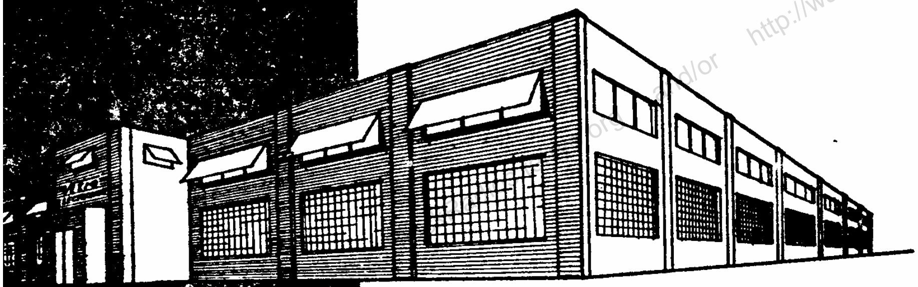
Instruction Book

For

Model 1907

Special Purpose Receiver



Vitro ELECTRONICS

A DIVISION OF VITRO CORPORATION OF AMERICA

919 JESUP-BLAIR DRIVE • SILVER SPRING, MARYLAND

PRODUCERS OF NEMS-CLARKE EQUIPMENT

ADDENDA

MODEL 1907 Special Purpose Receiver

IN SECTION 5, REPLACEMENT PARTS LIST, make the following changes.

C-207: Change the description to read, "Same as C-205".

C-213: Change the description to read, "CAPACITOR, CERAMIC DISC: 0.001 uf GMV 1000V, Sprague 40C214".

C-214, C-255, C-301, C-302, C-312, C-322, C-338, C-408, C-428, C-481: Change the description to read, "same as C-213".

C-221: Change the description to read, "0.5-5.5 uuf. modified per Vitro Electronics, AA-26, 507".

C-311: Change the description to read, "Same as C-208".

C-426: Change the description to read, "Not Used".

C-471: Change the description to read, "CAPACITOR, LOW PASS FILTER FEEDTHRU: 2500 uuf, Allen Bradley Type FIB-A.

C-502: Delete.

L-101: Change the description to read, "---100 ma, per Vitro Electronics AA 25, 478".

L-207: Change the description to read, "Not Used".

L-402: Delete "406".

L-406: Add, "---P/O T-406. *"

L-407: Delete, "408".

L-408: Add, "---P/O T-408.*"

R-143: Change the description to read, "---CTC Corp. Type X3542".

ON THE SCHEMATIC DIAGRAM, (fig. 5-1), PAGE 39, the following changes should be made.

C-207: Change the value from 1000 to 4700.

C-426: Delete

C-471: Change the value from 1000 to 2500.

Between pin 3 of V-401 and pin 3 of V-402, change the symbol of the COIL to read, "L-414".

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NAR 610311661

WARNING

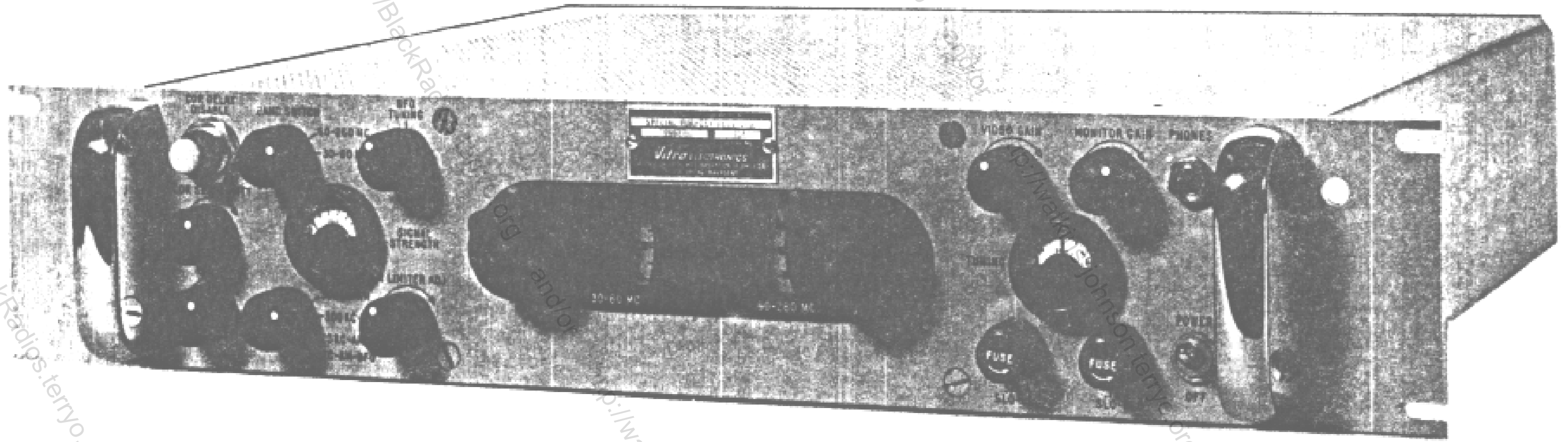
This equipment employs voltages which are dangerous and may be fatal if contacted by using personnel. Extreme caution should be exercised in working with the equipment with any of the protective covers removed.

Table of Contents

LIST OF ILLUSTRATIONS—Continued

Table 1-1.—*Specification for Model 1907 Special Purpose Receiver*

Type of Reception	AM-FM-CW.	
Frequency Range	30-260 mc (in 2 bands).	
	30-60 mc Tuner	**60-260 mc Tuner**
IF Rejection	50 db (min.)	65 db (min.).
Image Rejection	55 db (min.)	55 db (min.).
Noise Figure	6.5 db (max.)	6.5 db (max.).
Oscillator Radiation	40μv (max.)	4μv (max.).
Oscillator Stability	± 10 kc at 25° C. after 45-minute warm-up. Not more than ± 15 kc with 10° change in temperature from 250° C.	± 30 kc max. at 25° C. after 45-minute warmup. Not more than ± 50 kc with 10° change in temperature from 25° C.
IF Frequency	21.4 mc.	
IF Bandwidths	**300 kc**	**20 kc (crystal filter)**
Absolute Sensitivity:		
AM	2μv produces at least 9 db S/N with 50%, 1-kc modulation.	2μv produces at least 16 db S/N with 50%, 1-kc modulation.
FM	4μv produces at least 19 db S/N with 100-kc deviation, 1-kc modulation frequency.	
RF Input	2 N-type connectors switchable for 1 or 2 antennas designed to cover specific bandwidths.	
Input Impedance	50 Ω, unbalanced.	
Noise Limiter	Adjustable.	
Meters	Approximate signal-strength indicator and zero-center tuning indicator.	
Carrier Operated Relay	Built-in, 3-stage AGC-operated, with adjustable delay of 3 to 13 seconds. COR sensitivity approaches that of receiver. Includes delay disable provision to aid in setting up.	
Outputs Provided	1. Video; 600 Ω, unbalanced. 2. Monitor; 2000 Ω, unbalanced (for headphones) 3. Spectrum Display Unit (SDU); 50 ohms nominal impedance, broadband IF signal output.	
Video Output for FM	0.774-volt minimum with 4μv input, 100 kc deviation, 1-kc modulating frequency.	
FM Output Stability	Less than 2 db variation for inputs above 1.5 μv.	
Video Output for AM	0.774-volt minimum with 5 μv input, 50% modulation, 1-kc modulating frequency.	
AM Output Stability	Less than 7 db variation for 40-db variation in input.	
Video Response	250 cps to 100 kc at 3 db points in 300-kc IF position.	
BFO	Available in 20-kc bandwidth position and adjustable from front panel.	
Power Input	115/230 VAC, 50 to 60 cps.	
Power Consumption	64 watts (approximately).	
Weight	25 pounds (approximately).	
Size	19" wide x 3-1/2" high x 16-1/2" deep.	



1907-1-1

Figure 1–1. Frontispiece, Model 1907 Special Purpose Receiver

Section 1
General Description

1. GENERAL

The Model 1907 Special Purpose Receiver is a single conversion superheterodyne receiver which can be operated in the FM, AM, or AM-CW modes over a frequency range of 30–260 mc in two bands, 30–60 mc and 60–260 mc. The bandwidth during FM operation is 300 kc. In AM operation a choice of either a 300-kc bandwidth or a 20-kc bandwidth is available; in the AM-CW mode, the bandwidth is confined to 20 kc. Special care has been employed in the receiver design to give compactness, high sensitivity, and stable performance.

The particular features of the receiver include the following: A low impedance video output; a high impedance headphone output designed for monitoring and equipped with a separate gain control; provision for receiver operation with a single antenna or with separate antennas for each band; a low impedance IF signal output suitable for driving a Spectrum Display Unit (SDU); a signal strength meter; a tuning meter; a carrier operated relay (COR) which may be used to control auxiliary equipment; an AM noise limiter; and a self-contained 115/230 VAC power supply, convertible to operate on either primary power source by means of a toggle switch.

The location of the operating controls and connectors is as follows: The front panel mounts the pushbutton-light combination used for COR DELAY DISABLE and COR light; the BANDSWITCH; the BFO TUNING control; the VIDEO GAIN control; the MONITOR GAIN control; the PHONES monitor outlet; the COR SENSITIVITY control; the SIGNAL STRENGTH meter; the two tuning controls with illuminated dials visible through plastic panel windows and marked 30–60 mc and 60–260 mc, respectively; the TUNING meter; the RF GAIN-AVC control; the function selector with positions marked 300KC AM, 300KC FM, 20KC AM and 20KC AM-BFO; the 0.375A SLO-BLO and 0.75A SLO-BLO fuses; and the POWER switch. All other operating controls and connectors are on the chassis rear apron which mounts the SDU output; the VIDEO OUTPUT; two antenna receptacles marked J-103 and J-106; the COR DELAY control; the 115–230V selection switch; the AC power input receptacle; and the terminal board to which the COR-controlled auxiliary equipment is connected.

The panel and chassis are rigidly constructed of heavy gauge aluminum with the high frequency band RF tuner, the low frequency band RF tuner, the IF unit and the COR circuit made up as four subassemblies, separately mounted on the chassis with all but the COR circuit shielded. A transistorized video amplifier section is assembled on a printed circuit board mounted on the chassis top. All of the silicon diode power rectifiers are mounted on a single strip, readily available on the underside of the chassis where most of the other small components can be easily located.

The receiver weighs approximately 25 pounds, is 3½ inches high by 16½ inches deep by 19 inches wide and is designed for mounting on a standard 19-inch rack.

Further information concerning the receiver is contained in Table 1, Specifications for Model 1907 Special Purpose Receiver.

The receiver is shipped complete with a power cord, a 3-conductor to 2-conductor AC adaptor, and four plugs which mate to the two antenna inputs, the video output, and the SDU output.

Table 1-2.—*Tube, Transistor, and Diode Complement, Model 1907 Special Purpose Receiver*

Symbol	Type	Function
V-201	6688	First RF Amplifier, 30–60 mc Band.
V-202	6AK5	Mixer, 30–60 mc Band.
V-203	6AF4A	Local Oscillator, 30–60 mc Band.
V-301	7077	First RF Amplifier, 60–260 mc Band.
V-302	7077	First RF Amplifier, 60–260 mc Band.
V-303	7077	Second RF Amplifier, 60–260 mc Band.
V-304	6AK5	Mixer, 60–260 mc Band.
V-305	6AF4A	Local Oscillator, 60–260 mc Band.
V-401	6DC6	First IF Amplifier.
V-402	6DC6	Second IF Amplifier.
V-403	6CB6	Third IF Amplifier, AM; First Limiter, FM.
V-404	6AK5	Detector, AM; Second Limiter, FM.
V-405	6AL5	Discriminator.
V-406	6CB6	Beat Frequency Oscillator.
V-501	12AU7	COR Amplifier.
V-502	12AU7	COR Amplifier.
Q-101	2N117	Tuning Meter Amplifier.
Q-102	2N117	First Video Amplifier.
Q-103	2N117	Second Video Amplifier.
Q-104	2N117	Video Output Amplifier.
CR-101 thru CR-104	1N1692	Transistor Bias-Supply Bridge Rectifiers.
CR-105 thru CR-108	1N1695	Bridge Rectifiers, 150- and 250-volt Sources.
CR-109 thru CR-112	1N1695	215-volt Bridge Rectifiers.
CR-113	10M150Z5	Zener Diode, Voltage Regulator, 150-volt Source.
CR-114 & CR-115	1N1692	24-volt Relay Supply Rectifier.
CR-116	1N457	Noise Limiter Clipper Diode.
CR-201	1N457	AGC Delay Voltage Diode.
CR-501	1N458	COR Delay Diode.

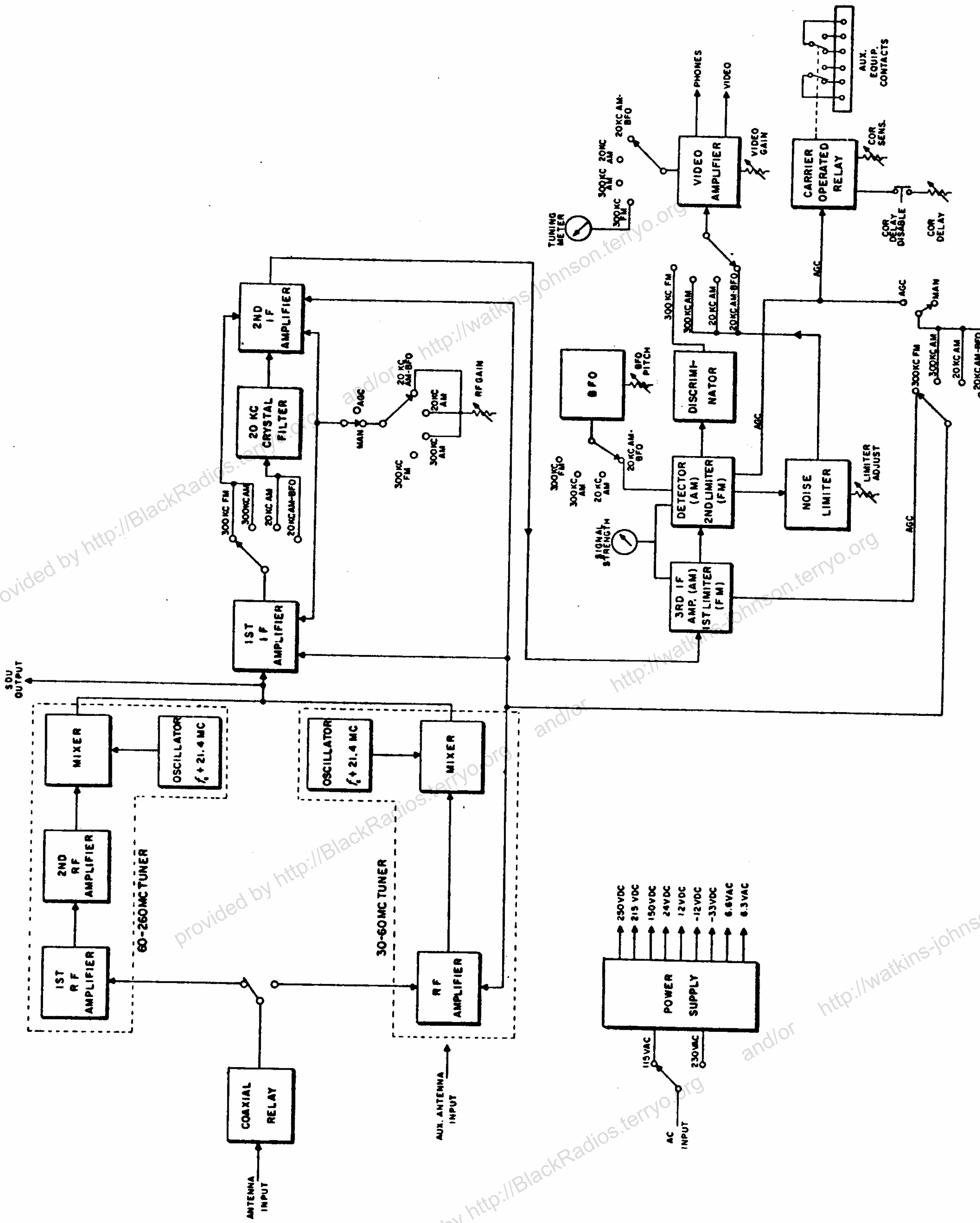


Figure 2-1. Block Diagram, Model 1907 Special Purpose Receiver

Section 2
Theory of Operation

1. ANALYSIS

The Model 1907 Special Purpose Receiver (shown by block diagram in fig. 2–1) is a single-conversion superheterodyne receiver which covers the frequency range between 30 and 260 mc in two bands, 30–60 mc and 60–260 mc; the unit may be operated in the AM, FM, or AM-CW mode.

The main antenna input is to a coaxial relay which automatically switches a single antenna to the RF tuner of the frequency band selected for operation. For operation with two antennas there is also an auxiliary antenna input and a spare length of coaxial cable for bridging one antenna directly to one of the RF tuner inputs while a second antenna connects to the remaining tuner through the coaxial relay.

The 30–60 mc RF tuner and the 60–260 mc RF tuner are completely separate, with each including a separate local oscillator and mixer. Bandswitching is accomplished by switching B+ to the oscillator and mixer of the tuner in the desired band. The 60–260 mc tuner uses two stages of RF amplification, neither being gain controlled; the 30–60 mc tuner uses one RF amplifier stage which is gain controlled by AGC during FM operation and also during AM operation if the AGC is turned on.

