INSTRUCTION BOOK

FOR

SPECIAL PURPOSE RECEIVERS

NEMS-CLARKE, Inc.

Silver Spring, Maryland

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WARNING

This equipment employs voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised while working with this equipment.

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LIST OF ILLUSTRATIONS

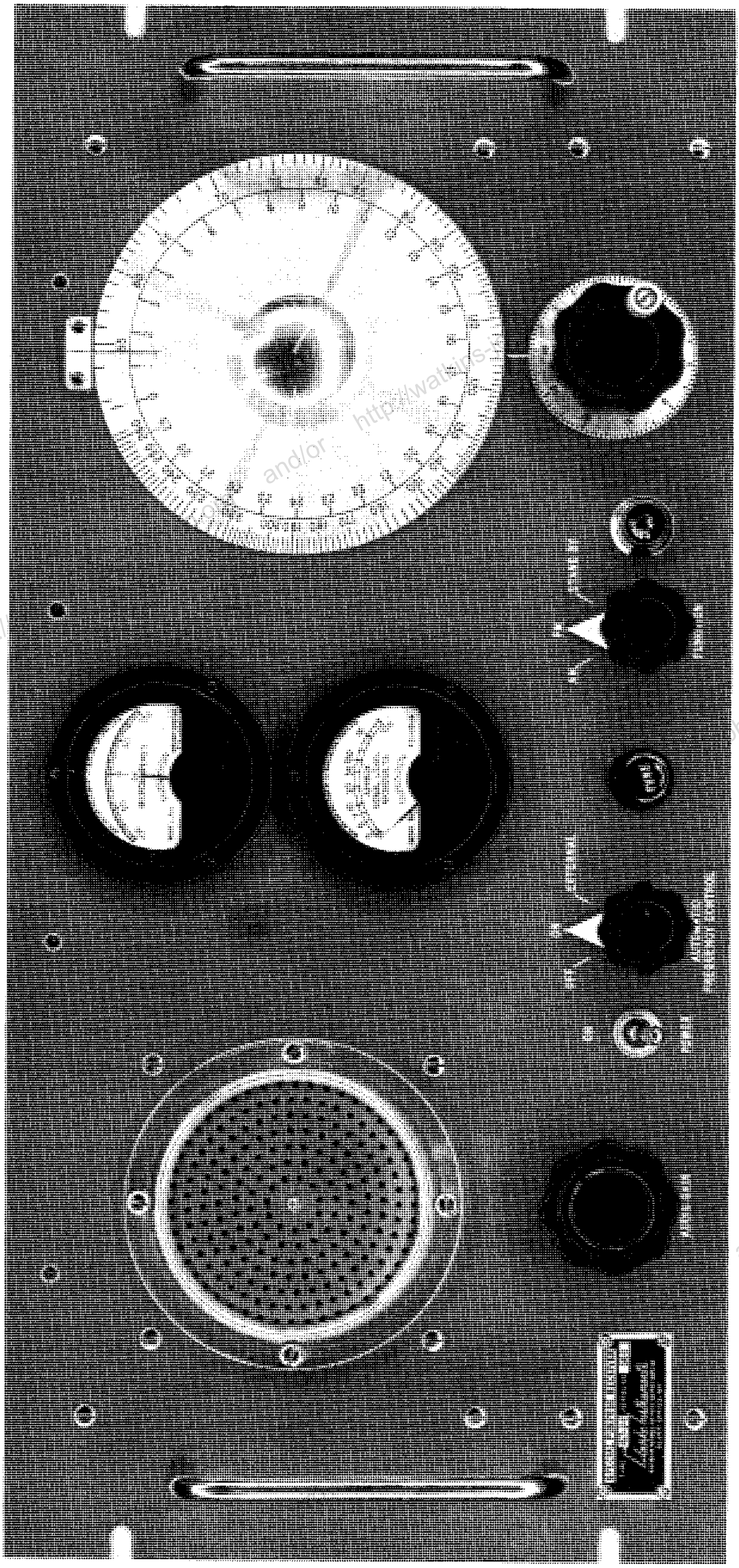


Fig. 1. Model 167 Receiver, Front View

PERFORMANCE SPECIFICATIONS

	TYPE 167-E	TYPE 167-F	TYPE 167-G	TYPE 167-J	TYPE 167-J-1	TYPE 167-J-2
Tuning Range	175-260 mc FM	55-260 mc FM	175-260 mc FM	55-260 mc FM	55-260 mc AM-FM	55-260 mc AM-FM
IF Rejection	Above 70 db	Above 70 db	Above 70 db	Above 70 db	Above 70 db	Above 70 db
Image Rejection	40 db	Above 40 db at all frequencies below 130 mc. Above 30 db at any frequency.	40 db	Above 40 db at all frequencies below 130 mc. Above 30 db at any frequency.	Above 40 db at all frequencies below 130 mc. Above 30 db at any frequency.	Above 40 db at all frequencies below 130 mc. Above 30 db at any frequency.
Noise Figure	9 db max. below 245 mc.	11 db max. below 245 mc.	9 db max. below 245 mc.	11 db max. below 245 mc.	11 db max. below 245 mc.	11 db max. below 245 mc.
Absolute Sensitivity (Measured without band-restricting filters.)	8 uv produces at least 22 db S/N ratio with 125 kc deviation at 1000 c.p.s.	8 uv produces at least 21 db S/N ratio with 125 kc deviation at 1000 c.p.s.	8 uv produces at least 24 db S/N ratio with 100 kc deviation at 400 c.p.s.	8 uv produces at least 23 db S/N ratio with 100 kc deviation at 400 c.p.s.	8 uv produces at least 22 1/2 db S/N ratio with 100 kc deviation at 400 c.p.s.	8 uv produces at least 22 1/2 db S/N ratio with 100 kc deviation at 400 c.p.s.
IF Frequency	21.4 mc	21.4 mc	21.4 mc	21.4 mc	21.4 mc	21.4 mc
IF Bandwidth	500 kc	500 kc	300 kc	300 kc	300 kc	300 kc
Discriminator Linearity	± 150 kc	± 150 kc	± 150 kc	± 150 kc	± 150 kc	± 150 kc
Output	0.08 v/kc	0.08 v/kc	0.08 v/kc	0.08 v/kc	0.08 v/kc on FM*	0.08 v/kc on FM*
Output Stability	Varies less than 2 db for inputs above 4 uv.	Varies less than 2 db for inputs above 4 uv.	Varies less than 2 db for inputs above 4 uv.	Varies less than 2 db for inputs above 4 uv.	Varies less than 2 db for inputs above 4 uv on FM.	Varies less than 2 db for inputs above 4 uv on FM.
AFC Time Constant	2.5 milliseconds	100 milliseconds	2.5 milliseconds	100 milliseconds	100 milliseconds	100 milliseconds
Video Response	300 cycles to 80 kc	8 cycles to 80 kc	300 cycles to 80 kc	8 cycles to 80 kc	8 cycles to 80 kc on FM	8 cycles to 80 kc on FM
Power Input	117V/60 cycles 65 watts	117V/60 cycles 65 watts	117V/60 cycles 65 watts	117V/60 cycles 65 watts	117V/60 cycles 65 watts	115/230V-60 cycles 65 watts
Squelch	None	None	None	None	None	Adjustable Threshold on FM and AM.

The input impedance is 75 ohms nominal on all models.
Automatic frequency control is incorporated in all receivers and works on AM and FM in AM-FM models.
All receivers have a signal strength indicator operating from 2 uv to 10 mv.
*The output of these receivers operating on AM is approximately 5 V r.m.s. for 50% modulation at 1 kc with 1 mv input.

TUBE COMPLEMENT		
Symbol	Type	Function
V-101	6J4	R. F. Amplifier
V-102	6AK5	Mixer
V-103	6J6	Oscillator and AFC reactance control
V-104	6CB6	1st IF Amplifier
V-105	6CB6	2nd IF Amplifier
V-106	6CB6	1st Limiter
V-107	6AK5	2nd Limiter
V-108	6AL5	Discriminator
V-109	12AU7	Video Amplifier
V-110	12AU7	Cathode Follower
V-111	12AU7	Audio Amplifier
V-112	VR-150	Voltage Regulator
V-113	5V4G	Rectifier
* V-114	12AU7	Squelch

*Used only in Model 167-J-2

Introduction

The Type 167 special purpose receivers are designed for applications such as telemetering, monitoring of guided missiles, radiosonde reception, and sound rebroadcasting and for other applications where a receiver with superior performance characteristics is required.

Originally these receivers were designed only for the reception of frequency-modulated telemetering signals from 217 to 219 megacycles, and are possibly the most widely used receivers for this application.

The line of receivers has been expanded and now includes models covering a continuous tuning range from 55 to 260 megacycles, IF amplifier bandwidths of either 300 kc or 500 kc, and AFC time constants of either 2.5 milliseconds or 100 milliseconds. Two models, the 167-J-1 and J-2, will receive either AM or FM. In addition, the 167-J-2 contains an audio squelch circuit.

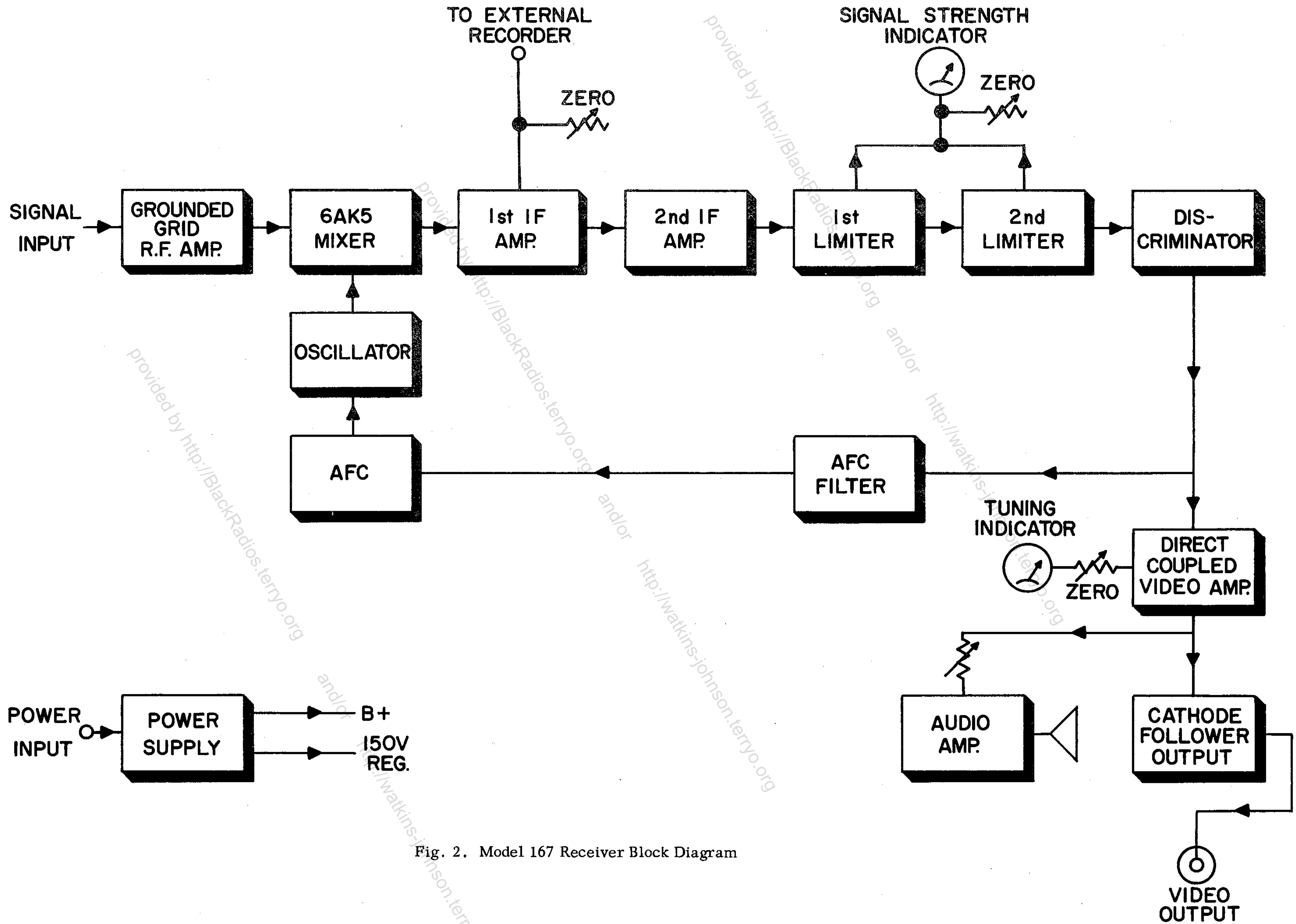


Fig. 2. Model 167 Receiver Block Diagram

Description

Mechanically, all models of the 167 series are very similar. The umber gray front panel is 8 3/4 inches high by 19 inches wide and is notched to fit standard mounting racks. Dust covers are provided on both top and bottom of all models. The depth behind the panel is 13 inches. The weight is approximately 26 pounds.

