

Imported American Receivers

RECEIVERS imported by the Government from the USA are of many makes and types. It is not possible to publish data for all models but, after analysis of the shipments, we have prepared service sheets dealing with the models and types of circuit present in the largest numbers. The Emerson reviews are the first of these and more will follow.

EMERSON 301, Etc.

Continued from opposite page

Voltage Analysis. — Readings taken with a 1,000 ohms-per-volt meter. Voltages shown are from the point indicated to the chassis side of the on-off switch with the volume control at full volume and no signal. The mains voltage (after the line cord) for these readings is 117.5 volts AC. Measurements on DC will be lower than those shown.

Valve.	Plate.	Screen.	Cathode	Heater.*
12SA7	88	88	0	12
12SK7	88	88	0	12
12SQ7	30	—	0	12
50L6	82	88	5.6	50
35Z5	—	—	120	35

Voltage across dial light—4.5 volts.
Voltage across speaker field—32 volts.
Resistance of speaker field—450 ohms.
*Measured across heater pins.

GANGING

IF Circuits.—Rotate the variable condenser to minimum capacity. Feed 455 kc to the grid of the 12SA7 through a .01 mfd condenser and adjust the four IF trimmers for maximum response.

The grid of the 12SA7 may be reached by clipping the ganging oscillator lead to the fixed section of the aerial tuning condenser.

RF Circuits.—Set the dial pointer at 160. Feed 1,600 kc from the ganging oscillator into a loop of wire about 12 in. in diameter.

Hold this radiating loop about 12 in. away from and parallel with the aerial coil. Advance the input to the loop until a satisfactory deflection is obtained on the output meter.

Adjust first the oscillator trimmer for maximum response, and then the aerial trimmer. The oscillator condenser is the front section of the variable condenser.

EMERSON 414, 415, 419, 439, 441

Single waveband, 540–1,630 kc (555–184 metre), six-valve superhet for operation on 105–125 volt AC or DC mains. A line cord is supplied with the set to allow it to work on 230 volt AC or DC mains. This line cord must not be cut.

ALL models have self-contained aeri-als and do not require additional aerial connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor aerial should be used. For this purpose, a lead has been brought out of the rear near the mains lead.

The self-contained aerial is slightly

THE following American receivers employ the same valve combination as this Emerson 414 series, and have similar circuit arrangements:—

Admiral	.. 4202—B6 : 4203—B6 : 4204—B6.
Fada	.. 215 : 252 (some models only).
GE	.. L604 : L613 : L621 : L600 (all with 12B7 as HF and IF valves).
Motorola	.. 61 x 17.
RCA	.. 15x : 16 x 2 : 16 x 3 : 16 x 11 : 16 x 13 : 26 x 1 (12SG7 as HF valve) : 26 x 3 : 26 x 4.
Stromberg	.. 500H.

directional and the set should be rotated through 90 degrees, leaving it at the position where the station being received is at maximum volume. These receivers do not require an earth connection and, in particular, no earthed wire must be connected to the chassis.

Models 414, 415 and 419 are shown in the circuit diagram, Fig. 1, and the differences in the design of models 439 and 441 are shown in Fig. 2.

