Simpson

INSTRUMENTS THAT STAY ACCURATE

OPERATOR'S MANUAL

MODEL 407

REMOTE ALIGNER

SIMPSON ELECTRIC COMPANY

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Long Distance Dial 312
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SIMPSON MODEL 407 REMOTE ALIGNER (MOTOROLA)

DESCRIPTION

The Simpson Model 407 Remote Aligner is a small, compact and accurate crystal controlled signal generator designed primarily for alignment and servicing of TV remote control amplifiers and transmission units of the supersonic type within the frequency limits of the generator.

The instrument provides four crystal controlled fixed frequency output signals. A crystal selector switch enables selection of the desired frequency, and an output control is used to provide the desired output amplitude. The output signal can be coupled directly or through a *100,000:1 attenuator probe. A fifth position on the crystal selector switch provides for external insertion of a crystal to obtain any desired frequency within the frequency "pull-in" range of the instrument.

SPECIFICATIONS

Signal: Sinewave output. Fixed crystal controlled frequencies at:

Position A	38.50 KC	p/m .01%
B	39.75 KC	p/m .01%
C	40.00 KC	p/m .01%
D	41.00 KC	p/m .01%
E	Determined by external crystal insertion	

Frequency "Pull-In" Range: Approximately 35 kcps to 45 kcps

Free-Running Range (without crystals): Approximately 35 kcps to 45 kcps

Out-Put: Two pairs of output terminals provide equal outputs.

Direct: Continuously variable from approximately 100 microvolts to at least 1.0 volt.

*Through 100,000:1 probe: Continuously variable from 0 to at least 10.0 microvolts.

Power Required: 110 VAC 60 cycle

*ACCESSORIES

A 100,000:1 attenuator probe (with cable) is available for low level output applications. The probe output tip is a phono plug.

CONTROLS

CRYSTAL SELECTOR

This control is labeled A, B, C, D and E. The first four positions select the correct internal crystal for the desired output frequency. Position E makes provision for a fifth crystal which can be inserted externally. In position E, without an external crystal, the divider in the instrument is free-running at an uncalibrated frequency determined by the FREQ. LOCK control setting.

FREQUENCY LOCK

This control adjusts the frequency of the divider within the instrument. Proper adjustment is obtained when the divider "locks in" at 1/2 the control crystal frequency. (See Schematic.) The range of this control is from approximately 35 kcps to 45 kcps.

OUTPUT

This control adjusts the output signal amplitude. For accurate output amplitude adjustment, the output should be monitored across the output terminals.

FREQUENCY LOCK ADJUSTMENT

This adjustment is checked at the factory to provide accurately calibrated output frequencies for the four internal crystals. Before using the instrument, this control should be accurately set as per the following procedure:

1. Turn on instrument and allow a few minutes for adequate warm-up time.

2. Connect oscilloscope to test point "X" (left terminal of crystal socket) and ground. See Figure 1.

3. Set Crystal Selector switch to position B or C.

4. Set Output control at maximum.

5. Adjust FREQ. LOCK control for correct waveform as shown in Figure 1.

6. Determine the frequency lock range for a correct waveform.

7. Set the FREQ. LOCK control to the approximate center of this range.

8. Recheck remaining Crystal Selector positions. The same correct waveform should result for all four positions (A, B, C and D.) If not, reset FREQUENCY LOCK for optimum setting until correct waveform is seen at test point "X" for all crystal selector positions with the same FREQ. LOCK setting. Output amplitude of sinewave for positions A, B, C and D will be constant within p/m 1 db.

*NOTE: The pip shown in the correct waveform results from the block oscillator action within the unit.

