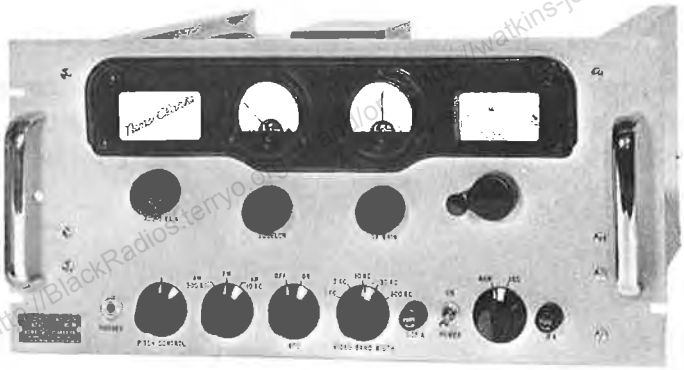
NEMS CLARKE
EQUIPMENT

February 1966

SPECIAL PURPOSE RECEIVER 1302-B



• PRODUCED BY

Vitro ELECTRONICS
A DIVISION OF VITRO CORPORATION OF AMERICA

919 JESSUP BLAIR DRIVE • SILVER SPRING, MARYLAND
2301 PONTIUS AVENUE • LOS ANGELES 64, CALIFORNIA

Warranty for Equipment and Accessories

Vitro Electronics warrants each new equipment to be free of defects in material and workmanship, for a period of one (1) year after date of original shipment, except that tubes, fuses, transistors and diodes will be warranteed for a period of 90 days. Any instrument which is found within the one year period not to meet the foregoing standards, after examination by our factory, will be repaired or at the option of Vitro replaced without charge. This warranty does not apply to equipment which has been altered, improperly handled, or damaged in any way.

Changes in Specifications

The right is reserved to change the published specifications of equipment at any time, and to furnish merchandise in accordance with current specifications, without incurring any liability to modify equipment previously sold.

Returning Equipment to Factory

Factory service is available for repair and readjustment of this instrument; however, a description of the trouble, plus the model and serial numbers of the unit should be forwarded first, whereupon instructions for correcting the trouble or authorization for returning the equipment will be given. This applies to all units, whether under warranty or not.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

SECTION 1. GENERAL DESCRIPTION

1.1 Purpose of Equipment.

The 1302-B Special Purpose Receiver has been specifically designed to meet the requirements of a highly stable, extremely sensitive AM-FM-CW receiver for critical application in the 55 to 260 mc range.

The receiver has a self-contained power supply and is capable of operation from a power source of 115/230 volts ±10%, 50 to 60 cycles ±5%, single phase, alternating current. Selection of primary voltage is accomplished by a two-position toggle switch located on the rear of the chassis. The switch is equipped with a locking device which presents accidental switching from one voltage to the other. Receivers designed for 400 cps operation may be obtained on special order.

Among the special features of the 1302-B receiver are audio squelch with adjustable threshold, FM reception with very low distortion, AM reception with selective IF bandwidths of 10 kc or 300 kc, BFO for CW reception, and a separate high-quality 600 ohm audio output. The video output signal passes through a variable lowpass filter, allowing a greatly improved S/N ratio when the full video bandwidth is not needed. High-level, low-impedance IF output from both IF amplifiers is made available on the rear apron of the chassis.

For further details concerning the capabilities and special features of the 1302-B receiver, see Table 1-1, Performance Specifications.

1.2 Description of Equipment.

The 1302-B receiver is 8-23/32 inches high by 19 inches wide by 16-7/8 inches deep. It occupies approximately 1.62 cubic feet, and weighs approximately 40 pounds. See Figure 1-1, Front View of the 1302-B Receiver.

Panel and chassis are of aluminum construction, and the panel is finished in smooth gray enamel. The panel is designed for standard 19-inch relay rack mounting, although the receiver is equipped with dust covers and louvered side panels, and may be used independently on a shelf or table. The IF amplifier and RF tuner are built as completely shielded subassemblies in this receiver, with most of the audio and video components mounted on a single terminal board on the underside of the main chassis.

1.3 Unpacking and Inspection.

Check the front panel of the receiver for damage to knobs, windows, meters and the frequency indicator dial.

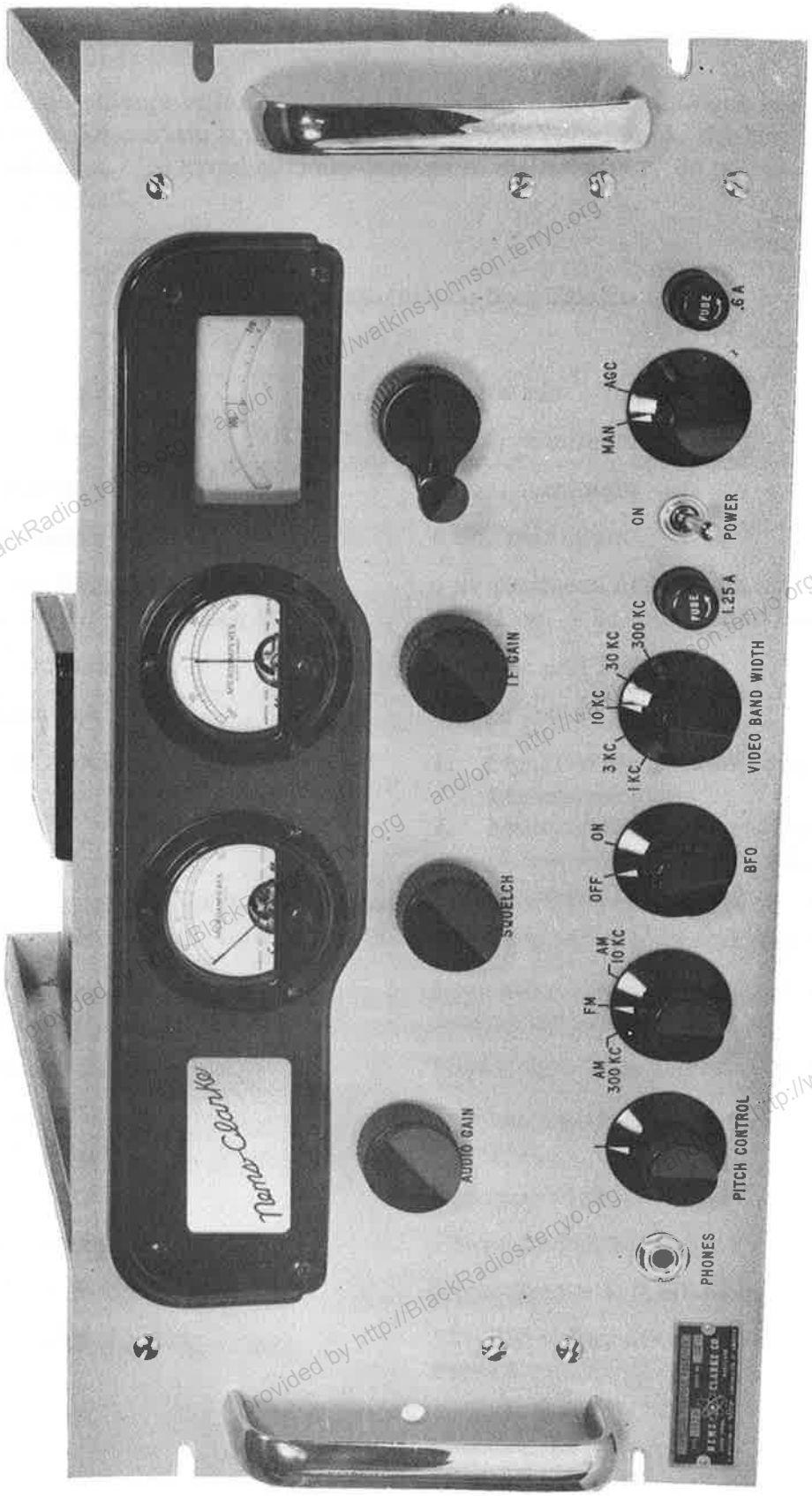


Figure 1-1. Special Purpose Receiver, 1302-B

Operate the control knobs; examine them for looseness. Operate the tuning controls through their entire range. Binding indicates a damaged tuning system.

Remove the top and bottom covers of the receiver main chassis.

Check line voltage switch S102 located on the main chassis deck towards the rear of the receiver and make certain it is placed in the proper position for the line voltage at the particular installation. To avoid serious damage to the receiver, do not use any fuse other than the value specified.

Table 1-1. Performance Specifications

Tuning Range	55-260 mc
IF Rejection	70 db, minimum
Image Rejection	58 db, minimum
Noise Figure	6 db, maximum
Absolute Sensitivity Measured without band-restricting filters	4 μv produces at least 23 db S/N with 100 kc deviation, 1 kc modulation frequency
IF Frequencies	21.4 mc and 1 mc
IF Bandwidth	300 kc and 10 kc
Outputs Provided	1. Signal-Wide band for supplying high-impedance load 2. Monitor-Panel mounted speaker headphones, or 600 ohms balanced output for external use
FM Output	0.10 volt per kc, approximately
AM Outputs, 300 kc and 10 kc strips	Approximately 10 v RMS for 500 μv input modulated 50% at 1 kc
FM Output Stability	Varies less than 2 db for inputs above 1 μv
AM Output Stability Both IF strips	7 db maximum variation for 40-db variation in input
Input Impedance	Approximately 50 ohms
Video Response	10 cps to 300 kc
Video Bandwidth Control	5 positions - 1, 3, 10, 30 and 300 kc
Power Input	115/230 volts, 50-60 cps (400 cps on special order)

SECTION 2. THEORY OF OPERATION

2.1 General Description.

a. A block diagram of the 1302-B receiver is shown in Figure 2-1. The circuit, with the function switch in the AM 300 kc or FM position is a single superheterodyne with an IF of 21.4 mc. With the function switch in the AM 10 kc position, a dual-conversion circuit is used, with a 21.4 mc first IF, followed by a 1 mc second IF.

The tuner is designed to produce the lowest possible noise figure consistent with the type tube used and a practical tuning structure capable of tuning 55 to 260 mc, with reasonably uniform performance over the band.

b. The IF amplifier, with the function switch in the FM position, uses two stages of amplification, cascade limiters, and a phase-shift discriminator. With the function switch in the AM 300 kc position, AGC voltage is applied to the first two stages, and the second limiter becomes the AM detector. With the function switch in the AM 10 kc position, plate voltage is removed from the 21.4 mc IF amplifier and applied to the 1 mc dual conversion mixer and IF amplifier.

The output signal of the IF strips (AM 300 kc, FM, or AM 10 kc) is fed through a variable lowpass filter, thus providing the maximum S/N ratio when the full video bandwidth is not needed. The output of the filter drives a two-stage direct-coupled video amplifier with cathode follower output. A portion of the follower output drives a four-stage squelch-audio amplifier circuit.

2.2 Detailed Description, RF Tuner.

a. ANTENNA. – The input impedance of the receiver is approximately 50 ohms over the frequency range of 55 to 260 mc. The input signal is applied through a type "N" 50 ohm coaxial receptacle located in the rear apron of the chassis.

b. FIRST RF STAGE. – The input signal is applied to the cathode of the grounded grid amplifier, V201. The conductive voltage necessary for the operation of this tube is delayed for approximately 30 seconds by means of the time delay relay, K201.

The plate tank circuit takes the form of a modified pi network and is used to couple the signal to the low input impedance of the 6J4 grounded grid second RF amplifier.

c. SECOND RF STAGE. – The output of the pi network drives the cathode of the 6J4 grounded grid second RF amplifier. A low-noise second stage is used so that the system noise figure (first RF, second RF, and mixer) is essentially that of the first stage.

