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WORKING INSTRUCTIONS

RECEPTION SETS CANADIAN VRL

Published by:

The Directorate of Electrical and Communication Design, Master General of the Ordnance Branch, Department of National Defence, Ottawa, Canada.

Approved by:

The Chief of the General Staff, Department of National Defence, Ottawa, Canada.

HQS 9070-12-3 VRL-INST-I 15 May, '44

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To the Chief of the Materiel Division. J.E.S. Ltd.

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CONTENTS

CHAPTER I.

GENERAL DESCRIPTION

CHAPTER II

OPERATING INSTRUCTIONS

CHAPTER III

SERVICE INSTRUCTIONS

CHAPTER III—Cont.

SERVICE INSTRUCTIONS

TABLES

PHOTOGRAPHS

DIAGRAMS

ABBREVIATIONS

A.C.	Alternating Current	M.	"Thousand" used with figures. Example: 10M means 10,000.
Amp.	Amplifier		
amp.	ampere		
A.V.C.	Automatic Volume Control	Meg.	Megohm
		mfd.	micro farad
B.F.O.	Beat Frequency Oscillator	mmfd.	micro micro farad
		mh.	milli henry
C.W.	Continuous Wave (Code)	Mult Vib.	Multi-Vibrator
		Osc.	Oscillator
D.C.	Direct Current	P.S.	Power Supply
Det.	Detector	Rec.	Receiver
I.F.	Intermediate Frequency	Reg.	Regulator
		R.F.	Radio Frequency
Ind.	Indicator	V. or v.	Volt
k.c.	kilocycles per second	w.	Watt.

CHAPTER I

GENERAL DESCRIPTION

1.1 GENERAL

Reception Sets Canadian VRL is a communications type general purpose 19 valve superheterodyne receiver covering a range from 1.4 to 28 megacycles and such additional items of equipment necessary for its operation in vehicles or as a fixed station. This receiver is designed to operate from a 115 volt 50/60 cycle A.C. source.

The Reception Set consists of two units.

(a) The Receiver Proper, mounted in a shock-proof angle iron rack.

(b) The Power Supply, which also contains the Crystal Calibrator and the loudspeaker, mounted in the rack directly above the receiver.

TABLE I

WEIGHTS AND MEASUREMENTS

Unit	Weight in Lb.	Dimensions in Inches		
		Length	Depth	Width
Receiver Proper	57	19	11¾	16⅞
Power Supply	31	19	7½	10
Rack (including "Vibration Eliminator" type feet	15½	20⅛	22	16½

1.2 CIRCUIT DESCRIPTIONS

The Receiver incorporates the following circuit functions.

1.2.1 RADIO FREQUENCY AMPLIFIER

Two stages of tuned Radio Frequency amplification, using a 6K7 tube in the first stage, and a 6L7 in the second, are used. Two stages are used in order to give good selectivity and a high image ratio.

1.2.2 FIRST DETECTOR

A 6K8 tube is used as the First Detector.

1.2.3 HIGH FREQUENCY OSCILLATOR

The High Frequency Oscillator tube is a 6SJ7, the plate voltage of which is regulated by the VR150/30 tube. The Oscillator is electron-coupled.

1.2.4 INTERMEDIATE FREQUENCY AMPLIFIER

The three stages give high selectivity and also the high gain required to maintain the very flat A.V.C. response from minimum to maximum signals.

1.2.5 CRYSTAL FILTER

A Crystal Filter unit is used in conjunction with the first I.F. stage, providing five ranges of selectivity varying from broad for phone reception, to sharp, for code reception.

1.2.6 A.V.C. SYSTEM

Two A.V.C. channels are used, fed from a common 6K7 amplifier stage, one section of the 6H6 diode rectifier supplying the I.F. stages. The other section, supplying the R.F. stages, has a delay voltage applied to it. The R.F. stages therefore operate at full sensitivity until a signal of appreciable magnitude is encountered. In this way a high signal to noise ratio is maintained on the weaker signals. No A.V.C. is applied to the First Detector in order to maintain frequency stability under fading signals and variation in the setting of the R.F. Gain Control. No A.V.C. is used on the last I.F. stage in order to reduce modulation rise to a minimum and also to reduce distortion on high signal inputs.

The A.V.C. is controlled by a three position switch which has "OFF", "F" (for fast), and "S" (for slow). In the "SLOW" position additional capacity is added across the A.V.C. voltage, thereby creating a delay in the A.V.C. action. This is very useful for maintaining the background noise at a low level between words and characters when using A.V.C. on C.W. reception.

1.2.7 BEAT FREQUENCY OSCILLATOR

The Beat Frequency Oscillator unit, using a 6J7 tube, is well shielded and isolated to remove all spurious beat frequencies. Since it is fed into the I.F. amplifier at a point after that supplying the A.V.C. amplifier, it does not develop additional A.V.C. voltage to reduce sensitivity, therefore, A.V.C. may be used on C.W. reception on both weak and strong signals. Voltage to this tube is also stabilized by the VR150/30 regulator tube, thereby maintaining good stability.

1.2.8 SECOND DETECTOR

A 6H6 diode detector is used, the elements being connected as a half wave rectifier.

1.2.9 NOISE SUPPRESSOR

One section of the A.V.C. diode is also used as a Noise Silencer. The voltage developed across the audio choke is fed through a coupling condenser to the injector grid of the 6L7 third I.F. stage. This has the effect of muting the receiver during the noise pulses. It operates on such noises as ignition interference, etc.

1.2.10 TONE CONTROL

The Tone Control is variable and will attenuate unwanted high audio frequencies under noisy reception conditions.

1.2.11 POWER SUPPLY

The Power Supply operates from a 115 volt 50/60 cycle A.C. source. The Rectifier valve is a Type 80. The Power Supply incorporates a voltage regulation valve (type

VR150/30) supplying regulated voltage to the High Frequency Oscillator and also to the Beat Frequency Oscillator. Two .02 microfarad 600 volt by-pass condensers are connected in series across the 115 volt line with their mid-point grounded. An extractor type fuse holder is employed in one side of the line.

1.2.12 CRYSTAL CALIBRATOR

A Crystal Calibrator is provided for calibrating purposes. This calibrator uses a combination crystal oscillating on either 100 k.c. or 1000 k.c. in conjunction with an oscillator valve Type 6K6GT. A multi-vibrator valve type 6C8G and amplifier valve type 6K7 provide sufficient output from the amplifier so that 10 k.c., 100 k.c. and 1000 k.c. frequencies may be employed throughout the range of the receiver. A four position switch is provided on the panel for selecting the desired frequency.

CHAPTER II

OPERATING INSTRUCTIONS

2.1 DESCRIPTION

Reception Set Canadian VRL is shipped complete with Power Supply and rack for mounting. The receiver is mounted by means of four screws and counter-sunk washers directly below the Power Supply (similarly mounted) in the rack. The Receiver and Power Supply are interconnected with the inter-unit cable provided. See photo No. 2. Both Receiver and Power Supply are shipped complete with valves installed in their respective sockets.

The Antenna terminal strip is mounted at the rear of the receiver chassis, marked "A, A1, G." When using a two wire transmission line from the antenna, it should be connected to terminals "A" and "A1". The Earth lead is to be connected to terminal marked "G". If a single wire line or simple antenna is used, it should be connected to terminal "A", terminal "A1" being jumpered to Earth terminal marked "G". This jumper should be removed when a two wire transmission line is being used.

Also mounted on the rear of the receiver is a strip containing ten terminals. Output at an impedence of 500 ohms is supplied between terminals No.'s 8 and 9, or at an impedence of 8 ohms between terminals No.'s 8 and 7. Terminal No. 10 is for simultaneous operation of other equipment with the "Send-Receive Switch". Terminal No. 10 is automatically grounded when "Send-Receive Switch" is in the "Send" position. In the "Send" position this switch also disconnects circuits so that no response is audible and also that no blocking effect takes place from strong adjacent signals. Instantaneous recovery of the receiver operation is made when the switch is thrown to "Receive".

2.2 OPERATION

Assuming that the Receiver and Power Supply are properly mounted in the rack as described heretofore, and as shown

in photos No.'s 1 and 2, the A.C. power cord may be plugged in and the power switch turned on. The receiver is now ready for operation, with the "Send-Receive Switch" in the "Receive" position.

IMPORTANT NOTE: The speaker switch should be turned on, and left on, at all times unless there is a suitable load connected to either the 8 ohm or the 500 ohm ouput terminals on the rear terminal strip.

Upon commencing operation the Selectivity and B.F.O. switches should be in "Off" positions with the AVC switch in the"F" (or Fast) position. The R.F. Gain control can be placed temporarily at 6 or 7.

The Range Switch is now turned to the desired band, and the main tuning dial turned to the desired frequency. It will be noted that the main tuning dial may be turned freely when the Vernier Knob is pressed downward, and to the right, away from the edge of the dial. For fine adjustment, the Vernier Knob can be used for tuning when in the "lock" position. When the Vernier Knob is used for tuning, the dial remains fixed securely on the frequency, upon removal of the hand from the Vernier control. Vernier tuning will be found especially desirable under conditions of vibration.