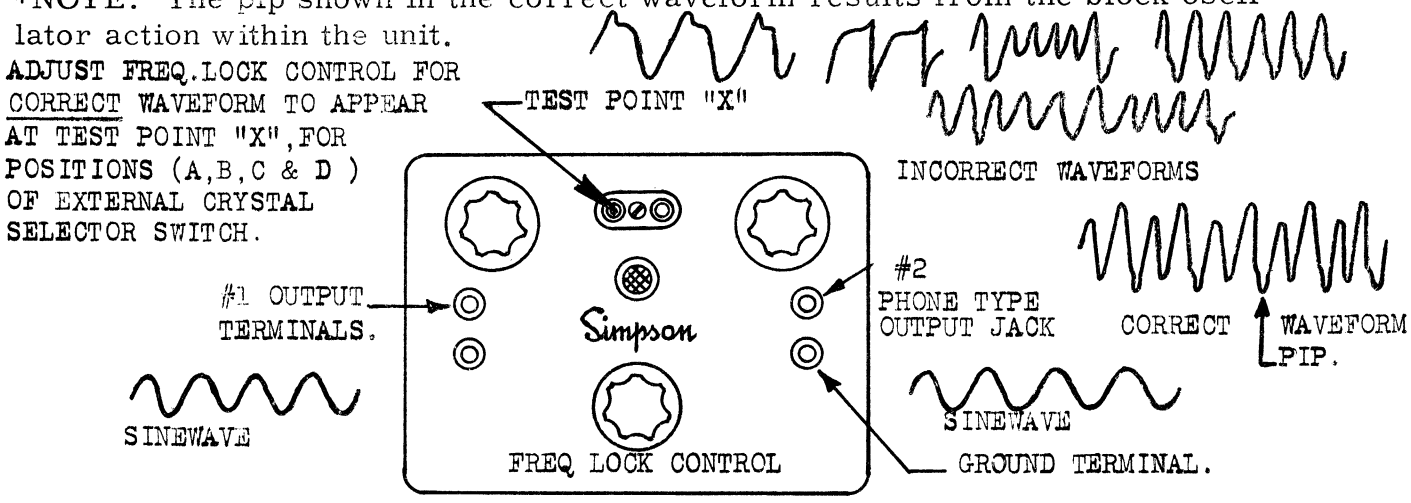


Figure 1 Waveforms produced at Output Terminals

OPERATION

Before operating the Model 407, be sure FREQUENCY LOCK ADJUSTMENT on Page 2 has been properly made for accuracy and stability.

1. Plug unit into 117 VAC, 60 cycle source and allow a few minutes for adequate warm-up.

2. Select desired signal output frequency with X'TAL SEL. switch.

3. Connect a VTVM, such as Simpson Model 311 or equivalent, across the output. Set the VTVM to lowest adequate ACV range. Maximum obtainable output from the Model 407 is about 1.0 volt.

(A) If a high level output is desired, connect a direct cable to the binding post output. Output can be continuously monitored with VTVM connected.

(B) If a low level output is desired, connect cable with a 100,000:1 attenuator probe to the binding post output. Read the VTVM meter directly and multiply reading by 10 for microvolts. Output can be continuously monitored with the VTVM.

4. Adjust OUTPUT control for desired output amplitude.

*ACCESSORY ATTENUATOR PROBE (100,000:1)

The attenuator probe has been accurately adjusted at the factory to produce exactly 100,000 to 1 attenuation. DO NOT ADJUST TRIMMER CAPACITOR IN PROBE. This would produce a different attenuation and would result in an unknown output voltage unless recalibrated.

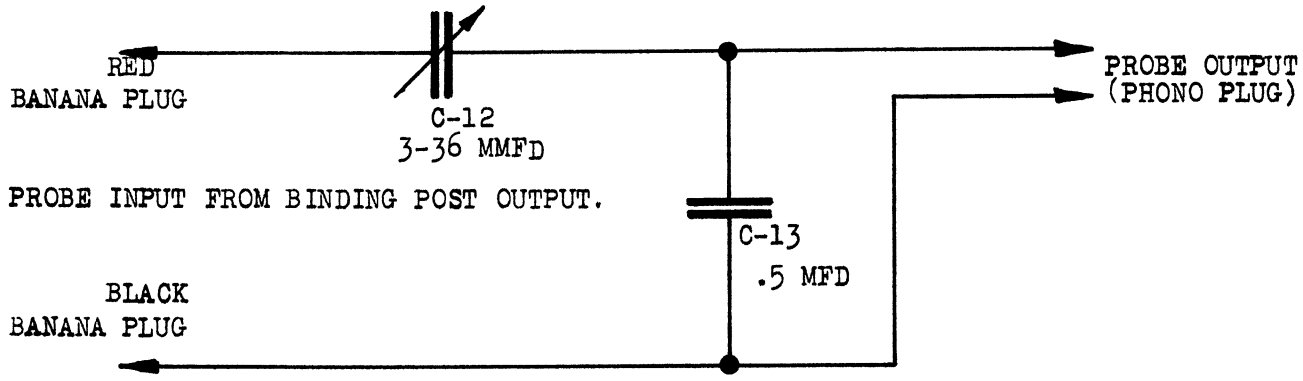


Figure 2 Attenuator Probe (100,000:1)