Performance characteristics of the various models are listed in the table on page 1.

Theory of Operation

The block diagram of the 167 receivers is shown in Fig. 2. The circuit is a single superheterodyne, employing one stage of radio-frequency amplification, which is designed to obtain the lowest possible noise figure consistent with an input tube of reasonable cost, ready availability, and reliable performance. The circuitry is mostly conventional, but particular care has been exercised to provide maximum sensitivity and to maintain excellent linearity of response.

In the following paragraphs the circuitry is described in detail.

1. Antenna. The input impedance of the receiver is 75 to 100 ohms over the frequency range of 55 to 260 megacycles. The circuit is arranged for coaxial input through a type SO-239 receptacle located on the rear apron of the chassis.

2. Radio-frequency tuner. The RF tuner is a self-contained subassembly with the input RF and output IF terminated in coaxial connectors. The simplified schematic diagram is shown in Fig. 3.

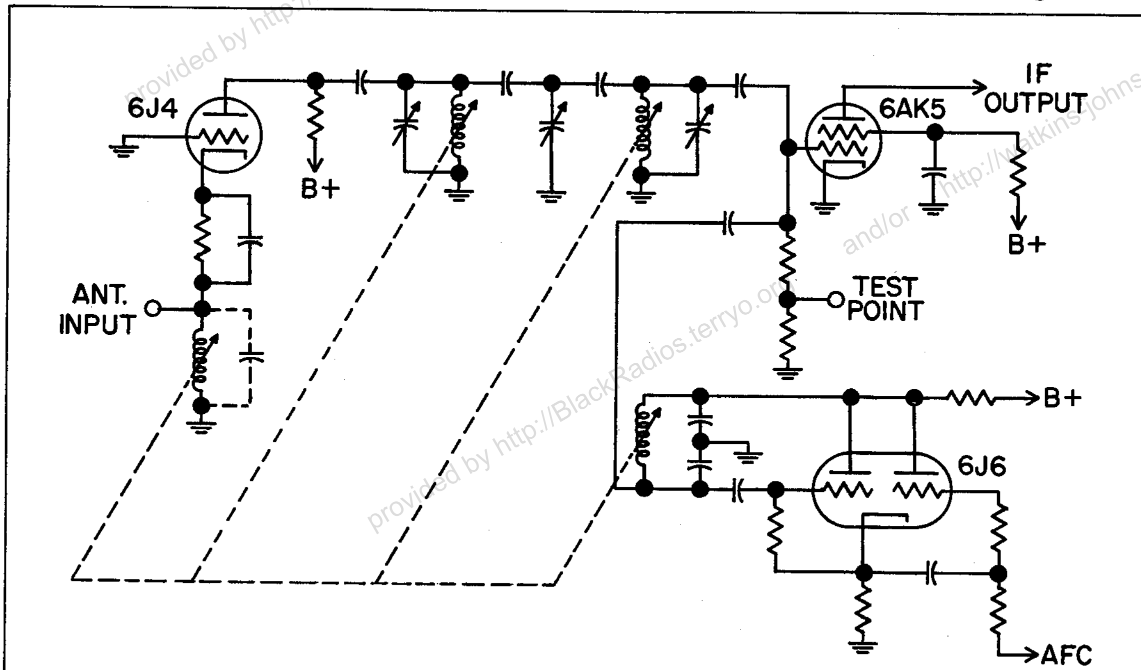


Fig. 3. R. F. Tuner, Simplified Schematic

A 6J4 triode grounded-grid RF amplifier is operated at maximum gain at all times in order to produce the utmost signal-to-noise ratio.

A 6AK5 pentode is used as a converter. The oscillator signal is injected into the grid circuit, developing an operating bias proportional to the amplitude of the local oscillator signal. This causes a minimum effect on the receiver operation due both to variations in local oscillator amplitude, and to AFC pulling of the oscillator. A tap on the converter grid resistor provides a convenient means for observing the response of the RF circuits.

One section of the 6J6 dual triode is used as an oscillator while the other section is used as the AFC reactance control tube.

The basic tuning element is a Mallory type S-4 spiral inductuner. The input circuit is broadly tuned by the first section of the inductuner. The second and third sections double tune a bandpass filter to produce a high gain with a minimum response to spurious signals. Adjustable coupling is provided by a capacitive "tee" section between the input and output sections of the bandpass filter. The remaining inductuner section is used as the oscillator tank inductance.

3. <u>IF amplifier</u>. The IF amplifier is a self-contained subassembly. Reference is made in the following discussion to the schematic diagrams located in the back of this instruction book.

Two high gain stages using 6CB6 tubes are followed by a 6CB6 first limiter and a 6AK5 second limiter. A 6AL5 is used in a discriminator circuit of the phase shift type. An automatic gain control voltage is derived from the first limiter grid circuit and applied to the first IF amplifier. This first IF amplifier and the first limiter do not have their cathode resistors bypassed, thus causing a cathode degeneration which practically eliminates the detuning caused by change in tube input capacitance resulting from a change in the bias voltage. Such circuitry is not necessary in the second limiter due to the different tube structure and smaller change in grid bias. A minimum of approximately one volt bias is on the second limiter due to grid rectification of noise signals.

The discriminator circuit is a balanced phase shift type, obtaining accurate balance by using bifilar type construction of the secondary. The AFC control voltage is fed to the RF tuner while operating on either AM or FM, and a self-resonant choke is connected in the output lead to prevent IF signals from leaving the IF subassembly.

An easily read, logarithmic scale, signal strength meter is operated from the voltages developed on the grids of the limiters.

When the AM-FM models are operating on AM, V-107 (FM second limiter) acts as the AM detector, and AGC voltage is fed back to the first two IF stages.

4. Output and monitoring circuits. One-half of a 12AU7 is used as a direct-coupled video amplifier. A zero-center scale meter is used as a tuning indicator and is connected in a bridge circuit consisting of the video amplifier and the other half of the 12AU7. The tuning meter operates only in the FM position of the selector switch on AM-FM models. Correct tuning in of a signal may be accomplished by first tuning in the signal with the selector switch in the FM position and then switching it to AM.

The output stage is a 12AU7 connected as a direct-coupled cathode follower.

A two-stage audio amplifier with built-in speaker is provided for monitoring.

5. External signal strength recording. Provision has been made for supplying 10 milliamperes to record variations in signal strength. This signal is the combined plate and screen currents to V-104, and it is adjusted to 10 milliamperes with no signal by varying the screen voltage with R-150. The signal thus obtained is reverse reading; i.e., 10 milliamperes is obtained with no signal, and minimum current is obtained at maximum signal.

6. Power supply. A conventional choke input power supply delivers a d.c. potential of 240 volts at point "Y" as shown on the schematic diagram, and 150 volts at point "Z". Under conditions of maximum current consumption by the entire receiver (i.e., all circuits and tubes functioning normally with no signal input), the current in the VR-150 tube should be in the order of 7 milliamperes. Adjustment of R-165 to compensate for mean power variations and provide optimum operation of the VR tube is accomplished by inserting a milliammeter in series with the ground lead attached to terminal "2" of the socket.

Normal deviations of power input voltage or frequency from the values listed in the table on page 1 can be accommodated without seriously affecting the performance of the receivers.

Models J-1 and J-2 have provision for connecting an external power supply through an octal plug on the rear apron of the chassis. Power requirements are 6.3 volts at 3.5 amperes and 220 volts at 80 milliamperes.

The model J-2 also has a toggle switch located on the rear apron, which provides for the selection of either 115v or 230v.

7. Panoramic output. An output at the IF frequency is provided for connection to a panoramic adapter. This output is obtained from the 6AK5 mixer plate load through a capacity divider. A special panoramic adapter, type No. T-3000 C-1, may be secured from Panoramic Radio Products, Incorporated, 10 South Second Avenue, Mount Vernon, New York.

8. Squelch circuit. Included in only the Model J-2 receiver, the squelch circuit is best described with the aid of the simplified schematic shown in Fig. 4.

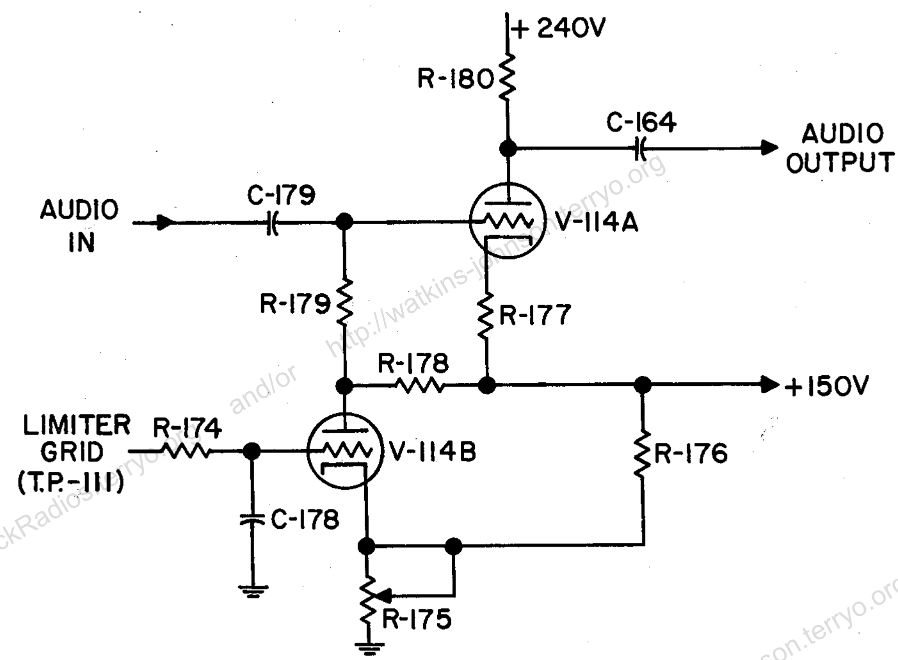


Fig. 4. Squelch Circuit, Simplified Schematic

V-114A acts as a gated audio amplifier stage, while V-114B serves as a d.c. amplifier and gate generator. The circuit is connected such that V-114B has zero grid voltage when no signal is being received and has a negative signal applied when a carrier is being received. The audio amplifier stage, V-114A, will pass an audio signal when the d.c. amplifier, V-114B, is nonconducting and will not pass an audio signal when V-114B is in a conducting condition. In this manner the audio circuit is disabled when no carrier is being received. The carrier strength necessary to make the audio section operative is adjusted by the threshold (squelch) control, R-175. The operation of this circuit is detailed in the following paragraph.

The d.c. amplifier tube V-114B is connected between the 150v supply and ground. The fixed bias on this stage is adjusted by R-175. The audio section V-114A is connected between the 240v supply and the 150v supply. The bias on this stage is the voltage drop across the cathode resistor, R-177, plus the voltage drop, if any, in the plate load resistor, R-178, in V-114-B. Assuming no signal is being received, the grid of the d.c. amplifier tube is zero or, at most, has a very small negative voltage on it. R-175 is adjusted until the noise just disappears from the output. In this condition the d.c. amplifier tube is drawing plate current, and the drop across its plate load, R-178, appears as a bias to V-114A. This voltage drop is sufficient to cut off V-114A and disable the audio signal. When a carrier is tuned in, a negative voltage is supplied from the second limiter in the IF strip through an isolation resistor, R-174, to the grid of V-114B. This voltage is sufficient to cut off V-114B, causing the voltage to drop to zero across the V-114B plate load resistor, R-178. V-114A receives only its normal cathode bias generated in its cathode bias resistor, R-177, and audio signals are passed through to the output.

