TM-11-348

INFORMATION SERVICE

RADIO RECEIVERS

BC-348-J, BC-348-N, BC-348-Q

PRICE $1.00

TUBE AND PILOT LIGHT CROSS REFERENCE

ARMY TUBE TYPE	RMA EQUIVALENT
VT-116	6SJ7
VT-117	6SK7
VT-150	6SA7
VT-152	6K6GT
VT-233	6SR7
Lamp Type LM-27	No. 44

GENERAL.

Radio Receivers BC-348-J, BC-348-N and BC-348-Q are eight-tube, six-band superheterodyne receivers designed for operation on a 28 volt aircraft power supply. Their power consumption is 60 watts. Antenna, ground, and headphone connections are made on the front panel and the power and interphone connections are made through a connector plug at the back of the receiver. Each receiver is capable of voice, tone, and c-w reception. Either manual or automatic volume control may be selected by a switch on the front panel; likewise normal or extreme selectivity is provided by means of an i-f crystal filter that may be switched in or out of the circuit as desired. A beat frequency oscillator is employed for c-w reception.

FREQUENCY RANGE AND BANDS.

BAND	FREQUENCY RANGE
1	200 - 500 Kilocycles
2	1.5 - 3.5 Megacycles
3	3.5 - 6.0 Megacycles
4	6.0 - 9.5 Megacycles
5	9.5 - 13.5 Megacycles
6	13.5 - 18.0 Megacycles

Intermediate Frequency .... 915 KC

INPUT COUPLING.

The antenna input circuit is designed to operate properly with antennas having capacities ranging from 50 to 250 mmf.

C-W OSCILLATOR.

The c-w oscillator employs the triode section of Tube VT-233 (second detector) in a tuned grid, plate feedback circuit. The variable iron core in the grid inductance is used for frequency adjustment and is so mounted

that about one turn of the beat frequency knob on the front panel will vary the frequency of the c-w oscillator approximately 4000 cycles each side of the zero beat position. (Arrow on knob pointing up).

The effects of ambient temperature variations are minimized by the use of a temperature compensated tuned circuit. The c-w oscillator operates at an extremely low level, minimizing harmonics and stray oscillator pickup. The output is capacitively coupled to the plate circuit of the second amplifier tube by a twisted wire capacitor. Amplification by the third i-f amplifier stage, the gain of which is not controlled either manually or by a-v-c, provides sufficient output from the c-w oscillator below the level at which the a-v-c operates, thus permitting the use of automatic volume control even for c-w reception.

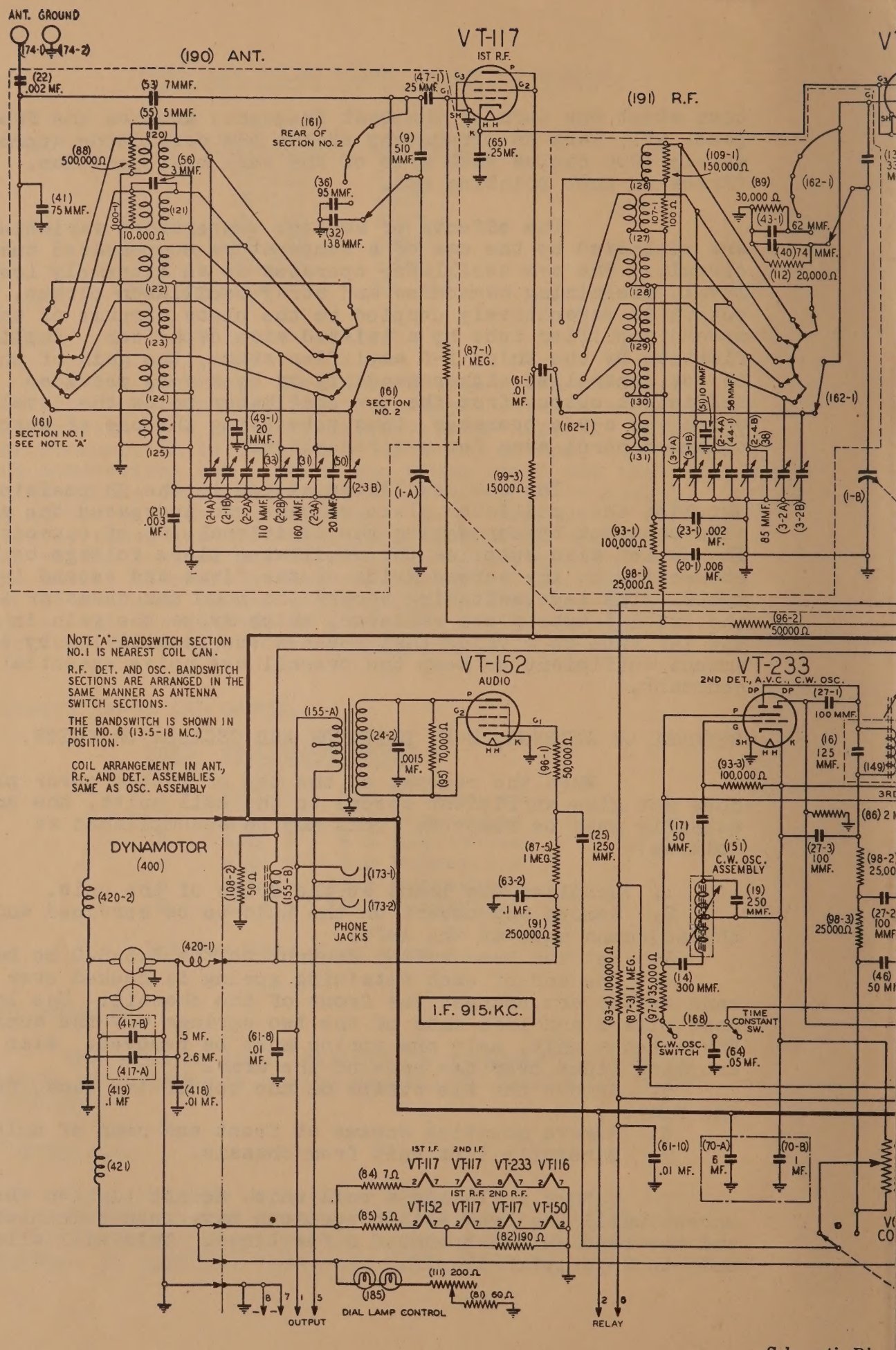
The c-w oscillator switch in the ON position, supplies the oscillator plate voltage and increases the a-v-c time constant by connecting the additional .05 mf capacitor. The switch also supplies the oscillator plate voltage by connecting to the screen grids of the first and second i-f tubes. The same switching shunts the 5000 ohm resistor across the 1st i-f tube plate resistor, which drops the gain in the 1st i-f tube to a value that reduces the sensitivity by an amount sufficient to keep the overall set noise essentially constant.

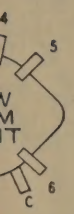
REMOVAL OF ANTENNA, R-F, DETECTOR AND OSCILLATOR UNITS.

When the removal of the top or bottom cover plate does not give sufficient access to the coil units, the entire assembly must be removed. This may be accomplished as follows:

1. Unsolder the leads at the front of the unit.
2. Remove top covers on the unit to be serviced and the adjacent unit at the left.
3. Set the band switch control to the 3.5-6.0 mc band.
4. One end of each retaining spring is hooked over the band switch arm nearest the front of the chassis. Use long nose pliers and lift ends of the two springs off the arms. For antenna unit, only one spring must be removed. Also lift coupling links over the ends of the arms.
5. Remove the tie strips on the top of the cans, front and rear.
6. Remove mounting screws at front and rear of unit.
7. Carefully lift unit from chassis.

When replacing a coil unit, do not tighten the screws until the band switch sections have been reconnected and the band switch operated a few times. This will allow the unit to reposition itself.


