SUPREME

MODEL 561 COMBINATION

A.F. AND R. F. SIGNAL GENERATOR

FORM 5142 OPERATING INSTRUCTIONS Stock #5117

ELECTRICAL SPECIFICATIONS

Power Supply Requirements: (unless otherwise specified on plate attached to grill in rear of chassis)

Voltage.....110/120 a.c.
Frequency.....60 cycles
Power Consumption.....50 watts

MECHANICAL SPECIFICATIONS

Over-all dimensions:
Height.....11 1/16 inches
Width.....15 1/8 inches
Depth.....8-3/4 inches

Weights:
Net.....35 pounds
Shipping.....40 pounds

STANDARD EQUIPMENT SUPPLIED WITH THE MODEL 561

QUANTITY INCLUDED	STOCK NUMBER	DESCRIPTION	PACKER'S CHECK
1	5117	Booklet, Instructions	✓
1	6725	Card, Return Registration	✓
1	7682	Screen, Calibrated non-linear	✓
2	5119	Connector, Shielded Cable	✓

The above list has been checked by the undersigned who is responsible for the completion of this package.

Model 561, Serial No. 1634 Signed M.L.C.
Shipping Department
SUPREME INSTRUMENTS CORPORATION

MENTION ABOVE NUMBERS IN ALL CORRESPONDENCE

IMPORTANT !

SEE ENCLOSED PAGE FOR INFORMATION CONCERNING REGISTRATION, TRANSPORTATION DAMAGES, GUARANTEE, REPLACEMENT PARTS, ETC. The instructions listed on this sheet must be complied with before the guarantee policy is applicable.

SUPREME INSTRUMENTS CORPORATION

GREENWOOD, MISSISSIPPI

INTRODUCTION

The SUPREME Model 561 is a combination signal generator incorporating an audio frequency generator, radio frequency generator and a frequency modulator. This unit is capable of providing the service technician with any type of signal required for the testing and alignment of radio receivers and similar electronic apparatus.

The audio frequency generator is of the beat frequency type designed to produce a controlled source of signal covering the audio spectrum (15 to 15,000 cycles). The output of this section is provided with a special transformer which offers the operator a choice of four carefully selected impedances to match the input of P.A. amplifiers, motion picture sound equipment, inter-department communication systems, etc.

The radio frequency generator is of the cathode tap feedback type using a separate tube as a buffer amplifier and modulator. The R.F. coils are so designed as to provide voltage of good waveform from 65 kilocycles to 20.5 megacycles in five bands of two scales. The R.F. inductors use adjustable iron cores and air trimmer capacitors, making the overall accuracy extremely high. The output is equipped with a completely shielded attenuator network for amplitude control from ½ micro-volt to 100,000 micro-volts.

The frequency modulator is of the electronic type and was especially designed to produce a variable frequency signal of almost constant amplitude over a predetermined band. The frequency sweep and time base provide a double image pattern with automatic synchronization.

The Model 561 also contains two vacuum-tube voltmeters, one for monitoring the A .F. output and percentage modulation and the other for checking the amplitude of the unmodulated signal.

A special switching arrangement makes it possible to use each of the three generators individually or in conjunction with each other. Thus we have a generator capable of providing a radio frequency test voltage which can be completely controlled as to frequency, output, type of modulation, percent and frequency of amplitude modulation.

DESCRIPTION OF PANEL AND COMPONENTS

METER: Three-inch round D'arsonval type.
Scales:
Set Carrier-Top scale with mark near center for indicating relative amplitude of unmodulated signal.
% Modulation-Lower scale with calibration marks (20-80) for indication the percentage of modulation.

SOCKET: (Lower left hand corner of panel labeled "A.F.OUTPUT") Output connections for audio generator and time base connections for frequency modulator.

SOCKET: (Lower right hand corner of panel labeled "R.F.OUTPUT") Output connections for radio frequency generator and frequency modulator.

PUSH BUTTONS: (Upper left hand cornerof panel labeled "AUDIO OUTPUT IMPEDANCE") Five buttons for automatic selection of output impedances. (50, 500, 5000, 50,000 and Balance) indicated above respective buttons.

PUSH BUTTONS: (upper right hand corner of panel labeled "RADIO FREQUENCY SELECTOR") Five buttons for selection of radio frequency band (65kc-205kc, 205kc-650kc, 650kc-2050kc, 2050kc-6.5mc, 6.5mc-20.5mc) indicated above respective buttons.

PUSH BUTTONS: (Center of panel labeled "R.F. MULTIPLIER") Four buttons for controlling output of R.F. signal in decade multiples of 1, 10, 100, 1000.

ROTARY SWITCH: (Lower center of panel labeled "OUTPUT SELECTOR") Five positions for applying power and selection of type of signal (OFF, C.W., AMP., Freq., EXT., AF.).

ROTARY POTENTIOMETER: (Lower left hand side of panel labeled "A.F. Attenuator") For A.F. output and percent modulation control "Off" position switches in R.F. vacuum-tube voltmeter.

ROTARY POTENTIOMETER: (Lower right hand side of panel labeled "R.F. ATTENUATOR") R.F. output control used as fine adjustment in conjunction with R.F. MULTIPLIER.

DIAL (Illuminated) (Left hand side of panel controlled by large knob directly below dial window) For selection of audio frequency (0 to 15,000 cycles).

DIAL (Illuminated) (Right hand side of panel controlled by large knob directly below dial window). For selection of radio frequencies between the band limits. Top scale (A-C-E) used in conjunction with 65-205, 650-2050, 6.5-20.5 buttons. Lower scale (B-D) used in conjunction with 205-650 and 2050-6.5 buttons.

HEXAGON KNOB: (Near center of panel labeled "AUDIO ZERO ADJ.") For initial adjustment of A.F. Generator.

HEXAGON KNOB: (Near center of panel labeled "CARRIER LEVEL") For adjusting amplitude of carrier to a predetermined level.

MODEL NUMBER: (Indicated on right hand side of panel).

SERIAL NUMBER: Stamped in panel directly above MULTIPLIER buttons.

BE SURE TO MENTION MODEL AND SERIAL NUMBER IN ALL CORRESPONDENCE.

PRELIMINARY INSTALLATION AND ADJUSTMENT

1. Connect the power supply plug to a convenient a-c supply socket. Be sure that it is of the proper voltage and frequency for which the tester was originally supplied. See ELECTRICAL SPECIFICATIONS on the first page of this instruction book.

2. To set up the audio generator, turn the OUTPUT SELECTOR switch to "EXT.A.F." position. Turn the audio dial (0-15,000) to " 0" and advance the A.F. ATTENUATOR until the meter indicates approximately center scale deflection. Regulate the hexagon knob "AUDIO ZERO ADJ." for zero beat. (This condition will be noted when the needle falls to zero deflection or is vibrating slowly on the left hand side of the meter scale.) The audio frequency voltage is available at the A.F. OUTPUT socket by depressing one

of the numbered (50,500,5000,50,000) AUDIO OUTPUT IMPEDANCE buttons and setting the audio dial to the desired frequency. For using the A.F. OUTPUT in conjunction with balanced or push-pull circuits, depress the proper impedance and "BAL" button simultaneously until both lock down. The output is available from the two leads of the cable and the chassis of the panel is the center tap.

3. To set up the radio frequency section, push the button which indicates points on either side of the desired frequency. Rotate dial to number on scale which is some decade sub-multiple of the desired point. Turn OUTPUT SELECTOR switch to CW position and A.F. ATTENUATOR to "OFF" position. Adjust hexagon knob CARRIER LEVEL until meter reads to center scale mark. With the controls in these positions, an unmodulated signal is available at the "R.F.Output" socket. Use "R.F. MULTIPLIER" for rough attenuation and "R.F. ATTENUATOR" for vernier. Turn OUTPUT SELECTOR to "AMP" position and advance A.F. ATTENUATOR to desired percent of modulation which will be indicated on the meter. The amplitude modulated signal is available at the R.F. OUTPUT socket.

4. For amplitude modulation set OUTPUT SELECTOR to "AMP" position and zero beat A.F. generator as described in Section 2. Adjust the carrier by turning the A.F. ATTENUATOR to "OFF" position and setting the carrier as shown in the previous paragraph (Section 3). After the desired R.F. and modulation frequency have been selected on the respective dials, advance A.F. ATTENUATOR to the desired percentage of modulation. The modulated signal is available at the R.F. OUTPUT socket and may be controlled by MULTIPLIER and R.F. ATTENUATOR.

