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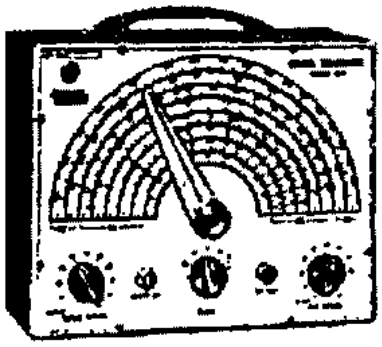
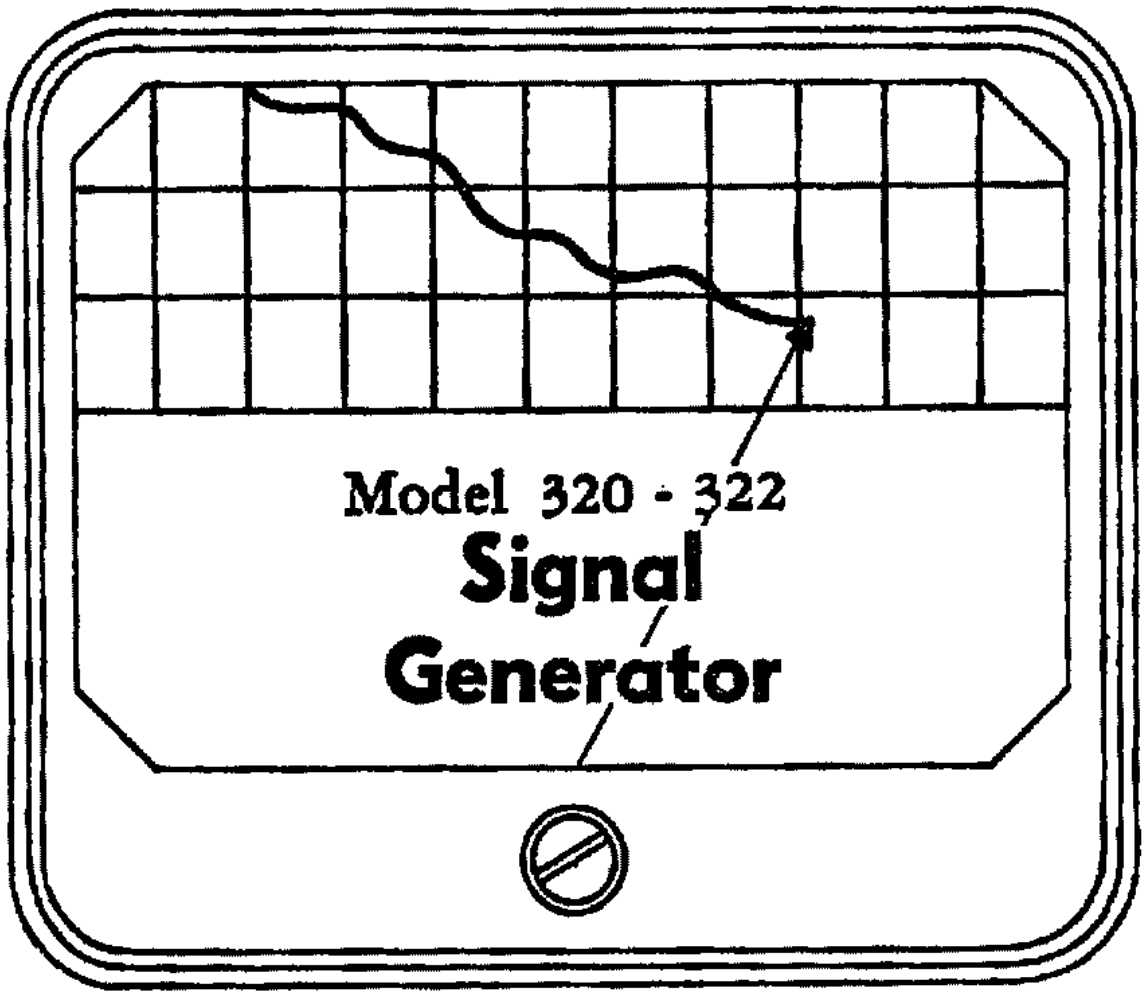
INSTRUCTION MANUAL FOR





EICO

ELECTRONIC
INSTRUMENT CO., Inc.

1-DESCRIPTION

The EICO Model 320 Signal Generator consists of a highly stable Hartly RF Oscillator, covering a frequency range of 150 kc to 34 mc, with strong harmonics to 102 mc. This entire range is calibrated on the dial in seven (7) ranges. The RF Oscillator is ½ of a 6SN7 tube. Variable outpat is taken from the cathode. The other half of the 6SN7 is a colpitts type sudio oscillator providing 400 cycle pure sine wave output which is also utilized to modulate the RF oscillator. An attenuator provides variable audio voltage.

