EMERSON

301, 330, 331, 332, 336, 351, 353, 376, 400, 421, 422, 425, 461, 463

Single waveband 540-1,600 kc (555-187.5 m) five-valve superhet for operation on 105-125 volt AC or DC mains; a suitable 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 aerials and do not require an additional aerial. For permanent installations, however, if it is desired to improve reception of weak stations, an outdoor aerial may be used. For this purpose a lead has been brought out at the rear near the mains lead.

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

Admiral	.. 67M5 : 4220—D5.
Andrea	.. 35H5.
Fada	.. 115 : 148 : 200 : 203 : 205 : 209 : 220.
GE	.. J—54W : L513 : L570 : L574.
Motorola	.. 51 x 16 : 51 x 19
RCA	.. 1 x : 6 x 2 : 14 x : 34 x : 35 x : 45 x 12 : 55 x.
Westinghouse	12 x 4 : 13 x 8.

The loop aerial is somewhat directional and the receiver should be rotated to the position where maximum volume is obtained. No earth connection is required, and, in particular, no earthed wire must be allowed to touch the chassis.

Valves employed are : (1) 12SA7 pentagrid oscillator modulator ; (2) 12 SK7 IF amplifier ; (3) 12SQ7 detector AF amplifier and AVC ; (4) 50L6 beam power output ; and (5) 35Z5 half-wave rectifier.

The oscillator section consists of a tapped coil between cathode and oscillator grid of the pentagrid valve, the grid side being connected to the chassis *via* C16 and the variable condenser C17 (C18). T2 and T3 are the IF transformers peaked at 455 kc.

The volume control is connected between the cathode and signal diode of the double diode triode, which is resistance capacity coupled to the beam power output valve. AVC is provided on the pentagrid and IF valves.

Tone correction is obtained with C10, and additional tone control is provided on some models by means of C22 and its accompanying switch.

Mains input is fed to the anode of the half-wave rectifier, from the cathode of which the dry electrolytics C20, C21 and the field winding of the loudspeaker pass the current to the HT line.

All cathodes are returned to chassis, in some models *via* R9. 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 one of the valves is removed or burns out, the dial light will not glow.

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

The colour coding of the IF transformer leads is as follows: Grid, green; grid return, black; anode, blue; HT+, red.

Continued on opposite page

RESISTANCES

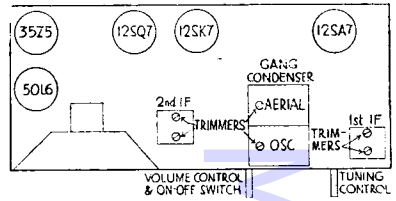
R 1—20,000 ohm	½ watt.
R 2—15 megohm	½ watt
R 3— 3 megohm	½ watt.
R 4—Volume Control 0.5 megohm.	
R 5—0.5 megohm	½ watt.
R 6—0.5 megohm	½ watt.
R 7—140 ohm	½ watt.
R 8—15 megohm	½ watt.
R 9—200,000 ohm	½ watt.

COILS

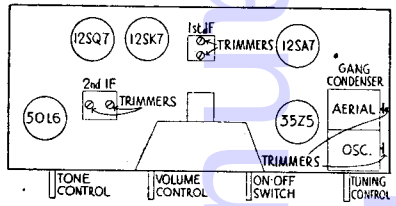
L 1	—Loop Aerial.
T 1	—Oscillator Coil.
T 2	—First IF Transformer.
T 3	—Second IF Transformer.