5. To produce a frequency modulated signal, rotate OUTPUT SELECTOR to "FREQ" position and set RADIO FREQUENCY SELECTOR to desired frequency plus 1000 kc. The frequency modulated signal is available at the R.F. OUTPUT socket and the time base is available at the A.F. OUTPUT socket. (Care should be taken to avoid letting the A.F. OUTPUT lead touch when OUTPUT SELECTOR is in "FREQ" position.

Note: Refer to last pages of this book for information in chart form.

GENERAL OPERATION
(Audio Generator)

Turn OUTPUT SELECTOR to "R.F. A.F." position. Turn A.F. ATTENUATOR so that meter will read approximately center scale. Set AUDIO DIAL to zero position. With "ZERO ADJ" zero beat the oscillator using the meter as an indicator. Select proper output impedance by depressing proper AUDIO OUTPUT IMPEDANCE button. Plug special shielded cable into A.F. OUTPUT jack and the audio oscillator is ready for operation, the proper audio frequency being selected by the dial setting. (Both output cables are identical and either one may be used for the A.F. output).

The audio oscillator performs a dual purpose--that is, it can be used to modulate the R.F. oscillator of the Model 561, or it can be used as a separate unit. At this time, we are only interested in its applications as a separate unit. Its application to modulate the R.F. section will be discussed later.

In testing an audio amplifier, the general procedure is the same regard-

less of its use; that is, P.A., receiver, etc. Normally, the output of the oscillator is fed directly into the amplifier by selecting the proper output impedance. However, if the maximum input voltage is so small that it is impossible to measure it with an ordinary voltmeter; an external attenuator must be used such as a "H", "L" or "T" pad. For normal testing, the attenuator is not needed, and in case it is used, care should be taken that proper impedance matching from oscillator to the external attenuator and from external attenuator to the input of the amplifier has been provided. By using an oscillograph on the output of the amplifier (such as the SUPREME Model 560 or 546) a check for waveform distortion can be made at the same time that the frequency response is checked.

CHECKING FREQUENCY RESPONSE OF AUDIO TRANSFORMER:

Much the same set-up is used in checking input transformer as audio amplifier. For audio interstage and output transformers it may be necessary to pass current through the primary winding by means of a battery. Care should be taken that the current drawn is that of the transformer rating.

FREQUENCY MEASUREMENT:

Frequencies from a few cycles per second up to 100 kilocycles per second may be measured in connection with the Supreme Model 546 or 560 Oscilloscope. This information is explained in the operation of these two instruments.

GENERAL OPERATION
(R.F. Oscillator)

Turn OUTPUT SELECTOR to "C.W." position. Select proper band on the RADIO FREQUENCY SELECTOR switch. Set R.F. DIAL to proper frequency. Turn A.F. ATTENUATOR to "OFF" position. With CARRIER LEVEL control, set meter to mark indicated as SET CARRIER point meter dial. The unmodulated carrier is available at the R.F. OUTPUT scale, whose level is controlled by the R.F. ATTENUATOR and R.F. MULTIPLIER.

In order to modulate the carrier, set OUTPUT SELECTOR to "AMP" position. Set up audio oscillator as described on page. Set up the unmodulated carrier as described above. Be sure that the A.F. ATTENUATOR control is in the " OFF" position when the carrier level is being set, or the meter will read the percent modulation rather than the R.F. Level. However, the carrier level must be set up before the percent of modulation can be read accurately on the meter. Therefore, after the carrier level has been set by turning the A.F. ATTENUATOR to the "OFF" position and adjusting the CARRIER LEVEL control, then turn the A.F. ATTENUATOR until the meter reads the desired percent of modulation. To express this in another way, the switch on back of the A.F. ATTENUATOR control is a meter circuit switch. In the "OFF" position the meter reads the percent of modulation. The frequency of modulation will depend upon the setting of audio dial. For normal testing this should be kept at approximately 400 cycles. This signal is also available at the R.F. output jack and controlled with the R.F. MULTIPLIER and R.F. ATTENUATOR.

USING THE MODEL 561 FOR SIGNAL TRACING

Because of its remarkable true waveform, both audio and R.F., the Model 561 is an ideal instrument to be used in connection with the Supreme Model

560 Vedolyzer. In locating trouble in a receiver, an amplitude modulated signal, modulated at 400 cycles, 30 to 50%, should be used. This should be fed into the antenna of the receiver under test and followed through the receiver as described in the Vedolyzer's instructions.

Trouble in the audio circuit such as mechanical vibration, waveform distortion, loss of gain, or the complete loss of the signal is easily located because the R.F. signal may be modulated at a variable audio frequency. While the oscillator is connected to the receiver's antenna, it is only necessary to turn the audio oscillator tuning knob to make these tests.

The Model 561 will work with any signal tracing instrument, as it provides all the different types of signals that might be used in any system.

SECOND DETECTOR DISTORTION

Poor tone quality many times can be traced directly to the second detector. For good reception this circuit must be able to handle modulated signal of more than 30%, for the transmitters of today are modulating close to 100% in order that they may cover as much area as possible. Therefore, it is only logical to test the second detectors, in the same capacity, as they must operate when they are placed in the customer's home. For this reason, Supreme Incorporated a variable percent modulation in the Model 561 which will modulate the R.F. carrier to 80%. With the scope (Model 546 or 560) connected to the diode load resistor, tune in an amplitude modulated signal, 30% - 400 cycles and note its waveform. Now turn the A.F. ATTENUATOR control up until the carrier is being modulated at 80% and note waveform.

USING THE MODEL 561 FOR ALIGNMENT

Care should be taken that the receiver has been properly prepared for alignment.

First, we must stop the receiver's oscillator and to do this, we connect a 0.5 mfd. capacitor between the oscillator grid and ground, or this may be connected between the stator of the oscillator tuning condenser and ground. Next, if the set has A.V.C. action, this should also be temporarily disconnected or the signal generator's output held below the A.V.C. point. However, in some receivers which do not have delayed A.V.C. action, A.V.C. is present at any signal level, and this may result in limiting the rectified voltage (at the second detector) to a value below that which will give a satisfactory scope image.

Due to the numerous types of A.V.C. circuits, no fixed ruling can apply. However, in sets having a separate A.V.C. tube, this tube can be removed during alignment. In most other circuits it is possible to connect a temporary shorting wire between ground and some part of the A.V.C. circuit. Other methods are shown in Figures 4, 5, and 6.

When receivers incorporate other special control circuits (R.F. noise suppressors, automatic frequency control, etc.) this circuit should also be interrupted. See examples in Figures 6 and 7. In some models, a switching arrangement is included to change over from A.F.C. to manual tuning and in those cases, just place the switch in "manual".

Also, in some models a "Q" on-off switch is included, and this should be in open position.

It should always be remembered that when shorting out portions of radio receiver circuits, care should be exercised that D.C. set voltages are not changed or interrupted.

Our first problem is to peak the I.F. stages of the receiver under test. To do this, find the I.F. frequency and assuming it is 175 kc., set the RADIO FREQUENCY SELECTOR switch on the 561 and turn the dial knob until the "175" marker is right over the hair-line shadow. Set up the Model 561 as described under "General Operation" (R.F. Oscillator). This will supply an audio modulated signal at the R.F. OUTPUT socket. Remember that the audio note that you hear in the speaker will depend on setting-up of the audio dial and should be kept at approximately 400 cycles for general testing.

