TRIPLETT

INSTRUCTION MANUAL

MODEL 3432
SIGNAL GENERATOR

Section I

DESCRIPTION

1. GENERAL

The Triplett Model 3432 Signal Generator consists of an electron coupled R. F. Oscillator calibrated in five fundamental bands covering a frequency of 165 KC to 40 MC with overlap on each band. Two harmonic bands are also provided for use at higher frequencies.

The R. F. Oscillator is capacity coupled to the "HI-LO" R. F. switch and to the attenuator control. The R. F. voltage is available at the front panel through a low capacity coaxial cable.

The unit is provided with a 400 cycle sine wave A. F. Oscillator with variable control which provides 0-100 percent modulation of the R. F. signal and approximately 10 RMS Volts A. F. signal to the A. F. jacks for external use. The black jack is ground.

Provision for external modulation of the R. F. signal is also provided.

Power for the unit is obtained from the 115 Volt 50-60 cycle power supply.

2. CIRCUIT

R. F. OSCILLATOR AND ATTENUATOR.—This oscillator uses a 6SJ7 tube in an electron coupled circuit with the R. F. coils connected to a follow-up shorting type Range Selector switch which permits the selection of each range as indicated by the Range Selector on the front panel.

The two section variable capacitor employed in tuning the R. F. coils is connected in parallel when used on the first three ranges with only one section being used on the last two ranges.

A. F. OSCILLATOR,—The A. F. Oscillator uses a 6J5 tube in a transformer coupled 400 cycle sine wave audio circuit with a separate winding for coupling the A. F. voltage to the suppressor grid of the 6SJ7 R. F. oscillator tube. The percentage of modulation is adjusted with the audio control and is variable between zero and 100 percent. A. F. signal of approximately 0-10 RMS Volts is also available at the "A. F. OUTPUT" jacks. Black jack is ground, red jack is Hi A. F. located on the front panel. A circuit selector switch is provided for controlling the modulation and A. F. signal output voltage. This switch also provides for external modulation of the R. F. signal with the percentage of modulation being controlled by the audio control.

POWER SUPPLY—The power supply uses a 6X5GT full wave rectifier tube with its D. C. output filtered by the reactor L6 and the dual 10 mfd. capacitor. The power transformer is electrostatically shielded to reduce the R. F. leakage into the A. C. line.

Section II

OPERATION

1. GENERAL

Before using the 3432 Signal Generator, read the operating instructions carefully. The Model 3432 Signal Generator is designed to operate on 115 volt, 50-60 cycle alternating current. The OFF-ON toggle switch controls the power to the power supply. For best accuracy, the unit should be allowed to warm up at least 15 minutes before making any alignments.

The controls and output connectors are clearly identified by the markings on the panel and serve the following purposes:

1—"RANGE SELECTOR"—R. F. Oscillator range selector switch.
2—"CIRCUIT SELECTOR"—Modulation and audio output selector.
3—"ATTENUATOR"—Adjustment of R. F. signal when "RF Selector" is on "Lo RF".
4—Main Dial—Calibrated R. F. signal in seven ranges controlled by the vernier tuning knob.
5—"EXT. MOD." and "A. F. OUTPUT"—Jacks for audio output and external modulation signal. Black jack is ground, Red jack is Hi A. F.
6—"R. F. OUTPUT"—Connection to coaxial cable for R. F. output signals.
7—"AUDIO"—Control for audio output, internal and external modulation.
8—"OFF-ON" Power Switch.
9—"RF SELECTOR"—Switch for selection of "Hi RF" or "Lo RF" output.

2. ALIGNMENT OF RECEIVERS

Modern radio receivers employ from two up to eight, ten or even more circuits to achieve the selectivity desired.

These circuits, however, are of little benfit unless all of them are working at their proper frequencies simultaneously. Only someone acquainted with the alignment of receivers in a Radio Production Department, or someone engaged in radio service work who has adjusted a receiver on which someone has tightened all of the adjusting screws can realize how dead a receiver can sound when all of its tuned circuits are considerably out of adjustment. The purpose of aligning a radio receiver is two-fold; to adjust it for maximum performance, and to make the dial indicate to within two or three percent the frequency of the station being received. Since a trimmer adjustment is more sensitive when the circuit capacity is low, the trimmer adjustment is usually made near the high frequency end of the tuning range. If the adjustment is made at the very end of the range, the maximum mistracking over the adjacent portion of the band will be greater than if an alignment point is chosen some small distance from the extreme high-frequency end of the tuning range. In the broadcast band, 1400 KC is the usual choice and is the frequency recommended as standard by the Institute of Radio Engineers. On short-wave bands on the same receiver, it is a good practice to align them at the same position on the gang condenser. Most manufacturers give the correct alignment information in the receiver instruction book.

