OPERATING INSTRUCTIONS

FOR

TRIPLETT MODEL 1632 SIGNAL GENERATOR

TRIPLETT

THE TRIPLETT ELECTRICAL INSTRUMENT Co.

MANUFACTURERS OF

PRECISION MEASURING INSTRUMENTS

BLUFFTON, OHIO

TRIPLETT

INSTRUCTIONS

MODEL 1632 SIGNAL GENERATOR

The Triplett Model 1632 Signal Generator contains an R. F. Oscillator calibrated in ten fundamental bands, covering a frequency of 100 K. C. to 120 M. C. It also has a buffer amplifier and Modulator stage, a metering system, a crystal Oscillator stage, and a self-contained Heterodyne Detector. The wide frequency range of this unit, makes possible its use not only for broadcast and standard short-wave, but also the newly allotted frequency modulated and television channels.

THE HETERODYNE DETECTOR allows direct calibration of any external signal within the frequency range of the R. F. Oscillator, or direct calibration of the R. F. Oscillator against the harmonics of the crystal oscillator stage.

THE VOLTAGE OUTPUT ATTENUATOR AND METERING SYSTEM are calibrated in output units which are closely related, but not absolute Microvolts.

THE HIGH OUTPUT RANGE provides a maximum output of 0.3 volts direct reading, on the first seven bands with somewhat lower output on the last three bands.

OUTPUT VOLTAGE is available at the end of a Coaxial cable with a terminating switch providing three selections of output.

CIRCUIT DESCRIPTION

R. F. OSCILLATOR—This Oscillator uses a 6J5 tube in a two-circuit arrangement, with Bands A to G inclusive operating as tuned grid with plate Feedback and Bands H to J inclusive as a Colpitts Oscillator. The R. F. Coils are of the permeability tuned type and all bands are trimmed with air-dielectric condensers. The entire R. F. Coil and Trimmer assembly is enclosed in a separate shield housing. On Band J the inductance consists of a short length of wire and Peaks broadly at the low end of the Band. At some points of Band J greater output may be obtained by decreasing the R. F. Level control.

BUFFER AMPLIFIER AND MODULATOR—The Output of the R. F. Oscillator is capacity coupled to the injector grid of a 6SA7 tube employed as a buffer amplifier and modulator. For Bands G, H and I a plate choke is used in the buffer plate circuit, these chokes being resonant near the low frequency end of each Band. By means of the circuit selector switch, modulated voltage, either of the 400 cycle generated by the internal audio oscillator or at any frequency up to 5 megacycles from an external source is introduced into the control grid of this Modulator. The internal modulating voltage when employed is adjusted to a value which gives approximately 30% modulation. On external modulation, any desired percentage modulation may be obtained by adjusting the value of the applied voltage. A potential of 1.4 Peak Volts will give approximately 30% modulation.

OUTPUT ATTENUATOR AND METERING CIRCUIT—The Modulated or unmodulated voltage appearing in the plate circuit of the buffer amplifier is applied to the Output attenuator and metering circuit. The metered circuit consists of one section of a 6F8G dual-triode tube serving as a diode rectifier and D. C. Microammeter. The output attenuator consists of a variable control calibrated in output units and a sectional shielded resistance ladder network in ten to one output steps. The last shunt resistor of the output multiplier terminates the 5 foot coaxial transmission line. For low output voltage, up to approximately 50,000 output units, the multiplier section of the output multiplier is used with a fixed level indicated by the red line on the output meter with the output voltage being subdivided by the variable output control and the multiplier switch. The R. F. Level Control is used in adjusting the voltage level at the meter.

