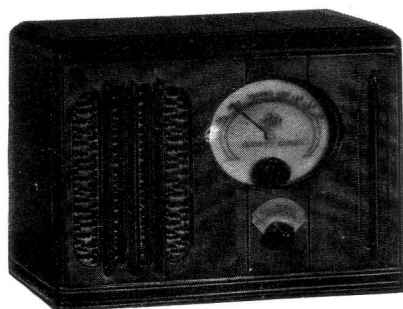


# Model 420

## The "Edinburgh"

### Battery Operated Receiver



### Specifications

**Frequency Range:**

525 to 1750 K.C.

**I.F.:**

470 K.C.

**Tubes:**

Type	Function
1D7G	1st Detector and Oscillator
1D5G	I.F. Amplifier
1F7G	2nd Detector, A.V.C., 1st A.F. Amplifier
1F5G	Output

**Power Supply:**

"A" Battery : 1.5 volts

"B" Battery : 90 volts

**A.V.C.:**

On 1D7G and 1D5G

**Controls:**

Upper—Tuning Control

Lower—Battery Switch and Volume Control.

**Cabinet:**

Table Model.

## MODEL 420 RADIO RECEIVER

**GENERAL.**—This is a battery-operated radio receiver of the superheterodyne type and employs four tubes. It is enclosed in a "personal" style table cabinet, and has the loudspeaker mounted on the chassis at the side of the dial. The dial is of the airplane type and uses a glass scale calibrated in megacycles. A vernier tuning drive is furnished. The tuning range is 525 to 1750 k.c.

**CIRCUIT.**—The antenna transformer, items 1, 2 and 3, uses both inductive coupling between primary and secondary, and capacitive coupling through item 3. The antenna section of the tuning capacitor is item 4, and the oscillator section is item 6. The plate and grid windings of the oscillator coil are items 10 and 11, respectively. Item 14 is the lag capacitor; item 12 is capacitive coupling on the oscillator coil between primary and secondary. Item 9 is the oscillator grid leak. The antenna and oscillator trimmers are items 5 and 7 respectively.

The 1D5G I.F. amplifier is coupled to the first detector by item 17, first I.F. transformer, double tuned by trimmers 18 and 19. The output of this tube is similarly coupled to the diodes of the 1F7G second detector. Item 35 is the volume control which also serves as the a.v.c. load resistor. The a.v.c. filter to the first detector consists of item 29 and 8, and to the I.F. amplifier, to which partial control is applied, consists of items 31 and 32.

The 1F7G acts also as the first audio amplifier, and is capacitance-resistance coupled both on its input and output sides.

The output amplifier is a type 1F5G pentode and is conventionally coupled to the high sensitivity magnetic speaker, item 47. Items 49 and 50 form an

equalizer on the plate of the type 1F5G, and item 48 is an r.f. bypass.

Items 51 and 52 are the minus "B" and plus "B" electrolytic bypass capacitors, respectively, and items 39 and 40 constitute a resistance in the "B" battery negative return from which bias is derived through item 46, for the type 1F5G, and through the filter items 33, 34 and 36, for the type 1F7G.

Permanently wired battery plugs are provided for connecting the "B" batteries.

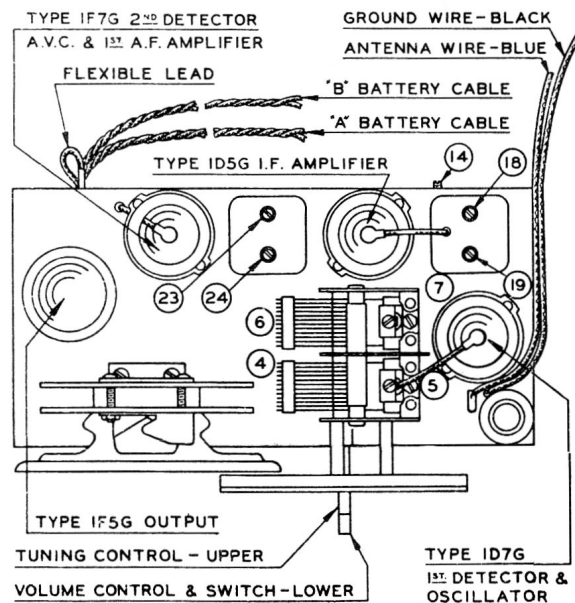


Fig. 1.—Model 420—Chassis Layout showing Aligning Positions.