Upon the setting of the frequency, the Volume Control may be adjusted to the desired level.

When receiving voice signals, satisfactory results will generally be obtained with the AVC switch in the "F" (or Fast) position, but under certain conditions of fading the "S" (or Slow) position may be found more desirable.

When the receiver is operated with the AVC switch in the "Off" position (no AVC action) the Volume Control should be advanced to 7 or 8, and the R.F. Gain Control should be used to some extent as a volume control.

If interference is encountered, the Selectivity Switch may be turned to positions No.'s 1, 2, or 3 when receiving voice (or positions No.'s 1 to 5 when receiving C.W.) and the Phasing Control adjusted for minimum interference. It may be necessary to adjust the main tuning dial very slightly in

conjunction with the adjustment of the Phasing Control to obtain maximum cancellation of the interfering signal.

When receiving C.W. signals the B.F.O. should be turned on and the pitch control adjusted to the desired beat note. (B.F.O. switch and Pitch control are combined in the same control knob). The AVC switch should be either in the "Off" or "S" (Slow) position, and the R.F. Gain Control adjusted for maximum intelligibility. The "S" (Slow) position, of the AVC switch introduces a time lag in the AVC action which effectively reduces the noise level between characters but still keeps the average signal level constant. It should be noted that the AVC switch should never be in the "Slow" position when tuning, as due to the time lag introduced, it is difficult to tune sharp signals.

2.2.1 TONE CONTROL

A tone control with slotted shaft for screw driver or coin adjustment is located on rear of chassis. This makes it possible to reduce the background hiss to a degree consistent with intelligibility for any particular application.

2.2.2 NOISE SUPPRESSOR

The noise suppressor aids very materially in reducing noise of the sharp intermittent type such as caused by ignition systems, etc. It should not, however, be expected to reduce all types of continuous noise.

Maximum benefit will be realized if the R.F. Gain Control is also adjusted to nearly full on when using the Noise Suppressor at some levels of noise. The Noise Suppressor control should, of course, be only turned up to the point where maximum reduction in noise takes place, continuing further will introduce slight distortion due to reduction of modulation peaks of the signal itself, but in speech is not particularly noticeable.

The Noise Suppressor makes it possible to receive signals through noise which would otherwise render them unintelligible.

2.3 OPERATION OF CRYSTAL CALIBRATOR

To use the Crystal Calibrator, connect a wire from the output of the Crystal Calibrator (which is No. 10 terminal on the Power Supply), to "A" on the Antenna terminal strip. This connection will not interfere materially with the response of signals and may be left on if so desired. The Calibrator switch is now turned to the 1000 k.c. position. Now, if the B.F.O. is turned on, a signal from the Crystal Calibrator will be heard at every 1000 k.c. point across the entire frequency range of receiver. The particular frequency of each of these points will be the frequency as indicated on the calibrated dial. Reading should be noted, for these points will fall very close to the dial calibration. Now the switch may be turned to the 100 k.c. point and at this position a signal will be heard every 100 k.c.

If setting the dial for some particular frequency, the following procedure is followed:

The frequency is now limited between two 100 k.c. points. The switch may now be turned to the 10 k.c. position and a signal will appear at every 10 k.c. By counting these signals from the 100 k.c. reference point, it is possible to have the frequencies located between two 10 k.c. points. These two points may further be divided by using the main tuning dial for this purpose. If, for instance, the frequency of 3563 k.c. is to be located, proceed as follows: Turn the Calibrator switch to 1000 k.c. and on Band "B" a carrier will be heard at 3 megacycles and at 4 megacycles. Set the pointer on the 3 megacycle signal, turn the switch to the 100 k.c. position and slowly advance the pointer towards 4 megacycles, carefully counting the signals. The first calibrator signal heard after leaving the 3 megacycle point will be 3100 k.c. Count carefully over until the fifth and sixth are located. Now the frequency being looked for is between these two points. The calibrator is now turned to the 10 k.c. position and by carefully checking it will be found that there are now ten carriers from 3500 k.c. to 3600 k.c. not counting the starting point of 3500 k.c. By carefully counting the 10 k.c. signals from 3500, the sixth one will be 3560 k.c. This point should be carefully noted on the 0-100 main tuning dial and then the position of the next signal also noted. At this point 3560 k.c. and 3570 k.c. will have been located. By dividing the number of degrees between these two points on the dial to approximately one-third, the frequency of 3563 k.c. will now be found.

When using the calibrator on the high frequency bands, the 10 k.c. points come very close together and are sometimes hard to distinguish and to count. Therefore, on these points it is somewhat simpler and just as accurate, to obtain two 100 k.c. points, one of which is on the high frequency side of the desired frequency and the other on the low frequency side. These two points are noted on the main dial and by dividing the number of divisions by 100, the desired frequency may be very closely found. It might be pointed out that for all practical purposes the linearity of the dial reading between any two 100 k.c. divisions over the spectrum is accurate.

CHAPTER III

SERVICE INSTRUCTIONS

3.1 VALVES

Receiver valves may be inspected or replaced by removal of the receiver Dust Cover which is held in position by four catches. Removal of this Dust Cover exposes all of the valves with the exception of those in the Tuner Unit and the B.F.O.

The valves in the Tuner Unit are exposed by removal of the top tuner shield lid which is held on by a catch, and access is gained to the valve in the B.F.O. by removal of the B.F.O. lid, also held in position by a catch. Spare valves are carried in the Unit Spares Compartment which is part of the power supply cover.

Valves in the Power Supply are exposed by removal of the Power Supply Dust Cover.

3.2 FUSE

The Power Supply A. C. line fuse is contained in an extractor-type fuse holder on the rear of the Power Supply chassis marked "Fuse". Spare fuses will be found in the Unit Spares Compartment.

3.3 PILOT BULB

The Pilot Bulb may be replaced by unscrewing the red pilot lamp lens from the front panel of the Power Supply. A supply of pilot bulbs will be found in the Unit Spares Compartment.

3.4 ALIGNMENT

All trimming condensers on the R.F. and I.F. coils are of a type which should retain their factory setting over a long period of time even under adverse conditions. If, however, due to replacement of parts or exceptionally heavy abuse, re-alignment becomes necessary, the following procedure is advised:

CAUTION: Do not attempt re-alignment of this receiver unless high standard test equipment is available.

Equipment necessary for both R.F. trimmers and I.F. coil adjustment:

Signal Generator—capable of supplying a modulated signal of 455 k.c. (for I.F. alignment) and from 1.5 megacycles to 27 megacycles (for R.F. alignment).

Output Meter—either

(1) High Resistance Voltmeter, preferably 5000 ohms per volt or higher or

(2) Rectifier type A.C. Voltmeter.

Insulated Screw Driver.

Resistor—400 ohms, for Dummy Antenna.

3.4.1 I.F. ALIGNMENT

Remove receiver from rack and re-connect to Power Supply. Remove Dust Cover and Top Tuner Shield lid. Also remove bottom plate of receiver.

Remove Grid Clip from 6K8 Mixer valve and connect signal generator between 6K8 grid and chassis.

If high resistance D.C. Voltmeter is used as output indicator, connect across audio diode load resistor No. R17D.

If a Rectifier type A.C. Voltmeter is used for output meter, connect by means of a phone plug in the phone jack, or connect across terminals 8 and 9 at the rear of the set.

3.4.2 FRONT PANEL CONTROL SETTINGS FOR I.F. ALIGNMENT

Noise Suppressor	"Off"
Selectivity	"1"
Phasing	"4"
Send Receive Switch	"Receive"
B.F.O.	"Off"
AVC	"Off"
Volume	Full on
R.F. Gain	"7 or 8"
Speaker	"On"
Calibrator	"Off"

Making particularly sure that selectivity switch is in No. 1 position, tune signal generator very carefully in the vicinity of 455 k.c. and locate the **exact** fundamental frequency of the crystal in the crystal filter, by observing the peak on the output meter.

With the signal generator tuned accurately to this frequency, adjust, by means of the insulated screw driver, through access holes in the side walls of the receiver, I.F. transformer coils No.'s T10A and T11A in the Crystal Filter, and I.F. transformers No.'s T1A, T1B for maximum ouput. I.F. transformer No. T2A, to be similarly adjusted, is clearly accessible from the rear of the receiver. Care must be taken not to overload the I.F. Amplifier with too high an input level as this would cause inaccurate adjustment of these transformers.

The AVC switch should now be turned on to the "F" (Fast) position and the AVC I.F. transformer T3A then tuned to resonance by means of the two adjustments on top of the transformer, in this case tuning for **minimum output.** It may be necessary to increase the output level of the signal generator to compensate for the AVC voltage developed, and still allow a readable output.

3.4.3 R.F. ALIGNMENT

When the bottom plate of the receiver is removed, tuner trimmers will be observed through adjustment holes in the bottom shield of the tuner assembly. Position of each trimmer is clearly marked.