DUMMY ANTENNA—In order to make allowance for the effects that the outside antenna will have on the alignment of the receiver, a substitute

for the antenna called a dummy antenna representing the average antenna is used to connect the Signal Generator to the antenna connection of the receiver. The dummy antenna is connected in series with the coaxial cable.

For receiver frequency ranges up to 1700 KC, the average antenna is essentially a capacity of 200 micromicrofarads if used on a high impedance primary. On frequencies above 1700 KC the average antenna can be represented by a 400 ohm carbon resistor.

TRF RECEIVERS—On a TRF receiver, all tube circuits operate simultaneously at one frequency. Aligning a factory built receiver having a dial calibration to match the coils and condensers used, the dial is set to indicate the frequency at some signal of known frequency and the individual circuit adjusted to maximum performance on the signal at that setting of the condenser.

SUPER-HETERODYNE RECEIVERS—On a Super-Heterodyne receiver, circuits must operate at three different frequencies, properly related, if satisfactory performance is to be obtained. Beginning with the circuit closest to the output tubes, the intermediate-frequency circuits must all operate at the same frequency in order to give satisfactory amplification. Actually they will work over a wide frequency range, but if they are operated very far from the intermediate-frequency specified for the given dial, coils and tuning condensers, the dial indication will be in error more than the customary few percent and, in the case of receivers employing special cut tracking plates in the oscillator condensers, serious mistracking of the oscillator with other tuned circuits will result producing a loss in sensitivity and reduction in image-ratio.

I. F. ALIGNMENT—The first adjustment on a Super-Heterodyne receiver is to align the intermediate-frequency amplifier at the correct frequency. The transformer should be adjusted to give the strongest signal by adjusting, in turn, each of the adjustments on all of the I. F. transformers. The intermediate-frequency stages should be aligned first and in their reversed order starting at the stage immediately preceding the second detector. For this procedure, the coaxial cable is connected to the grid of the tube preceding the stage under alignment and the ground clip to the receiver ground with the Signal Generator set to the I. F. frequency specified by the manufacturer. Since it is essential that the operating characteristics of a stage be un-altered, this connection to the grid should be made with the grid lead in place. This procedure should be continued until all of the I. F. transformers have been aligned properly. When the alignment of the I. F. amplifier is completed, alignment of the R. F. and oscillator circuits should be made.

OSCILLATOR ALIGNMENT—Connect the appropriate dummy antenna between the high side of the Signal Generator output and the antenna connection of the receiver and set the frequency of the Signal Generator to an appropriate frequency on the band to be aligned; this is usually about 80% of the maximum frequency tunable on that band—set the receiver dial to the corresponding frequency. Turn the volume and sensitivity controls of the receiver full on; then turn the generator attenuator to high output and adjust the oscillator trimmer until a signal is heard. Reduce the signal from the Signal Generator as alignment proceeds, always using as little input as possible because weak signals permit a more accurate alignment than strong signals. Care should be taken that the alignment condenser and not the

series padding condenser be used for this adjustment.

R. F. AND ANTENNA ALIGNMENT—Next align the R. F. amplifier circuit. On the band below 6 megacycles, the frequency of the R. F. amplifier circuit has very little effect upon the oscillator frequency, but at higher frequencies the adjustments of the R. F. circuit have a slight effect upon the frequency of the oscillator; consequently, it is necessary when aligning a high frequency R. F. amplifier to ROCK the gang condenser very slightly as the alignment proceeds to be sure that a shift in oscillator frequency has not shifted the Heterodyne signal out of range of the I. F. amplifier. The antenna circuit is then aligned by adjusting the antenna coil trimmer.

OSCILLATOR PADDING—Shifting the tuning dial to a point about 10% up from its lowest frequency, the oscillator circuit should be padded for best tracking with the antenna and R. F. circuits by adjusting the series padding capacitors as recommended by the receiver manufacturer. If the radio set is sufficiently sensitive to produce a readily discernable hiss in the speaker, the easiest way to pad the oscillator circuit is to adjust the padding condenser for maximum hiss or minimum noise. When this point is padded, it is well to turn to the high frequency end and re-align that part of the band.

F. M. RECEIVERS—For high speed visual alignment of F.M.receivers, a frequency modulated test oscillator giving a strong frequency modulated signal over a range of several hundred kilocycles and a Cathode Ray Oscillograph are desirable.