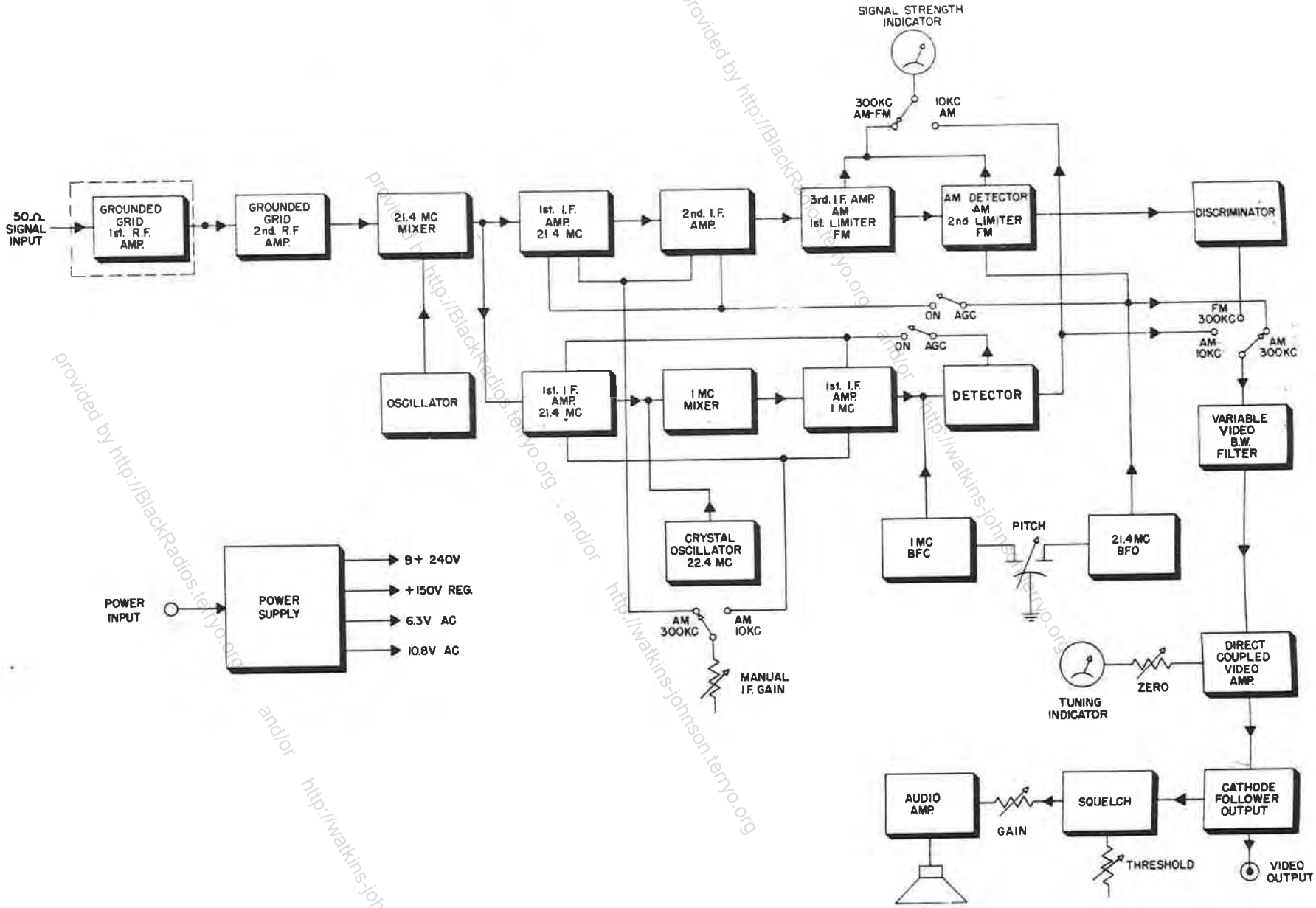


Figure 2-1. Block Diagram, 1302B Receiver

The plate of the 6J4 is coupled to the grid of 6AK5 pentode mixer by a double-tuned over-coupled bandpass filter. A capacity "T" is used to provide coupling between the primary and secondary tuned circuits. The shunt element of the "T" is adjustable, thus providing a control over the interstage bandwidth. A small iron-core inductor across the shunt element of the "T" network approaches parallel resonance at 55 mc, thus increasing the coupling at the low end and providing a more uniform coupling over the tuning range of 55 to 260 mc.

d. MIXER. – 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 to variations in local oscillator amplitude. A decoupled test point (TP-202) from a tap on the mixer grid resistors provides a convenient means for observing the response of the RF circuits.

e. LOCAL OSCILLATOR. – The local oscillator utilizes a 6AF4 tube in a modified Colpitts configuration. The end inductors are made of heavy straps to insure frequency stability. The frequency stability of the oscillator is very high due to the use of a high G_m tube which is loosely coupled to the high Q tank circuit.

2.3 Detailed Description, IF Strip and Main Chassis.

a. IF AMPLIFIER FUNCTION SWITCH IN FM POSITION. – The first IF transformer, located on the IF subassembly, is connected to the mixer plate through a short length of RG62/U coaxial cable. Two high gain stages (V301, V302) using 6DC6 tubes are followed by a 6CB6 (V303) first limiter and a 6AK5 (V304) second limiter. A 6AL5 (V305) is used in a discriminator circuit of the phase-shift type. Accurate balance is obtained by using a bifilar winding for the secondary. An automatic gain control voltage is derived from the first limiter grid circuit and applied to the first IF amplifier. The first IF amplifier and the first limiter do not have their cathode resistors bypassed, thus causing cathode degeneration which practically eliminates the detuning caused by changes 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. A self-resonant choke is connected in the output lead of the discriminator to prevent IF signals from leaving the IF subassembly. A relative signal strength meter with a logarithmic characteristic is operated from the voltage developed at the grids of the limiters.

b. IF AMPLIFIER FUNCTION SWITCH IN AM 300 KC POSITION. – The first two high-gain 6DC6 remote cutoff amplifiers (V301, V302) receive an AGC voltage developed at the grid of the 6AK5 (V304) AM detector. The third IF amplifier (V303) which drives the AM detector, is not gain controlled but its signal handling capabilities have been improved by increasing the screen voltage. A self-resonant choke is connected in the AM output lead from the 6AK5 AM detector (V304) to prevent IF signals from leaving the IF subassembly.

With the AGC switch in the manual position the AGC voltage is shorted to ground, and the IF gain control in the cathode circuit of the two 6DC6 IF amplifiers is unshorted and becomes operative. The gain-controlled stages use cathode compensation of input capacity variation with bias change. The zero center tuning meter operates only in the FM position. Correct tuning of an AM signal may be accomplished by first tuning in the signal with the selector switch in the FM position and then switching to the AM 300 kc position.

The signal-strength meter, M101, is not calibrated, though it may be used for a relative indication of signal strength. The signal-strength meter is switched between the limiters or AM detector in the 300 kc wide amplifier and the AM detector in the 10 kc wide amplifier.

c. IF AMPLIFIER FUNCTION SWITCH IN AM 10 KC POSITION. – Plate and screen voltage are removed from the 21.4 mc IF amplifier, and a 21.4 mc signal is capacitively coupled from T302 to the grid of V307, the 21.4 mc isolation amplifier preceding V308, the 1 mc pentode mixer. The output of V306, the 22.4 mc crystal controlled 2nd conversion oscillator, is capacitively coupled to the grid of V308, the 1 mc mixer. Terminal "D" of T310 provides a convenient test point for the alignment of the selective double-tuned 21.4 mc amplifier, consisting of T309 and T310. This selective 21.4 mc amplifier is used to increase the rejection of the second image and to further isolate the 22.4 mc crystal oscillator from the front end.

The output of the 1 mc mixer, V308 is coupled to V309, a 1 mc amplifier, through T311 and T312, which, together comprise a 1 mc double-tuned transformer. V310, the signal detector and AGC diode, is coupled to V309 through T313 and T314, which comprise the second 1 mc double-tuned IF transformer.

With the AGC switch in the manual position, the AGC voltage is shorted to ground, and R105 is unshorted and becomes operational. (R105 is the IF gain control in the cathode circuit of V307 and V309, the two 6BA6 remote cutoff IF amplifiers.)

d. BEAT FREQUENCY OSCILLATORS, 21.4 MC AND 1 MC. – The two BFO's are an integral part of the IF amplifiers, with V312 in the 21.4 mc circuit and V311 in the 1 mc circuit. A differential capacitor is used, permitting a single front panel Pitch control to operate both the 21.4 mc and the 1 mc BFO's.

The BFO "ON-OFF" switch is interwired with the "AM 300 kc-FM-AM 10 kc" function switch so that the appropriate BFO is energized.

e. VIDEO. – The output of the IF strips, AM 300 kc, FM 300 kc, or AM 10 kc, is fed to the input of a 5 position lowpass filter. The cutoff frequency can be set to 300 kc, 30 kc, 10 kc, or 1 kc by a front panel selector switch. The output of this filter drives one-half of a 12AU7 direct-coupled video amplifier (V106A). A zero center scale meter (M102) 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 (V106B). A partial bypass of the cathode of the first video amplifier extends the high frequency response. The output video amplifier is a 12AU7 tube (V108) connected as a direct-coupled cathode follower. A tap on the cathode resistor of the output video amplifier provides the signal source to drive the monitor audio amplifier, V107.

f. THE SQUELCH CIRCUIT. – The squelch circuit is best described with the aid of the simplified schematic of Figure 2-2. V105A acts as a gated audio amplifier stage, while V105B serves as a dc amplifier and gate generator. The circuit is connected in such a manner that V105B 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, V105A, will pass an audio signal when the dc amplifier, V105B, is nonconducting, and will not pass an audio signal when V105B, 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 R115. The operation of this circuit is detailed in the following paragraph.

The dc amplifier tube, V105B, is connected between the 150 v supply and ground. The fixed bias on this stage is adjusted by R115. The audio section, V105A, is connected between the 250 volt supply and the 150 volt supply. The bias on this stage is the voltage drop across the cathode resistor, R114, plus the voltage drop, if any, in the plate load resistor, R117, in V105B. Assuming no signal is being received, the grid of the dc amplifier tube is zero, or at most has a very small negative voltage on it. R115 is adjusted until the noise just disappears from the output. In this condition the dc amplifier tube is drawing plate current, and the drop across its plate load, R117, appears as a bias to V105A. This voltage drop is sufficient to cut off V105A 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, R111, to the grid of V105B. This voltage is sufficient to cut off V105B, causing the voltage to drop to zero across the V105B plate load resistor, R117. V105A receives only its normal cathode bias generated in its cathode bias resistor, R114, and audio signals are passed through to the output.

When receiving amplitude-modulated signals with a high percentage of modulation, the squelch circuit may cut off on negative modulation peaks when the envelope amplitude becomes zero. To prevent this, a filter consisting of R111 and C108 is placed between the limiter and the grid of the DC 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.

g. AUDIO AMPLIFIER. – The output of V105A is used to drive a two-stage resistance coupled audio amplifier. The output amplifier drives a four-inch panel mounted speaker, a phone jack which silences the speaker when in use, and an independent 600 ohm balanced output.

h. PANORAMIC OUTPUT. – An output at the IF 21.4 mc frequency is provided for connection to a panoramic adapter. This output is obtained from the 6AK5 (V203) mixer plate load through a capacity divider. A special panoramic adapter, type No. T-3000 CL, may be secured from Nems-Clarke Company.

i. POWER SUPPLY. – A conventional two-section capacitive input filter power supply delivers a dc potential of 240 volts. V102 and V103 provide two separate 150 volt dc regulated outputs.

The 1302-B receiver has a toggle switch located on the rear apron, which provides for the selection of either 115 volt or 230 volt operation.

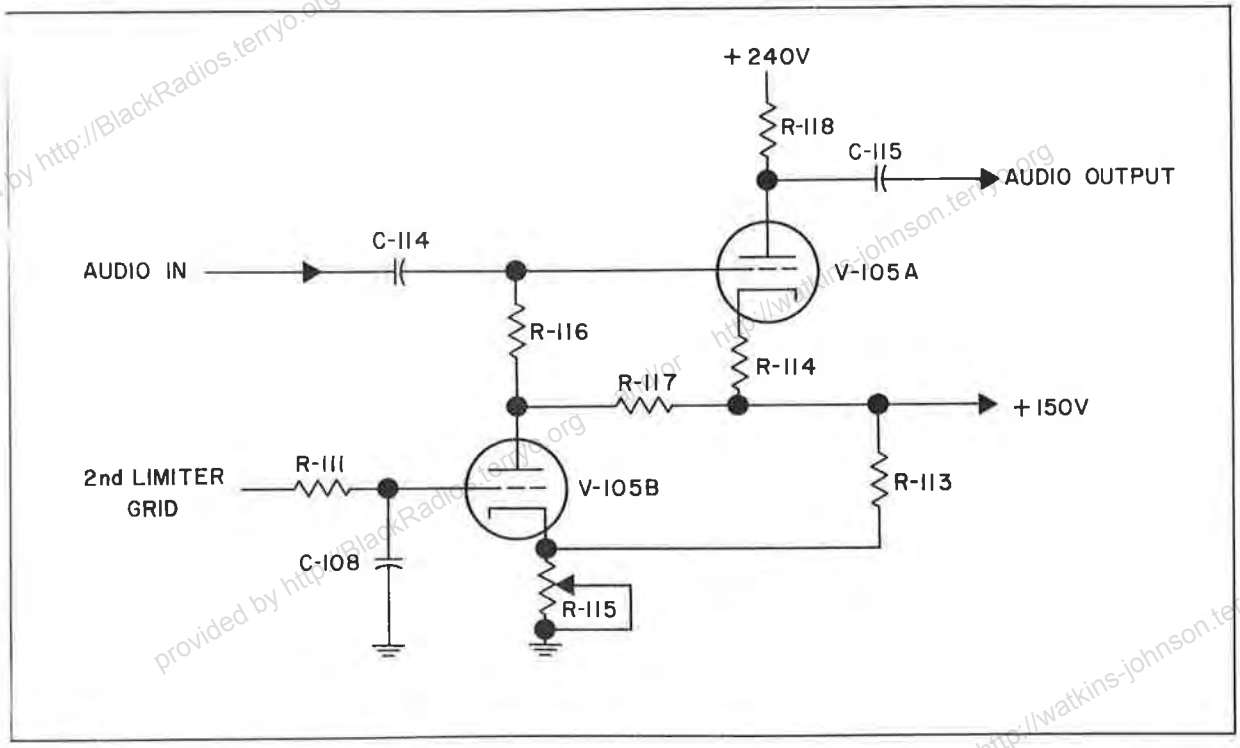


Figure 2-2. Model 1302-B Receiver Squelch Circuit, Simplified Schematic

SECTION 3. OPERATION

3.1 Introduction.

Figure 1-1 shows the appearance and location of controls on the front panel of the 1302-B Special Purpose Receiver.

