

INSTRUCTION BOOK
FOR
OSCILLATOR EQUIPMENT, TYPE RC-12

MANUFACTURED BY
AUDIO RESEARCH, INC.



FOR OFFICIAL USE ONLY

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INSTRUCTION BOOK
FOR
OSCILLATOR EQUIPMENT, TYPE RC-12

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Notice

Oscillator, Equipment type RC-12, was designed for use with the non-oscillating receivers of Radio Sets, types SCR-()-183, SCR-()-185, SCR-()-187 and SCR-AA-192, and may be used with all variations of these sets as the necessary provisions for obtaining power supply have been incorporated therein. All references in this book to components of the SCR-AA-192 apply to corresponding components of later models of similar sets.

OSCILLATOR EQUIPMENT, TYPE RC-12

I. COMPONENT PARTS

A. Oscillator Equipment, type RC-12. See Fig. 1.

The oscillator equipment consists of the following component parts:

<u>Quantity</u>	<u>Description</u>
2	*Books, Instruction.
1	*Case, type CS-45.
2	*Chart, type MC-132 (1 in use, 1 spare).
1	*Cord, type CD-122. (length as required)
1	*Oscillator, type BC-RC-183 (Includes Mounting, type FT-103).
3	*Tube, type VT-36 (1 in use, 2 spare).
3	*Tube, type VT-37 (1 in use, 2 spare).
20 ft.	Wire, type W-65.

(*) NOTE:- Only those parts marked with an asterisk were supplied by Audio Research, Inc., on order, No. 10271-NY-35. The type RC-12 equipment is intended primarily for use with radio sets having radio receivers similar to that of the type SCR-AA-192, and, when so used, obtains its power supply from the same source as the radio receiver. It may, however, obtain power from any other power supply of the proper rating as hereinafter described.

II. USES AND GENERAL DESCRIPTION

A. The uses of Oscillator Equipment, type RC-12, are as follows:

1. To enable a non-oscillating receiver to receive unmodulated CW signals.
2. To roughly check calibration of transmitter or receiver.
3. As a source of modulated or unmodulated radio frequency energy or signals for checking radio receivers.

B. Description of Oscillator, type BC-RC-183.

A front view of the oscillator illustrating the panel arrangement is shown in Fig. 1. The panel and case are made of aluminum. The unit can be removed from the case by removing the six screws from the flange on the panel. Figs. 2 and 3 show views of the interior of the oscillator.

From these photographs it is seen that the tuning capacitor is mounted in the center of the sub-panel. On one side of the capacitor are the coils for the seven different frequency bands. On the other side of the capacitor are located the two tubes, a VT-36 and a VT-37, the output potentiometer and the power plug socket. The audio-transformer and various small resistors and capacitors are located beneath the sub-panel. These parts can be identified in Figs. 2 and 3 by using the material list included as a part of these instructions.

The front panel controls are as follows:

1. Band Selector Switch
2. Tuning Control

3. Output Control
4. Filament ON-OFF Switch
5. Modulation ON-OFF Switch
6. Filament Switch to be set for a 6 or 12 volt supply
7. Phone Jack
8. Input Binding Post
9. Output Binding Post

All connections for power supply are made to the oscillator through a single cord and plug which fits into the socket located in the right end of the oscillator.

Access to the tubes may be had by removing the plate from the top of the oscillator case.

The oscillator may be removed from the Mounting, type FT-103, by sliding the snap catches toward the center.

The weight of the Oscillator, type BC-RC-183, with Mounting, type FT-103, and tubes, is 6 pounds and 2 ounces. The weight of Mounting, type FT-103, is 10 ounces.

The dimensions of this oscillator with or without the mounting are shown in Fig. 7.

C. Description of Case, type CS-45.

This case contains the Chart, type MC-132 showing the calibration curve of the oscillator. The case is made of welded aluminum. Its weight, including the chart, is 2 pounds 14 ounces and its dimensions are shown in Fig. 7. The Chart, type MC-132, weighs 6-1/2 ounces.

The face of the case has a celluloid window through which the chart may be read. The chart is approximately 8 inches wide by 36 feet long and is mounted in the case on two rollers. These rollers are connected through a gear system to the small hand wheel on the end of the case. Thus, by turning the hand wheel, any part of the chart may be made to appear beneath the window. This Chart, type MC-132, is a long piece of cross-section paper upon which the calibration curve is plotted using dial settings as abscissae and frequencies as ordinates. One major division of the ordinate scale has been left blank or unused, and the frequency scale or figures shifted to the opposite side of the chart, at each point where the frequency band changes.

NOTE:- The calibration curve of one oscillator will differ from that of another; so therefore, the serial number of an oscillator and the serial number of the calibration curve used with it **MUST BE THE SAME.**

D. Description of Cord, type CD-122.

This cord is made of a 2-conductor shielded Cordage, type CO-121. The cord is furnished in various lengths, and each end is terminated in a Plug, type PL-56. One plug fits in the socket in the oscillator and the other in the bottom socket of the Junction Box, type TM-AA-153, TM-AB-167, TM-AD-167 or TM-AE-172, depending on which radio receiver is used. If the oscillator is to be used with some other receiver, provisions must be made (probably by removing one of the Plugs, type PL-56, or by using Cord, type CD-123) to obtain the proper filament and plate voltages from some other source. This source may be separate batteries or the supply may be obtained from the receiver batteries. For the wiring of Cord, type CD-122, refer to Fig. 6.

E. Vacuum Tubes.

Oscillator, type BC-RC-183, uses two vacuum tubes, a VT-36 and a VT-37.

(1) The Tube, type VT-36, is a tetrode or four-element tube, having an indirectly heated cathode, a control grid, a screen grid, and a plate. The oxide coated cathode is heated by a two-terminal heater filament. The control grid terminal is brought out at the top of the tube. The other terminals are brought out at the five prongs in the base. The tube is characterized by (a) high amplification factor; (b) high internal plate resistance; (c) low power output.

(2) The Tube, type VT-37, is a triode or three-element tube having an indirectly heated cathode, a control grid, and a plate. All terminals are brought out at the five prongs in the base. In the Oscillator, type BC-RC-183, this tube is used as an audio frequency oscillator and modulator or as a detector. The following table will give an idea of the characteristics of these two types of tubes:

	<u>VT-36</u>	<u>VT-37</u>
Heater voltage	6.3	6.3
Heater current	0.3 amp.	0.3 amp.
Control grid voltage	-3	-13.5
Screen grid voltage	90	-
Plate voltage	180	180
Plate current	.0031 amp.	.0043 amp.
Amplification factor	525	9.2
Plate resistance	500,000 ohms	10,200 ohms

II. FREQUENCY RANGE

The frequency range of this equipment is from 150 kcs. to 13,000 kcs. and is divided into seven bands, as follows:

Band 1	150-280 kcs.
Band 2	280-527 kcs.
Band 3	527-1005 kcs.
Band 4	1005-1960 kcs.
Band 5	1960-3850 kcs.
Band 6	3850-7200 kcs.
Band 7	7200-13000 kcs.

The oscillator is changed from one frequency band to the other by means of the Band Change Switch at the left of the tuning control.

IV. INSTALLATION FOR SERVICE

A. Oscillator Equipment, type RC-12.

Since the oscillator is comparatively small and compact, it is a simple matter to install it in an airplane or other place where it is desired for use. If installed in an airplane, it must be easily accessible to the operator since there is no means of remote control. Coupling can be obtained by paralleling the receiver antenna lead-in with a piece of Wire, type W-65, attached to the output binding post of the oscillator. See Fig. 10. The length of this wire, together with the output control, must be varied to obtain the proper coupling. The Case, type CS-45, should be carried in a map case or elsewhere within convenient reach of the operator. Cord, type CD-122, properly bonded should be run from Junction Box, type TM-AA-153, TM-AB or AD-167, or TM-AE-172, depending on which radio set is being used, to the oscillator. If this is not done, either a 6 or 12 volt storage battery for filaments and a 67-1/2 volt plate supply must be obtained from the receiver or separate batteries. One plug may be removed from Cord, type CD-122, and the wires connected to the voltages as shown in Fig. 6. BE SURE THAT THE SWITCH ON THE PANEL MARKED 6V-12V IS SAFETY WIRED IN THE CORRECT POSITION FOR THE BATTERY SUPPLY USED.

