

# EMERSON 413, 440, 465, 465A (BC) & 467

Two waveband, 540-1,620 kc (555-185 metre), 8.8-12.2 mc (24.5-16.3 metre), 6 valve superhet for operation on 105-125 volt AC or DC mains. A suitable line cord or Clarostat fixed resistance is supplied with each set to allow for working on 230 volt AC or DC mains. The 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 somewhat directional, and the set should be rotated through 90 degs., leaving it in the position

where the required station is received with maximum volume.

These receivers do not require an earth connection and, in particular, no earthed wire must be connected to the chassis.

The original models used all octal based valves as shown in the left-hand column. Later productions used one, two or three loctal based valves somewhat indiscriminately. These types are shown in the next column.

	Octal	Loctal	
1	6 SG7 or 6 SD7	7H7	modulator.
2	6J5		oscillator.
3	6SK7	7A7	IF amplifier
4	6SQ7	7B6	detector, AF amplifier and AVC.
5	25L6		beam power output.
6	25Z6		half wave rectifier.

The aerial coil L1 is for medium waves and T3 is the short wave aerial coil. It will be noticed that on the same former as T3 there are two small coils of heavy wire in circuit with each side of the mains lead. These act as HF chokes and reduce mains hum.

The condenser C1 (C3) is used for tuning on both wavebands. A separate oscillator and modulator system is used and the oscillator coil T4 is tuned by C2 (C4).

T1 and T2 are the IF transformers peaked at 455 kc. AVC voltage is applied to the modulator and IF valves.

The double-diode triode valve is resistance-capacity coupled by R8, C15, R9 to the beam power output valve. R9 is made variable and with C16 acts as a tone control. Fixed tone correction is by C17.

All the cathodes are returned to chassis. The heater circuit has all the valves in series, the dial light being tapped off the fixed resistance R12.

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.

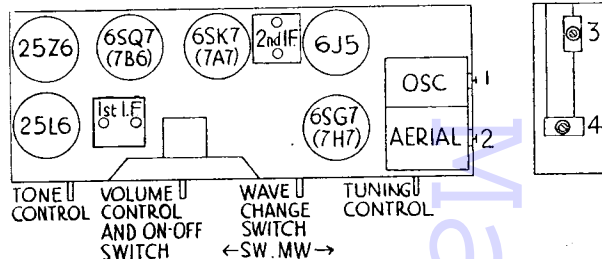
If replacements are made or the wiring disturbed in the HF section of the circuit, the receiver should be carefully re-aligned.

When operating on DC it may be necessary to reverse the line plug.

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

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

These diagrams identify the major features of the chassis and show the trimmer positions.



### 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

### COILS

- L1 Aerial coil.
- T1 First IF transformer.
- T2 Second IF transformer.
- T3 Short wave aerial coil.
- T4 Two waveband oscillator coil.

### RESISTANCES

- R1, R11 50,000 ohm 1/2-watt carbon.
- R2 5,000 ohm 1/2-watt carbon.
- R3, R4 3 meg 1/2-watt carbon.
- R5 50,000 ohm 1/2-watt carbon.
- R6 .5 meg volume control.
- R7 10 meg 1/2-watt carbon.
- R8 .5 meg 1/2-watt carbon.
- R9 .4 meg tone control.
- R10 140 ohm 1-watt wire wound.
- R12 155 ohm ballast resistance.

### CONDENSERS

- C1, C2 Two gang variable condenser.
- C3, C4 Trimmers, part of variable condenser.
- C5 Trimmer, part of T3.
- C6 Trimmer, part of T4.
- C7, C8, C9 Trimmers, part of IF transformers.
- C10 Trimmer and .0001 mfd mica, part of T2.
- C11, C20 .002 mfd 600-volt tubular.
- C12 .02 mfd 200-volt tubular.
- C13 .05 mfd 200-volt tubular.
- C15, C17 .02 mfd 400-volt tubular.
- C16, C18, C21 .00022 mfd mica.
- C25, C19 .00011 mfd mica.
- C22 .00046 mfd mica.
- C23 .1 mfd 200-volt tubular.
- C24 .01 mfd 400-volt tubular.
- C26, C27 Dual 20 mfd 150-volt dry electrolytic.
- C28 .05 mfd 400-volt tubular.

readings is 117 volts AC. Measurements on DC will be lower than those shown.