3.2 Control Settings.

a. Set line voltage selector switch, S102, located on the rear apron of the chassis, to the appropriate position for the line voltage encountered. This switch provides for input voltages of either 115 or 230 vac, and is equipped with a locking device which prevents accidental switching from one voltage to the other.

b. POWER. – Turn on the power switch, S101, located on the front panel. For the 1302-B receiver, a time delay relay (K201) is used to delay the application of conductive voltage to the first RF amplifiers for approximately 30 seconds. Delay of conductive voltage to the first RF amplifier is in the interest of improved tube life. The receiver will, therefore, be inoperative for approximately thirty seconds after it is turned on.

c. MODULATION. – The modulation selector switch (S104) has three positions: AM 300 kc, FM, and AM 10 kc.

(1) FM. – The function switch must be in the FM position. The IF bandwidth is 300 kc. The BFO should be in the "OFF" position. The manual AGC switch (S105) and the IF gain control are inoperative in the FM position. The zero-center tuning meter (M102) is operative only in the FM position.

(2) AM WIDEBAND (300 kc). – The function switch must be in the AM 300 kc position. The manual AGC switch should be in the AGC position except when the BFO is to be used. For BFO operation, the manual IF gain control (R105) should be adjusted to produce the loudest beat note.

(3) AM NARROW BAND (10 kc). – The function switch must be in the AM 10 kc position. The manual AGC switch should be in the AGC position except when the BFO is to be used. For BFO operation, the manual IF gain control (R105) should be adjusted to produce the loudest beat note. Care must be taken when tuning in the 10 kc IF position to avoid "missing" the station.

d. VIDEO BANDWIDTH. – The video bandwidth switch (S106) has five positions: 300 kc, 30 kc, and 1 kc. The position resulting in the best S/N ratio should be used.

e. SQUELCH. – The squelch circuit is inoperative with the squelch control R115 counter-clockwise against its stop. In the absence of a signal, rotate the squelch threshold control clockwise until the background noise just becomes inaudible. Any usable signal should then disable the squelch circuit.

f. AUDIO. – Adjust as needed.

SECTION 4. MAINTENANCE

4.1 Introduction.

The 1302-B receiver should give comparatively trouble-free performance. If, however, trouble occurs, rapid and effective troubleshooting may be accomplished by the application of a simple effect-to-cause reasoning process, along with the data given in this section. A thorough knowledge of the theory of operation, as contained in Section 2, is essential to successful effect-to-cause reasoning. As a general statement, it may be said that frequent recurrence of a trouble usually indicates that the effect and not the cause has been remedied, and further investigation should be made.

Reference should be made to the schematic diagrams in Section 7 and to the figures in Section 6 for the physical location of components. Such trouble as broken leads or solder joints and loose or defective tubes will not be discussed at length here, but should be suspected and searched for in all cases where the trouble is not immediately apparent. The illustrations given in this section show the location of all major components and such smaller components as cannot be readily identified from adjacent stencils on the receiver.

Table 4-1. Approximate Voltage Measurements, Model 1302-B

TUBE	PIN #1	PIN #2	PIN #3	PIN #4	PIN #5	PIN #6	PIN #7	PIN #8	PIN #9
				RF TUNER					
V202	Gnd	1.1	Gnd	6.3ac	Gnd	Gnd	130		
V203	-2.0	Gnd	6.3ac	Gnd	145	59	Gnd		
V204	*53	Do not measure	Gnd	6.3ac	2.5	Do not measure	*53		
				MAIN CHASSIS					
V102	147	NC	NC	NC	147	NC	Gnd		
V103	148	NC	NC	NC	148	NC	Gnd		
V105	145	-.27	24	Gnd	Gnd	210	133	150	6.2ac
V106	135	Gnd	6.7	Gnd	Gnd	137	-.1	6.8	6.2ac
V107	98	0	5.7	Gnd	Gnd	230	0	8	6.2ac
V108	235	138	141	Gnd	Gnd	235	138	141	6.2ac
				IF AMPLIFIER; FUNCTION SWITCH IN FM POSITION					
V301	-.33	.7	5.9ac	Gnd	134	76	Gnd		
V302	-.32	.82	5.9ac	Gnd	133	69	Gnd		
V303	-.31	.12	6.0ac	Gnd	135	34	Gnd		
V304	-6.6	Gnd	6.0ac	Gnd	37	83	Gnd		
V305	-.22	-7.0	4.8ac	Gnd	Gnd	Gnd	-12.4		
				IF AMPLIFIER; FUNCTION SWITCH IN AM 300 KC POSITION					
V301	-1.2	.68	5.9ac	Gnd	130	76	Gnd		
V302	-.37	.81	5.9ac	Gnd	130	71	Gnd		
V303	-.18	.31	6.0ac	Gnd	131	58	Gnd		
V304	-3.8	Gnd	6.0ac	Gnd	35	85	Gnd		
V305	-.13	-7.2	4.8ac	Gnd	Gnd	Gnd	-12		

Table 4-1. Approximate Voltage Measurements, Model 1302-B (Cont.)

TUBE	PIN #1	PIN #2	PIN #3	PIN #4	PIN #5	PIN #6	PIN #7	PIN #8	PIN #9
				BFO SWITCH ON					
V312	-9.7	0	5.9ac	Gnd	145	126	Gnd		
				IF AMPLIFIER; FUNCTION SWITCH IN AM 10 KC POSITION					
V306	-7.4	Gnd	Gnd	5.9ac	149	83	0		
V307	-.22	Gnd	5.9ac	Gnd	143	58	-.6		
V308	-1.17	Gnd	5.9ac	Gnd	148	71	Gnd		
V309	-.22	Gnd	5.9ac	Gnd	148	61	.65		
V310	0	-.1	5.9ac	Gnd	5.6	Gnd	-1.25		
				BFO SWITCH ON					
V311	-27	0	5.9ac	Gnd	149	104	Gnd		

*Use 1-meg isolating resistor between tube pin and meter probe

NOTES

Line voltage 115 vac, 60 cps; S102 set to 115 v; dial tuned to 220 mc; no signal input; squelch control and audio gain control full CCW; AGC on; BFO off except for measurements on V311 and V312; R127 discriminator tuning meter balance set in accordance with procedure shown in Section 4; filament voltages measured between tube pin and chassis except V201; DC voltages taken with an 11-megohm VTVM; all voltages measured with respect to Gnd.

SECTION 5. ALIGNMENT AND ADJUSTMENT PROCEDURES

5.1 General.

This section contains the alignment and adjustment procedure for the 1302-B receiver. Reference should be made to the schematic diagrams, Figures 7-1 and 7-2, and to the figures in Section 6 for the physical location of components called out in this section.

5.2 IF Alignment Procedure, (Sweep Method) 300 KC IF Strip.

a. GENERAL INSTRUCTIONS. - In order to minimize the frequency response of the detectors (including their decoupling networks) used for visual alignment, the sweep generator sweep width used should be no greater than that required to produce the desired oscilloscope pattern. The marker generator signal at 21.4 mc should be coupled in as required to produce a suitable marker pip. Check to see that the marker generator connection does not upset the response shape by disconnecting the marker generator and observing that the response shape does not change. In general, the marker signal can be introduced by connection to a turn or two of insulated wire wrapped around the sweep generator lead near the point of connection to the circuit under test, or by coupling to the sweep generator lead through a small capacitor.

In order to avoid extraneous coupling or regeneration, the sweep and the marker generator leads should be dressed out and away (toward the input end) from the stages already tuned.

A low capacity shielded cable, such as RG-62/U coaxial cable should be used for connection to the oscilloscope. The cable capacity, plus oscilloscope input capacity, should be held to a maximum of 100 $\mu\mu$f. The direct coupled (DC) vertical amplifier connection should be used on the oscilloscope.

The adjustment procedure should be carefully followed and adjustments should be made in the order given. The receiver should be allowed sufficient warm-up time to stabilize its operation.

b. EQUIPMENT REQUIRED. -

(1) Sweep Generator Type RCA 59C

(2) Oscilloscope, Type Dumont 304A or equivalent

(3) 21.4 mc center frequency crystal controlled marker, with side markers of 21.025 and 21.775 mc

(4) One 10.0 ohm, 1/2 watt resistor

(5) One 200 ohm, 1/2 watt resistor

(6) Assorted leads and connectors as indicated in text

c. CONTROL SETTINGS. – During the entire alignment procedure the receiver controls must be set as follows unless otherwise indicated:

(1) Squelch Control. . . . . .Maximum CCW.

(2) BFO Pitch Control. . . . . .Aligned at reference mark.

(3) Line Selector S102 . . . . . .115 V AC position.

(4) BFO . . . . . .OFF

(5) Video Bandwidth . . . . . .300 kc position.

(6) Audio Gain . . . . . .Set maximum CCW.

(7) AM-FM Control . . . . . .Place in FM position.

(8) MAN-AGC Control . . . . . .Place in MAN position.

(9) IF GAIN Control . . . . . .Set maximum CCW.

Turn on power. Set receiver tuning dial to lowest frequency and remove local oscillator tube V204.

d. SECOND LIMITER, ADJUSTMENT OF T307. – Remove second IF amplifier V302 from its socket. Connect the scope to TP302 (see Figure 6-7). Connect the sweep generator between pin #1 of V303 and ground on the tube socket mounting strap nut. Set the sweep generator output to maximum. Adjust T307 for a symmetrical response centered around the center frequency marker at 21.4 mc.

e. DISCRIMINATOR, ADJUSTMENT OF T308. – Remove the first limiter V303 from its socket. Connect the sweep generator between pin #1 of V304 and ground on the tube socket mounting strap nut. Set the sweep generator output to maximum. Adjust the discriminator transformer T308 for a symmetrical S-shaped discriminator curve, centered around 21.4 mc. The discriminator peak-to-peak separation should be 750 kc, plus or minus 30 kc. The adjustments for equal amplitude of the two peaks should be made with the marker disconnected to prevent base-line shift.

f. FIRST LIMITER, ADJUSTMENT OF T305, AND T306. – Replace V302, and V303. Remove V301. Connect the scope to TP301 (see Figure 6-7). Connect the sweep generator between pin #1 of the second IF amplifier V302 and ground on the tube socket mounting strap nut. Set the sweep generator to produce a peak scope deflection of 0.25 volts. Adjust T305 (primary) and T306 (secondary) for a symmetrical response curve centered around 21.4 mc. The shape of the response curve should be flat-topped or slightly double-peaked.

g. SECOND IF AMPLIFIER, ADJUSTMENT OF T303, and T304. – Replace V301. Disconnect the cable connected to J202 on the RF chassis. See Figure 6-1. Connect the

5.4 Local Oscillator Adjustments.

a. 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 C229. This adjustment should be made with a signal generator of high accuracy at 60 mc.

The high-frequency end of the dial is controlled by the location of C230 on the end inductor L210. The correct adjustment is made at the factory and should not require readjustment in the field.

b. MECHANICAL ADJUSTMENTS. – Normally the tuning dial will not need any adjustment in the field, however, if the above procedure fails to restore normal operation, refer to the following.

(1) Loosen both stops.

(2) Rotate dial to the extreme low-frequency end until the dial is stopped by the inductuner stop. Hairline should align with triangle on dial.

(3) Back up just off the inductuner stop and tighten the set screws in the dial drive low-frequency stop.