The intermediate output frequency of both mixers is 21.4 mc and this signal is always passed through two 300-kc bandwidth IF amplifier stages. When operation at a bandwidth of 20 kc is selected, the bandpass is narrowed further by the introduction of a 20-kc bandwidth crystal filter between the first two IF amplifier stages.

Depending on the mode of operation selected, gain control within the receiver is obtained through either an AGC system or a manual RF GAIN control. During FM operation, manual gain control is not available and an AGC voltage from the first limiter stage is applied to the two IF amplifiers as well as to the 30–60 mc band RF amplifier, if receiver operation is in the 30–60 mc band. During AM operation, either AGC or manual operation may be selected. If AGC operation is selected, the AGC voltage is obtained from the detector and applied in the same fashion as it is applied during FM operation. If manual gain is selected, it is applied to only the first two IF amplifier stages, regardless of which frequency band is in operation.

From the second IF amplifier stage, the signal passes to a succeeding stage which functions as a first limiter during FM operation and as a third IF amplifier during AM operation. This stage is coupled to one which functions as a detector during AM operation and as a second limiter during FM operation. In the latter case, its output is coupled to a discriminator.

According to whether operation is in the AM or FM mode, the output of the detector or discriminator is selected for application to the video amplifier; however, if the AM detector is in use, the signal first passes through a noise limiter before reaching the video amplifier.

From the video amplifier the signal passes to the video and monitor outputs. A manual control governs the video amplifier gain and an additional manual control is available to adjust the signal level at the monitor output.

The BFO operates only when 20KC AM-CW operation has been selected, in which case its output is coupled directly to the stage which functions as a detector during AM operation.

During either AM or FM operation the carrier operated relay (COR) is actuated by AGC voltage from the stage which functions as either a detector or second limiter. The COR controls a light and two sets of DT contacts to which auxiliary equipment can be connected.

The signal strength meter receives signals from the first limiter stage and also from the detector/second limiter stage.

The tuning meter functions only when 300KC FM operation has been selected, at which time it receives a signal from a meter amplifier stage which is incorporated with the video amplifier.

The SDU output is fed by the output of the active mixer from the point where the two mixers couple to the first IF amplifier stage.

The power supply functions on either 115 or 230 VAC and is provided with a switch for use in setting-up for operation on either primary power source. The power supply furnishes all the requirements for the receiver which include 250, 215, 24, 12, −12, and −33 VDC as well as a regulated 150-VDC supply and two AC filament supplies, one of 6.3 volts and one of 6.6 volts.

2. ANTENNA INPUTS

The main and auxiliary antenna inputs are two N-type connectors mounted on the chassis rear apron. The main input is connected directly to a coaxial relay, K-101, which is controlled by a 24-VDC sound, applied through the band switch so that the relay automatically transfers the antenna to the RF tuner appropriate to the frequency band selected. The auxiliary antenna input connects to a length of coaxial cable which has its other end free. This unused coaxial cable is held clipped to the chassis, available for use as a bridge connector if operation of the receiver with two antennas is desired. (See Section 3, Operating Instructions, for information regarding the use of the receiver with either one or two antennas.)

3. RF TUNER, 60–260 MC BAND

Performance curves depicting the IF rejection, image rejection, noise figure, AM output stability, and oscillator radiation of the receiver during use of the high band tuner are given in Figures 2–2 through 2–6, respectively.

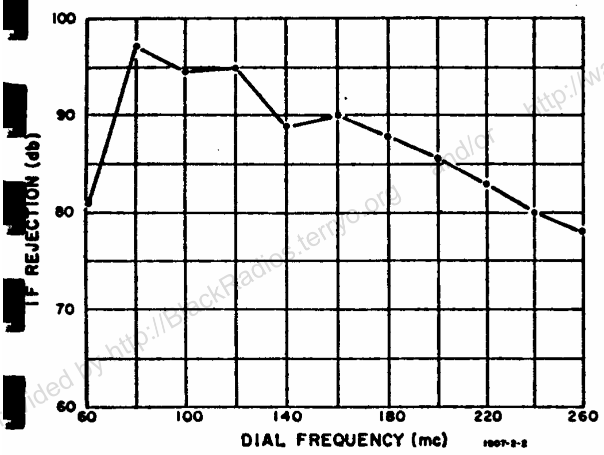


Figure 2–2. IF Rejection, High Band Tuner

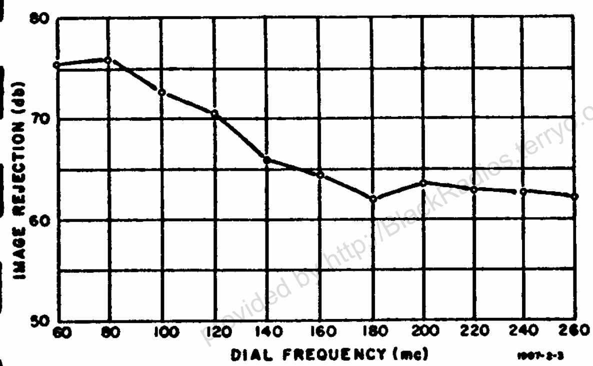


Figure 2–3. Image Rejection, High Band Tuner

A. First RF Amplifier.—The first RF amplifier stage of the 60–260 mc band tuner uses two type 7077 ceramic planar tubes, V-301 and V-302, with their plates and grids in parallel. The stage configuration is that of a grounded-grid amplifier. The use of two tubes improves the impedance match between the antenna and the cathode input to the two tubes. Input impedance is approximately 50 ohms across the entire frequency band. In order to maintain the tubes at the optimum operating point for low noise, this stage is provided with a separate 215-VDC supply which has its negative side held −10 volts below ground. The output from the first stage is to a shunt-fed coupling tuned by inductor L-302A, part of a four-section Mallory Inductuner. The coupling configuration is that of a modified pi network, used to match the high impedance output of the first stage to the low input impedance of the second stage.

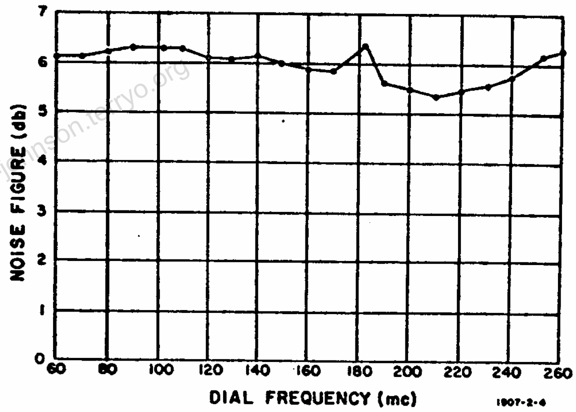


Figure 2–4. Noise Figure, High Band Tuner

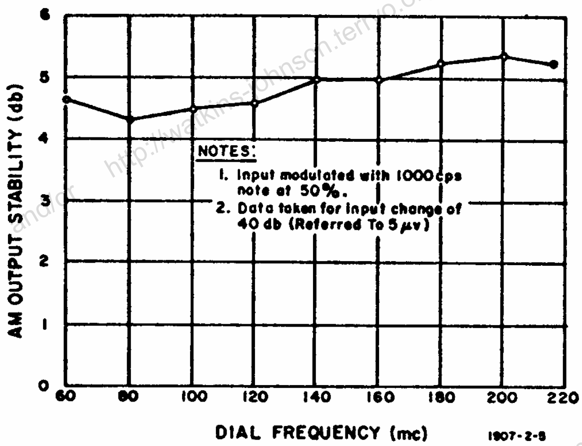


Figure 2–5. AM Output Stability, High Band Tuner

B. Second RF Amplifier.—The second RF amplifier stage of the 60–260 mc band tuner is a single type 7077 tube, V-303, connected in a grounded-grid circuit. Power for the stage is provided by the floating B-plus used for the first RF amplifier. The output of the second RF amplifier is connected to the mixer by a double-tuned coupling which is tuned by two sections of the Mallory Inductuner, L-302B and L-302C.

C. Mixer.—The high band mixer is a type 6AK5 tube, V-304, which receives both the second RF amplifier signal and the local oscillator signal at its control grid. A decoupled test point (TP-301), connects to the

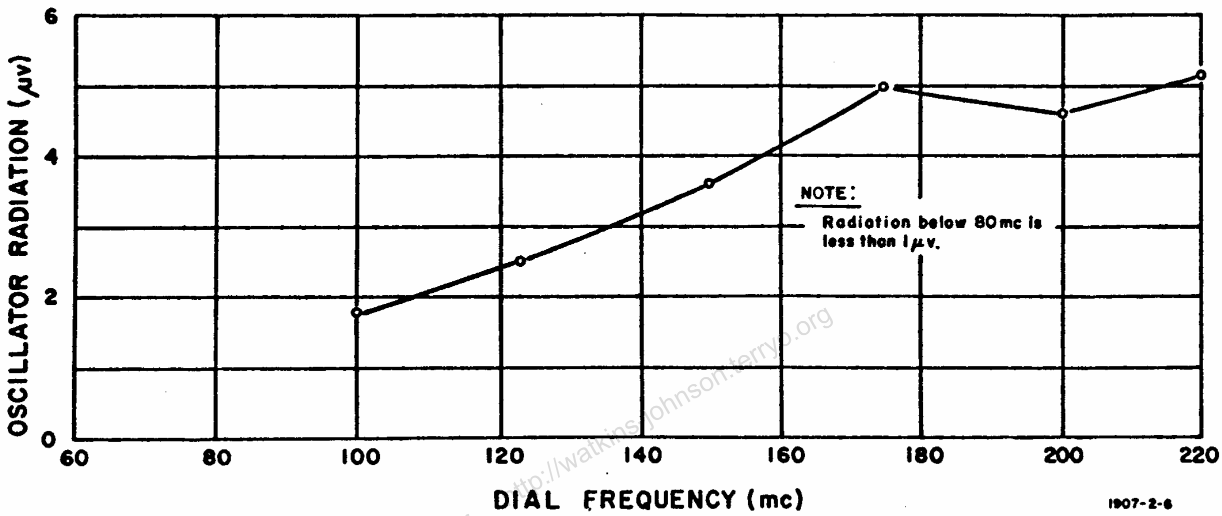


Figure 2-6. Oscillator Radiation, High Band Tuner

junction of the two mixer grid resistors, R-311 and R-312, through isolating resistor R-310. This point provides a convenient point for observing either the incoming carrier signal or the oscillator signal.

D. Oscillator.—The local oscillator coupled to the high band mixer is a type 6AF4A tube, V-305, operated in a modified Colpitts configuration and tuned by inductor L-302D, a section of the Mallory Inductuner. The output frequency is 21.4 mc above that of the received carrier wave and the output is applied to the mixer grid through capacitor C-323. Dual capacitor C-315B is used to feed back an oscillator signal which is out-of-phase with any of the oscillator energy injected at the grid of the mixer which might otherwise tend to radiate through the antenna input, thus reducing the effective level of such radiation. The oscillator is brought into operation when required by a section of bandswitch S-103 which applies B-plus to the tube.

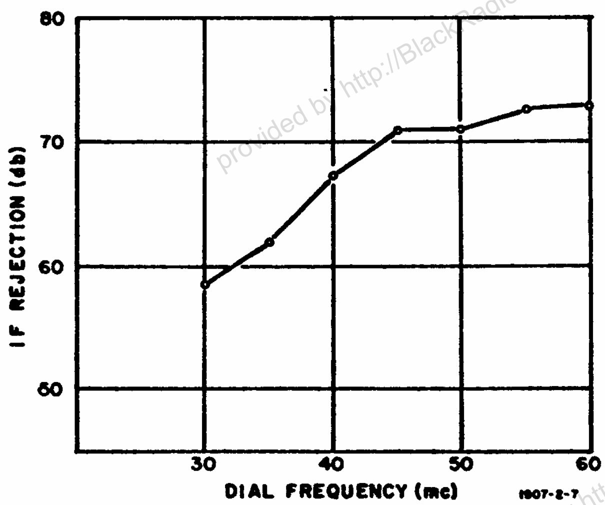


Figure 2-7. IF Rejection, Low Band Tuner

4. RF TUNER, 30–60 MC BAND

Performance curves depicting IF rejection, image rejection, noise figure, AM output stability, and oscillator radiation of the receiver during operation of the low band tuner are given in Figures 2–7 through 2–11, respectively.

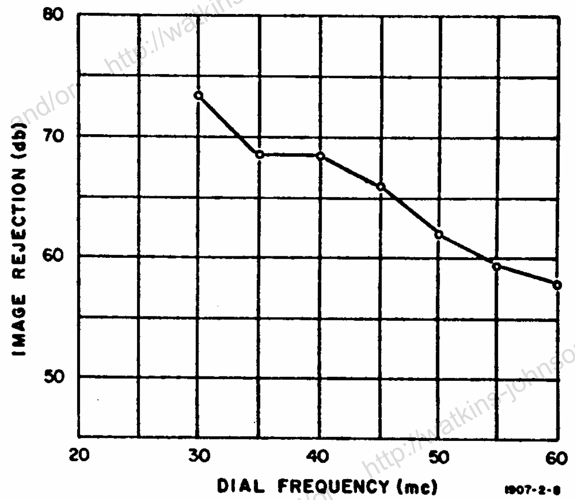


Figure 2-8. Image Rejection, Low Band Tuner

A. RF Amplifier.—The single stage of RF amplification in the 30–60 mc tuner is provided by a type 6688 pentode, V-201, connected in a grounded-cathode circuit. The high impedance of the grid circuit is matched to the 50-ohm antenna input by capacitors C-201 and C-230. Both the input and output of the amplifier are tuned by sections of a Mallory Inductuner, L-208A and L-208B, respectively. During the FM mode of operation, the amplifier gain is controlled by an AGC voltage derived from the first limiter; during the AM mode of operation, the gain of this stage may or may not be con-

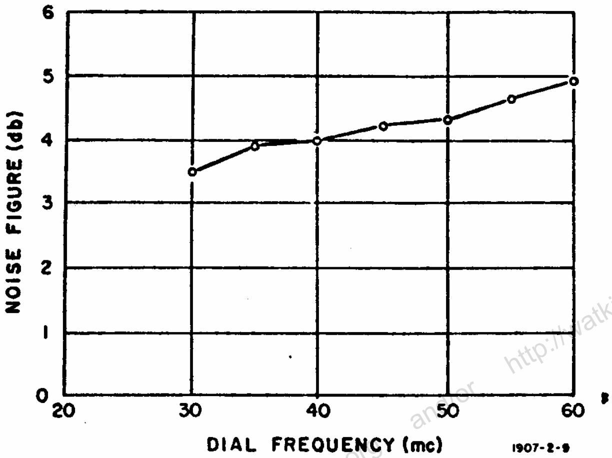


Figure 2–9. Noise Figure, Low Band Tuner

trolled automatically, depending on the position of the front-panel control, S-105. This AGC voltage is delayed by the drop across the forward resistance of CR-201, a diode connected in series with resistor R-211 between the 250-VDC supply and ground.

B. Mixer.—The low band mixer is a type 6AK5 pentode, V-202, which receives both the RF amplifier signal and the local oscillator signal on its control grid. A test point (TP-201), taken from the junction between the two grid resistors, R-206 and R-207, through isolating resistor R-205 provides a convenient point for observation of either of the two signals which reach the mixer grid.

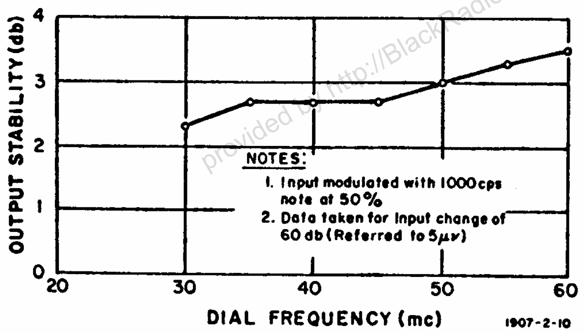


Figure 2–10. AM Output Stability, Low Band Tuner

C. Oscillator.—A type 6AF4A triode, V-203 in a modified Colpitts circuit, is used as the 30–60 mc band local oscillator. The oscillator is tuned by L-208C, a section of a Mallory Inductuner, to a frequency 21.4 mc above that to which the receiver is tuned. Output is taken through capacitor C-220. When the 30–60 mc band of the receiver is operated, the oscillator is energized by a section of bandswitch S-103, which applies B-plus to the tube.

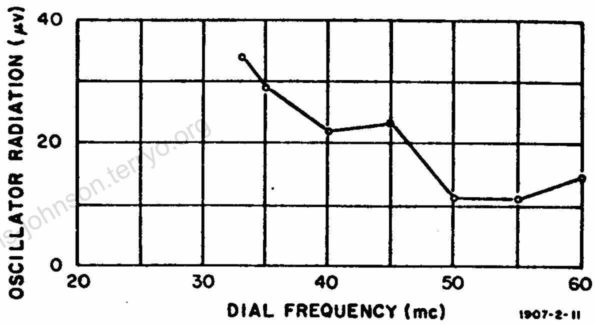


Figure 2–11. Oscillator Radiation, Low Band Tuner

5. IF UNIT

Input.—Input to the 21.4 mc IF unit is through inductor T-401 which functions as a plate tank circuit inductor common to both of the two mixer stages. These two stages are made to share the same output circuit since the bandswitch, S-103, functions so that only the oscillator stage in the appropriate RF tuner receives plate voltage, while the other is rendered inoperative by the absence of such voltage. In addition, the screen voltage is removed from the unused mixer to prevent noise from leaking through from its front end. A portion of the output from the active mixer is tapped off from the junction of capacitors C-401 and C-402 for passage through resistor R-401 to the SDU output at J-107.