Valve.	Anode.	Screen.	Cathode.	Heater.
6SG7 } 6SD7 } 7H7 }	92	63	0	6.3
6J5	102	—	0	6.3
6SK7 } 7A7 }	102	102	0	6.3
6SQ7 } 7B6 }	30	—	0	6.3
25L6	92	102	6.5	25.0
25Z6	—	—	150	25.0

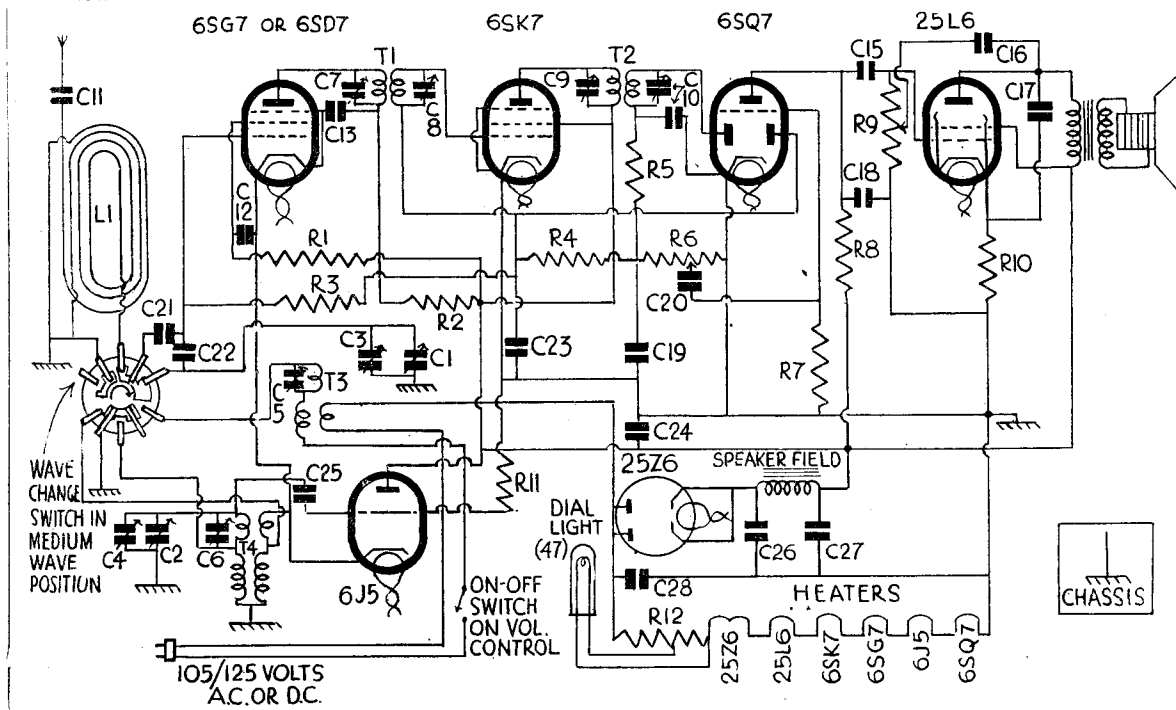
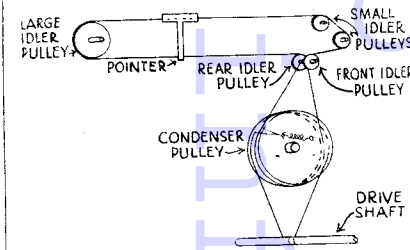
Voltage across dial light 4.5 volts.  
Voltage across speaker field, 32 volts.  
Resistance of speaker field, 450 ohms.

### GANGING

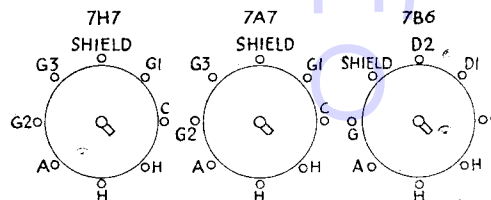
IF Circuits.—Rotate the variable condenser to minimum capacity position. Feed 455 kc to the grid of the 6SG7 (6SD7) valve (pin 4) through a .01 mfd condenser and adjust the four IF trimmers for maximum response.

RF Circuits.—Turn the waveband switch to the short-wave position (anti-clockwise). Set the dial pointer at 12 mc and using a 300 ohm

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Left, the circuit with its separate oscillator valve, and, right, the bases of the Loctal alternatives to the standard "tubes." Above, details of the cord drive with horizontal dials.



# EMERSON 426, 433

Single waveband, 540-1,630 kc (555-184 m), six-valve superhet for operation on 105-125-volt AC or DC mains, or on dry batteries (9 volts low tension; 90 volts high tension). A suitable external 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 receiver has a self-contained aerial and normally does not require additional aerial or earth connections. For permanent home installations, however, an additional outside aerial and earth may be used for distant stations. Two leads for such connections (blue for aerial, black for earth) are seen when the chassis is removed from the cabinet.

The internal aerial has directional properties and the set should be rotated to the position where the desired station is received with maximum volume.