When receiving amplitude-modulated signals with a high percentage of modulation, the squelch circuit may be cut off on negative modulation peaks when the envelope amplitude becomes zero. To prevent this, a filter consisting of R-174 and C-178 is placed between the limiter and the grid of the d.c. amplifier. This filter has a long enough time constant to reject the lowest audio frequency likely to be received, but not long enough to noticeably delay operation of the squelch.

Alignment Procedure

The 167 receivers have been fully aligned at the factory and should require no further alignment. However, should further alignment be necessary, the following step-by-step procedure is given.

Before proceeding with the alignment, make sure that the function switch on the J-1 and J-2 receivers is set in the FM position.

The order of alignment is as follows:

1. Align second limiter T-104.
2. Align discriminator transformer T-105.
3. Align IF transformers T-103, T-102, and T-101.
4. Check dial alignment.
5. Adjust local oscillator.
6. Align RF amplifier.
7. Repeat adjustment of local oscillator.
8. Calibrate signal-strength meter.

1. Second Limiter Alignment

A. C. W. Method

(1) Remove V-105.

(2) Set the signal generator to 21.4 mc and connect to pin 1 of V-106.

(3) Connect a high-resistance d.c. voltmeter (VTVM) to the second limiter grid return (TP-111).

(4) Set the signal generator to produce the following approximate value on the VTVM.

1v on Models E, F, and G

2v on Models J, J-1, and J-2

(5) Detune the primary slug (see Fig. 5) of T-104 counterclockwise against the stop.

(6) Increase the signal generator output to produce approximately the same value on the VTVM as in step 4, above.

(7) Adjust the secondary slug (see Fig. 5) of T-104 for a maximum reading on the VTVM.

(8) Adjust the primary slug of T-104 for maximum reading, keeping the signal generator output adjusted for the same value on the VTVM as in step 4, above. DO NOT readjust the secondary for a maximum, as this will result in improper adjustment.

The second limiter transformer, T-104, has a 3-db bandwidth of approximately 2.5 mc. The low circuit Q's and heavy coupling make visual alignment of this transformer desirable but not essential. The procedure outlined above will produce less than 1-db tilt in this transformer. Thus the slope is negligible over the narrow bandwidth, from center, as listed below:

$\pm$ 250 kc for Models E and F

$\pm$ 150 kc for Models G, J, J-1, and J-2

B. Sweep Method

(1) Remove V-105.

(2) Connect sweep generator to pin 1 of V-106.

(3) Connect oscilloscope to second limiter grid (TP-111).

(4) Adjust the primary and secondary of T-104 for maximum symmetrical output around a 21.4 -mc center frequency.

2. Discriminator Alignment. In preparation for alignment of the discriminator transformer T-105, remove the 6AK5 (second limiter) tube, V-107, and note the reading of the center frequency meter. If it is off center, it should be centered by means of the potentiometer, R-153, located on the rear apron of the chassis. Difficulty in readily securing an exact center reading is indicative of a defective 6AL5 tube (V-108), a defective 12AU7 tube (V-109), or their associated components, and must be corrected before proceeding further. After this adjustment, replace V-107 and proceed as follows:

A. C. W. Method

(1) Remove V-105.

(2) Set the signal generator to 21.4 mc and connect to pin 1 of V-106.

(3) Connect a high-resistance d.c. voltmeter (VTVM) to the second limiter grid return (TP-111).

(4) Set the signal generator output to produce the following approximate value on the VTVM:

1v on Models E, F, and G

2v on Models J, J-1, and J-2

(5) Reconnect the VTVM to the discriminator output lead (See Fig. 7).

(6) Tune the secondary of T-105 (see Fig. 5) to zero output, then counterclockwise until the VTVM shows a reading of 0.5 volt.

(7) Turn the primary of T-105 (see Fig. 5) to give a maximum reading on the VTVM.

(8) Retune the secondary to produce a zero reading on the VTVM.

(9) Detune the signal generator above and below 21.4 mc to produce a maximum positive and negative output. These voltages should be equal and have a magnitude of approximately ± 8 v.d.c. Minor adjustment of the primary of T-105 will cause the two peak voltages to become exactly equal.

B. Sweep Method

(1) Remove V-105.

(2) Connect the sweep generator to pin 1 of V-106.

(3) Connect the oscilloscope to the discriminator output lead (see Fig. 7).

(4) Adjust the primary and secondary slugs of T-105 for maximum symmetrical output around a 21.4-mc center frequency. The peak-to-peak separation should be 750 kc.

3. IF Alignment

A. C. W. Method

The characteristics of cascaded critically coupled amplifier stages are such as to make alignment difficult; however, the advantages of response stability, gain, and adjacent-channel selectivity make this type of coupling most desirable. Alignment has been kept as simple as possible by designing T-101, T-102, and T-103 to have almost identical characteristics. The primary and secondary Q's have been kept high and therefore the mutual coupling low for the required bandwidth. These factors suggest a rather simple alignment procedure with a minimum of equipment. The resonant frequency of the primary or the secondary in the absence of the other (no coupling) is very nearly the proper tuning when the circuits are coupled.

If the primary circuit is detuned, the secondary adjusted for maximum output, and the primary then retuned to maximum, the overall response will be approximately correct. This procedure is as follows:

(1) Remove the oscillator tube to prevent mixing at the signal generator harmonic frequencies.

(2) Set the receiver dial to the following approximate frequency:

175 mc for Models E and G

60 mc for Models F, J, J-1, and J-2.

(3) Set the signal generator to 21.4 mc and connect to the antenna receptacle. If sufficient output is not obtained, connect to the mixer grid.

(4) Connect a high-resistance d.c. voltmeter (VTVM) to the second limiter grid return (TP-111).

(5) Set the generator to produce the following approximate voltage on VTVM:

1v on Models E, F, and G

2v on Models J, J-1, and J-2

(6) If the IF amplifier is known to be considerably out of adjustment, it will be necessary to peak T-101 and T-103 to provide adequate gain.

(7) Detune the primary by turning the bottom slug of T-103 counterclockwise against the stop.

(8) Increase the signal generator output to produce the same approximate voltage on the VTVM as in step 5, above.

(9) Adjust the secondary (top) slug of T-103 for maximum reading on the VTVM.

(10) Adjust the primary (bottom) slug of T-103 for maximum reading, keeping the signal generator adjusted to the voltage output indicated in step 5, above. DO NOT readjust the secondary for a maximum as this will result in improper adjustment.

(11) Repeat steps 7 through 10 for T-102 and T-101.

NOTE: It is not necessary that this sequence be followed, as any transformer may be adjusted without affecting the other.

The alignment may be checked by varying the signal generator frequency as follows:

$\pm$ 240 kc for Models E and F

$\pm$ 100 kc for Models G, J, J-1, and J-2

The output voltage should be constant within $\pm$ 1 db over this range.

B. Sweep Method

If a sweep generator and an oscilloscope are available, they may be used to check the response; however, the above procedure should first be performed and then the response checked or retouched, as required. For this test, replace the signal generator with the sweep generator and the VTVM with the oscilloscope. Slight readjustment of the transformer slugs may give some improvement in response shape.

The IF and the discriminators are adjusted at the factory for the correct value of coupling. This coupling is varied by moving the end turn of one winding closer to or farther from the adjacent winding for T-101, T-102, and T-103 and by adjusting a coupling loop for T-105. Replacement of these transformers in field service is not recommended unless adequate (visual) test equipment is available to properly set the coupling; otherwise, there may be a change in overall bandwidth.

4. Dial Adjustment

A. The following procedure should be followed to adjust the dial on Model E and G receivers.

(1) Loosen the set screw in each stop nut and back off both nuts two or three turns.

(2) Rotate the knob counterclockwise until the gears are stopped by the inductuner's own mechanism. The inductuner's slugs should then be to the right side as viewed from the front of the panel.

(3) The dial should now be at zero. If not, loosen the dial set screws and adjust. Tighten the dial set screws.

(4) Set the rear stop nut against the slide block and tighten the set screw.

(5) Rotate the knob clockwise until the dial is again set to zero.

(6) Set the front stop nut against the slide block and tighten the set screw. This completes the dial stop adjustment.

B. The procedure for adjusting the dial on the model F, J, J-1, and J-2 receivers is simple and can be done rapidly.

(1) Rotate the dial to the extreme low-frequency end. The dial mark just below 55 mc should line up under the indicator. (This mark is the logging scale zero.)

(2) If 55 mc does not coincide with the indicator line, loosen the dial set screws, align, and retighten the screws.

5. Local Oscillator Adjustment. The only adjustment necessary in the local oscillator is to make the tuning dial read properly. This section may be disregarded if the dial is reading correctly.

If a tube has been replaced and an error is noted, it may be corrected by adjustment of C-116 (see Fig. 5). This adjustment should be made with a signal generator of high accuracy or a crystal-controlled transmitter of known frequency, and should be made at the following frequency:

200 mc for Models E and G

60 mc for Models F, J, J-1, and J-2.

The high frequency end of the dial is controlled by an end inductor which is set at the factory and should not require readjustment in the field.

6. R. F. Amplifier Alignment. The bandpass circuit between the R. F. amplifier and the mixer has primary, secondary, and coupling adjustments. Proper adjustment requires that a sweep generator be connected to the antenna receptacle, and an oscilloscope to the small glass insulated feed-through terminal, TP-117, on the top of the R. F. unit (see Fig. 5). The dial and the sweep generator should be set to the following frequency and the response adjusted for a flat top with maximum gain.

200 mc for Models E and G

60 mc for Models F, J, J-1, and J-2

The local oscillator adjustment should now be rechecked.

7. Repeat Step 5

8. Signal Strength Meter Calibration. The "10 mv adjust" potentiometer on the rear apron of the chassis should be set to make the meter read full scale when an input signal of 10 mv at approximately 200 mc is applied to the antenna receptacle. This meter is intended to indicate the order of magnitude of the input signal and is frequency sensitive. For accurate determination of input level, a correction curve should be plotted for the desired frequency.