## REALIGNING INSTRUCTIONS

To secure full advantage of the performance characteristics of this receiver, any realignment necessary should be carried out carefully. A reliable test oscillator or signal generator, and also a high resistance output meter should be employed.

### I. F. ALIGNMENT:—

- Set the signal generator at 470 k.c. and connect its output through 0.1 mf. capacitor to the grid cap of the first detector (type 1D7G) tube. Set the receiver dial at about 600 k.c.
- Adjust trimmers 18, 19, 23 and 24 until maximum sensitivity is obtained.
- Reduce the output from the signal generator to as low a value as will give an output reading, and check the alignment of these four trimmers. All should peak properly.

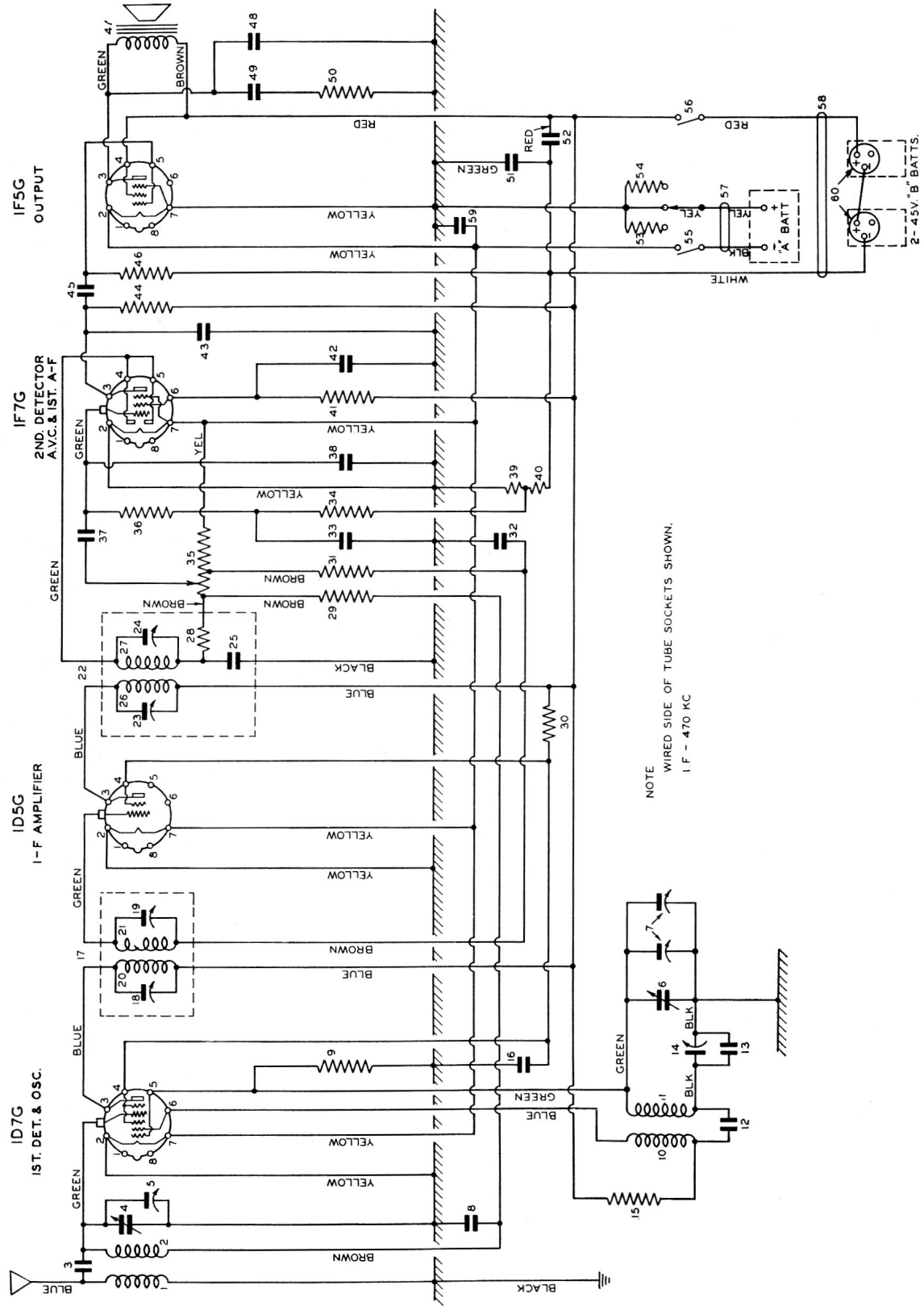
### R. F. ALIGNMENT:—

- With the gang all in, check the position of the