Connect the output of the 561 to the receiver's first detector grid circuit. Be sure to remove any connection to this grid circuit from the previous R.F. coil, because its low impedance might act as a shunt. Also, any radio signals received through the R.F. stages might beat with the test oscillator to produce spurious beat notes. In receivers where the control grid of the first detector tube is brought out to a top cap and the tube is self-biased by means of a resistor in the cathode circuit, (See Figure 8) the top cap clip can be removed and the output from the 561 connected directly between top cap and chassis. In receivers where a part or all of the control grid bias is obtained from the set's voltage divider, the 561's output should be connected in series with the control grid of the tube and the top cap lead (with the grounded shield connected to the receiver's top cap lead.) See Figure 9. Care must be exercised when aligning AC-DC redeivers, as the chassis is very seldom at ground potential and it is quite possible, when connecting the 561 to the first circuit, to damage the 561 attenuator resistor. This possibility can be eliminated by including 0.5 mfd. capacitors in series with both the inner lead and outer shield lead from the 561 and a 0.1-meg. resistor connected across the condensers as shown in Figure 10. Next the scope should be connected to the A.C. supply, turned on and its vertical amplifier circuit connected to the proper place in the receiver's second detector circuit. The exact connections once more depend on the receiver to be aligned and several types of connections are shown in Figures 11, 12, 13 and 14. The ground of the scope is connected to the receiver's chassis and the scope's vertical input jack connected to "A" in the various circuit shown.

In receivers using power detection (where the tube is biased to cut-off), a somewhat different arrangement must be made. (See Figure 15) First, the wire running from the detector plate to the audio transformer should be disconnected ("C" in Figure 15.) Then, the capacitor across the cathode resistor should be disconnected at "B" and finally, the vertical amplifier connection made to "A". This, temporarily, converts the second detector from a biased to a diode detector. In peaking the I.F.'s, the horizontal amplifier should be set so that there is no deflection in the horizontal direction. The vertical gain on any scope should be rotated to wide open and left there during all alignment. All receiver controls which might affect the gain of the signal should be left full on, as the only proper place to control gain during a visual alignment test is at the Signal generator.

Should the operator not own a scope, he can use his output meter as an indicator, connecting it as per the usual manner.

On the 561, set the MULTIPLIER switch at "1000" position and the ATTENUATOR control at "5". If signal generator is tuned to the I.F. frequency with all connections correctly made and the I.F. stages are not too badly out of tune, an audio note should be heard in the speaker (unless a connection has been broken such as in a power detector circuit). Advance the scope's INTENSITY and FOCUS

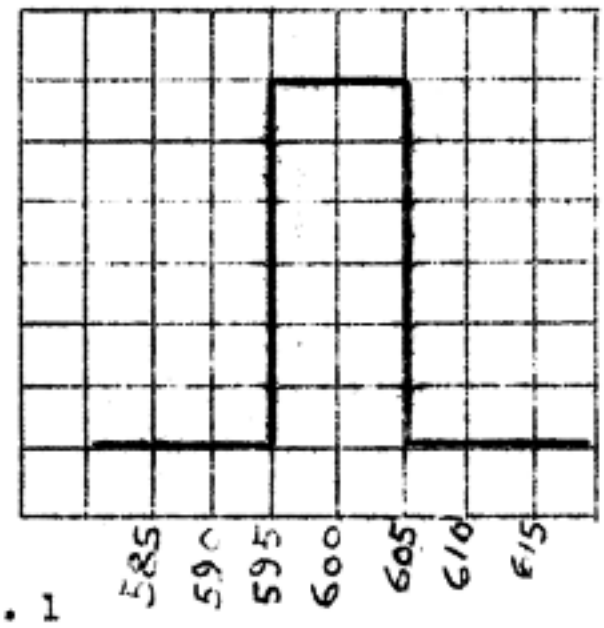


Fig. 1
PERFECT RESPONSE CURVE

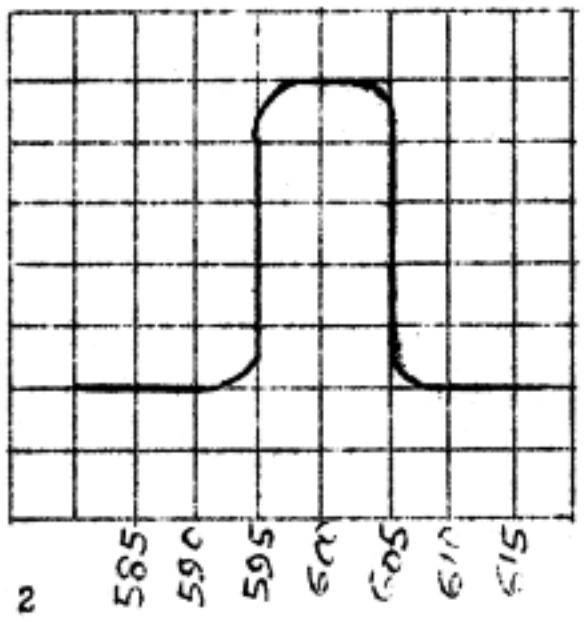
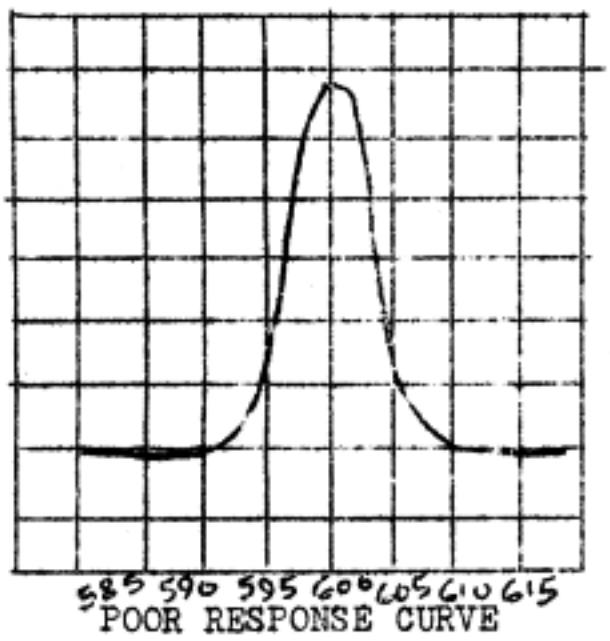


