AB66
Wien Bridge Oscillator

Operating Manual

Ver.1.1

An ISO 9001 : 2000 company

Innovative Technology Ecosystem

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TÜV TÜV Rheinland Group

CERTIFICATE

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Indore – 452 010, Madhya Pradesh, India

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An audit was performed, Report No. 07930
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The certificate is valid until 2010-11-20
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RoHS Compliance

Scientech Products are RoHS Complied.

RoHS Directive concerns with the restrictive use of Hazardous substances (Pb, Cd, Cr, Hg, Br compounds) in electric and electronic equipments.

Scientech products are “Lead Free” and “Environment Friendly”.

It is mandatory that service engineers use lead free solder wire and use the soldering irons upto (25 W) that reach a temperature of 450°C at the tip as the melting temperature of the unleaded solder is higher than the leaded solder.

Introduction

AB66 is a compact, ready to use **Wien Bridge Oscillator** experiment board. This is useful for students to understand functionality of **Wien Bridge Oscillator** and the effect of RC combination on the Output frequency. It can be used as stand alone unit with external DC Power Supply or can be used with **Scientech Analog Lab ST2612** which has built in DC Power Supply, AC Power Supply, function generator, modulation generator, continuity tester, toggle switches and potentiometer.

List of Boards :

Model	Name
AB01	Diode characteristics (Si, Zener, LED)
AB02	Transistor characteristics (CB NPN)
AB03	Transistor characteristics (CB PNP)
AB04	Transistor characteristics (CE NPN)
AB05	Transistor characteristics (CE PNP)
AB06	Transistor characteristics (CC NPN)
AB07	Transistor characteristics (CC PNP)
AB08	FET characteristics
AB09	Rectifier Circuits
AB10	Wheatstone bridge
AB11	Maxwell's Bridge
AB12	De Sauty's Bridge
AB13	Schering Bridge
AB14	Darlington Pair
AB15	Common Emitter Amplifier
AB16	Common Collector Amplifier
AB17	Common Base Amplifier
AB18	RC-Coupled Amplifier
AB19	Cascode Amplifier
AB20	Direct Coupled Amplifier
AB21	Class A Amplifier
AB22	Class B Amplifier (push pull emitter follower)
AB23	Class C Tuned Amplifier
AB24	Transformer Coupled Amplifier
AB25	Phase Locked Loop (FM Demodulator & Frequency Divider / Multiplier)
AB26	FET Amplifier
AB27	Voltage Controlled Oscillator
AB28	Multivibrator (Mono stable/Astable)
AB29	F-V and V-F Converter
AB30	V-I and I-V Converter
AB31	Zener Voltage Regulator
AB32	Transistor Series Voltage Regulator
AB33	Transistor Shunt Voltage Regulator

AB35	DC Ammeter
AB37	DC Ammeter (0-2mA)
AB39	Instrumentation Amplifier
AB41	Differential Amplifier (Transistorized)
AB42	Operational Amplifier (Inverting / Non-inverting / Differentiator)
AB43	Operational Amplifier (Adder/Scalar)
AB44	Operational Amplifier (Integrator/ Differentiator)
AB45	Schmitt Trigger and Comparator
AB49	K Derived Filter
AB51	Active filters (Low Pass and High Pass)
AB52	Active Band Pass Filter
AB54	Tschebyscheff Filter
AB56	Fiber Optic Analog Link
AB57	Owen's Bridge
AB58	Anderson's Bridge
AB59	Maxwell's Inductance Bridge
AB64	RC – Coupled Amplifier with Feedback
AB66	Wien Bridge Oscillators
AB67	Colpitt Oscillator
AB68	Hartley Oscillator
AB80	RLC Series and RLC Parallel Resonance
AB82	Thevenin's and Maximum Power Transfer Theorem
AB83	Reciprocity and Superposition Theorem
AB84	Tellegen's Theorem
AB85	Norton's theorem
AB88	Diode Clipper
AB89	Diode Clampers
AB90	Two port network parameter
AB91	Optical Transducer (Photovoltaic cell)
AB92	Optical Transducer (Photoconductive cell/LDR)
AB93	Optical Transducer (Phototransistor)
AB96	Temperature Transducer (RTD & IC335)
AB97	Temperature Transducer (Thermocouple)
AB101	DSB Modulator and Demodulator
AB102	SSB Modulator and Demodulator
AB106	FM Modulator and Demodulator

and many more……

Theory

Oscillators are circuits that produce periodic waveforms without input other than perhaps a trigger. They generally use some form of active device, lamp, or crystal, surrounded by passive devices such as resistors, capacitors, and inductors, to generate the output.