(4) Rotate dial to the extreme high-frequency end until the dial is stopped by the inductuner stop. Hairline should align with triangle on dial, if not, loosen screws on inductuner shaft and align triangle.

(5) Back up just off the inductuner stop and tighten the set screws in the dial-drive high-frequency stop. This completes the dial adjustments.

5.5 RF Amplifier Alignment.

a. RF AMPLIFIER ALIGNMENT. – The RF circuits are wideband compared with the IF selectivity and are designed around the highly stable Mallory S-4 spiral inductuner. The end inductors are also very stable, and therefore the unit should not require realignment. If realignment is found necessary:

(1) Unsolder C248 from the inductuner lug and solder to the BNC test connector.

(2) Connect a sweep generator with a 50-ohm source impedance to the BNC test jack.

(3) Connect oscilloscope to front-end test point TP202.

(4) Set the dial to 70 mc.

(5) Adjust C217 and C222 for a double-tuned symmetrical response centered at 70 mc. Use 70-mc marker.

(6) Adjust C220 for a 15% dip in the response.

(7) Repeat (5) above.

(8) Set dial to 250 mc and bend end inductors L207 and L209 to produce a symmetrical response centered at 250 mc. Use 250-mc marker.

(9) Unsolder C248 from the BNC test connector and resolder to the inductuner.

(10) Connect sweep generator to the antenna jack J101 or J201.

NOTE

An accurate 50-ohm source can be achieved by using a 6- or 10-db ohm pad between the sweep generator output and the receiver input.

(11) Set the dial to 70 mc.

(12) Adjust C243 for a symmetrical response.

(13) Set the dial to 250 mc and move the position of C244 along the end portion of end inductor L204 to produce a symmetrical round-nose response.

5.6 IF Alignment (CW Method).

a. INTRODUCTION. - In the event that it should become necessary to align the IF strip, and a suitable sweep generator and oscilloscope are not readily available, the following CW alignment procedure is included. It is to be noted that alignment by the sweep method is more efficient and effective than the CW method that follows, and, alignment by the sweep method is more easily adaptable to troubleshooting should the necessity arise. Therefore, if suitable equipment is available, the sweep method of alignment should be used.

b. SECOND LIMITER ALIGNMENT. - (CW Method)

(1) Remove V302.

(2) Set the signal generator to 21.4 mc and connect its output to pin #1 of V303.

(3) Connect a high-resistance voltmeter (VTVM) to the second limiter grid return (TP302).

(4) Set the signal generator output to produce approximately 2.0 volts on the VTVM.

(5) Detune the primary slug of T307 counter-clockwise against the stop.

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

(7) Adjust the secondary slug of T307 for a maximum reading on the VTVM.

(8) Adjust the primary slug of T307 for a maximum reading, keeping the signal generator output adjusted for the same value on the VTVM as in (4) above. DO NOT readjust the secondary for a maximum as this will result in improper alignment.

The second limiter transformer, T307, has a 3.0 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 1.0 db tilt in the response of this transformer. Thus the slope is negligible over the narrow 300 kc IF bandwidth.

c. DISCRIMINATOR ALIGNMENT (CW METHOD). – In preparation for alignment of the discriminator transformer, T308, remove the 6AK5 (second limiter) tube, V304, and note the reading of the center frequency meter M102. If it is off center, it should be centered by means of the potentiometer, R127, located on the rear apron of the chassis. Difficulty in readily securing an exact center reading is indicative of a defective 6AL5 tube (V305), a defective 12AU7 tube (V106), or their associated components, and must be corrected before proceeding further. After this adjustment, replace V308 and proceed as follows:

(1) Remove V302.

(2) Set the signal generator to 21.4 mc and connect to pin 1 of V303.

(3) Connect a high-resistance dc voltmeter (VTVM) to the second limiter grid return (TP302).

(4) Set the signal generator output to produce 2 volts on the VTVM.

(5) Connect the VTVM to the discriminator output lead, (TP303).

(6) Tune the secondary of T308 to zero output, then counter-clockwise until the VTVM shows a reading of 0.5 volt.

(7) Tune the primary of T308 to give a maximum reading on the VTVM.

(8) Retune the secondary to produce a zero (balance) 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 volts, D.C. Minor adjustment of the primary of T308 will cause the two peak voltages to become exactly equal.

d. IF AMPLIFIERS (CW METHOD). –

(1) 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 the three capacitively coupled double-tuned IF transformers, comprising T301, T302, T303, T304, T305, and T306, to have almost identical characteristics. The primary and secondary Q's have been kept high, and therefore the mutual coupling is 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 couplings) 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 returned to maximum, the overall response will be approximately correct. This procedure is as follows:

(2) Remove the oscillator tube (V204) to prevent mixing at the signal generator harmonic frequencies.

(3) Set the receiver dial to approximately 60 mc.

(4) Set the generator to 21.4 mc and connect to pin 1 of V203.

(5) Connect a high-resistance dc voltmeter (VTVM) to the second limiter grid return (TP302).

(6) Set the generator output level to produce approximately 2 v on the VTVM.

(7) If the IF amplifier is known to be considerably out of adjustment, it will be necessary to peak T301, T302, T303, T304, T305 and T306, to provide adequate gain.

(8) Detune the primary (T305) counter-clockwise against the stop.

(9) Increase the signal generator output to produce 2 v on the VTVM.

(10) Adjust the secondary (T306) for maximum reading on the VTVM.

(11) Adjust the primary (T305) for maximum reading, keeping the signal generator output adjusted to maintain 2 v on the VTVM. DO NOT readjust the secondary (T306) for a maximum as this will result in improper adjustment.

(12) Repeat steps 7 through 10 for T302, T303, and T304.

NOTE

It is not necessary to follow this sequence, as any transformer may be adjusted without affecting the others.

e. 10 KC IF ALIGNMENT (CW METHOD). - Function switch in AM 10 kc position. BFO off, AGC off, IF gain control maximum clockwise.

(1) Connect an accurate 21.4 mc CW generator to pin 1 of V307.

(2) Remove local oscillator, V204.

(3) Connect VTVM to terminal "D" of T310

(4) Adjust T309 and T310 for maximum indication on meter.

(5) Connect VTVM to TP304.

(6) Peak T311, T312, T313, and T314 for maximum indication on meter.

(7) Turn BFO on and with pitch control on reference line, adjust T315 for zero beat.

SECTION 6. PARTS LIST

6.1 General.

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

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
C101,C102	CAPACITOR, Fixed: 4700 pf, 500 v	90901725	Sprague 20C8
C104 A & B	CAPACITOR, Fixed: 35 - 35 μf, 450 v	90910330	Sprague CE52F350R
C105	CAPACITOR, Fixed: 0.1 μf, ±20%, 200 v	90940710	Aerovox P123ZNGP
C106,C107	CAPACITOR, Fixed: 0.01 μf, 600 v	90901775	Erie 811Z5V103P
C108	CAPACITOR, Fixed: 0.05 μf, ±20%, 200 v	90940510	Aerovox P123ZGP
C109	CAPACITOR, Mica: 56 pf, ±5%, 500 v	90921194	Elmenco DM15E560J03
C110	CAPACITOR, Fixed: 2200 pf, ±10%, 400 v	90940075	Aerovox P88N
C111	CAPACITOR, Mica: 750 pf, ±5%, 500 v	90920858	Elmenco CM20D751J
C112	CAPACITOR, Mica: 220 pf, ±5%, 500 v	90920600	Elmenco CM15E221J
C113	CAPACITOR, Mica: 43 pf, ±5%, 500 v	90920260	Elmenco CM15E430J
C114, C115	CAPACITOR, Ceramic: 0.01 μf, ±20%, 500 v	90901776	Erie HA-811
C116	CAPACITOR, Mica: 300 pf, ±5%, 500 v	90920675	Elmenco CM15E301J
C117	Same as C106		

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
C119	CAPACITOR, Fixed: 1.0 μf, ±20%, 400 v	90941190	Sprague 88P10504T13
C301	CAPACITOR, Ceramic: 10 pf, ±10%, 500 v	90900700	Erie NPO-301
C302	CAPACITOR, Ceramic: 8.2 pf, ±0.5 pf, 500 v	90900620	Erie NPO-301
C303	CAPACITOR, Mica: 220 pf, ±5%, 500 v	90920600	Elmenco CM15E221J
C304	Part of T301		
C305	CAPACITOR, Ceramic: 1000 pf, ±20%, 1000 v	90901640	Sprague 40C214A
C306	CAPACITOR, Feedthrough: 1000 pf, 500 v	90901560	Sprague 514C1
C307	Same as C101		
C308	CAPACITOR, Ceramic: 2.2 pf, ±0.1 pf, 500 v	90900190	Erie NPO-301
C309	CAPACITOR, Ceramic: 1000 pf, 500 v	90901550	Sprague 507C2
C310	Same as C308		
C311	Part of T302		
C312	Part of T302		
C313	Same as C301		
C314	CAPACITOR, Ceramic: 3.3 pf, ±0.25 pf, 500 v	90900312	R1CC22C0J339C EIA-198
C315	Same as C309		
C316, C317	Same as C106		
C318	CAPACITOR, Ceramic: 470 pf, ±10%, 500 v	90901470	Erie GP2-331
C319	Same as C101		
C320	CAPACITOR, Ceramic: 390 pf, ±10%, 500 v	90901450	Erie GP2-331

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
C321	Same as C318		
C322	Same as C101		
C323	Part of T309		
C324	Same as C106		
C325	Part of T303		
C326	Part of T309		
C327	CAPACITOR, Ceramic: 1.5 pf, ±0.1 pf, 500 v	90900130	Erie NPO-A
C328	CAPACITOR, Ceramic: 1.8 pf, ±0.1 pf, 500 v	90900150	Erie NPO-A
C329,C330	Part of T310		
C331,C332	Part of T304		
C333,C334	Same as C306		
C335	Same as C309		
C336,C337	CAPACITOR, Ceramic: 0.5 pf, ±0.25 pf, 600 v	90900030	Centralab TCZR5
C338	Same as C101		
C339	Same as C318		
C340	Same as C306		
C341	Same as C320		
C342	Same as C318		
C343	Same as C106		
C344	Part of T311		
C345	Same as C106		
C346	Part of T311		
C347	Same as C327		
C348	Part of T305		
C349,C350	Same as C306		
C351	Part of T306		
C352	Same as C328		
C353,C354	Part of T312		

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
C355	CAPACITOR, Ceramic: 2.2 pf, ±0.25 pf, 500 v	90900200	Erie NPO-301
C356	CAPACITOR, Ceramic: 0.03 pf, 1000 v	90901790	Aerovox BPD
C357	CAPACITOR, Ceramic: 22 pf, ±5%, 500 v	90900920	Erie NPO-301
C358, C359, C360	Same as C306		
C361	Same as C106		
C362	Part of T313		
C363	Same as C106		
C364	CAPACITOR, Ceramic: 1.5 pf, ±0.1 pf, 500 v	90900130	Erie NPO-301
C365	Same as C318		
C366	Same as C306		
C376	Same as C309		
C368, C369	Same as C318		
C370	Part of T314		
C371	CAPACITOR, Mica: 33 pf, ±5%, 500 v	90920210	Elmenco CM15E330J
C372	CAPACITOR, Mica: 510 pf, ±5%, 300 v	90921258	DM15F511J03
C373	Same as C336		
C374	Same as C301		
C375	CAPACITOR, Mica: 100 pf, ±5%, 500 v	90920450	Elmenco CM15E101J
C376	Same as C106		
C377	CAPACITOR, Ceramic: 41 pf, ±20%, 500 v	90901280	Sprague 514C11A
C378	CAPACITOR, Mica: 51 pf, ±5%, 500 v	90920316	Elmenco CM15E510J
C379	Same as C375		
C380	Same as C336		

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Vendor
C381	Same as C106		
C382	Same as C101		
C383	CAPACITOR, Ceramic: 1000 pf, ±20%, 600 v	90901630	Centralab D6-102
C384	Part of T308		
C385	Same as C383		
C386	Part of T308		
C387	Same as C309		
C388	CAPACITOR, Ceramic: 39 pf, ±5%, 500 v	90901180	Erie NPO-308
C389	Same as C106		
C390	Same as C306		
C391	CAPACITOR, Mica: 270 pf, ±5%, 500 v	90920650	Elmenco CM15E271J
C392	Part of T315		
C393	CAPACITOR, Mica: 27 pf, ±5%, 500 v	90920160	Elmenco CM15E271J
C394	Same as C306		
C395	CAPACITOR, Mica: 10 pf, ±5%, 500 v	90920050	Elmenco CM15C100J
C396	CAPACITOR, Variable: 2.7 - 19.6 pf, 1250 v	90950180	E. F. Johnson 160-311
C397, C398	Part of T316		
C399	Same as C305		
C400	Same as C309		
C401, C402	Same as C306		
C403, C404, C405	Same as C101		
C406, C407	Same as C106		
C408	Same as C101		
CR101, CR102, CR103, CR104	DIODE, Silicon	91600190	Raytheon 2N539