B. First and Second IF Amplifiers.—The first and second IF amplifiers, V-401 and V-402, are type 6DC6 pentodes operated as high gain stages. During FM operation, a provision for manual gain control is not included since the limiters must always be driven to saturation; in this case, the RF GAIN potentiometer, R-111, is shorted out through relays K-102 and K-103 and the two stages are gain controlled by an AGC voltage which is time delayed by a resistor-capacitor combination made up of R-402 and C-408 in the first stage and R-410 and R-428 in the second stage. During AM operation, the gain of the two stages can be controlled by the AGC voltage, applied in the same fashion as that used in the FM operation, or manual gain control can be selected by operation of the RF GAIN-AVC control, on which both potentiometer R-111 and the AGC-MAN switch, S-105, are conveniently ganged together. If manual gain is chosen, the cathode bias of the first and second IF amplifier tubes is varied by adjustment of potentiometer R-111 in series with resistor R-110 between the 250-VDC supply and ground. If AGC is selected during AM operation, potentiometer R-111 is bypassed to ground by switch S-105.

The nature of the coupling between the two stages is determined by the positions of relays K-401 and K-402. During FM operation, relay K-401 is energized and relay K-402 is deenergized, with the result that the first and second IF amplifiers are coupled through a 300-kc bandwidth double-tuned network. Double-tuned coupling is used at this point and for coupling between succeeding stages in the IF unit because such a provision provides accurate control of the bandwidth while producing the most desirable response curve, with steep sides and a flat top. For 300KC AM operation, coupling is the same as during FM operation; for 20KC AM and 20KC AM-CW operation, coupling is through a crystal filter.

C. Crystal Filter. — For 20KC AM and 20KC AM-CW operation a crystal filter, FL-401, with a 20-kc bandwidth centered at 21.4 mc, replaces the double-tuned coupling between the first and second IF amplifier stage. At all times, either the crystal filter or the double-tuned coupling is placed in the circuit by the functioning of relays K-401 and K-402 which also operate to ground the coupling element not in use. The two relays are actuated by a 24-volt DC source which reaches them through function switch section S-104B. To keep the load on the 24-volt source constant, these two relays are connected so that either one or the other is actuated at all times.

D. First Limiter.—In the FM mode of operation, a type 6BC6 sharp-cutoff pentode, V-403, functions as the first limiter. The tube cuts off sharply, or limits, in both the negative- and positive-going directions because the screen potential is quite low as a result of the dividing action between resistors R-422 and R-421 since the latter is returned to ground through relays K-102 and K-103. The first limiter also functions to provide AGC voltage generated by grid rectification and the voltage so produced is fed through relay K-102 to those stages which are gain-controlled automatically.

E. Second Limiter.—A second limiter for FM operation is obtained through the operation of a 6AK5 pentode, V-404, which receives a signal from the first limiter through a double-tuned network and which passes on a signal to the discriminator through another double-tuned network. The stage also uses grid rectification to produce an AGC voltage which is applied to the input of the COR circuit at R-503.

F. Discriminator. — The FM demodulator is a Foster-Seely discriminator which uses a type 6AL5 tube, V-405. The use of a bifilar winding in the secondary of transformer T-409 provides accurate balance to the discriminator because such windings equalize the capacity to ground from each side of the secondary. A convenient test point at which the discriminator output can be viewed is at the feedthrough insulator marked FM OUTPUT which is mounted on one wall of the IF unit subassembly. A self-resonant choke, L-412, acts to keep any IF signals from appearing in the discriminator output which is coupled to the video amplifier through one set of relay K-103 contacts. The use of relay K-103, a miniature type mounted on the IF unit close to both the two demodulator stages and the transistorized video amplifier, shortens the length of the leads required to connect the demodulated outputs to the video amplifier, thus keeping losses to a minimum and avoiding the necessity for using shielded cables, which tend to attenuate the high frequencies.

G. Third IF Amplifier.—The use of the receiver for AM reception includes operation of the 6CB6 tube, V-403, as a third IF amplifier instead of as a limiter, which is its function during FM reception. Use of the tube as an amplifier is made possible by an increase in gain brought about by operating the screen grid at a higher voltage than is used when the tube is operating as a limiter. The higher screen grid voltage is brought about by the action of relays K-102 and K-103, the contacts of which are positioned during AM operation so as to remove resistor R-421 from ground, thereby eliminating the voltage divider action. Relays K-102 and K-103 operate when 24-volts DC is applied through function switch section S-104A. The two relays are connected so that one is always actuated and the other is not, a condition which keeps a constant load on the 24-volt DC supply.

H. Detector.—Detection during AM operation is accomplished in the grid circuit of a type 6AK5 tube, V-404, which is connected so as to be suitable without circuit modification for use either as an FM limiter or AM detector. Output is taken through inductor L-411, a self-resonant choke used to prevent any IF energy from reaching the output. From inductor L-411, the output is passed through a voltage divider made up of resistors R-116 and R-117 in series to ground, with the signal to the video amplifier input through capacitor C-107 and one set of relay K-103 contacts. The detector output can easily be viewed at a test point provided by the feed-through insulator marked AM OUTPUT which is mounted on one wall of the IF unit subassembly. The AGC voltage used during AM operation is tapped off the detector output at resistor R-116 and passed through resistor R-113 to relay K-102, which applies it to the AGC gain controlled stages. The AGC-MAN switch, S-105 shorts this voltage to ground during operation with manual gain control and shorts the RF GAIN potentiometer to ground during operation with AGC.

I. Noise Limiter.—During all AM operation, the demodulated output of the AM detector is subjected to the action of an adjustable noise limiter circuit made up of a crystal diode, CR-116, functioning as a variably biased clipper. The diode clips the output signal from the detector by grounding out those portions of the signal which swing beyond a certain level of voltage with respect to ground. The signals reach the diode at its junction point with resistor R-116. The AC grounding action is provided by capacitor C-114 which connects the signal to ground through the forward resistance of the diode whenever the signal level exceeds that of the reverse bias applied to the diode from potentiometer R-141, which develops the bias as a result of its connection in series with resistor R-142 between a −33-volt source and ground. Potentiometer R-141 is a panel control which makes it possible to adjust the level of the clipping action according to the carrier level and percent modulation.

J. BFO.—The BFO is made up of a type 6CB6 pentode, V-406, connected in a modified Hartley configuration in which the frequency of operation is controlled through Vari-Cap, C-462, a capacitor whose value is controlled by the level of DC voltage applied to it. The DC voltage applied to it is controlled by the BFO TUNING control, potentiometer R-138, which provides the Vari-Cap with a variable positive voltage tapped off a voltage divider consisting of resistors R-137, R-138, and R-139 all of which are in series between 250 volts DC and ground. The BFO is turned on by function switch section S-104C which applies B-plus to the tube each time 20-kc AM-CW operation is chosen. Output of the BFO is applied to the detector grid through C-455.

6. VIDEO AMPLIFIER

The video amplifier is a three-stage transistor amplifier made up of three type 2N117 transistors, Q-102, Q-103, and Q-104, mounted on a printed circuit board and biased by two floating DC voltages of 12 and −12 volts DC potential, which are at AC ground because of capacitive filtering across the transistor bias rectifier output. (See paragraph 8, Power Supply.)

As shown in Figure 2–12, the signal is effectively applied to the amplifier through resistor R-119 in a series with a parallel combination of resistors, R-124 and R-126, to ground. The first and third stages are in grounded-collector configurations; the second stage is in a grounded-emitter configuration since capacitor C-110 places the emitter at signal ground. The use of a grounded-collector circuit with a high input impedance for the first stage matches the amplifier input impedance to the high impedance of the signal source. The use of a grounded-collector circuit in the third stage makes it possible to match the stage output to the low impedance video output. Inverse feedback is used to improve the response and is obtained through the connection of resistor R-132 between the third stage emitter to the second stage base.

Gain control of the entire amplifier is provided by potentiometer R-128 in the coupling network between the first and second stages. An additional gain control for the monitor output is made up of potentiometer R-135. The over-all action of all three stages is to provide a unity voltage gain with a power gain of 160 or more. The video response (see fig. 2–13) is flat ±3 db over the range between 250 cps and 100 kc. The video

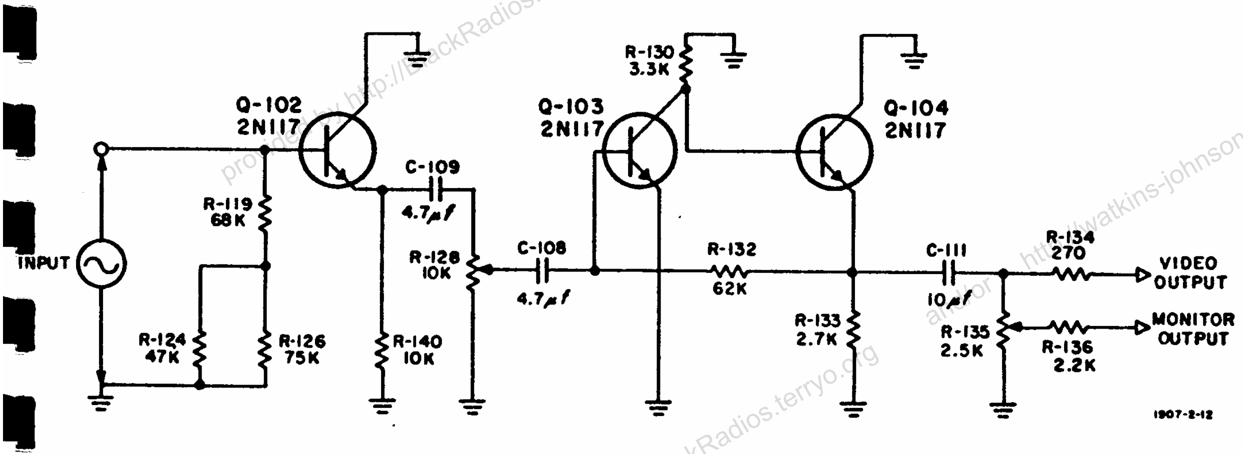


Figure 2–12. Video Amplifier, Equivalent Signal Circuit

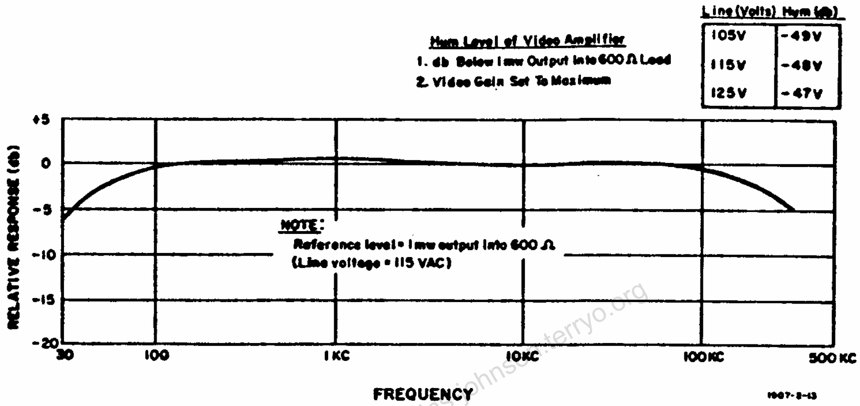


Figure 2-13. Video Amplifier Frequency Response

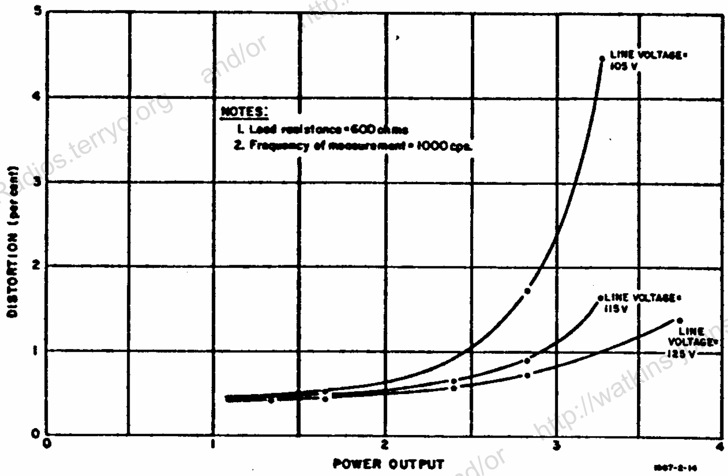


Figure 2-14. Video Amplifier Percent Distortion vs. Power Output as a Function of Line Voltage

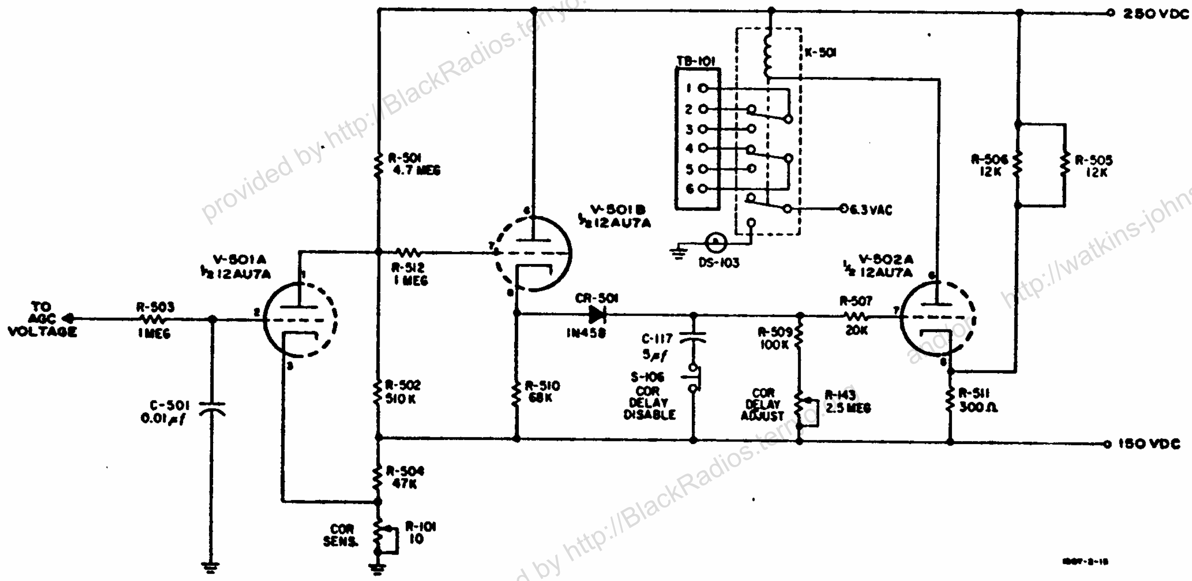


Figure 2-15. COR Circuit, Simplified Schematic Diagram

output impedance is 600 ohms and the monitor output impedance is 2000 ohms. Video amplifier distortion is depicted by curves in Figure 2–14.

7. CARRIER OPERATED RELAY CIRCUIT

The carrier-operated relay (COR) circuit provides carrier-on, carrier-off control of a panel light and auxiliary equipment, provided such equipment is connected to the two available sets of relay contacts through their terminating points on TB-101, a terminal board on the chassis rear apron. The relay is actuated when a carrier of adequate strength is received. When the carrier disappears, the relay transfers to its unactuated position within 3 to 13 seconds. A chassis rear-apron mounted COR DELAY ADJUST control may be used to vary the delay period of the carrier-off functioning within those limits of time. The sensitivity of the circuit to varying levels of carrier strength is adjustable by means of a panel mounted COR SENS control and a panel mounted COR DELAY DISABLE control is available to remove the delay of the carrier-off action while adjusting sensitivity.

The circuit (see fig. 2–15) accomplishes control of the relay by the carrier through the use of three stages of DC amplification, the first being voltage-controlled by AGC and the last actuating the relay. The presence of a carrier causes the AGC voltage to block the first stage and this in turn causes the next two stages to conduct.

The AGC voltage is applied through resistor R-503 to the control grid of a triode section of a type 12AU7 tube, V-501A. The stage is cathode biased by COR SENS potentiometer R-101 to a point such that it is cut off by the AGC voltage and the potentiometer may be used to vary the AGC voltage level (and hence carrier level) required to block the tube.

With the second stage directly coupled to the first stage, the second stage grid is swung in a positive or negative direction by the voltage drop across the first stage plate-load resistor, R-501. The connection of the second stage between 250 VDC and 150 VDC, and the use of a cathode resistor, R-510, biases the second stage to a level such that the amount of positive or negative grid swing it receives from the first stage is enough to either block the second stage or allow it to conduct. Therefore, the second stage conducts when AGC voltage blocks the first stage.