The aerial coil, L1, is tuned with the

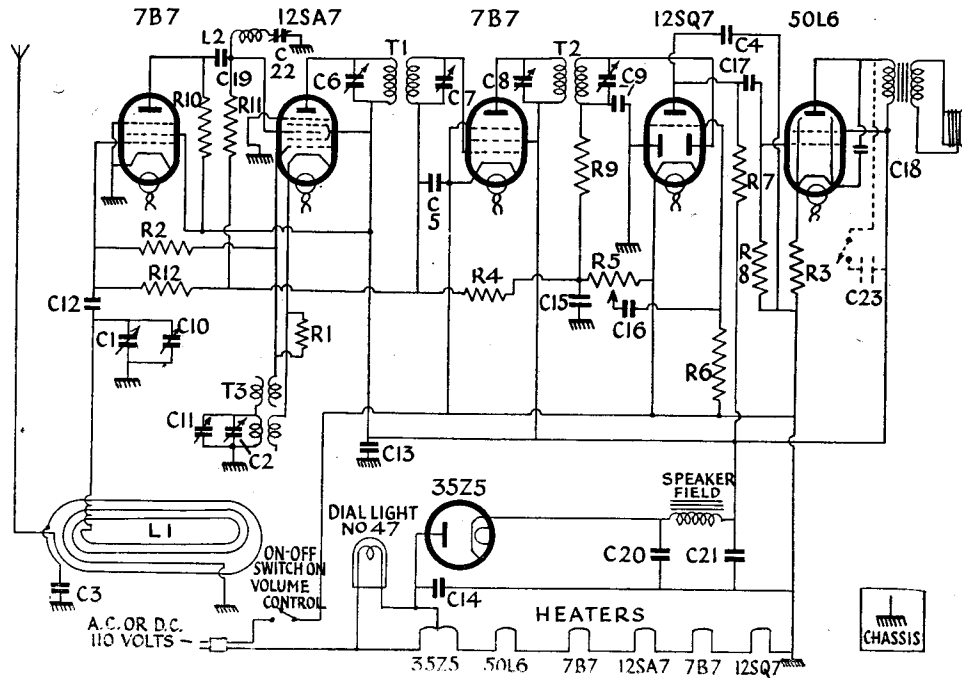
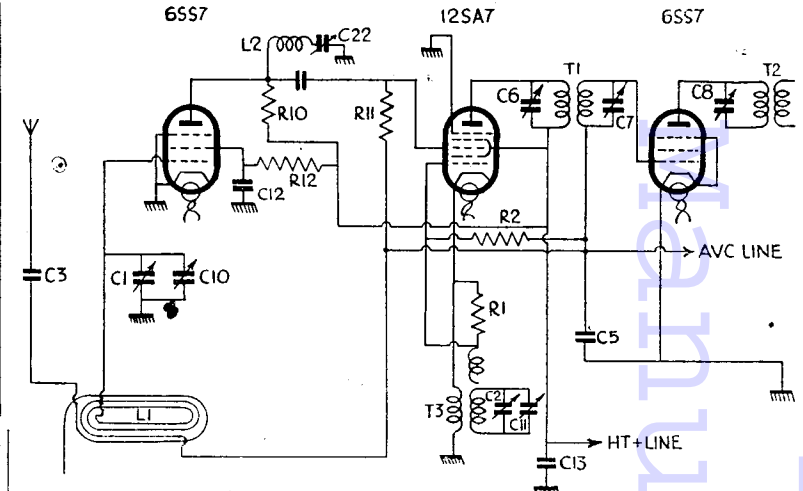


Fig. 2: Top of the page is the HF part of the circuit of models 439 and 441. Rest of the circuit is like that for the 414.

Fig. 1: The circuit of models 414, 415 and 419. The set has an RF stage in front of the frequency changer.



	Models 414, 415, 419	Models 439, 441	DESCRIPTION.
L1			Loop aerial.
L2			Wave trap.
T1			First IF transformer.
T2			Second IF transformer.
T3			Oscillator coil.
R1	20,000 ohm	200,000 ohm	1/2-watt carbon.
R2	10 meg	15 meg	1/2-watt carbon.
R3	140 ohm	140 ohm	1/2-watt wire wound.
R4	3 meg	3 meg	1/2-watt carbon.
R5	.5 meg	.5 meg	Vol. control.
R6	15 meg	15 meg	1/2-watt carbon.
R7	500,000 ohm	500,000 ohm	1/2-watt carbon.
R8	500,000 ohm	500,000 ohm	1/2-watt carbon.
R9	50,000 ohm	50,000 ohm	1/2-watt carbon (part of T2).
R10	10,000 ohm	10,000 ohm	1/2-watt carbon.
R11	25,000 ohm	25,000 ohm	1/2-watt carbon.
R12	1 meg	33,000 ohm	1/2-watt carbon.
C1, C2			Two-gang condenser.
C3	.002 mfd	.002 mfd	600-v tubular.
C4	.0002 mfd	.0002 mfd	600-v tubular.
C5	.05 mfd	.05 mfd	200-v tubular.
C6, C7, C8			Trimmers, part of IF trans.
C9			Trimmer and fixed condenser, part of T2.
C10, C11			Trimmers, part of gang.
C12	.00022 mfd	.05 mfd	Mica (.00022 mfd), 400-v tubular (.05).
C14	.05 mfd	.05 mfd	400-v tubular.
C15	.00011 mfd	.00022 mfd	Mica.
C19			
C17	.02 mfd	.02 mfd	400-v tubular.
C18	.03 mfd	.02 mfd	400-v tubular.
C20	20+20 mfd	20+20 mfd	Dual, 150-v electrolytic.
C21			
C22			Trimmer, part of wave trap.
C23		0.4 mfd	200-v tubular.