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
DS101	LAMP, Incandescent 6-8 v, 0.15 amp	93500310	G.E. 47
F101	FUSE, Slo-Blo: 1.25 amp	91800270	Buss MDL
F102	FUSE, Slo-Blo: 0.6 amp	91800180	Buss MDL
J101	CONNECTOR, Plug	91370260	1PC UG-1052/U
J102	CONNECTOR, Jack	91370180	BNC UG-291/U
J103	CONNECTOR, Receptacle	91371250	Hubbell 7486
J105, J106	Same as J102		
J107	CONNECTOR, Tel Jack	91370110	Switchcraft C-12A
J108	CONNECTOR, Receptacle	91371000	BNC UG-290/U
J301	CONNECTOR, Receptacle	91371380	MX1530/U
J302, J303, J304	CONNECTOR, Receptacle	91371070	BNC UG-1095/U
L101, L102	COIL	AA15060-01	
L103	CHOKE	AB17117-01	
L104, L105	COIL	AA15056-01	
L301	COIL	AA14804-90	
L302	Part of T301		
L303	Part of T302		
L304	CHOKE	AA15059-01	
L305	Part of T309		
L306	COIL	AA15056-01	
L307	Part of T303		

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Vendor
L308	Part of T304		
L309	Part of T310		
L310	CHOKE	AA14805-01	
L311	CHOKE	AA16625-01	
L312	Part of T305		
L313	Part of T311		
L314	Part of T312		
L315	Part of T306		
L316	Part of T313		
L317	Part of T314		
L318, L319	Part of T307		
L320	Same as L301		
L321, L322 A & B	Part of T308		
L323	COIL	AA15058-01	
L324	Part of T315		
L325	Same as L301		
L326 A & B	Part of T316		
L327	CHOKE	AA14807-01	
L328	Same as L311		
LS101	SPEAKER, 2 x 3 inch	94650010	RCA KS 16107
M101	METER: 0 - 50 micro amp	92180210	Marion 52-N
M102	METER: 0 - 100 micro amp	92180240	Marion 52-N
R102	RESISTOR, Fixed Composition: 4 K, ±3%, 25 w	93580530	Dalohm PH-25
R103	RESISTOR, Fixed Composition: 2.5 K, ±3%, 25 w	93580500	Dalohm PH-25

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
R104	RESISTOR, Fixed Composition: 12 K, ±10%, 1 w	93560410	Allen Bradley GB1231
R105	RESISTOR, Variable: 10 K, ±10%, 2 w	93150270	Allen Bradley JA1N048D103UA
R106	RESISTOR, Fixed Composition: 20 M, ±5%, 1/2 w	93552090	Allen Bradley EB2065
R107, R108	RESISTOR, Fixed Composition: 330 K, ±5%, 1/2 w	93551630	Allen Bradley EB3345
R109	RESISTOR, Fixed Composition: 47 K, ±5%, 1/2 w	93551290	Allen Bradley EB4735
R110	RESISTOR, Fixed Composition: 470 K, ±5%, 1/2 w	93551680	Allen Bradley EB4745
R111	RESISTOR, Fixed Composition: 1.0 M, ±5%, 1/2 w	93551780	Allen Bradley EB1055
R112	RESISTOR, Fixed Composition: 100 K, ±5%, 1/2 w	93551430	Allen Bradley EB1045
R113	RESISTOR, Fixed Composition: 47 K, ±10%, 2 w	93570490	Allen Bradley HB4731
R114	RESISTOR, Fixed Composition: 2 K, ±5%, 1/2 w	93550730	Allen Bradley EB2025
R115	Same as R105		
R116	Same as R111		
R117	RESISTOR, Fixed Composition: 240 K, ±5%, 1/2 w	93551580	Allen Bradley EB2445
R118	RESISTOR, Fixed Composition: 22 K, ±5%, 1/2 w	93551140	Allen Bradley EB2235
R119	Same as R110		
R120	RESISTOR, Variable: 250 K, ±10%, 2 w	93150520	Allen Bradley JA1N048P254AA
R121	RESISTOR, Fixed Composition: 220 K, ±5%, 1/2 w	93551560	Allen Bradley EB2245

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
R122	RESISTOR, Fixed Composition: 15 K, ±5%, 1/2 w	93551080	Allen Bradley EB1535
R123	RESISTOR, Fixed Composition: 3.3 K, ±5%, 1/2 w	93550810	Allen Bradley EB3325
R124	Same as R109		
R125	RESISTOR, Fixed Composition: 10 K, ±5%, 1/2 w	93551020	Allen Bradley EB1035
R126	Same as R118		
R127	RESISTOR, Variable: 50 K, ±10%, 2 w	93150400	Allen Bradley JA1L040S503UC
R128	Same as R123		
R129	RESISTOR, Fixed Composition: 1 K, ±10%, 1/2 w	93550630	Allen Bradley EB1021
R130	Same as R111		
R131	Same as R121		
R132	RESISTOR, Fixed Composition: 6.8 K, ±10%, 1 w	93560370	Allen Bradley GB6821
R133	RESISTOR, Fixed Composition: 10 K, ±10%, 1 w	93560400	Allen Bradley GB1031
R134	Same as R111		
R135	Same as R112		
R136	RESISTOR, Fixed Composition: 24 K, ±5%, 1/2 w	93551160	Allen Bradley EB2435
R137	RESISTOR, Fixed Composition: 33 K, ±5%, 1/2 w	93551220	Allen Bradley EB3335
R138	RESISTOR, Fixed Composition: 110 K, ±5%, 1/2 w	93551450	Allen Bradley EB1145
R139	RESISTOR, Fixed Composition: 39 K, ±5%, 1/2 w	93551250	Allen Bradley EB3935
R301	Same as R118		
R302	RESISTOR, Fixed Composition: 1 K, ±5%, 1/2 w	93550620	Allen Bradley EB1025

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
R303	Same as R109		
R304	Same as R110		
R305	Same as R121		
R306	Same as R125		
R307	RESISTOR, Fixed Composition: 82 Ω, ±5%, 1/2 w	93550260	Allen Bradley EB8205
R309	RESISTOR, Fixed Composition: 100 Ω, ±5%, 1/2 w	93550296	Allen Bradley EB1015
R310, R311	Same as R109		
R312	Part of T303		
R313, R314	Part of T310		
R315	Same as R121		
R316	RESISTOR, Fixed Composition: 20 K, ±5%, 1/2 w	93551120	Allen Bradley EB2035
R317, R318	Same as R307		
R319	RESISTOR, Fixed Composition: 150 K, ±5%, 1/2 w	93551500	Allen Bradley EB1545
R320	Same as R112		
R321	Part of T311		
R322	Part of T305		
R323	Part of T312		
R324	RESISTOR, Fixed Composition: 30 K, ±5%, 1/2 w	93551200	Allen Bradley EB3035
R325	Same as R309		
R326	RESISTOR, Fixed Composition: 820 Ω, ±5%, 1/2 w	93551750	Allen Bradley EB8245
R327	Same as R125		
R328	Same as R112		
R329	RESISTOR, Fixed Composition: 51 Ω, ±5%, 1/2 w	93550190	Allen Bradley EB5105

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
R330	Same as R109		
R331, R332	Part of T313		
R333	Same as R118		
R334	Same as R109		
R335	Part of T307		
R336	Same as R302		
R337	Part of T307		
R339	RESISTOR, Fixed Composition: 4.7 K, ±5%, 1/2 w	93550880	Allen Bradley EB4725
R340, R341	RESISTOR, Fixed Composition: 1.5 M, ±5%, 1/2 w	93551840	Allen Bradley EB1555
R342	Same as R109		
R344, R345	Same as R137		
R346	Same as R109		
R347	Same as R125		
R348	Same as R112		
R349	Same as R125		
R350	Same as R109		
R351	Same as R112		
R352	RESISTOR, Fixed Composition: 4.7 Ω, ±10%, 1 w	93560036	Allen Bradley EB47G1
R353	Part of T316		
R354	Same as R125		
R355	Same as R302		
R356	Same as R125		
R357	Part of T309		
R358	Same as R302		
R359	Same as R125		
R360	Same as R329		
R361	Same as R309		
S101	SWITCH, Toggle SPST	94850314	MS25098-22 MIL-S-3950

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
S102	SWITCH, Toggle, SPDT	94850350	MS35058-23 MIL-S-3950
S103	SWITCH, BFO	A-15072-02	
S104	SWITCH, AM-FM	A-15071-02	
S105	SWITCH, AGC-MAN	A-15074-02	
S106	SWITCH, Bandwidth	A-16222-01	
T101	TRANSFORMER, Power	AC-18227-01	
T102	TRANSFORMER, Assembly	AB-14487-01	
T301	TRANSFORMER, IF	AB-14796-01	
T302	TRANSFORMER, IF	AB-14794-01	
R303	TRANSFORMER, IF	AB-14797-01	
T304	TRANSFORMER, IF	AB-14795-01	
T305	Same as T303		
T306	TRANSFORMER, IF	AB-14793-90	
T307	TRANSFORMER, Limiter	AB-14799-90	
T308	TRANSFORMER, Discriminator	AB-14976-01	
T309	TRANSFORMER, IF	AB-15098-01	
T310	TRANSFORMER, IF	AB-15101-01	
R311	TRANSFORMER, IF	AB-15103-01	
T312	TRANSFORMER, IF	AB-15100-01	
T313	TRANSFORMER, IF	AB-15102-01	
T314	TRANSFORMER, IF	AB-15104-01	
T315	TRANSFORMER, IF	AB-15099-01	
T316	TRANSFORMER, IF	AB-14798-90	
TB101	TERMINAL STRIP	95150130	Cinch 5-140-Y
V102, V103	TUBE	95400009	RCA OA2

Table 6-1. Replaceable Parts, 1302B Receiver, IF Strip and Main Chassis (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
V104	TUBE	95400210	RCA 6AL5
V105, V106, V107, V108	TUBE	95400468	RCA 12AU7A
V301, C302	TUBE	95400380	RCA 6DC6
V303	TUBE	95400339	RCA 6CB6A
V304	TUBE	95400200	GE 6AK5
V305	TUBE	95400216	RCA 6AL5
V306	TUBE	95400240	RCA 6AU6
V307	TUBE	95400270	RCA 6BA6
V308	Same as V304		
V309	Same as V307		
V310	Same as V305		
V311, V312	Same as V303		
XC104	SOCKET	94450050	TS101P01
XF101, XF102	FUSE HOLDER	92120116	Buss, HKD
XV102, XV103	SOCKET	94450010	Alcon 550LL-2
XV105, XV106, XV107, XV108	SOCKET	94450020	Alcon 950LL-2
XV301 thru XV312	Same as XV102		
XY301	SOCKET, Crystal	94440003	Johnson 126-105-2
Y301	CRYSTAL 22.4 mc	91470014	CR33A/U

Table 6-2. Replaceable Parts, 1302B Receiver, RF Tuner Assembly

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
C213	CAPACITOR, Fixed: 0.01 mfd, ±20%, 500 v	90901781	R2CC63Z5U103M EIA Spec RS-198
C217	CAPACITOR, Variable: 0.5 - 3.0 pf, 500 v	90950020	Centralab 829-3
C218	Same as C213		
C219	CAPACITOR, Fixed: 2 pf, ±0.25 pf, 500 v	90900180	Erie NPO-301
C220	CAPACITOR, Variable: 1 - 6 pf, 500 v	90950080	Centralab 829-6
C221	Same as C219		
C222	CAPACITOR, Variable: 1 - 4 pf, 500 v	90950070	Centralab 829-4
C223	CAPACITOR, Fixed: 10 pf, ±10%, 500 v	90900700	Erie NPO-301
C224	CAPACITOR, Feedthru: 47 pf, ±20%, 500 v	90901280	Sprague 514C11A
C225, C226	CAPACITOR, Fixed: 1000 pf, ±20%, 500 v	90901641	R2CC60Z5U102M EIA Spec. RS-198
C227	CAPACITOR, Fixed: 1000 pf, 500 v	90901547	Allen Bradley SS5A
C228	CAPACITOR, Fixed: 1000 pf, 500 v	90901544	Allen Bradley FA5C
C229	Same as C220		
C230	CAPACITOR, Fixed: 8.2 pf, ±0.5 pf, 500 v	90900620	Erie NPO-301
C231	CAPACITOR, Fixed: 6.8 pf, ±0.25 pf, 500 v	90900550	Erie N220-301
C232	Same as C227		
C233	CAPACITOR, Fixed: 0.5 pf, ±0.1 pf, 500 v	90900010	Erie NPO-301
C234	CAPACITOR, Fixed: 3.3 pf, ±0.25 pf, 500 v	90900310	Erie NPO-301

Table 6-2. Replaceable Parts, 1302B Receiver, RF Tuner Assembly (Cont.)

