

MODEL ORC-27A
R-C OSCILLATOR
OPERATION MANUAL

KIKUSUI ELECTRONICS CORP.

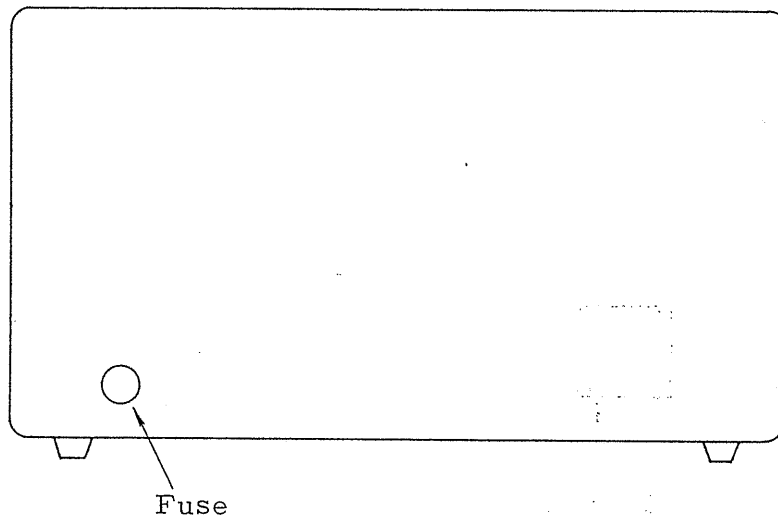
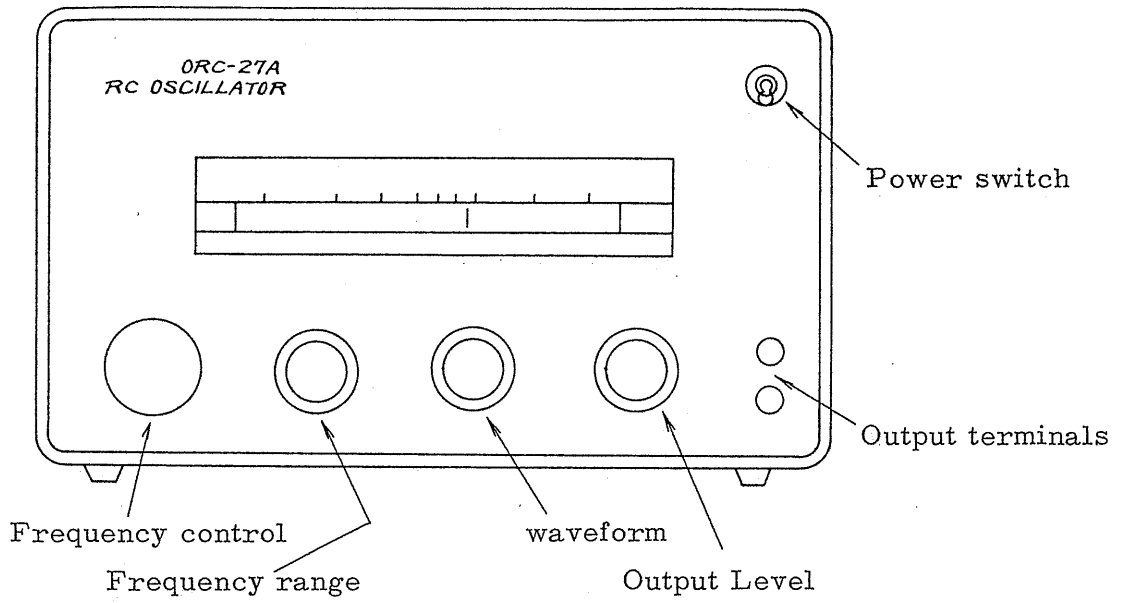
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1. SPECIFICATIONS