B. After the batteries have been connected, the voltages available at the oscillator should be checked by means of a voltmeter. This can be conveniently done at Plug, type PL-56. (See Fig. 6.) Between terminals 27 and 35, the reading should be 6 volts or 12 volts and between 27 and 36, there should be 67-1/2 volts. Radio Set Analyzer, Weston Model 660, which is a part of Test Set, type I-56, can be used to check these voltages. In fact, the entire oscillator can be checked with the above instrument. A typical set of readings from such a check follows: The filament and plate voltages were first measured at Plug, type PL-56, and found to be 12-V and 68-V, respectively. The Band Selector Switch was set on 1008-1930 kc. Both switches 22 and 24 were "ON".

READINGS TAKEN WITH I-56 TEST SET

TUBE TYPE	FILAMENT VOLTAGE	CATHODE VOLTAGE	CONTROL GRID VOLTAGE	SCREEN GRID VOLTAGE	PLATE VOLTAGE	SCREEN GRID CURRENT	PLATE CURRENT	TUBE CHECK PLATE CURRENT CHANGE
	H X-14 X at H	K X-70 X at H	CG-X 14 X at K	NG X-700 X at K	P X-140	NG-7 ma	P-7 ma	P-7 ma
VT-36	Mod. Off-5.8	0	.1	62	63	2	2.8	0.8-1.4
VT-36	Mod. On-5.8	0	.1	62	63	2.3	2.4	0.8-1.4
VT-37	Mod. Off-5.7	0	NG-X 14V 0.4	0	60	0.0	4.9	1.4-1.8
VT-37	Mod. On-5.7	0	5.8	0	60	0.2	3.0	1.2-1.8

BE SURE THAT THE SWITCH ON THE PANEL MARKED 6V-12V IS SAFETY WIRED IN THE 12V POSITION WHEN THE OSCILLATOR IS CONNECTED TO RADIO SET, TYPE SCR-192 OR TO ANY 12-VOLT FILAMENT SUPPLY.

V. OPERATION

The operation of Oscillator Equipment, type RC-12, is as follows:

A. As a Beat Oscillator.

When this equipment is used as a beat oscillator, it enables a non-oscillating receiver used with Radio Set, type SCR-192 or SCR-183, to receive unmodulated CW signals. In order to pick up or receive a CW signal on a known frequency, proceed as follows:

1. Obtain oscillator data (band selector switch and dial settings) for the given frequency from the calibration curve and set the oscillator accordingly. Throw switches 22 and 24 to the "ON" position. After the tubes have warmed up (approximately 30 seconds) the oscillator will be delivering a modulated radio frequency signal.

2. Turn on the receiver and, being sure the correct coil set is in use, tune the receiver to resonance with the oscillator signal. This point will be determined by maximum signal in the phones, the phones being plugged into the receiver output. The receiver and oscillator will now be set very close to the frequency of the desired CW signal.

3. The next step is to turn the modulator switch 22 OFF. Then tune the FREQUENCY dial of the oscillator slightly and the desired CW signal should be heard. The pitch of the note heard can be varied as desired by slight changes of the oscillator dial. The output of the oscillator can be varied by means of the OUTPUT CONTROL.

B. As a Frequency Indicator (or Checker).

THIS EQUIPMENT SHOULD NOT BE CONSIDERED A PRECISION FREQUENCY METER. When used as a frequency meter the results obtained will be only approximate and are merely a check on receiver or transmitter calibrations. When checking transmitter frequencies the oscillator may receive its power from either the receiver junction box or from a suitable battery supply.

IN ORDER TO OBTAIN MOST STABLE FREQUENCY FROM THE OSCILLATOR, THE FILAMENTS SHOULD BE TURNED ON FOR AT LEAST ONE-HALF HOUR BEFORE THE EQUIPMENT IS USED TO CHECK ANY TRANSMITTER OR RECEIVER CALIBRATION. ALSO THE TEMPERATURE AT WHICH THE OSCILLATOR IS BEING USED SHOULD BE AS NEAR AS POSSIBLE TO THE TEMPERATURE INDICATED ON THE CALIBRATION CHART. IN OTHER WORDS, IF THE EQUIPMENT IS USED AT A TEMPERATURE DIFFERENT FROM THAT AT WHICH IT WAS CALIBRATED, THERE WILL BE DECIDED ERRORS IN THE EMITTED FREQUENCY OF THE OSCILLATOR. THE OSCILLATOR WAS ORIGINALLY CALIBRATED USING A 12-VOLT FILAMENT SUPPLY AND A 220-VOLT PLATE SUPPLY CONNECTED TO THE OSCILLATOR BY MEANS OF CORD, TYPE CD-122.

1. To Check the Calibration or Frequency of a Transmitter.

The proper setting for the oscillator is first obtained from the calibration curve. After the oscillator has been set to the desired frequency, set the transmitter as near as possible to this frequency making use of any calibration chart or other data on the transmitter that is available. Be sure the modulation of the oscillator is turned off. Connect a short piece of wire (5-10 feet) to the input binding post of the oscillator and loosely couple it to the transmitting antenna. On the higher frequencies (above 5000 kc) this coupling becomes rather critical and care must be taken in order that the pick-up on the oscillator antenna is not sufficient to block or otherwise render inoperative the detector tube in the oscillator. Now vary the tuning of the transmitter until the beat note is heard. It will be possible by careful tuning to set the transmitter on zero beat after passing back and forth over this point and picking up the note on each side a few times. Care must be taken in this "zero beat" method to insure that the fundamental, not harmonic, frequency of the oscillator and transmitter are being compared, or 'beat'. That is, say the fourth harmonic of the oscillator with the third or fifth harmonic of the transmitter. This matter can generally be determined by the

relative strength of the beat notes because the beat of the fundamental frequencies will be the strongest or loudest. However, under certain possible conditions of coupling, etc., this method may fail and, therefore, extreme care on the part of the operator is necessary if reliable measurements are to be made. When the transmitter has been set on zero beat, it will be operating on the same frequency as the oscillator. In this case the transmitter frequency is varied to correspond to the oscillator frequency. Observe the precautions given above when using the oscillator for this purpose.

2. To Check the Calibration of a Receiver.

This process is very similar to the use of the oscillator in connection with the receiver for the reception of CW signals previously described in Section V-A. The oscillator is coupled to the receiver by attaching a short piece of wire to output binding post No. 35 and running it close to and parallel with the antenna lead-in. See Fig. 10. A head set should be plugged into the receiver or receiver control box. The modulator may be used in this case as it will aid in obtaining the approximate receiver setting. After this receiver setting has been found, the modulator should be turned off, if the receiver is capable of receiving CW, and the final setting of the oscillator obtained by the zero beat method. If the receiver is not capable of receiving CW, the modulation should be left on, and the oscillator tuned for maximum signal. The FREQUENCY dial setting is then read and converted to kilocycles from the chart as before.

3. To Set a Receiver to a Given Frequency.

This process is the opposite to that described in paragraph 2, above. The oscillator is first set to the desired frequency by the aid of the chart. The receiver is then tuned until the oscillator note is picked up. As before the modulator may be used to obtain the approximate setting of the receiver. Any number of receivers may, of course, be set to this frequency.

4. When checking frequencies or calibrations, it will be found that the oscillator tuning becomes more critical at higher frequencies. This is due to the fact that the kilocycle density on the dial, that is, the number of kilocycles per dial division, increases as the frequency increases, and hence, the dial must be set with a greater degree of accuracy at the high frequencies than at the low frequencies if the same kilocycle accuracy is to be obtained. When checking an "unknown" frequency the danger of obtaining a beat note between harmonics instead of between fundamentals is increased and, therefore, the operator should use great care in making measurements of this kind.