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455 kc. AVC voltage is applied to the HF, pentagrid and IF valves.

The double-diode-triode is resistance-capacity coupled by R7, C17, R8, to the beam power output valve. C18 is for tone correction and in models 439 and 441 there is an additional tone control with C23, and its accompanying switch.

All the cathodes are returned to chassis. The heater circuit has all the valves in series, the dial light being taken from a tapping on the rectifier heater. The set will work with the dial light out, but it is advisable to replace as soon as possible if it should burn out. If one of the valves is removed or burns out the dial light will not glow.

If replacements are made or the wiring disturbed in the HF section, the receiver should be carefully realigned.

In operating the receiver on DC, it may be necessary to reverse the line plug for correct polarity.

The colour coding of the IF transformer leads is as follows:—

- Grid—green. Anode—blue.
- Grid return—black. HT+—red.

GANGING

IF Circuits.—Rotate the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7

valve (pin No. 8) through a .01 mfd. condenser and adjust the four IF trimmers for maximum response.

Wave Trap.—Feed 455 kc to the external aerial lead and adjust the wave trap condenser until minimum response is obtained.

HF Circuits.—Set the dial pointer at 140. Feed 1,400 kc from the ganging oscillator into a loop of wire about 12 in. in diameter. Hold this radiating loop about 12 in. away from and parallel with the aerial coil.

Advance the input to the loop until a satisfactory deflection is obtained on the output meter. Adjust first the oscillator trimmer for maximum response and then the aerial trimmer.

The oscillator condenser is the front section of the variable condenser.

VALVES AND VOLTAGES

Models 414, 415, 419	Models 439, 441
1 7B7 .. HF amplifier	6SS7
2 12SA7 .. Pentagrid modulator-oscillator	12SA7
3 7B7 .. IF amplifier	6SS7
4 12SQ7 .. Detector, AF amplifier and AVC	12SQ7
5 50L6 .. Beam power output	50L6
6 35Z5 .. Half-wave rectifier	35Z5

NB.—A few receivers of model 439 will be found to use 0.3 amp heater valves instead of the 0.15 amp heater types shown above. The valve combination is then as follows: 6SG7, 6SA7, 6SK7, 6SQ7, 25L6, 25Z6. The circuit arrangement is substantially the same.

Continued in next column

From the Engineer's Case Book

ENGINEERS are sometimes puzzled to find that a set is unstable at certain parts of the dial after a condenser in the HF or LF section has been replaced.

This may be due to one of two causes. Either the original condenser was of the non-inductive type and the replacement is one of the type in which the layers are wound in a roll; or the outer layer of the condenser may accidentally have been connected to a point at high HF or LF potential and may be causing reaction.

In the former case there is no alternative but to fit a non-inductive type; but in the second, all that is necessary is to turn the condenser round so that the outer layer of foil is at the low HF potential end of the circuit (usually HT+, or chassis).

As condensers are not always marked, the experiment has to be tried to find out which side is actually the outer.

Rectifier Burn-outs

AFTER a rectifying valve has been burnt out, the trial of a new one may well result in that also being destroyed.

Continued from previous column

Readings taken with a 1,000 ohms-per-volt meter. Voltages shown are from point indicated to chassis side of on-off switch with volume control at full volume and no signal. The mains voltage (after the line cord) for these readings is 117 volts AC. Measurements on DC will be lower than those shown.