CONDENSERS

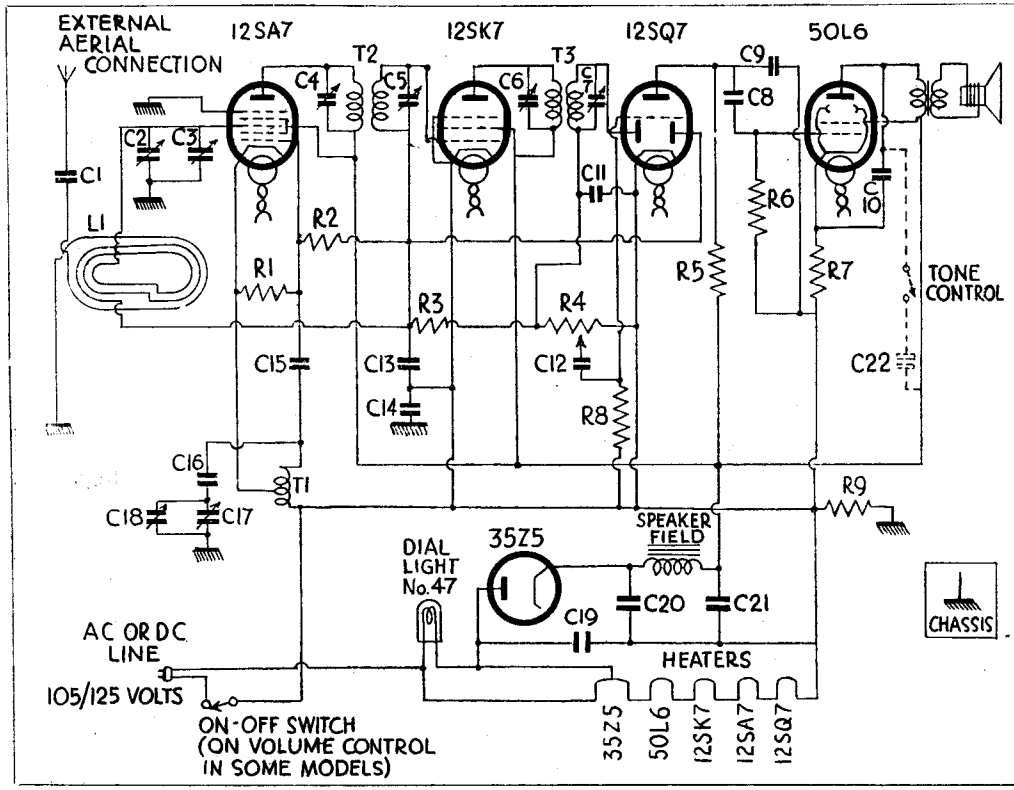
C 1	—0.002 mfd 600 volt Tubular.
C 2 C 17	—Two Gang Variable Condenser.
C 3 C 18	—Trimmers on Variable Condenser.
C 4 C 5	—Trimmers on First IF Transformer.
C 6 C 7	—Trimmers on Second IF Transformer.
C 8	—0.024 mfd 400 volt Tubular.
C 9	—0.00022 mfd Mica.
C 10	—0.024 mfd 400 volt Tubular.
C 11	—0.00022 mfd Mica.
C 12	—0.002 mfd 600 volt Tubular.
C 13	—0.05 mfd 200 volt Tubular.
C 14	—0.15 mfd 200 volt Tubular.
C 15	—0.00022 mfd Mica.
C 16	—0.05 mfd 200 volt Tubular.
C 19	—0.05 mfd 400 volt Tubular.
C 20 C 21	—Dual 20 mfd 150 volt Dry Electrolytic.
C 22	—0.04 mfd 200 volt Tubular.

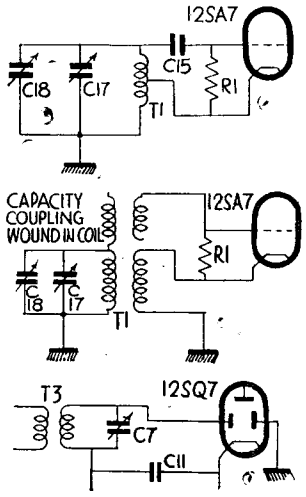


Top of chassis layout for models 301 and 425. In model 376, the same chassis is used with twin speakers.



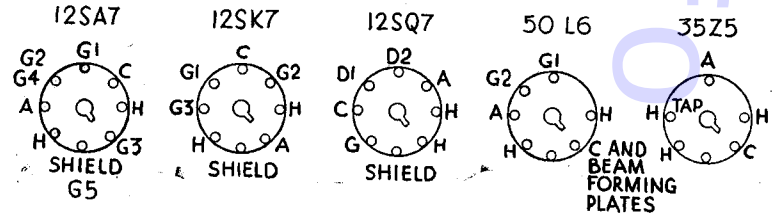
Chassis layout diagram for the models 421 and 422.

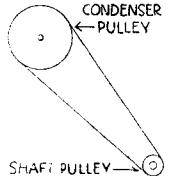


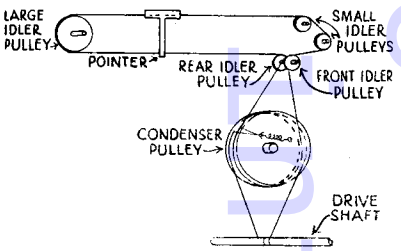


Left : Two modifications of the oscillator circuit found in some models with an alternative circuit for the double - diode triode.

Left : Basic circuit of the 301 series of single - band sets with .15 amp valves. Right : Pin connections of the valves looking from underneath.







How the cord drive is arranged on models with square dials (left) and on those with horizontal dials.

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.

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.

ALL models have self-contained aerials 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 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 variable condenser, C1 (C10). The coupling between the HF valve and the pentagrid is untuned, but there is a 455 kc wave trap, L2, C22, in this circuit. The oscillator coil is connected between the cathode and oscillator grid of the pentagrid, and is tuned by C2 (C11).