Connect signal generator to antenna terminal through the 400 ohm resistor as a Dummy Antenna. The shielded or grounded lead of the signal generator must be clipped to the receiver chassis or connected to the Earth terminal marked "G" on receiver chassis. Terminal marked "A1" should be jumpered to terminal marked "G".

The Output meter is connected as in the case for I.F. Alignment.

3.4.4 PANEL CONTROL SETTINGS FOR R.F. ALIGNMENT

Noise Suppressor	"Off"
Selectivity	"Off"
Phasing	Optional
R.F. Gain	Adjusted to desired level.
B.F.O.	"Off"
AVC	"Off"
Volume	Full on
Speaker	"On"
Calibrator	"Off"

BAND "A"

Turn Range Switch to Band "A" and Tuning Dial of receiver to 3.2 megacycles on the "A" scale. Supply a signal from the signal generator of same frequency. Adjust Band "A" oscillator trimmer, C23P, until the signal is received at this setting.

Important Note: It may so happen that there will be two positions of the **oscillator** trimmers where Signal Generator will be heard. The low capacity (high frequency) position is the correct one to use, the other frequency being the "image frequency".

Adjust Band "A" Detector trimmer, C23L, R.F. trimmer, C23H, and Antenna trimmer, C23D, for maximum output.

NOTE: Be extremely careful when aligning all bands that the image frequency is not used for alignment, being careful to pick the right frequencies as set out above.

BAND "B"

Turn Range Switch to Band "B" and Tuning Dial of receiver to 6.7 megacycles on "B" scale. Supply a signal from signal generator of the same frequency. Adjust Band "B" oscillator trimmer, C23O, until the signal is received at this setting. Adjust Band "B" Detector trimmer, C23K, R.F. trimmer, C23G, and Antenna trimmer, C23C, for maximum output.

BAND "C"

Turn Range Switch to Band "C" and Tuning Dial of

receiver to 14.5 megacycles on "C" scale. Supply a signal from signal generator of the same frequency. Adjust Band "C" oscillator trimmer, C23N, until the signal is received at this setting. Adjust Band "C" Detector trimmer, C23J, R.F. trimmer, C23F, and Antenna trimmer, C23B, for maximum output.

BAND "D"

Turn Range Switch to Band "D" and Tuning Dial of receiver to 27 megacycles on "D" scale. Supply a signal from Signal Generator of the same frequency. Adjust Band "D" oscillator trimmer, C23M, until the signal is received at this setting. In the case of the "D" Band oscillator it is suggested that **both** the positions where the signal can be heard, **be found** and the low capacity (high frequency) signal be used.

Diverting now from the procedure followed in Bands "A", "B" and "C" at this point, de-tune receiver dial slightly higher than 27 megacycles so that the signal from the signal generator is not audible and adjust detector trimmer, C23I, for maximum **noise level**. In this case if noise peaks can be heard at two positions of detector trimmer it is the **high capacity, low frequency** position which is correct to use.

Now tune the receiver dial back to 27 megacycles so that the signal generator signal is in tune, then adjust R.F. trimmer, C23E, and Antenna trimmer, C23A, and readjust detector trimmer, C23I, for maximum indication on output meter.

CHAPTER III
SERVICE INSTRUCTIONS
TABLE II
TEST VOLTAGES

GENERAL NOTE: For purposes of these tests controls shall be placed in the positions indicated below unless otherwise indicated.

RF Gain . . . . . Full
Selectivity . . . . . Off
Noise Suppressor . . . . . Off
BFO . . . Off (On for V2A)
AVC . . . . . F (Fast)
Volume . . . . . Off

Calibrator . . Off (On for P.S.)
Send-Rec. Switch . . . Rec.
Range Switch . . . "A" Band
Tuning Dial . . . Mid. Scale
Speaker Switch . . . . On

Antenna shorted to ground.
No signal input.
Line voltage 115 AC.

Meter—5000 ohms per volt.

NOTE: All voltages are measured between the point indicated and the chassis.

Circuit Ref.	Valve Type	Function	Pin No. 1	2	3	4	5	6	7	8
V4A	6K7	1st R.F.	—	5.8AC	218DC	75DC	*2.1DC	—	—	*2.1DC
V6A	6L7	2nd R.F.	—	5.8AC	230DC	75DC	*4.2DC	—	—	*4.2DC
V5A	6K8	Mixer	—	5.8AC	235DC	75DC	—	*1.4DC	—	*1.4DC
V9A	6SJ7	Osc.	—	5.8AC	—	—	—	148DC	—	148DC
V4B	6K7	1st I.F.	—	5.8AC	230DC	75DC	—	—	—	*2.0DC
V4C	6K7	2nd I.F.	—	5.8AC	228DC	75DC	—	—	—	*2.0DC
V6B	6L7	3rd I.F.	—	5.8AC	227DC	70DC	—	—	—	*3.2DC
V1A	6H6	2nd Det.	—	5.8AC	—	—	—	—	—	—
V4D	6K7	AVC Amp.	—	5.8AC	220DC	75DC	*2.4DC	—	—	*2.4DC

* Meter on 10v. scale.

SERVICE INSTRUCTIONS (Continued)

TEST VOLTAGES

Circuit Ref.	Valve Type	Function	Pin No. 1	2	3	4	5	6	7	8
V1B	6H6	AVC Det.	—	5.8AC	—	—	—	—	—	15DC
V8A	6SF5	Audio	—	*1.1DC	—	—	123DC	—	—	5.8AC
V3A	6K6GT	Output	—	5.8AC	227DC	238DC	—	—	—	15DC
V2A	6J7	BFO	—	5.8AC	15DC	66DC	—	—	—	—
V10A	6U5	Tun. Ind.	—	62DC	—	238DC	—	5.8AC	—	—
POWER SUPPLY: (Calibrator in 10 k.c. position).										
V3B	6K6GT	Xtal. Osc.	—	6.1AC	—	126DC	—	—	—	*2.7DC
V7A	6C8G	Multi-Vib.	—	6.1AC	41DC	—	—	60DC	—	—
V4E	6K7	Cal. Amp.	—	6.1AC	238DC	140DC	*4.0DC	—	—	*4.0DC
V13A	VR150	Regulator	—	—	—	—	147DC	—	—	—
V12A	80	Rectifier	275DC	300AC	300AC	275DC	—	—	—	—

* Meter on 10v. scale.

TABLE III
COMPONENTS AND PARTS FOR RECEPTION SETS CANADIAN VRL

Circuit Reference	Location	Value	†Rating	Tol.*	Type	Manufacturer	Mfg. Part No.	Used In
CONDENSERS								
C1A		.00005			Mica	Mallory	MC-837	Rec.
C1B		.00005			"	"	"	P.S.
C1C		.00005			"	"	"	P.S.
C2A		.0001			"	"	MC-839	Rec.
C2B		.0001			"	"	"	"
C2C	CR11	.0001			"	"	"	"
C2D		.0001			"	"	"	"
C2E		.0001			"	"	"	"
C2F		.0001			"	"	"	"
C2G		.0001			"	"	"	P.S.
C2H		.0001			"	"	"	"
C3A		140 mmf.		3%	Silver Mica	Elemco	603-M	Rec.
C3B		140 mmf.			" "	"	603-M	"
C4A		.0002			Mica	Aerovox	1468B	"
C4B		.0002			"	"	1468B	"
C5A		.00025			"	Mallory	MC-842	"
C6A	CR12	.0004			"	Aerovox	1468B	"
C6B	CR13	.0004			"	"	1468B	"
C6C	CR14	.0004			"	"	1468B	"
C7A		.00083		3%	Silver Mica	Elemco	602-L	"
C8A		.001		5%	Mica	Aerovox	1467	P.S.
C8B		.001		5%	"	"	1467	"
C9A		.001	600v.		Tubular	"	141-101	Rec.
C10A		.00155		3%	Silver Mica	Elemco	602-L	"
C11A		.002	600v.		Tubular	Aerovox	141-102	"

* Tolerance +20% —0 unless otherwise marked.
† Rating of mica condensers all 500v. Tubulars as marked. Electrolytics as marked.

TABLE III—(Continued)

Circuit Reference	Location	Value	†Rating	Tol.*	Type	Manufacturer	Mfg. Part No.	Used In
CONDENSERS (Continued)								
C12A		.00573		3%	Mica	Elemco	502-L	Rec.
C13A		.008		3%	"	"	502-L	"
C14A	CR1	.02	600v.		Tubular	Aerovox	141-105	"
C14B	CR1	.02	"		"	"	"	"
C14C	CR1	.02	"		"	"	"	"
C14D	CR2	.02	"		"	"	"	"
C14E	CR2	.02	"		"	"	"	"
C14F	CR2	.02	"		"	"	"	"
C14G	CR2	.02	"		"	"	"	"
C14H	CR3	.02	"		"	"	"	"
C14I	CR3	.02	"		"	"	"	"
C14J	CR3	.02	"		"	"	"	"
C14K	CR4	.02	"		"	"	"	"
C14L	CR4	.02	"		"	"	"	"
C14M		.02	"		"	"	"	"
C14N	CR6	.02	"		"	"	"	"
C14O	CR6	.02	"		"	"	"	"
C14P	CR7	.02	"		"	"	"	"
C14Q	CR7	.02	"		"	"	"	"
C14S	CR8	.02	"		"	"	"	"
C14T	CR10	.02	"		"	"	"	"
C14U	CR9	.02	"		"	"	"	"
C14V	CR9	.02	"		"	"	"	"
C14W		.02	"		"	"	"	"
C14X	CR15	.02	"		"	"	"	P.S.
C14Y	CR15	.02	"		"	"	"	"
C14Z	CR15	.02	"		"	"	"	"

* Tolerance +20% —0 unless otherwise marked.
† Rating of mica condensers all 500v. Tubulars as marked. Electrolytics as marked.