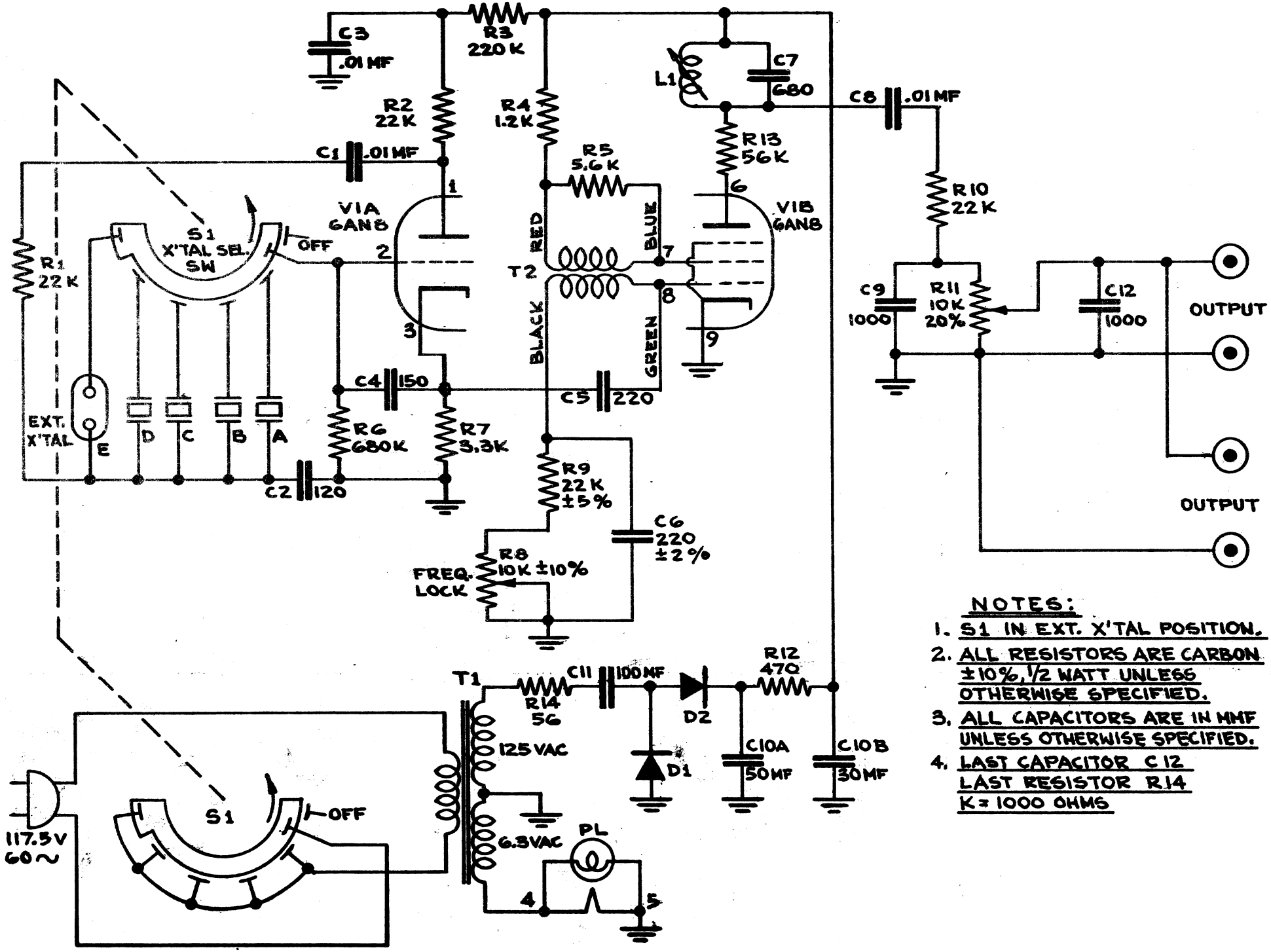
MODEL 407 PARTS LIST

SYMBOL	DESCRIPTION	PART NO.
C_1	Capacitor, .01 mf, 600 WVDC	1-115385
C_2	Capacitor, 120 mmf, 600 WVDC, ceramic	1-114362
C_3	Capacitor, 01 mf, 600 WVDC	1-115385
C_4	Capacitor, 150 mmf, 500 WVDC	1-113907
C_5	Capacitor, 220 mmf, 500 WVDC, ceramic	1-113854
C_6	Capacitor, 200 mmf, 500 WVDC, p/m 2% silver mica	1-116554
C_7	Capacitor, 680 mmf, 600 WVDC, ceramic	1-114363
C_8	Capacitor, .01 mf, 600 WVDC	1-115385
C_9	Capacitor, 1000 mmf, 500 WVDC, ceramic	1-115462
$C_{10}A$	Capacitor, 50 mf, 350 WVDC, electrolytic	1-115382
$C_{10}B$	Capacitor, 30 mf, 350 WVDC electrolytic	1-115382
C_{11}	Capacitor, 100 mf, 150 WVDC, electrolytic	1-115383
C_{12}*	Capacitor, Variable, 3-36 mmf, 500 WVDC	1-116204
C_{13}*	Capacitor, .5 mf, 100 WVDC	1-115384
C_{14} - C_{15}	Capacitor, 1000 mmf, 500 WVDC	1-115462
R_1	Resistor, 22K ohm, 1/2 W p/m 10%	1-113439
R_2	Resistor, 22K ohm, 1/2 W, p/m 10%	1-113439
R_3	Resistor, 220K ohm, 1/2 W, p/m 10%	1-114226
R_4	Resistor, 1.2K ohm, 1/2 W, p/m 10%	1-114680
R_5	Resistor, 5.6K ohm, 1/2 W, p/m 10%	1-114465

*Used in Accessory Attenuator Probe

SYMBOL	D E S C R I P T I O N	PART NO.
R6	Resistor, 680K ohm, 1/2 W, p/m 10%	1-114346
R_7	Resistor, 3.3K ohm, 1/2 W, p/m 10%	1-114225
R_{11}	Resistor, 10K ohm, p/m 30% Frequency Lock Control	1-116939
R_9	Resistor, 22K ohm, 1/2 W, p/m 10%	1-113439
R_{10}	Resistor, 22K ohm, 1/2 W, p/m 10%	1-113439
R_8	Resistor, 10K ohm, p/m 10%, Output Control	1-118382
R_{12}	Resistor, 470 ohm, 1/2 W, p/m 10%	1-113940
R_{13}	Resistor, 56K ohm, 1/2 W, p/m 10%	1-113947
R_{14}	Resistor, 56 ohm, 1/2 W, p/m 10%	1-115388
V_1	Tube, 6AN8 GT, Oscillator	1-115373
D_1	Rectifier, Selenium, 20 ma, 130 VRMS	1-115381
D_2	Rectifier, Selenium, 20 ma, 130 VRMS	1-115381
T_1	Transformer, Power	1-115380