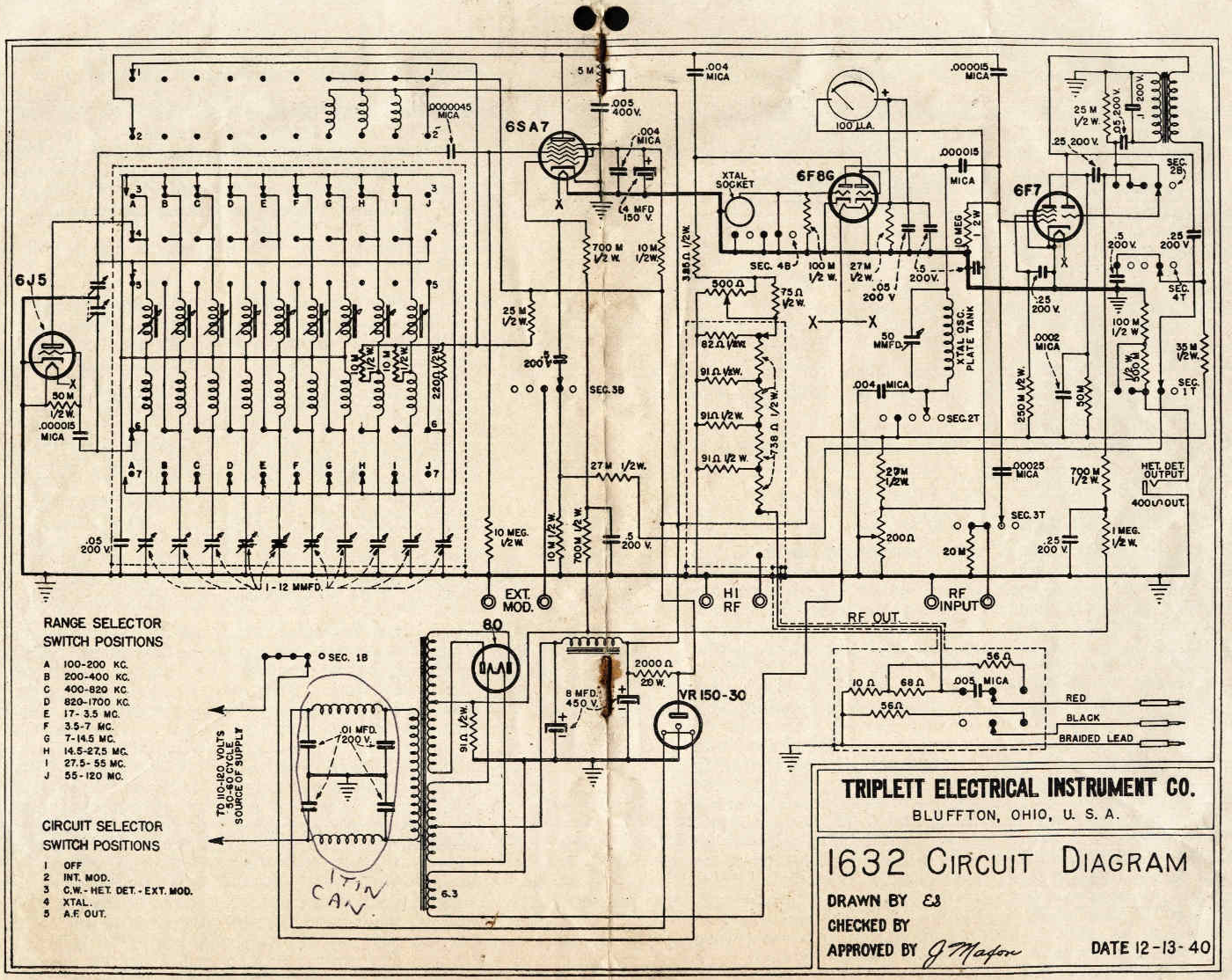
A separate jack is provided for obtaining voltages above 50,000 output units and the meter circuit is connected across this jack when the multiplier is placed in the high R. F. position. When the high R. F. output jack is used, the voltage is read directly on the meter and is the voltage appearing between the jack and ground. The variable control is left at maximum position when the high R. F. output jack is used and the impedance of this output connection is 500 ohms.