TABLE III—(Continued)

Circuit Reference	Location	Value	†Rating	Tol.*	Type	Manufacturer	Mfg. Part No.	Used In
CONDENSERS (Continued)								
C14A1	CR15	.02	600v.		Tubular	Aerovox	141-105	P.S.
C14B1	CR15	.02	"		"	"	"	"
C14C1	CR16	.02	"		"	"	"	"
C14D1	CR16	.02	"		"	"	"	"
C15A	CR8	.05	"		"	"	141-106	Rec.
C15B	CR6	.05	"		"	"	"	"
C15C	CR7	.05	"		"	"	"	"
C15D	CR9	.05	"		"	"	"	"
C15E	CR10	.05	"		"	"	"	"
C15F	CR10	.05	"		"	"	"	"
C15G	CR9	.05	"		"	"	"	"
C16A	CR6	.1	400v.		"	"	141-007	"
C16B	CR7	.1	"		"	"	"	"
C16C	CR8	.1	"		"	"	"	"
C16D	CR9	.1	"		"	"	"	"
C16E		.1	"		"	"	"	"
C17A	CR5	.1	600v.		"	"	"	"
C17B	CR5	.1	"		"	"	"	"
C17C		.1	"		"	"	"	"
C18A		1 mfd.	200v.		Cased	"	261	"
C19A		.5	600v.		Tubular	"	684	P.S.
C19B		.5	"		"	"	684	Rec.
C20A, C20B	In same unit.	8x8	450v.		Dual-Electrolytic	"	2GL-450	P.S.
C20C, C20D	" " "	"	"		" "	"	"	"
C21A		8 mfd.	"		Tub. Electrolytic	Mallory	BB-61	"

* Tolerance +20% —0 unless otherwise marked.
† Rating of mica condensers all 500v. Tubulars as marked. Electrolytics as marked.

TABLE III—(Continued)

Circuit Reference	Location	Value	†Rating	Tol.*	Type	Manufacturer	Mfg. Part No.	Used In
CONDENSERS (Continued)								
C22A	CR10	10 mfd.	25v.		Tub. Elect.	Aerovox	PRT-25	Rec.
C22B	CR10	10 mfd.	25v.		"	"	PRT-25	"
C23A		25 mmfd.			Trimmer	Centralab	822	"
C23B		"			"	"	"	"
C23C		"			"	"	"	"
C23D		"			"	"	"	"
C23E		"			"	"	"	"
C23F		"			"	"	"	"
C23G		"			"	"	"	"
C23H		"			"	"	"	"
C23I		"			"	"	"	"
C23J		"			"	"	"	"
C23K		"			"	"	"	"
C23L		"			"	"	"	"
C23M		"			"	"	"	"
C23N		"			"	"	"	"
C23O		"			"	"	"	"
C23P		"			"	"	"	"
C23Q		"			"	"	"	P.S.
C24A		3-30 mmfd.			"	Mallory	CT-959	Rec.
C25A		2-25 mmfd.			Variable	National	UMB-25	"
C26A		4-25 mmfd.			"	Sickles	ATR-66	"
C27A, C27B, C27C, C27D	4 Gang main tuning.				"	Radio Condenser	417	"
C28A		.005 mfd.	600v.		Tubular	Aerovox	684	Rec.

* Tolerance +20% —0 unless otherwise marked.
† Rating of mica condensers all 500v. Tubulars as marked. Electrolytics as marked.

TABLE III—(Continued)

Circuit Reference	Location	Value	Rating	Tol.	Type	Manufacturer	Mfg. Part No.	Used In
RESISTORS								
R1A	CR15	2500 ohm	10w.	10%	Fixed	Lectrohm		P.S.
R2A		25M ohm	50w.	10%	Semi-Variable	Lectrohm		"
R3A		25 ohm	½w.	10%		Stackpole		Rec.
R4A		50 ohm	"	10%		"		"
R5A		350 ohm	"	10%		I.R.C.		"
R5B	S3A	350 ohm	"	10%		"		"
R6A	CR1	400 ohm	"	10%		Stackpole		"
R6B	CR3	"	"	10%		"		"
R6C		"	"	10%		"		"
R6D		"	"	10%		"		"
R6E		"	"	10%		"		"
R6F		"	"	10%		"		"
R6G		400 ohm	"	10%		"		P.S.
R7A	CR2	1000 ohm	"	10%		"		Rec.
R8A		1500 ohm	"	10%		"		"
R9A	CR1	2M ohm	"	10%		"		"
R9B	CR2	"	"	10%		"		"
R9C	CR3	"	"	10%		"		"
R9D		"		10%		"		"
R10A	CR10	3M ohm	"	10%		"		"
R11A	CR2	5M ohm	"	10%		"		"
R11B	CR3	"	"	10%		"		"
R11C	CR5	"	"	10%		"		"
R11D	CR6	"	"	10%		"		"
R11E		"	"	10%		"		"
R11F	CR7	"	"	10%		"		"
R11G		"	"	10%		"		"

TABLE III—(Continued)

Circuit Reference	Location	Value	Rating	Tol.	Type	Manufacturer	Mfg. Part No.	Used In
RESISTORS (Continued)								
R11H	CR8	5M ohm	½ w.	10%		Stackpole		Rec.
R11I	CR11	"	"	10%		"		"
R11J		"	"	10%		"		"
R11K		"	"	10%		"		P.S.
R12A		100M ohm	"	10%		"		Rec.
R12B	CR15	10M ohm	"	10%		"		P.S.
R12C		"	"	10%		"		Rec.
R13A		25M ohm	"	10%		"		P.S.
R14A		30M ohm	"	10%		"		"
R15A	CR4	50M ohm	"	10%		"		Rec.
R15B		"	"	10%		"		"
R15C		"	"	10%		"		"
R15D	CR15	"	"	10%		"		P.S.
R15E	CR15	"	"	10%		"		"
R15F		"	"	10%		"		"
R16A		100M ohm	"	10%		"		Rec.
R16C		"	"	10%		"		"
R16D		"	"	10%		"		"
R16E		"	"	10%		"		"
R17A		250M ohm	"	10%		"		"
R17B	CR10	"	"	10%		"		"
R17C		"	"	10%		"		P.S.
R17D	CR11	"	"	10%		"		Rec.
R18A		500M ohm	"	10%		"		"
R18B	CR10	"	"	10%		"		"
R18C	CR10	"	"	10%		"		"
R18D		"	"	10%		"		"

TABLE III—(Continued)

Circuit Reference	Location	Value	Rating	Tol.	Type	Manufacturer	Mfg. Part No.	Used In
RESISTORS (Continued)								
R18E		500M ohm	½ w.	10%		Stackpole		Rec.
R18F		"	"	10%		"		"
R18G	CR15	"	"	10%		"		P.S.
R19A	CR12	1 meg.	"	10%		"		Rec.
R19B	CR13	1 meg.	"	10%		"		"
R19C	CR14	1 meg.	"	10%		"		"
R20A		5 meg.	"	10%		"		P.S.
R21A	CR10	500 ohm	1w.	10%		"		Rec.
R23A	R.F. Gain	10M ohm			Control	Mallory	Type G	"
R24A	Noise Suppressor	100M ohm			"	I.R.C.	CC-737	"
R25A	Audio Gain	500M ohm			"	I.R.C.	CC-715	"
R25B	Tone Controls	500M ohm			"	I.R.C. Modified	VRL SPC-1	"
R26A		500 ohm	½	10%		Stackpole		P.S.
TUBES								
V1A	2nd Det.				6H6	R.V.C.		Rec.
V1B	AVC Det.				6H6	"		"
V2A	B.F.O.				6J7	"		"
V3A	Output				6K6GT	"		"
V4A	1st R.F.				6K7	"		"
V4B	1st I.F.				6K7	"		"
V4C	2nd I.F.				6K7	"		"
V4D	AVC Amp.				6K7	"		"
V5A	Mixer				6K8	"		"
V6A	2nd R.F.				6L7	"		"
V6B	3rd I.F.				6L7	"		"
V8A	Audio				6SF5	"		"
V9A	H.F. Osc.				6SJ7	"		"

TABLE III—(Continued)