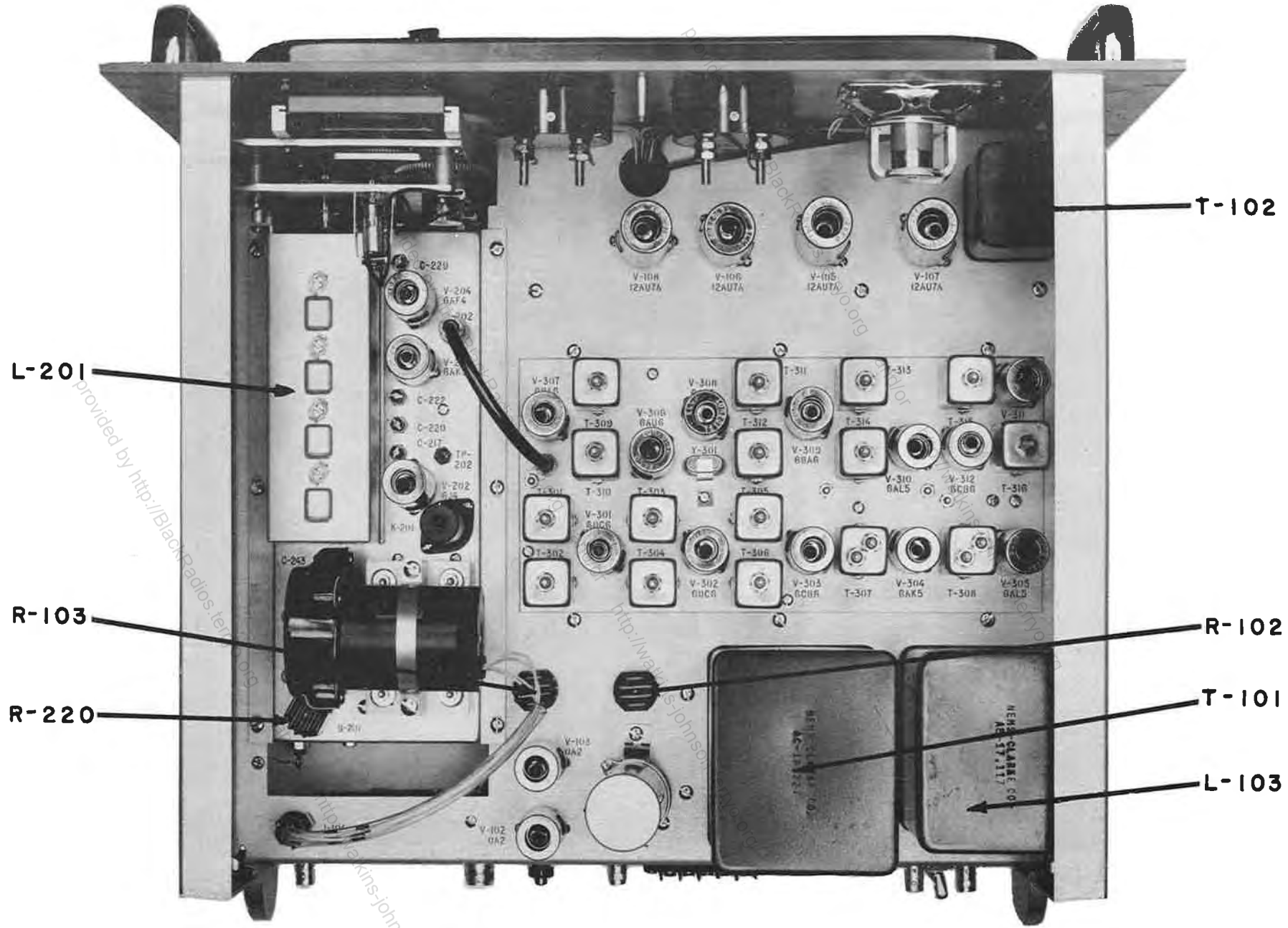
Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
C235	Same as C225		
C236	Same as C228		
C237	Same as C233		
C238	Same as C228		
C239, C240, C241	Same as C227		
C242	Same as C228		
C243	Same as C217		
C244	Same as C231		
C245	Same as C227		
C246, C247	CAPACITOR, Fixed: 22 pf, ±10%, 500 v	90900950	Erie NPO-301
C248	CAPACITOR, Fixed: 1000 pf, ±20%, 600 v	90901630	Centralab D6-102
C249, C250	Same as C227		
C251	CAPACITOR, Fixed: 500 pf, ±20%, 500 v	90901510	Erie GP2-331
C252, C253	Same as C228		
C254, C255, C256	Same as C227		
C257	CAPACITOR, Fixed: 100 mfd, 25 v	90901256	Electrolytic CD NLW 100-25
C258	Same as C228		
C259	CAPACITOR, Variable: 0.7 - 12 pf, 750 v	90950051	JFD VC 22G
C261A, C261B	CAPACITOR, PC	A-17729-01	
C262, C263	Same as C228		
C264	Same as C223		
CR201	DIODE	91600200	GE 1N540
CR202	DIODE	91600216	GE 1N751A
J201, J202, J203	CONNECTOR, Receptacle	91371020	UG-625B
K201	RELAY, Time Delay: 30 sec	93400125	Amperite 6N030T

Table 6-2. Replaceable Parts, 1302B Receiver, RF Tuner Assembly (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
L201	COIL, RF:	AA-14734-01	
L202, L203	COIL, RF:	AA-14735-01	
L204	COIL, Contact:	A-14759-01	
L205, A, B, C, D	INDUCTUNER	300197-01	
L206	Same as L202		
L207	COIL, Contact:	A-17727-01	
L208	COIL, RF:	AA-14737-01	
L209	COIL, Contact:	A-14749-01	
L210	COIL, Contact:	A-17728-01	
L211	COIL	102354-90	
L212	Same as L208		
L213, L214	CHOKE, RF:	AA-16625-01	
R201	RESISTOR, Fixed Composition: 240 Ω, ±5%, 1/2 w	93550420	Allen Bradley EB2415
R202	RESISTOR, Fixed Composition: 330 Ω, ±5%, 1/2 w	93550450	Allen Bradley EB3315
R205	RESISTOR, Fixed Composition: 1.5 K, ±5%, 2 w	93570180	Allen Bradley HB1525
R206	RESISTOR, Fixed Composition: 5.6 K, ±5%, 1 w	93560330	Allen Bradley GB5625
R207	RESISTOR, Fixed Composition: 6.2 K, ±5%, 1 w	93560350	Allen Bradley GB6225
R208	RESISTOR, Fixed Composition: 120 Ω, ±5%, 1/2 w	93550320	Allen Bradley EB1215
R209, R210	RESISTOR, Fixed Composition: 470 K, ±5%, 1/2 w	93551680	Allen Bradley EB4745
R211	RESISTOR, Fixed Composition: 27 K, ±5%, 1/2 w	93551180	Allen Bradley EB2735
R212	RESISTOR, Fixed Composition: 150 K, ±5%, 1/2 w	93551500	Allen Bradley EB1545

Table 6-2. Replaceable Parts, 1302B Receiver, RF Tuner Assembly (Cont.)

Reference Designation	Name and Description	Part Number Vitro	Part Number Vendor
R213	RESISTOR, Fixed Composition: 8.2 K, ±10%, 2 w	93570330	Allen Bradley HB8221
R214	Same as R211		
R215	RESISTOR, Fixed Composition: 220 Ω, ±5%, 1/2 w	93550400	Allen Bradley EB2215
R216	RESISTOR, Fixed Composition: 100 Ω, ±5%, 1/2 w	93550296	Allen Bradley EB1015
R217	RESISTOR, Fixed Composition: 510 Ω, ±5%, 1 w	93560150	Allen Bradley GB5115
R218	RESISTOR, Fixed Composition: 1 K, ±5%, 1 w	93560200	Allen Bradley GB1025
V201	TUBE, Electron	95400675	GE 7768
V202	TUBE, Electron	95400390	6J4
V203	TUBE, Electron	95400200	6AX5
V204	TUBE, Electron	95400170	6AF4A
XK201	SOCKET, Tube	94450090	MIL-S-12883A
XV201	CONTRACT HEATER Assembly	91341000	Jettron 8785
XV202, XV203, XV204	SOCKET, Tube	94450010	Alcon 550LL-2



NOTE: On some models the blower has been removed from the RF Tuner Assembly and the inductuner has been changed from L201 to L205.

Figure 6-1. 1302-B Receiver, Top View, (Dust Cover Removed)

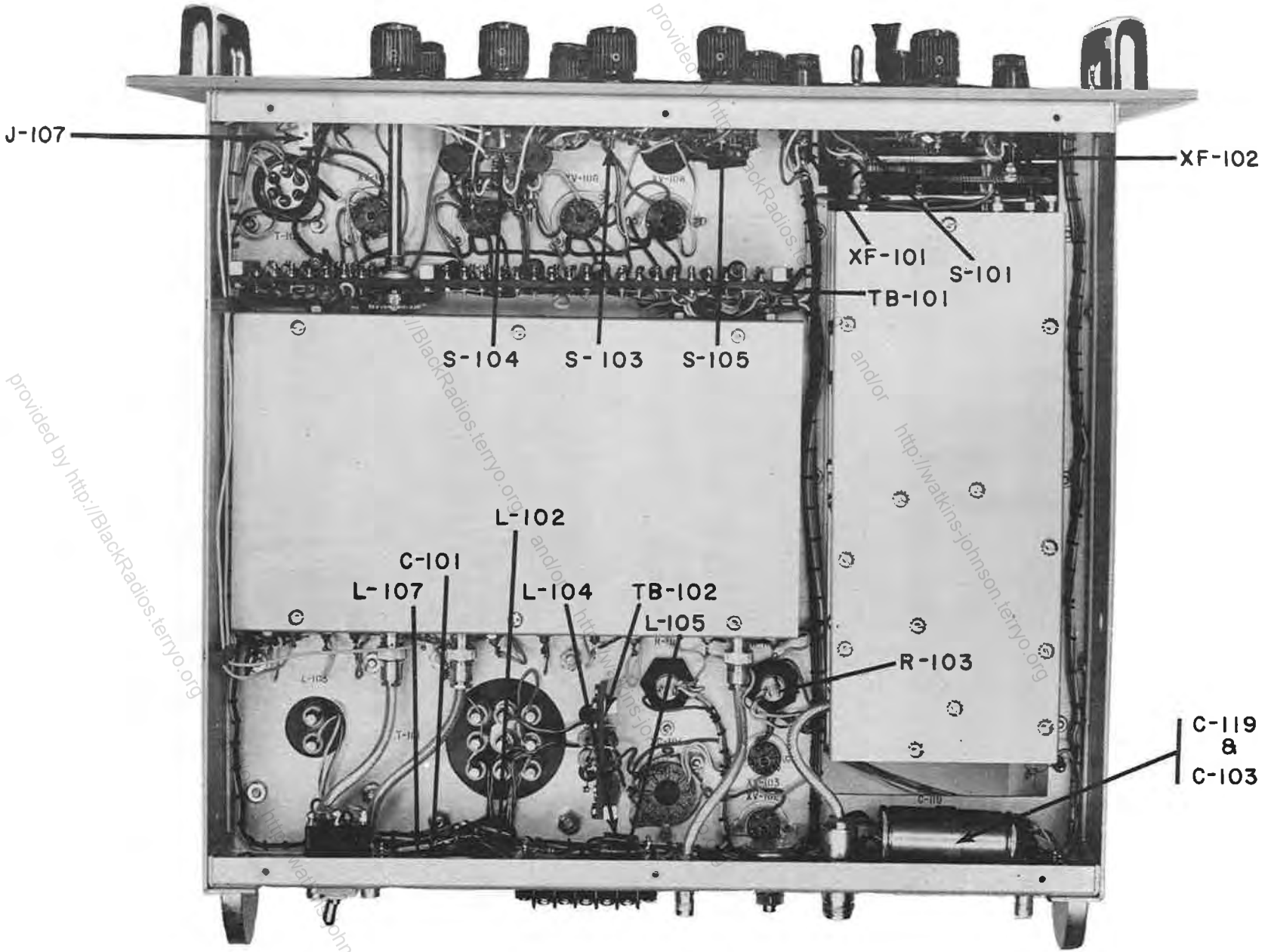


Figure 6-2. 1302-B Receiver, Bottom View, (Dust Cover Removed)