| | | |
|---------------------------------|---|-----------------|
| Type | Wien Bridge RC Oscillator | |
| Power Requirement | -----V, 50/60Hz Approx. 30VA | |
| Dimensions | 300(W) x 170(H) x 153(D) mm | |
| (Max.) | 300(W) x 180(H) x 190(D) mm | |
| Weight | Approx. 4.5 kg | |
| Vacuum Tube | 6AV6 | 1 |
| | 6AR5 | 2 |
| | 12AT7 | 1 |
| | 6X4 | 1 |
| Accessories | Operation Manual | 1 |
| | Test Data | 1 |
| Frequency Range | x 1 | 18 - 200Hz |
| | x 10 | 180 - 2000Hz |
| | x 100 | 1800 - 20000Hz |
| | x 1 k | 18 - 200kHz |
| Calibration Accuracy | From 18 Hz to 200 kHz ± (2% + 1 Hz) | |
| Frequency regulation | For AC -----V, ± 5%, Less than ± 1% | |
| Frequency response | Sine : Less than ± 0.5 dB (reference : 1 kHz) | |
| | Square : Less than ± 0.5 dB (reference : 1 kHz) up to 20 kHz | |
| Maximum Output | Sine : more than 5 V rms | |
| | Square : more than 10 Vp-p | |
| | Complex : more than 10 Vp-p | |
| Distortion of Sine Wave | Less than 1% at 1 kHz | |
| Sag or Overshoot of Square Wave | Less than 1 dB | |
| Complex Wave | Base | line frequency |
| | Superposed Wave | 18 Hz - 200 kHz |
| | Amplitude Ratio | Approx. 4:1 |
| Output Impedance | Less than 3 kΩ | |

2. FUNCTION OF CONTROLS AND TERMINALS



3. OPERATION

3.1 INITIAL PROCEDURE

Connect the power cable to a power line of the specified voltage and frequency. Turn the power switch to ON. The lamp of dial illumination will light and the instrument will operate after a few minutes warm-up. It will be within specifications after 30 minutes.

3.2 FREQUENCY

Set the RANGE and FREQUENCY controls for the desired frequency. The frequency dial scale must be multiplied by the multiplying factor indicated by the RANGE switch setting to obtain the oscillator frequency. EXAMPLE: 100 (on dial scale) x 10 (multiplying factor indicated by RANGE SWITCH setting) = 1 kHz the oscillator frequency.

When the rotary switch which selects WAVEFORM is set in the position of COMPLEX, the value obtained above is the frequency of superposed wave, while the base frequency is constant (= line frequency) at any position of the RANGE and FREQUENCY controls setting.

3.3 OUTPUT TERMINALS

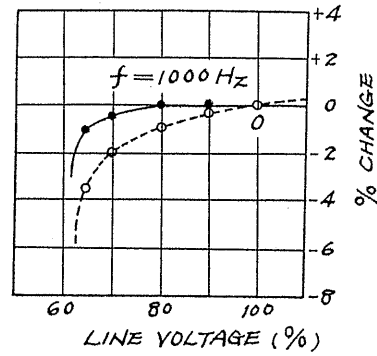
The unbalanced output is obtained from the potentiometer connected between the cathode of the cathode follower and ground. The value of the output impedance varies nearly from zero to 3 k Ω according to the position of the output control; being maximum near its center position. The load resistance higher than 10 k Ω is desired to avoid the increase of distortion in output waveform.

The lower value of resistance may be used at the lower voltage of the output without the increase of distortion.

4. OPERATING CONSIDERATION

4.1 CHANGE IN OUTPUT CAUSED BY LINE VOLTAGE VARIATION

The example of change in the output voltage with the frequency of oscillation and the output voltage is shown in Fig. 1.



— Frequency
 - - - - - Output Voltage

Fig. 1

4.2 FREQUENCY RESPONSE

Frequency response of sine and square wave output are shown in Fig. 2.

— Load resistance \circ 70pF shunted
 - - - - - " 10k Ω 70pF shunted

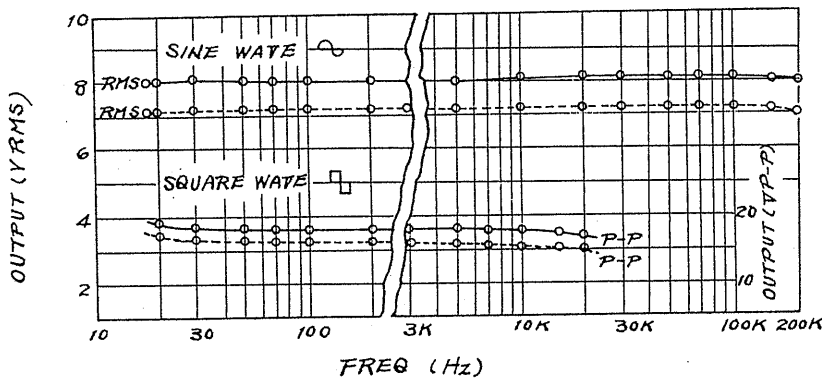


Fig. 2

4.3 SQUARE WAVE

Square wave in this instrument is shaped from sine wave through the clipper circuit. The faster rise time is obtained nearly proportional to frequency. However, the quality of the waveform becomes poor because of the upper frequency limit of the circuits.