Conduction through the second stage causes a positive voltage, developed across the second stage cathode resistor, R-510, to be applied through the foreward resistance of diode CR-501 to the grid of the third stage, V-502A. A cathode follower configuration is used in the second stage so that capacitor C-117 is charged through a low impedance and therefore charges rapidly. Such rapid charging action is necessary to avoid delaying the carrier-on action because the voltage applied to the third stage grid does not reach the full value of that developed across resistor, R-510 until capacitor C-117 has fully charged. The third stage is connected between 250 VDC and 150 VDC, and receives a fixed bias from a voltage divider made up of resistors R-505 and R-506 in parallel and in series with resistor R-511 between 250 VDC and 150 VDC. This bias is enough to keep the third stage blocked until its grid receives a positive charge from the second stage The carrier operated relay, K-501, is connected in the third stage plate circuit and is closed when the tube conducts. Thus the presence of AGC voltage, by causing the first stage to block and the second stage to conduct, ultimately causes the third stage to conduct and the relay to close.

When the carrier disappears, causing the second stage to cease conduction, the relay is held closed for a period of 3 to 13 seconds due to third stage conduction which results from the fact that capacitor C-117 holds a positive charge on the third stage grid. Since the presence of diode CR-501 necessitates that this capacitor discharge only through resistor R-509 and COR DELAY potentiometer R-143, adjustment of this control provides variation of the length of the time between the loss of the carrier and the transferring of the relay to the carrier-off position.

The relay has three sets of contacts, two of which are made available for use in the carrier control of auxiliary equipment by their connection to TB–101 on the chassis rear apron. The third set of relay contact controls the COR panel light so that it is on when a carrier is present and off when there is no carrier.

The COR light is physically combined with a push-button switch, the COR DELAY DISABLE control, S-106. When depressed, this switch disconnects one side of capacitor C-117 from the circuit, no longer permitting the capacitor to delay the carrier-off functioning of the circuit. This is desirable during sensitivity adjustment of the circuit.

8. POWER SUPPLY

The receiver features a self-contained power supply which meets all power requirements. Greater compactness and reliability are obtained in the power supply through the use of silicon diode rectifiers, some of which are clip mounted to facilitate removal for testing. The power supply can operate on either a 115 VAC or a 230 VAC, 50 to 400 cps, power source and changeover from operation on one voltage to operation on the other is made easy by the provision of a locked toggle switch, S-102 on the chassis rear apron, which makes the change by connecting the two power transformer primary windings in series for 230 VAC operation and in parallel for 115 VAC operation. The same switch also selects a fuse appropriate for the voltage chosen, a 0.75-ampere fuse being required for 115 VAC operation and a 0.375-ampere fuse being required for 230 VAC operation. Protection against damage due to accidental placement of the 0.75-ampere fuse in the 0.375-ampere fuseholder is afforded by the fact that, during 230 VAC operation, the incoming power must pass through both fuseholders. The power transformer, T-101, is equipped with seven secondaries. Two of these are a 6.3-volt and a 6.6-volt AC winding used for filament power. A third winding powers a full-wave rectifier producing a capacitor-filtered 24-volt DC supply for relay operation. The fourth winding powers a bridge rectifier producing floating 12 VDC and −12 VDC RC filtered transistor bias supplies which are held at AC ground by filter capacitors C-105 and C-106. The fifth secondary supplies a bridge rectifier whose output is filtered and then tapped off at 250 VDC, unregulated and at 150 VDC, regulated by resistor R-107 and Zener diode CR-113. The sixth secondary supplies a bridge rectifier which produces 215 VDC, the negative side of which is held at −10 VDC away from ground. This floating B-plus supply is used for the high band RF amplifiers only. The seventh power transformer secondary supplies a half-wave rectifier made up of diode CR-117, which produces a −33 VDC supply used to bias the noise limiter diode, CR-116.

9. SIGNAL STRENGTH METER

The signal strength meter, M-101, indicates the relative strength of the carrier being received by reading the value of the AGC voltage with respect to ground. During AM operation, AGC voltage from the detector output is applied to the meter through resistor R-112. During FM operation, the meter receives AGC voltage through resistor R-114 from the first limiter stage and through resistor R-112 from the second limiter stage. The use of AGC voltage from both limiters gives the signal strength meter an extended range during FM operation because the voltage from the first limiter does not affect the meter until the voltage from the second has reached the limit of its effect.

10. TUNING METER

During FM reception only, the TUNING meter, M-102, indicates the accuracy of the receiver tuning (see Section 3, Operating Instructions, Paragraph 4, Tuning Meter). The meter does this by reading the value of the DC component of the discriminator output, a component which is zero when tuning is exact and, when tuning is inexact, is of a polarity determined by the direction in which tuning is off. The meter is connected in a balanced DC amplifier circuit so that it reads the voltage between the emitters of the first video amplifier, Q-102, and the tuning meter amplifier, a type 2N117 transistor, Q-101. The use of Q-101 in the meter circuit (instead of simply measuring the voltage directly to ground from the Q-102 emitter) compensates the meter circuit for drift brought about by changes in the transistor characteristics due to temperature variations and also permits the inclusion of potentiometer R-121 for use in adjusting the tuning meter to zero. Potentiometer R-121 is mounted on the printed circuit board. The tuning meter functions only during FM reception because its operation is dependent on the discriminator output which does not reach the video amplifier during AM reception. (For tuning AM signals, see Section 3, Operating Instructions, Paragraph 4, Tuning Meter.)

Section 3
Operating Instructions

1. GENERAL

Since operating instructions for the receiver depend largely on system integration, a complete discussion of receiver operation is not presented here, but certain important points are discussed.

2. OPERATION WITH ONE ANTENNA

For operation with only one antenna, connect the antenna to the chassis rear apron N-type connector marked J-103. The antenna is then connected to the coaxial relay which automatically transfers the antenna to the RF tuner for the frequency band selected.

3. OPERATION WITH TWO ANTENNAS

For operation with two antennas, connect the high band antenna to the chassis rear apron N-type connector marked J-103. The high frequency band antenna is then connected to the high frequency tuner through the coaxial relay each time the band switch is operated to the 60–260 mc position. Disconnect the coaxial cable leading from the coaxial relay to the low band RF tuner at the BNC-type connector labeled J-201 on the low frequency tuner subassembly. Locate the coaxial cable attached to the N-type chassis rear apron connector marked J-106, pull the end free of the clip which holds it and connect that end to the jack J-201. Connect the low band antenna to the chassis rear apron N-type connector marked J-106. The low band antenna will now reach the low frequency tuner through jack J-106 and the spare length of coaxial cable.

4. TUNING METER

The tuning meter indicates zero when the receiver is receiving an FM carrier and tuning is exactly at the center frequency. When tuning is below the carrier frequency the meter indicates to the left of zero and when tuning is above the carrier frequency the meter indicates to the right of zero. Since the meter does not function during AM reception, AM signals should be tuned in with the function switch set for FM operation after which receiver operation can be changed to AM.

Section 4
Maintenance

1. GENERAL

The Model 1907 Special Purpose Receiver will give comparatively trouble-free performance. However, should trouble occur, it is important that maintenance personnel be thoroughly familiar with Section 2, Theory of Operation. In addition, they should make use of Tables 4–1 and 4–2 (the voltage charts), Figures 4–1 through 4–12 which show the pin designations of transistors and relays and the locations of all parts in the receiver, and Figure 5–1, the complete schematic diagram.

The receiver presents no special maintenance problems and normally requires no care beyond being kept clean. Cleaning is best accomplished by the use of compressed air at not more than 60 psi. In addition, the gear trains may occasionally require a drop of light oil.

CAUTION

All maintenance work within the RF tuners in this receiver should be kept to a minimum and performed only by trained and experienced personnel. The placement of components and the dress of the leads within the tuners has been carefully engineered to give maximum performance. In making any replacements of such components great care should be exercised to duplicate the exact physical layout of the original assembly. In particular, the high band noise figure may be increased if the components in the high band RF tuner are disturbed and changes in the dress of the low band RF tuner B+ leads are apt to bring excessive oscillator radiation.

Table 4–1.—*Tube Socket Voltage Chart, Model 1907 Special Purpose Receiver*

Tube	Type	1	2	3	4	5	6	7	8	9
I. 30–60 MC TUNER-BAND SWITCH IN 30–60 MC POSITION										
V-201	6668	+1.8	+0.4	+1.8	0	6.15AC	0	+165	0	+140
V-202	6AK5	−2.3	0	6.15AC	0	+150	+63	0	......	......
V-203	6AF4A	[1]+78	(2)	0	6.15AC	0	(2)	[1]+78	......	......
II. 60–260 MC TUNER-BAND SWITCH IN 60–260 MC POSITION										
V-301	[3] 7077	......	......	......	......	......	......	......	......	......
V-302	[3] 7077	......	......	......	......	......	......	......	......	......
V-303	[4] 7077	......	......	......	......	......	......	......	......	......
V-304	6AK5	−1.5	0	6.15AC	0	+150	+52	0	......	......
V-305	6AF4A	[1]+66	(2)	6.10AC	0	+1.6	(2)	[1]+66	......	......
III. IF STRIP; BAND SWITCH, ANY POSITION; FUNCTION SWITCH IN BFO FOR V-406										
V-401	6DC6	+0.4	+1.5	6.1AC	0	+215	+89	0	......	......
V-402	6DC6	+0.4	+1.7	6.1AC	0	+225	+98	0	......	......
V-403	6CB6	0	+0.34	6.15AC	0	+145	[5]+77	0	......	......
V-404	6AK5	−0.4	0	6.15AC	0	+190	+70	0	......	......
V-405	6AL5	0	−11	0	4.95AC	0	0	−11	......	......
V-406	6CB6	−3.2	0	6.1AC	0	+143	+124	0	......	......

Notes:

1. DC voltages taken with 11-megohm VTVM.
2. AC voltages taken with 5000 ohms-per-volt AC meter.
3. Control settings: Function switch in 300 kc AM except for measuring potentials on V–406 when 20 kc AM-BFO RF Gain control should be in AVC position, video and monitor gain maximum clockwise, Band Switch as indicated.
4. Line voltage 115 VAC. No signal input to antenna.
5. Voltages taken to ground except 7077 tube filaments.

[1] Indicates use of 1-megohm isolating resistor on VTVM probe.
[2] Do not measure.
[3] Filament (pin-to-pin), 6.2AC; plate, +110; cathode, +0.15 to +0.7.
[4] Filament (pin-to-pin), 6.2AC; plate, +120; cathode, +0.15 to +0.7.
[5] In FM position, approximately +30.

Table 4–2.—*Transistorized Video Amplifier Voltage Chart, Model 1907 Special Purpose Receiver*

Transistor No.	Emitter	Base	Collector
Q–101*	−0.78	−0.12	+12.0
Q–102*	−0.85	−0.18	+12.0
Q–103	−9.6	−8.8	+3.1
Q–104	+2.4	+3.1	+12.0

Note.—Values vary with different transistors.

Voltages taken with 11-megohm VTVM with following conditions:

1. Function Switch: 300-kc AM position.
2. AVC: On.
3. Video gain maximum clockwise.
4. Monitor gain maximum clockwise.
5. No input signal; 115v AC Line.

* Emitter and Base of Q–101 and Q–102 may change polarity with some transistors.

2. TROUBLESHOOTING

By far the greatest percentage of troubles will be caused by failures of replaceable parts, particularly tubes, and the proper functioning of all tubes, fuses, relays, and semiconductors should be assured either by test or by replacement with parts known to be good before any further troubleshooting is carried out.

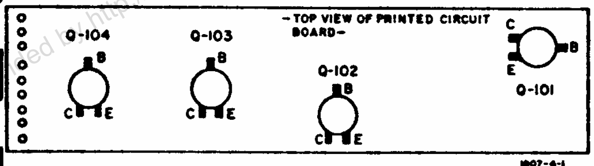


Figure 4–1. Transistor Socket Pin Designations

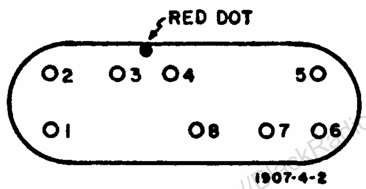


Figure 4–2. Miniature Relay Pin Designations

Once this has been done, the initial troubleshooting should be directed toward localizing the trouble to a specific portion of the receiver. The best means to accomplish this is to feed a signal in at the antenna inputs and then check the receiver operation for each mode of operation across each frequency band. Overall failure of the receiver usually indicates power supply trouble. Observation of the signal from each RF tuner, from both the AM detector and the FM discriminator and from the video amplifier can be made through the use of test points mentioned in the discussion of these units in Section 2. In addition, the two meters should be carefully observed to gain an indication which will help localize the trouble.

When the trouble has been narrowed down to a particular section or subassembly, voltage and resistance measurements, along with direct observation will usually give an indication of the faulty components. All connections should be checked to ensure that they are electrically adequate and any replaceable component tested to see that its value has not changed or that it has not become burned or damaged.

Further guides to checking the receiver performance are listed in Table 1 which presents the performance specifications, as well as in all the performance curves which have been included in Section 2.

Finally, it is recommended that, even though a realignment is not necessary, maintenance personnel familiarize themselves with the alignment procedures because these include methods of checking performance which might be of value in other work in addition to complete alignment.

3. ALIGNMENT, IF UNIT, SWEEP METHOD, 300 KC AND 20 KC BANDWIDTH

A. General Instructions.—In order to minimize the effect of 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 21.4-mc marker generator signal should be coupled in as required to produce a suitable marker pip. Check to ensure 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.

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

A low capacity shielded cable, such a 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 connections should be used on the oscilloscope.

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

B. Equipment Required.—The following equipment (or equivalent) is required to perform the alignment:

(1) Sweep Generator, Type RCA 59–C Modified.

