Stewart-Warner Corp.

	Model: R-116	Chassis:	Year: Pre March 1934
	Power:	Circuit:	IF:
	Tubes:		
	Bands:		

Resources
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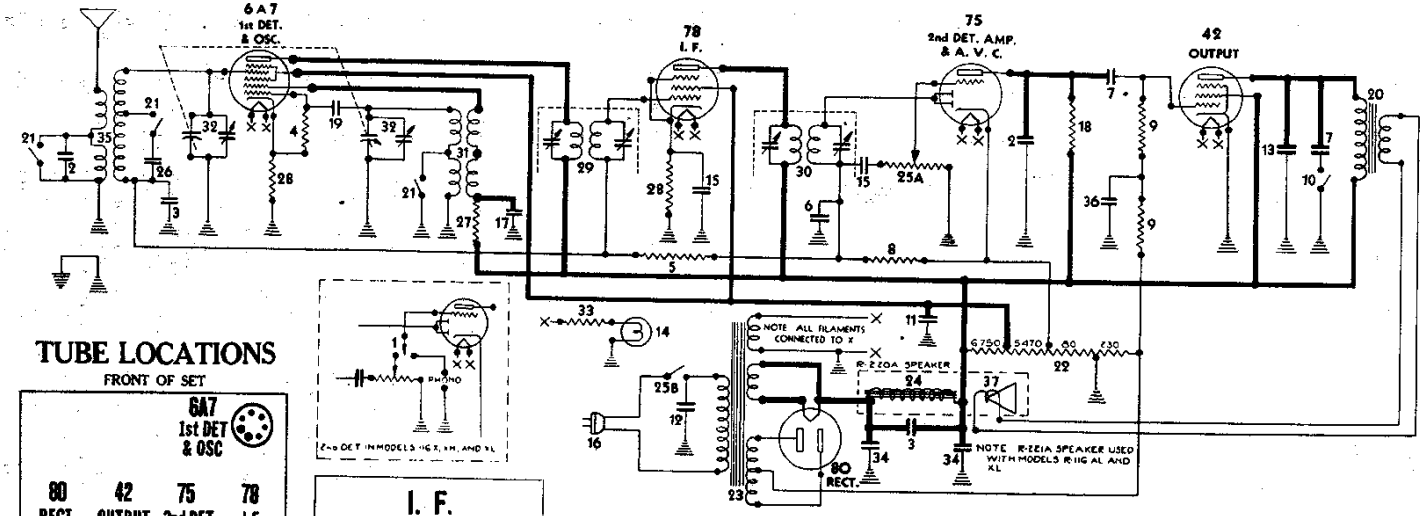

TUBE LOCATIONS

FRONT OF SET

I. F. FREQUENCY 456 K. C.

VOLTAGE TABLE

Line Voltage 115 A. C. — Volume Control Full On

Type of Tube	Position in Circuit	Filament Voltage	Plate Voltage	Screen Grid Voltage	Control Grid Voltage	Cathode (Bias) Voltage
6A7*	1 Det & Osc.	6.15	240	90	0	2.7
78	I. F.	6.15	240	90	0	2.4
75	2nd Det.	6.15	110		0	1.3
42	Output	6.15	227	240	-1.5†	0
80	Rect.	5.0	320 Volts D. C. From Filament to Ground			

* Oscillator plate voltage, 130; Oscillator grid voltage, —7.5.

† Actual bias voltage on type 42 tube is 17.0 volts measured across 230 ohm section of voltage divider.

Speaker field voltage, 85.

All D. C. voltages are to be measured with respect to ground, using a high resistance voltmeter of 1000 ohms per volt. Readings will vary, depending upon voltage range of meter, being higher for higher range instruments. This variation is most marked for second detector plate voltage.

Readings taken with set analyzers will be different because such instruments generally measure voltages with respect to cathode instead of ground.