Fig. 2
BEST PRACTICAL RESPONSE CURVE



POOR RESPONSE CURVE

Fig. 3

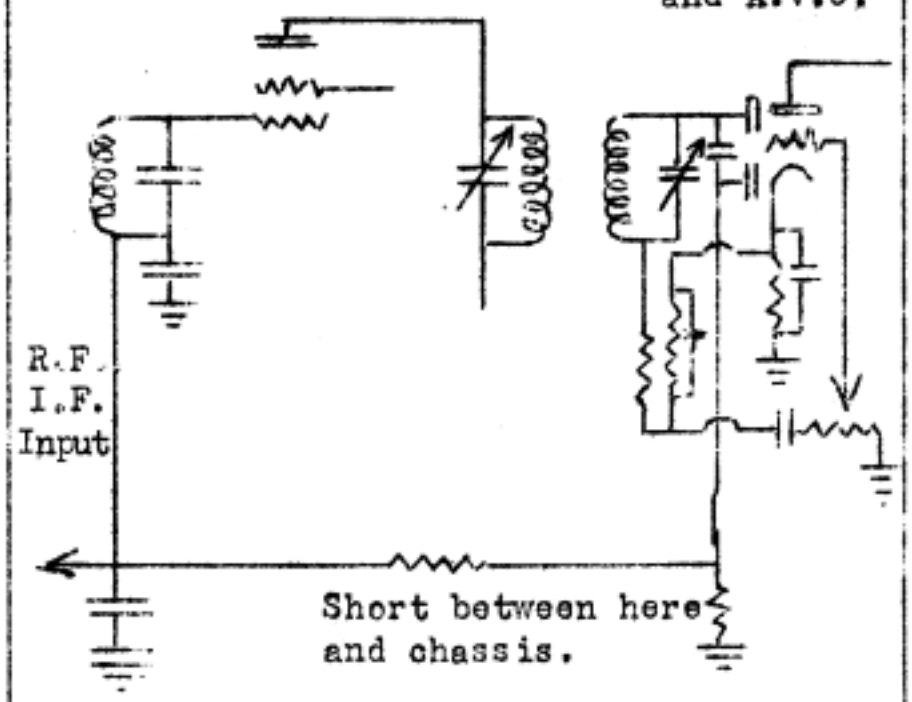


Fig. 4

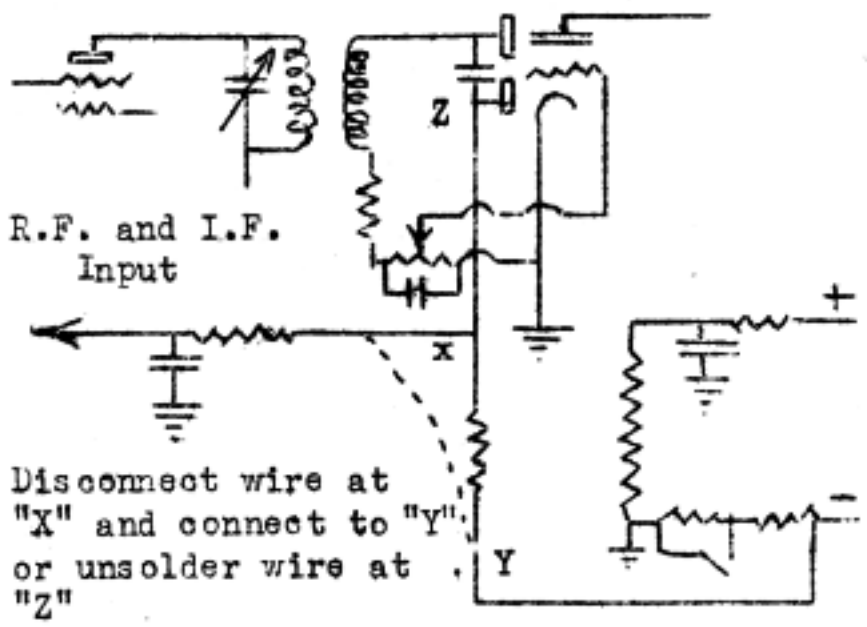


Fig. 5

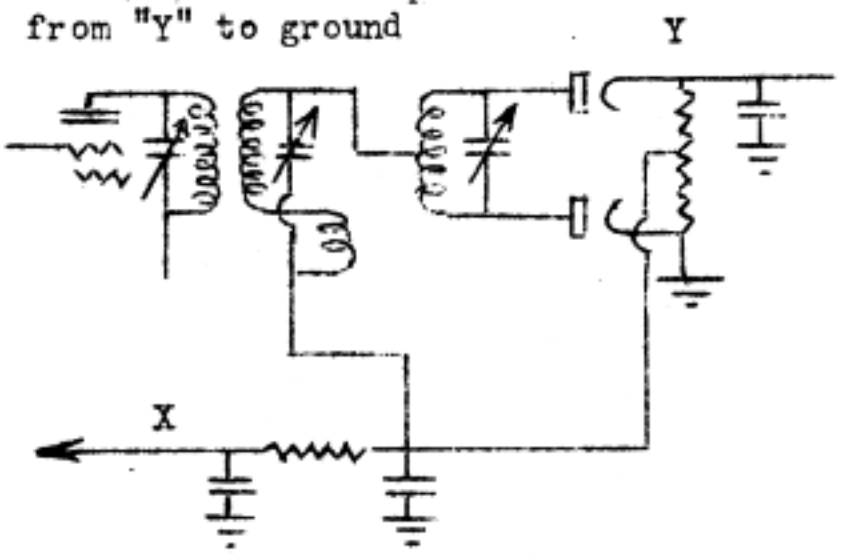
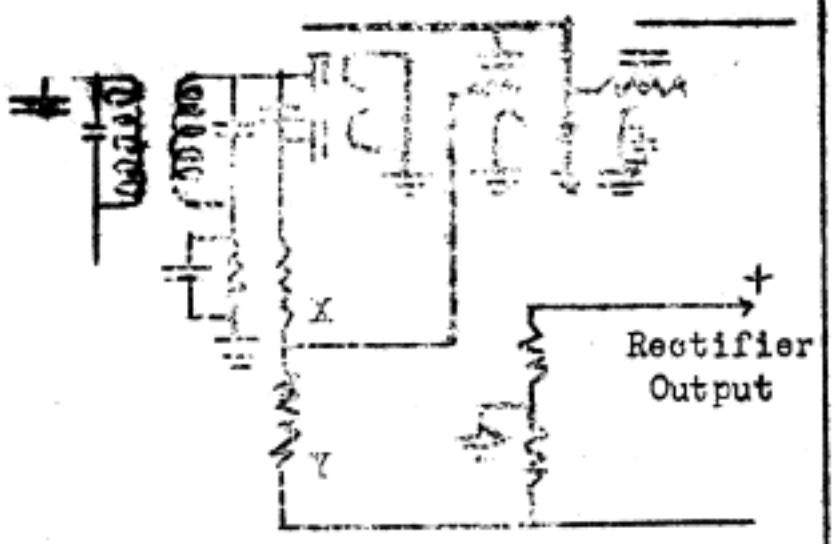
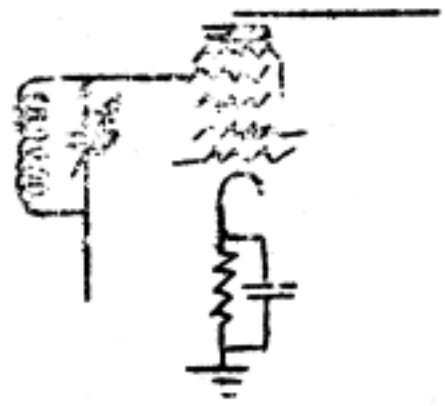


Fig. 6



To interrupt "Q" Action connect wire from X to Y.