C. Elementary Vernier Principle and Method of Reading Vernier on the Oscillator.

1. A vernier is a device for determining a sub-division of the smallest division of a scale more accurately than can be done by simply estimating the fractional part. It is based upon the fact that the eye can judge to a greater degree of accuracy when two lines coincide than it can estimate a fractional part of a division.

2. Assume that Fig. 8 is part of a scale calibrated in feet and tenths of feet. It is evident that the scale can be accurately read to the nearest tenth of a foot. Any attempt to read this scale to the hundredth part of a foot would be only a guess or estimate. However, by the use of a vernier, this scale can be read accurately to the hundredth part of a foot. A simple form of vernier to accomplish this purpose, shown in Fig. 8, is constructed by taking a length equal to 9 divisions of the scale and dividing it into 10 equal parts. One space on the vernier is then equal to $9/10$ of a space on the scale; that is, it is $1/10$ part shorter than a space on the scale. Hence, ab equals $1/10$ of a space on the scale or .01 ft., cd equals $2/10$ of a space or .02 ft., etc. Now if the vernier is raised until a and b coincide, the index has been moved $1/10$ of a space or .01 ft., and the reading will be 5.01 ft. If the vernier is moved $1/10$ of a space higher, then line 2 coincides with the next higher line on the scale

and the reading is 5.02 ft. (See Fig. 8.) Similarly, Fig. 8 shows a reading of 5.26 ft. Thus, it is seen that the number of a line on the vernier which coincides with a line on the scale is the number of tenths of the smallest division of the scale that the index point (zero) lies above the next lower division of the scale. Furthermore, it will be seen from its construction that it is impossible to have more than one coincidence at a time on a single vernier.

3. The vernier used with the dial on the Oscillator, type BC-RC-183, enables one to read the dial setting accurately to the tenth of the smallest space on the dial scale. If the reading of the tuning dial is such that a graduation on this dial exactly coincides with the indicator, the reading is a whole number and the vernier is not used. The tuning dial used is calibrated clockwise and, therefore, the nearest graduation on the tuning dial to the left of the indicator is the basic reading. This basic reading is always a whole number and the fractional division above this whole number is obtained by using the vernier. The indicator is considered as zero on the vernier scale. If the reading on the tuning dial is not a whole number it will be found that one of the graduations on the vernier scale will coincide exactly with one of the graduations on the tuning dial. The number of graduations from the indicator to this point will be the number of tenths which must be added to the basic reading. Two concrete examples using the vernier are as follows:

Let the dial setting be as shown on Fig. 9. It is evident that the nearest whole number (basic reading) on the dial scale to the left of the indicator is 98. It will also be seen that the only graduations of both scales to the right of the indicator which exactly coincide are the sixth from the indicator. This means that six-tenths must be added to the basic reading. The correct reading is, therefore, 98.6.

Let the dial setting be as shown on Fig. 9-A. It is evident that the nearest whole number (basic reading) on the dial scale to the left of the indicator is 148. It will also be seen that the only graduations of both scales which exactly coincide are four to the right of the indicator. This means that four-tenths must be added to the whole number. The correct reading is, therefore, 148.4.

D. How to Use the Calibration Chart.

The use of the calibration curve on Chart, type MC-132, is probably self-evident. As was previously stated, frequencies are plotted as ordinates and oscillator dial settings as abscissae. By means of this plotted curve the dial setting corresponding to any frequency can be ascertained, and conversely, the frequency in any specified band for any given dial setting can be found. Assume that it is desired to find the dial setting for 500 kc. The hand wheel is turned until 500 appears along the edge of the window. By going across the chart on the horizontal 500 line, it is found that this line intersects the curve at approximately 120. This exact point is the dial setting for 500 kc. Of course, in order for the oscillator to be working on this frequency, the BAND SELECTOR must be set on 280-527 kc. band, the band which includes 500 kc. It is evident that there are seven different frequencies, which correspond to this dial setting or any other dial setting, depending upon the frequency band in use.

NOTE:- The calibration of one oscillator will differ from that of another, so therefore, the serial number of the oscillator and the serial number of the calibration chart used with it **MUST BE THE SAME.**

E. Precautions to be Observed.

IMPORTANT:- THE FILAMENT SWITCH MARKED 6V-12V SHOULD BE SAFETY WIRED IN THE CORRECT POSITION. If the oscillator is using a 12-volt filament supply and the switch is thrown to the 6-volt position, the tubes will be damaged and burned out.

USE THE OSCILLATOR AT A TEMPERATURE AS NEAR AS POSSIBLE TO THAT SPECIFIED ON THE CALIBRATION CHART.

Care should be exercised in the handling of this equipment to prevent violent shocks and undue exposure to adverse temperature and humidity conditions.

No changes or modification of any nature should be made in the equipment.

Case, type CS-45, containing Chart, type MC-132, should be handled carefully. The hand wheel should not be turned beyond the calibrated or data-bearing ends of the chart.

In order to obtain best results from the oscillator equipment it is necessary to maintain a supply of vacuum tubes which are suitable for use with the equipment. The three VT-36 tubes furnished with the oscillator were selected for use with it during the original calibration. That is, the three Tubes, type VT-36, have very similar characteristics. It is essential that as soon as the oscillator equipment is received the two spare oscillator tubes be checked for use in the equipment. This can be done as follows: With the original tube in the oscillator (the one used during calibration and shipped in place in the oscillator), couple the oscillator input loosely to a source of radio frequency such as a transmitter having good frequency stability. Tune the oscillator to zero beat. Note the dial reading (FREQUENCY) carefully. Now remove the original VT-36 and insert a new VT-36. Retune the zero beat. If the "FREQUENCY" setting is the same as the previous setting, the second VT-36 may be considered satisfactory for use in the oscillator. Repeat the process for the third VT-36. This check should be made periodically as tubes which have been tested and were once satisfactory may become unsatisfactory after several months, whether they are in use or on the shelf. Similar tests can be made by coupling the output of the oscillator to the input of a regenerative receiver. In all tests give the tubes sufficient time to warm up properly and become stable in their operation. The selected VT-36 tubes should be appropriately marked and stored for future use in the oscillator in which they were checked. The VT-37 tubes do not have to be matched since they do not affect the frequency.

VI. FUNCTION OF PARTS

In the following description, reference will be made to the various parts of the oscillator by number. These numbers appear on the schematic diagram, Fig. 4, and with the aid of the material list given in Section X each part can be identified.

The oscillator contains two tubes, a VT-36, used as a radio frequency oscillator and a VT-37, used as an audio frequency oscillator or detector. The latter, when used as an audio frequency oscillator, is so coupled as to modulate the radio frequency output. The filaments of the two tubes are connected either in parallel or in series by means of Switch 23, depending upon whether a 6 or 12-volt source for filament current is used. The coils numbered 1 to 7, inclusive, are the inductances used for the 7 different frequency bands. Connection is made to the desired coil by means of Switch 8. This switch carries taps which move on 3 different plates. Fourteen is the tuning capacitor and fifteen a padding capacitor. The radio frequency oscillatory circuit is in each case composed of one of the coils (1 to 7) and capacitors 14 and 15. Ten and eleven are the radio frequency grid leak and capacitor, respectively, for placing the proper bias on the grid of the radio frequency oscillator. The output of the oscillator is taken off at binding post 35, through output condenser 18 and potentiometer 16. Voltage for the plates of both tubes and the screen grid of the radio frequency oscillator is obtained at terminal 26 of the receptacle when the oscillator is used with Radio Set, type SCR-192. The value of the potential is 220 volts and is dropped to 67-1/2 volts by means of Resistor 26. If separate batteries are used as a source, 67-1/2 volts are all that are necessary and connection should be made through Terminal 36. (See Fig. 6.)