However, it is possible to make all necessary alignment operations without this equipment by the use of the 3432 Signal Generator and a sensitive voltmeter such as Triplett Model 625-N or 625-NA. The following procedure will be helpful in using the fixed frequency method of alignment of F. M. receivers, but the receiver manufacturer's instructions should be followed wherever possible.

Connect the 3432 coaxial output cable to the grid of the limiter tube and ground. Connect a sensitive voltmeter (10,000 ohms per volt or better) across the two cathodes of the discriminator tube. Set the Signal Generator to the exact I. F. frequency as specified by the receiver manufacturer and using an unmodulated signal, adjust the primary trimmer of the discriminator transformer for maximum meter reading. Now adjust the secondary trimmer until a zero voltage reading is obtained. Care must be used in selecting the correct I. F. frequency on the Signal Generator and this setting must not be changed until all the I. F. transformers are adjusted. Without changing the Signal Generator frequency setting, shift the coaxial cable to the R. F. input grid of the first detector or mixer. I. F. trimmer alignment is started with the trimmer at the input of the limiter stage and proceeds by adjusting each trimmer, in turn, back through the trimmer across the output of the first detector. Repeat the trimmer adjustment in the same order using great care to obtain exact peak adjustment as indicated on the voltmeter; this will insure that the output of the discriminator will be equal on both sides of the frequency modulated carrier. The alignment of the R. F. mixer and oscillator in an F. M. receiver is exactly the same as that used in the A. M.receiver as described earlier in this book.

If the above procedure is used and the receiver manufacturer's instructions are followed carefully, correct alignment of F. M. receivers may be accomplished with the 3432 A. M. Signal Generator.

Section III

MAINTENANCE AND PARTS LIST

1. GENERAL

The Model 3432 Signal Generator is designed to require little or no maintenance. With the exception of replacing tubes when they are defective, no trouble should be experienced with this unit. Illustrations (Figures 1 and 2) are provided to acquaint the user with the various circuits and calibration.

TABLE OF TUBE SOCKET VOLTAGES: (Measured with 1000 ohm per volt meter from socket pin to ground). A. C. line 115 Volts.

	1	2	3	4	5	6	7	8
6SJ7	0	0	0	0	0	110V DC	6.3V AC	90V DC
6J5	0	0	170V DC	0	0	0	6.3V AC	6V DC
6X5GT	0	0	180V AC	0	180V AC	0	0	190V DC

2. CALIBRATION

If the R. F. Oscillator tube should require replacement, it may be necessary to recalibrate the R. F. Oscillator circuits to the correct frequency printed on the calibrated dial. It will be necessary to have a crystal oscillator or other source of accurate signals that will produce a fundamental or harmonic signal when connected to a receiver that will tune the following frequencies or their harmonics.

CALIBRATION FREQUENCIES

Oscillator Band	Coil Adjustment	Trimmer Adjustment
A	165 KC	525 KC
B	500 KC	1750 KC
C	1700 KC	6200 KC
D	6000 KC	18.5 MC
E	18 MC	40 MC

Remove the four screws located at the four corners of the front panel. The entire Signal Generator unit can then be lifted out of the case. Remove the coil box back cover. The "E" band should be calibrated first. Set the "RANGE SELECTOR" to band "E" and connect the coaxial cable to the receiver antenna and ground terminals.

A crystal oscillator or other signal source that will provide fundamental or harmonic signals at the calibration frequencies should also be connected to the same receiver terminals.

Allow the Signal Generator and receiver to warm up at least thirty minutes before any adjustments are made. Tune the receiver to the frequency listed for coil adjustment of "E" band (18 MC). A signal from the crystal oscillator should be heard.

Tune the Signal Generator dial until a signal is heard beating with the crystal signal in the receiver when the Signal Generator dial is near the calibration frequency (18 MC). Referring to Figure 2, adjust the iron core coil adjustment (L5) as indicated until the dial reading is correct.

Now tune the receiver to the frequency listed for trimmer adjustment of band "E" (40MC). The signal from the crystal oscillator again should be heard. Again tune the Signal Generator dial until its signal is heard beating with the crystal signal and adjust the capacity adjusting screw (C9) (Fig. 2) until the dial reading is correct.

This procedure should be repeated several times until both calibration points on the Signal Generator dial are correct.

Care should be used in adjusting the receiver in order that the fundamental and not the image signal is used. The image signal is usually lower in frequency than the fundamental signal.