Circuit Reference	Location	Value	Rating	Tol.	Type	Manufacturer	Mfg. Part No.	Used In
	TUBES (Continued)							
V10A	Tuning Ind.				6U5	RVC		Rec.
V3B	Crystal Osc.				6K6GT/G	"		P.S.
V4E	Calibrator Amp.				6K7	"		"
V7A	Mult. Vib.				6C8G	Raytheon		"
V12A	Rectifier				80	R.V.C.		"
V13A	Voltage Reg.				VR150/30	"		"
	TRANSFORMERS AND COILS							
T1A	Interstage I.F.					Farley	77366-T1A	Rec.
T1B	Interstage I.F.					"	77366-T1B	"
T2A	Output I.F.					"	77367-T2A	"
T3A	AVC Output I.F.					Miller	612-C-4	"
T4A	Audio Output					Hammond	16797	"
T9A	B.F.O.Coil Assembly					Farley	BFO 313-1	"
T10A	Crystal Filter I.F. Coil (Input)					"	CF 313-1	"
T11A	Crystal Filter I.F. Coil (Output)					"	CF 313-2	"
T12A	Power Transformer					Hammond	16696	P.S.
T13A	"A" Band Antenna Coil					V.R.L.	R.F. 13	Rec.
T14A	"B" Band Antenna Coil					"	R.F. 14	"
T15A	"C" Band Antenna Coil					"	R.F. 15	"
T16A	"D" Band Antenna Coi l					"	R.F. 16	"
T17A	"A" Band R.F. Coil					"	R.F. 17	"
T18A	"B" Band R.F. Coil					"	R.F. 18	"
T19A	"C" Band R.F. Coil					"	R.F. 19	"

TABLE III—(Continued)

Circuit Reference	Location	Value	Rating	Tol.	Type	Manufacturer	Mfg. Part No.	Used In
	TRANSFORMERS AND COILS (Continued)							
T20A	"D" Band R.F. Coil					VRL	R.F. 20	Rec.
T17B	"A" Band Det. Coil					"	R.F. 17	"
T18B	"B" Band Det. Coil					"	R.F. 18	"
T19B	"C" Band Det. Coil					"	R.F. 19	"
T20B	"D" Band Det. Coil					"	R.F. 20	"
T5A	"A" Band Osc. Coil					"	R.F. 5	"
T6A	"B" Band Osc. Coil					"	R.F. 6	"
T7A	"C" Band Osc. Coil					"	R.F. 7	"
T8A	"D" Band Osc. Coil					"	R.F. 8	"
	CHOKES							
L1A	Filter Input Choke					Hammond	10-150-X	P.S.
L1B	Filter Output Choke					"	10-150-X	P.S.
L2A	Noise Suppressor Choke					"	151	Rec.
L3A	R.F. Choke	2.5 mh.				Miller	4537	P.S.
L4A	Cal. 10-100 k.c. (CR15) Osc. Plate Coil	8 mh.				"	660	"
L5A	10-1000 k.c. Osc. Crystal Plate Coil (CR15)	.200 mh.				"	7584	"
	SWITCHES							
S1A	Speaker Switch				SPST	Bud Radio	1003	"
S1B	Power Switch				SPST	Bud Radio	1003	"
S2A	BFO ⅜" with notch and leads				SPST	Bud Radio	20590-EH	Rec.
S3A	Send Receive Switch				DPDT (bat handled)	Bud Radio	1120	"

TABLE III—(Continued)

Circuit Reference	Location	Value	Rating	Tol.	Type	Manufacturer	Mfg. Part No.	Used In
SWITCHES (Continued)								
S4A	AVC Switch				2p. 3 pos.	Mallory	3223J	Rec.
S5A	Crystal Filter Switch				2p. 6 pos.	"	3226J	"
S6A S6B S6C S6D S6E S6F S6G S6H	Range Switch				Special	V.R.L.		"
S7A	Calibrator Switch				3p. 4 pos.	Mallory	3234J	P.S.
MISCELLANEOUS								
X1A	Crystal (Filter)				455 K.C.	Bliley	CF 1	Rec.
X2A	Calibrator Crystal				100-1000 k.c.	Bliley	SMC 100	P.S.
LS1A	Loud Speaker	3 amp. 250v.			6" P.M.	Jensen	PM6C	"
J1A	Phone Jack	6.8 v.			open circuit	Mallory	702-A	Rec.
	Fuse					Cooper	3AG	P.S.
	Pilot Lamp				B.B.	Can. Gen. Elect.	47	"

TABLE III—(Continued)

Circuit Reference	Location	Value	Rating	Tol.	Type	Manufacturer	Mfg. Part No.	Used In
SOCKETS								
	For V4A				8 prong mica filled	Amphenol	RS8T	Rec.
	" V6A				"	"	"	"
	" V5A				"	"	"	"
	" V9A				"	"	"	"
	" V4B				8 prong Wafer socket	Cinch	6714	"
	" V4C				"	"	"	"
	" V6B				"	"	"	"
	" V1A				"	"	"	"
	" V8A				"	"	"	"
	" V3A				"	"	"	"
	" V2A				"	"	"	"
	" V4D				"	"	"	"
	" V1B				"	"	"	"
	" V3B				"	"	"	P.S.
	" V7A				"	"	"	"
	" V4E				"	"	"	"
	" V13A				"	"	"	"
	" V12A				4 prong Mica filled	Amphenol	RS4T	"
	" V10A				6 prong Socket assembly Tuning Ind.	"	MEA-6	Rec.