2-GENERAL OPERATING INSTRUCTIONS

Before using the EICO Model 320 Signal Generator, read the instructions very carefully. The EICO Model 320 Signal Generator is designed to operate on 105 to 120 volts, 50-60 cycle elternating current. The AC power switch is located on the RF attenuator control. For hest 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 tha makings on tha panel and serve the followiag purpose.

1. *BANDSWITCH:* RF oscillator renge selector which selects frequencies from 150 kc to 102 mc. Bands E, F; aad G are on the same switch position.

2. *R.F. ATTENUATOR:* Adjusts strength of RF signal delivered to RF output connector. When turned to the extreme counter-clockwise position, signal generator is turned off.

3. *AUDIO ATTENUATOR:* Adjusts strength of 400 cycle audio voltage delivered to audio output connector. When turned to the extreme counter-clockwise position, the audio oscillator is turned off and the RF signal is unmodulated.

4. *RF OUTPUT:* Connect coaxial cnble supplied with the instrument for either modulated or unmodulated signals. *NOTE:* Put ground lead of coexial cable to B- of receiver, which is not necessarily the chassis, depending upon the perticular model. Do not confuse the RF

output connector with the audio output coanector.

5. *AUDIO OUTPUT:* For 400 cycle aadio aignal, connect coaxial cable to audio output counector.

3-MICRO-CYCLE VERNIER TUNING

USE OF ADDITIONAL 0-100 REFERENCE SCALE - When certain applications of the signal geaarator require constant resattiag to particular fraquancy, it will be advaatageous to remember the settiag oa the 0-100 reference scale and set the pointer accordingly.

4-ALIGNMENT OF AM RECEIVERS

Modern Radio Receivers employ from two up to aight, tea or even more circuits to achieve the selectivity desired.

These circuits, however, ere of little benefit unless all of them are workiag at their proper frequencies aimultaneously. Only someoae acquaiated with the alignment of Receivers in a Radio Prodactioa Departmaat, or someoae engaged in Radio Service work who has adjusted a Receiver on which someone has tighteaad all of the adjustiag screws, caa realize how dead a Receiver caa sound when all of its tuned circuits are out of adjustmeat aay considerable extent. The purpose of aligning a Receiver is two-fold to adjust it for maximum performaace, and to make the dial indicate to within two or three per cent the frequeacy of the atatioa being received. Siace a trimmer adjustmeat is more aeasitive when the circuit capacity is low, the trimmar adjustment is usually made near the high-frequency ead of the tuniag range. If the adjustmeat is made at the very ead of the range, the maximum mistrackiag over the adjacent portion of the band will be greater thaa if an alignment point is chosen some small distaace from the ex-

treme high-frequency end of the tuniag range. In the broadcaat hand, 1400 K.C. is usual choice and is the frequency recommended as standard by the Institute of Radio Engineers. On short-wave band on the same receiver, it is a good practice to align them at the aame position on the gang condenaer. Most manufacturers give the correct alignment information in the Receivers instruction book.

DUMMY ANTENNA - In order to make allowance for the effects that the outside enteana will have on the alignment of the Receiver, a subatitute for the antenna called e dnmmy antenna repreaeatiag the average antenna ia used to connect the Signal Generator to the Antenna conaection of the Receiver. For receiver frequency ranges up to 1700 K.C. the average antenna ia eaaentially a capacity of 200 Micromicrofarads, if used on a high inpedance primary. On frequencies above 1700 K.C. the averaga antenna csn be repreaented by a 400 ohm carbon reaistor.

TRF RECEIVERS - On a TRF Receiver, all tube circuits operate aimultaneously at one frequency. Aligning a factory bnilt receiver having a dial calibration to match the coils and condensers used, the dial is aet to indicate the frequency at aome signal of known frequency and the individual circuit adjusted to maximum performance on the signal at that setting of the condenaer.

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 closeat to the outpnt tubes, the intermediate-frequency circuits must all operate at the same freqnency in order to give satisfactory amplification. Actually they will work over a wide frequency range, but if they are operated very far from the iatermediate frequency speoified for the given dial, coils and tuning condensers, the dial iadication will be in error more than the cuatomary 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 reault, producing a loss in sensitivity and reduction ia image-ratio.

I. F. ALIGNMENT - The first adjustment on a Super-Heterodyne Receiver ie to align the intermediate-frequency amplifier at the correct frequency. The transformer should be adjusted to give the strongest aignal by adjusting, in turn each of the edjustments on all of the I. F. tranaformars. The intermediate frequency stages should be aligned firat 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 nnder alignment, and the ground clip to the Receiver ground. Since it is esaentiel that the operating characteristics of a stage shonld not be altered, this connection to the grid should be made with the grid lead in place. This procedure should be continued until all of the IF transformers have been aligned properly. When the alignment of the IF amplifier is completed, alignment of the RF 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 eppropriate frequency on the hand to he aligned, this is usually ahout 80% of the maximum frequency tunable on that band - aet tha Receiver dial to the corresponding frequency. Turn the volume and sensitivity controls of the Receiver full on; now 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 uaing 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.