The frequency determining circuit of the audio oscillator comprises the right winding of transformer 29 and capacitors 32 and 33. The grid circuit of the tube is coupled to this circuit by means of the transformer.

VII. CARE AND MAINTENANCE

A. Oscillator, type BC-RC-183.

This unit should be considered a delicate piece of equipment. Rough handling and improper care will quickly cause the oscillator to lose its frequency stability and calibration. The equipment should be kept free from dust. Care should be exercised to prevent undue exposure to adverse temperature and humidity conditions.

Never try to force a cloth or other material between the condenser plates or they may be sprung, thereby changing the calibration of the oscillator. The equipment should be covered when not in use to prevent dust from settling in the unit.

In order to obtain the best results from the oscillator equipment, it is necessary to maintain a supply of vacuum tubes which are suitable for use with the equipment. A method of matching RF tubes, type VT-36, for use with the equipment is explained in Section V-E, pages 13 and 14. Extra tubes for each equipment should be kept on hand at all times since the matching of tubes can only be done with the aid of a precision frequency standard if there is no matched tube with the equipment for comparison.

B. Case, type CS-45.

Case, type CS-45, containing Chart, type MC-132, should be handled carefully. The hand wheel should not be turned beyond the end of the calibrated or data-bearing part of the chart.

C. Recalibration.

In case complete recalibration becomes necessary, there are several means by which it can be accomplished without the aid of a standard of frequency.

a. Calibration may be made against another like oscillator which is known to be in proper calibration. In this case, couple the output of the oscillator known to be in calibration to the input of the oscillator whose calibration is in doubt. Set to a frequency near the low end of the range and tune the doubtful oscillator to zero beat. Repeat the process at several points throughout the dial.

NOTE:- Each time this is done, the actual frequency of the setting (obtained from calibration chart of oscillator in calibration) and the dial setting of the doubtful oscillator should be recorded. Checks should be made in each of the seven frequency bands. When they are completed, the data on hand should be compared with the original calibration curve of the doubtful oscillator. If the data differs from the original calibration to any great extent, it is necessary to prepare a new chart.

b. Calibration Against Standard Frequency Transmissions.

If an oscillator is not available which is known to be in calibration, it is possible to get several checks from standard frequency transmission. A list of these transmissions can be obtained from the Bureau of Standards or from the American Radio Relay League, giving frequency, time and general procedure. Checks on the oscillator can be obtained by coupling the output of the oscillator to the lead-in wire of a receiver which has been tuned to the standard frequency transmission. By beating the oscillator output with the incoming signal, it will be possible to get the necessary check

on the oscillator since the frequency of the incoming signal is known. A number of these checks should be made before any correction factor is applied to the calibration curve. It must be further borne in mind that the accuracy of calibration as read from Chart, type MC-132, is of the order of 0.05 per cent with normal plate and filament voltages.

VIII. REMOVAL FROM SERVICE

A. Repacking the Set.

If it is desired to pack the various parts of the oscillator equipment for shipment, the spare tubes should be placed in good cartons. Each piece should then be wrapped in heavy paper and all packed securely in a wooden box in excelsior or similar material.

B. Preparation for Storage.

No special preparations are necessary for storing Oscillator Equipment, type RC-12. It should be kept in a clean, dry place just as any other radio equipment.

IX. LIST OF ILLUSTRATIONS

Fig. 1 Picture of Oscillator Equipment, type RC-12

Fig. 2 Top Interior View of Oscillator, type BC-RC-183

Fig. 3 Bottom Interior View of Oscillator, type BC-RC-183

Fig. 4 Schematic Diagram of Oscillator, type BC-RC-183

Fig. 5 Wiring Diagram of Oscillator, type BC-RC-183

Fig. 6 Cording Diagram

Fig. 7 Outline Drawing

Fig. 8 Elementary Vernier Theory

Fig. 9 Method of Reading Vernier on Oscillator

Fig. 10 Installation as Oscillator Equipment, type RC-12

X. LIST OF PARTS

The following is a list of the component parts of Oscillator, type BC-RC-183, according to reference numbers on Schematic Diagram, Fig. 4.

<u>Reference Number</u>	<u>Description</u>	<u>Audio Research Drawing Reference</u>
1	Coil, Band No. 1 (150-280 K.C.)	B-315
2	Coil, Band No. 2 (280-527 K.C.)	B-315
3	Coil, Band No. 3 (527-1005 K.C.)	B-316
4	Coil, Band No. 4 (1005-1960 K.C.)	B-317
5	Coil, Band No. 5 (1960-3850 K.C.)	B-318
6	Coil, Band No. 6 (3850-7200 K.C.)	B-316
7	Coil, Band No. 7 (7200-13000 K.C.)	B-318
8	Band Change Switch	B-319
9	Telephone jack	B-320
10	Resistor 20,000 ohms	B-321
11	R.F. grid blocking capacitor .00025 mfd.	B-322
12	R.F. oscillator socket	B-323
13	Tube, type VT-36	
14	Tuning Capacitor	B-309
15	Padding Capacitor.	B-324
16	Output control potentiometer 1400 ohms	B-325
17	R.F. Input Capacitor .001 mfd.	B-326
18	R.F. Output Capacitor .001 mfd.	B-326
19	Resistor 20,000 ohms	B-321
20	A.F. oscillator socket	B-323
21	Tube, type VT-37	
22	Modulator ON-OFF switch.	B-328
23	Filament 6V-12V switch	B-329
24	Filament, ON-OFF switch.	B-330
25	Cable plug receptacle.	B-331
26	Voltage dropping resistor, 25,000 ohms	B-332
27	Resistor, 50,000 ohms.	B-333
28	A.F. Output series resistor, 2000 ohms	B-334
29	A.F. Oscillator transformer.	B-307
30	A.F. Grid capacitor .1 mfd.	B-335
31	A.F. Output series capacitor .5 mfd.	B-336
32	Battery by-pass capacitor .5 mfd.	B-336
33	A.F. Oscillator capacitor .05 mfd.	B-337
34	R.F. Input binding post.	B-338
35	R.F. Output binding post	B-338
36	Plate Series Resistor, 500 ohms.	B-339