Fig. 7



1ST Detector

Fig. 8

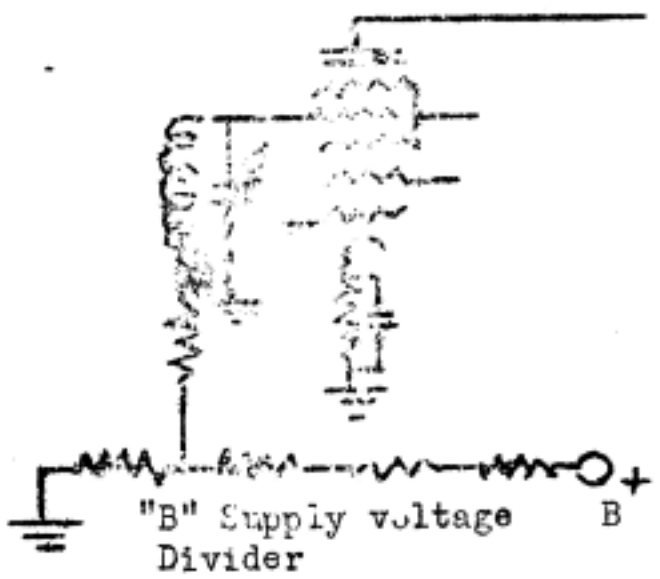


Fig. 9

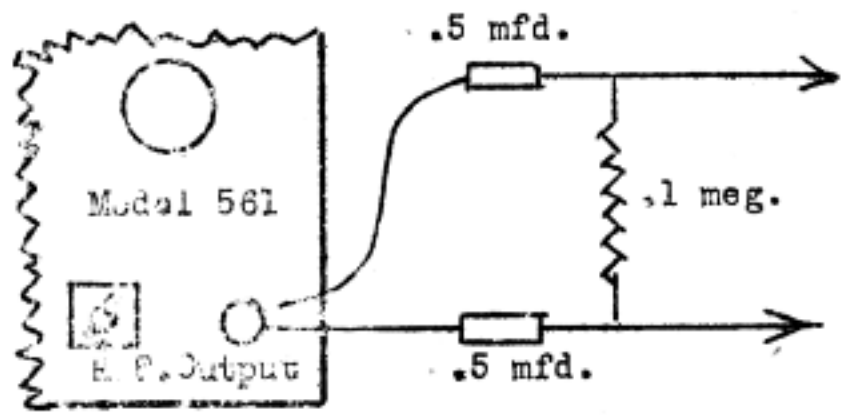


Fig. 10

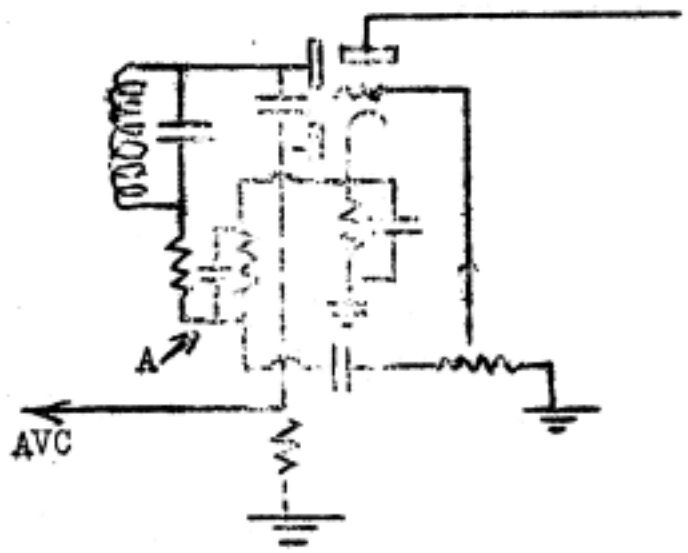


Fig. 11

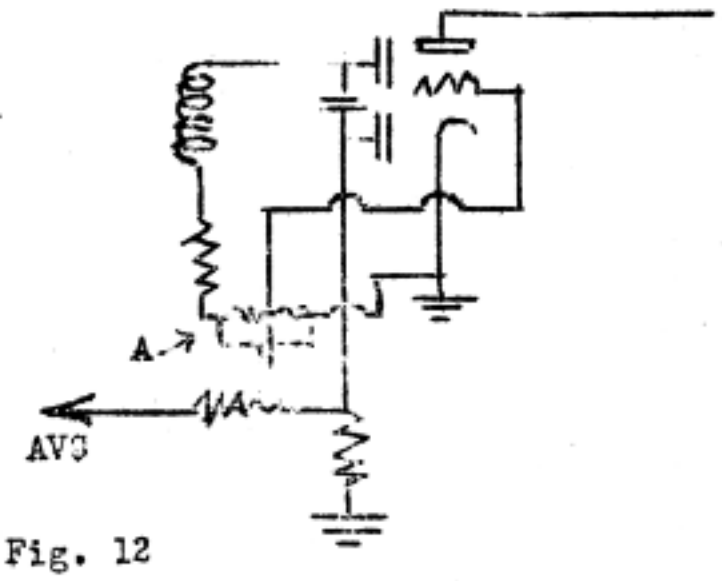


Fig. 12

controls for satisfactory visibility with minimum brill iance. You should have a vertical line on the scope such as in Figure 17. The line will probably be off screen, so retard the MULTIPLIER and ATTENUATOR controls until the line is about one inch long (on 3-inch screen).

Next peak the I.F. transformers for maximum length of line on the scope screen. If the line goes off screen during adjustments, retard the Signal generator multiplier and attenuator controls until the line is again one inch long.

The MULTIPLIER switch is a rough gain control and the R.F. ATTENUATOR potentiometer is a fine gain control.

On receivers employing a variable selectivity control, this control should be placed in the most selective position during this peaking adjustment.

GENERAL OPERATION

(Frequency Modulator)

If the Model 561 has been set up for an audio modulated or unmodulated signal, it is only necessary to turn the OUTPUT SELECTOR to the "FREQ." position to obtain a frequency modulated signal. To obtain the correct frequency, the dial setting must be set 1000 kc. above the desired frequency. For example, a frequency modulated signal of 456 kc. is wanted: therefore, we set our dial at 456 kc. + 1000 kc. or 1456 kc. A frequency modulated signal of 600 kc. is wanted: therefore, we set our dial at 600 kc. + 1000 kc. or 1600 kc. This signal is available at the R. F. OUTPUT jack and controlled through the R.F. ATTENUATOR and R.F. MULTIPLIER. The "time base" is used in connection with the frequency modulator is available at the A.F. OUTPUT jack when the OUTPUT SELECTOR is in the "FREQ" position.