Recalibrate the other ranges following the same procedure using the correct calibration frequencies as given in the chart.

3. MAINTENANCE PARTS LIST

Ref. Symbol	Description	Part No.
None	Coaxial cable assem.	T-79-24
T-2	Power transformer	T-23-16
T1	Audio transformer	T-23-17
L6	Filter choke	8979
C14	Dual 10 mfd. capacitor	T-43-22
C10	Variable capacitor	T-43-65
C5 to C9 Inc.	Trimmer capacitor	T-3217-5
R6	Attenuator control	T-16-8
R9	Audio control	T-16-27
S1	Attenuator switch	T-22-88
S2	Circuit switch	T-22-87
S3	Off-On switch	T-2439-12
S4	Range switch	T-22-84
L1	R. F. coil assem. Band "A"	T-2542-71
L2	R. F. coil assem. Band "B"	T-2542-72
L3	R. F. coil assem. Band "C"	T-2542-73
L4	R. F. coil assem. Band "D"	T-2542-74
L5	R. F. coil assem. Band "E"	T-2542-75
R2	Resistor, 39K, 1/2W	T-15-1109
R3-R4	Resistor, 10K, 1/2W	T-2601-½-10K
R7	Resistor, 1K, 1/2W	T-2601-½-1K
R1	Resistor, 20K 1/2W	T-2601-½-20K
R8	Resistor, 51K, 1/2W	T-15-1079
R5	Resistor, 10Ω, 1/2W	T-2601-½-10
R10	Resistor, 30K, 10 W	T-15-1103
C1	Capacitor, 0.000015 Mfd. Mica	T-2631-M21
C2-C13	Capacitor, 0.01 Mfd. 400 WV	T-2631-P14
C3	Capacitor, 0.0001 Mfd. Mica	T-2631-M1
C4	Capacitor, 0.005 Mfd. 400 WV	T-2631-P29
C11	Capacitor, 0.05 Mfd. 200 WV	T-2631-P3
C12	Capacitor, 0.25 Mfd. 200 WV	T-2631-P5
None	Dial Cover Assem.	T-10-680
None	Jack, Black, Banana	T-33-12
None	Jack, Red, Banana	T-33-13
None	Knob, 1¼", Bar	T-34-11
None	Knob. 1⅛", Round	T-34-13