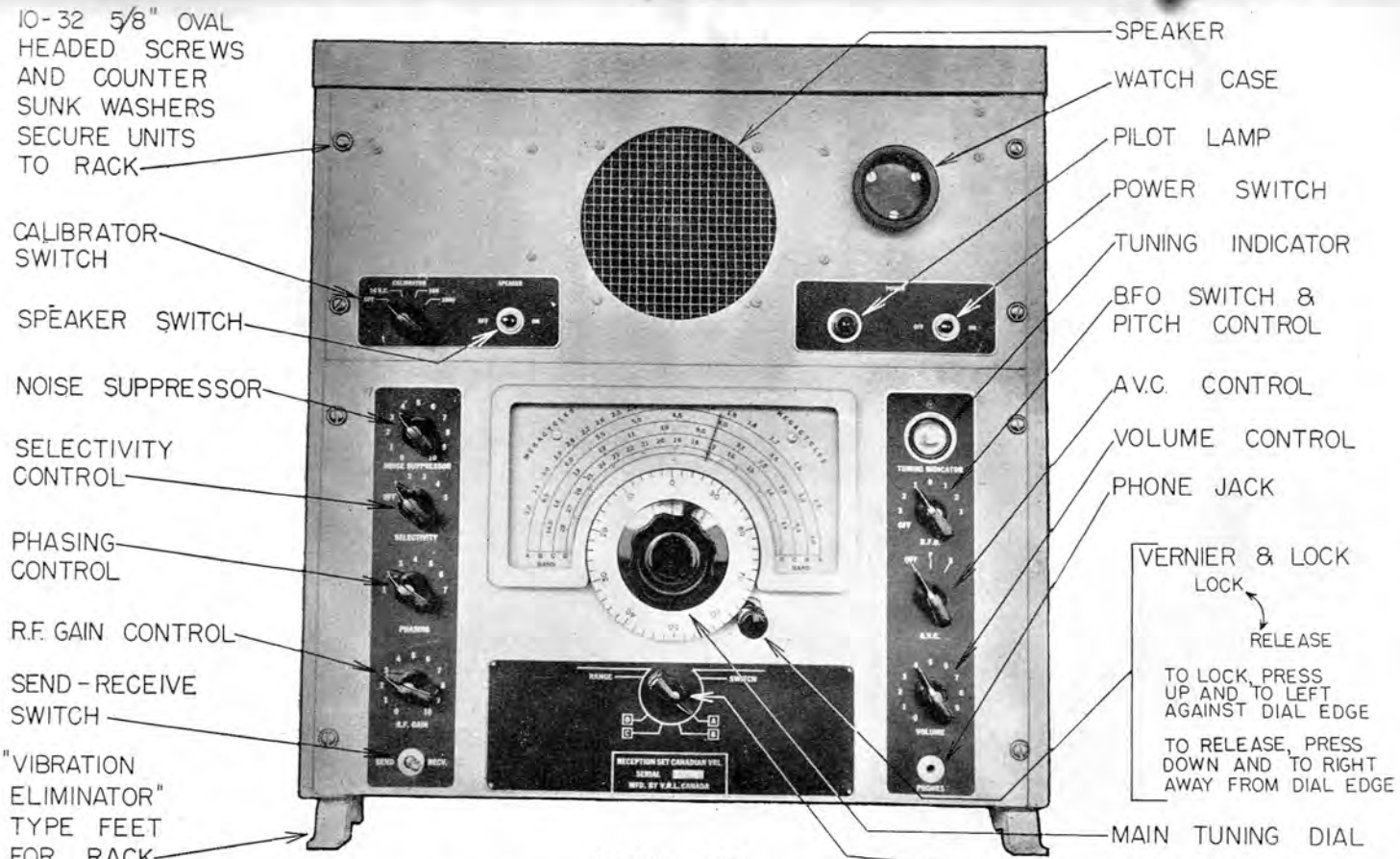

PHOTO NO. 1
FRONT VIEW OF COMPLETE ASSEMBLY

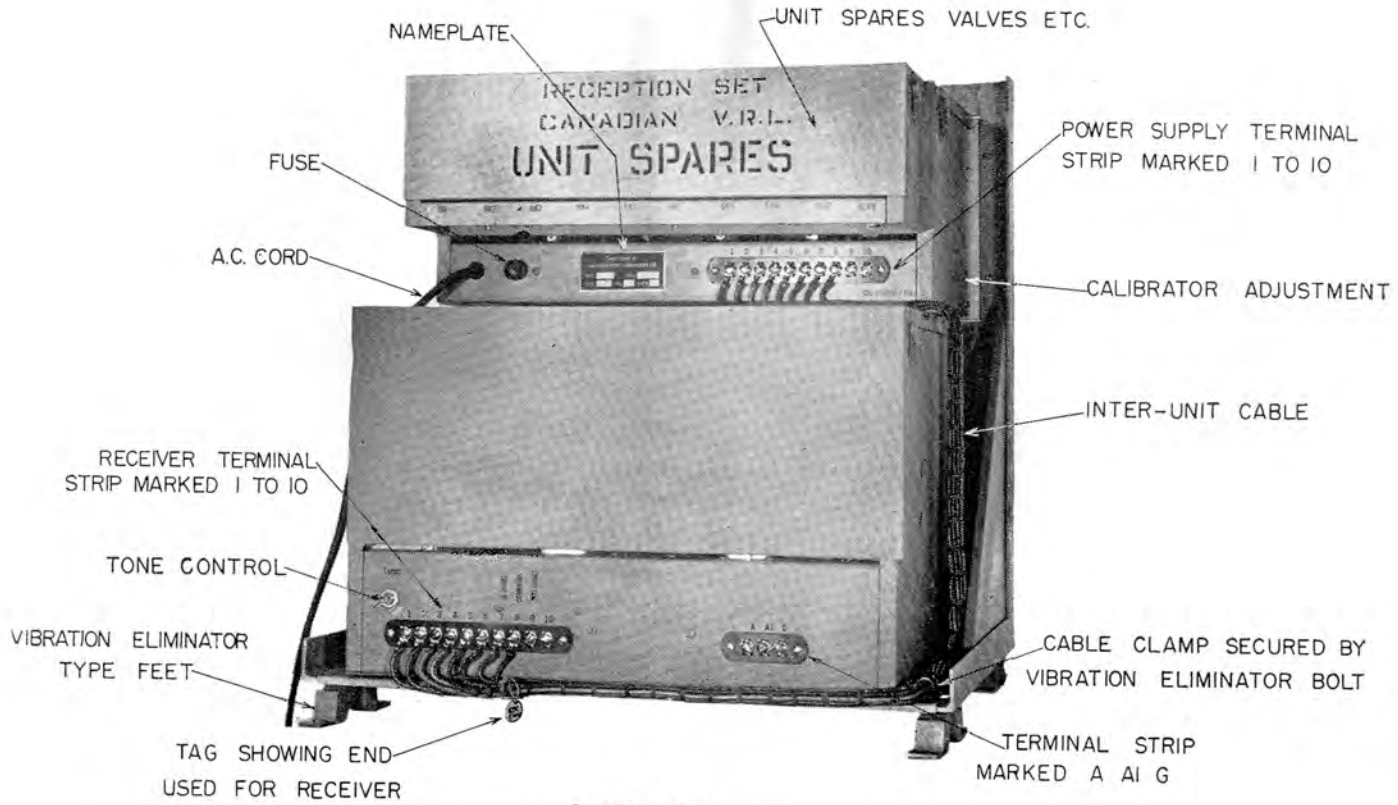

PHOTO NO.2
REAR VIEW OF COMPLETE ASSEMBLY
SHOWING CONNECTION OF INTER-UNIT CABLE

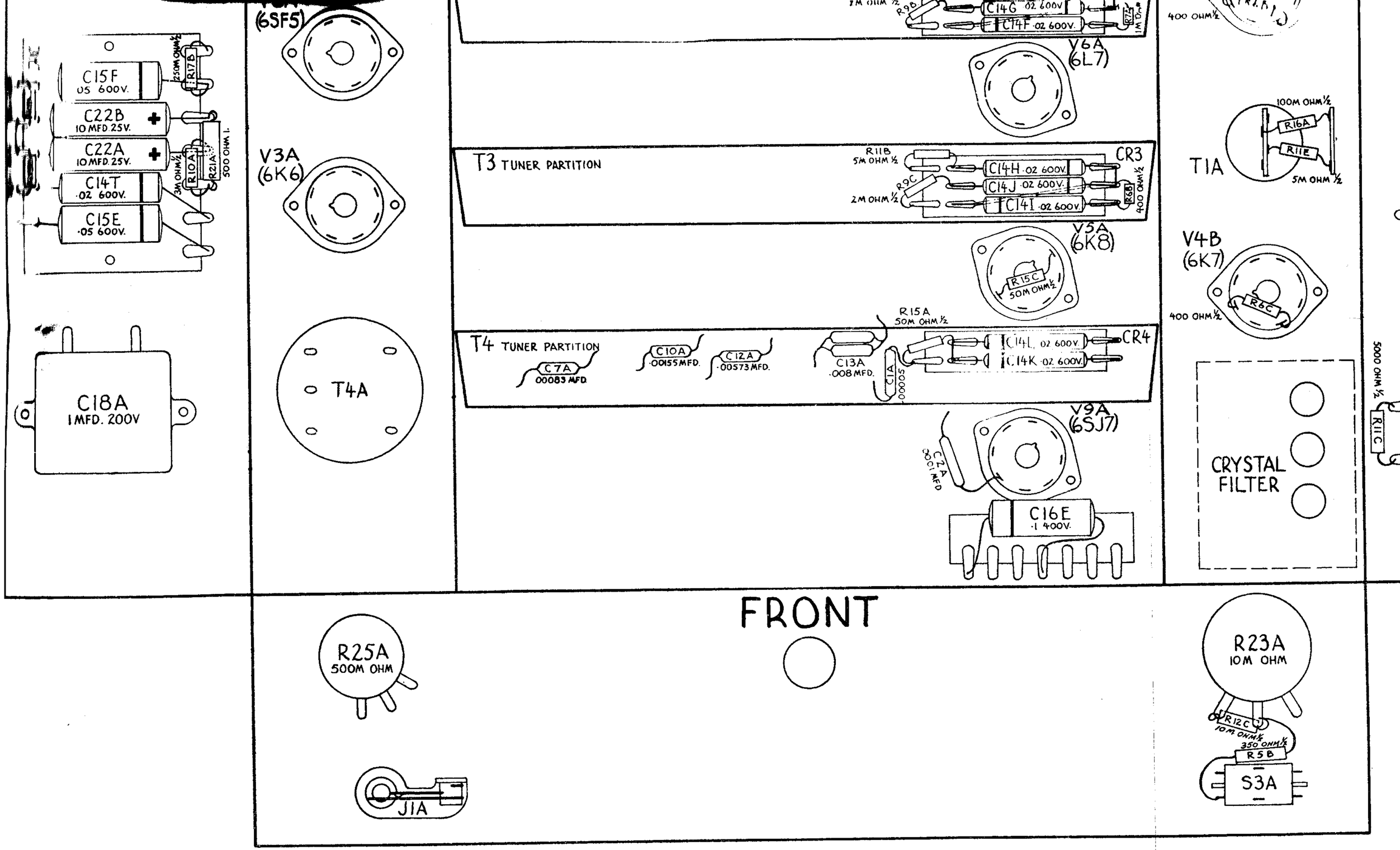

FIG. 1

FORMALIZED BOTTOM VIEW OF RECEIVER SHOWING LAYOUT OF PART

REAR

C28A .005 600V

R25B 500M OHM

L2A

CR9
C14U .02 600V.
C15G .05 600V.
C16D .1 400V.
C15D .05 600V.
C14V .02 600V.

A AI G

C19B .5 600V.

BF0

V1B (6H6)
500M OHM ½
R18D
C2D .0001
R18E 50M OHM ½
C4A .0002

5M OHM ½ R11J

T3A

V4D (6K7)
500M OHM ½ R18F
400 OHM ½ R6F

V1A (6H6)

250M OHM ½ R17D
5M OHM ½ R11I
C2C .0001
50M OHM ½ R15B
R8A 1800 OHM ½
C2B .0001 MFD
T2A

V6B (6L7)
250M OHM ½
R17A
R6E
400 OHM ½

5M OHM ½ R11H
C14S .02 600V.
C15A .05 600V.
C16C .1 400V.
CR8

T1 TUNER PARTITION
2M OHM ½ R9A
C14A .02 600V.
C14C .02 600V.
C14B .02 600V.
CR1
R6H 400 OHM ½

V4A (6K7)

T1B
R11G
5M OHM ½

5M OHM ½ R11F
C14Q .02 600V.
C15C .05 600V.
C16B .1 400V.
C14P .02 600V.
CR7

T2 TUNER PARTITION
5M OHM ½ R11A
2M OHM ½ R9B
C14D .02 600V.
C14E .02 600V.
C14G .02 600V.
C14F .02 600V.
CR2
R7A 1M OHM ½

V6A (6L7)

V4C (6K7)
R6D
400 OHM ½

V8A (6SF5)

V3A (6K6)

R17B
R10A
R21A
500 OHM 1.