pointer. It should line up with the .52 megacycle calibration.

- Couple the signal generator to the antenna lead (blue) through 100 mmf. mica capacitor. Connect the ground lead (black) to ground.
- Set the signal generator and receiver at 1600 k.c. Adjust one of the trimmers, item 7, on the top of the gang to bring in the signal. The second trimmer, designated as item 7, is on the lower side of the gang and does not need to be adjusted unless the top trimmer will not bring in the signal.
- Adjust trimmer, item 5, for maximum output.
- Set the generator at 600 k.c., and tune the receiver to the signal. Adjust the lagging trimmer, item 14, for maximum output, while rocking the gang.
- Recheck at 1600 k.c.

# MODEL 420 RADIO RECEIVER



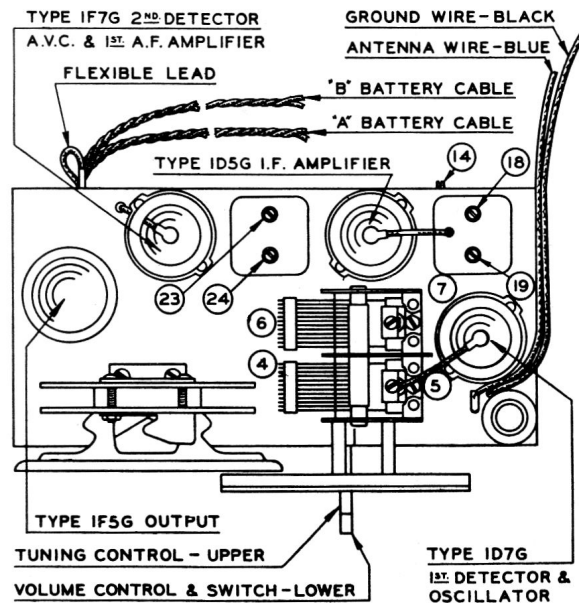
Schematic Circuit Diagram, Model 420.