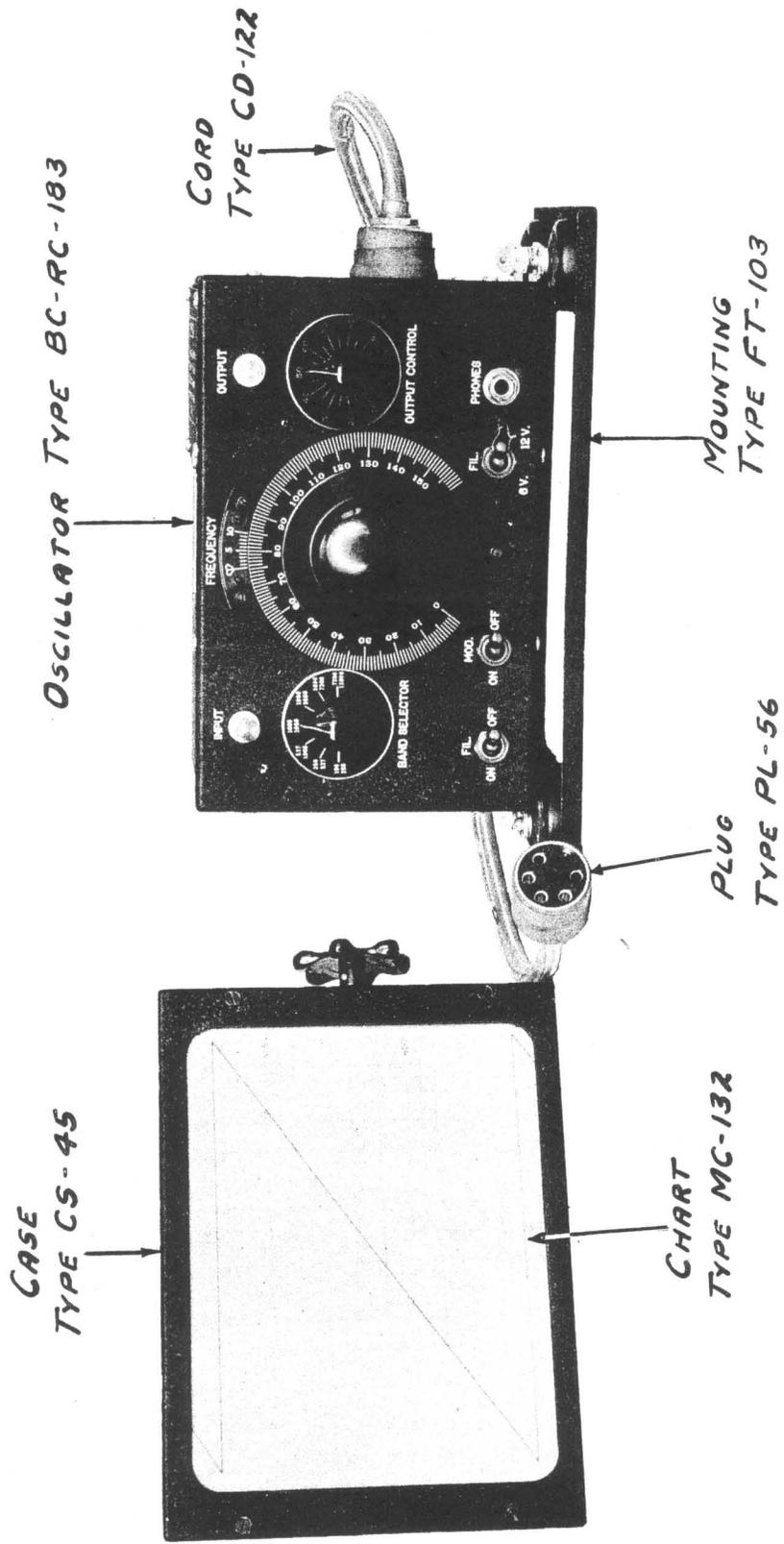


FIG. 1.
OSCILLATOR EQUIPMENT TYPE RC-12



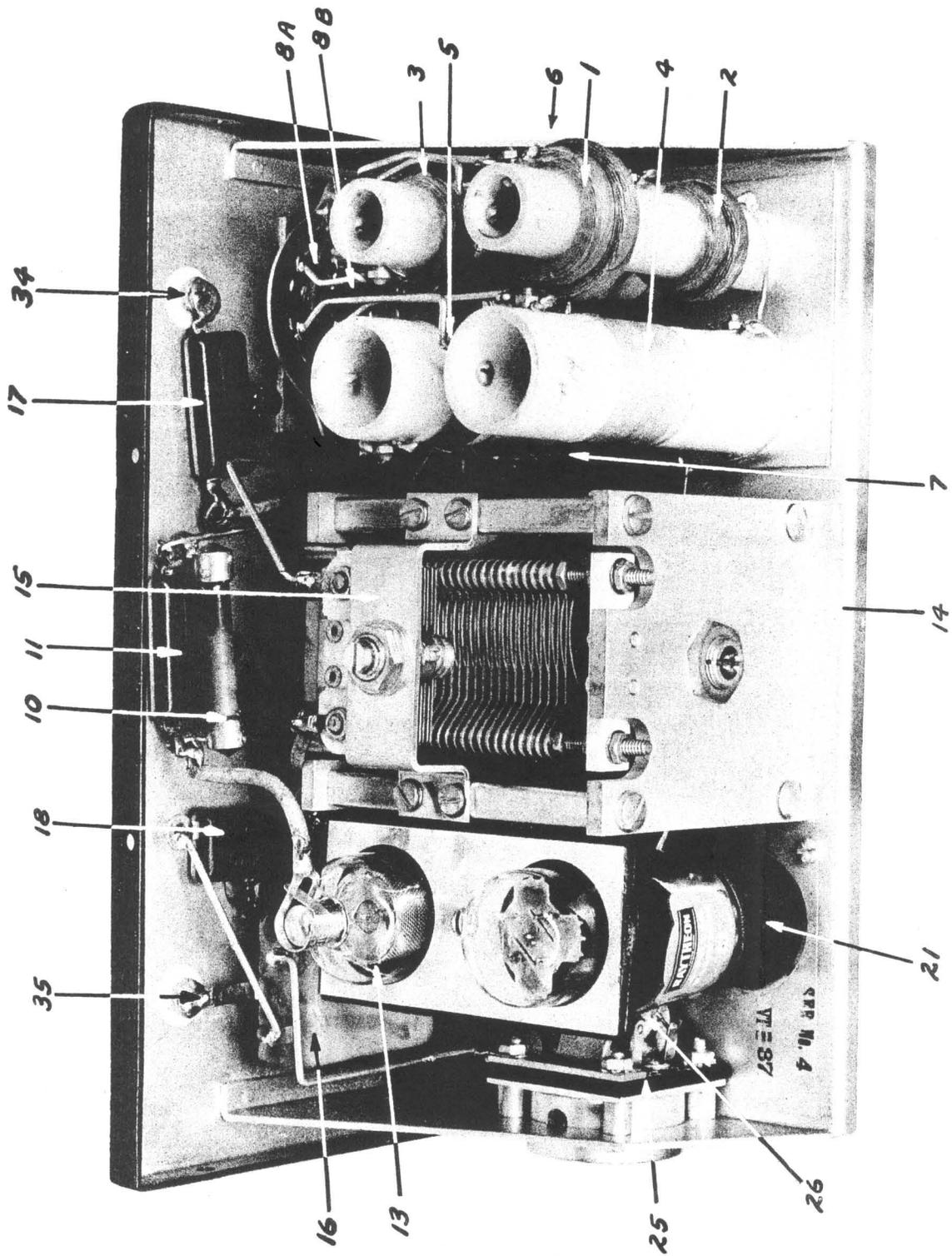


FIG. 2.

OSCILLATOR TYPE BC-RC-183
TOP INTERIOR VIEW - COVER REMOVED.