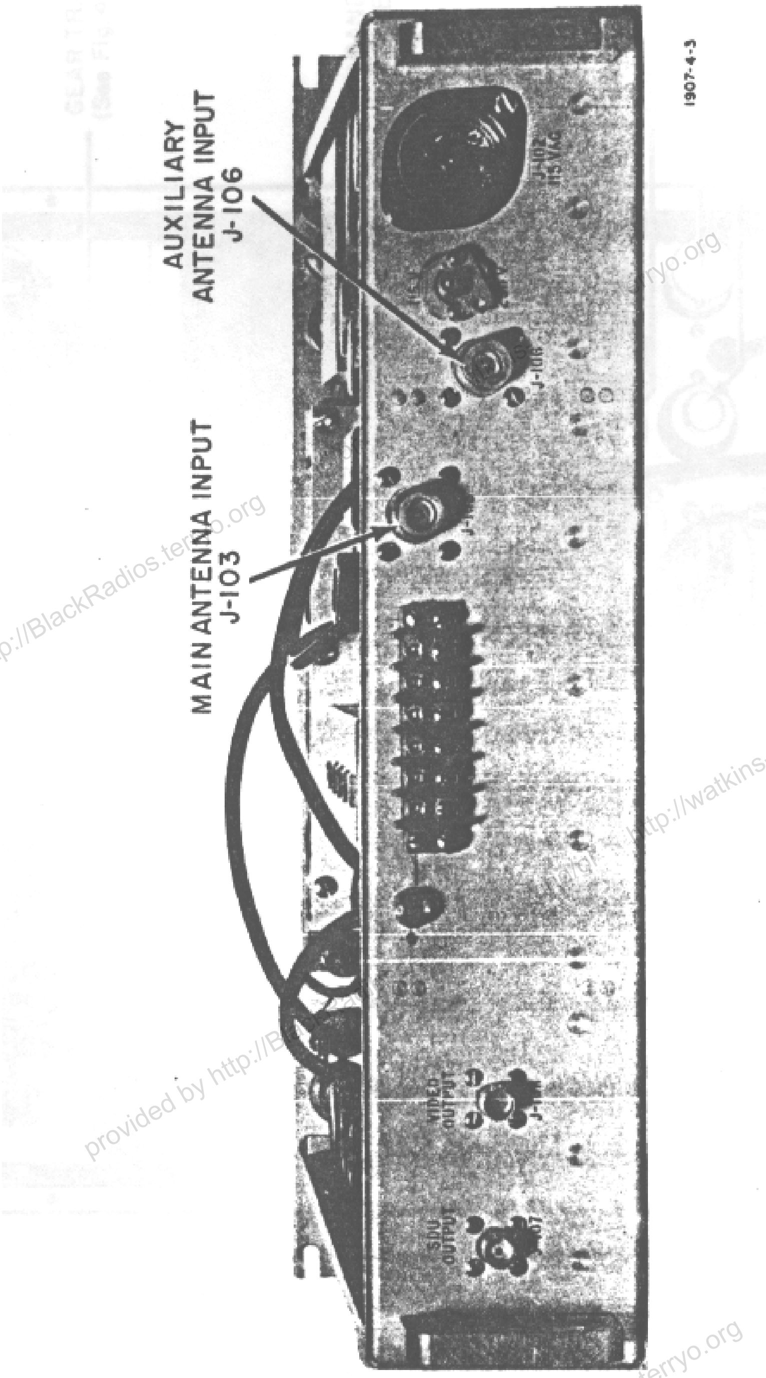


Figure 4-3. Chassis Rear Apron

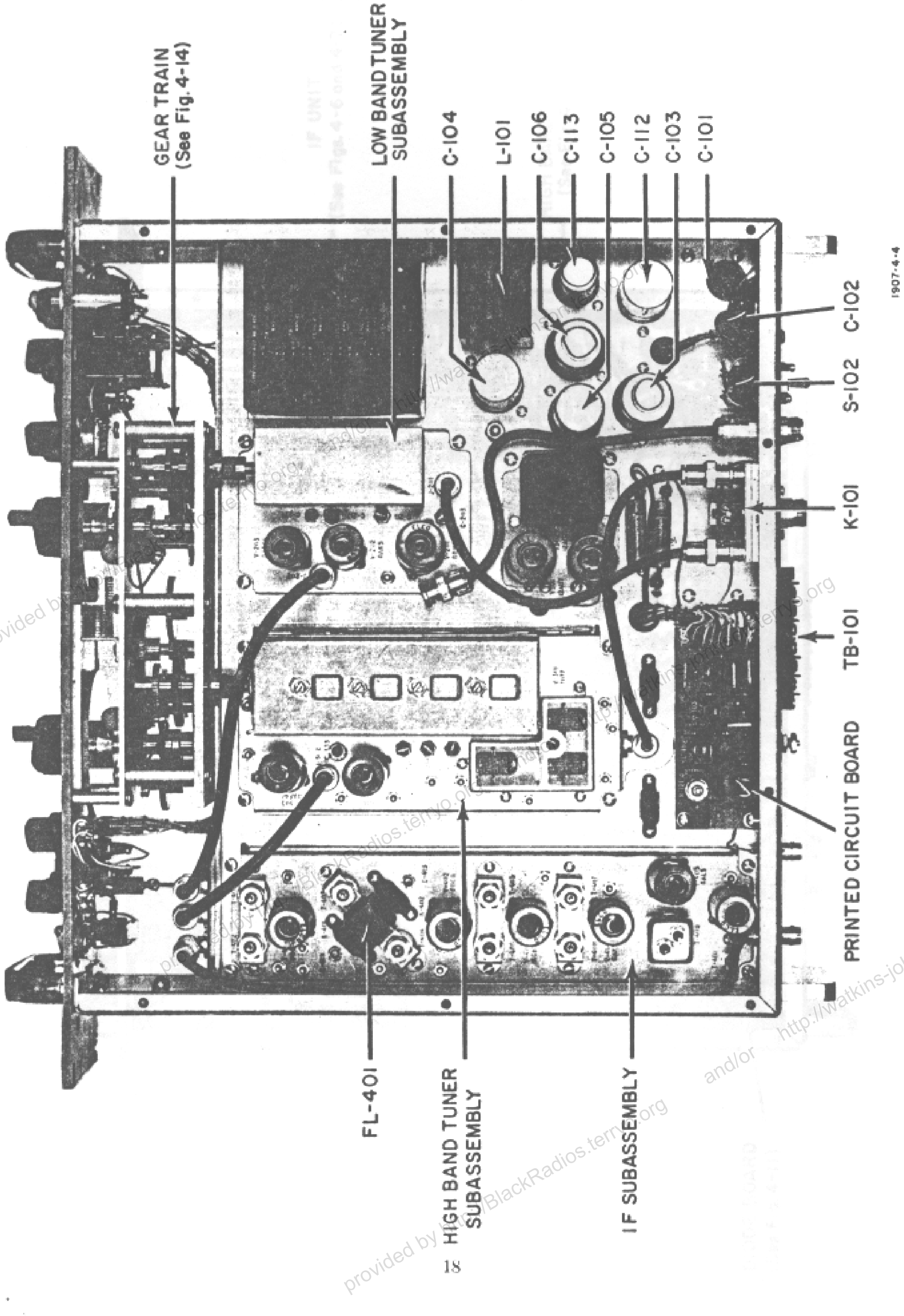


Figure 4-4. Chassis Top

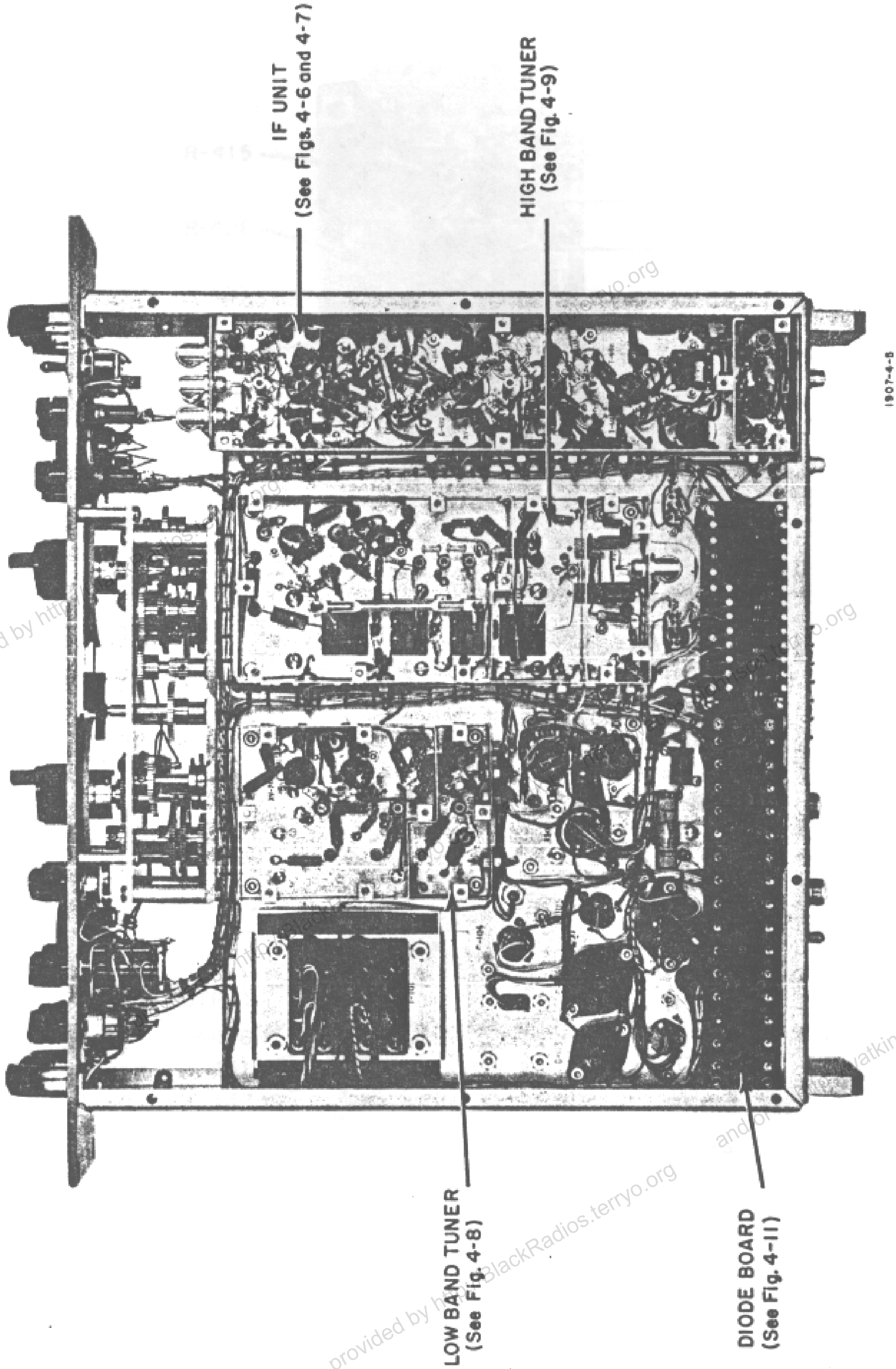


Figure 4-5. Chassis Bottom

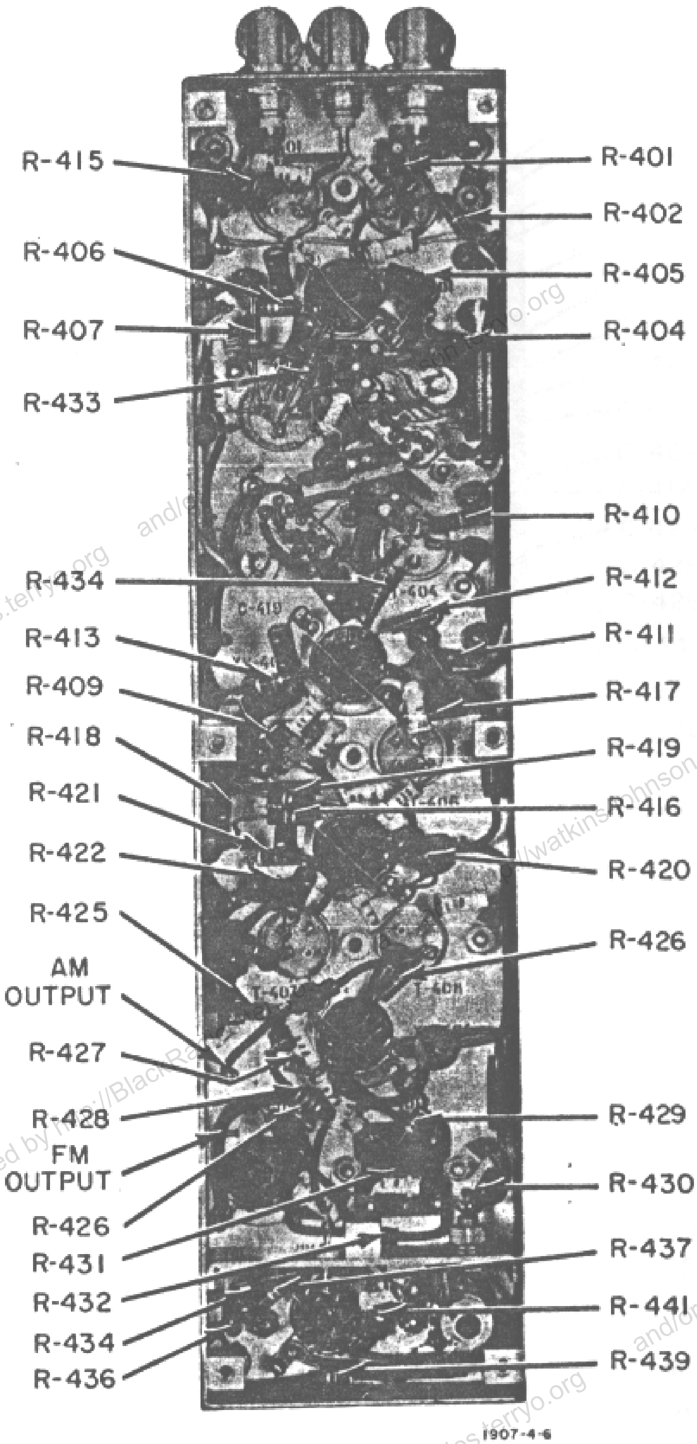


Figure 4-6. Resistor Identification, IF Unit Subassembly

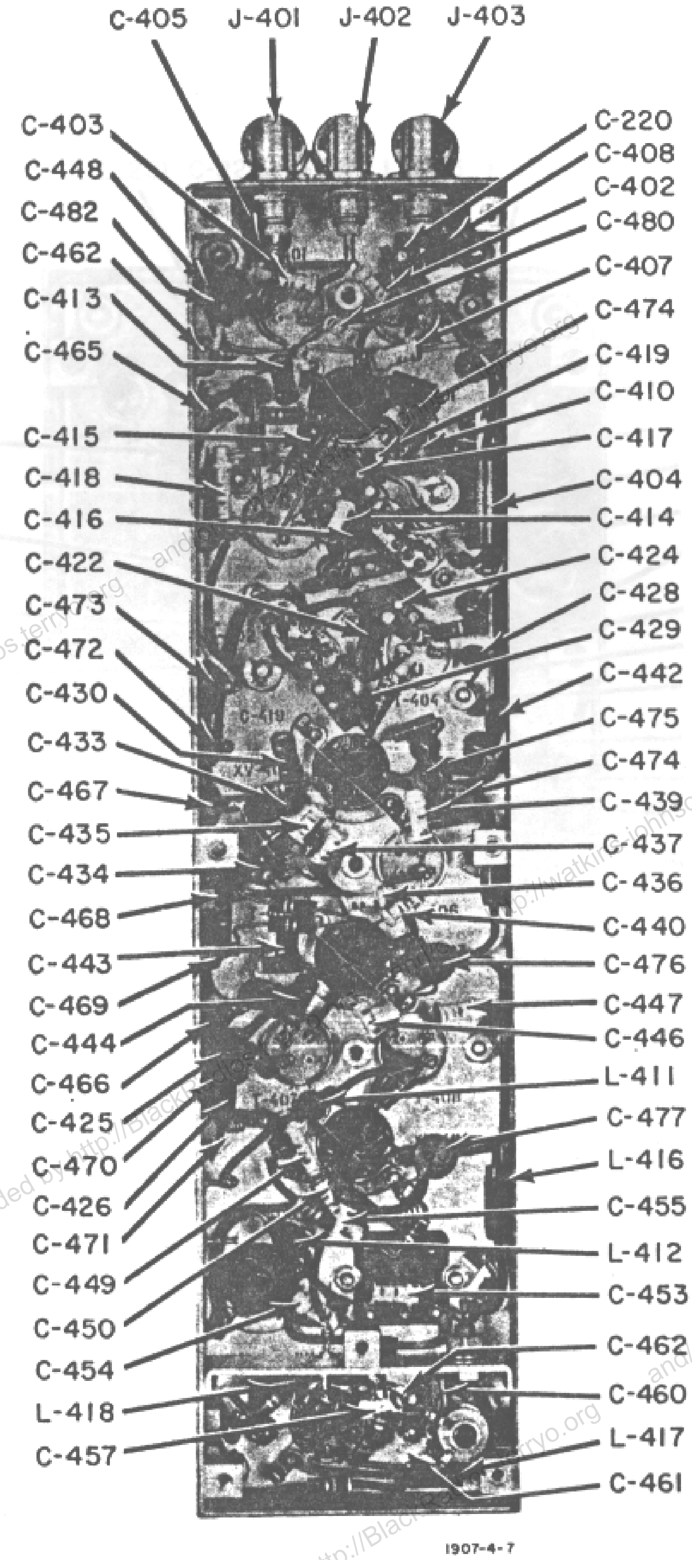


Figure 4-7. Capacitor and Coil Identification, IF Unit Subassembly

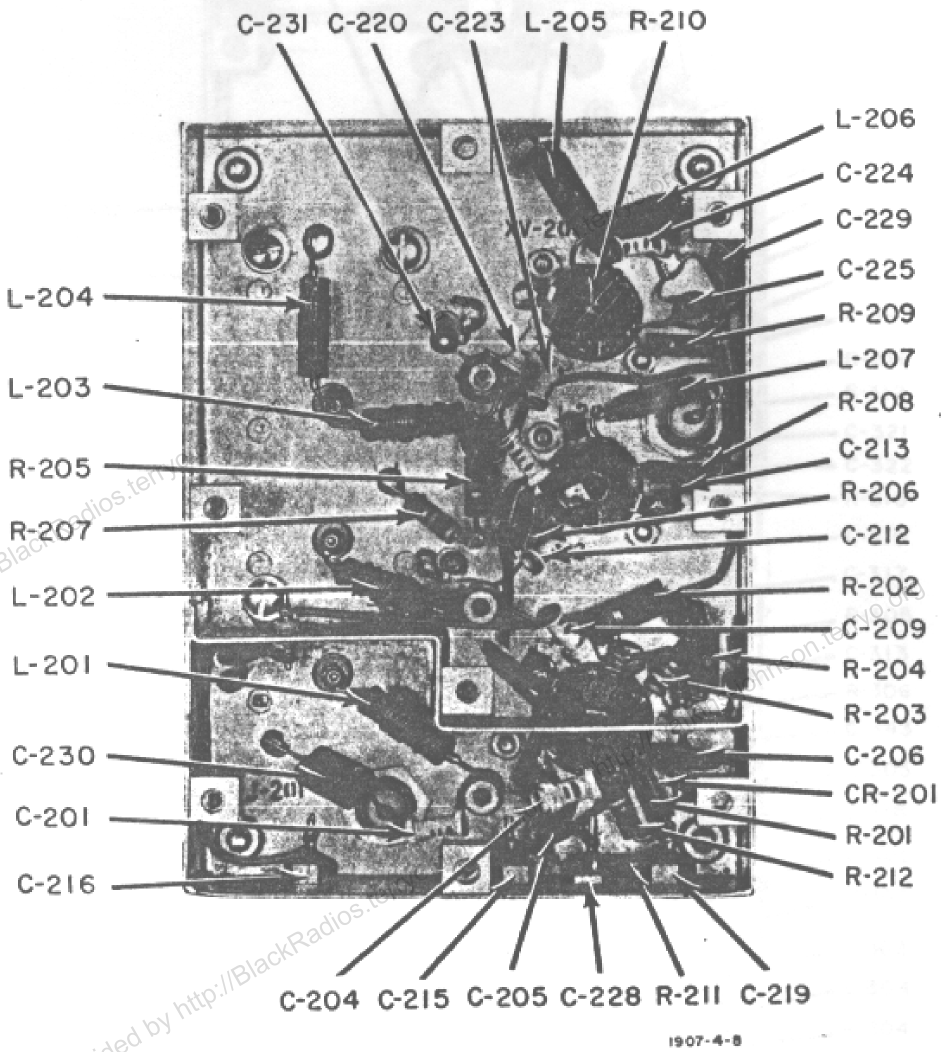


Figure 4-8. Low Band Tuner, Bottom View

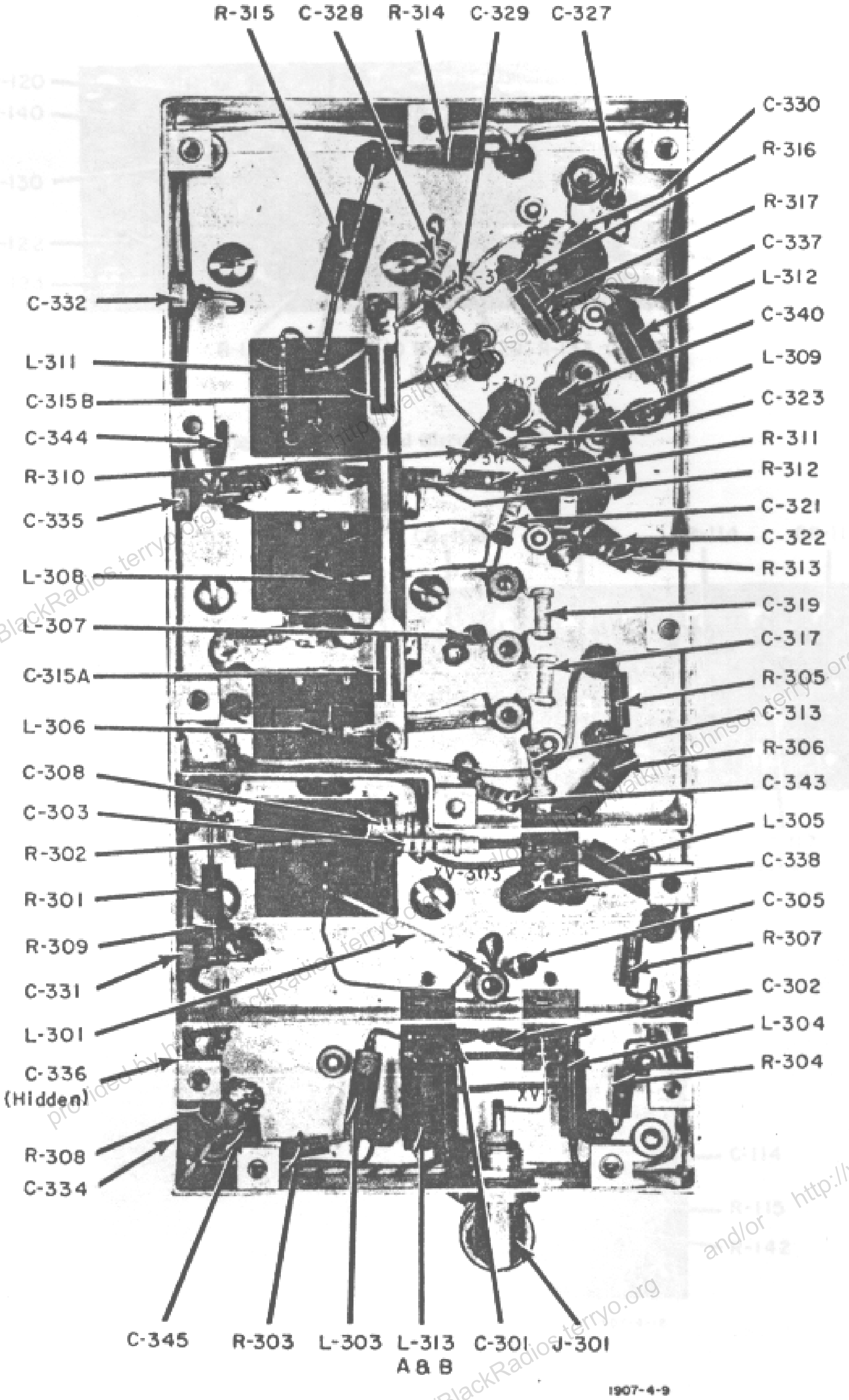


Figure 4-9. High Band Tuner, Bottom View

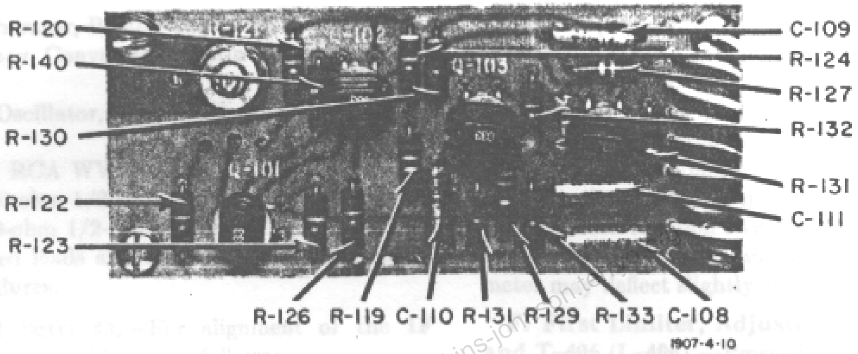


Figure 4-10. Printed Circuit Board

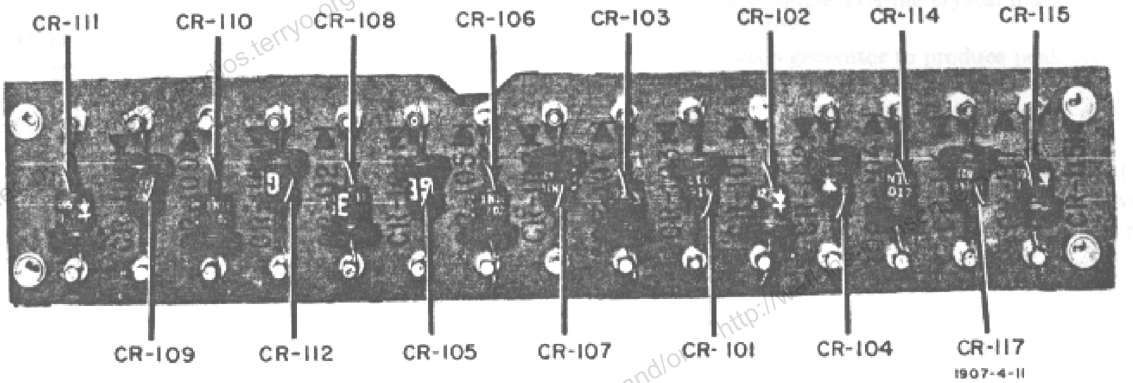


Figure 4-11. Diode Board

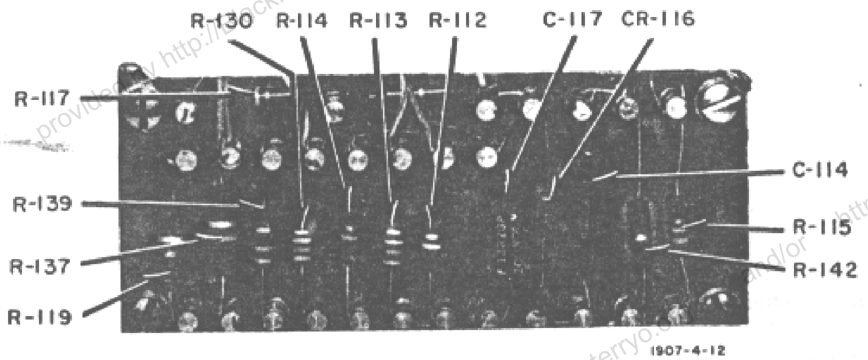


Figure 4-12. Resistor Board

(2) Oscilloscope, Type DuMont 304–A.

(3) 21.4 mc Center Frequency Crystal Controlled Marker.

(4) FM Generator, Booton Type 202–B.

(5) Frequency Converter, Booton Univerter Type 207–B.

(6) Audio Oscillator, Hewlett-Packard Type 200–CD.

(7) VTVM, RCA WV–98–A.

(8) One 10.0-ohm 1/2-watt resistor.

(9) One 200-ohm 1/2-watt resistor.

(10) Assorted leads and connectors as indicated by the test procedures.

C. Control Settings.—For alignment of the IF unit all controls should be set as follows:

(1) BFO TUNING control at reference mark.

(2) Function switch at 300 KC-AM position, unless otherwise indicated in procedures.

(3) VIDEO GAIN control at maximum counterclockwise position.

(4) RF GAIN-AVC control at maximum counterclockwise position just before point at which AGC is switched on.

(5) BAND SWITCH at 60–260 mc position.

D. Second Limiter, Adjustment of T–407 and T–408.—Proceed as follows:

(1) Remove V–402 from socket.

(2) Connect oscilloscope to AM OUTPUT point.

(3) Connect sweep generator to pin 3 of T–406 and ground cable shield to tube socket mounting strap nut. Set sweep generator output to maximum.

(4) Loosely couple 21.4 mc crystal marker generator to pin 3 of T–406.

(5) Adjust T–407 (L–407) and T–408 (L–408) for symmetrical response centered around 21.4 mc. Response should be about 1.8 mc wide at 3 db points.

E. Discriminator, Adjustment of T–409.—Proceed as follows:

(1) Remove first limiter tube, V–403, from socket.

(2) Connect sweep generator to pin 1 of V–404 and ground cable shield on tube socket mounting strap nut. Set sweep generator output to maximum.

(3) Loosely couple marker generator to pin 1 of V–404.

(4) Connect oscilloscope to FM OUTPUT point.

(5) Adjust primary and secondary of transformer T–409 for a symmetrical S-shaped discriminator curve centered around 21.4 mc. Adjustment for equal amplitude of the two peaks should be with marker disconnected to prevent base-line shift. Discriminator peak-to-peak separation should be 750kc ±30kc.

(6) Remove sweep generator and tightly couple in 21.4-mc marker generator.

(7) Replace oscilloscope with VTVM set to 1.5-volt DC range. Readjust secondary of T–409 for zero output voltage. (This is a fine adjustment which will not show up clearly on the oscilloscope.)

(8) With marker generator still connected, set function switch to 300 KC-FM position and zero tuning meter by adjusting potentiometer R–121. (The potentiometer is located on the printed circuit board. This adjustment should be made only after the receiver has been thoroughly warmed up.)

(9) Return function switch to 300 KC-AM position. (When function switch is in the AM position, the tuning meter may deflect slightly.)

F. First Limiter, Adjustment of T–405 (L–405) and T–406 (L–406).—Proceed as follows:

(1) Replace V–402 and V–403, remove V–401.

(2) Connect oscilloscope to AM OUTPUT point.

(3) Connect sweep generator to pin 1 of V–402 and ground shield on tube socket mounting strap nut.

(4) Loosely couple 21.4-mc crystal marker generator to pin 1 of V–402.