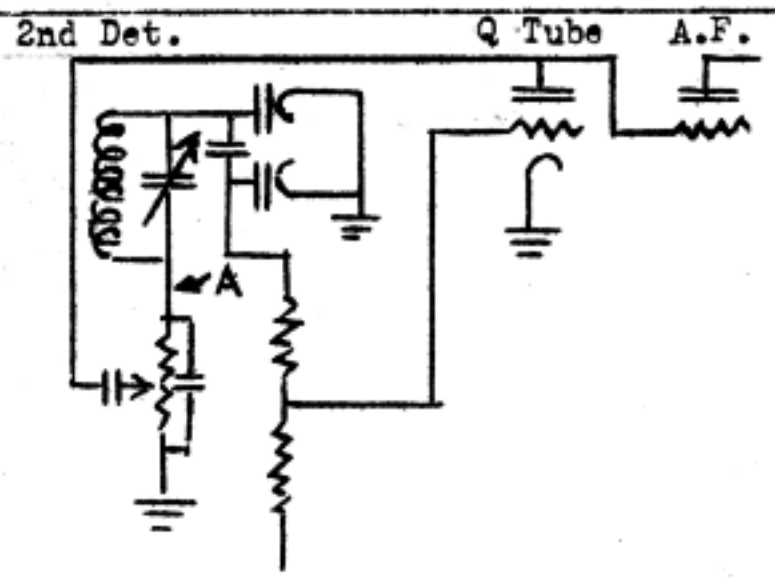


Fig. 13

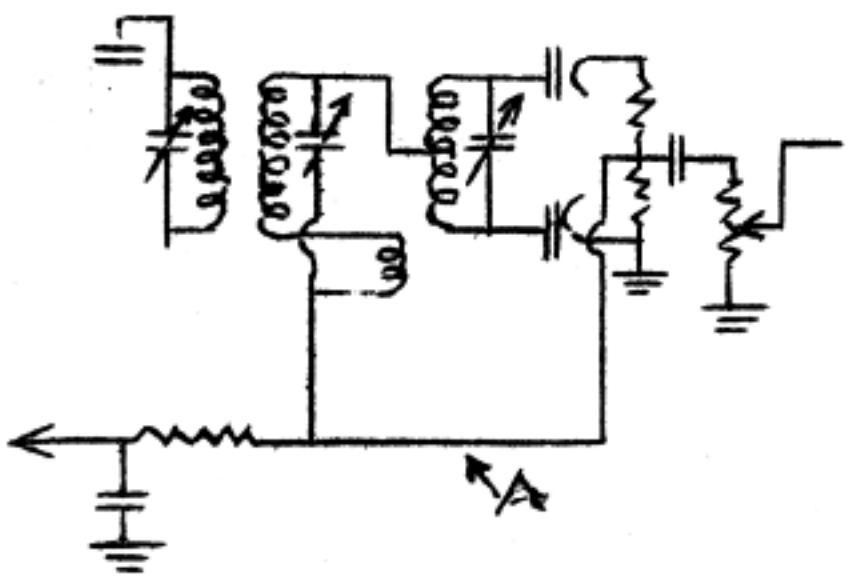


Fig. 14

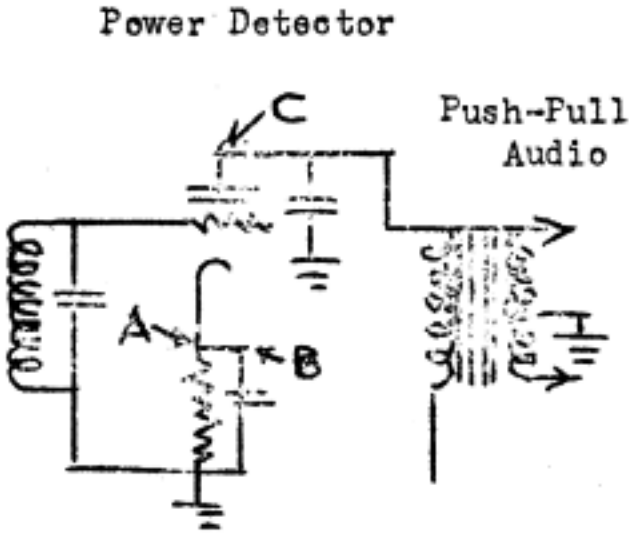


Fig. 15

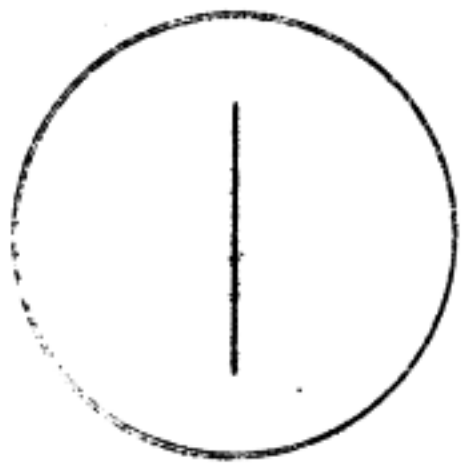


Fig. 16

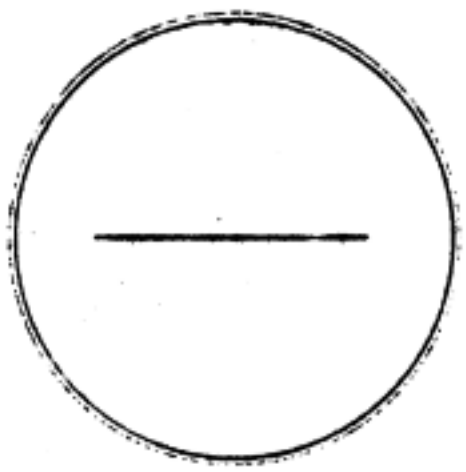


Fig. 17

Fig. 18

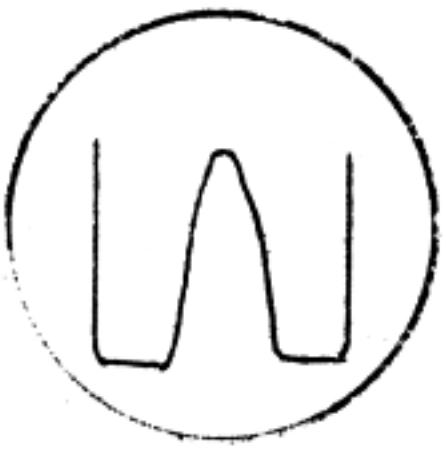


Fig. 19

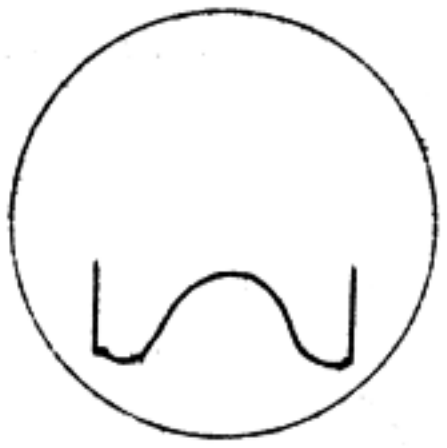


Fig. 20

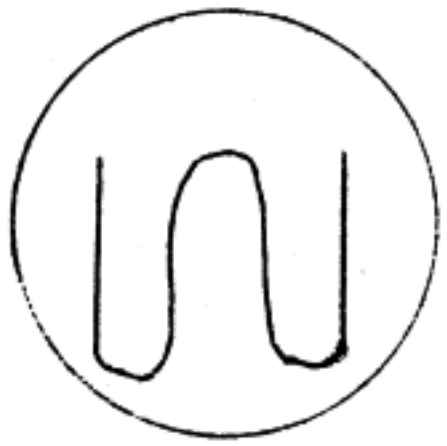


Fig. 21

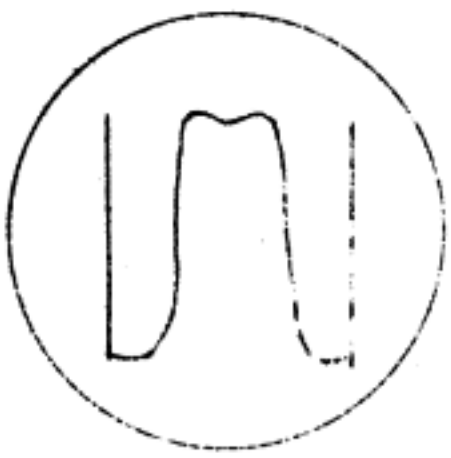


Fig. 22

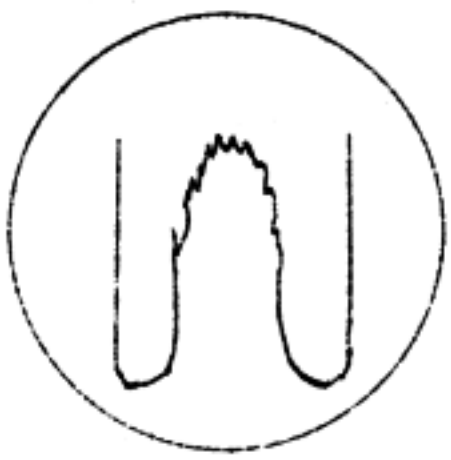


Fig. 23

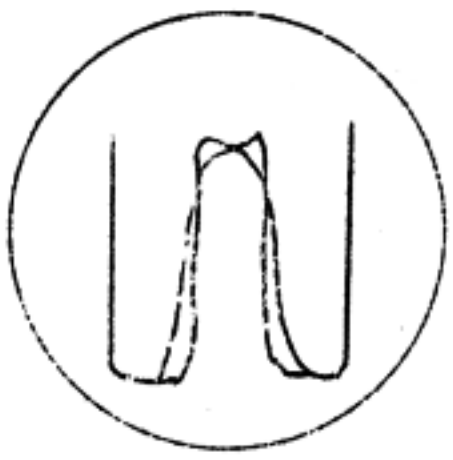


Fig. 24

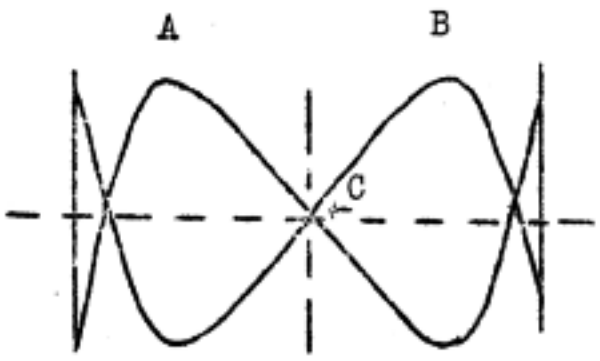


Fig. 25 CORRECT

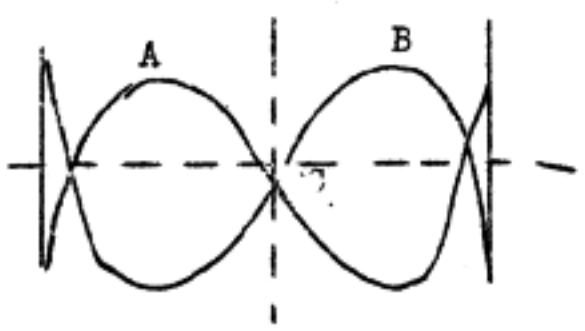


Fig. 26 INCORRECT

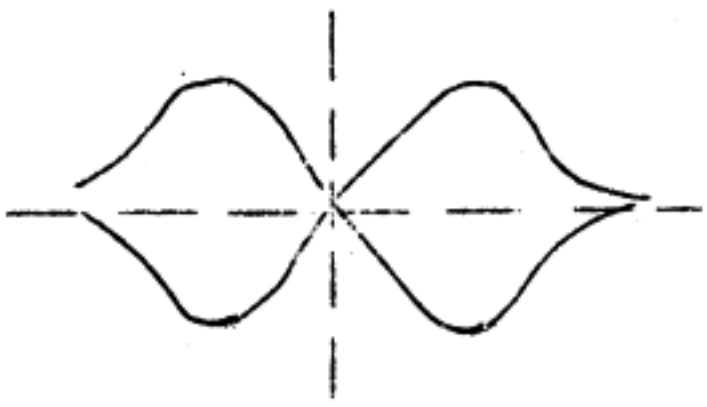


Fig. 27 CORRECT

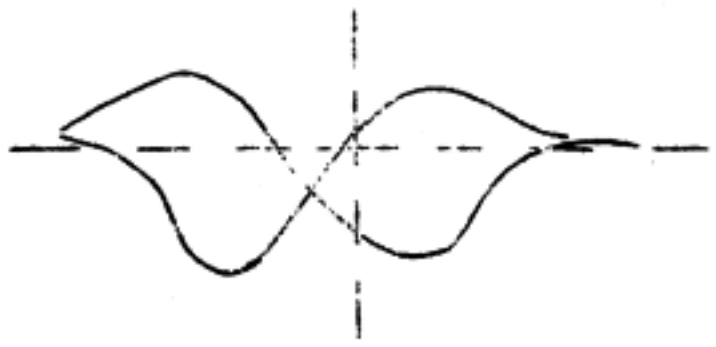


Fig. 28 INCORRECT

FREQUENCY-BAND WIDTH ALIGNMENT

Next, change the OUTPUT SELECTOR switch on the Model 561 to "FREQ" position. When the OUTPUT SELECTOR switch is in the "FREQ" position, the "time base" is available at the A.F. OUTPUT jack. This is used as a horizontal sweep during the band width alignment procedure and is fed into the horizontal amplifier. (See operating data on Models 546 or 560 for instructions to use an external sweep.) Next, set the dial 1000 kc. above the frequency printed on dial. For example, for 175 kc. signal dial will be set at 1750 kc. (See "Set-up for Freq. Modulated Signal").