5. MAINTENANCE.

The instrument was thoroughly tested and inspected before being shipped, but in the case of defect, refer to the following descriptions and the typical DC voltage written in the circuit diagram.

5.1 REMOVAL OF CASE

To remove the case, remove five screws on the top and bottom of the front panel shown in Fig. 3, and slide the case to the rear and off the instrument. It is recommended to pull off the power cable from the line during above procedure.

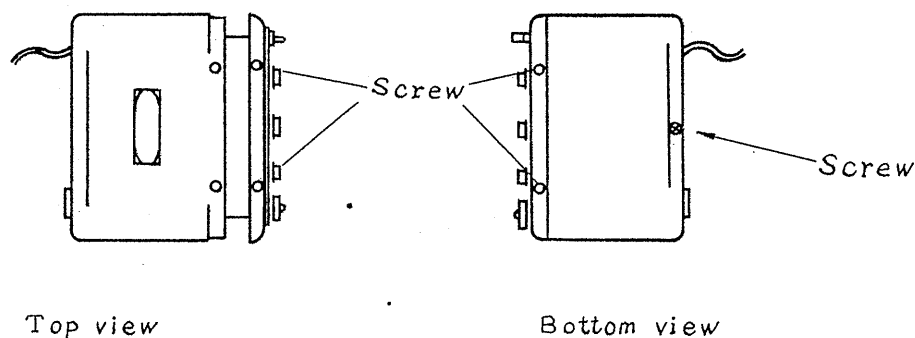


Fig. 3

5.2 FREQUENCY CALIBRATION

The resistors and tuning capacitor of the frequency determining network in the instrument are selected according to the specified rating.

The instrument will oscillate over all ranges properly at the frequency indicated on the frequency dial if the calibration is made at only one point near high end of the dial. The following procedure is recommended when the frequency standard of 2000Hz for instance is available.

(1) CHECK FOR LOW OF DIAL

Check the dial needle is exactly on " 0 " of the even scale beneath the mirror when turning capacitor is in the position of maximum capacitance.

(2) CAPACITY BALANCE OF BRIDGE

Set the turning capacitor in the maximum capacitance position and the RANGE switch on " x10 ". Replace the thermistor with the variable resistor of about $10k\Omega$ and adjust its value to get the oscillator output nearly the same in the level with thermistor. Turn frequency dial slowly toward high end and the oscillator output level will fluctuate.

Adjust trimmers Ct1, Ct2 to keep the output level nearly constant.

(3) CALIBRATION AT 2000Hz

Adjust trimmers Ct1, Ct2 in approximately same quantity to get the oscillator frequency of 2000Hz on the dial scale "200".

This adjustment may be done with thermistor connected instead of the variable resistor for the stable output voltage. In this case, however, when trimmers are adjusted in relatively much quantity because of a large error in frequency, adjustment in step (2) should be repeated.

Check the frequency error on every point in every range and a large error is still found after above adjustment or further accuracy is desired, the following procedure may be adopted.

- (a) In the range of x1, resistance value of $20M\Omega$ is adopted as a branch of Wien Bridge. Such a high resistor shows generally a larger drift in its value, besides the deterioration of the insulation resistance parallel to the resistor may become unnegligible after long period of operation. Check the resistor and the associated circuit. Adjust the effective value of resistance of necessary.

- (b) The oscillation frequency is often slightly lower than dial indication of "200" in the range of x100 and x1k. Then, adjust the frequency by connecting high resistor or small capacitor parallel to R1.
- (c) If the more precise calibration is desired on each point on the dial between both end of the range, bend the plate segments of turning capacitor rotor associated with each dial point.