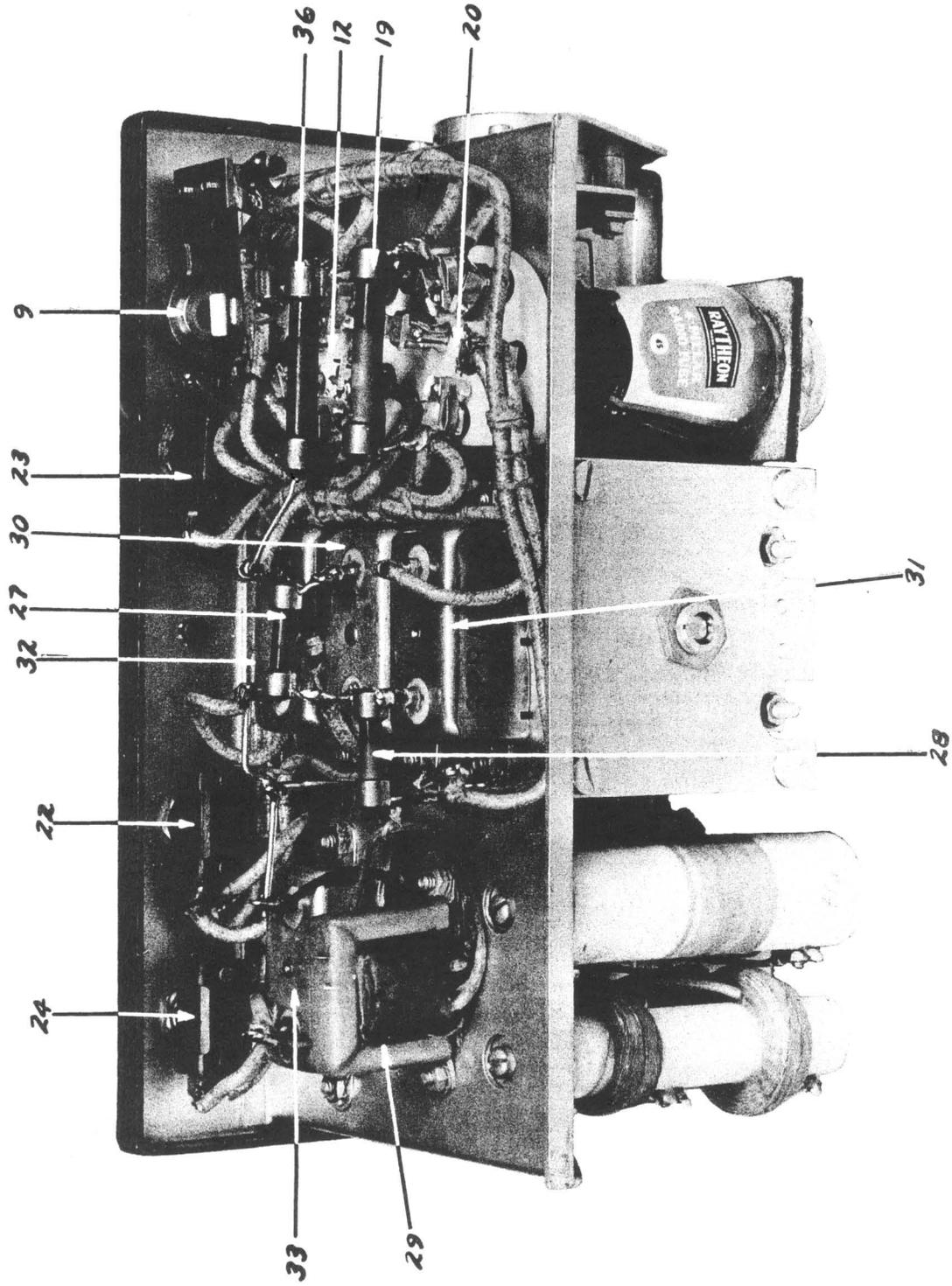


FIG. 3.

OSCILLATOR TYPE BC-RC-183
 BOTTOM INTERIOR VIEW - COVER REMOVED



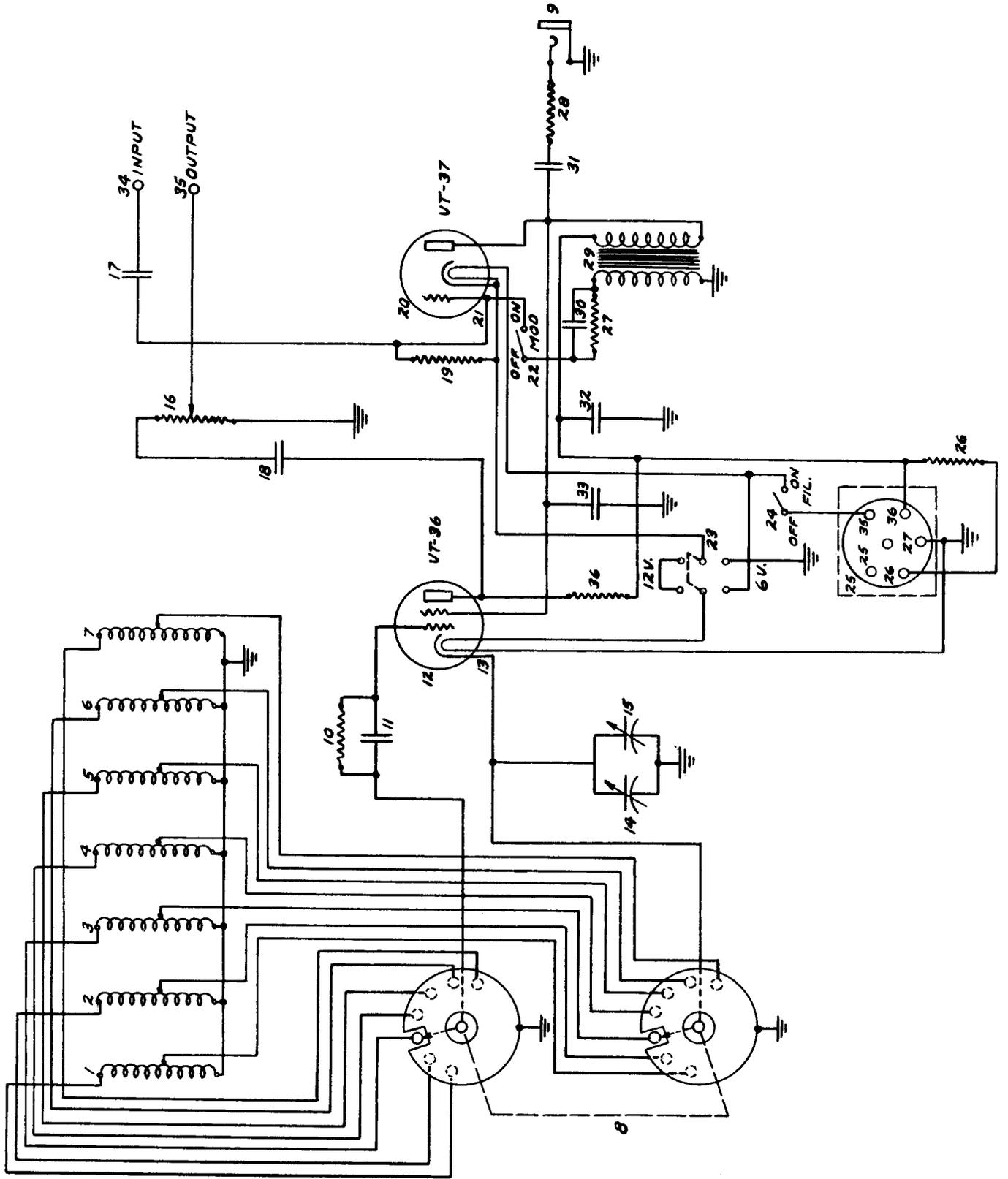
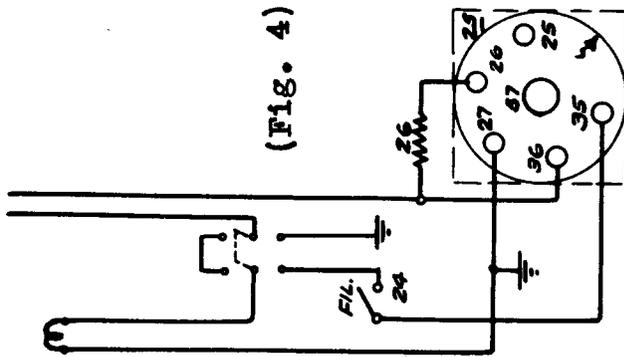


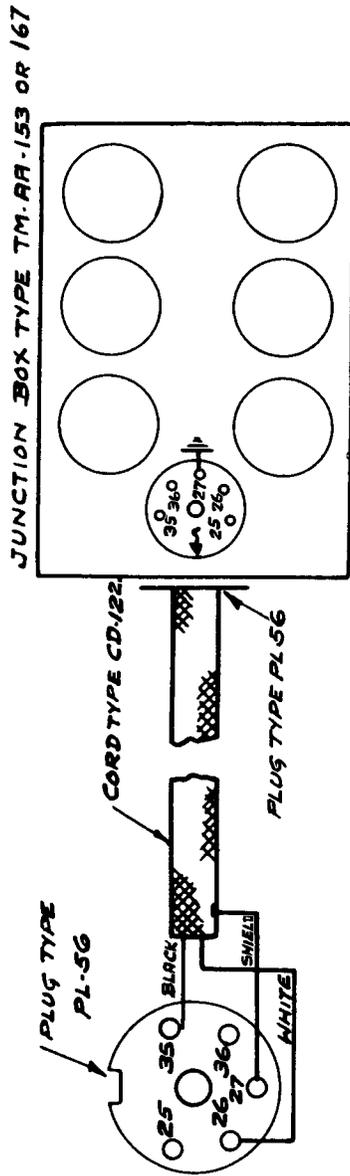
FIG. 4. SCHEMATIC DIAGRAM OF OSCILLATOR TYPE BC-RC-183