There are two main classes of oscillator: Relaxation and Sinusoidal. Relaxation oscillators generate the triangular, sawtooth and other non sinusoidal waveforms. Sinusoidal oscillators consist of amplifiers with external components used to generate oscillation, or crystals that internally generate the oscillation. The focus here is on sine wave oscillators, created using operational amplifiers Op-Amps. Sine wave oscillators are used as references or test waveforms by many circuits.

An oscillator is a type of feedback amplifier in which part of the output is fed back to the input via a feedback circuit. If the signal fed back is of proper magnitude and phase, the circuit produces alternating currents or voltages. Two requirements for oscillation are :

1. The magnitude of the loop gain A_vB must be at least 1.

2. The total phase shift of the loop gain A_vB must be equal to 0° or 360°. If the amplifier causes a phase shift of 180°, the feedback circuit must provide an additional phase shift of 180° so that the total phase shift around the loop is 360°.

Wien Bridge Oscillator :

The Wien Bridge is one of the simplest and best known oscillators and is used extensively in circuits for audio applications. Figure 1 shows the basic Wien Bridge circuit configuration. On the positive side, this circuit has only a few components and good frequency stability.

Because of its simplicity and stability, it is the most commonly used audio-frequency oscillator. In the figure shown the Wien Bridge circuit is connected between the amplifier input terminals and the output terminal. The bridge has a series RC network in one arm and a parallel RC network in the adjoining arm. In the remaining two arms of the bridge, resistor R1 and Rf are connected.
The phase angle criterion for oscillation is that the total phase shift around the circuit must be 0°. This condition occurs only when the bridge is balanced, that is at resonance. The frequency of oscillation Fo is exactly the resonant frequency of the balanced Wien Bridge and is given by

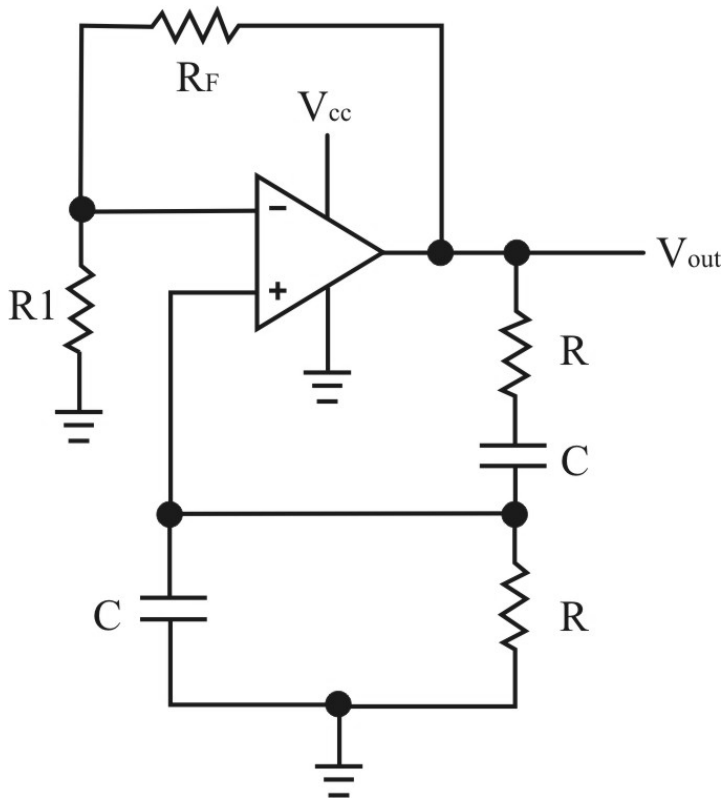
$$Fo = 1/2\ \pi\ RC = 0.159 / RC$$

Assuming that the resistors are equal in the value, and the capacitors are equal in the value in the reactive leg of the Wien Bridge. At this frequency the gain required for sustained oscillation is given by

$$Av = 1/B = 3$$

That is, $1+ R_f / R_1 = 3$

Or $R_f = 2R_1$



Wien-Bridge Circuit Schematic

Figure 1

Experiment

Objective :

Study of Wien Bridge Oscillator and effect on output frequency with variation in RC combination

Equipments Needed :

1. Analog board of **AB66.**
2. DC power supplies -12V, +12V from external source or **ST2612 Analog Lab**.
3. 2 mm patch cords.