The IF transformers are peaked at

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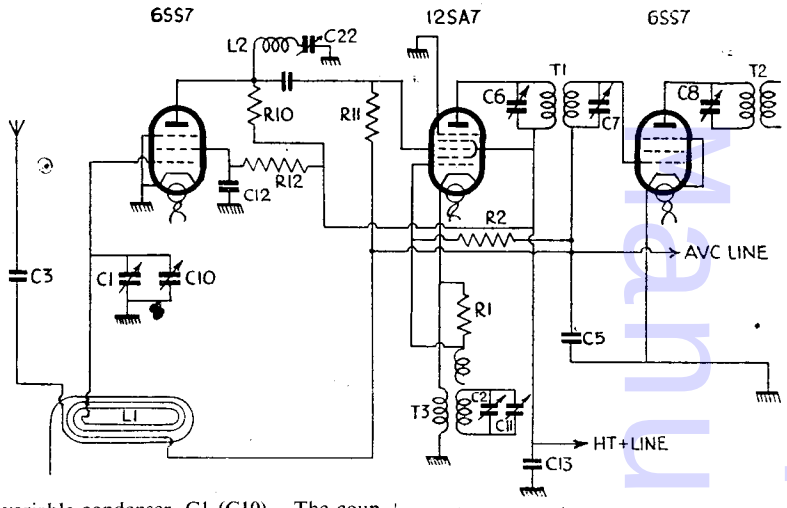

Fig. 2 : Top of the page is the HF part of the circuit of models 439 and 441. Rest of the circuit is like that for the 414.

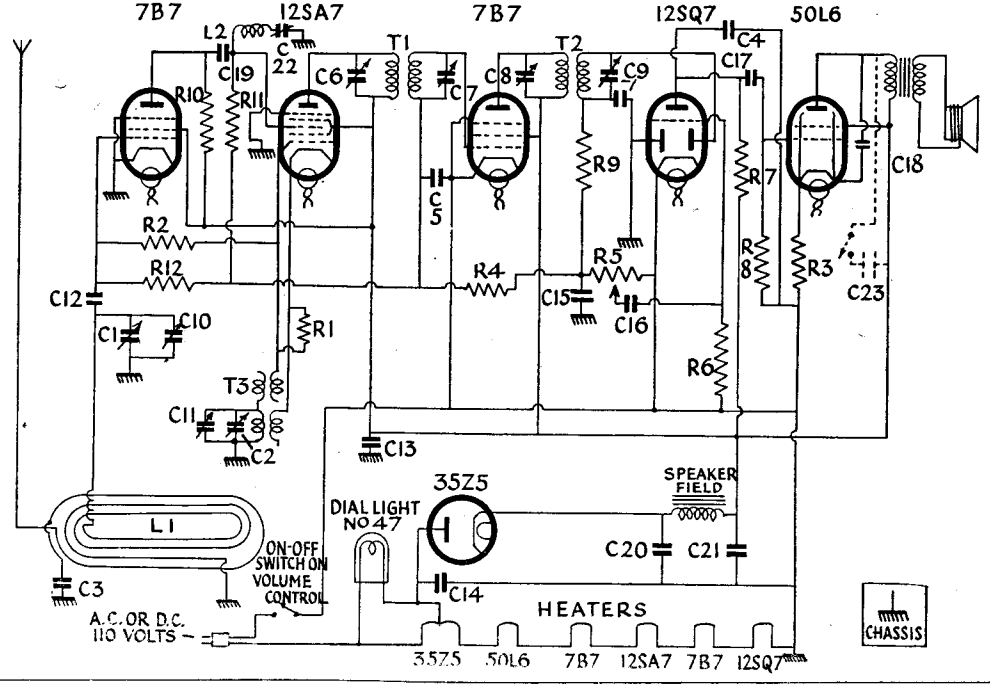

Fig. 1: The circuit of models 414, 415 and 419. The set has an RF stage in front of the frequency changer.

	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	½-watt carbon
R2 ..	10 meg	15 meg	½-watt carbon.
R3 ..	140 ohm	140 ohm	½-watt wire wound.
R4 ..	3 meg	3 meg	½-watt carbon.
R5 ..	.5 meg	.5 meg	Vol. control.
R6 ..	15 meg	15 meg	½-watt carbon.
R7 ..	500,000 ohm	500,000 ohm	½-watt carbon.
R8 ..	500,000 ohm	500,000 ohm	½-watt carbon.
R9 ..	50,000 ohm	50,000 ohm	½-watt carbon (part of T2).
R10 ..	10,000 ohm	10,000 ohm	½-watt carbon.
R11 ..	25,000 ohm	25,000 ohm	½-watt carbon.
R12 ..	1 meg	33,000 ohm	½-watt carbon.
C1, C2			Two-gang condenser.
C3, C16	.002 mfd	.002 mfd	600-v tubular.
C4 ..	.0002 mfd	.0002 mfd	600-v tubular.
C5, C13	.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, C19	.00011 mfd	.00022 mfd	Mica.
C17 ..	.02 mfd	.02 mfd	400-v tubular.
C18 ..	.03 mfd	.02 mfd	400-v tubular.
C20, C21	20+20 mfd	20+20 mfd	Dual, 150-v electrolytic.
C22 ..			Trimmer, part of wave trap.
C23 ..	—	0.4 mfd	200-v tubular.