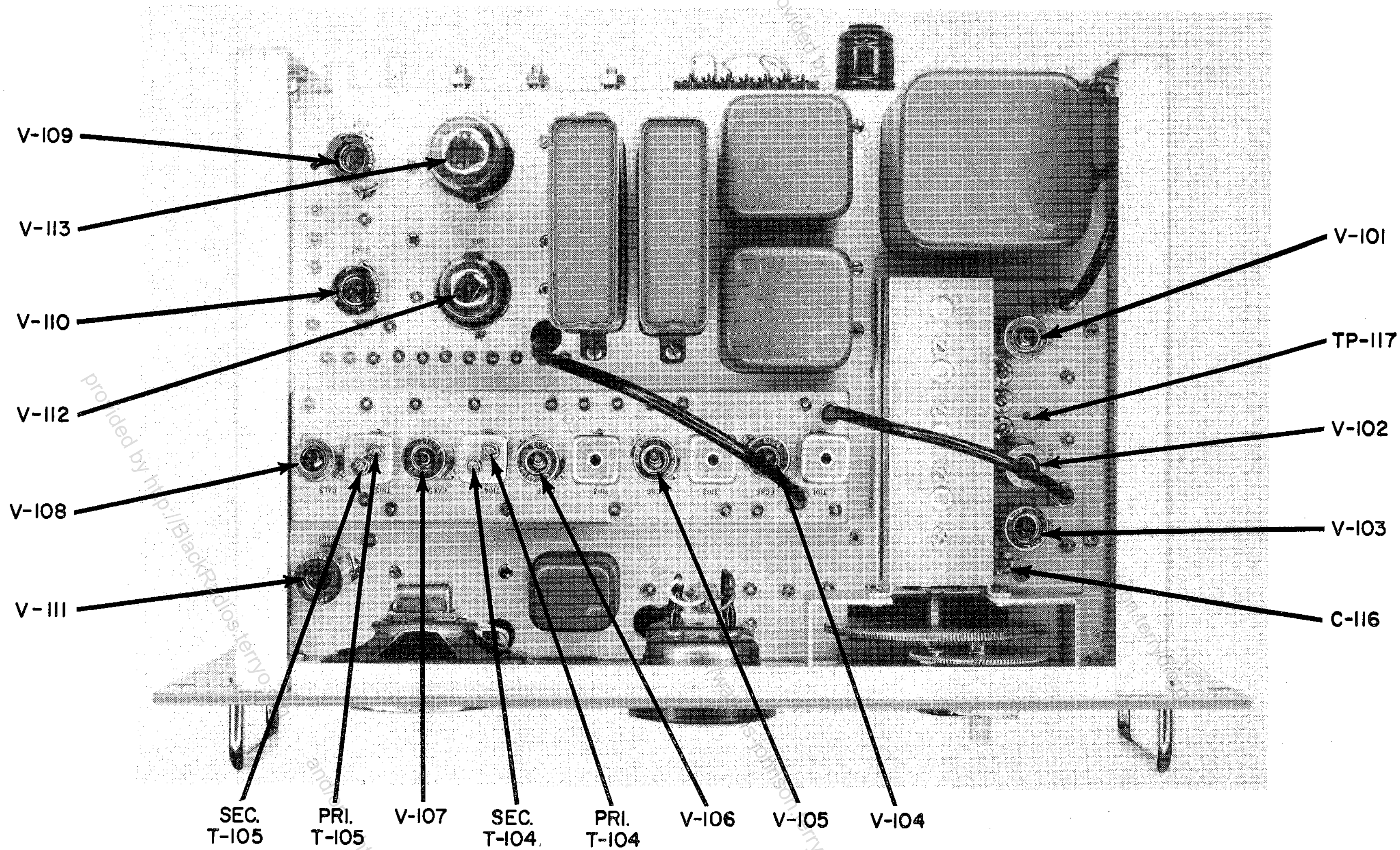


Fig. 5. Model 167 Receiver, Top View

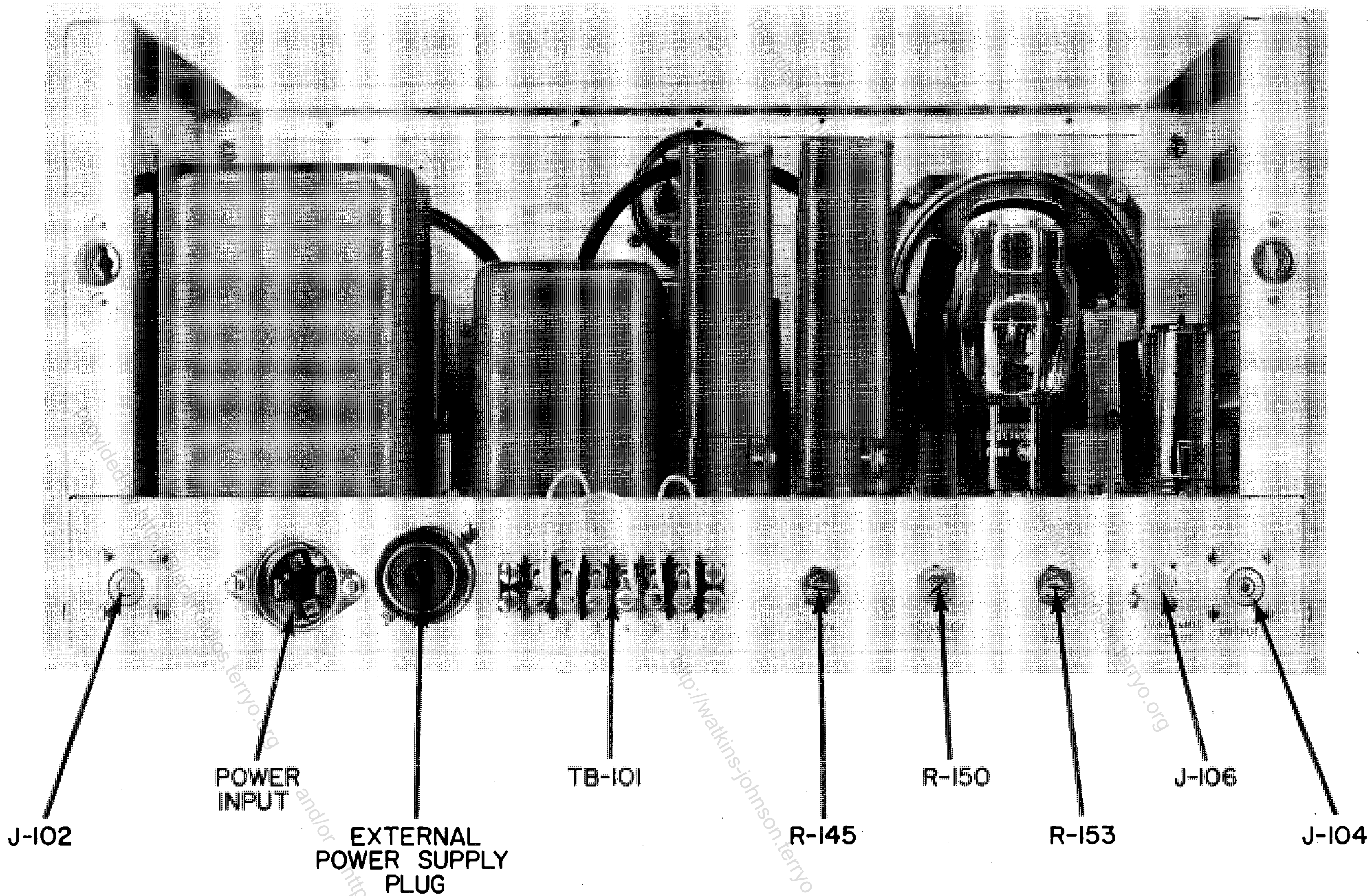


Fig. 6. Model 167 Receiver, Rear View

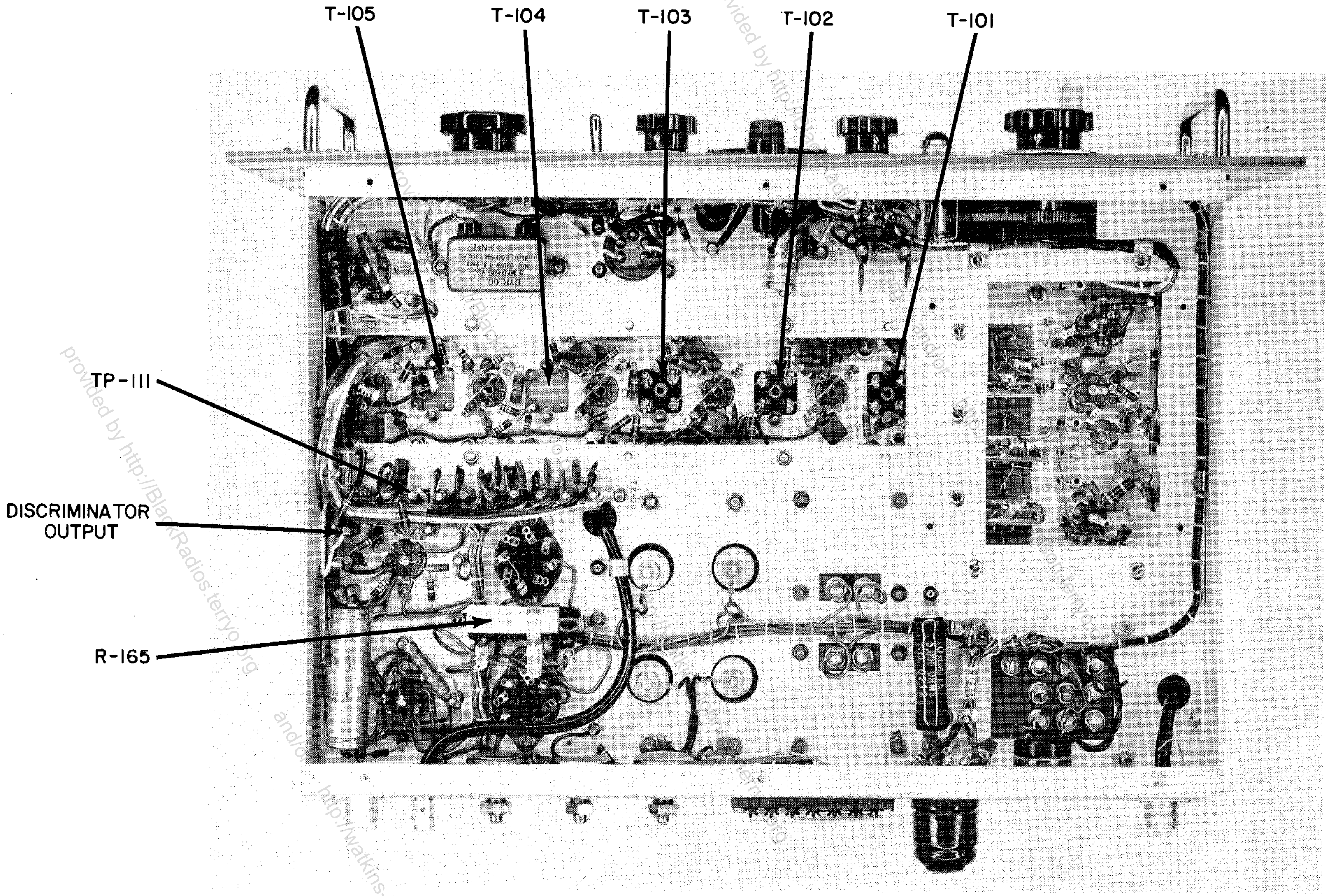


Fig. 7. Model 167 Receiver, Bottom View

PARTS LIST

Model 167 Special Purpose Receivers

When ordering replacement parts, give the equipment name and model number, and the symbol number and description of each item ordered.

Replacement parts which will be supplied against an order may not be exact duplicates of the original parts. However, only minor differences in the electrical or mechanical characteristics will be involved and, consequently, will in no way impair the operation of the equipment.

Symbol No.						Description
167-E	167-F	167-G	167-J	167-J-1	167-J-2	
C-101	C-101	C-101	C-101	C-101	C-101	Capacitor: Ceramic, disc, 0.001 uf, 500V
C-102	C-102	C-102	C-102	C-102	C-102	Capacitor: Ceramic, GP2, insulated, 500 uuf ±20%, 500V
C-103	C-103	C-103	C-103	C-103	C-103	Capacitor: Ceramic, trimmer, 0.5-3 uuf, 500V
C-104	—	C-104	—	—	—	Capacitor: Ceramic, NPO, uninsulated, 1 uuf ±0.1 uuf, 500V
—	C-104	—	C-104	C-104	C-104	Capacitor: Ceramic, NPO, uninsulated, 2.5 uuf ±0.25 uuf, 500V
C-105	—	C-105	—	—	—	Capacitor: Ceramic, trimmer, 1-4 uuf, 500V
—	C-105	—	C-105	C-105	C-105	Capacitor: Ceramic, trimmer, 1-6 uuf, 500V
C-106	—	C-106	—	—	—	Capacitor: Ceramic, NPO, uninsulated, 1 uuf ±0.1 uuf, 500V
—	C-106	—	C-106	C-106	C-106	Capacitor: Ceramic, NPO, uninsulated, 2.5 uuf ±0.25 uuf, 500V
C-107	C-107	C-107	C-107	C-107	C-107	Capacitor: Ceramic, trimmer, 1-4 uuf, 500V
C-108	C-108	C-108	C-108	C-108	C-108	Capacitor: Ceramic, NPO, uninsulated, 10 uuf ±0.5 uuf, 500V
C-109	C-109	C-109	C-109	C-109	C-109	Capacitor: Ceramic, NPO, uninsulated, 1 uuf ±0.1 uuf, 500V
C-110	C-110	C-110	C-110	C-110	C-110	Capacitor: Ceramic, disc, 0.001 uf, 500V
C-111	C-111	C-111	C-111	C-111	C-111	Capacitor: Ceramic, disc, 0.005 uf, 500V
112, 113	112, 113	112, 113	112, 113	112, 113	112, 113	
C-114	C-114	C-114	C-114	C-114	C-114	Capacitor: Ceramic, NPO, uninsulated, 10 uuf ±0.5 uuf, 500V
C-115	—	C-115	—	—	—	Capacitor: Ceramic, NPO, uninsulated, 5 uuf ±0.25 uuf, 500V
—	C-115	—	C-115	C-115	C-115	Capacitor: Ceramic, NPO, uninsulated, 6 uuf ±0.3 uuf, 500V
C-116	C-116	C-116	C-116	C-116	C-116	Capacitor: Ceramic, trimmer, 1-6 uuf, 500V
C-117	C-117	C-117	C-117	C-117	C-117	Capacitor: Ceramic, NPO, uninsulated, 5 uuf ±0.25 uuf, 500V
C-118	C-118	C-118	C-118	C-118	C-118	
119, 120	119, 120	119, 120	119, 120	119, 120	119, 120	Capacitor: Ceramic, disc, 0.001 uf, 500V
121	121	121	121	121	121	
C-122	C-122	C-122	C-122	C-122	C-122	Not used
C-123	C-123	C-123	C-123	C-123	C-123	Capacitor: Ceramic, N470, uninsulated, 39 uuf ±5%, 500V