ANT. GROUND
(74-1) (74-2)
(190) ANT.
VT-117
1ST R.F.
(191) R.F.
(22) .002 MF.
(53) 7MMF.
(55) 5MMF.
(120)
(88) 500,000Ω
(56) 3 MMF.
(41) 75 MMF.
(100-1)
(121)
10,000Ω
(122)
(123)
(124)
(125)
(161) SECTION NO. 1 SEE NOTE "A"
(161) REAR OF SECTION NO. 2
(36) 95 MMF.
(32) 138 MMF.
(9) 510 MMF.
(47-1) 25 MMF.
(65) .25 MF.
(161) SECTION NO. 2
(87-1) 1 MEG.
(61-1) .01 MF.
(99-3) 15,000Ω
(49-1) 20 MMF.
(33)
(31)
(50)
(2-3 B)
(1-A)
(21) .003 MF.
(2-1A)
(2-1B)
(2-2A)
110 MMF.
(2-2B)
160 MMF.
(2-3A)
20 MMF.
(109-1) 150,000Ω
(126)
(89) 30,000Ω
(162-1)
(43-1) 62 MMF.
(40) 74 MMF.
(112) 20,000Ω
(127)
(128)
(129)
(130)
(131)
(51) 10 MMF.
50 MMF.
(3-1A)
(3-1B)
(2-4A) (44-1)
(2-4B) (38)
85 MMF.
(3-2A)
(3-2B)
(1-B)
(93-1) 100,000Ω
(23-1) .002 MF.
(20-1) .006 MF.
(98-1) 25,000Ω
(96-2) 50,000Ω
NOTE "A"- BANDSWITCH SECTION NO.1 IS NEAREST COIL CAN.
R.F. DET. AND OSC. BANDSWITCH SECTIONS ARE ARRANGED IN THE SAME MANNER AS ANTENNA SWITCH SECTIONS.
THE BANDSWITCH IS SHOWN IN THE NO. 6 (13.5-18 M.C.) POSITION.
COIL ARRANGEMENT IN ANT., R.F., AND DET. ASSEMBLIES SAME AS OSC. ASSEMBLY
VT-152
AUDIO
(155-A)
(24-2)
.0015 MF.
(95) 70,000Ω
(96-1) 50,000Ω
VT-233
2ND DET., A.V.C., C.W. OSC.
(27-1) 100 MMF.
(16) 125 MMF.
(93-3) 100,000Ω
(149)
(17) 50 MMF.
(151) C.W. OSC. ASSEMBLY
(19) 250 MMF.
(14) 300 MMF.
(27-3) 100 MMF.
(98-3) 25000Ω
(46) 50 MF
(168) TIME CONSTANT SW.
C.W. OSC. SWITCH
(64) .05 MF.
(93-4) 100,000Ω
(87-3) 1 MEG.
(97-1) 35,000Ω
(25) 1250 MMF.
(87-5) 1 MEG.
(63-2) .1 MF.
(91) 250,000Ω
DYNAMOTOR
(400)
(420-2)
(420-1)
(108-2) 50Ω
(155-B)
(173-1)
(173-2)
PHONE JACKS
(417-B) .5 MF.
(417-A) 2.6 MF.
(419) .1 MF
(418) .01 MF.
(61-8) .01 MF.
I.F. 915 K.C.
(421)
IST I.F. 2ND I.F.
VT-117 VT-117 VT-233 VT-116
(84) 7Ω
IST R.F. 2ND R.F.
VT-152 VT-117 VT-117 VT-150
(85) 5Ω
(82) 190Ω
(111) 200Ω
(185)
(81) 60Ω
DIAL LAMP CONTROL
OUTPUT
RELAY
(61-10) .01 MF.
(70-A) 6 MF.
(70-B) 1 MF.



BAND SWITCH SECTION NO.1
IS NEAREST COIL CAN.

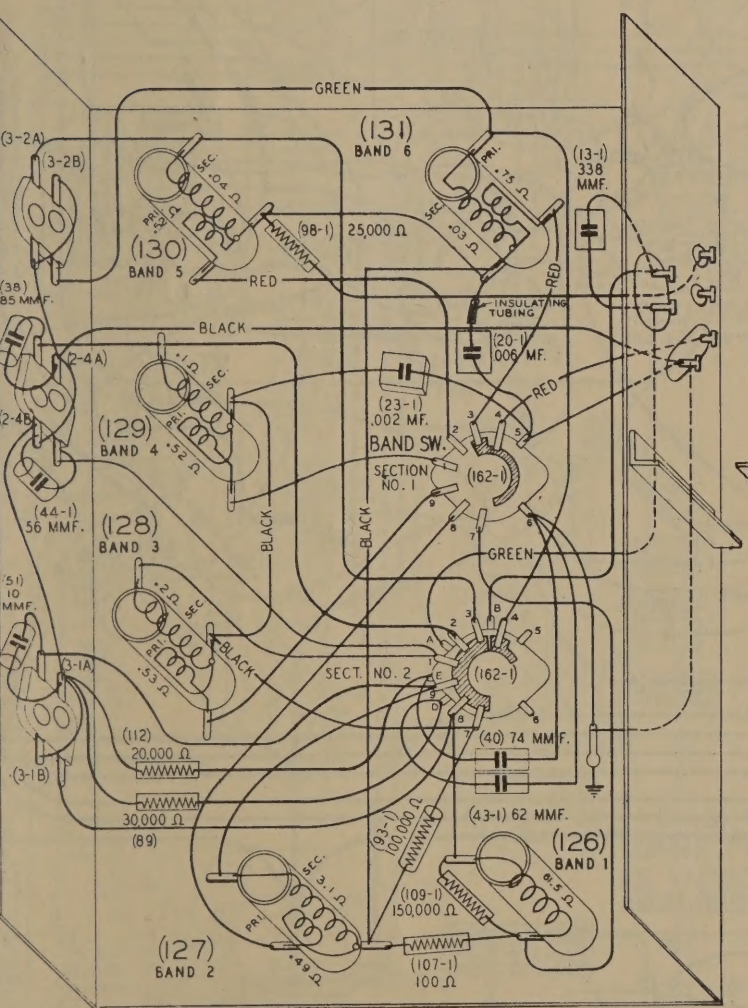
TCH CONTACT
UMBERING

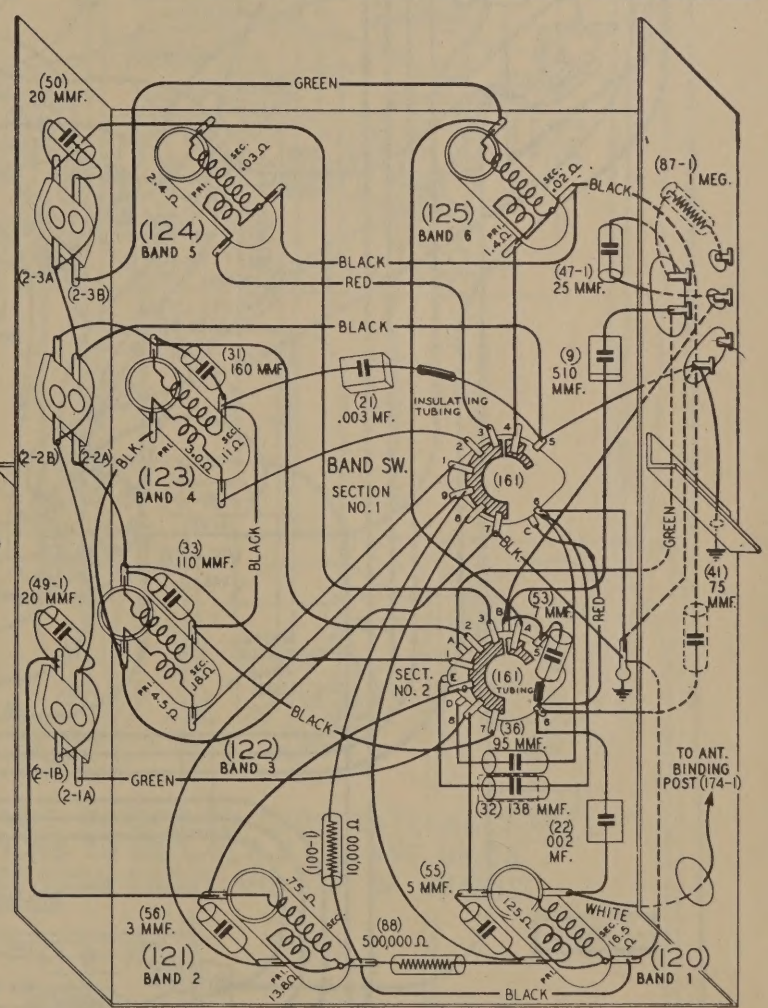
R.F. BAND SWITCH CONNECTIONS

SECT.		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
NO.1	FRONT	4—7	4—8	4—9	1—4	2—4	3—4
SECT.	FRONT	8 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
NO.2	REAR						