R-116 PARTS LIST

Diag. No.	Part No.	Description	List Price
1	73689	Phonograph Switch (Used in R-116X, XL, and XH)	$1.00
2	81158	.0001 Mfd. Mica Fixed Condenser	.25
3	81630	.1 Mfd. 100 volt Fixed Condenser	.30
4	81681	29,000 ohm, ½ watt Carbon Resistor	.20
5	81682	1.1 megohm, ½ watt Carbon Resistor	.20
6	81812	.00051 mfd. Mica Fixed Condenser	.25
7	83007	.02 Mfd. 600 volt Fixed Condenser	.35
8	83072	510,000 ohm, ½ watt Carbon Resistor	.20
9	83082	260,000 ohm, ½ watt Carbon Resistor	.20
10	83179	Tone Control Switch	.30
11	83214	.25 mfd. 250 volt Fixed Condenser	.30
12	83216	.02 mfd. 1000 volt Fixed Condenser	.35
13	83219	.01 mfd. 600 volt Fixed Condenser (Used in models R-116-AL and XL only. See No. 83552 for R-116-A, AH, X and XH)	.30
14	83278	6.3 volt Pilot Light Bulb	.15
	83352	.015 mfd. 600 volt Fixed Condenser (Used in Models 116A, AH, X, and XH only)	.35
15	83353	.05 mfd. 100 volt Fixed Condenser	.30
16	83406	Power Cord and Plug	.50
17	83440	.1 mfd. 400 volt Fixed Condenser	.35
	83455	Diaphragm and Shell Assembly (for R221A Speaker used in Models R-116AL and XL)	2.75
18	83538	260,000 ohm, 1 watt Carbon Resistor	.25
19	83539	.00026 mfd. Mica, Fixed Condenser	.25
20	83541	Output Transformer for R-220A Speaker (Used in Models R-116 A, AH, X and XH. See No. 83625 for R-116, AL and XL)	2.00
21	83542	Range Switch	1.00
22	83543	6750-5470-80-230 ohm Voltage Divider	1.00
23	83544	Power Transformer, 115 volts, 60 cycles. (Used in R-116A, AH, and AL only. See No. 83620 for 115-250 volt, 25-60 cycle)	4.25
24	83548	Field Coil and Housing for R-220A Speaker. (Used in R-116A, AH, X, and XH. See No. 83635 for R-221A Speaker Field Coil	2.50
25-A, 25-B	83551	{500,000 ohm Volume Control, {Line Switch} in one unit	1.25
26	83554	.0011 mfd. Mica Fixed Condenser	.25
27	83555	21,000 ohm, 1 watt Carbon Resistor	.25
28	83556	310 ohm, ½ watt Carbon Resistor	.20
29	83557	1st I. F. Transformer Complete	1.75
30	83558	2nd I. F. Transformer Complete	1.75
31	83559	Oscillator Coil	1.25
32	83565	Variable Condenser	2.50
33	83566	10 ohm Wire Wound Resistor	.25
34	83613	8 mfd. 440 volt Dry Electrolytic Condenser	1.65
	83620	Power Transformer, 115-250 volts 60 cycles. (Used in Models R-116X, XH, XL)	6.00
	83625	Output Transformer for R-221A Speaker. (Used in Models R-116AL and XL only)	2.00
35	83631	Antenna Coil	1.50
36	83632	.5 mfd. 100 volt Fixed Condenser	.40
	83635	Field and Hum Bucking Coils (for R-221A Speaker used in R-116 AL and XL)	2.50
37	83662	Diaphragms and Shell Assembly for R-220A Speaker. (Used in R-119A, AH, X and XH only. See No. 83455 for R-221A Speaker)	2.50

MISCELLANEOUS PARTS NOT SHOWN ON DIAGRAM

83447	Range Switch Knob	.10
83470	Speaker Cable (Used in R-116 AL and XL)	.50
83560	Tube Shield	.15
83574	Pilot Light Socket and Bracket	.15
83577	Escutcheon (Used in R-1161 and R-1162)	.35
83579	Knob for R-1161-2-3-4	.25
83580	Dial & Bushing (Used in R-116A, AL, X, & XL	.45
83581	Volume Control Dial and Bracket (Used in R-116A, AL, X, and XL	.12
83590	Volume Control Dial and Bracket (Used in R-116AH and XH)	.12
83593	Escutcheon (Used in R-1163-A)	.35
83603	Dial and Bushing (Used in R-116AL & XL)	.45
83637	Escutcheon (Used in R-1165)	.35
83638	Knob for Model R-1165	.30
R-220A	Dynamic Speaker (6 inch used in Models R-116A, AH, X, and XH)	6.25
R-221A	Dynamic Speaker (8 inch used in Models R-116L and XL)	7.00