With all connections made, the alignment curve should appear on the screen without having to change anything else. Re-adjust the I.F. controls for the best possible band-pass working from the second detector backward. In sets which have a high enough gain per stage, the signal should be fed into only one stage at a time and alignment made on that particular stage to prevent an adjustment in one stage compensating for mis-alignment in following stage. For example, feed the signal into the top cap of the last i-f tube and align the last i-f transformer. Feed the signal then into the preceding i-f tube and align the next to the last i-f transformer. Proceed in like manner until all stages have been aligned. Any adjustments made at this point should be made with the utmost care not to change the trimmers a large amount. The resulting scope picture may look like any one of the Figures 18 to 25 or something similar.

A proper picture for a cheap receiver will be something similar to Fig. 19 where the i-f design does not allow for much band width. A better designed receiver may result in a picture similar to Fig. 21, whereas, a high fidelity receiver with iron core i-f's and good design may result in a picture similar to Fig. 22.

Figure 18 shows incorrect alignment. The two traces should lie one on top of the other. Adjust trimmers in this case to bring one trace over the other and still keep maximum image height. The same situation occurs in Fig. 24. Careful trimmer adjustment will make the two curves coincide. Fig. 23 shows oscillation either in the receiver or from some signal coming through the r-f section or through the A.C. supply line. Momentary distortion of the screen pattern is also due to supply line disturbances. Use a good line filter or trace the source of the trouble and remedy it there. If interference is being picked up in the receivers antenna coil, it may be necessary to short a wire, temporarily, between the aerial and ground posts of the receiver.

Another point to remember is ALWAYS ALIGN A RECEIVER WITH THE GROUND WIRE ATTACHED. Many servicemen report that when this is not done, incorrect alignment results. This also places the receiver chassis at ground potential and helps shield it from extraneous interferences.

Also remember that you are doing two things when making this alignment procedure: (1) aligning the i-f stages so that the resulting image is as high as possible. (2) aligning the stages so that they will have the proper band width. In some cases, the best that can be done is a compromise between maximum height and proper band width. See difference in height between Figs. 20 and 21.

A.F.C. ALIGHMENT PROCEDURE

If the receiver has an A.F.C. circuit, it should be aligned next, as the A.F.C. circuits should be tuned to the exact frequency of the i-f. Leave the Model 561 dial as it was when the i-f alignment was completed and turn the "ATTENTUATOR CONTROL" up. Move the input to the vertical amplifier of the scope from the second detector to the un-grounded cathode of the discriminator tube. Disconnect the large bypass condenser at this point. The small value bypass condenser at times connected near this point in the cathode circuit should remain connected. This capacitor will have a value around 200mmfd. If one is not included in the set under test, temporarily connect one during the A.F.C. Adjustment.

The time base on the 561 should be connected to the scope horizontal amplifier circuits exactly the same as when making visual alignment measurements and the horizontal line adjusted to about a two-inch length.

Back out the secondary trimming condenser of the A.F.C. transformer until nearly open. You should do this for ease of primary alignment. You would get only a negligible change in reading when adjusting the primary trimmer if the secondary trimmer happened to be adjusted for zero discrimination. You will have an image on your scope like Fig. 26. Adjust this primary trimmer so that the height of the scope image is maximum.

Next, adjust the secondary trimmer until the cross-over point marked "C" is on a line with the center line of the image. Correct adjustment is shown in Fig. 25 as against incorrect adjustment in Fig. 26. Then finally, go back and adjust the primary trimmer very carefully and follow this with a final adjustment of the secondary trimmer so that the resulting image is maximum in height and the cross-over point is on a line with the horizontal center of the image. Reconnect set and remove all leads.

Once you have adjusted a few sets using the Supreme method, you will see how labor-saving and automatically fool-proof it is. Study Figs. 25 and 26 again. Note that in the exclusive Supreme 2 to 1 interlocking method, loops A and B are identical and that when the correct adjustment has been made, point "C" is exactly on the center line. When an incorrect adjustment is made, the two loops A and B in Fig. 25 simply move apart to positions A1 and B1 in Fig. 26. The correct adjustment is easy and the degree of misadjustment is know ppsitively at all times.

However, this is not the case with other methods as the two loops are not necessarily the same, due either (1) to non-linear saw-tooth sweep or (2) to methods of wobbulation in the signal generator. Note Figs. 27 and 28.

The only thing you have to go by is the position of the crossing point "F" which just drifts up and down, sideways and at times even moves entirely off the screen. Due to these effects and also that the two loops are seldom the same in size and shape, other methods are wasting and costly.

Therefore, the error-proof Supreme triple-interlocking A.F.C. adjustment circuit is completely and "Supreme-ly" exclusive.

ALIGNING R.F. END

After the i-f alignment procedure is finished, disconnect the 561 Signal Generator from the receiver's first detector and connect it to the antenna and ground posts of the set. Remove the short in the receiver's oscillator so that it can again work. Switch the 561's "OUTPUT SELECTOR" to "AMP" and tune both the receiver and the 561 to 1400 kc. (Set 561 tuning

dial to 1400 kc.)

Retard scope horizontal amplifier gain so that original vertical line will result (see Fig. 16). Adjust 561's "MULTIPLIER" AND "ATTENUATOR" controls for a two-inch vertical line on cathode ray screen. Adjust oscillator, first detector and r-f trimmers for greatest amplitude of image.

Adjust oscillator padder for greatest amplitude of screen image, even though the images are not on top of each other. If an "all-wave" radio, throw receiver's wave band switch to short waves and follow same procedure for each band, aligning trimmers at high frequency end of dial and padder at low frequency. end.

Most servicing authorities now agree that it is not necessary to use frequency modulation on either the broadcast or the short wave bands, except for padder adjustments, as the selectivity of the receiver is not altered by slight misadjustment of the r-f tuning controls and when peaking these controls, the only effect on the selectivity curve is to raise its amplitude without changing its band width. While frequency modulation is possible with the 561 on the broadcast band, it need not be used except where the serviceman desires to make a rapid and final check of the receiver's overall response or, of course, when using for "padder" adjustment.

Skip-band receivers usually have an extended first band, their high frequency limit being around 1800 to 2000 kc. on this band. The high frequency end of such bands should be calibrated at 1600 kc. instead of 1400 kc.

After alignment is completed, remove all temporary shorting wires in receiver and resolder all temporarily disconnected wires. Remove all test leads from receiver and turn off test instrument.

USING BAND E FOR HIGHER FREQUENCIES

Band E on the 561 has a coverage from 6.5 mc. to 20.5 mc. For higher frequencies, it is only necessary to utilize Band E's harmonics. Thus, the second harmonic of 6.5 mc. is 13.0 mc. and the second harmonic of 20.5 is is 41.0 mc. Therefore, any frequency may be obtained between 20.5 and 41.0 by dividing the wanted frequency in half and obtaining this value on D and E. Thus, if a 20 mc. signal is desired, you would set the dial on 10 mc. in the E band. For frequencies from 41.0 mc. to 61.5 mc., the third harmonic can be used. Thus, if a frequency of 45 mc. is desired, by dividing by three, the result would be 15 and the dial should be so set at 15 mc.

SPECIAL INSTRUCTIONS

Remember that this is a new instrument and that it differs from the ordinary test oscillator in that the audio modulation can be completely reduced to zero. In other words, although the r-f dial might be set at the correct frequency, the "OUTPUT SELECTOR" switch set in the correct position, no AUDIO NOTE can be heard in the receiver's speaker unless the "A.F. ATTENUATOR" has been turned up to produce the audio modulation. Also, remember that the FREQUENCY of the audio note heard will be determined by the setting of the audio dial. For general testing this should be about 400 cycles.