Circuit diagram :

Circuit used to study **Wien Bridge Oscillator** is shown in figure 2.

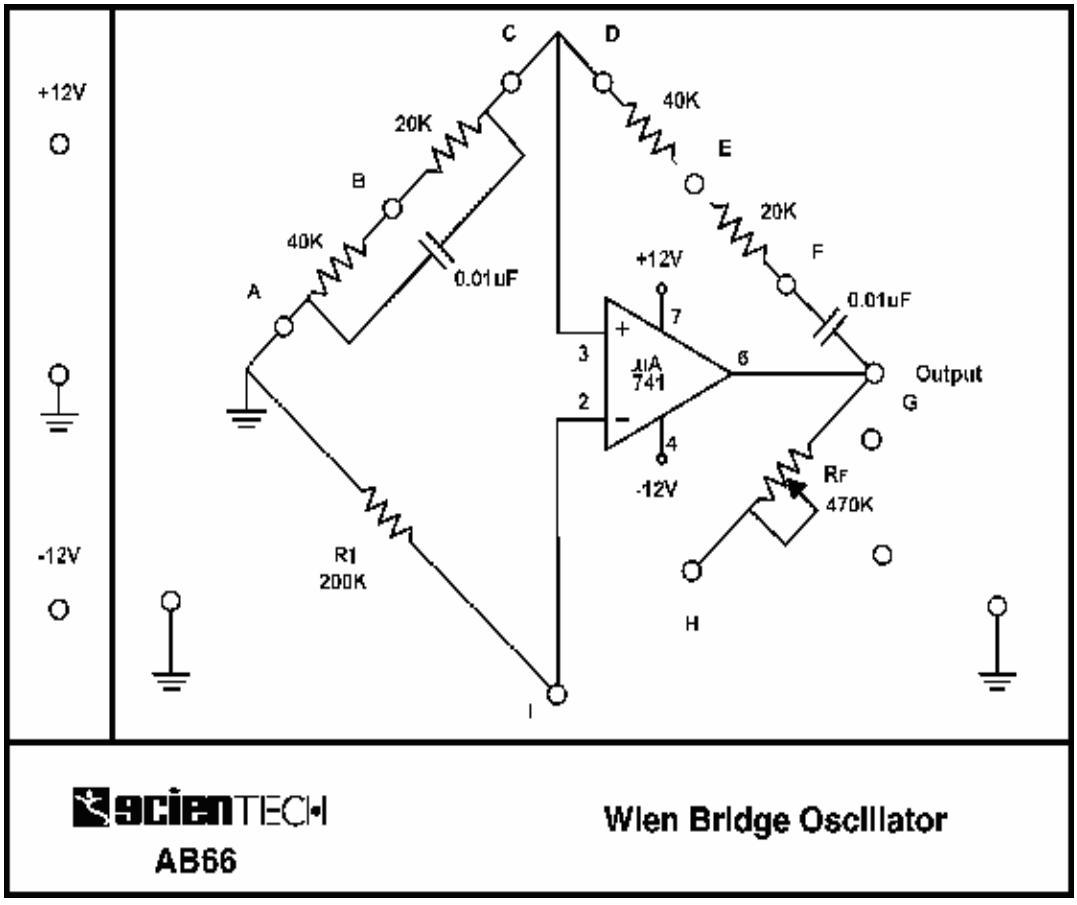


Figure 2

Procedure :

- To study **Wien Bridge Oscillator** proceed as follows :