Symbol No.						Description
167-E	167-F	167-G	167-J	167-J-1	167-J-2	
C-124	C-124	C-124	C-124	C-124	C-124	Capacitor: Ceramic, disc, 0.001 uf, 500V
C-125	C-125	C-125	C-125	C-125	C-125	Capacitor: Ceramic, N750, insulated, 200 uuf ±10%, 500V
C-126	C-126	C-126	C-126	C-126	C-126	Capacitor: Ceramic, GP2, insulated, 500 uuf ±20%, 500V
C-127	C-127	C-127	C-127	C-127	C-127	Capacitor: Ceramic, disc, 0.005 uf, 500V
C-128, 129	C-128, 129	C-128, 129	C-128, 129	C-128, 129	C-128, 129	Capacitor: Ceramic, GP2, insulated, 500 uuf ±20%, 500V
C-130	C-130	C-130	C-130	C-130	C-130	Capacitor: Ceramic, disc, 0.005 uf, 500V
C-131	C-131	C-131	C-131	C-131	C-131	Capacitor: Ceramic, NPO, uninsulated, 8.2 uuf, ±0.5 uuf, 500V
C-132	C-132	C-132	C-132	C-132	C-132	Capacitor: Ceramic, N470, uninsulated, 39 uuf, ±5%, 500V
C-133	C-133	C-133	C-133	C-133	C-133	Capacitor: Ceramic, disc, 0.005 uf, 500V
C-134	C-134	C-134	C-134	C-134	C-134	Capacitor: Ceramic, GP2, insulated, 500 uuf, ±20%, 500V
C-135	C-135	C-135	C-135	C-135	C-135	Capacitor: Ceramic, disc, 0.005 uf, 500V
C-136, 137	C-136, 137	C-136, 137	C-136, 137	C-136, 137	C-136, 137	Capacitor: Ceramic, GP2, insulated, 500 uuf, ±20%, 500V
C-138	C-138	C-138	C-138	C-138	C-138	Capacitor: Ceramic, NPO, 8.2 uuf ±0.5 uuf, 500V
C-139	C-139	C-139	C-139	C-139	C-139	Capacitor: Ceramic, N470, uninsulated, 39 uuf ±5%, 500V
C-140	C-140	C-140	C-140	C-140	C-140	Capacitor: Ceramic, NPO, uninsulated, 50 uuf ±5%, 500V
C-141	C-141	C-141	C-141	C-141	C-141	Capacitor: Ceramic, N750, insulated, 50 uuf ±20%, 500V
C-142, 143, 144	C-142, 143, 144	C-142, 143, 144	C-142, 143, 144	C-142, 143, 144	C-142, 143, 144	Capacitor: Ceramic, GP2, insulated, 500 uuf, ±20%, 500V
C-145, 146	C-145, 146	C-145, 146	C-145, 146	C-145, 146	C-145, 146	Not used
C-147	C-147	C-147	C-147	C-147	C-147	Capacitor: Ceramic, disc, 0.005 uuf, 500V
C-148	C-148	C-148	C-148	C-148	C-148	Capacitor: Ceramic, NPO, uninsulated, 50 uuf ±5%, 500V
C-149	C-149	C-149	C-149	C-149	C-149	Capacitor: Ceramic N330, insulated, 33 uuf, ±5%, 500V
C-150, 151	C-150, 151	C-150, 151	C-150, 151	C-150, 151	C-150, 151	Capacitor: Ceramic, disc, 0.001 uf, 500V
C-152	C-152	C-152	C-152	C-152	C-152	Capacitor: Ceramic, N220, uninsulated, 33 uuf ±10%, 500V
C-153	C-153	C-153	C-153	C-153	C-153	Not used
C-154	C-154	C-154	C-154	C-154	C-154	Capacitor: Ceramic, N470, uninsulated, 39 uuf, ±5%, 500V
C-155	C-155	C-155	C-155	C-155	C-155	Capacitor: Ceramic, NPO, uninsulated, 50 uuf, ±5%, 500V
C-156, 157, 158 159, 160	C-156, 157, 158 159, 160	C-156, 157, 158 159, 160	C-156, 157, 158 159, 160	C-156, 157, 158 159, 160	C-156, 157, 158 159, 160	Capacitor: Ceramic, disc 0.005 uf, 500V
C-161	—	C-161	—	—	—	Capacitor: Ceramic, insulated, 0.01 uf, 600V
—	C-161	—	C-161	C-161	—	Capacitor: Paper, bathtub, 0.5 uf, 600V
—	—	—	—	—	C-161	Capacitor: Metalized paper, 0.5 uf, 200V
C-162	C-162	C-162	C-162	C-162	C-162	Capacitor: Ceramic, N750, insulated, 50 uuf ±20%, 500V

Symbol No.						Description
167-E	167-F	167-G	167-J	167-J-1	167-J-2	
C-163	C-163	C-163	C-163	C-163	C-163	Capacitor: Ceramic, disc, 0.005 uf, 500V
C-164	C-164	C-164	C-164	C-164	C-164	Capacitor: Ceramic, insulated, 0.01 uf, 600V
C-165	—	C-165	—	C-165	C-165	Capacitor: Paper, 0.1 impregnated, 0.1 uf, 600V
—	—	—	C-165	—	—	Capacitor: Metalized paper, 1 uf, 400V
—	C-165	—	—	—	—	Not used
C-166	C-166	C-166	C-166	C-166	C-166	Capacitor: Ceramic, insulated, 0.01 uf, 600V
C-167,	C-167,	C-167,	C-167,	C-167,	C-167,	Capacitor: Oil filled, 10 uf, 600V
168	168	168	168	168	168	
C-169	C-169	C-169	C-169	C-169	C-169	Capacitor: Ceramic, NPO, uninsulated, 22 uuf ±10%, 500V
C-170	C-170	C-170	C-170	—	—	Capacitor: Ceramic, disc, 0.005 uf, 500V
—	—	—	—	C-170	C-170	Capacitor: Metalized paper, 1 uf, 400V
C-171	C-171	C-171	C-171	—	—	Capacitor: Ceramic, NPO, uninsulated, 4.7 uuf ±0.25 uuf, 500V
—	—	—	—	C-171,	C-171,	Capacitor: Ceramic, disc, 0.005 uf, 500V
—	—	—	—	172	172	
C-172	C-172	C-172	C-172	—	—	Capacitor: Ceramic, GP2, insulated, 500 uuf ±20%, 500V
—	—	—	—	C-173,	C-173,	Capacitor: Ceramic, insulated 0.01 uf, 600V
—	—	—	—	174	174	
—	—	—	—	C-175	C-175	Capacitor: Ceramic, disc, 0.005 uf, 500V
—	—	—	—	C-176	C-176	Capacitor: Ceramic, disc, 0.001 uf, 500V
—	—	—	—	C-177	C-177	Capacitor: Ceramic, disc, 0.005 uf, 500V
—	—	—	—	C-178	—	Capacitor: Ceramic, GP2, insulated, 500 uuf, ±20%, 500V
—	—	—	—	—	C-178	Capacitor: Metalized paper, 0.05 uf, 200V
—	—	—	—	C-179	—	Capacitor: Ceramic, NPO, uninsulated, 4.7 uuf ±0.25 uuf, 500V
—	—	—	—	—	C-179	Capacitor: Paper, Oil impregnated, 0.01 uf, 600V
—	—	—	—	—	C-180	Capacitor: Paper, oil impregnated, 0.1 uf, 600V
—	—	—	—	—	C-181	Capacitor: Ceramic, NPO, uninsulated, 4.7 uuf, ±0.25 uuf, 500V
—	—	—	—	—	C-182	Capacitor: Ceramic, GP2, insulated, 500 uuf, ±20%, 500V
F-101	F-101	F-101	F-101	F-101	F-101	Fuse: Cartridge, 2 amp, 3AG
I-101	I-101	I-101	I-101	I-101	I-101	Lamp: Pilot, 6-8 Volt, 0.25 amp.
J-101	J-101	J-101	J-101	J-101	J-101	Connector: Receptacle, SO-239
J-102,	J-102,	J-102,	J-102,	J-102,	J-102,	Connector: Receptacle, BNC, UG-625/U
103	103	103	103	103	103	
J-104	J-104	J-104	J-104	J-104	J-104	Connector: Receptacle, SO-239
J-105	J-105	J-105	J-105	J-105	J-105	Connector: Receptacle, BNC, UG-625/U
J-106	J-106	J-106	J-106	J-106	J-106	Connector: Receptacle, BNC, UG-262/U
L-101,	L-101,	L-101,	L-101,	L-101,	L-101,	Inductuner: Spiral, P. R. Mallory, Type S-4
102, 103	102, 103	102, 103	102, 103	102, 103	102, 103	
104, 105	104, 105	104, 105	104, 105	104, 105	104, 105	

Symbol No.						Description
167-E	167-F	167-G	167-J	167-J-1	167-J-2	
L-101A, 102A, 103A, 104A, 105A.	L-101A, 102A, 103A, 104A, 105A	L-101A, 102A, 103A, 104A, 105A	L-101A, 102A, 103A, 104A, 105A	L-101A, 102A, 103A, 104A, 105A	L-101A, 102A, 103A, 104A, 105A	Inductance in interconnecting leads
L-106	—	L-106	—	—	—	Choke: R. F., 3.8 uh, Part/Dwg No. A-167-101
—	L-106	—	L-106	L-106	L-106	Inductance: Padder, Part/Dwg No. A-167-116
L-107	L-107	L-107	L-107	L-107	L-107	Choke: R.F., 2.5 uh, Part/Dwg No. A-167-103
L-108	L-108	L-108	L-108	L-108	L-108	Choke: R. F., 28 uh, Part/Dwg No. A-167-102
L-109	L-109	L-109	L-109	L-109	L-109	Choke: R. F., 2.5 uh, Part/Dwg No. A-167-103
L-110, 111	L-110, 111	L-110, 111	L-110, 111	L-110, 111	L-110, 111	Choke: Filter, Chicago Transformer Part No. RH 1085
LS-101	LS-101	LS-101	LS-101	LS-101	LS-101	Speaker: 4" Permanent magnet, RCA Type 404S2
M-101	M-101	M-101	M-101	M-101	M-101	Meter: 0-50 ua, Scale per Dwg B-167-501
M-102	M-102	M-102	M-102	M-102	M-102	Meter: 100-0-100 ua
P-101	P-101	P-101	P-101	P-101	P-101	Not used
P-102, 103	P-102, 103	P-102, 103	P-102, 103	P-102, 103	P-102, 103	Connector: Plug, UG-260/U
P-104	P-104	P-104	P-104	P-104	P-104	Not used
P-105	P-105	P-105	P-105	P-105	P-105	Connector: Plug UG-260/U
R-101	—	R-101	—	—	—	Resistor: Fixed, composition, 100 ohms ±10%, 1/2W
—	R-101	—	R-101	R-101	R-101	Resistor: Fixed, composition, 120 ohms ±10%, 1/2W
R-102	—	R-102	—	—	—	Not used
—	R-102	—	R-102	R-102	R-102	Resistor: Fixed, composition, 4700 ohms ±10%, 1W
R-103, 104	R-103, 104	R-103, 104	R-103, 104	R-103, 104	R-103, 104	Resistor: Fixed, composition, 470,000 ohms ±20%, 1/2W
R-105	R-105	R-105	R-105	R-105	R-105	Resistor: Fixed, composition, 150,000 ohms ±10%, 1/2W
R-106, 107	R-106, 107	R-106, 107	R-106, 107	R-106, 107	R-106, 107	Resistor: Fixed, composition, 150 ohms ±10%, 1/2W
R-108	R-108	R-108	R-108	R-108	R-108	Resistor: Fixed, composition, 3300 ohms ±10%, 1/2W
R-109	R-109	R-109	R-109	R-109	R-109	Resistor: Fixed, composition, 27,000 ohms ±10%, 1/2W
R-110	R-110	R-110	R-110	R-110	R-110	Resistor: Fixed, composition, 27 ohms ±10%, 1/2W
R-111	R-111	R-111	R-111	R-111	R-111	Resistor: Fixed, composition, 220 ohms ±10%, 1/2W
R-112	R-112	R-112	R-112	R-112	R-112	Resistor: Fixed, composition, 100,000 ohms ±5%, 1/2W
R-113	R-113	R-113	R-113	R-113	R-113	Resistor: Fixed, composition, 1000 ohms ±10%, 1/2W
R-114	R-114	R-114	R-114	—	—	Resistor: Fixed, composition, 470,000 ohms ±20%, 1/2W
—	—	—	—	R-114	R-114	Resistor: Fixed, composition, 240,000 ohms ±5%, 1/2W