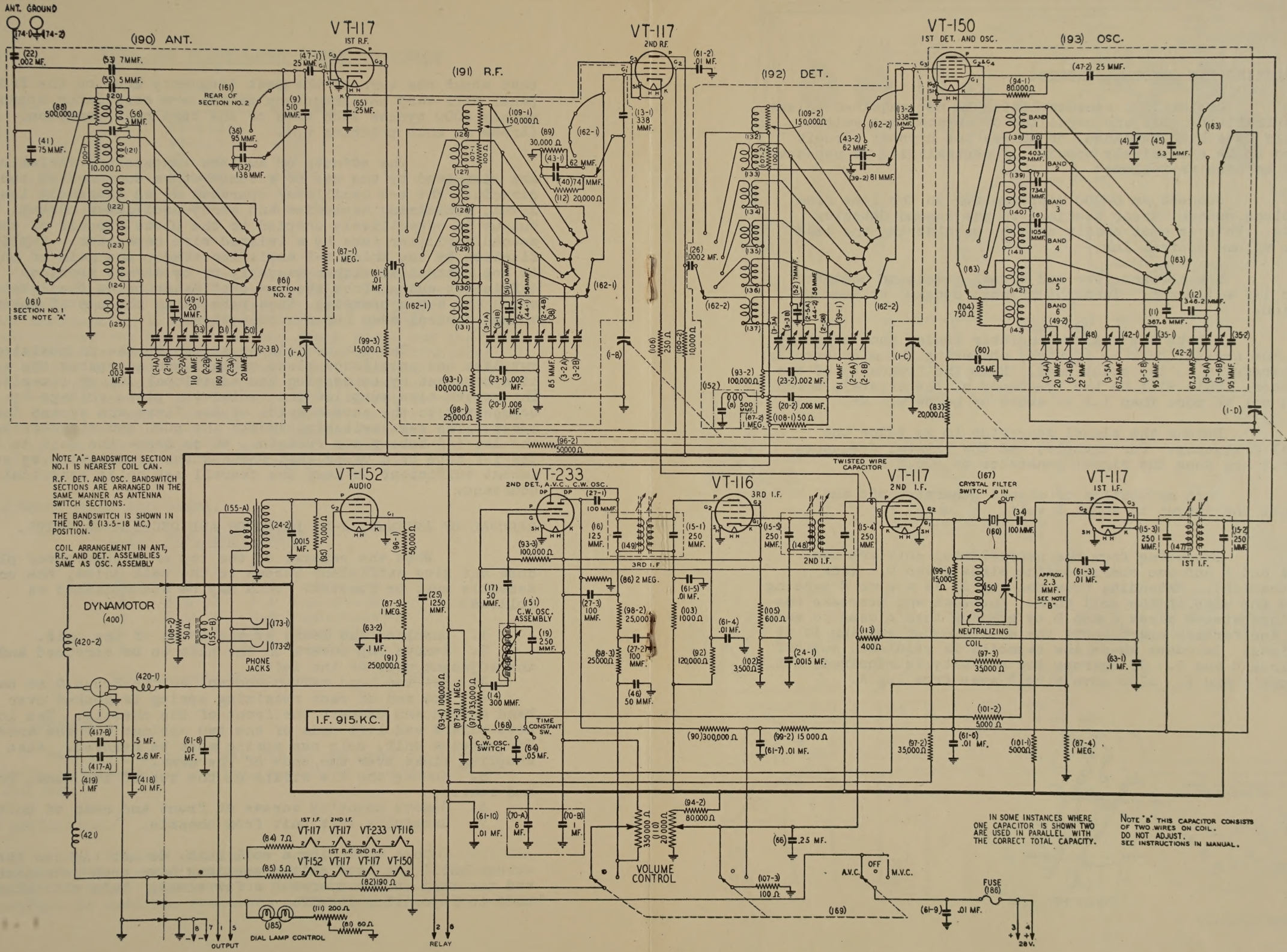
ANTENNA BAND SWITCH CONNECTIONS

		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
SECT. NO.1	FRONT	8 | C	7—8 9 | C	1 7—8—9 | C	2 1—7—8—9 | C	3 1—2—7—8—9 | C	4 1—2—3—7—8—9 | C
	REAR						
SECT. NO.2	FRONT	8 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						





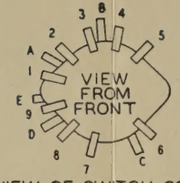
R-F Detector and Oscillator Units



Schematic Diagram,

NOTE-
TURN BAND SWITCH TO BAND COIL IS IN, BEFORE READING COIL RESISTANCES

ALL BAND SWITCH SECTIONS ARE SHOWN IN THE NO.6 POSITION (13.5-18 M.C.).



VIEW OF SWITCH CONTACT LOCATING NUMBERING

BAND SWITCH SECTION NO.1 IS NEAREST COIL CAN.

OSC. BAND SWITCH CONNECTIONS

SECT.		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
NO.1	FRONT	4—7	4—8	4—9	1—4	2—4	3—4
SECT. NO.2	FRONT	8 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						

DETECTOR BAND SWITCH CONNECTIONS

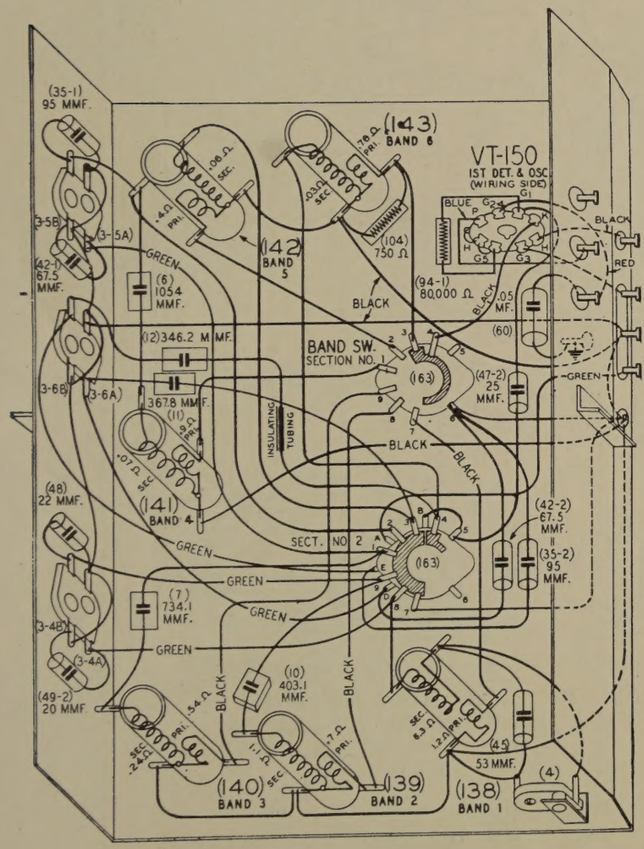
SECT.		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
NO.1	FRONT	4—7	4—8	4—9	1—4	2—4	3—4
SECT. NO.2	FRONT	8 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						