T3 TUNER PARTITION
R11B 5M OHM ½
R9C
2M OHM ½
C14H .02 600V.
C14J .02 600V.
C14I .02 600V.
CR3
R6B 400 OHM ½

V5A (6K8)
R15C 50M OHM ½

R15A 50M OHM ½

T1A
100M OHM ½
R16A
R11E
5M OHM ½

V4B (6K7)
R6C

5M OHM ½ R11D
C14O .02 600V.
C15B .05 600V.
C16A .1 400V.
C14N .02 600V.

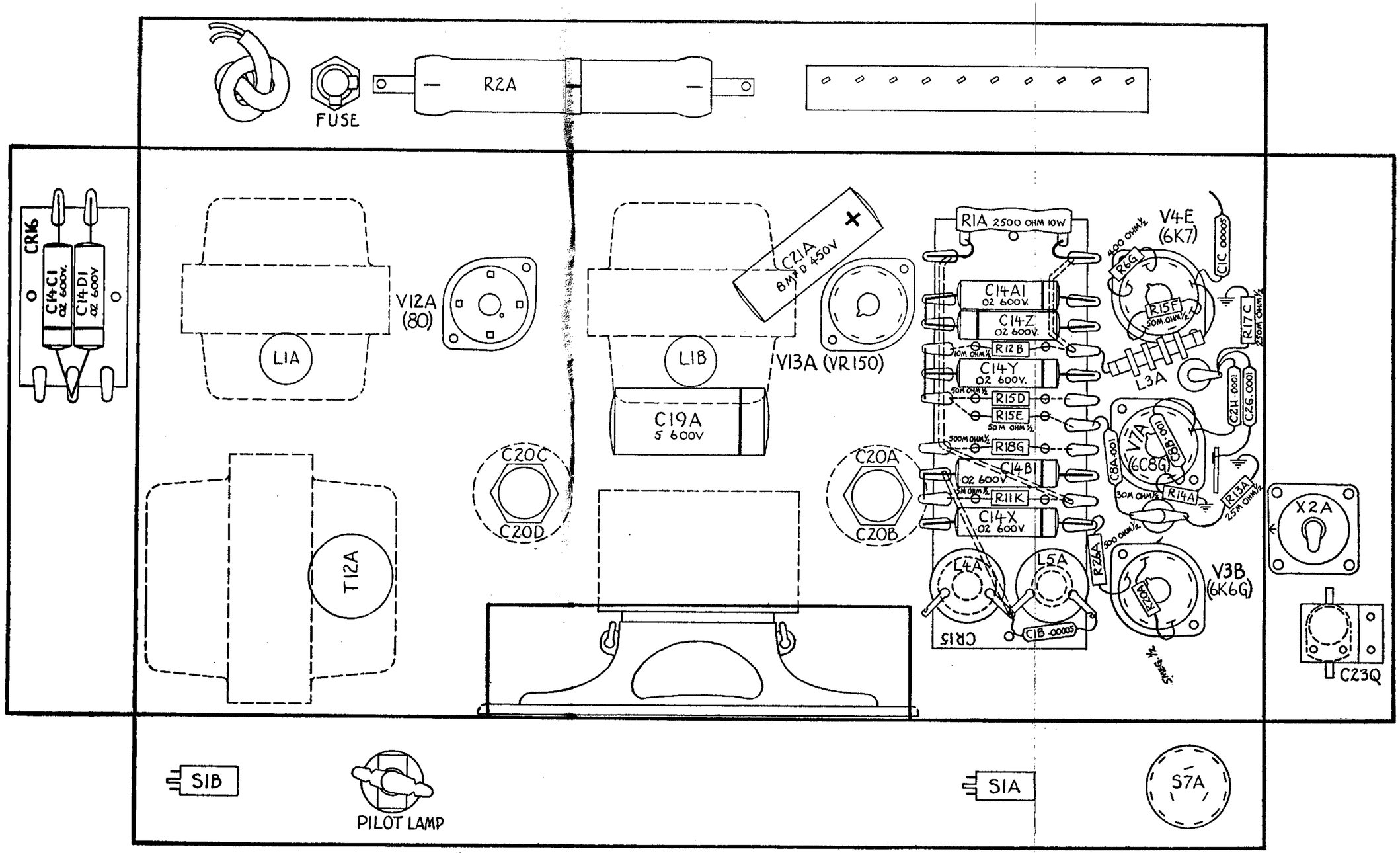

FIG. 2

FORMALIZED BOTTOM VIEW OF POWER SUPPLY SHOWING LAYOUT OF PARTS

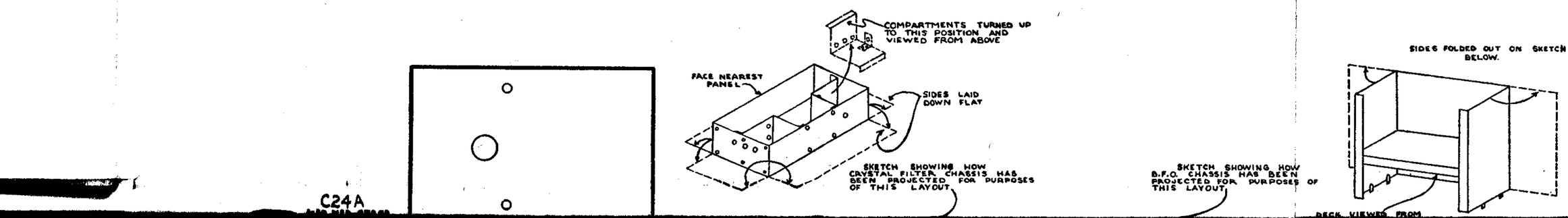

FIG. 2

FORMALIZED BOTTOM VIEW OF POWER SUPPLY SHOWING LAYOUT OF PARTS

FIG. 3

FORMALIZED INSIDE VIEW OF CRYSTAL FILTER

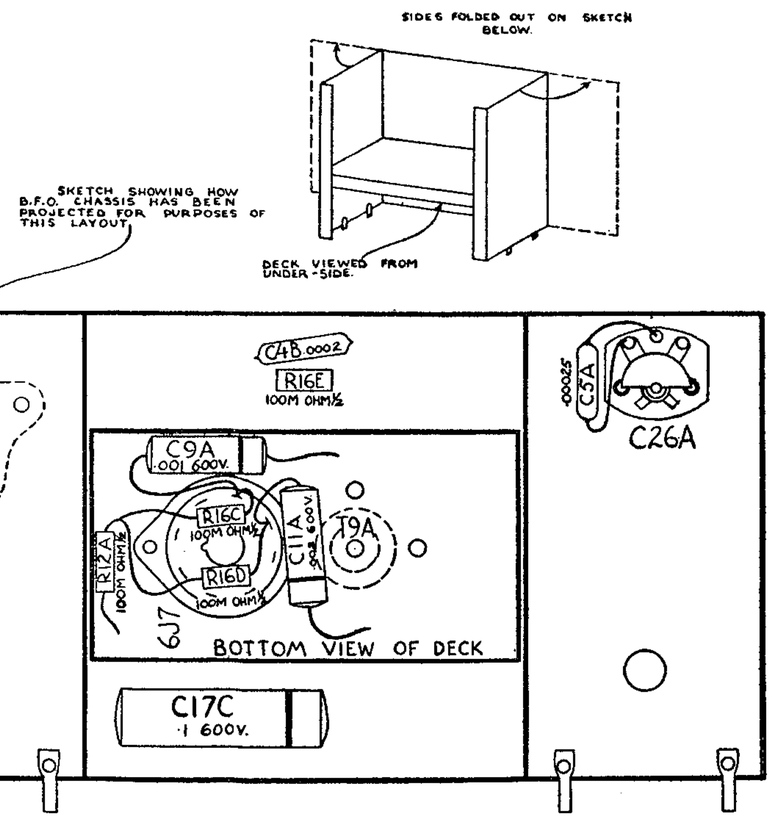

FIG. 4

FORMALIZED INSIDE VIEW OF B.F.O.