Symbol No.						Description
167-E	167-F	167-G	167-J	167-J-1	167-J-2	
R-115	R-115	——	——	——	——	Resistor: Fixed, composition, 10,000 ohms ±5%, 1/2W
——	——	R-115	R-115	——	——	Not used
——	——	——	——	R-115	R-115	Resistor: Fixed, composition, 22,000 ohms ±10%, 1/2W
R-116	R-116	R-116	R-116	R-116	R-116	Resistor: Fixed, composition, 51 ohms ±5%, 1/2W
R-117	R-117	R-117	R-117	R-117	R-117	Resistor: Fixed, composition, 4,700 ohms ±5%, 1/2W
R-118	R-118	R-118	R-118	R-118	R-118	Resistor: Fixed, composition, 1,000 ohms ±10%, 1/2W
R-119	R-119	——	——	——	——	Resistor: Fixed, composition, 10,000 ohms ±5%, 1/2W
——	——	R-119	R-119	——	——	Not used
——	——	——	——	R-119	R-119	Resistor: Fixed, composition, 22,000 ohms ±10%, 1/2W
R-120	R-120	R-120	R-120	——	——	Resistor: Fixed, composition, 150 ohms ±10%, 1/2W
——	——	——	——	R-120	R-120	Resistor: Fixed, composition, 100 ohms ±10%, 1/2W
R-121	R-121	R-121	R-121	R-121	R-121	Resistor: Fixed, composition, 47,000 ohms ±10%, 1/2W
R-122	R-122	R-122	R-122	R-122	R-122	Resistor: Fixed, composition, 1000 ohms ±10%, 1/2W
R-123, 124	R-123, 124	R-123, 124	R-123, 124	R-123, 124	R-123, 124	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
R-125, 126	R-125, 126	——	——	——	——	Resistor: Fixed, composition, 10,000 ohms ±5%, 1/2W
——	——	R-125	R-125	——	——	Resistor: Fixed, composition, 47,000 ohms ±10%, 1/2W
——	——	——	——	R-125	R-125	Resistor: Fixed, composition, 22,000 ohms ±10%, 1/2W
——	——	R-126	R-126	R-126	R-126	Resistor: Fixed, composition, 10,000 ohms ±5%, 1/2W
R-127	R-127	R-127	R-127	R-127	R-127	Resistor: Fixed, composition, 100,000 ohms ±5%, 1/2W
R-128	R-128	R-128	R-128	R-128	R-128	Resistor: Fixed, composition, 51 ohms ±5%, 1/2W
R-129	R-129	R-129	R-129	R-129	R-129	Resistor: Fixed, composition, 47,000 ohms ±10%, 1/2W
R-130	R-130	R-130	R-130	R-130	R-130	Resistor: Fixed, composition, 120,000 ohms ±10%, 1/2W
R-131	R-131	R-131	R-131	R-131	R-131	Resistor: Fixed, composition, 1000 ohms ±10%, 1/2W
R-132	R-132	R-132	R-132	——	——	Resistor: Fixed, composition, 470,000 ohms ±20%, 1/2W
R-133	R-133	R-133	R-133	R-132, 133	R-132, 133	Resistor: Fixed, composition, 47,000 ohms ±10%, 1/2W
——	——	——	——			
R-134	R-134	R-134	R-134	R-134	R-134	Resistor: Fixed, composition, 33,000 ohms ±5%, 1/2W
R-135	R-135	R-135	R-135	R-135	R-135	Resistor: Fixed, composition, 47,000 ohms ±10%, 1/2W
R-136	R-136	R-136	R-136	R-136	R-136	Resistor: Fixed, composition, 33,000 ohms ±5%, 1/2W
R-137	R-137	R-137	R-137	R-137	R-137	Resistor: Fixed, composition, 1,000 ohms ±10%, 1/2W
R-138	R-138	R-138	R-138	R-138	R-138	Resistor: Fixed, composition, 10,000 ohms ±5%, 1/2W
R-139, 140	R-139, 140	R-139, 140	R-139, 140	R-139, 140	R-139, 140	Resistor: Fixed, composition, 100,000 ohms ±5%, 1/2W
R-141	R-141	R-141	R-141	R-141	R-141	Resistor: Fixed, composition, 5 ohms ±5%, 1/2W (two 10-ohm in parallel)

Symbol No.						Description
167-E	167-F	167-G	167-J	167-J-1	167-J-2	
R-142, 143	R-142, 143	R-142, 143	R-142, 143	R-142, 143	R-142, 143	Resistor: Fixed, composition, 220,000 ohms ±10%, 1/2W
R-144	R-144	R-144	R-144	R-144	R-144	Resistor: Fixed, composition, 100,000 ohms ±5%, 1/2W
R-145	R-145	R-145	R-145	R-145	R-145	Resistor: Variable, composition, 1 meg, ±20%, Linear taper
R-146	R-146	R-146	R-146	—	—	Resistor: Fixed, composition, 470,000 ohms ±20%, 1/2W
—	—	—	—	R-146	R-146	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
R-147	R-147	R-147	R-147	R-147	R-147	Resistor: Fixed, composition, 220,000 ohms ±10%, 1/2W
R-148	R-148	R-148	R-148	R-148	R-148	Resistor: Fixed, composition, 130,000 ohms ±5%, 1/2W
R-149	R-149	R-149	R-149	R-149	R-149	Resistor: Fixed, composition, 220,000 ohms ±10%, 1/2W
R-150	R-150	R-150	R-150	R-150	R-150	Resistor: Variable, composition, 50,000 ohms ±10%, linear taper
R-151	R-151	R-151	R-151	R-151	R-151	Resistor: Fixed, composition, 47,000 ohms ±10%, 1/2W
R-152	R-152	R-152	R-152	R-152	R-152	Resistor: Fixed, composition, 22,000 ohms ±10%, 1/2W
R-153	R-153	R-153	R-153	R-153	R-153	Resistor: Variable, composition, 50,000 ohms ±10%, linear taper
R-154	R-154	R-154	R-154	R-154	R-154	Resistor: Fixed, composition, 3,300 ohms ±10%, 1/2W
R-155	R-155	R-155	R-155	R-155	R-155	Resistor: Fixed, composition, 33,000 ohms ±5%, 1/2W
R-156	R-156	R-156	R-156	R-156	R-156	Resistor: Fixed, composition, 3,300 ohms ±10%, 1/2W
R-157	R-157	R-157	R-157	R-157	R-157	Resistor: Fixed, composition, 10,000 ohms ±10%, 1W
R-158	R-158	R-158	R-158	R-158	R-158	Resistor: Fixed, composition, 6,800 ohms ±10%, 1W
R-159	—	R-159	—	—	—	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
—	—	—	—	R-159	R-159	Resistor: Fixed, composition, 51 ohms ±5%, 1/2W
—	R-159	—	—	—	—	Not Used
—	—	—	R-159	—	—	Resistor: Fixed, composition, 100,000 ohms ±5%, 1/2W
R-160	R-160	R-160	R-160	R-160	R-160	Resistor: Variable, composition, 500,000 ohms ±10%, logarithmic taper
R-161	R-161	R-161	R-161	R-161	R-161	Resistor: Fixed, composition, 10,000 ohms ±5%, 1/2W
R-162	R-162	R-162	R-162	R-162	R-162	Resistor: Fixed, composition, 220,000 ohms ±10%, 1/2W
R-163	R-163	R-163	R-163	R-163	R-163	Resistor: Fixed, composition, 1,000 ohms ±10%, 1/2W
R-164	R-164	R-164	R-164	R-164	R-164	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
R-165	R-165	R-165	R-165	R-165	R-165	Resistor: Adjustable, wire wound, 2,500 ohms 25W
R-166	R-166	R-166	R-166	R-166	R-166	Resistor: Fixed, wire wound, 5000 ohms, 25W
—	—	—	—	R-167	R-167	Resistor: Fixed, composition, 100,000 ohms ±5%, 1/2W
—	—	R-167, 168	R-167, 168	—	—	Resistor: Fixed, composition, 22,000 ohms ±10%, 1/2W
R-167, 168	R-167, 168	—	—	—	—	Not used
—	—	—	—	R-168	R-168	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
R-169	R-169	R-169	R-169	R-169	R-169	Resistor: Fixed, composition, 33,000 ohms ±5%, 1/2W

Symbol No.						Description
167-E	167-F	167-G	167-J	167-J-1	167-J-2	
—	—	—	R-170	—	—	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
—	—	—	—	R-170	R-170	Resistor: Fixed, composition, 240,000 ohms ±5%, 1/2W
—	—	—	—	R-171	R-171	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
—	—	—	—	R-172, 173	R-172, 173	Resistor: Fixed, composition, 470,000 ohms ±20%, 1/2W
—	—	—	—	—	R-174	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
—	—	—	—	—	R-175	Resistor: Variable, composition, 10,000 ohms ±10%, linear taper
—	—	—	—	—	R-176	Resistor: Fixed, composition, 47,000 ohms ±10%, 2W
—	—	—	—	—	R-177	Resistor: Fixed, composition, 2,000 ohms ±10%, 1/2W
—	—	—	—	—	R-178	Resistor: Fixed, composition, 240,000 ohms ±5%, 1/2W
—	—	—	—	—	R-179	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
—	—	—	—	—	R-180	Resistor: Fixed, composition, 22,000 ohms ±10%, 1/2W
—	—	—	—	—	R-181, 182	Resistor: Fixed, composition, 1 meg ±10%, 1/2W
S-101	S-101	S-101	S-101	S-101	S-101	Switch: Rotary, 1 pole, 3 pos.
S-102	S-102	S-102	S-102	S-102	S-102	Switch: Toggle, SPST
S-103	S-103	S-103	S-103	—	—	Switch: Toggle, SPDT
—	—	—	—	S-103	S-103	Switch: Rotary, 4 pole, 3 pos.
—	—	—	—	—	S-104	Switch: Toggle, DPDT
T-101	T-101	—	—	—	—	Transformer: IF, Part/Dwg No. A-167-207
—	—	T-101	T-101	T-101	T-101	Transformer: IF, Part/Dwg No. A-167-208
T-102, 103	T-102, 103	—	—	—	—	Transformer: IF, Part/Dwg No. A-167-110
—	—	T-102	T-102	T-102, 103	T-102, 103	Transformer: IF, Part/Dwg No. A-167-104
—	—	T-103	T-103	—	—	Transformer: IF, Part/Dwg No. A-167-105
T-104	T-104	T-104	T-104	T-104	T-104	Transformer: IF, Part/Dwg No. B-30-755
T-105	T-105	T-105	T-105	T-105	T-105	Transformer: Discriminator, Part/Dwg No. B-13,882
T-106	T-106	T-106	T-106	T-106	T-106	Transformer: Audio output, Part/Dwg No. A-167-108
T-107	T-107	T-107	T-107	T-107	—	Transformer: Power, Chicago Transformer, Part No. PHC-85
—	—	—	—	—	T-107	Transformer: Power, Chicago Transformer, Part No. PHC-85
V-101	V-101	V-101	V-101	V-101	V-101	Tube: Electron, 6J4
V-102	V-102	V-102	V-102	V-102	V-102	Tube: Electron, 6AK5
V-103	V-103	V-103	V-103	V-103	V-103	Tube: Electron 6J6
V-104, 105, 106	V-104, 105, 106	V-104, 105, 106	V-104, 105, 106	V-104, 105, 106	V-104, 105, 106	Tube: Electron, 6CB6
V-107	V-107	V-107	V-107	V-107	V-107	Tube: Electron, 6AK5