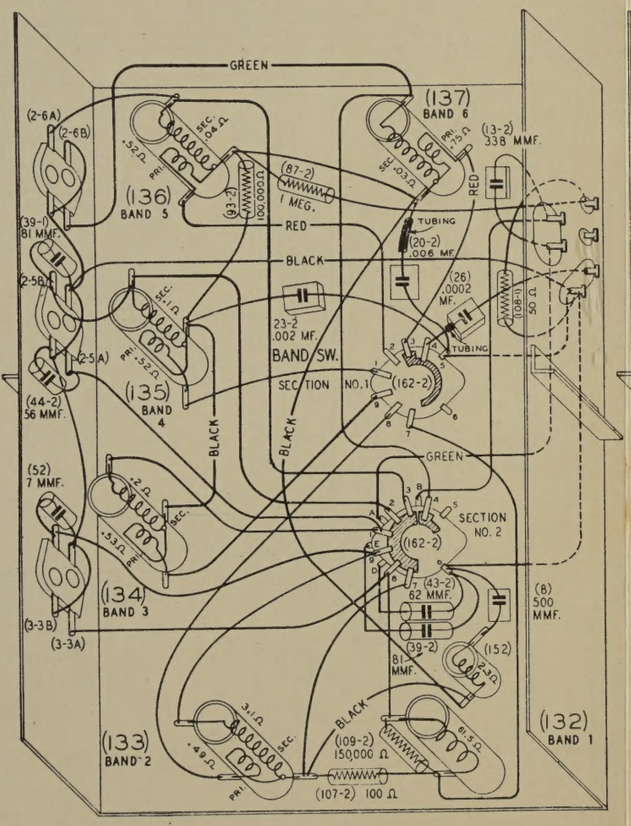
R.F. BAND SWITCH CONNECTIONS

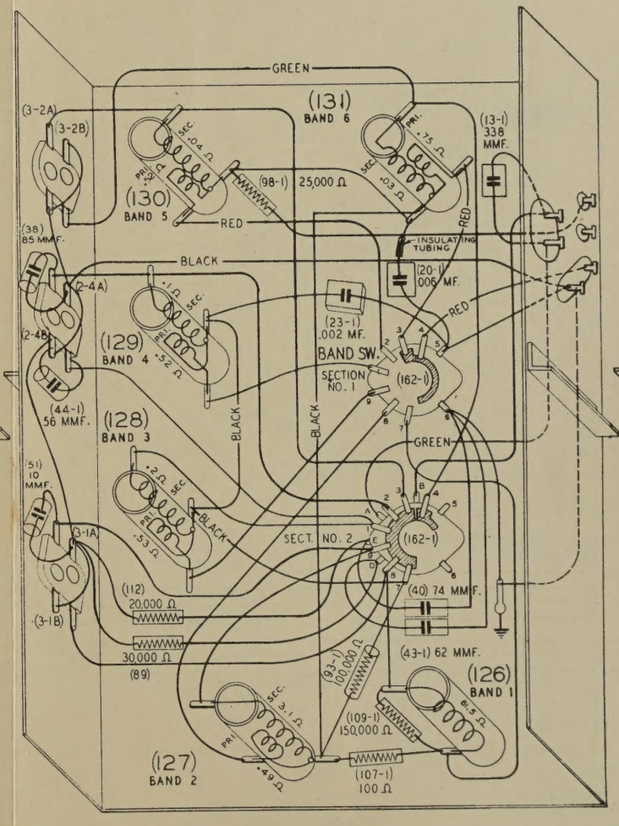
SECT.		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
NO.1	FRONT	4—7	4—8	4—9	1—4	2—4	3—4
SECT. NO.2	FRONT	8 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						

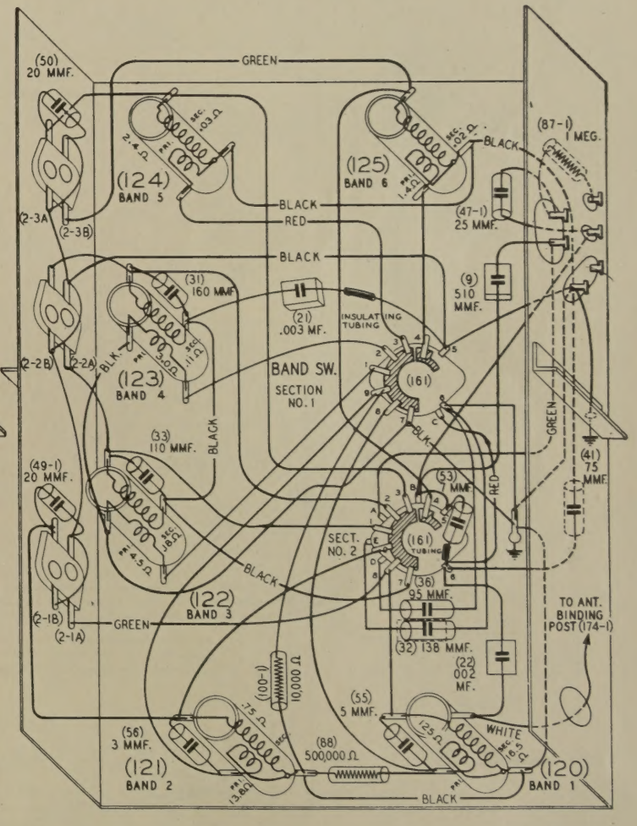
ANTENNA BAND SWITCH CONNECTIONS

		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
SECT. NO.1	FRONT	8 | C	7—8 9 | C	1 7—8—9 | C	2 1—7—8—9 | C	3 1—2—7—8—9 | C	4 1—2—3—7—8—9 | C
	REAR						
SECT. NO.2	FRONT	8 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						





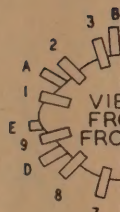




Wiring Diagram, Antenna, R-F Detector and Oscillator Units

NOTE-
TURN BAND SWITCH TO BAND COIL IS IN, BEFORE READING COIL RESISTANCES

ALL BAND SWITCH SECTIONS ARE SHOWN IN THE NO.6 POSITION (13.5-18 M.C.).