(5) Set sweep generator to produce peak oscilloscope deflection of 4 volts.

(6) Adjust T–405 (L–405), which is the primary of first limiter input coupling transformer, and T–406 (L–406), which is secondary of first limiter input coupling transformer, for symmetrical response curve centered around 21.4 mc. Shape of response curve should be flat topped or slightly double-peaked.

G. Second IF Amplifier and Crystal Filter, Adjustment of T–403, T–404, C–418, and C–419.—Proceed as follows:

(1) Arrange setup as shown in Figure 4–13 in which sweep generator with low sweep rate (5 cps) is used to make possible alignment of crystal filter without distorting response curve.

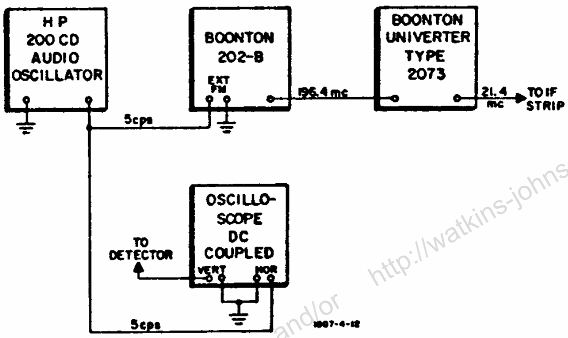


Figure 4–13. Second IF Amplifier-Crystal Filter Alignment Setup

(2) Replace V–401.

(3) Disconnect cable connected to J–102 on 60–260-mc tuner.

(4) Connect oscilloscope to AM OUTPUT point.

(5) Solder 10-ohm resistor between pin 1 of V-401 and ground on tube socket mounting strap nut.

(6) Solder one end of 200-ohm resistor to pin 1 of V-401.

(7) Connect low sweep rate generator between free end of 200-ohm resistor and grounded lead of 10-ohm resistor.

(8) Set function switch to 20 KC-AM position.

(9) Adjust sweep generator for sweep rate of 5 or 6 cycles per second and deviation of approximately 50 kc.

(10) Adjust T-403 (L-403) and T-404 (L-404) for best crystal filter response. (This response occurs at about maximum gain settings of T-403 (L-403) and T-404 (L-404). A slight ripple may occur on the top of the response and one corner may be more rounded than the other.)

(11) Replace low sweep rate generator with standard 60-cps sweep rate generator

(12) Set function switch to 300 KC-AM position.

(13) Adjust C-418 and C-419 for symmetrical response centered around 21.4 mc. (The response curve should be round-topped. After adjustment is completed, remove the 10-ohm resistors.)

H. First IF Amplifier, Adjustment of T-401 and T-402.—Proceed as follows:

(1) Reconnect cable to J-102.

(2) Install IF bottom cover and tighten all mounting screws.

(3) Connect oscilloscope to AM OUTPUT point.

(4) Connect sweep generator to TP-301 (C-333) and ground cable shield.

(5) Set sweep generator output to produce 4-volt peak oscilloscope deflection.

(6) Adjust T-401 (L-401) and T-402 (L-402) for symmetrical response centered around 21.4 mc. (The response should be very nearly flat-topped.)

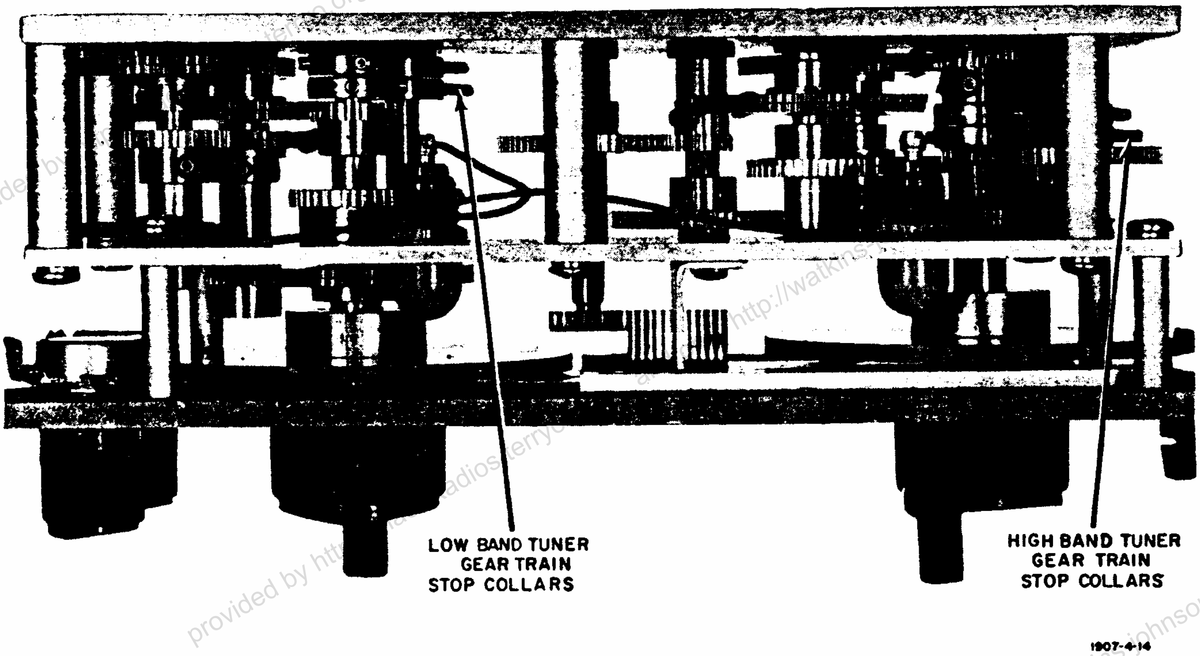


Figure 4-14. Gear Trains, High and Low Band Tuners

I. BFO.—Proceed as follows:

(1) Remove sweep generator and connect 21.4-mc crystal marker generator to TP–301 (C–333) on 60–260 mc tuner.

(2) Set function switch to 20-kc AM-BFO position and adjust L–413B for zero beat. Observe zero beat on oscilloscope attached to the AM OUTPUT point or with headphones, ensuring that BFO knob is aligned exactly on reference mark before zero beating commences. Adjustment of the RF GAIN may be made to obtain best beat note.

4. MECHANICAL ADJUSTMENT OF TUNING DIALS

A. General.—Normally the tuning dials will not need any adjustment in the field; however, they must read accurately before any adjustments are made in the RF section of the receiver and if it is suspected that the dials have slipped, the adjustment procedure, which is the same for either tuner, should be carried out.

B. Mechanical Adjustment Procedure, Low or High Band Tuner Dials.—Proceed as follows:

(1) Loosen both gear train stop collars (see fig. 4–14) on tuner being adjusted.

(2) Rotate dial to extreme high frequency end until dial is stopped by Inductuner stop. (Hairline should align with last mark on each dial, 269 mc and 67 mc. If not, loosen Inductuner coupling and set dial properly. Tighten set screws in Inductuner coupling when finished.)