RF AND ANTENNA ALIGNMENT - Next align the RF Amplifier circuit. On the band below 6 megacycles the frequency of the RF amplifier circuit has very little effect upon the Oscillator frequency, bnt at higher frequeucies the adjustments of the RF circuit have a slight effect upon the frequency of the Oscillator; consequently it is necessary, when align-

ing a high-frequency RF 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 IF amplifier. The Antenna circuit is then aligned in the conventional manner.

OSCILLATOR PADDING - Shifting the tuning dial to a point about 10% up from its lowest frequency, the Oscillatnr circuit should be padded for best tracking with the Antenna and RF circuits. If the Radin Set is sufficiently sensitive to produce a readily discernable hisa in the apeaker, the easiest way to pad the Oacillator circuit is to adjust the padding Condenser for maximum hiss or minimum noise. When thia point is padded it ia well tn turn to the high frequency end and re-align that part of the band.

5-ALIGNMENT OF FM RECEIVERS

The first atep is to align the primary and secondary trimmers of the discriminator trsnsformer. To do this connect the output cable of the signal generator hetween grid and ground the limiter tube. If two limiter tubes are used the signal generator is connected acroas the grid circuit of the second limiter tube. The VOM is now cnnnected across both cathodes of the diacriminatnr. A VTVM may also be used for thia purpose. With the aignal generator set for an unmodulated aignal at the IF frequency specified hy the mnnufacturar, the Primary trimmer ia first adjusted for Maximum output on the indicating meter. Following this the Secondary trimmer is adjuated for minimum output on the meter scale. It may be found that when adjuating the secondary three poaitinns of the trimmer will result in a minimum reading. The correct position ia the one where a slight rotation of the trimmer in either direction of the minimum position increases the meter reading.

The VOM is now connected in series with the ground return of the grid resistor of the limiter, with the instrument set at the most suitable micro-

amp range. If a VTVM is used the meter is connected across this grid resistor, using the lowest scale that will render satisfactory readings. The IF trimmers of the various stages are now aligned for maximum output starting with the last IF stage and proceeding to the first as in the conventional superheterodyne. The setting of the signal generator must not be disturbed from the original position of the dial setting where the original discriminator adjustments were made.

In some receivers it will be found that the IF transformers are overcoupled to obtain a broad bandpass characteristic. When aligning this type of IF transformer it will be found that two consecutive peaks are obtained when each trimmer is rotated. The procedure in this case is to adjust each trimmer for a dip between these peaks. This occurs when both adjustments result in the same output meter readings. It is advisable at this point to repeat all the foregoing adjustments, starting with the discriminator and ending with the first IF. This is to insure symmetry of response in the discriminator and in the IF stages.

In order to check response symmetry in the IF stages, the signal generator is shifted 50 to 100 kc on each side of resonance, at the same time observing the grid current in the limiter stage. Symmetrically aligned IF transformers will give fairly equal but opposite readings for equal and opposite frequency deviations from resonance. The linearity of the discriminator is checked in a similar manner, the voltmeter being connected now across both diodes of the discriminator.

ALIGNMENT OF FM OSCILLATOR CIRCUIT - The alignment of the oscillator and RF trimmers is conventional. The signal generator is set at approximately 100 mc. and the receiver dial to this same setting. Then, with the output indicating meter connected in the grid circuit of the limiter, the oscillator and RF trimmers are tuned consecutively for maximum output.

It will be observed that the procedure varies insofar as the discriminator transformer is first de-

tuned, thereby permitting all adjustments to be observed on the meter connected across the diode cathode connections of the discriminator. This is a timesaving procedure. Notice that the final adjustment is made on the discriminator transformer.

FM RATIO DETECTOR ALIGNMENT - The alignment of FM receivers employing ration detectors.

Equipment necessary: RF Signal Generator and VTVM

1. Connect VTVM from ground to audio lead of radio detector (discriminator). Connect generator tuned to 10.7 mc to grid of third FM i-f tube through .01 mfd capacity. Use minimum signal necessary for good indication in all following:

2. Turn secondary slug of ratio detector transformer (top slug) out as far as it will turn.

3. Tune primery for maximum output.

4. Connect generator to grid of second FM i-f tube.

5. Tune primary and secondary of third FM i-f transformer for maximum output.

6. Connect generator to grid of first FM i-f tube.

7. Tune primary and secondary of second FM i-f transformer for maximum output.

8. Connect generator to converter grid through 10,000 ohm resistor and .1 mfd. capacitor.

9. Tune primary and secondary of first FM i-f transformer for maximum putput.

10. Tune secondary of ration detector transformer for zero or minimum output.

11. After all adjustments, the signal generator should be tuned 50-100 kc on each of 10.7 mc. If equal deflections of opposite polarity on the VTVM are shown, the i-f system is aligned. Deflections ununequal by more than 10% or so indicate inaccurate alignment.