POWER SUPPLY FOR OSCILLATOR type BC-RC-183



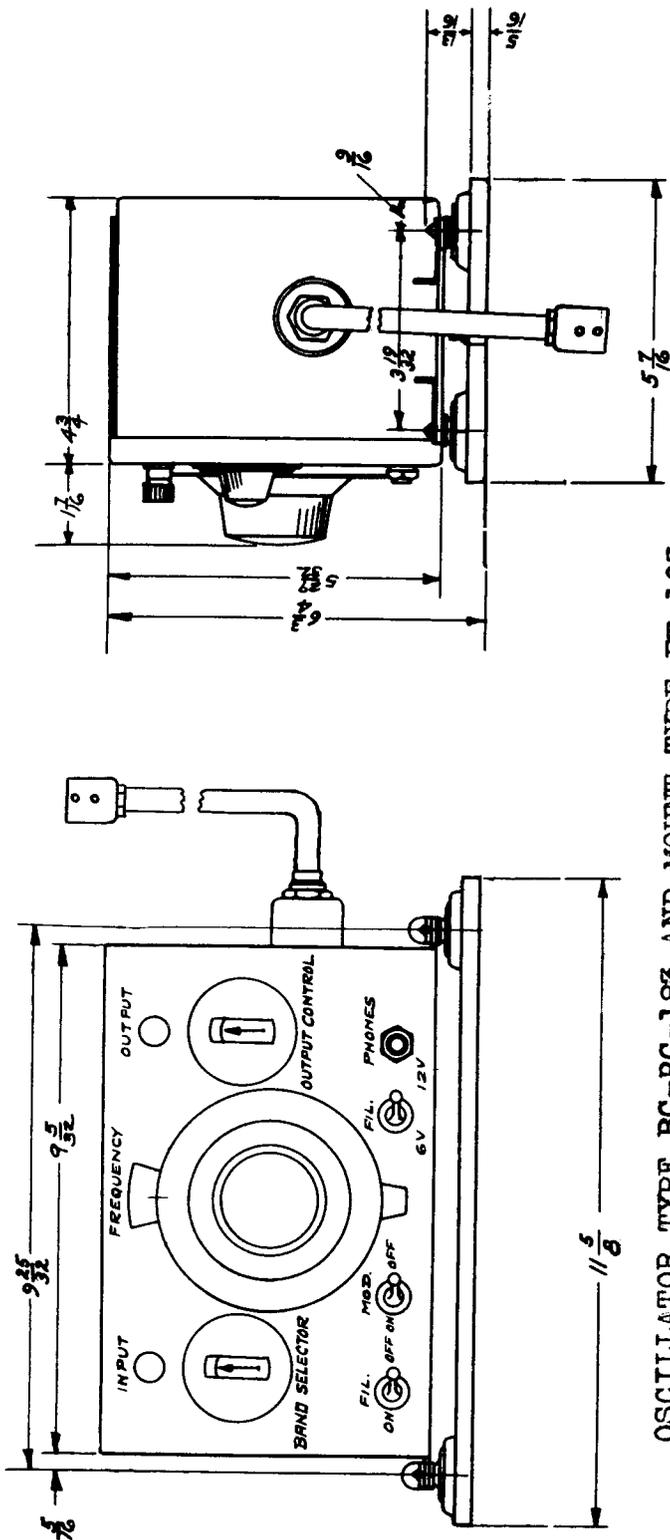
(Fig. 4)

OSCILLATOR
type BC-RC-183



See table of contents
under "Notice" for
sets with which this
equipment is used.

Fig. 6. Cording Diagram.
Oscillator Equipment, Type RC-12.



OSCILLATOR TYPE BC-RC-183 AND MOUNT TYPE FT-103

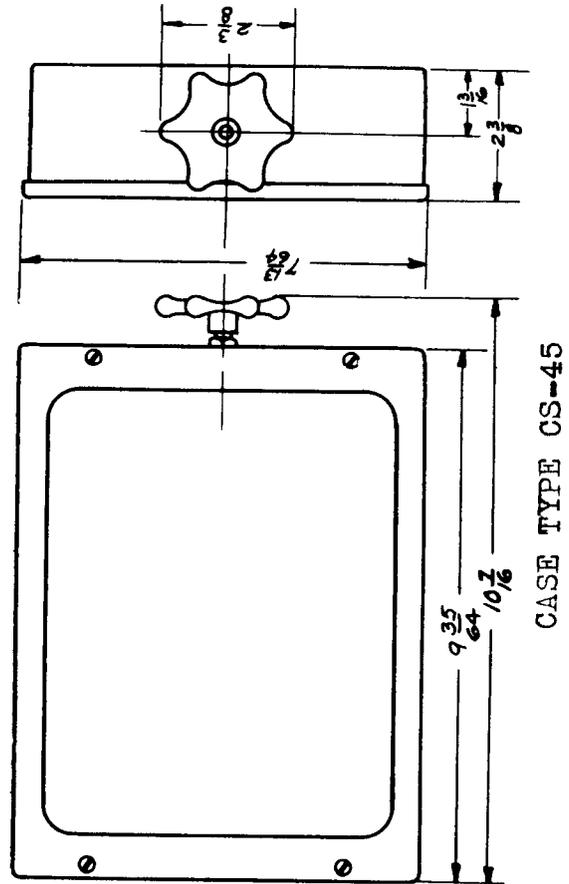
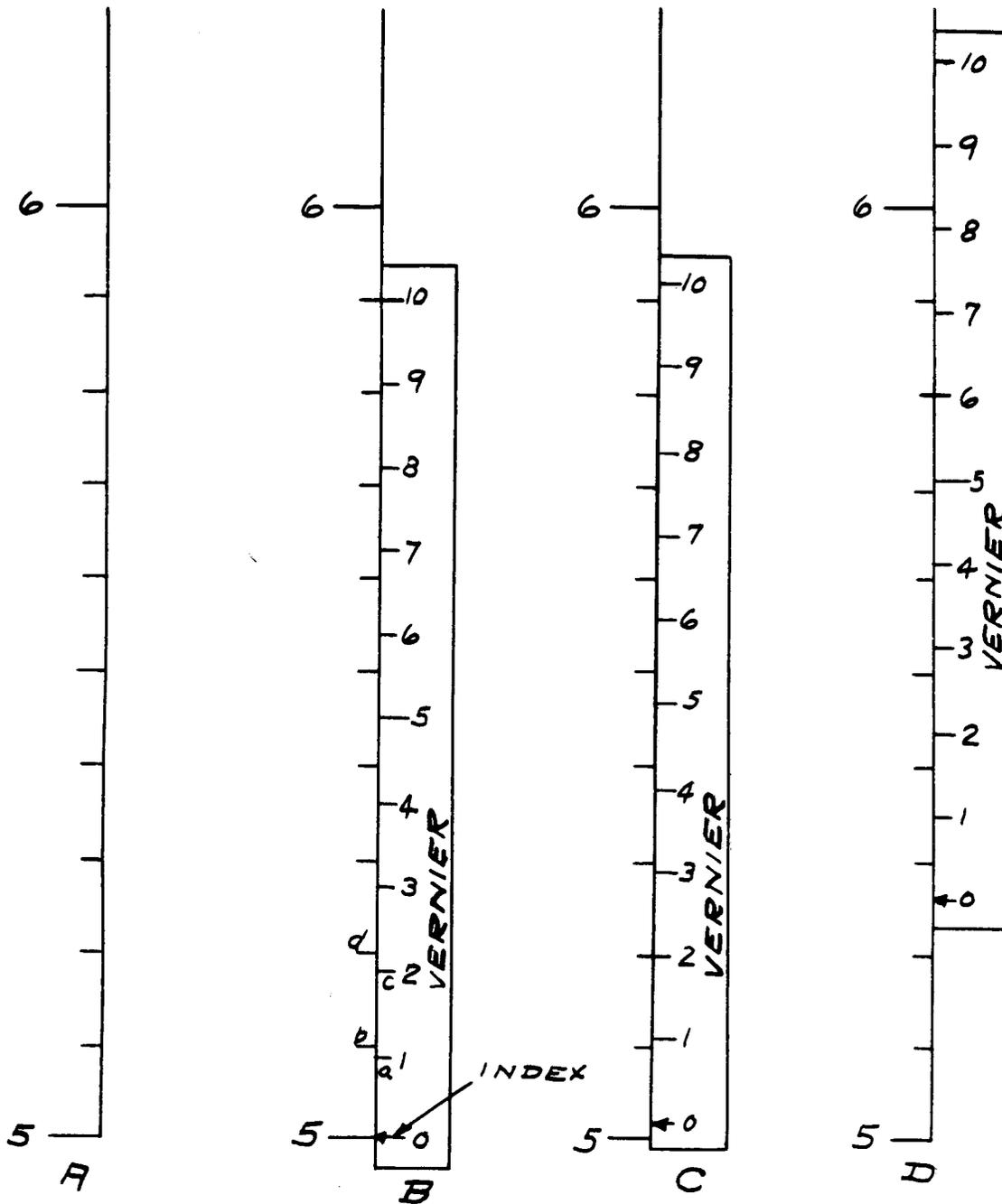