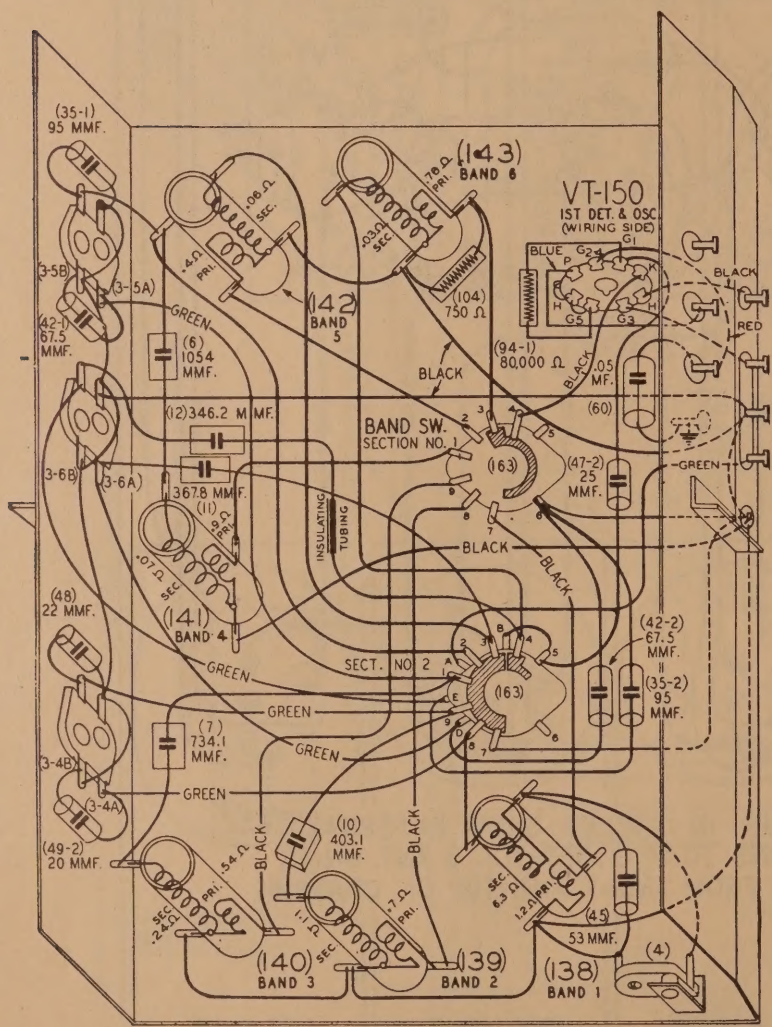
VIEW OF SW
LOCATING

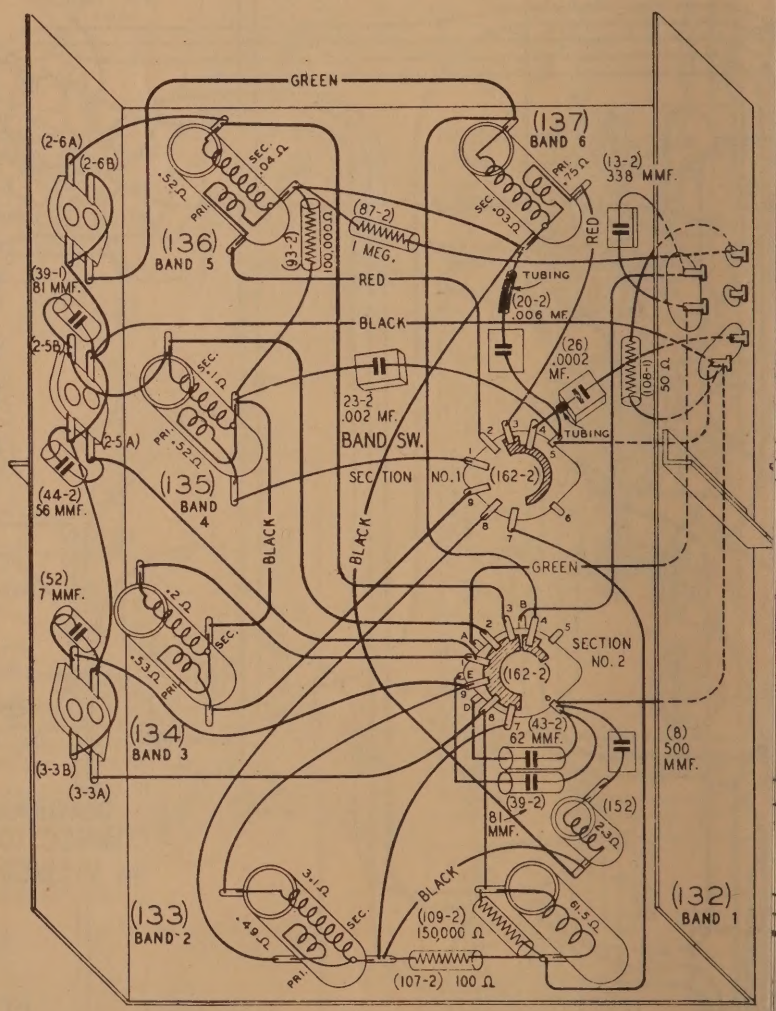
OSC. BAND SWITCH CONNECTIONS

SECT.		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
NO.1	FRONT	4—7	4—8	4—9	1—4	2—4	3—4
SECT. NO.2	FRONT	8 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						

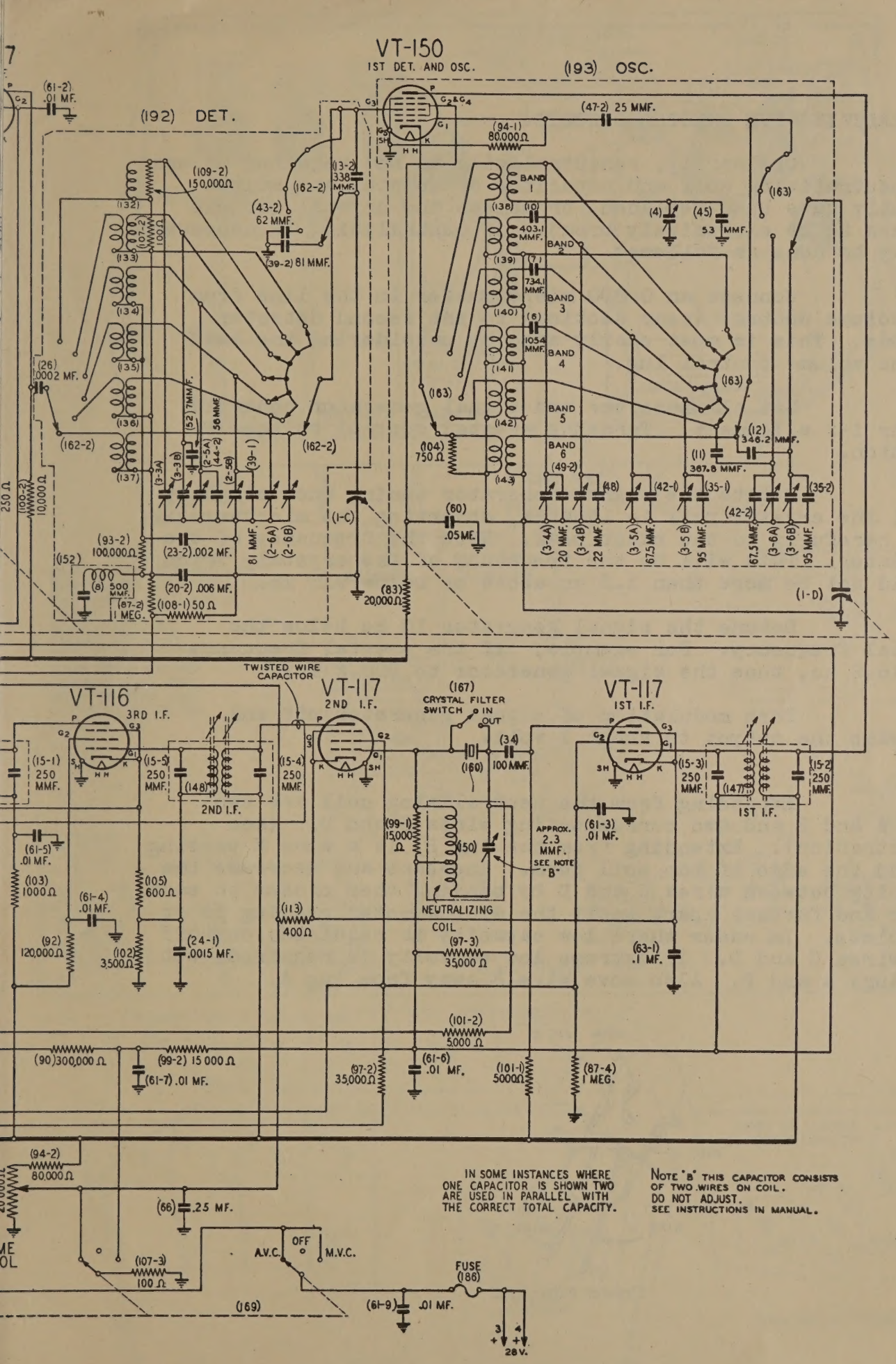
DETECTOR BAND SWITCH CONNECTIONS

SECT.		POS.1	POS.2	POS.3	POS.4	POS.5	POS.6
NO.1	FRONT	4—7	4—8	4—9	1—4	2—4	3—4
SECT. NO.2	FRONT	8 | A—B	7—8 9 | A—B	1 7—8—9 | A—B	2 1—7—8—9 | A—B	3 1—2—7—8—9 | B A—D	4 1—2—3—7—8—9 | B E—A
	REAR						



