basically, the 555 timer is a highly stable integrated circuit capable of functioning as accurate time-delay generator and as a free running multivibrator, when used as an oscillator the frequency and duty cycle are accuratly controlled by only two external resistors and a capacitor The circuit may be triggered and reset on falling wave forms. Its prominent features are :-

1) Timing from micro seconds through ours.
2) Monostable and astable operation.
3) Adjustable duty cycle.
4) Ability to operate from a wide range of supply voltages.
5) Output compatible with CMOS, DTL & TTL.
6) High current output can sink and source 200mA.
7) Trigger and reset inputs are logic compatible.
8) Output can be operated normal on and normal off.
9) High temperature stability.

PROCEDURE

555 timer can also function as a bistable multivibrator. This multivibrator offers the advantage that it operate from many different supply voltages, uses little power and requires no external

component other than by pass capacitors in noisy environments. It also provides a direct relay driving capability. As shown in circuit diagram a negative pulse applied to the trigger input terminal (pin no. 2) sets the multivibrator and the output Q goes high. A positive going pulse applied to threshold terminal will reset the multivibrator and drive the Q output low. Multivibrator can also be reset by applying a negative going pulse to the reset terminal (pin no. 4). In this mode pin 6 is kept low.

1) Connect the circuit as shown in figure printed on the front panel.

2) Switch ON the instument using ON/ OFF toggle switch provided on front panel.

3) Apply a positive going pulse at pin no. 6 of I.C. through push to on switch provided on front panel.

4) To set the multivibrator, apply a negative going pulse at pin no. 2. It will reset the multivibrator and output Q goes high.

STANDARD ACCESSORIES

1. One Singlepoint Patchcords for Interconnections.
2. Instruction Manual .

De Sauty's bridge

Aim :- To compare the capacities of two condensers (or) to find the capacitance of the given condenser, by using De Sauty's bridge.

Apparatus :- Two condensers, two resistance boxes or two resistance pots of 10 KHz , Signal generator, head phone and well insulated connecting wires.

Formula :- Capacity of a unknown capacitor $C_2 = \frac{R_1}{R_2} x C_1$ µF

Where C_1 is the capacity of the known capacitor.

R_1 and R_2 are the variable non- inductive resistors.

Description :- The De Sauty's bridge is an A.C Bridge works on the principle of Wheat stone's bridge . This bridge is used to determine the capacity of an unknown capacitor C_2 in terms of the capacity of a standard known capacitor C_1. Here R_1 and R_2 are non - inductive resistors . R_1, R_2 ,C_1 and C_2 are connected in a Wheat stone's bridge as shown in the figure-1. When the bridge is balanced, the ratios of impedances are equal as given below.

$$\frac{Z_1}{Z_2} = \frac{Z_3}{Z_4}$$

$$\frac{\frac{1}{j\omega C_1}}{R_1} = \frac{\frac{1}{j\omega C_2}}{R_2}$$

$$\frac{C_2}{C_1} = \frac{R_1}{R_2}$$

Procedure :- The connections are made as shown in the figure. The resistance R_1 and a condenser C_1 are in series in one branch of the bridge and a resistance R_2 and another capacitor C_2 are in series in another branch. The A.C signal generator frequency is adjusted to a fixed value of 1 KHz or below, which is convenient to our ear.

A resistance is unplugged in R_1 and the resistance R_2 is adjusted till the sound in the head - phone is reduced to zero level . The value of R_2 is measured with a multi-meter and noted. While measuring the resistances, they should be in open circuit. The above process is repeated for different values of R_1 and the values are noted in the table .

When the hum in the head – phone is at zero level , then the time constants of the upper and the lower braches of Wheat stone's bridge equal i.e. $C_1R_1 = C_2R_2$.

$$C_2 = \frac{R_1}{R_2} x C_1 \ \mu F$$

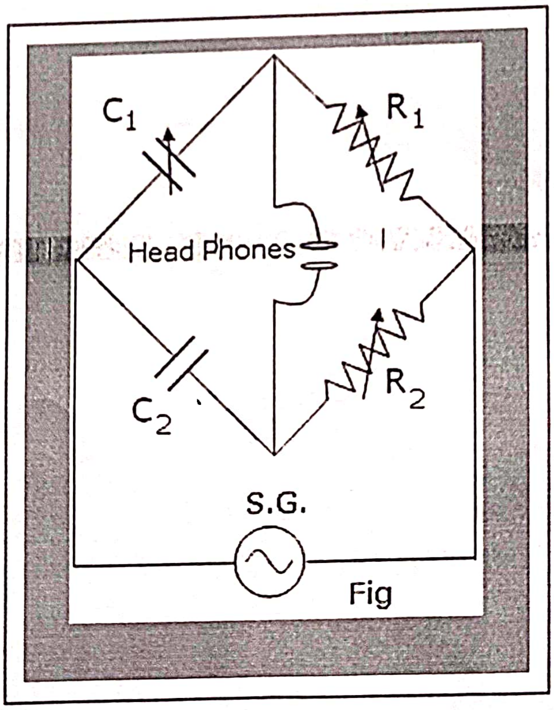
Precautions :- 1) The connecting wires should not be in contact with the experiment table.

2) The wires are checked up for continuity .

Result :-

Table

S.No.	Capacity of known condenser C_1 μF	Resistance R_1 Ω	Resistance R_2 Ω	Capacity of unknown condenser $C_2 = \frac{R_1}{R_2} X C_1$ μF	Standard Value of C_2 μF
1.					
2.					
3.					
4.					
5.					
6.					



Fig

* * * * *