TERMINAL STRIP ON CHASSIS
A
A1
G
S6A
S6B
S6C
S6D
S6E
S6F
T16A
T15A
T14A
T13A
C23A
C23B
C23C
C23D
C23E
C23F
C23G
C23H
C23I
C23J
C23K
C23L
C27A
C27B
C6A
C6B
C14A
C14B
C14C
C14D
C14E
C14F
C14G
R19A
R19B
R6A
R9A
R11A
R7A
R9B
R11B
V4A
6K7
T20A
T19A
T18A
T17A
V6A
6L7
T20B
T19B
T18B
T17B
C14H
C141
C231
C16E
TERMINAL STRIP ON TUNER
1
2
R25B
C28A
C15F
T4A
R18C
V3A
6K6GT
R17B
V8A
6SF5
R10A
C22A
R18B
C22B
R21A
V1A
6H6
T2A
C2B
C2C
R25A
C14S
C14T
C15E
R8A
R15B
R17D
R11I
R11H
V6B
6L7
C15D
T1B
C15C
R11G
C16C
R17A
R6E
R11F
V4C
6K7
C14Q
R6D
J1A
C2D
V1B
6H6
T3A
V4D
6K7
R18D
R18E
C14U
S4A
C18A
C14V
C4A
R24A
L2A
R18F
C15G
R11J
R6F
C16D
R19E
V10A
6U5
C14W
C9A
R16E
C4B
C26A
C5A
T9A
V2A
6J7
R16C
R16D
C17C
C11A
R12A
S2A
TO HEATERS AND TO NOS 6&7 ON TUNER
1
2
3
4
5
6
7
8

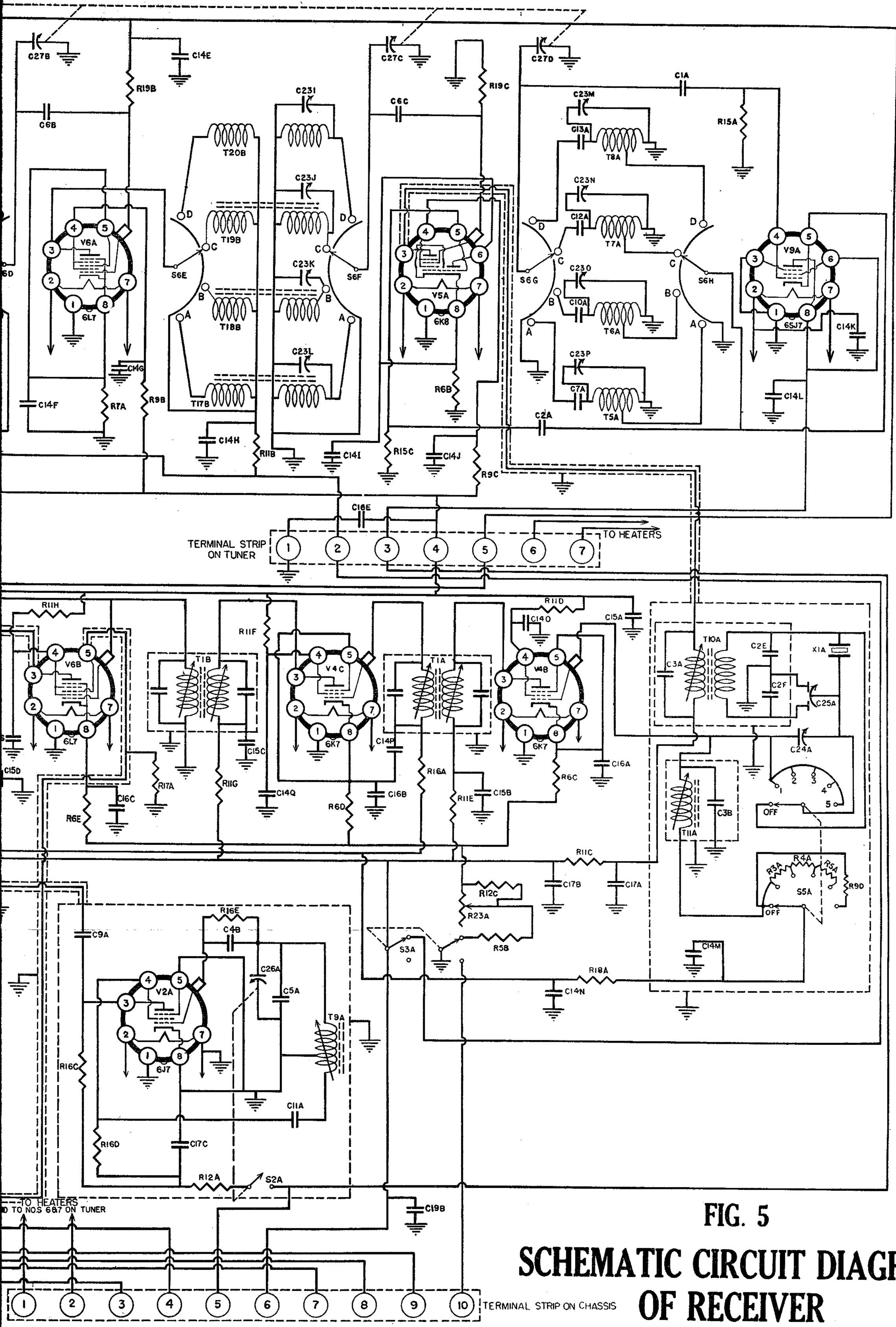

FIG. 5

SCHEMATIC CIRCUIT DIAGRAM OF RECEIVER

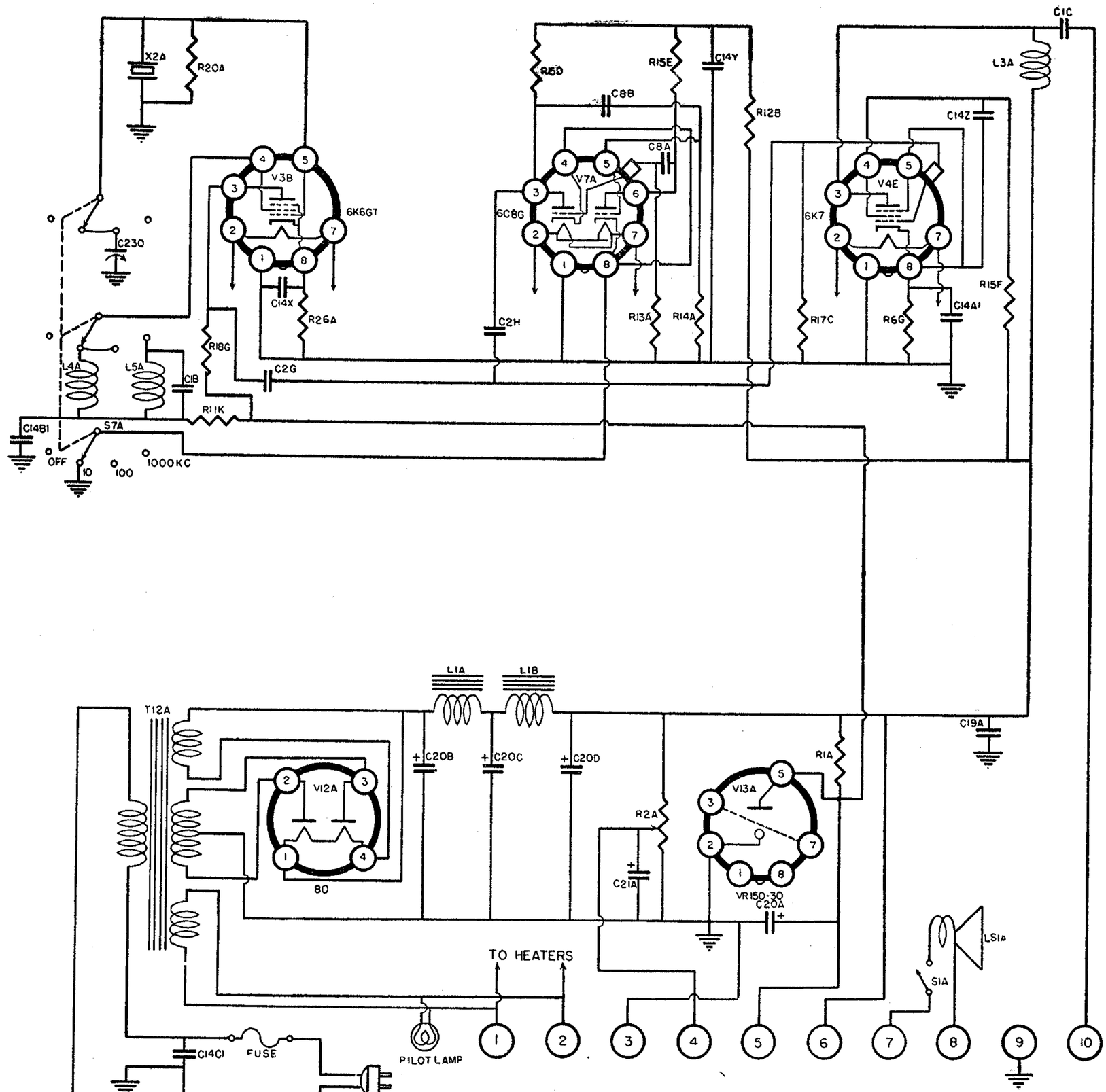

FIG. 6

SCHEMATIC CIRCUIT DIAGRAM OF POWER SUPPLY