For battery operation the plug at the end of the mains lead must be inserted into the sockets on the bottom of the

chassis (visible when the cabinet is tipped up).

The type of battery is Emerson Uni-Power-Pac, No. 749.

The colour coding of the battery cable is as follows:—

- Red . . . . . HT - (67.5 v).
- Blue . . . . . HT -
- Yellow . . . . . LT (7.5 v).
- Black . . . . . LT-

The aerial coil L1 is tuned with C2 (C20) and the oscillator coil L2 with C3 (C21). The IF transformers are peaked at 455 kc—the first one being double-tuned, and the second one tuned on the secondary side only.

The colour coding of the IF trans-

former leads is as follows:—

- Green—grid. Blue—anode.

Black—grid return. Red—HT + AVC voltage is applied to the frequency-changer and IF valves.

The single diode pentode is resistance-capacity coupled by R16, C11, R17, to the beam power output valve, and tone correction is obtained with C14.

The heater circuit has all the valves (except the rectifier) in series and, when used on the mains, both the LT and HT supplies are derived from the rectifier output. There is no dial light.

If replacements are made to the HF section of the circuit, the receiver should be carefully re-aligned.

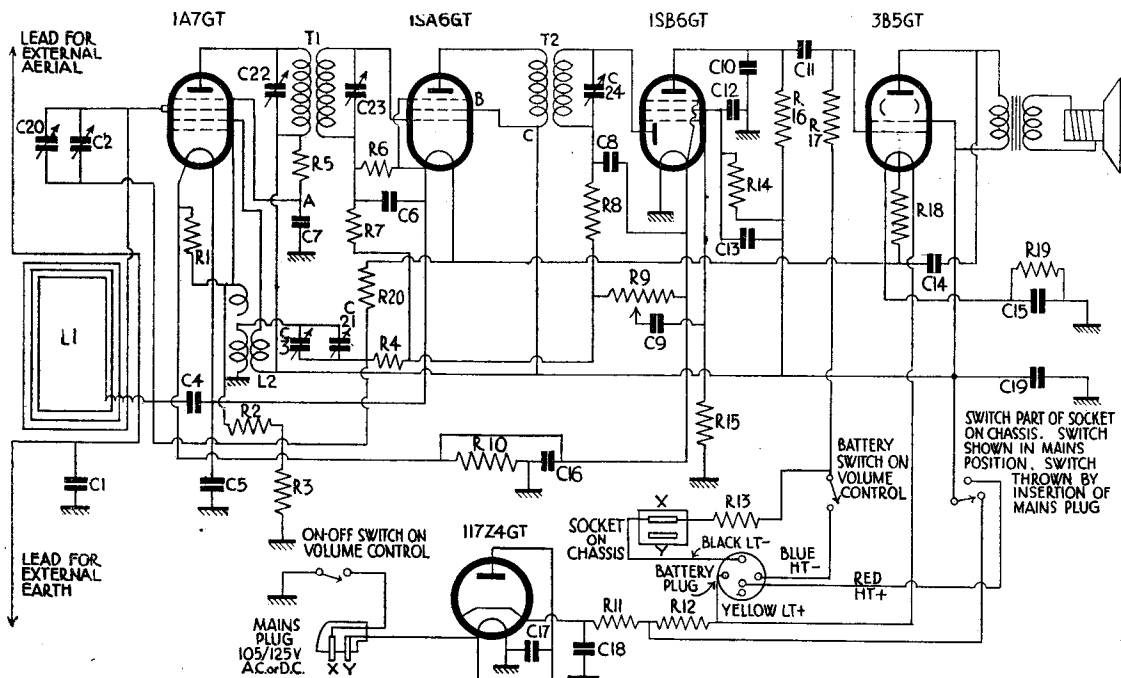
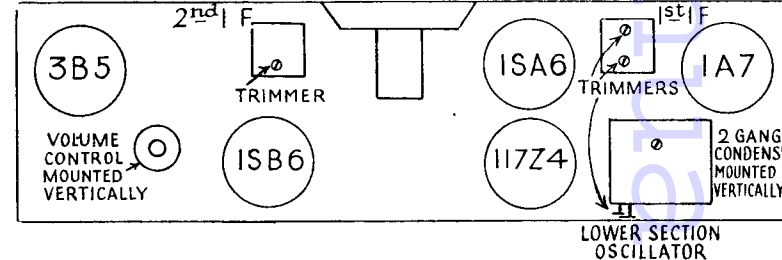
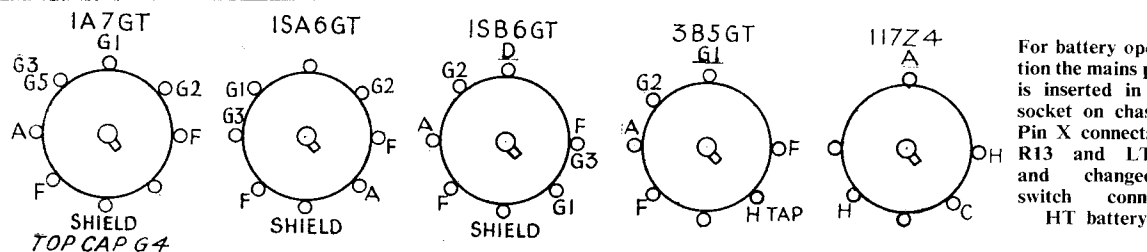
## VOLTAGE ANALYSIS