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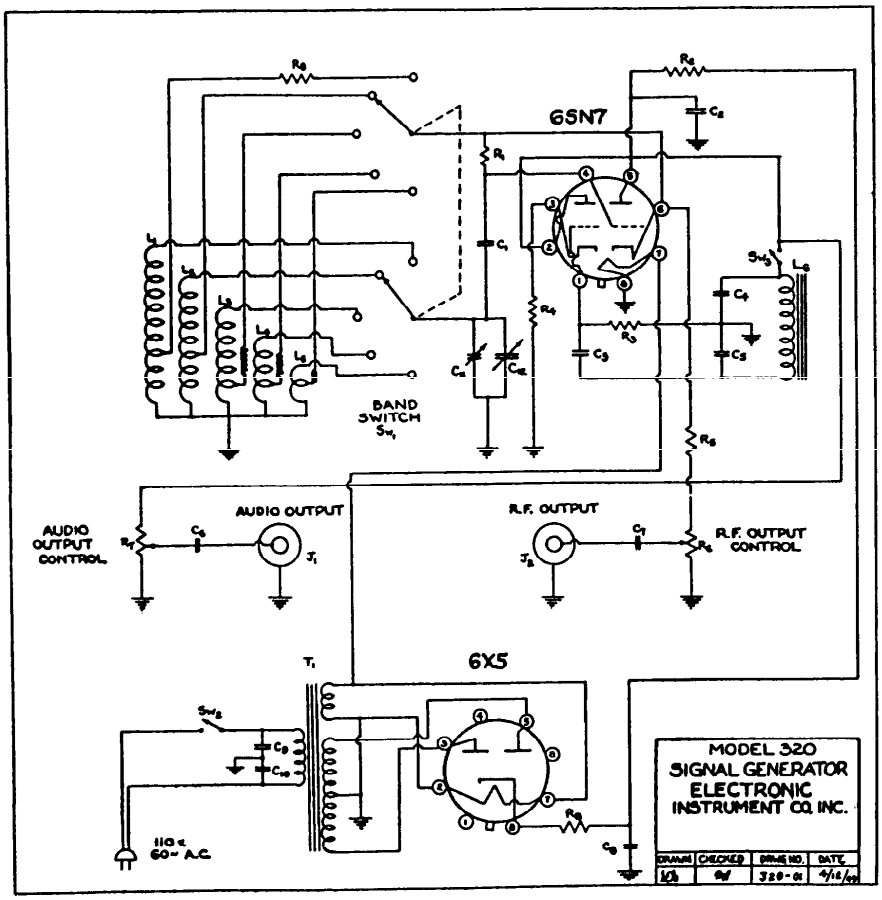
GUARANTEE

This instrument is guaranteed to be free from defects in material and workmanship in accordance with the terms of the Standard RMA Warranty.



ITEM	PART #	SPECIFICATION
R1	19	100 K RESISTOR
R2	20	5600 OHM RESISTOR
R3	21	65 K RESISTOR
R4	22	20K OHM RESISTOR 20
R5	23	10 K RESISTOR
R6	24	10 K POT WITH SWITCH
R7	25	500 K POT WITH SWITCH
R8	27	5000 OHM RESISTOR
R9	26	2700 OHM RESISTOR
C1	7	50 MMF MICA COND.
C2	8	.002 MFD. COND.
C3	9	.05 MFD. COND.
C4	10	.25 MFD. COND.
C5	11	.50 MFD. COND.
C6	12	.01 MFD. COND.
C7	12	.01 MFD. COND.
C8	14	16 MFD. OR OVER ELECTROLYTIC
C9	15	.1 MFD. COND.
C10	15	.1 MFD. COND.
C11	17	50 MMFD AIR TRIMMER
C12	18	360 MMFD TUNING COND.
T1	6	POWER TRANSFORMER
SW1	30	BANDSWITCH
SW2	24	PART OF R6
SW3	25	PART OF R7
L1	31	BAND A COIL - RED DOT
L2	32	BAND B COIL - BLUE DOT
L3	33	BAND C COIL - GREEN DOT
L4	34	BAND D COIL - WHITE DOT
L5	35	BAND E, F, G, COIL YELLOW DOT
L6	36	AUDIO OSCILLATOR CHOKE

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