# REPLACEMENT PARTS LIST

Schematic Designation	Value and Description	Part Number	Schematic Designation	Value and Description	Part Number
1	Antenna Transformer Primary	K-2767	44	Resistor, $\frac{1}{4}$ megohm, $\frac{1}{4}$ watt	K-2226-4
2	Antenna Transformer Sec.		45	Capacitor, 0.2 mf, 175 volts...	K-2227-7
3	Coupling Capacitor 4 mmf...		46	Resistor, 1 megohm, $\frac{1}{4}$ watt...	K-2226-2
4	Ant. Sec. Cap. Gang.....		47	Loudspeaker.....	K-2255-2
5	Ant. Sec. Trim. Cap.....	K-2815	48	Capacitor, .001 mf, 350 volts..	K-2228-1
6	Osc. Sec. Cap. Gang.....		49	Capacitor, .01 mf, 175 volts...	K-2227-6
7	Osc. Sec. Trim. Cap.....		50	Resistor, 30,000 ohms, $\frac{1}{4}$ watt	K-2226-44
8	Capacitor, 0.1 mf, 175 V.....		51	Capacitor, electrolytic, 10 mf, 5 volts.....	K-2771
9	Resistor, 50,000 ohms, $\frac{1}{4}$ watt	K-2226-6	52	Capacitor, electrolytic, 4 mf, 90 volts.....	
10	Osc. Transformer Pri.....	K-2760	53	Resistor, wirewound, 0.9 ohm, $\frac{1}{4}$ watt .....	K-2252-1
11	Osc. Transformer Sec.....		54	Resistor, wirewound, 2.7 ohms, $\frac{1}{4}$ watt.....	K-2252-2
12	Capacitor, .005 mf, 175 volts..	K-2227-4	55	"A" Batt. Switch } Mounted	.....
13	Capacitor, 300 mmf, mica....	K-1611-10	56	"B" Batt. Switch } on item 35	
14	Capacitor, 9-110 mmf, var...	K-2889-2	57	"A" Batt. Cable.....	K-2493
15	Resistor, 10,000 ohms, $\frac{1}{4}$ watt	K-2226-10	58	"B" Batt. Cable.....	K-2782
16	Capacitor, 0.1 mf, 175 volts..	K-2227-9	59	Capacitor, .5 mf, 175 volts....	K-2227-11
17	1st I.F. Transformer Assem...	K-2758	60	"B" Batt. Plug.....	.....
18	Cap. 30-130 mmf, var.....	K-2134-1			
19	Cap. 30-130 mmf, var.....				
20	1st I.F. Trans. Pri.....	K-2777			
21	1st I.F. Trans. Sec.....				
22	2nd I.F. Transf. Assem.....	K-2759			
23	Cap., 30-130 mmf, var.....	K-2932-1			
24	Cap., 30-130 mmf, var.....				
25	Capacitor, 100 mmf, mica....	K-2778			
26	Second I.F. Transf. Pri.....				
27	Second I.F. Transf. Sec.....	K-2226-6			
28	Res. 50,000 ohm, $\frac{1}{4}$ watt....				
29	Resistor, 2 megohm, $\frac{1}{4}$ watt..	K-2226-1			
30	Resistor, 30,000 ohms, $\frac{1}{4}$ watt	K-2226-44			
31	Resistor, 1 megohm, $\frac{1}{4}$ watt..	K-2226-2			
32	Capacitor, 0.1 mf, 175 volts..	K-2227-9			
33	Capacitor, 0.1 mf, 175 volts..	K-2227-9			
34	Resistor, $\frac{1}{2}$ megohm, $\frac{1}{4}$ watt.	K-2226-3			
35	Volume Control, $\frac{1}{2}$ megohm.	K-2764			
36	Resistor, 1 megohm, $\frac{1}{4}$ watt..	K-2226-2			
37	Capacitor, .02 mf, 175 volts...	K-2227-7			
38	Capacitor, 100 mmf, mica....	K-1611-2			
39	Resistor, 165 ohms, $\frac{1}{4}$ watt..	K-2226-48			
40	Resistor, 195 ohms, $\frac{1}{4}$ watt..	K-2226-49			
41	Resistor, 1 megohm, $\frac{1}{4}$ watt.	K-2226-2			
42	Capacitor, 0.1 mf, 175 volts...	K-2227-9			
43	Capacitor, 100 mmf, mica....	K-1611-2			

## MISCELLANEOUS

Battery Plugs.....	K-2457
Dial Scale (Glass).....	K-2826
Dial Gasket.....	K-2816
Complete loudspeaker (Magnetic)...	K-2255-2
Tube Shield.....	K-2267-3
Tube Shield Base.....	K-2390
Filament battery adjusting Strip...	K-2763
Tuning Knob.....	K-2830-1
Volume Control Knob.....	K-2830-2
Sockets, octal base.....	K-1924-1
Felt for Loudspeaker.....	K-2491-4
Filament battery Cable (black and yellow).....	K-2493
"B" Battery Cable (red and white)...	K-2782
Dial backing card (gold).....	K-2933
Clip for dial Scale.....	K-2836
Indicator Pointer.....	K-2851
Escutcheon Label.....	K-2891
Escutcheon Pins.....	PP-2453
Tuning Wrench (all models).....	K-836



Model 420—Chassis Layout showing Aligning Positions.