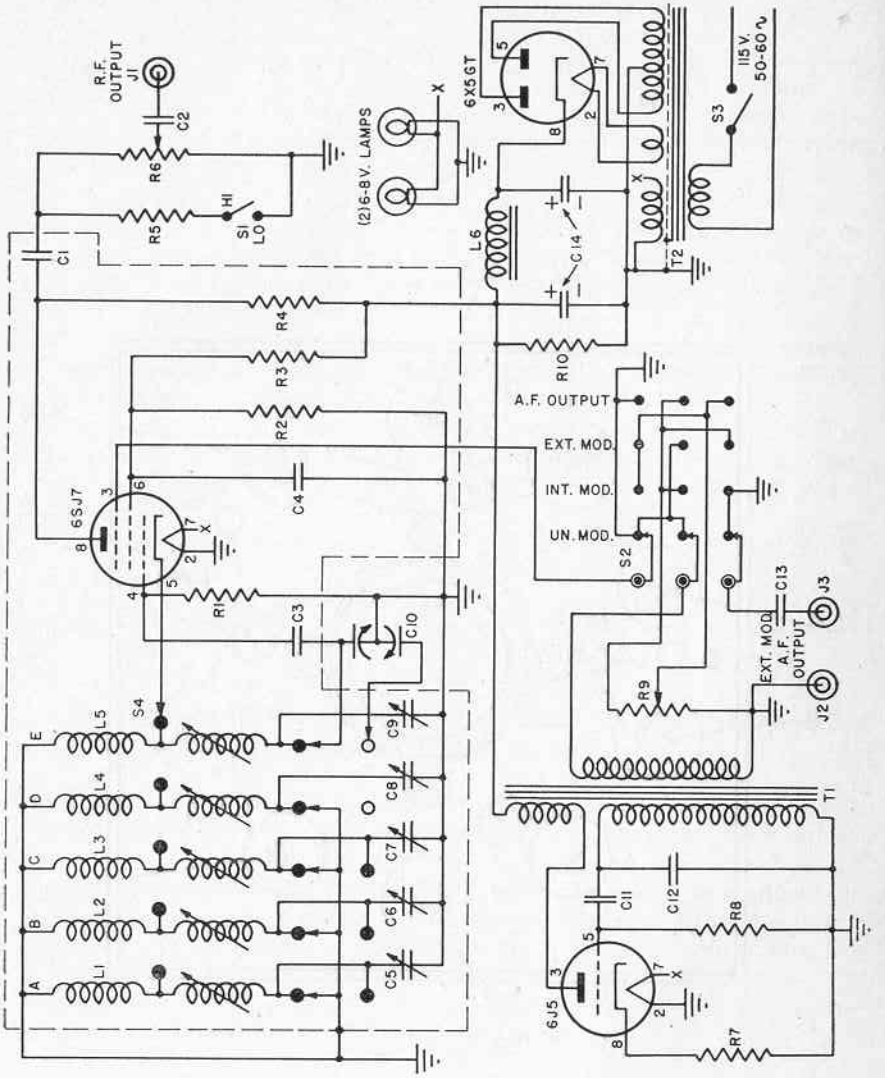

Fig. 1 Wiring Diagram, 3432

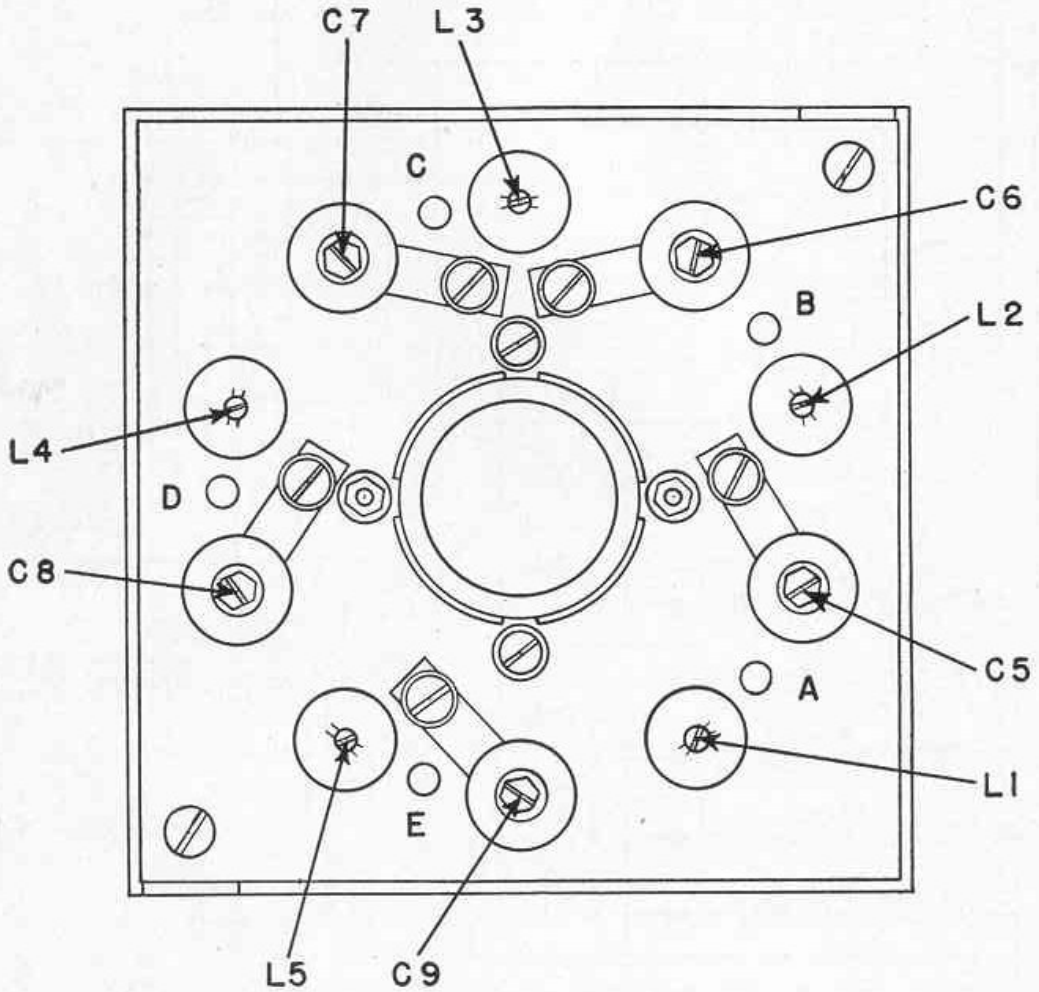

Fig. 2 RF Oscillator Compartment, Rear View, Back Cover Removed.