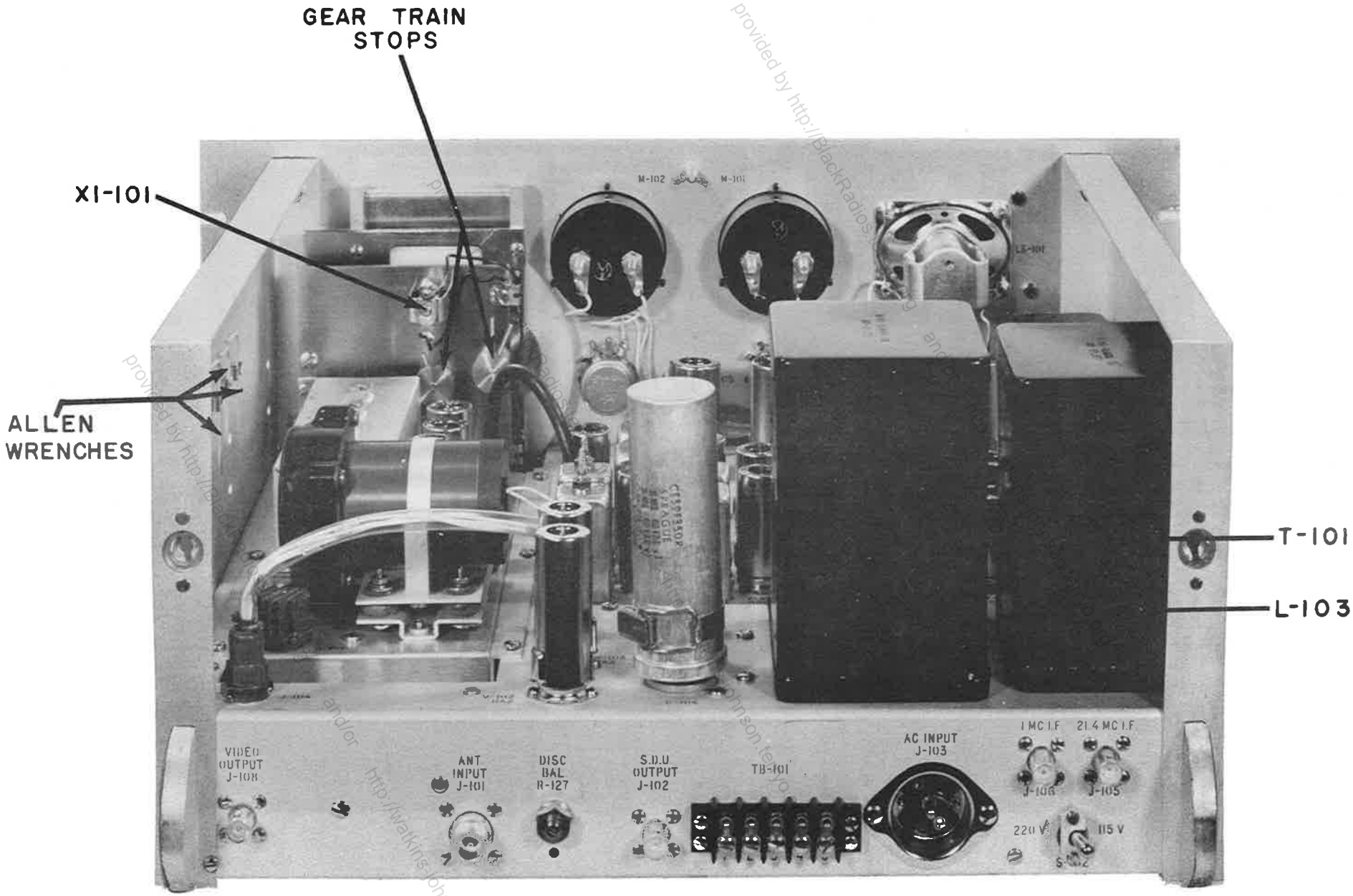
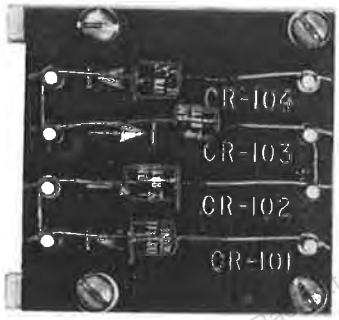


Figure 6-3. 1302-B Receiver, Rear View, (Dust Cover Removed)



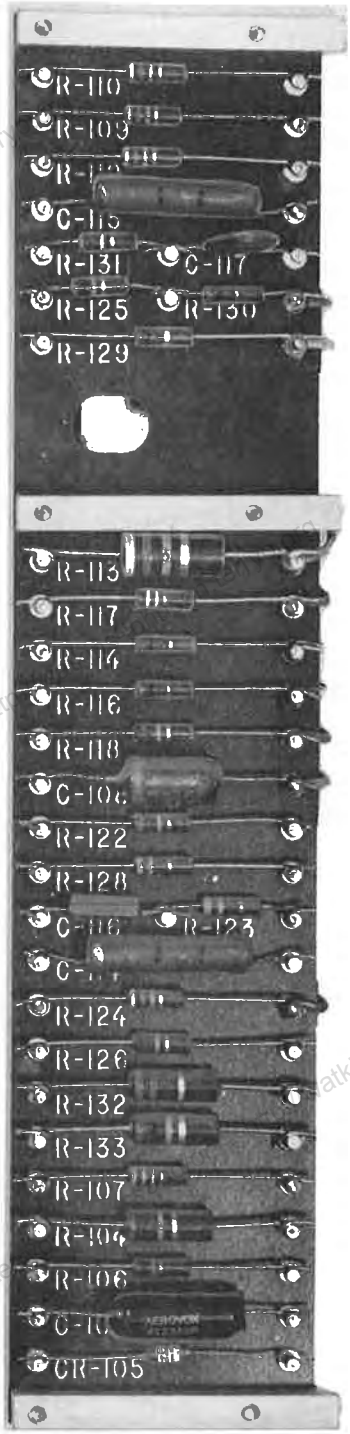


Figure 6-4. Resistor Boards Used in the 1302-B Receiver, Main Chassis

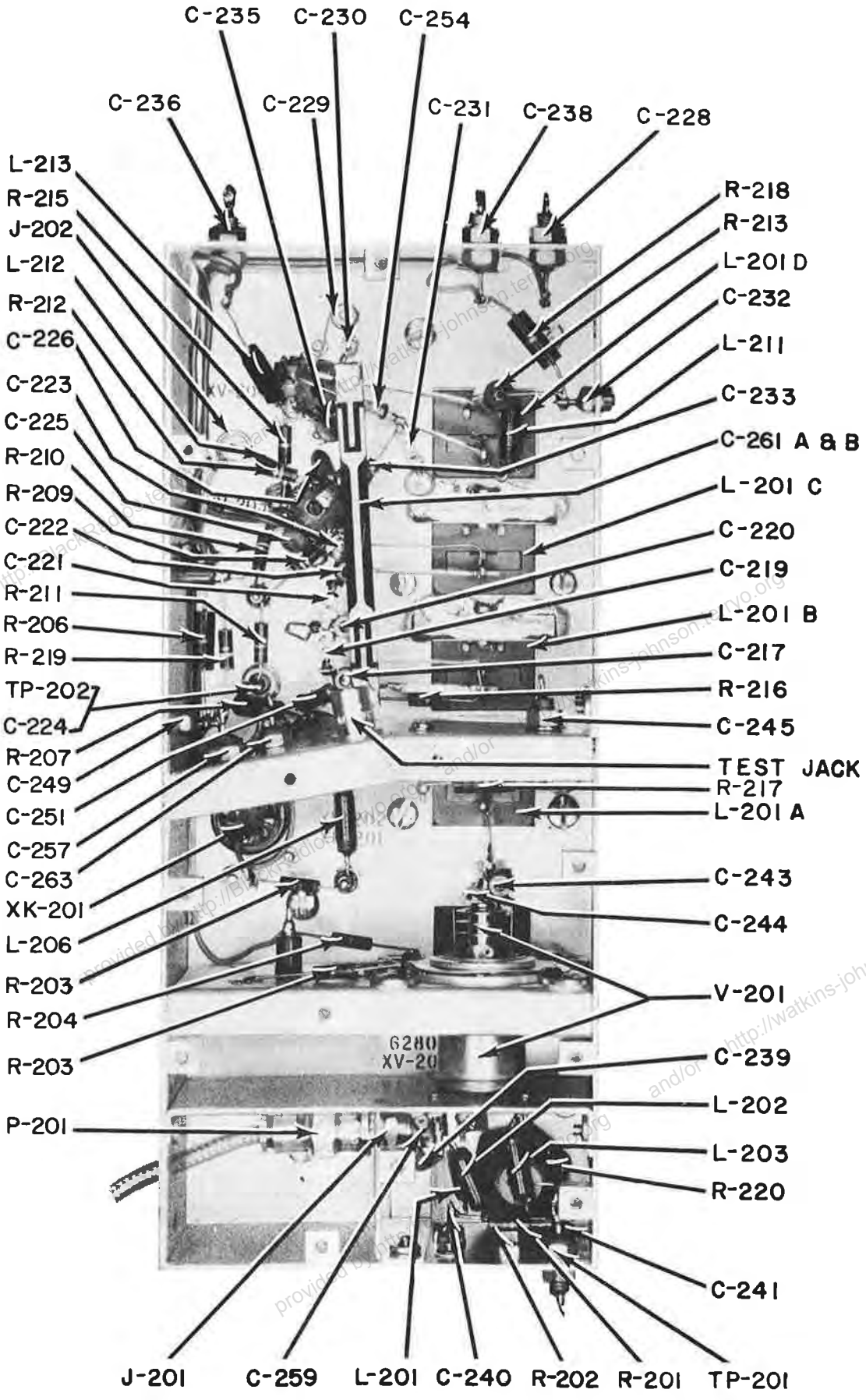


Figure 6-5. RF Tuner, Model 1302-B Receiver, Bottom View, (Dust Cover Removed)

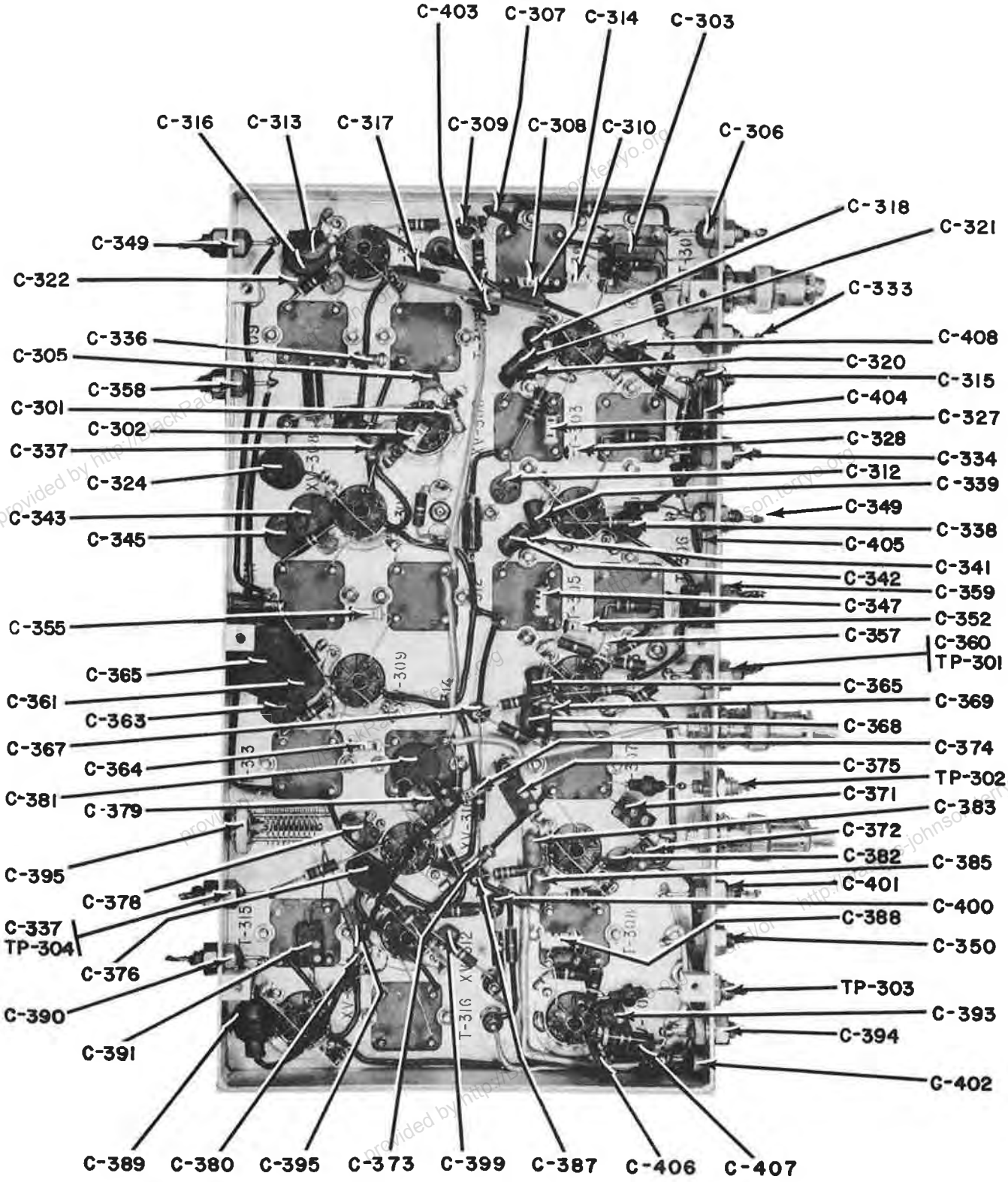


Figure 6-6. IF Strip, 1302-B Receiver, Bottom View, Location of Capacitors and Test Points