SERVICE DATA FOR MODEL R-116 CHASSIS

CIRCUIT DESCRIPTION

The Stewart-Warner Model R-116 chassis uses a five-tube superheterodyne circuit. The incoming signal goes to the tuned first detector circuit and then beats with the oscillator output to produce a 456 K. C. intermediate frequency signal. This particular frequency is chosen to prevent image frequency interference.

The 456 K. C. signal is amplified by a high-gain I. F. stage and is then rectified by the diodes of the 75 tube which are connected in parallel. The audio component of the rectified signal is impressed across the 500,000 ohm potentiometer through condenser No. 15. The volume is controlled by selecting any desired portion of the A. F. voltage with the moving arm of the potentiometer which is connected to the grid of the 75 tube. The triode section of this tube acts as a high-mu audio amplifier, resistance-coupled to the type 42 output tube. This method of coupling produces excellent tone quality.

The necessary A. V. C. operating voltage is secured by smoothing out the modulated drop across resistor No. 8 by a resistance-capacity filter consisting of resistor No. 5 and condensers No. 3 and 6, and applying the voltage to the grids of the 6A7 and 78 tubes. Thus the bias of these tubes increases and drops in proportion to the strength of the received signal and tends to maintain the audio output at a practically constant value.

For the reception of short wave signals, portions of the antenna coil primary and the oscillator grid coil are shorted and a condenser is connected across part of the antenna coil secondary. This reduces the inductance of the coils and thus permits tuning to higher frequencies.

The R-116 A, H, and L are designed for operation on 115 volt 60 cycle power circuits while the R-116 X, XH, and XL are adaptable for use with voltages of 115, 125, 230, 240, or 250 at any frequency from 25 to 60 cycles. To permit this flexibility of operation, the power transformer has two separate tapped primaries. The connections for the various line voltages are shown on the tag attached to the transformer. All X models are also wired for operation with a high impedance phonograph pick-up. The R-116 AL and XL chassis are used in console cabinets with 8 inch speakers. The others are used in table models with 6 inch speakers.

ALIGNING THE R-116 CHASSIS

Before attempting to align a set, the service man should remove the chassis from the cabinet and become familiar with the general layout and with the function and location of the various alignment trimmers. The following discussion briefly explains how each circuit is affected during the various steps of alignment.

The first detector and oscillator circuits are aligned by the two trimmers located on the two-gang variable condenser and are kept in exact step by the special shape of the rotor plates of the oscillator section. This shaping of the plates makes it unnecessary to use a padding condenser for low frequency alignment.

The I. F. transformers, located on the top of the chassis in front of the 75 and 78 tubes, are the tuned-input, tuned-output type, with each winding tuned by a separate trimmer condenser. The four I. F. adjustments are reached through holes in the tops of the I. F. transformer shields.

PRELIMINARY STEPS

A high-grade modulated oscillator and a sensitive output meter are necessary for correct alignment of the Model R-116 receiver. It must be possible to reduce the oscillator output to a very low value or the signal will cause the A. V. C. circuit to function making it difficult to secure exact alignment. The output meter must be sufficiently sensitive to give a satisfactory reading with the low signal.

All aligning adjustments should be made with the **volume control full on but with no broadcast signal being received.** The output meter should be connected between the plate of the 42 and the chassis through a .25 mfd. condenser or across the speaker voice coil, depending upon the type used.

ALIGNING PROCEDURE

The step-by-step routine given below should be carefully followed after reading the preceding instructions.