AUDIO OSCILLATOR AND HETERODYNE DETECTOR—A 6F7 tube is employed as an Audio Oscillator and Heterodyne Detector. The triode section of this tube is used as an Audio Oscillator when the selector switch is in the Modulated or Audio Output position and is used as an Amplifier for the Heterodyne Detector when the selector switch is set for Heterodyne detection. This Audio Oscillator is capacity

coupled to a resistor network when used for Modulation or Audio Output and approximately four peak volts is available at the phone jack. The Pentode section of the 6F7 is used as a Grid Leak Detector with the radio frequency voltage from the Buffer Modulator, external R. F. jack, and crystal oscillator output permanently connected to the Control Grid. This permits an external R. F. Signal or the crystal oscillator harmonics to produce a Beat note with the Signal Generator R. F. Oscillator, thereby permitting calibration of either the Signal Generator or the external R. F. Signal. This Beat note signal is heard with a headset connected in the phone jack.

CRYSTAL OSCILLATOR—The crystal oscillator stage is provided for the convenience of checking the calibration of the R. F. Oscillator and consists of a variable condenser, and coil combination which resonates at 1000 K. C. and is permanently capacity coupled to the control grid of the 6F7 Heterodyne Detector. A 5-prong socket is available on the top side of the Oscillator chassis to accommodate any standard crystal mounting and the fibre condenser shaft is located nearby for adjustment of this circuit. If a crystal with a frequency other than 1000 K. C. is used, it will be necessary to provide a coil that will resonate at the crystal frequency when connected in place of the 1000 K. C. coil across the 50 Mmfd variable condenser. The crystal Oscillator is in operation when the selector switch is turned to the point marked XTAL. Crystals are not furnished as a part of the Model 1632 and must be purchased separately when desired.

COAXIAL CABLE—Output termination is at the end of the Coaxial cable and consists of the last shunt resistor of the multiplier, output condenser, resistor network for doublet antenna connection, and selector switch enclosed in a shield. Red, black and braided leads project from the side of shield with the selection switch at the end. With the switch in the D position the red lead is connected direct to the end of the Coaxial cable and resistor network and is used with standard receiver antenna connection. With switch in C position a .005 M. F. D. (400 volt) condenser is connected in series with the red lead so that connection may be made directly to the grid circuit of the I. F. Stages without removing the Grid lead or affecting D. C. Voltages existing thereon. This condenser also serves as a protection for the multiplier attenuator circuit when working with D. C. circuits. In the D. D. position both the black and the red leads are connected to the doublet network for use on Receivers having a balanced antenna circuit. The braided ground lead should be connected to the chassis ground with all three switch positions.


6SA7
6F8G
6F7
6J5
6Q
VR 150-30
XTAL SOCKET
XTAL OSC. PLATE TANK
EXT. MOD.
HI RF
RF INPUT
RF OUT
HET. DET. OUTPUT
400Ω OUT
SEC. 1B
SEC. 2B
SEC. 3B
SEC. 3T
SEC. 4B
SEC. 4T
SEC. 2T
SEC. 1T
1-12 MMFD.
TO 110-120 VOLTS 50-60 CYCLE SOURCE OF SUPPLY
TIN CAN
RED
BLACK
BRAIDED LEAD
RANGE SELECTOR SWITCH POSITIONS
A 100-200 KC.
B 200-400 KC.
C 400-820 KC.
D 820-1700 KC.
E 17-3.5 MC.
F 3.5-7 MC.
G 7-14.5 MC.
H 14.5-27.5 MC.
I 27.5-55 MC.
J 55-120 MC.
CIRCUIT SELECTOR SWITCH POSITIONS
1 OFF
2 INT. MOD.
3 C.W.-HET. DET.-EXT. MOD.
4 XTAL.
5 A.F. OUT.
TRIPLETT ELECTRICAL INSTRUMENT CO.
BLUFFTON, OHIO, U. S. A.
1632 CIRCUIT DIAGRAM
DRAWN BY ES
CHECKED BY
APPROVED BY J Mason
DATE 12-13-40

OPERATION

The Model 1632 Signal Generator is designed to operate on 105-125 volts, 50-60 cycle, Alternating Current. The OFF and ON supply current is made with the selector switch. All controls and jacks are clearly identified by the marking on the panel and serve the following purposes:

1—Range SELECTOR—R. F. Oscillator Range Selector Switch.
2—R. F. INPUT AND GROUND JACKS—R. F. Input jacks to grid of Heterodyne Detector.
3—PHONE JACKS—Headphone jacks for Heterodyne Detector or Audio Output.
4—CIRCUIT SELECTOR—Power switch and selector for all circuits.
5—R. F. LEVEL—adjustment for meter voltages.
6—EXT. MOD. AND GND JACKS—Input jacks for external modulation voltage.
7—OUTPUT UNIT—Calibrated variable output control.
8—OUTPUT MULTIPLIER—Output Multiplier switch and high R. F. Selector.
9—OUTPUT PLUG—Coaxial cable connection.
10—HI R. F. JACK AND GND—Output jack for R. F. Voltage to .3 volts.
11—METER—Output Meter indicating R. F. Level.

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 benefit 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 out of adjustment any considerable amount. The purpose of aligning a Radio Receiver is two-fold—to adjust it for maximum performance, and to make the dial indicate 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 a 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 K. C. 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 of the gang condenser.

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 condenser, 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 therefore 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 preceeding the second detector. For this procedure the Coaxial cable selector switch should be in Position C, with the red wire connected to the grid of the tube preceeding the stage under alignment, and the ground clip to the Receiver ground. Since it is essential that the operating characteristics of a stage should 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 I. F. transformers have been aligned properly and when the alignment of the I. F. Amplifier is completed, alignment of the R. F. and Oscillator circuits should be made.

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.

On frequency ranges up to 1700 K. C. the average antenna is

essentially a capacity of 200 Micromicrofarads, if used on a high impedance primary. On frequencies above 1700 K. C., the average antenna can be represented by a 400 ohm carbon resistor.

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 which is usually about 80% of the maximum frequency tunable on that band, set the Receiver dials to the corresponding frequency. Turn the volume and sensitivity controls of the receiver full on, turn the Generator up 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 is used in 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 in the conventional manner.

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. 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.

ADJUSTMENTS

With the exception of tuning the crystal Oscillator, only one other adjustment should be attempted by the purchaser of this equipment. In the return circuit of the tube voltmeter a 200 ohm potentiometer is employed to cancel out the initial Cathode current of the 6F8G voltmeter tube. When this tube ages or is replaced, it may be necessary to re-adjust this control. In such cases, allow the unit to become thoroughly warmed up, remove the 6SA7 buffer tube from its socket so that no R. F. Voltage is applied to the diode circuit and adjust the 200 ohm control, for zero indication on the meter. This control is located near the crystal Oscillator variable condenser.

Due to the wide frequency coverage of this unit, the calibration of the R. F. Oscillator should never be attempted by the purchaser but should be returned to the factory for adjustment.

Care must be taken whenever the Generator is removed from the case so that the leads or parts near the R. F. Variable Condenser, tube mounting brackets and the R. F. Coil Shield are not disturbed as this would change the calibration of the R. F. Oscillator section.

The standard R. M. A. Warranty applies to this merchandise.

TUBE COMPLIMENTS

R. F. Oscillator	1	6J5 tube
Buffer Amplifier and Modulator	1	6SA7 tube
R. F. Voltmeter, Rectifier and Crystal Oscillator	1	6F8G tube
Audio Oscillator & Heterodyne Detector	1	6F7 tube
Voltage Regulator	1	VR150 tube
Power Rectifier	1	80 tube

The Triplett Electrical Instrument Co.
Bluffton, Ohio, U. S. A.

Form No. 121040. Printed in U. S. A.


RANGE SELECTOR
MODEL 1032
GND.
RF INPUT
PHONES
CW
MOD.
INT. MOD.
EXT. MOD.
XTAL
OFF
AF OUT
CIRCUIT SELECTOR
RF LEVEL
GND.
EXT MOD.
OUTPUT UNITS
SIGNAL GENERATOR
GND.
HI RF
X100
X1M
X10
X10M
OUTPUT
X1
HI
OUTPUT MULTIPLIER