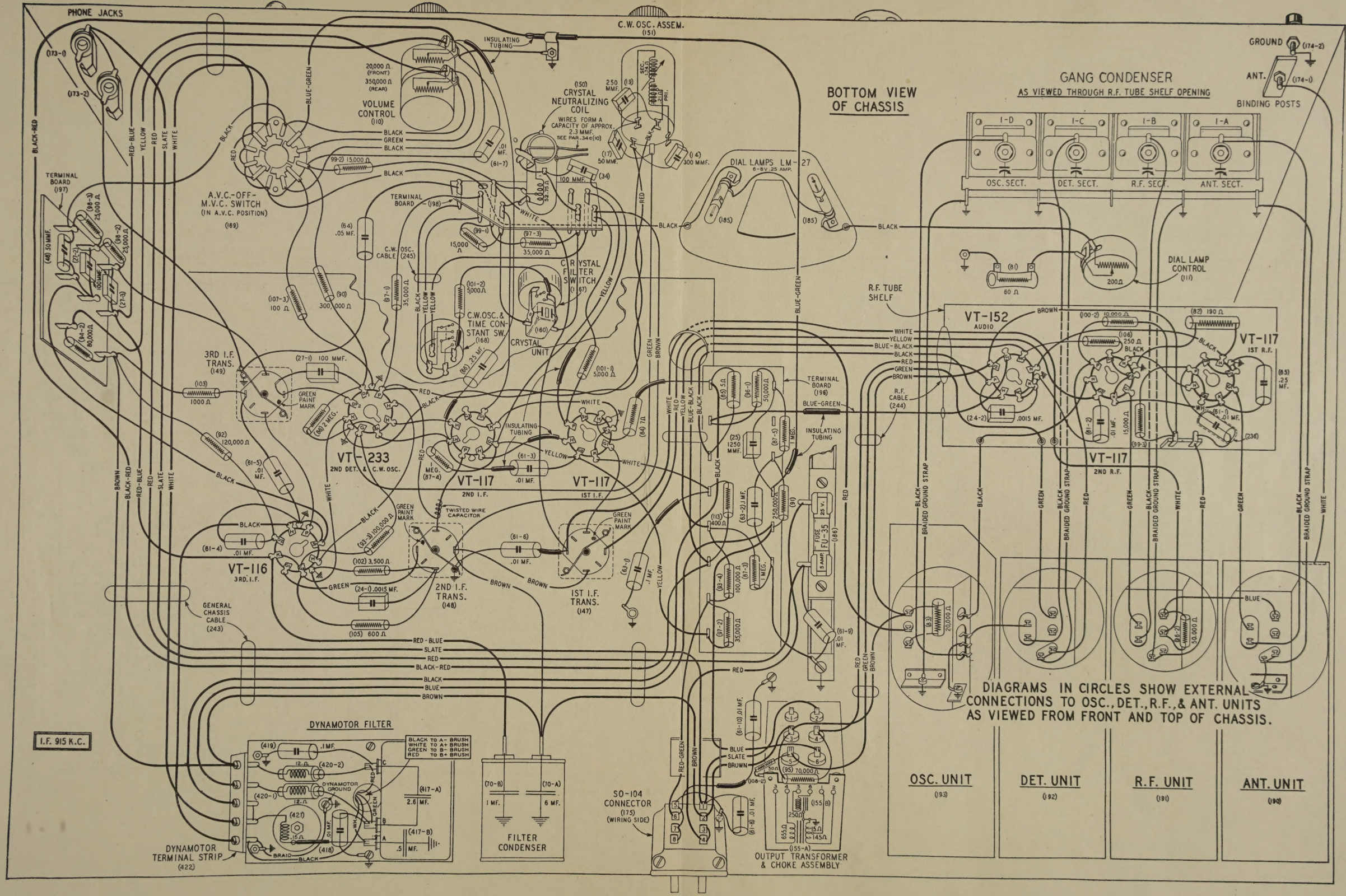


Wiring Diagram, Antenna

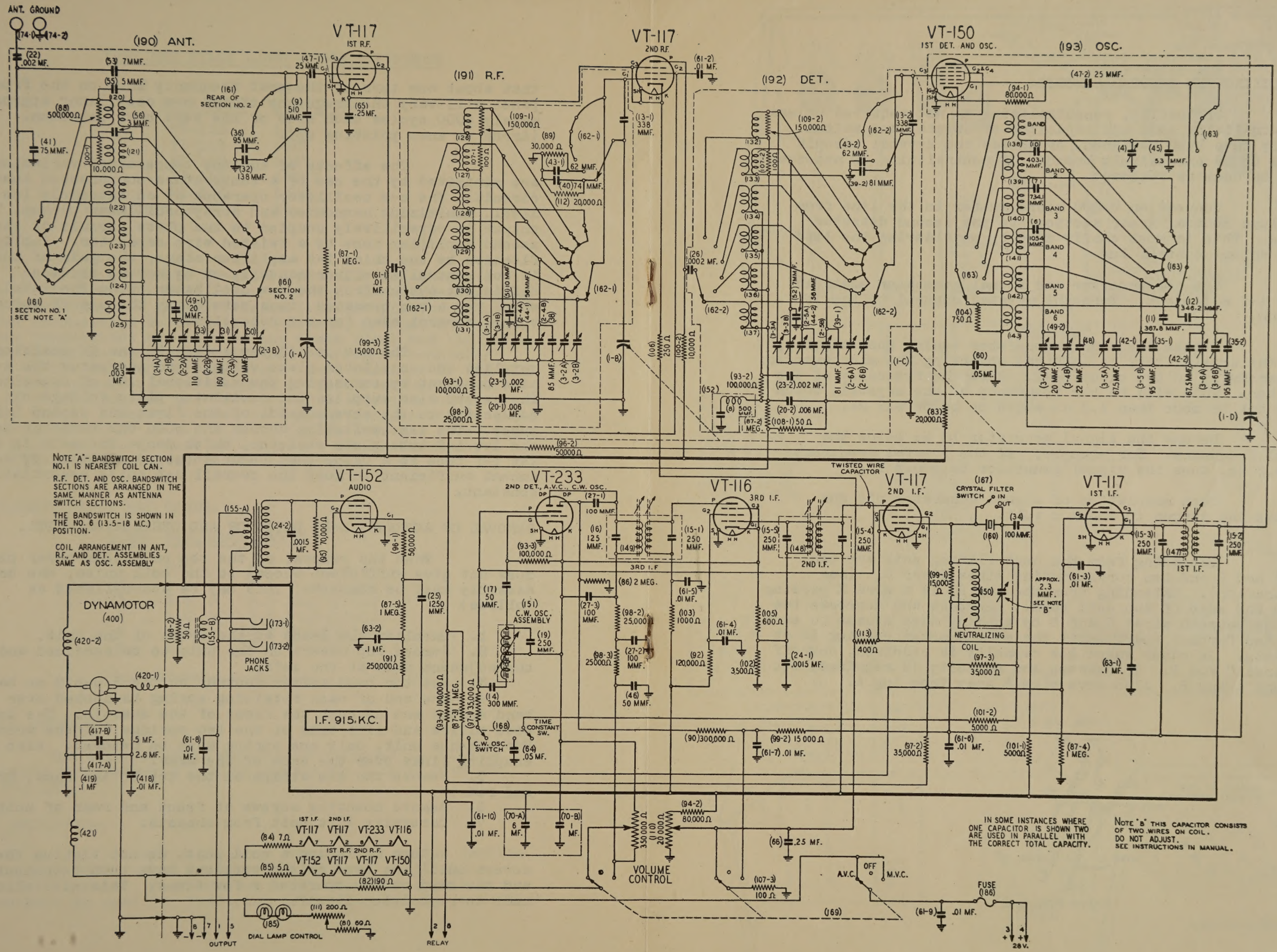


IN SOME INSTANCES WHERE ONE CAPACITOR IS SHOWN TWO ARE USED IN PARALLEL WITH THE CORRECT TOTAL CAPACITY.

NOTE "B" THIS CAPACITOR CONSISTS OF TWO WIRES ON COIL. DO NOT ADJUST. SEE INSTRUCTIONS IN MANUAL.



Wiring Diagram, Chassis,



Schematic Diagram,

NEUTRALIZING THE CRYSTAL CIRCUIT.