T_2	Transformer, Blocking Oscillator	1-117923
L_1	Coil, variable	1-115470
A	Crystal, 76.570 KC, p/m .01%	1-117919
B	Crystal, 78.570 KC, p/m .01%	1-117920
C	Crystal, 81.610 KC, p/m .01%	1-117921
D	Crystal, 83.610 KC, p/m .01%	1-117922
S_1	Switch, External selector	1-117926
M_1	Pilot light, #47, 6-8 volts	1-113747
E	Socket, External X'Tal.	1-113966

SYMBOL	DESCRIPTION	PART NO.
Knobs	X'Tal Sel.	1-115546
	Output	1-115546
	Freq. Lock	1-115658
	Attenuator (100,000:1) Probe Assembly Complete	10-890431
	Probe Assembly (100,000:1)	10-860479
	Cable, Assembly, Attenuator Probe	10-830096



NOTES:

1. S1 IN EXT. X'TAL POSITION.
2. ALL RESISTORS ARE CARBON ±10%, 1/2 WATT UNLESS OTHERWISE SPECIFIED.
3. ALL CAPACITORS ARE IN MMF UNLESS OTHERWISE SPECIFIED.
4. LAST CAPACITOR C 12
   LAST RESISTOR R14
   K = 1000 OHMS

WARRANTY

SIMPSON ELECTRIC COMPANY warrants each instrument and other articles of equipment manufactured by it to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory any instrument or other article of equipment which shall within 90 days after delivery of such instrument or other article of equipment to the original purchaser be returned intact to it, or to one of its authorized service stations, with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on its part, and SIMPSON ELECTRIC COMPANY neither assumes nor authorizes any other persons to assume for it any other liability in connection with the sale of its products.

This warranty shall not apply to any instrument or other article of equipment which shall have been repaired or altered outside the SIMPSON ELECTRIC COMPANY factory or authorized service stations, nor which has been subject to misuse, negligence or accident, incorrect wiring by others, or installation or use not in accord with instructions furnished by the manufacturer.