SERVICE AND MAINTENANCE

METER ZERO ADJUSTMENT

The carrier level meter and percent modulation meter are separate and distinct vacuum-tube voltmeters. They have been calibrated and set for zero at the factory. Should the zero adjustment need setting because of a wide variation of line voltage, there are two screw driver adjustments on the right side of the instrument which can be used to adjust the zero position. The adjustment nearer the front panel adjusts the audio meter. For this adjustment, set the A.F. ATTENUATOR at ZERO, not "OFF", and adjust the meter to zero after the instrument has warmed up.

The R.F. meter zero adjustment is nearer the back of the instrument. Set the R.F. ATTENUATOR" in the "OFF" position and adjust the meter to zero after the instrument has warmed up.

A.F. AND R.F. CALIBRATION

Complete calibration instructions may be had upon request. The complex nature of the calibration usually request that the oscillator be sent to an Authorized Service Station. However, if the R.F. oscillator is out only a small amount due to tube depreciation or small changes in capacity, it will only be necessary to remove back cover. Do not remove the instrument from the case. The trimmer can easily be seen on the back of the R.F. coil shield. The iron cores should normally need no adjustment as they were set and locked in position.

APPLICATION OF THE SUPREME MODEL 561 COMBINATION GENERATOR FOR GENERAL RADIO & P. A. SERVICE WORK

PRELIMINARY ADJUSTMENTS: Connect A.C. plug to a convenience outlet and allow tubes to reach proper temperature. Turn left hand dial (A.F. Selector) to zero. Set the output selector to amplitude modulation "Amp.". Advance A.F. Attenuator until meter reads about half scale. Adjust "Audio Adjust" (small left hand knob below meter) until meter needle falls to zero or vibrates at a slow rate. Turn left hand dial (A.F. Attenuator) to about 1000 cycles and reset A.F. Attenuator for half scale deflection. Return A.F. Selector from 1000 back to zero and see if meter needle is vibrating slowly. If not, slightly turn audio adjust knob.

Turn A.F. Attenuator to "OFF" position. Adjust small right hand knob below meter for meter deflection to "set carrier" mark.

Now the Model 561 is ready to produce any type of signal required for radio work.

TYPE OF SIGNAL	MODEL 561 COMBINATION GENERATOR CONTROL FOR SETTINGS AND CONNECTIONS					
Similar functions of earlier SUPREME Models indicated in parenthesis	"OUTPUT SELECTOR" Bar pointer knob center of panel	"A.F. SELECTOR" (cycles per second) Left hand dial	"A.F. ATTENUATOR" (adjusted to meter readings) Read on percent modulation scale.	"MULTIPLIER" (push 1000 or 100 button) Attenuator between 50 & 100%	Connect cable to R.F. Output	FREQUENCY (push band button & select your choice on R.F. selector scale.
800 cycle Amp. Modulated (189)&	AMP.	800	30%	Choice	R.F. CONNECTOR CABLE	Choice
400 cycle Amp. Modulated (570)	AMP.	400	30%	Choice	R.F. CONNECTOR CABLE	Choice
Any Frequency Amp. Mod.(561)	AMP.	Choice (Signal Tracing)	Choice in R.F.&A.F. Sections)	Choice	R.F. CONNECTOR CABLE	Choice
Audio Frequency 400 cycles (570)	Ext.A.F.	400	Choice		A.F. Output (push impedance button)	Select matching impedance
Audio Frequency Any frequency (561)	Ext. A.F.	Choice (Signal Tracing in amplifier, P.A. systems, etc.)	Choice			
Frequency Mod. 456 KC.	FREQ.	(Visual Alignment)		Choice	R.F. Output	1456 KC.

IMPORTANT

REGISTRATION: A RETURN REGISTRATION CARD ACCOMPANIES EACH NEW *SUPREME* INSTRUMENT. THIS REGISTRATION CARD MUST BE FILLED OUT AND RETURNED TO THE FACTORY WITHIN *ten days* AFTER THE RECEIPT OF THE INSTRUMENT. THIS REGISTRATION ESTABLISHES OWNERSHIP AND PLACES THE FACTORY IN A POSITION TO MAIL ANY ADDITIONAL DATA ISSUED ON THE OPERATION OF THE INSTRUMENT IF A GENERAL MAILING IS MADE.

GUARANTEE: *SUPREME* INSTRUMENTS ARE GUARANTEED TO BE FREE FROM DEFECTS IN MATERIAL OR WORKMANSHIP FOR 90 DAYS. THE GUARANTEE IS NOT APPLICABLE UNLESS THE PARAGRAPH *"REGISTRATION"* IS COMPLIED WITH.

TRANSPORTATION DAMAGES: *SUPREME'S* LIABILITY CEASES UPON DELIVERY OF THE SHIPMENT IN GOOD CONDITION TO THE TRANSPORTATION COMPANY GUARANTEEING SAFE DELIVERY. IF THE TESTER IS RECEIVED IN AN INOPERATIVE OR DAMAGED CONDITION, THE USER OF THE TESTER SHOULD REQUEST A *concealed damage report* FROM THE TRANSPORTATION COMPANY. IN THE EVENT THE USER HAS THE INSTRUMENT REPAIRED AT OUR NEAREST AUTHORIZED SERVICE STATION, HE SHOULD FILE CLAIM, AFTER THE REPAIR HAS BEEN SATISFACTORILY MADE, WITH THE TRANSPORTATION COMPANY, SUPPORTING HIS CLAIM WITH (1) TRANSPORTATION RECEIPTS (2) RECEIPTED SERVICE STATION INVOICE AND (3) THE TRANSPORTATION COMPANY'S CONCEALED DAMAGE REPORT. IF THE INSTRUMENT IS RETURNED DIRECTLY TO THE FACTORY FOR SUCH REPAIR, THE USER SHOULD MAIL SEPARATELY THE TRANSPORTATION COMPANY'S CONCEALED DAMAGE REPORT TO THE *Factory Service Engineer.*

SERVICE: SHOULD ANY OF YOUR *SUPREME* EQUIPMENT FAIL TO FUNCTION PROPERLY PLEASE OBSERVE THE FOLLOWING NOTES WHICH WILL ENABLE US TO GIVE YOU FAST AND EFFICIENT SERVICE. IF YOU ARE RETURNING ANY INSTRUMENT TO THE FACTORY, PLEASE SHIP VIA *Prepaid Express* AND MAIL *Separately* A LETTER ADVISING OUR SERVICE DEPARTMENT OF ALL THE TROUBLE YOU HAVE EXPERIENCED WITH THE TESTER. ON THE OTHER HAND, THE TROUBLE MAY BE MINOR, ONE WHICH YOU MAY CORRECT YOURSELF IN JUST A FEW MINUTES. IN SUCH CASE, WRITE US FIRST AND USUALLY WE CAN GIVE YOU THE INFORMATION WHICH WILL SAVE A LOT OF UNNECESSARY DELAY AND EXPENSE.

REPLACEMENT PARTS: IF THE OWNER SHOULD REQUIRE PARTS OR ACCESSORIES FOR ANY *SUPREME* EQUIPMENT, THESE MAY BE OBTAINED THROUGH YOUR JOBBER OR ORDERED DIRECTLY FROM THE FACTORY. ORDERS UNDER $1.00 SHOULD BE ACCOMPANIED WITH REMITTANCE COVERING THE PRICE OF THE ITEMS AND MAILING CHARGES. ORDERS OVER $1.00 SHOULD BE ACCOMPANIED BY A DEPOSIT OF NOT LESS THAN 50% OF THE TOTAL AMOUNT AND WILL BE SHIPPED C.O.D. FOR THE BALANCE DUE. ALL REMITTANCES SHOULD BE MADE BY *Check* OR *Money Order.* PLEASE DO NOT SEND STAMPS. DATA, SUCH AS INSTRUCTIONS, TUBE LISTS, AND CIRCUIT DIAGRAMS, SHOULD BE ORDERED FROM THE SERVICE DEPARTMENT. *IN ALL CASES, STATE THE MODEL AND SERIAL NUMBER OF THE TESTER.*

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