FIG. 7 OUTLINE DIMENSIONS



A NO VERNIER READING POSSIBLE
B CORRECT READING 5.00
C " " 5.02
D " " 5.26

FIG. 8. Elementary Vernier Theory.

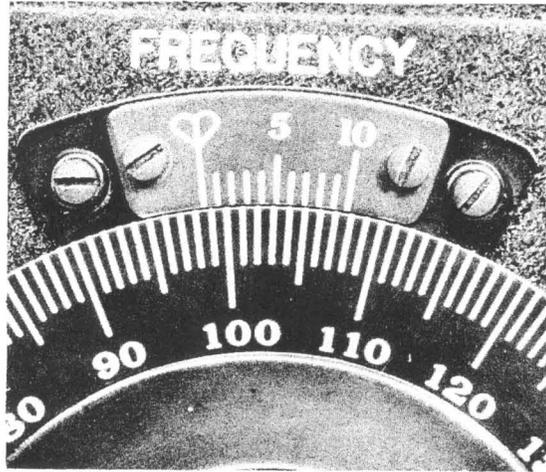


FIG. 9.

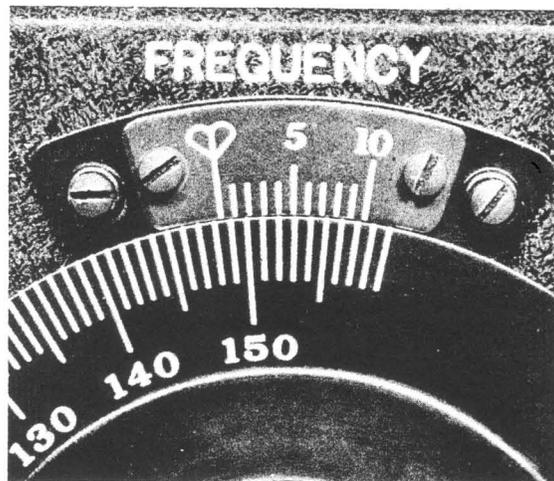


FIG. 9-A.

METHOD OF READING VERNIER ON OSCILLATOR, TYPE BC-RC-183.

Coupled, -Not
Electrically Connected.

Wire to be from 6 to 8 ft.
long depending on Coupling desired.

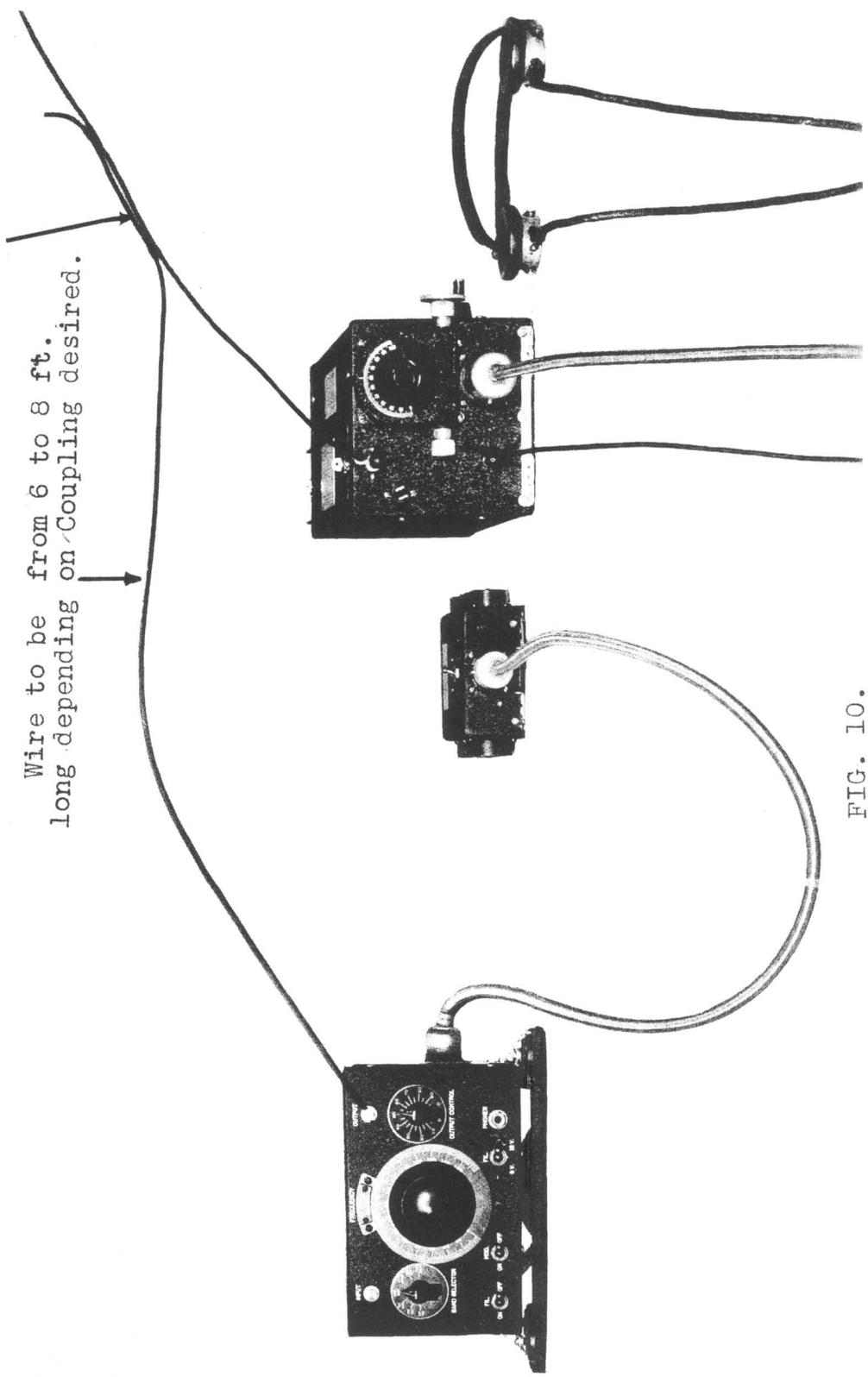


FIG. 10.

INSTALLATION AS OSCILLATOR EQUIPMENT, TYPE RC-12.