## REALIGNING INSTRUCTIONS

## I. F. ALIGNMENT:—

- (a) Set the signal generator at 470 k.c. and connect its output through 0.1 mf. capacitor to the grid cap of the first detector (type 1D7G) tube. Set the receiver dial at about 600 k.c.
- (b) Adjust trimmers 18, 19, 23 and 24 until maximum sensitivity is obtained.
- (c) Reduce the output from the signal generator to as low a value as will give an output reading, and check the alignment of these four trimmers. All should peak properly.

## R. F. ALIGNMENT:—

- (a) With the gang all in, check the position of the pointer. It should line up with the .52 megacycle calibration.

- (b) Couple the signal generator to the antenna lead (blue) through 100 mmf. mica capacitor. Connect the ground lead (black) to ground.
- (c) Set the signal generator and receiver at 1600 k.c. Adjust one of the trimmers, item 7, on the top of the gang to bring in the signal. The second trimmer, designated as item 7, is on the lower side of the gang and does not need to be adjusted unless the top trimmer will not bring in the signal.
- (d) Adjust trimmer, item 5, for maximum output.
- (e) Set the generator at 600 k.c., and tune the receiver to the signal. Adjust the lagging trimmer, item 14, for maximum output, while rocking the gang.
- (f) Recheck at 1600 k.c.

## SOCKET VOLTAGE AND CURRENT READINGS

TUBE	VOLTAGES					CURRENTS—M.A.	
	Filament	Plate	Screen	Grid	Screen	Plate	
						Normal Bias	Bias red. $4\frac{1}{2}$ V.
Type 1D7G 1st Det. and Oscillator	1.95	(3) 90	37	—	1.0	(4) .65	1.4
Type 1D5G I-F Amplifier	1.95	90	37	—	.6	1.45	1.75
Type 1F7G 2nd Det. A-V-C and 1st Audio Amplifier	1.95	14	8	(1) 2.2	.06	.20	.21
Type 1F5G Output	1.95	82	90	(2) 4.6	1.5	5.3	8.5

1. Measured across resistor item 39.

2. Measured negative B to ground.

3. Anode-grid voltage—75 volts.

4. Anode-grid current—.7 m.a.

## SOCKET RESISTANCE READINGS TO GROUND - OHMS

Tube	Top Cap Control Grid	Pin No. 1	Pin No. 2 Filament	Pin No. 3 Plate	Pin No. 4 Screen	Pin No. 5	Pin No. 6	Pin No. 7 Filament	Pin No. 8
Type 1D7G	2.5 Megs.	....	0	Open *(12.5)	Open *(30,000)	(No. 1 Grid) 50,000	(Anode-Grid) Open *(10,000)	4.0 (approx.)	....
Type 1D5G	1.5 Megs.	....	0	Open *(12.5)	Open *(30,000)	....	....	4.0 (approx.)	....
Type 1F7G	1.5 Megs.	....	0	Open *(250,000)	(Diode) 550,000	(Diode) 550,000	(Screen) Open *(1 Megohm)	4.0 (approx.)	....
Type 1F5G	....	....	4.0 (approx.)	Open *(1,500)	Open *(0)	(Grid) 1 Megohm	....	0	....

\*Measured to Pin No. 4 on 1F5G.

The pins are numbered to correspond with the schematic circuit diagram. The readings apply to the set with the battery switch in the "off" position.

The filament-to-ground resistances marked "4.0 ohms (approx.)" should only be measured on the low resistance scale of an ohmmeter; otherwise the tubes may be damaged.