Symbol No.						Description
167-E	167-F	167-G	167-J	167-J-1	167-J-2	
V-108	V-108	V-108	V-108	V-108	V-108	Tube: Electron, 6AL5
V-109, 110, 111	V-109, 110, 111	V-109, 110, 111	V-109, 110, 111	V-109, 110, 111	V-109, 110, 111	Tube: Electron, 12AU7
V-112	V-112	V-112	V-112	V-112	V-112	Tube: Electron, VR-150
V-113	V-113	V-113	V-113	V-113	V-113	Tube: Electron, 5V4-G
—	—	—	—	—	V-114	Tube: Electron, 12AU7
						Fuseholder
						Socket: Tube, min. 7-pin
						Socket: Tube, min. 9-pin
						Socket: Tube, octal

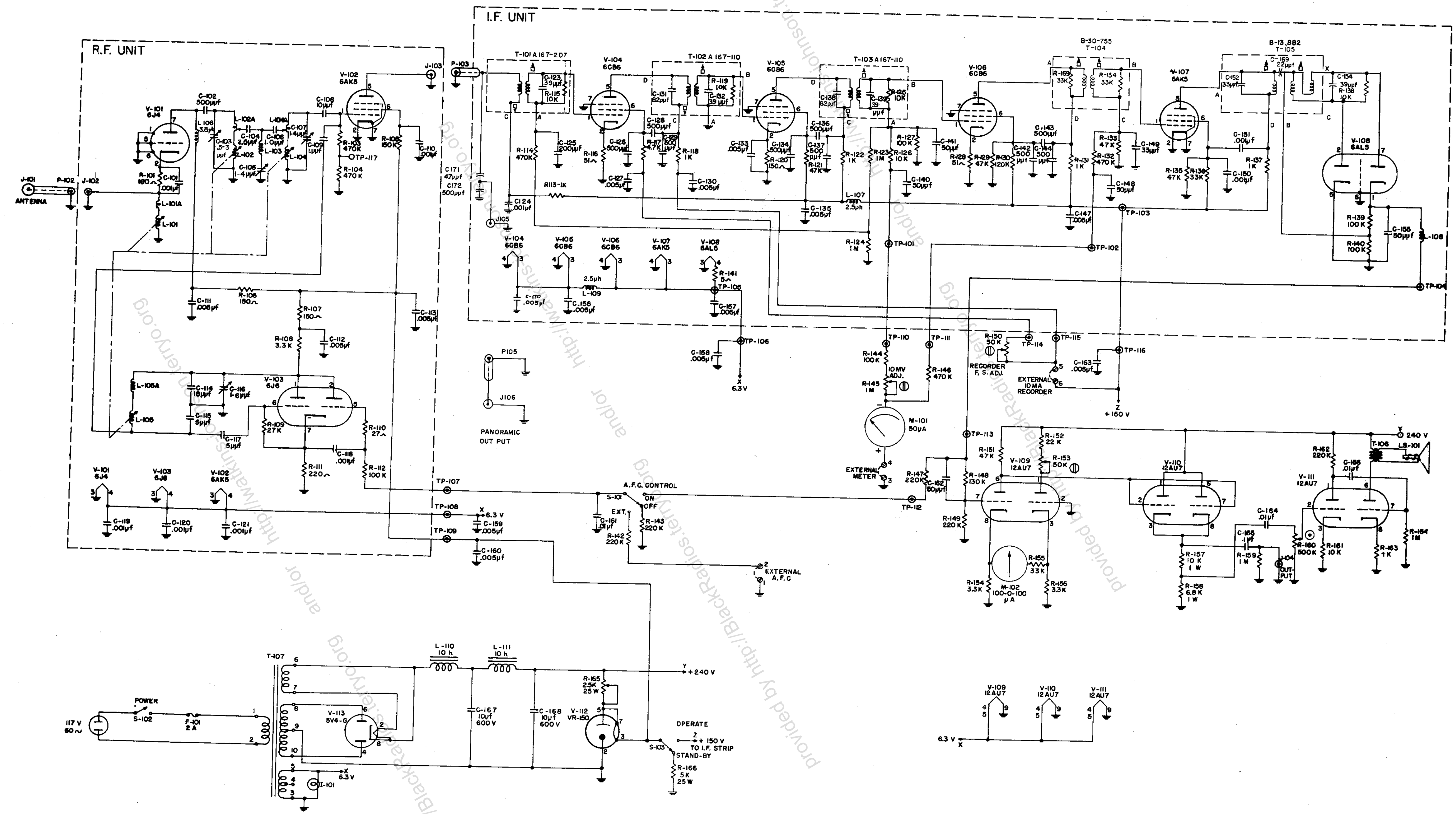


Figure 8. Schematic Diagram, Model 167-E