Ordinarily, reneutralizing is not required unless the neutralizing coil and capacitor or crystal and switch assembly have been replaced, or unless the crystal circuit appears to be excessively broad. If neutralizing is necessary, it may be done as follows:

Connect an 0-200 microammeter in the line from the volume control (rear section) to the second detector cathode. This is most easily done by unsoldering the lead at the volume control lug.

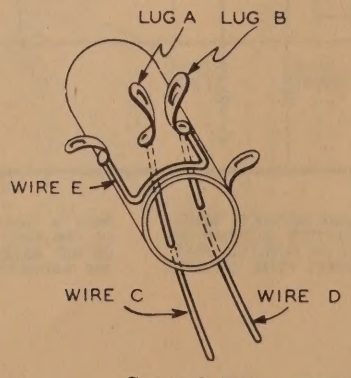
Set all receiver and signal generator controls as for i-f alignment. Turn the crystal control to the IN position.

Rotate the signal generator tuning knob slightly until the crystal peak is located, observing the microammeter. Tune carefully to the exact peak. Note the frequency of the generator. This will be the frequency of the crystal, which should not be more than 1.3 kc above or below 915 kc.

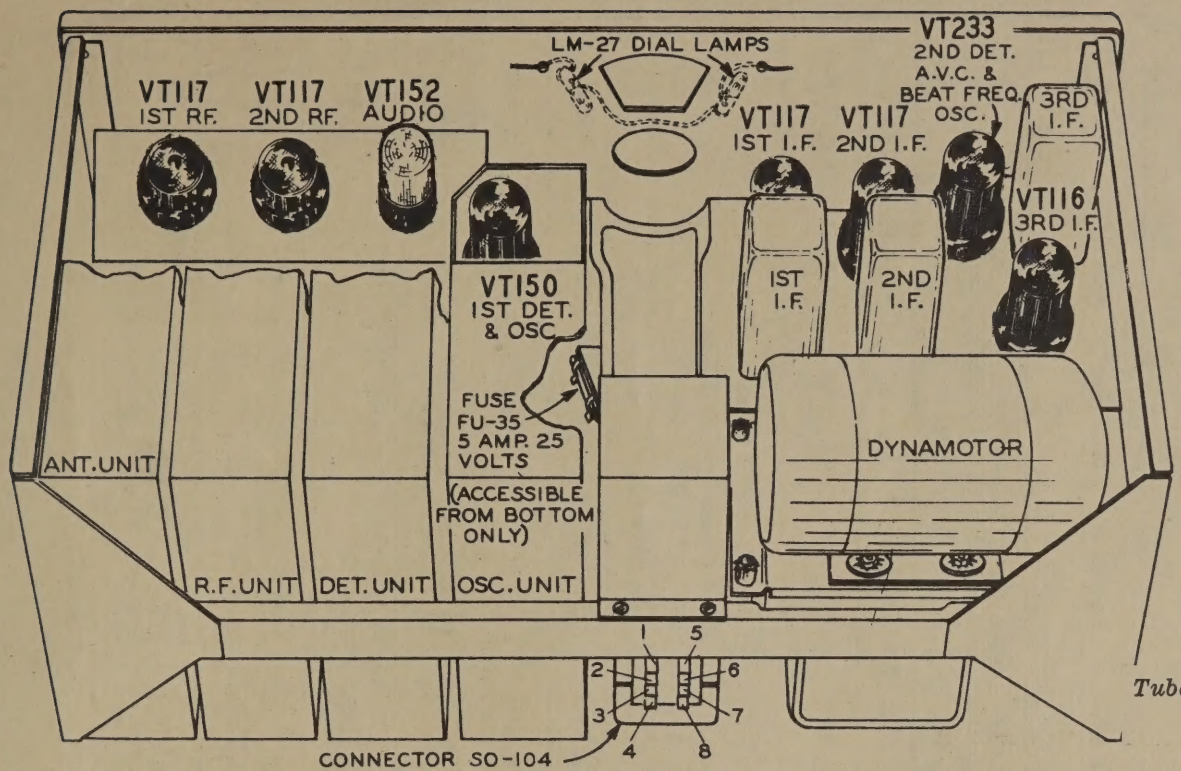
Detune the signal generator 10 kc below the crystal frequency. For example; if the crystal frequency is 916.2 kc, tune the signal generator to 906.2 kc.

Turn modulation of signal generator off and increase the output to about 1 volt.

Extending from the neutralizing coil are two lugs A and B and two corresponding wires C and D. (see illustration). Extending from the lug B, is a wire E passing around the edge of the coil form. Increase and decrease the capacity between wires C and D by bending them closer to each other and farther apart until the microammeter reading is at a minimum. In cases where low capacity is required, cut off the wires C and D. If extreme low capacity is required, cut off lugs A and B. Also move wire E away from lug A.