Readings taken with a 1,000 ohm-per-volt meter. Voltages listed are from point indicated to chassis with the volume control turned on full and no signal. Mains voltage (after the line cord) for these readings was 117.5 v AC. Measurements on DC will be lower.

V.	Type.	Anode.	Screen.	Osc. Anode.	Fil.*
1	1A7GT	69	46	69	1.4
2	1SA6GT	69	70	—	1.4
3	1SB6GT	9	5	—	1.4
4	3B5GT	67	69	—	2.5
5	117Z4GT	Cathode 125 v.		—	125v

\*Readings across valve pins.

Current drain on batteries: LT, 20 ma; HT, 7 ma.



EARLIER CHASSIS A-B CONNECTED; B-C DISCONNECTED  
LATER CHASSIS A-B DISCONNECTED; B-C CONNECTED

- COILS**  
L1 Loop aerial.  
L2 Oscillator coil.  
T1 1st IF transformer.  
T2 2nd IF transformer.
- RESISTANCES**
- R1 220,000 ohm 1/2-watt carbon.
  - R2, R16 1 megohm 1/2-watt carbon.
  - R3 470,000 ohm 1/2-watt carbon.
  - R4 3.3 megohm 1/2-watt carbon.
  - R5, R6, R17 22,000 ohm 1/2-watt carbon.
  - R7, R20 10 megohm 1/2-watt carbon.
  - R8 47,000 ohm 1/2-watt carbon.
  - R9 1.5 megohm volume control.
  - R10 290 ohm 1/2-watt wire-wound.
  - R11, R12 R11—960 ohm 3.5 watts; R12—1,375 ohm 3.6 watts, ballast.
  - R13 290 ohm 1/2-watt metallised filament, ceramic coated.
  - R14, R15 4.7 megohm 1/2-watt carbon.
  - R18 510 ohm 1-watt wire-wound.
  - R19 800 ohm 1-watt wire-wound.

- CONDENSERS**
- C1, C9, C11, C14 .002 mfd. 600-volt tubular.
  - C2, C3 Variable condenser—2 gang.
  - C4, C16 .1 mfd. 200-volt tubular.
  - C5 .25 mfd 400-volt tubular.
  - C6 .01 mfd 400-volt tubular.
  - C7 5 mfd 100-volt dry electrolytic.
  - C8 .0002 mfd mica.
  - C10 .00006 mfd. mica.
  - C12 .03 mfd 200-volt tubular.
  - C13 .003 mfd 600-volt tubular.
  - C15 40 mfd 40-volt dry electrolytic.
  - C17 .05 mfd 400-volt tubular.
  - C18, C19 Dual 40 mfd. 150-volt dry electrolytic.
  - C20, C21 Trimmers, part of variable condenser.
  - C22, C23, C24 Trimmers, part of IF transformers.

**GANGING**

**IF Circuits.**—Rotate the variable condenser to the minimum capacity position. Feed 455 kc from a signal generator to the control grid of the 1A7GT valve through a .01 mfd condenser and adjust the three IF trimmers for maximum response.

**HF Circuits.**—Set the dial pointer at 140. Set the signal generator to 1,400 kc and feed its output into a loop of wire about 12 in. in diameter. Hold this radiating loop about 12 in. from and parallel with the internal aerial. Increase the output of the signal generator until a satisfactory deflection is obtained on the output meter.

Adjust first the oscillator trimmer (lower section of gang) and then the aerial trimmer for maximum response.

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carbon resistance as a dummy aerial feed 12 mc from the ganging oscillator to the external aerial lead.

Adjust first the short-wave oscillator trimmer C6 and then the short-wave aerial trimmer C5 for maximum response.

Turn the waveband switch to the medium-wave position (clockwise). Set the dial pointer at 160 and 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 the aerial coil and advance the input until a satisfactory deflection is obtained on the output meter.

Adjust first the oscillator trimmer C4 and then the aerial trimmer C3 for maximum response. The oscillator condenser is the rear section of the gang condenser.

Note.—It will be found that there are many small circuit variations even among receivers of the same type.