(3) Back the dials off from Inductuner stop until dial reads 265 mc or 62 mc. Tighten set screws on stop collar which stops dial at high end of band.

(4) Rotate dial to low frequency end of band being adjusted and set stop collar which stops dial at low end of band so that dial travels approximately one division below last mark. (This completes the adjustment.)

5. ALIGNMENT, RF SECTIONS

A. Local Oscillator Adjustment.—The only adjustment necessary in the local oscillators is one made to make the tuning dials read accurately. Replacement of the oscillator tubes, V–202 in the low band tuner and V–305 in the high band tuner, may cause the dials to read inaccurately but it should be carefully noted that if the dials read accurately no local oscillator adjustments should be carried out. If adjustments are made, proceed as follows:

(1) Set function switch to 300 KC-AM position.

(2) Set band switch to frequency band corresponding to dial which is reading inaccurately.

(3) Connect CW source (either crystal calibrated or crystal controlled) of high accuracy to antenna input at jack J–103. (If the 30–60 mc tuner oscillator is being adjusted, set the output frequency at 60 mc. If the 60–260 mc oscillator is being adjusted, set the output frequency at 100 mc. In either case, keep the output below 1000μv to avoid overloading the IF section.)

(4) Make sure all bottom covers are in place.

(5) Connect VTVM to AM OUTPUT point.

(6) If 30–60 mc tuner oscillator is being adjusted, adjust C–221 (accessible on the chassis top near V–203) for maximum AGC voltage as indicated on VTVM. If 60–260 mc tuner oscillator is being adjusted, adjust C–326 (accessible on the chassis top near V–305) for maximum AGC voltage as indicated on VTVM. In either case, keep VTVM reading below −8 volts DC to avoid overloading IF unit.

B. 30–60 MC RF Tuner Tracking.—Proceed as follows:

(1) Ascertain that 30–60 mc dial reads accurately. If not, correct inaccuracy by adjusting local oscillator or by making mechanical adjustment.

(2) Set function switch to 300 KC-AM position.

(3) Set band switch to 30–60 mc position.

(4) Set RF GAIN control to AGC position.

(5) Ensure that all bottom covers are in place.

(6) Attach oscilloscope to test point TP–201.

(7) Feed sweep generator and marker into antenna input at jack J–103.

(8) Connect VTVM to AM OUTPUT point on IF chassis.

(9) Set receiver dial at 30 mc.

(10) Adjust marker accurately for 30 mc.

(11) Carefully adjust dial for maximum AGC voltage as indicated by VTVM, being careful not to let marker signal produce more than −8 volts of AGC in order to avoid overloading IF unit.

(12) Set sweep generator to 30 mc and observe response, adjusting marker amplitude as necessary. Marker blip should be seen at peak of response curve or no more than 10 percent down from peak. Adjust C–203 and C–211 until this is the case.

(13) Repeat steps (9), (10), (11), and (12) using 60-mc marker and sweep generator frequency.

(14) Continue adjusting C–203 and C–211 until response is satisfactory at both ends of band.

(15) Check at points between 30 and 60 mc. At these points, marker should not fall further than 25 percent from peak of response. (Further adjustment of C–203 and C–211 may be necessary to effect this condition.)

C. 60–260 MC RF Tuner Tracking.—It is not recommended that alignment of the 60–260 mc RF tuner be attempted in the field. The RF circuits within the subassembly are wide band compared with the IF selectivity and are designed around a Mallory S–4 Spiral Inductuner which has highly stable end inductors which will not need realignment. If such alignment is attempted, a noise generator and a 21.4 mc post amplifier are mandatory in order to obtain an RF response with the best noise figure.

Section 5
Replacement Parts List

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

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

Symbol No.	Name of Part and Description
C-101	CAPACITOR, CERAMIC DISC: 0.0047 μf GMV 1400VDCW, Type U, Radio Materials.
C-102	Same as C-101.
C-103A, B	CAPACITOR, ELECTROLYTIC: 2 Section 15-15 μf at 85° C. 350v, w/phenolic mtg washer, Sprague TVL-2625.
C-104A, B	CAPACITOR, ELECTROLYTIC: 2 Section 25-100 μf at 85° C. 50v, w/phenolic mtg washer, Sprague TVL-2324.
C-105	CAPACITOR, ELECTROLYTIC: 1 Section 500 μf at 85° C. 25v, w/phenolic mtg washer, Sprague TVL-1220.
C-106	Same as C-105.
C-107	CAPACITOR, PAPER METALIZED: 0.1 μf ±20% 200v, Aerovox P123ZGP.
C-108	CAPACITOR, TANTALUM SOLID ELECTROLITE: 4.7 μf ±10% 20v, Sprague 150D475X9020B2.
C-109	Same as C-108.
C-110	CAPACITOR, TANTALUM SOLID ELECTROLITE: 33 μf ±20% 6v, Sprague 150D336X0006B2.
C-111	CAPACITOR, TANTALUM SOLID ELECTROLITE: 10 μf ±20% 20v, Sprague 150D106X0020B2.
C-112A, B	Same as C-103A, B.
C-113	CAPACITOR ELECTROLYTIC: 1 Section 100 μf at 85° C. 50v, w/phenolic mtg washer, Sprague TVL-1317.
C-114	Same as C-107.
C-115	CAPACITOR, ELECTROLYTIC: 5 μf 150v, Sprague TVA1403.
C-116	Same as C-115.
C-117	Same as C-115.
C-201	CAPACITOR, CERAMIC: 12 μμf ±10% 500v, Erie NPO-A.
C-202	NOT USED.
C-203	CAPACITOR, CERAMIC TRIMMER: 1.5-10 μμf 600v, Centralab 829-10.
C-204	CAPACITOR, CERAMIC: 47 μμf ±10% 500v, Erie NPO-T.
C-205	CAPACITOR, CERAMIC DISC: 0.0047 μf GMV 500v, Sprague 20C8.
C-206	Same as C-205.
C-207	CAPACITOR, CERAMIC DISC: 0.001 μf GMV 1000v, Sprague 40C214.
C-208	CAPACITOR, CERAMIC BUTTON STANDOFF: 0.001 μf GMV 500v, Sprague 507C2.
C-209	CAPACITOR, CERAMIC: 5.6 μμf ±0.25 μμf 500v, Erie NPO-A.
C-210	CAPACITOR, CERAMIC: 18 μμf ±10% 500v, Erie NPO-A.
C-211	CAPACITOR, CERAMIC TRIMMER TUBULAR: 1-7.5 μμf 600VDCW, Centralab 829-7.
C-212	Same as C-201.
C-213	Same as C-207.
C-214	Same as C-207.
C-215	CAPACITOR, CERAMIC FEEDTHRU: 0.001 μf GMV, Sprague 514C1.
C-216	Same as C-215.
C-217	CAPACITOR, CERAMIC FEEDTHRU: 47 μμf ±20% 500v, Sprague 514C11A.

REPLACEMENT PARTS LIST—Continued

Symbol No.	Name of Part and Description
C–218	NOT USED.
C–219	Same as C–215.
C–220	CAPACITOR, CERAMIC: 0.5 μμf ±0.1 μμf 500v Erie NPO–A.
C–221	CAPACITOR, TRIMMER: 0.6–5.5 μμf JFD MQ103.
C–222	CAPACITOR, CERAMIC: 4.7 μμf ±0.25 μμf 500v, Erie NPO–A.
C–223	CAPACITOR, CERAMIC: 6.8 μμf ±0.5 μμf 500v, Erie NPO–A.
C–224	CAPACITOR, CERAMIC: 10 μμf ±1.0 μμf 500v, Erie NPO–A.
C–225	Same as C–207.
C–226	Same as C–205.
C–227	Same as C–205.
C–228	Same as C–215.
C–229	Same as C–205.
C–230	CAPACITOR, MICA: 62 μμf ±5% 500v, Elmenco CM15E620J.
C–231	CAPACITOR, CERAMIC: 3.3 μμf ±0.25 μμf 500v, Erie, type N330–A.
C–301	Same as C–207.
C–302	Same as C–207.
C–303	Same as C–208.
C–304	Same as C–208.
C–305	CAPACITOR, CERAMIC: 2.0 μμf ±0.1 μμf 500v, Erie NPO–A.
C–306	CAPACITOR, TRIMMER: 1–4 μμf 600v, Centralab 829–4.
C–307	Same as C–208.
C–308	CAPACITOR, CERAMIC: 30 μμf ±10% 500v, Erie NPO–T.
C–309	CAPACITOR, CERAMIC: 0.001 μf ±10% 500v, Erie GP2–302.
C–310	Same as C–208.
C–311	Same as C–309.
C–312	Same as C–211.
C–313	Same as C–309.
C–314	Same as C–211.
C–315A, B	CAPACITOR, PRINTED CIRCUIT: per Nems-Clarke A–17,729.
C–316	Same as C–208.
C–317	Same as C–305.
C–318	Same as C–211.
C–319	Same as C–305.
C–320	Same as C–211.
C–321	Same as C–224.
C–322	Same as C–207.
C–323	CAPACITOR, FIXED COMP: 0.27 μμf ±10% 500v, Quality Comp, type QC.
C–324	Same as C–208.
C–325	Same as C–208.
C–326	Same as C–221, modified per Nems-Clarke AA–26, 507.
C–327	CAPACITOR, CERAMIC: 8.2 μμf ±0.5 μμf 500v, Erie NPO–A.
C–328	CAPACITOR, CERAMIC: 5.6 μμf ±0.25 μμf 500v, Erie, type N220–A.
C–329	CAPACITOR, CERAMIC: 3.3 μμf ±0.1 μμf 500v, Erie NPO–A.
C–330	Same as C–220.
C–331	Same as C–215.
C–332	Same as C–215.
C–333	Same as C–217.
C–334	Same as C–215.
C–335	Same as C–215.
C–336	Same as C–215.
C–337	Same as C–205.
C–338	Same as C–207.
C–339	Same as C–208.
C–340	Same as C–205.
C–341	Same as C–208.
C–342	Same as C–208.
C–343	CAPACITOR, CERAMIC: 0.68 μμf ±0.1 μμf 500v, Erie NPO–A.
C–344	Same as C–205.

REPLACEMENT PARTS LIST—Continued

Symbol No.	Name of Part and Description
C–345	CAPACITOR, TANTALUM: 2.2 μf ±10% 20v, Sprague 150D225X9020A2.
C–346	Same as C–305.
C–401	CAPACITOR, MICA: 220 μμf ±5% 500v, Elmenco CM15E221J.
C–402	Same as C–222.
C–403	CAPACITOR, CERAMIC: 2.7 μμf ±0.1 μμf 500v, Erie NPO–A.
C–404	Same as C–107.
C–405	Same as C–205.
C–406	Same as C–208.
C–407	CAPACITOR, CERAMIC: 33 μμf ±10% 500v, Erie NPO–T.
C–408	Same as C–207.
C–409	Same as C–208.
C–410	Same as C–205.
C–411	Same as C–208.
C–412	Same as C–208.
C–413	CAPACITOR, CERAMIC: 470 μμf ±10% 500v, Erie GP2–331.
C–414	Same as C–208.
C–415	Same as C–413.
C–416	Same as C–309.
C–417	CAPACITOR, MICA: 68 μμf ±5% 500v, Elmenco CM15E680J.
C–418	CAPACITOR, GLASS TRIMMER: 1–28 μμf 500v, JFD MC–603.
C–419	Same as C–418.
C–420	CAPACITOR, MICA: 91 μμf ±5% 500v, Elmenco CM15E910J.
C–421	Same as C–327.
C–422	Same as C–420.
C–423	CAPACITOR, MICA: 120 μμf ±5% 500v, Elmenco CM15E121J.
C–424	Same as C–423.
C–425	Same as C–205.
C–426	Same as C–205.
C–427	Same as C–208.
C–428	Same as C–207.
C–429	Same as C–417.
C–430	Same as C–205.
C–431	Same as C–208.
C–432	Same as C–413.
C–433	Same as C–401.
C–434	CAPACITOR; CERAMIC: 360 μμf ±10% 500v, Erie GP2–331.
C–435	Same as C–327.
C–436	Same as C–208.
C–437	CAPACITOR, CERAMIC: 1.0 μμf ±0.1 μμf 500v, Erie NPO–A.
C–438	CAPACITOR, CERAMIC: 1.2 μμf ±0.1 μμf 500v, Erie NPO–A.
C–439	CAPACITOR, CERAMIC: 39 μμf ±10% 500 v, Erie NPO–T.
C–440	CAPACITOR, CERAMIC: 22 μμf ±10% 500v, Erie NPO–A.
C–441	Same as C–208.
C–442	Same as C–205.
C–443	CAPACITOR, CERAMIC: 270 μμf ±10% 500v, Erie GP2–331.
C–444	Same as C–443.
C–445	Same as C–443.
C–446	Same as C–437.
C–447	Same as C–407.
C–448	Same as C–215.
C–449	Same as C–309.
C–450	Same as C–309.
C–451	Same as C–407, P/O T–409.*
C–452	Same as C–440, P/O T–409.*
C–453	CAPACITOR, CERAMIC: 39 μμf ±10% 500v, Erie NO30–T.
C–454	CAPACITOR, CERAMIC: 27 μμf ±10% 500v, Erie NPO–T.
C–455	Same as C–343.
C–456	Same as C–208.
C–457	Same as C–440.

* Not separately replaceable.

REPLACEMENT PARTS LIST—Continued

Symbol No.	Name of Part and Description
C–458	Same as C–215.
C–459	Same as C–215.
C–460	CAPACITOR, MICA: 82 μμf ±5% 500v, Elmenco CM15E820J.
C–461	Same as C–223.
C–462	CAPACITOR, VOLTAGE VARIABLE: 2.2–26 μμf 100VDCW Pacific Semiconductors, Varicap V–10E.
C–463	Same as C–215.
C–464	Same as C–215.
C–465	Same as C–215.
C–466	Same as C–215.
C–467	Same as C–215.
C–468	Same as C–215.
C–469	Same as C–215.
C–470	Same as C–215.
C–471	Same as C–215.
C–472	Same as C–215.
C–473	Same as C–215.
C–474	Same as C–205.
C–475	Same as C–205.
C–476	Same as C–205.
C–477	Same as C–205.
C–478	CAPACITOR, CERAMIC DISC: 0.01 μf GMV 500v, Sprague 29C9B8.
C–479	Same as C–208.
C–480	CAPACITOR, CERAMIC: 1.5 μμf ±0.1 μμf 500v, Erie NPO–A.
C–481	Same as C–207.
C–482	Same as C–205.
C–501	Same as C–478.
C–502	Same as C–115.
CR–101	SEMICONDUCTOR DEVICE, Diode, Silicon: 1N1692.
CR–102	Same as CR–101.
CR–103	Same as CR–101.
CR–104	Same as CR–101.
CR–105	SEMICONDUCTOR DEVICE, Diode, Silicon: 1N1695.
CR–106	Same as CR–105.
CR–107	Same as CR–105.
CR–108	Same as CR–105.
CR–109	Same as CR–105.
CR–110	Same as CR–105.
CR–111	Same as CR–105.
CR–112	Same as CR–105.
CR–113	SEMICONDUCTOR DEVICE, Diode, Zener, Silicon: 150v ±5% 10w, Motorola 10M150Z5.
CR–114	Same as CR–101.
CR–115	Same as CR–101.
CR–116	SEMICONDUCTOR DEVICE, DIODE, SILICON: 1N457, #HD6006, Hughes.
CR–117	Same as CR–105.
CR–201	Same as CR–116.
CR–501	SEMICONDUCTOR DEVICE, Diode: 1N458.
DS–101	LAMP: 6v 0.2 amps T–1–3/4, Dialco #328.
DS–102	Same as DS–101.
DS–103	Same as DS–101, P/O S–106.*
E–201	SHIELD, ELECTRON TUBE: Collins 66J4.
E–202	SHIELD, ELECTRON TUBE: Collins 66J1.
E–203	Same as E–202.
E–304	Same as E–202.
E–305	Same as E–202.
E–401	SHIELD, ELECTRON TUBE: Collins 66J2.
E–402	Same as E–401.
E–403	Same as E–401.
E–404	Same as E–202.
E–405	Same as E–202.
E–406	Same as E–401.