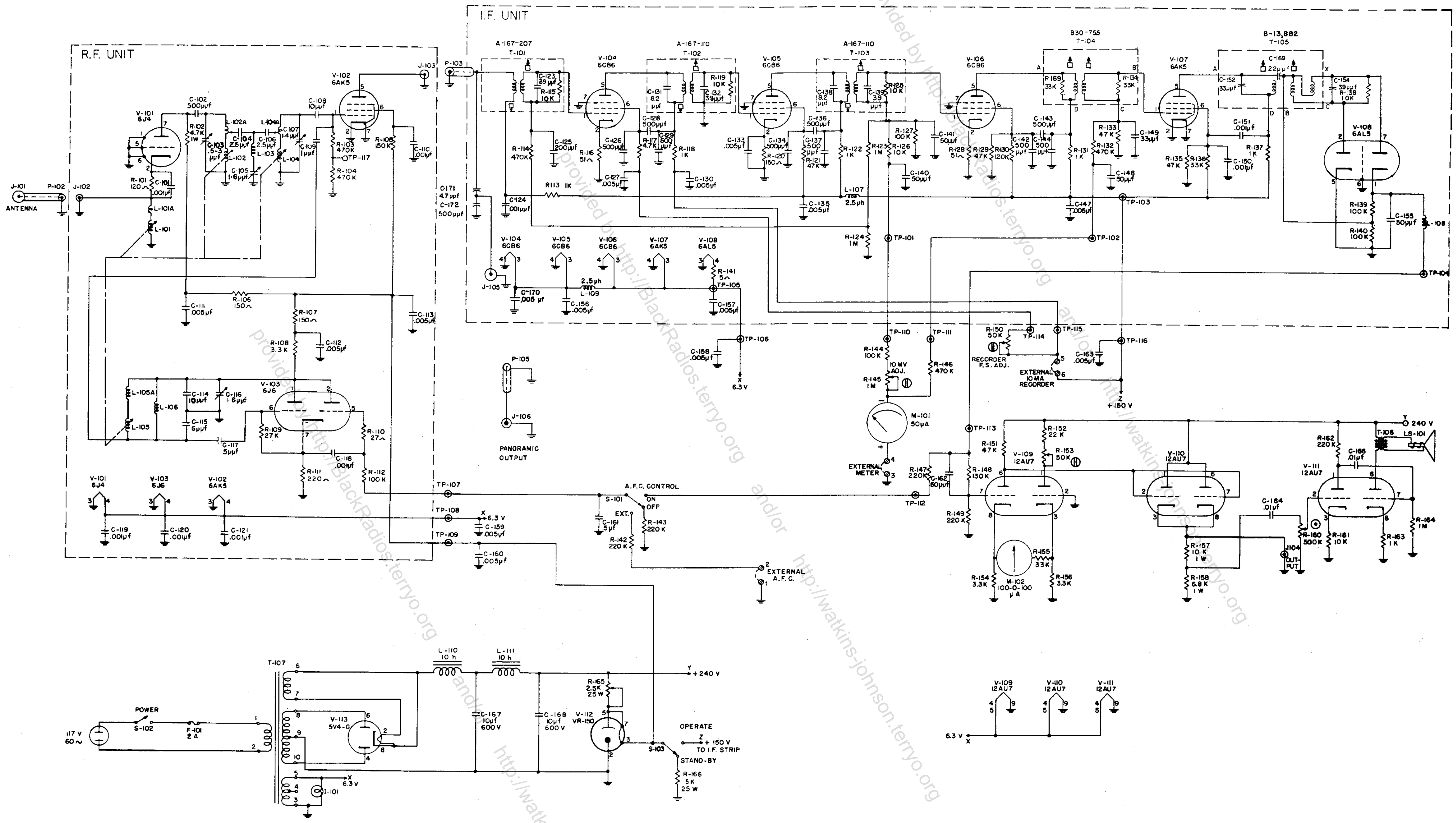


Figure 9. Schematic Diagram, Model 167-F

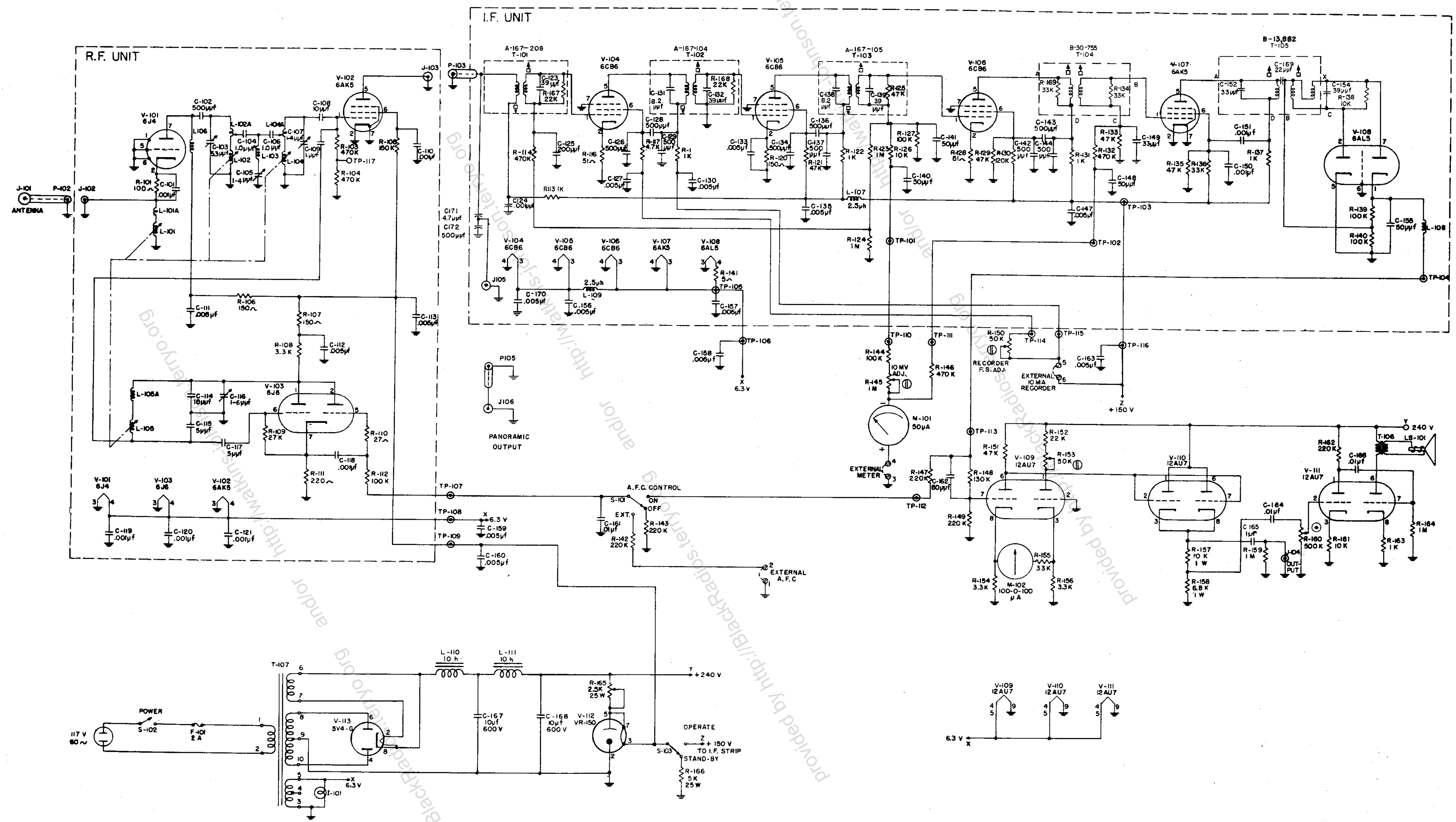


Figure 10. Schematic Diagram, Model 167-G

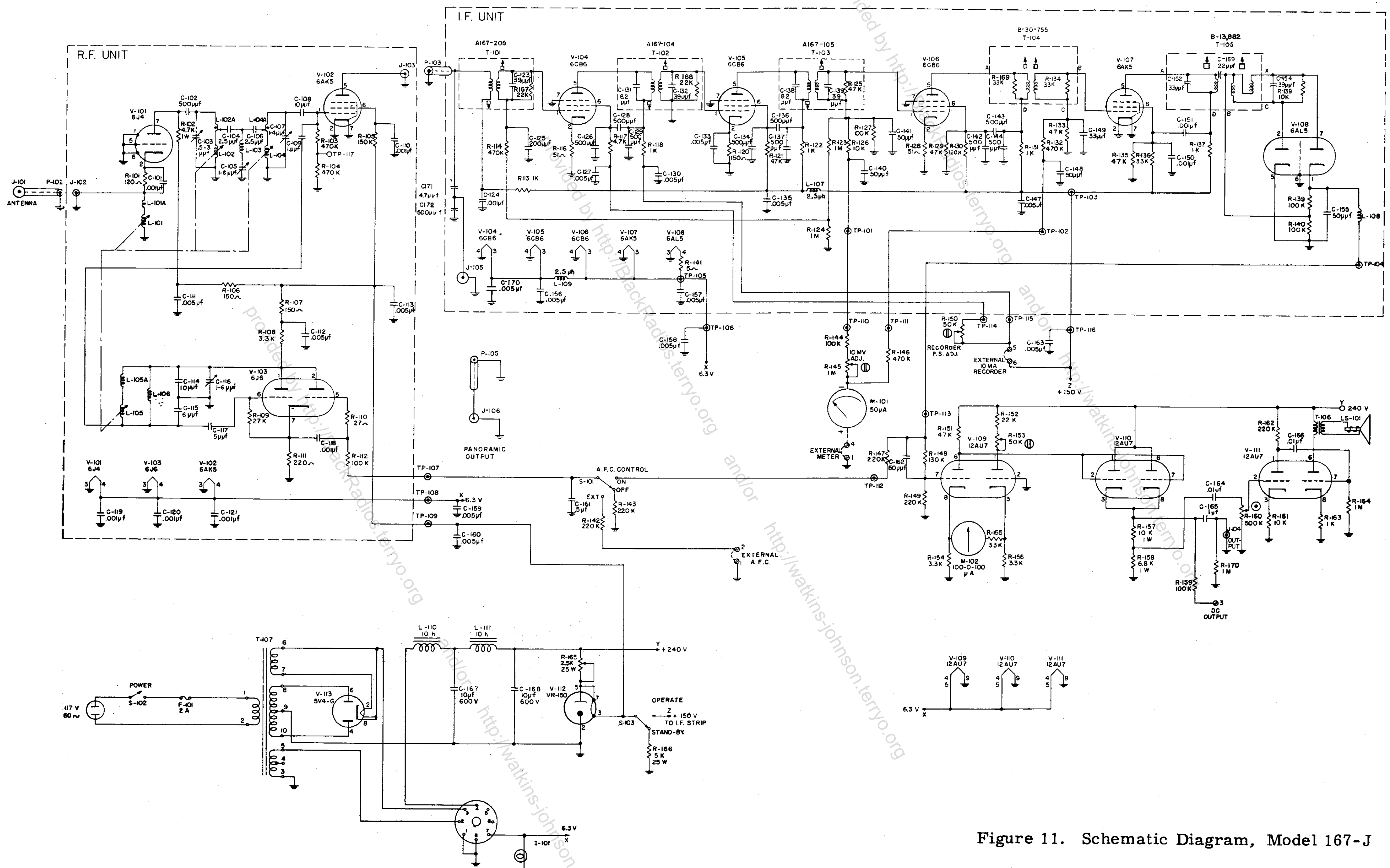
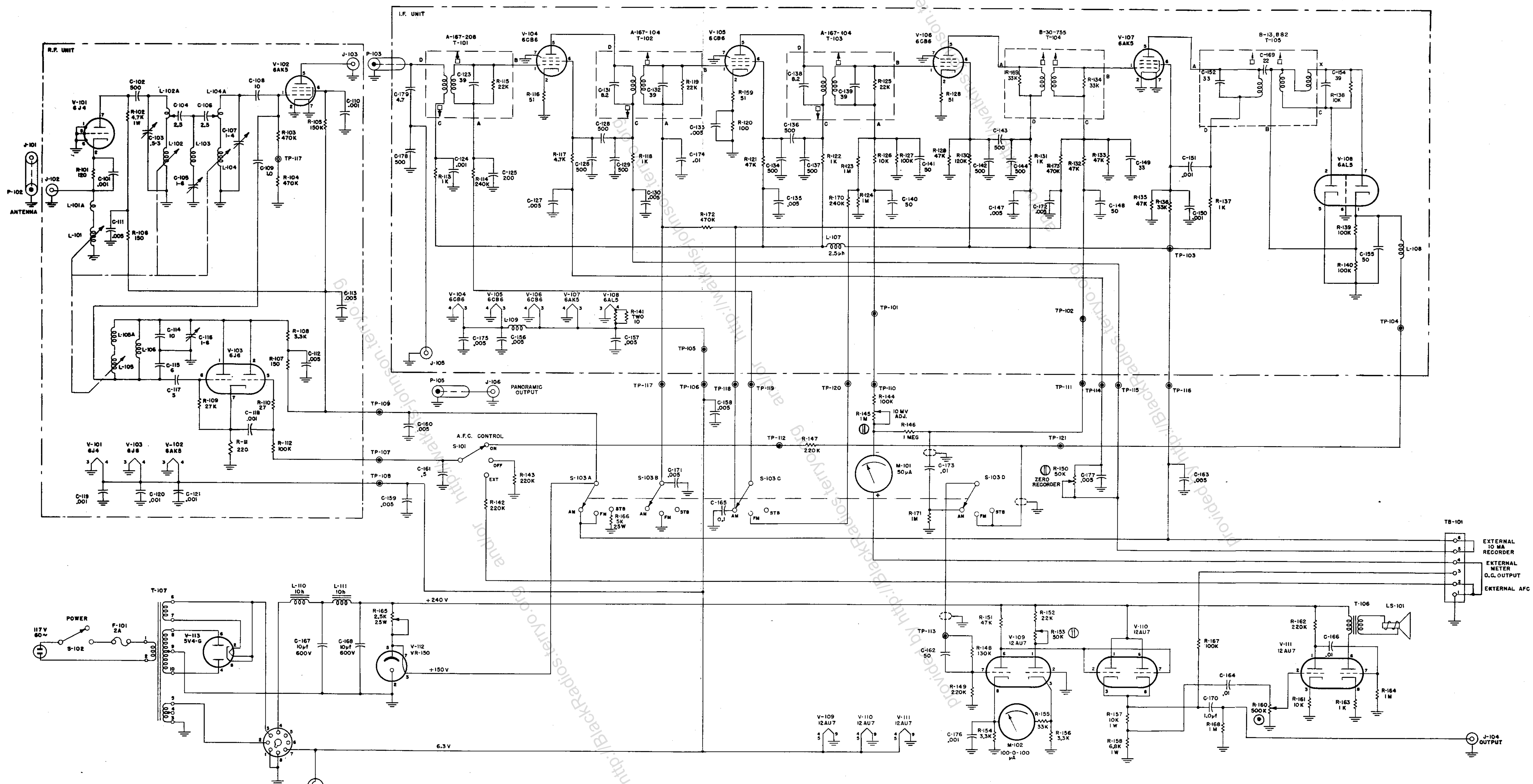


Figure 11. Schematic Diagram, Model 167-J



NOTE:
CAPACITANCE VALUES OF 1. OR MORE IN μμf AND LESS THAN 1 IN μf UNLESS OTHERWISE SPECIFIED. ALL RESISTANCE VALUES ARE OHMS, ½ WATT UNLESS OTHERWISE SPECIFIED.

Figure 12. Schematic Diagram, Model 167-J-1

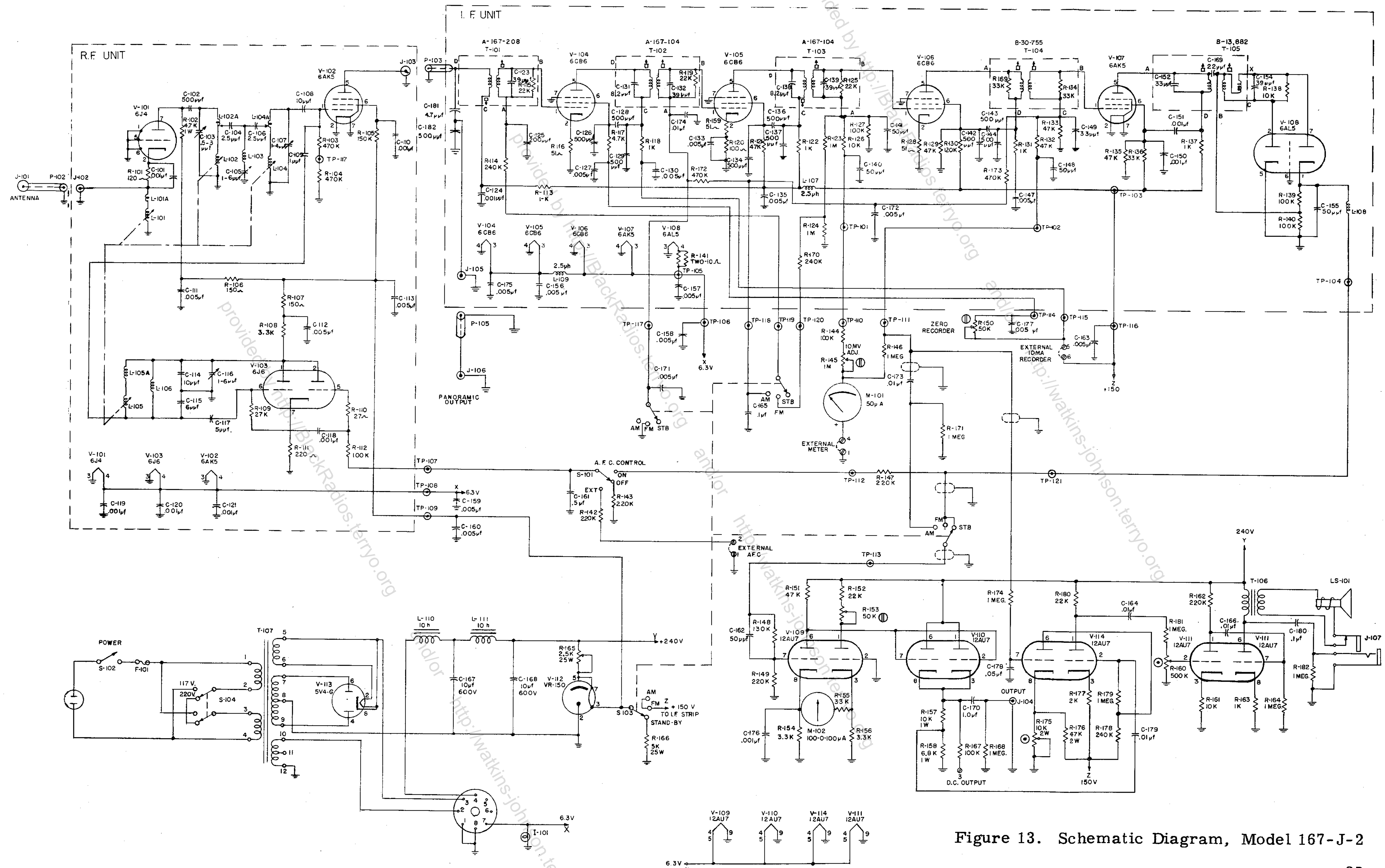


Figure 13. Schematic Diagram, Model 167-J-2