Valve.	MODELS 414, 415 and 419.			
	Anode.	Screen.	Cathode.	Heater.*
7B7 ..	18	88	0	5.5
12SA7 ..	88	88	0	12.0
7B7 ..	88	85	0	5.5
12SQ7 ..	30	—	0	12.0
50L6 ..	82	88	5.6	50.0
35Z5 ..	—	—	120	35.0
	MODELS 439 AND 441.			
6SS7 ..	50	57	0	6.0
12SA7 ..	87	89	0	12.0
6SS7 ..	88	89	0	6.0
12SQ7 ..	30	—	0	12.0
50L6 ..	82	89	5.3	50.0
35Z5 ..	—	—	115	35.0

Voltages across pilot light, 4.5 volts.
Voltage across speaker field, 32 volts.
Resistance of speaker field, 450 ohms.
*Measured across heater pins.

section returned to the proper position. After reganging, the set then functioned in a perfectly normal manner.—A.W.L.

Sets Should be Sealed

COULD makers devise some simple arrangement whereby a receiver could be "sealed" by an engineer after repairing? This would deter unauthorised persons from meddling with the apparatus and protect both the owner and the repairer.

Too often after a set has been repaired a dabbler comes along and tries to improve on the work done. If damage is done, the original repairer is notified and left in ignorance of the meddling and may be out of pocket as a result.

Use for Old Valves

ALWAYS keep old AC-DC valves (including USA valves of all types). They are very useful, if their heaters are OK, for testing in a universal set where a new valve is wanted.—F.D.C.

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Press the button allocated to the particular station, turn the oscillator screw (clockwise for increase in wavelength) above the button, so that the index mark coincides with the wavelength required. Then carefully rotate the screw for the loudest output.

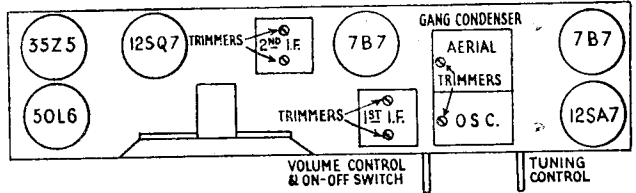
Adjust the pre-selector trimmer below the button (clockwise for increase in wavelength) for loudest output. Finally, make a careful readjustment of each tuned circuit. The remainder of the tuned circuits associated with each button should be adjusted in the same manner outlined above.

Adjustment of the LW oscillator trimmer T5 (painted red) will affect tuning of the three press-button stations. Therefore, when this trimmer is used to adjust the manual LW circuit always retrim the automatic stations oscillator adjustments L15 to L17.

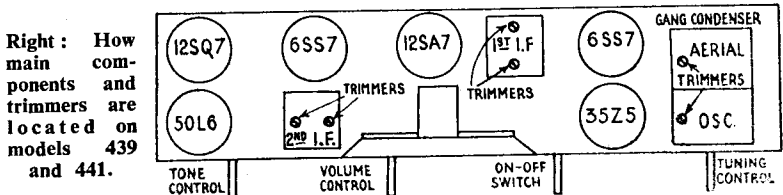
Adjustment of the MW manual aerial trimmer T4 may necessitate retrimming the MW press-button trimmers T7 and T8.

Adjustment to the LW manual aerial T6 may necessitate retrimming the LW press button trimmer T9.

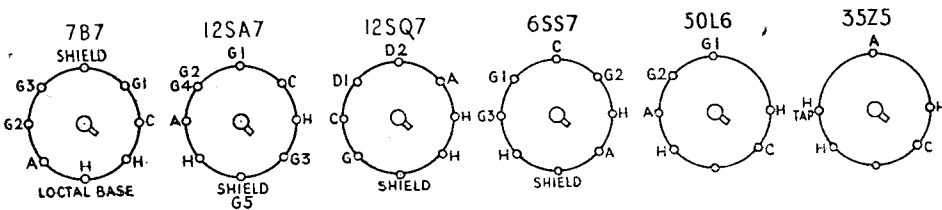
The replacing of the frequency-changer V1, may slightly alter the oscillator tuning. To compensate for this, press the button covering the 200-350 metre band (No. 3 button) and adjust the LW oscillator trimmer T5 until the station is correctly tuned; the remaining stations will then be automatically returned.



Left: The top of chassis layout for the models 414, 415 and 419.



Right: How main components and trimmers are located on models 439 and 441.



Left: Pin connections of the valves used in the Emerson 414 series.