1. Connect +12V,-12V DC power supplies at their indicated position from external source or **ST2612 Analog Lab**.

2. Connect a 2mm patch cord between test point I and H.

3. Switch 'On' the Power Supply.

4. Vary R_f Potentiometer to make gain (R_f / R_l) greater than 2.

5. Record the value of output frequency at test point G.

6. Compare measured frequency with the theoretically calculated value.

7. Vary gain Potentiometer of 470K to adjust gain of the amplifier in case of clipped waveform.

8. Switch off the Power Supply.

9. Connect a 2 mm patch cord between test points A and B, D and E.

10. Repeat the above steps from step 3 to 8.

11. Switch off the Power Supply

12. Connect a 2 mm patch cord between test points B and C, E and F.

13. Repeat the above steps from step 3 to 8.

Data Sheet

μA741, μA741Y
GENERAL-PURPOSE OPERATIONAL AMPLIFIERS

SLOS094B – NOVEMBER 1970 – REVISED SEPTEMBER 2000

- Short-Circuit Protection
- Offset-Voltage Null Capability
- Large Common-Mode and Differential Voltage Ranges
- No Frequency Compensation Required
- Low Power Consumption
- No Latch-Up
- Designed to Be Interchangeable With Fairchild μA741

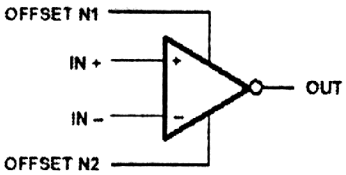
description

The μA741 is a general-purpose operational amplifier featuring offset-voltage null capability.

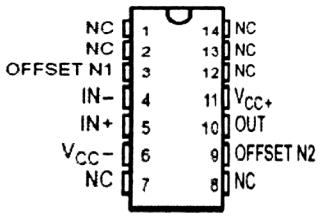
The high common-mode input voltage range and the absence of latch-up make the amplifier ideal for voltage-follower applications. The device is short-circuit protected and the internal frequency compensation ensures stability without external components. A low value potentiometer may be connected between the offset null inputs to null out the offset voltage as shown in Figure 2.

The μA741C is characterized for operation from 0°C to 70°C. The μA741I is characterized for operation from −40°C to 85°C. The μA741M is characterized for operation over the full military temperature range of −55°C to 125°C.

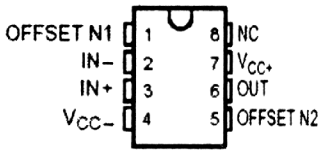
symbol



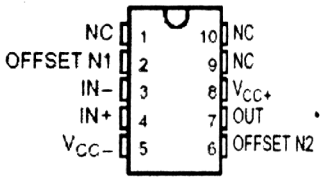
μA741M . . . J PACKAGE
(TOP VIEW)



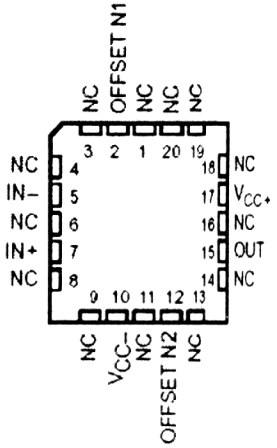
μA741M . . . JG PACKAGE
μA741C, μA741I . . . D, P, OR PW PACKAGE
(TOP VIEW)



μA741M . . . U PACKAGE
(TOP VIEW)



μA741M . . . FK PACKAGE
(TOP VIEW)



Warranty

1. We guarantee the product against all manufacturing defects for 24 months from the date of sale by us or through our dealers. Consumables like dry cell etc. are not covered under warranty.

2. The guarantee will become void, if

a) The product is not operated as per the instruction given in the operating manual.

b) The agreed payment terms and other conditions of sale are not followed.

c) The customer resells the instrument to another party.

d) Any attempt is made to service and modify the instrument.

3. The non-working of the product is to be communicated to us immediately giving full details of the complaints and defects noticed specifically mentioning the type, serial number of the product and date of purchase etc.

4. The repair work will be carried out, provided the product is dispatched securely packed and insured. The transportation charges shall be borne by the customer.

For any Technical Problem Please Contact us at **service@scientech.bz**

List of Accessories

1. 2 mm Patch Cords (Red) ..... 2 Nos.

2. 2 mm Patch Cord (Blue) ..... 7 Nos.

3. 2 mm Patch Cord (Black) ..... 3 Nos.

4. e-Manual.....1 No.

Updated 30-03-2009