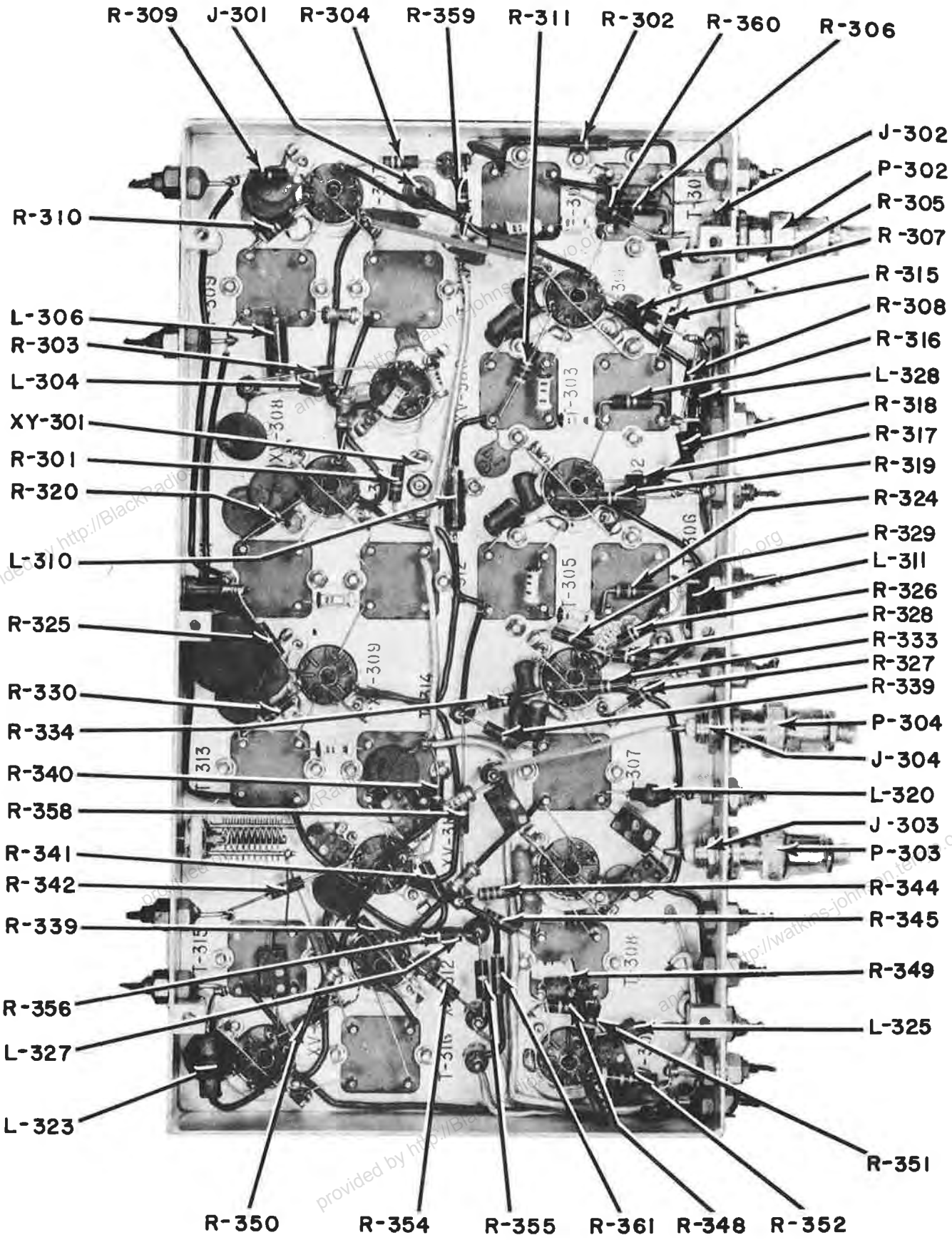
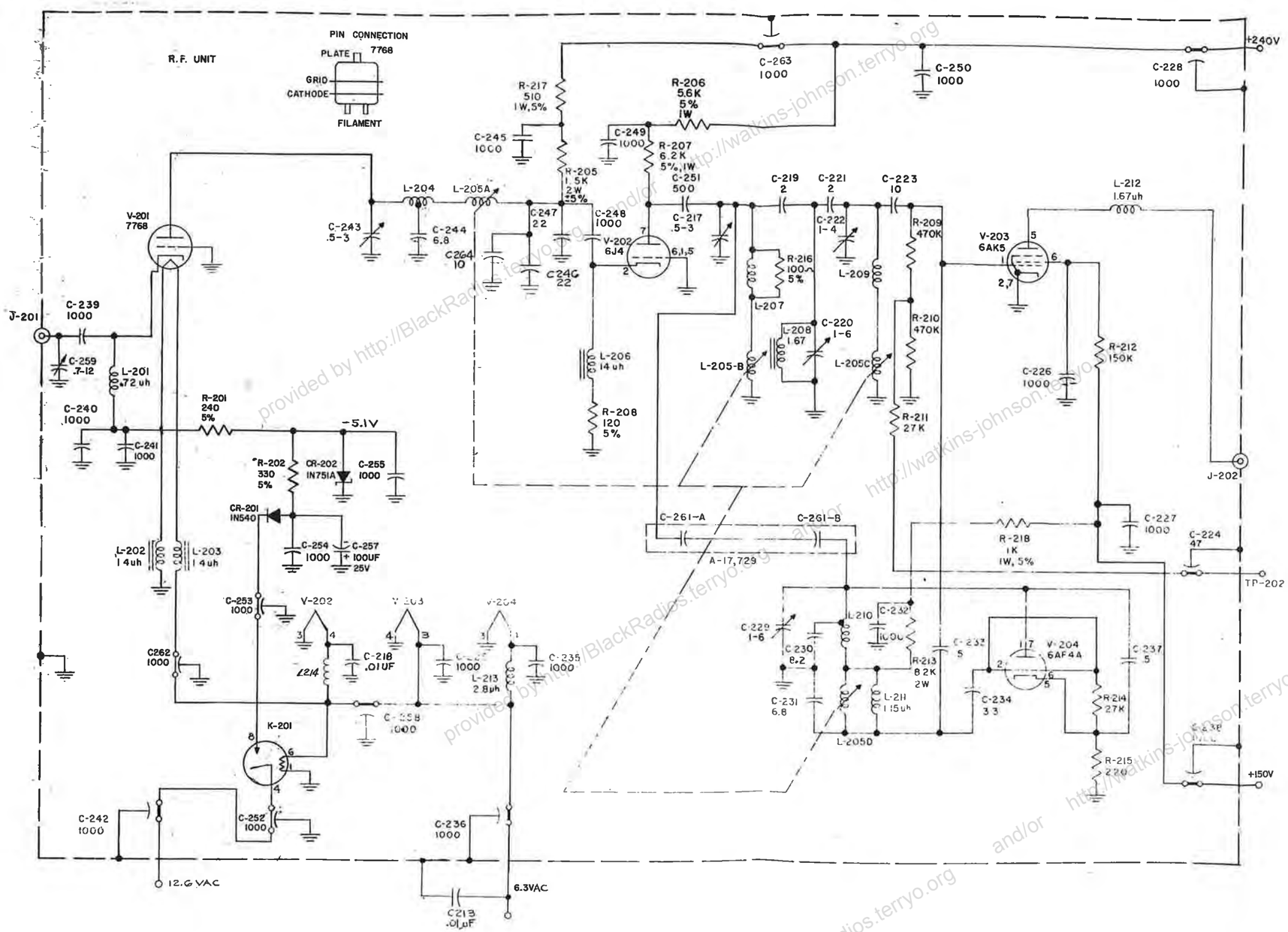


Figure 6-7. IF Strip, 1302-B Receiver, Bottom View, Location of Resistors and Miscellaneous Items

SECTION 7. SCHEMATIC DIAGRAMS

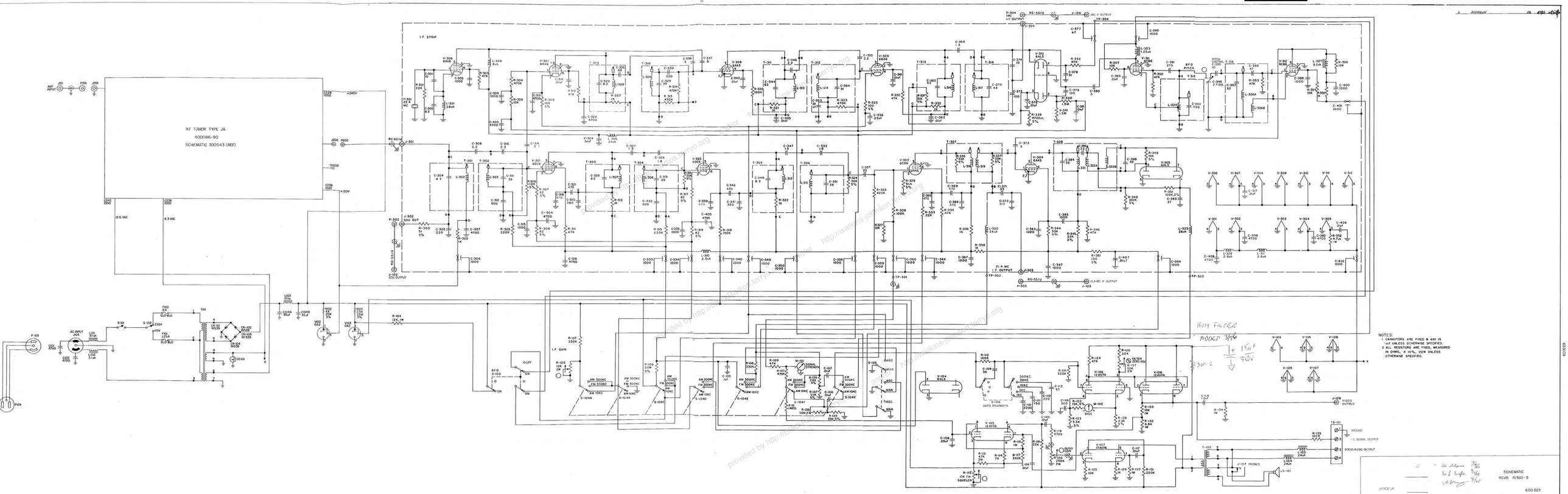
7.1 General.

This section contains the schematic diagrams for the 1302B Receiver. See Figures 7-1 and 7-2.



NOTE:
1. UNLESS OTHERWISE SPECIFIED:
   1.1 CAPACITORS ARE IN UUF.
   2.3 RESISTORS ARE IN OHMS, ±10% 1/2 W.

Figure 7-1. RF Tuner Assembly, 1302-B Receiver Schematic Diagram, 300543


I.F. STRIP
RF TUNER TYPE JA
400086-90
SCHEMATIC 500543 (REF)
HUM FILTER
ADDED 3/1/60
NOTES:
1. CAPACITORS ARE FIXED & ARE IN mfd UNLESS OTHERWISE SPECIFIED.
2. ALL RESISTORS ARE FIXED, MEASURED IN OHMS, ± 10%, 1/2W UNLESS OTHERWISE SPECIFIED.
SCHEMATIC
RCVR R1302-B
600 023