Crystal Filter Coil

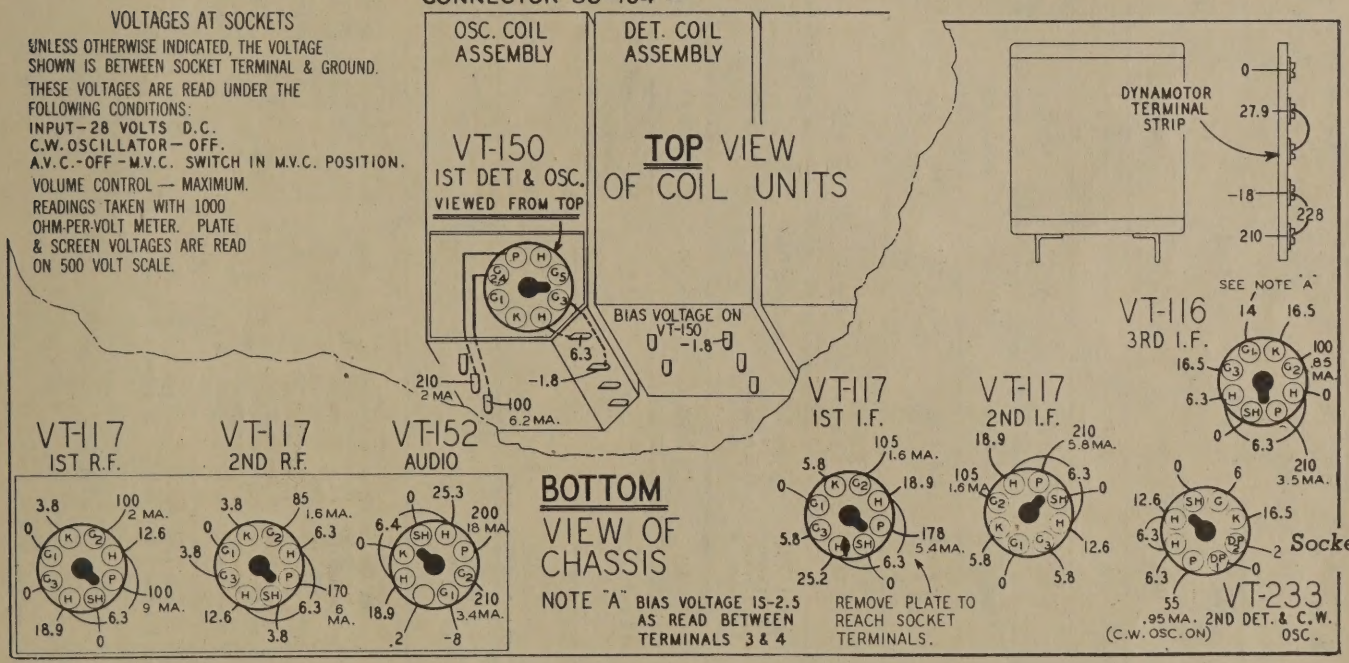


Tube Positions

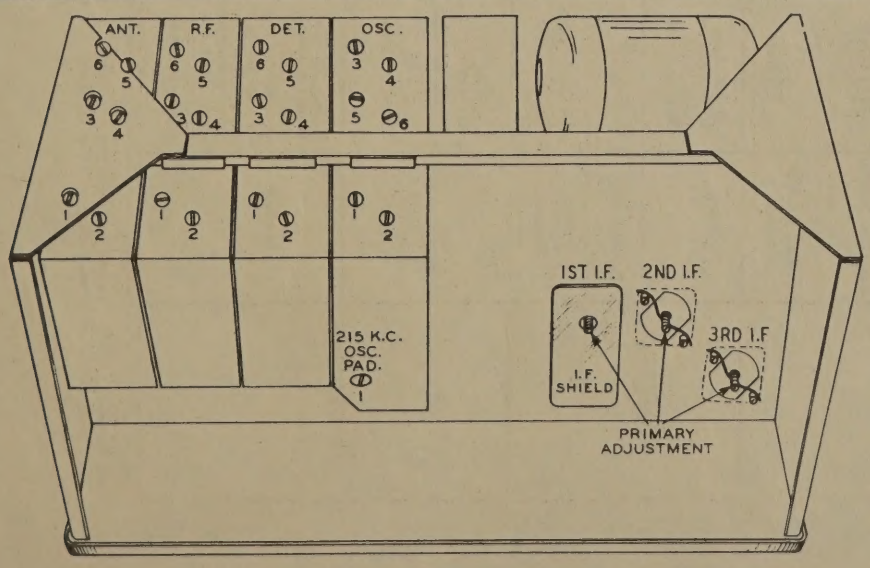
VOLTAGES AT SOCKETS

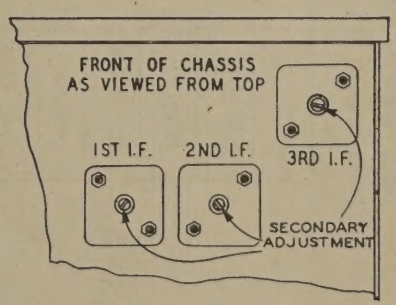
UNLESS OTHERWISE INDICATED, THE VOLTAGE SHOWN IS BETWEEN SOCKET TERMINAL & GROUND.

THESE VOLTAGES ARE READ UNDER THE FOLLOWING CONDITIONS:
INPUT – 28 VOLTS D.C.
C.W. OSCILLATOR – OFF.
A.V.C.-OFF – M.V.C. SWITCH IN M.V.C. POSITION.
VOLUME CONTROL — MAXIMUM.
READINGS TAKEN WITH 1000 OHM-PER-VOLT METER. PLATE & SCREEN VOLTAGES ARE READ ON 500 VOLT SCALE.



Socket Voltages





Location of Trimmer Capacitors

ALIGNMENT CHART

FOLLOW ALIGNMENT IN ORDER FROM LEFT TO RIGHT
START WITH 3rd I-F ADJUSTMENT IN 1st COLUMN, THEN 2nd I-F AND ETC.

Connect Signal Generator Ground Lead to Ground Post of Receiver Using a Short Heavy Lead.

Allow Chassis and Signal Generator to Heat up for Several Minutes.

		3rd I.F.	2nd I.F.	1st I.F.	No. 1 Band	215 kc. Osc. Padder	No. 2 Band	No. 3 Band	No. 4 Band	No. 5 Band	No. 6 Band
RECEIVER CONTROLS	C.W. OSC.	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	CRYSTAL	OUT	OUT	OUT	OUT	OUT	OUT	OUT	OUT	OUT	OUT
	AVC-OFF-MVC	MVC	MVC	MVC	MVC	MVC	MVC	MVC	MVC	MVC	MVC
	VOLUME	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum
	Band Sw. Setting	No. 2 Band 1.5-3.5 Mc	No. 2 Band 1.5-3.5 Mc	No. 2 Band 1.5-3.5 Mc	No. 1 Band 200-500 kc.	No. 1 Band 200-500 kc.	No. 2 Band 1.5-3.5 Mc	No. 3 Band 3.5-6 Mc	No. 4 Band 6-9.5 Mc	No. 5 Band 9.5-13.5 Mc	No. 6 Band 13.5-18 Mc
	Tuning Control Position	1.5 Mc	1.5 Mc	1.5 Mc	470 kc.	215 kc.	3.3 Mc	5.7 Mc	9.0 Mc	13.0 Mc	17.3 Mc
SIGNAL GENERATOR	Antenna Connections	3rd I.F. Tube VT-116 Control Grid Socket Terminal No. 4	2nd I.F. Tube VT-117 Control Grid Socket Terminal No. 4	1st Det. Tube VT-150 Control Grid External Terminal	Antenna Post	Antenna Post	Antenna Post	Antenna Post	Antenna Post	Antenna Post	Antenna Post
	Dummy Ant.	.1 MFD	.1 MFD	.1 MFD	100 MMF	100 MMF	100 MMF	100 MMF	100 MMF	100 MMF	100 MMF
	Frequency Setting	915 kc. ±1000 Cycles or less	915 kc. ±1000 Cycles or less	915 kc. ±1000 Cycles or less	470 kc.	Shut Off Signal Generator See Note B	3.3 Mc	5.7 Mc	9.0 Mc	13.0 Mc	17.3 Mc
PROCEDURE	Sensitivity	60,000 Microvolts	2,100 Microvolts	35 Microvolts	3-7 Microvolts See Note A		3-7 Microvolts See Note A	3-7 Microvolts See Note A	3-7 Microvolts See Note A	3-7 Microvolts See Note A	3-7 Microvolts See Note A
	Trimmers Adjusted	3rd I.F. Tuning Cores	2nd I.F. Tuning Cores	1st I.F. Tuning Cores	No. 1 Trimmers on Osc. Det. R.F. and Antenna Units.	215 kc. Oscillator Padder	No. 2 Trimmers on Osc. Det. R.F. and Antenna Units.	No. 3 Trimmers on Osc. Det. R.F. and Antenna Units.	No. 4 Trimmers on Osc. Det. R.F. and Antenna Units.	No. 5 Trimmers on Osc. Det. R.F. and Antenna Units.	No. 6 Trimmers on Osc. Det. R.F. and Antenna Units.
	Procedure	Increase Sig. Gen. to about 1 volt. Adjust 3rd I.F. Tuning Core screws, first top screw & then bottom. Adjust topand bottom screws again and then a third time to maximum output.	Decrease input from Sig. Gen. to 10 milliwatt output level. Adjust 2nd I.F. Tuning Core screws, top screw first, then bottom. Adjust top & bot. screws again, and then a third time to maximum output.	Decrease input from Sig. Gen. to 10 milliwatt output level. Adjust 1st I.F. Tuning Core screws, top screw first, & then bottom. Adjust top & bot. screws again, and then a third time to maximum output.	Adjust No. 1 Trimmer on Osc. Unit to max. output. Then adjust Trimmers on Det., R.F., & Antenna Units, in that order to max. output, and decrease signal as required to maintain 10 milliwatts output. Repeat above.	Adjust 215 kc. osc. Padder to max. output. Repeat No. 1 Band adjustment & 215 kc. Osc. Padder adjustments 2 or 3 times to insure correct tracking & dial calibration.	Adjust No. 2 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., & Ant. Units in that order to max. output & decrease signal as required to maintain 10 milliwatt output. Repeat above.	Adjust No. 3 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., & Ant. Units in that order to max. output & decrease signal as required to maintain 10 milliwatt output. Repeat above.	Adjust No. 4 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., & Ant. Units in that order to max. output & decrease signal as required to maintain 10 milliwatt output. Repeat above.	Adjust No. 5 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., & Ant. Units in that order to max. output & decrease signal as required to maintain 10 milliwatt output. Repeat above.	Adjust No. 6 Trimmer on Osc. Unit to max. output. Then adjust trimmers on Det., R.F., & Ant. Units in that order to max. output & decrease signal as required to maintain 10 milliwatt output. Repeat above.

Note A—SENSITIVITY—Adjust Signal Generator until output is 10 milliwatts. Turn off modulation of Signal Generator. Turn down receiver Volume Control until 2.5 milliwatts of noise output is reached. Turn on generator modulation again, and raise generator output to 10 milliwatts on output meter.

Note B—This adjustment uses the noise developed in the receiver as the only signal.