1. The modulated oscillator should be tuned to a frequency of 152, 228, or 456 K. C. to align the 456 K. C. I. F. amplifier. **Do not use the oscillator calibration curve to determine this frequency but check the oscillator** harmonics against broadcast stations which are required to be on their assigned frequency. First check the accuracy of the broadcast dial by noting whether stations come in at the correct setting. With the oscillator set at 152 K. C., the third harmonic is used for aligning while the fifth harmonic can be tuned in on the broadcast dial. It should come in at exactly 760 K. C.

To be sure that you have the harmonic of the 152 K. C. signal, tune in the other harmonics on the broadcast dial. These should come in 152 K. C. on either side of the original setting. With a 228 or 456 K. C. oscillator signal a similar procedure can be followed using 910 K. C. (The exact frequency to be used is 912 K. C. but 910 will be satisfactory.)

2. Connect the oscillator output from the grid cap of the 6A7 to chassis. Turn the tuning condenser of the set to some point where it has no effect upon the signal strength.

3. Adjust the oscillator output to give about one-half full scale deflection of the output meter.

ADJUSTING THE I. F. CIRCUIT

1. Adjust all four I. F. trimmer condensers, in each case tuning carefully to make sure that maximum deflection is obtained on the output meter. It is desirable to use an all-bakelite screw driver for this purpose although one with a small metal point may be used.

No inward or sideward pressure should be applied to the alignment tool, or the condenser may spring back to a different setting as soon as the tool is removed.

2. Go back and repeat all four adjustments since the changing of each I. F. trimmer affects the others to a certain extent, thus necessitating readjustment.

ADJUSTING R. F. AND OSCILLATOR CIRCUITS

1. Connect a .0001 mfd. condenser from the blue aerial wire to the output of the oscillator, and ground both set and oscillator. Adjust the oscillator frequency to 1400 K. C. and carefully tune the receiver to give maximum output. Set the oscillator output to produce about half-scale deflection on the output meter.

2. Carefully adjust the 1st detector trimmer which is the front one on the gang, to give a maximum output meter reading. Retune the set and again adjust the trimmer. The rear section which tunes the oscillator, should not be touched unless the set is out of calibration at the high frequency end of the dial.

If the set is out of calibration it can be re-calibrated as follows: Disconnect the test oscillator, connect an aerial and set the tuning dial at the frequency reading of some broadcast station between 1000 and 1500 K. C., whose exact frequency is known and which can be picked up without any difficulty. Adjust the oscillator trimmer (rear) until this station is brought in with maximum volume. Re-connect the modulated oscillator and output meter and again adjust the front trimmer for maximum output meter reading. This is necessary because the first detector circuit is always affected by any change in the oscillator tuned circuit.

HUM AND NOISE ELIMINATION

Hum in early R-116 table model chassis may be reduced by reversing the two speaker field coil leads. This may be done underneath the chassis where these leads connect to the two electrolytic condensers. The green field coil lead should go to the front electrolytic condenser, and the white lead to the rear electrolytic. Later production chassis already have the connections made in this way. All console model chassis are already wired for least hum with the white lead connected to the front electrolytic and the green to the rear electrolytic.

Excessive hum may also be due to the fact that the A. C. line lead is too close to the .05 mfd. 100 volt condenser No. 15 which is hooked in series with the volume control. The remedy is to separate the two as far as possible.

Another cause of hum is poor contact at the grounding lug of the voltage divider. This may be caused by the grounding screw being loose or may be at the point where the resistance wire is soldered to the terminal strap on the resistor. To eliminate hum from this cause, first tighten the grounding screw and solder to the chassis. If the hum continues, the 230 ohm negative end of the voltage divider should be replaced by a **230 ohm wire wound** resistor. The two wires connected to the negative end of the voltage divider should be unsoldered and hooked to one end of the new resistor. The other end should be soldered to ground, preferably to the lug located just below the short wave switch.

Intermittent or noisy operation especially noticeable when the dial is turned or when the variable condenser is jarred, is frequently caused by metal particles shorting the variable condenser. This trouble can be eliminated by cleaning with a blast of air or by running a pipe cleaner between the plates.