* Not separately replaceable

REPLACEMENT PARTS LIST—Continued

Symbol No.	Name of Part and Description
E–501	SHIELD, ELECTRON TUBE: Collins 66J5.
E–502	Same as E–501.
F–101	FUSE: 3/4 amp slo-blo, Bussman MDL.
F–102	FUSE: 3/8 amp slo-blo, Bussman MDL.
FL–401	FILTER, BANDPASS CRYSTAL: 21.4 mc center frequency 3 db bandwidth 20kc ± 300 cps, type 11–B1, McCoy.
J–101	NOT USED.
J–102	CONNECTOR RECEPTACLE: Twist lock, Hubbell 7486.
J–103	CONNECTOR RECEPTACLE: Type N, P/O K–101.*
J–104	CONNECTOR RECEPTACLE: Type BNC, P/O K–101.*
J–105	Same as J–104.
J–106	CONNECTOR RECEPTACLE: Type N, UG–1052/U.
J–107	CONNECTOR RECEPTACLE: Type BNC, UG–291/U.
J–108	CONNECTOR RECEPTACLE: Type BNC, UG–290/U.
J–109	CONNECTOR RECEPTACLE: Phone jack, open circuit, Switchcraft C–11.
J–201	CONNECTOR RECEPTACLE: Type BNC, UG–1094/U.
J–202	Same as J–201.
J–301	CONNECTOR RECEPTACLE: Type BNC, UG–1098/U.
J–302	Same as J–201.
J–401	Same as J–301.
J–402	Same as J–301.
J–403	Same as J–301.
K–101	RELAY: 26VDCW 2.5 coil w/std non-shorting contacts elec. curve 2 coaxial assembly w/type N input connector and type BNC output connector, Danbury-Knudsen, type CR251N or #94CSA1/2–127, Automatic Metal, w/o dust cover.
K–102	RELAY: Miniature DPDT 24VDC, Potter & Brumfield SC11DA.
K–103	Same as K–102.
K–401	Same as K–102.
K–402	Same as K–102.
K–501	RELAY: Potter & Brumfield TS4519–1.
L–101	CHOKE ASSEMBLY: 8 hy 75 ma, per Nems-Clarke AB–31,824.
L–201	COIL RF: 0.158 μh, per Nems-Clarke AA–23,868.
L–202	Same as L–201.
L–203	COIL RF: 0.235 μh, per Nems-Clarke AA–23,870.
L–204	COIL RF: 1.23 μh, per Nems-Clarke AA–23,871.
L–205	COIL RF: 2.8 μh, per Nems-Clarke AA–16,625.
L–206	Same as L–205.
L–207	COIL RF: 2.7 μh, Wilco 210–11–27.
L–208A, B, C	TUNER SPIRAL: 3 Section, Mallory HLT–142–1/FAX–903, mod. per Nems-Clarke A–25,303.
L–301	INDUCTOR END ADJUSTABLE: per Nems-Clarke A–25,192.
L–302A, B, C, D	TUNER SPIRAL: 4 Section, Mallory 8304, mod. per Nems-Clarke A–25,178.
L–303	INDUCTOR RF CHOKE: 4.7 μh, Wilco 213–11–47.
L–304	Same as L–303.
L–305	INDUCTOR RF CHOKE: 14 μh, per Nems-Clarke AA–14,735.
L–306	INDUCTOR END ADJUSTABLE: per Nems-Clarke A–25,193.
L–307	COIL RF: 1.67 μh, per Nems-Clarke AA–14,737.
L–308	INDUCTOR END ADJUSTABLE: per Nems-Clarke A–25,191.
L–309	Same as L–307.
L–310	INDUCTOR END FIXED: per Nems-Clarke A–25,189.
L–311	INDUCTOR RF FIXED: 1.13 μh, per Nems-Clarke AA–23,562.

* Not separately replaceable.

REPLACEMENT PARTS LIST—Continued

Symbol No.	Name of Part and Description
L-312	Same as L-205.
L-313A, B	INDUCTOR RF CHOKE BIFILAR: 7μh per Nems-Clarke AA-25,195.
L-314	NOT USED.
L-315	COIL: #22, Bus wire 1-3/8 in. lg.
L-401	COIL WINDING: per Nems-Clarke AA-25,272-1, P/O T-401, 403, 404.*
L-402	COIL WINDING: per Nems-Clarke AA-25,272-2, P/O T-402, 406.*
L-403	Same as L-401.
L-404	Same as L-401.
L-405	COIL WINDING: per Nems-Clarke AA-25,272-3. P/O T-405.*
L-406	Same as L-402.
L-407	COIL WINDING: per Nems-Clarke AA-25,272-4, P/O T-407, 408.*
L-408	Same as L-407.
L-409	COIL WINDING: per Nems-Clarke AA-25,237, P/O T-409.*
L-410A, B	COIL WINDING: per Nems-Clarke AA-25,238 P/O T-409.*
L-411	COIL RF CHOKE: 28 μh, per Nems-Clarke AA-14,804.
L-412	Same as L-411.
L-413A, B	COIL WINDING: per Nems-Clarke AB-32-095, P/O T-410.*
L-414	Same as L-205.
L-415	Same as L-205.
L-416	Same as L-205.
L-417	Same as L-205.
L-418	RF CHOKE: 6.6 μh, per Nems-Clarke AA-25,641.
M-101	METER: 0-100 DC Microampere movement panel mtg 1 in. Inter. Instr. #100C100X1.
M-102	METER: 100-0100 DC Microampere movement panel mtg 1 in. Inter. Instr. #100C 100-0-100 DCUA.
P-101	CONNECTOR, POWER: molded plug & cable assembly 10 ft. lg, Cornish 3533, P/O W-101.
P-102	CONNECTOR, POWER: plug twistlock, Hubbell 7484, P/O W-101.*
P-103	CONNECTOR PLUG: type N UG-21B/U.
P-104	CONNECTOR PLUG: type BNC UG-88/U.
P-105	Same as P-104.
P-106	Same as P-103..
P-107	Same as P-104.
P-108	Same as P-104.
P-109	CONNECTOR PLUG PHONE: P/O monitor output not supplied.
P-201	Same as P-104.
P-202	CONNECTOR PLUG: type BNC UG-260/U.
P-301A, B	Same as P-104.
P-302	Same as P-202.
P-401	Same as P-202.
P-402	Same as P-202.
P-403	Same as P-104.
Q-101	TRANSISTOR: Texas Instr. 2N117.
Q-102	Same as Q-101.
Q-103	Same as Q-101.
Q-104	Same as Q-101.
R-101	RESISTOR, VARIABLE COMP: 10k ±20% 1/2w "A" taper w/3/8 in. lg x 1/4 in. dia bushing 3/4 in. lg, plain shaft, Cts type 65 JF21247.
R-102	NOT USED.
R-103	RESISTOR, FIXED COMP: 1k ±10% 2w, AB HB 1021.
R-104	NOT USED.
R-105	NOT USED.
R-106	RESISTOR, FIXED COMP: 8.2Ω ±5% 1w, AB GB 82G5.
R-107	RESISTOR, FIXED WIREWOUND: 2.2k ±3% 10w, Dalohm RH-10.
R-108	RESISTOR, FIXED COMP: 390Ω ±5% 1/2w, AB EB 3915.

* Not separately replaceable

REPLACEMENT PARTS LIST—Continued

Symbol No.	Name of Part and Description
R-109	Same as R-108.
R-110	RESISTOR, FIXED COMP: 330k ±10% 1/2w, AB EB 3341.
R-111	RESISTOR, VARIABLE COMP: 10k ±20% 1w w/spdt switch to actuate at end of CW rotation 3 amp at 125VAC w/3/8 in. bushing 3/4 in. lg, plain shaft, Cts. JF21250 VF-90.
R-112	RESISTOR, FIXED COMP: 150k ±10% 1/2w, AB EB 1541.
R-113	Same as R-110.
R-114	RESISTOR, FIXED COMP: 62k ±5% 1/2w, AB EB 6235.
R-115	NOT USED.
R-116	RESISTOR, FIXED COMP: 27k ±10% 1/2w, AB EB 2731.
R-117	Same as R-116.
R-118	Same as R-102.
R-119	RESISTOR, FIXED COMP: 68k ±10% 1/2w, AB EB 6831.
R-120	RESISTOR, FIXED COMP: 36k ±5% 1/2w, AB EB 3635.
R-121	RESISTOR, VARIABLE COMP: 25k ±20% 1/2w std D taper w/3/8 in. locking bushing 1/2 in. slotted shaft, Cts type 65 JF21249.
R-122	Same as R-114.
R-123	RESISTOR, FIXED COMP: 10k ±5% 1/2w, AB EB 1035.
R-124	RESISTOR, FIXED COMP: 47k ±5% 1/2w, AB EB 4735.
R-125	Same as R-104.
R-126	RESISTOR, FIXED COMP: 75k ±5% 1/2w, AB EB 7535.
R-127	RESISTOR, FIXED COMP: 15k ±10% 1/2w, AB EB 1531.
R-128	Same as R-101.
R-129	RESISTOR, FIXED COMP: 3.3k ±10% 1/2w, AB EB 3321.
R-130	RESISTOR, FIXED COMP: 3.3k ±5% 1/2w, AB EB 3325.
R-131	RESISTOR, FIXED COMP: 1k ±5% 1/2w, AB EB 1025.
R-132	Same as R-114.
R-133	RESISTOR, FIXED COMP: 2.7k ±5% 1/2w, AB EB 2725.
R-134	RESISTOR, FIXED COMP: 270Ω ±10% 1/2w, AB EB 2711.
R-135	RESISTOR, VARIABLE COMP: 2.5k ±20% 1/2w "A" taper w/3/8 in. lg x 1/4 in. dia bushing 3/4 in. lg. plain shaft, Cts type 65 JF21248.
R-136	RESISTOR, FIXED COMP: 2.2k ±10% 1/2w, AB EB 2221.
R-137	RESISTOR, FIXED COMP: 15k ±10% 1w, AB GB 1531.
R-138	RESISTOR, VARIABLE COMP: 5k ±20% 1/2w std D taper w/3/8 in. lg x 1/4 in. dia bushing 3/4 in. lg plain shaft, Cts. type 65.
R-139	Same as R-129.
R-140	Same as R-123.
R-141	Same as R-101.
R-142	RESISTOR, FIXED COMP: 2.7k ±10% 1/2w, AB EB 2721.
R-143	RESISTOR, VARIABLE COMP: 2.5 meg, Cts. 6001.
R-144	NOT USED.
R-145	RESISTOR, FIXED COMP: 13k ±5% 1/2w, AB EB 1335.
R-201	RESISTOR, FIXED COMP: 160Ω ±5% 1/2w, AB EB 1615.
R-202	RESISTOR, FIXED COMP: 6.8k ±5% 1w, AB GB 6825.
R-203	RESISTOR, FIXED COMP: 39k ±5% 1/2w, AB EB 3935.
R-204	RESISTOR, FIXED COMP: 820Ω ±10% 1/2w, AB EB 8211.
R-205	Same as R-116.
R-206	RESISTOR, FIXED COMP: 470k ±10% 1/2w, AB EB 4741.
R-207	Same as R-206.

REPLACEMENT PARTS LIST—Continued

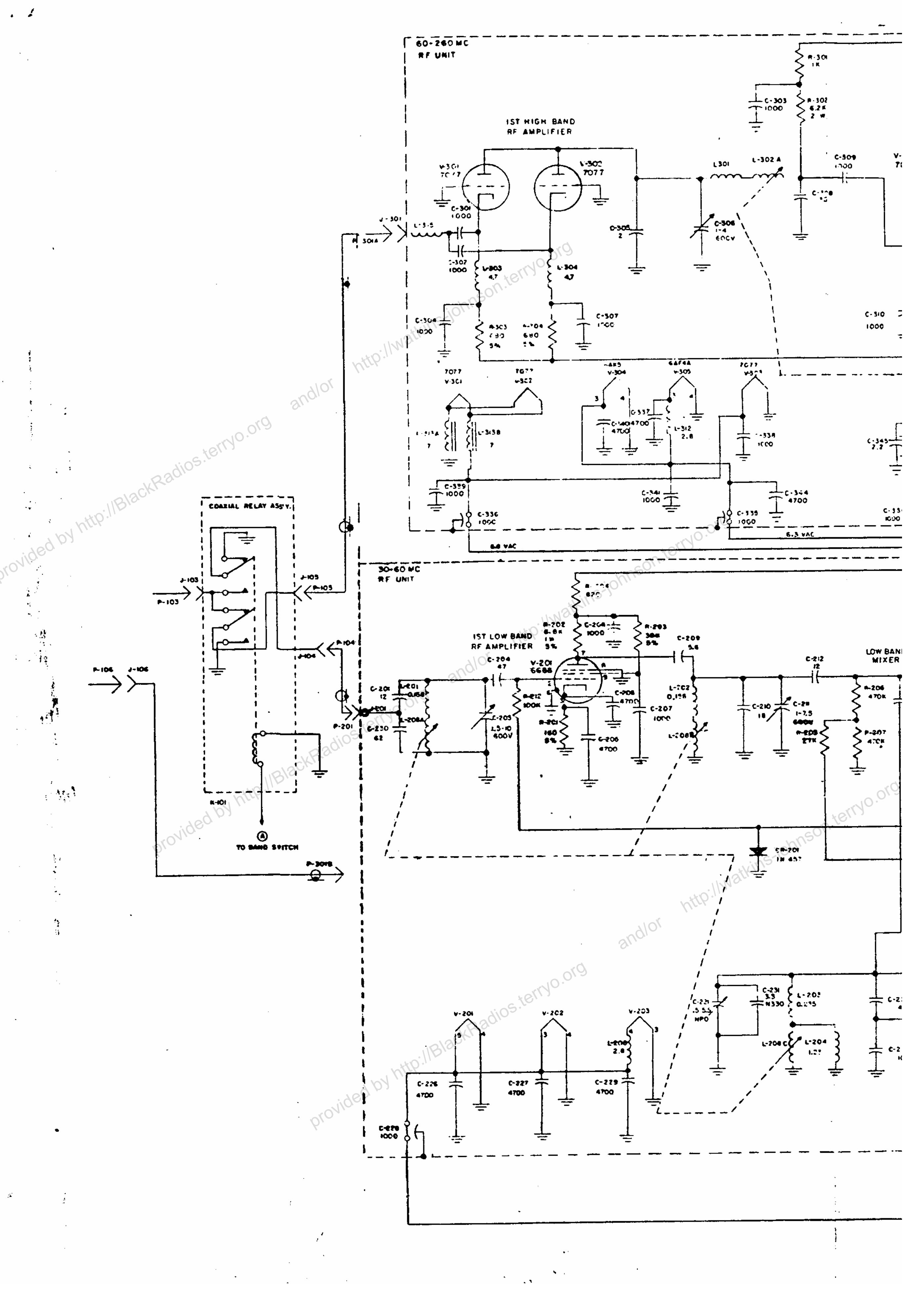
Symbol No.	Name of Part and Description
R-208	Same as R-112.
R-209	RESISTOR, FIXED COMP 8.2k ±5% 1/2w, AB EB 8225.
R-210	RESISTOR, FIXED COMP: 100k ±5% 1/2w AB EB 1045.
R-211	RESISTOR, FIXED COMP: 22 meg ±10% 1/2w, AB EB 2261.
R-212	RESISTOR, FIXED COMP: 100k ±10% 1/2w, AB EB 1041.
R-301	RESISTOR, FIXED COMP: 1k ±10% 1/2w, AB EB 1021.
R-302	RESISTOR, FIXED COMP: 6.2k ±5% 2w, AB HB 6225.
R-303	RESISTOR, FIXED COMP: 680Ω ±5% 1/2w, AB EB 6815.
R-304	Same as R-303.
R-305	RESISTOR, FIXED COMP: 2.7k ±10% 1/2w, AB EB 2721.
R-306	RESISTOR, FIXED COMP: 12k ±10% 1w, AB GB 1231.
R-307	Same as R-303.
R-308	RESISTOR, FIXED COMP: 6.8k ±5% 1/2w, AB EB 6825.
R-309	RESISTOR, FIXED COMP: 330k ±5% 1/2w, AB EB 3345.
R-310	Same as R-116.
R-311	Same as R-206.
R-312	Same as R-206.
R-313	Same as R-112.
R-314	RESISTOR, FIXED COMP: 1k ±10% 1w, AB GB 1021.
R-315	RESISTOR, FIXED COMP: 8.2k ±5% 2w, AB HB 8225.
R-316	RESISTOR, FIXED COMP: 27k ±5% 1/2w, AB EB 2735.
R-317	RESISTOR, FIXED COMP: 220Ω ±5% 1/2w, AB EB 2215.
R-401	RESISTOR, FIXED COMP: 47Ω ±10% 1/2w, AB EB 4701.
R-402	RESISTOR, FIXED COMP: 220k ±10% 1/2w, AB EB 2241.
R-403	Same as R-316.
R-404	RESISTOR, FIXED COMP: 68Ω ±5% 1/2w, AB EB 6805.
R-405	RESISTOR, FIXED COMP: 82Ω ±5% 1/2w, AB EB 8205.
R-406	RESISTOR, FIXED COMP: 47k ±10% 1/2w, AB EB 4731.
R-407	Same as R-301.
R-408	NOT USED.
R-409	Same as R-301.
R-410	Same as R-402
R-411	Same as R-404.
R-412	Same as R-405.
R-413	Same as R-406.
R-414	Same as R-301.
R-415	Same as R-301.
R-416	RESISTOR, FIXED COMP: 820k ±10% 1/2w, AB EB 8241.
R-417	RESISTOR, FIXED COMP: 47k ±5% 1/2w, AB EB 4735.
R-418	Same as R-406.
R-419	Same as R-212.
R-420	RESISTOR, FIXED COMP: 51Ω ±5% 1/2w, AB EB 5105.
R-421	RESISTOR, FIXED COMP: 22k ±10% 1/2w, AB EB 2231.
R-422	Same as R-406.
R-423	Same as R-301.
R-424	NOT USED.
R-425	Same as R-301.
R-426	RESISTOR, FIXED COMP: 22k ±5% 1/2w, AB EB 2235.
R-427	RESISTOR, FIXED COMP: 33k ±10% 1/2w, AB EB 3331.
R-428	Same as R-427.
R-429	Same as R-406.
R-430	Same as R-210.
R-431	Same as R-210.

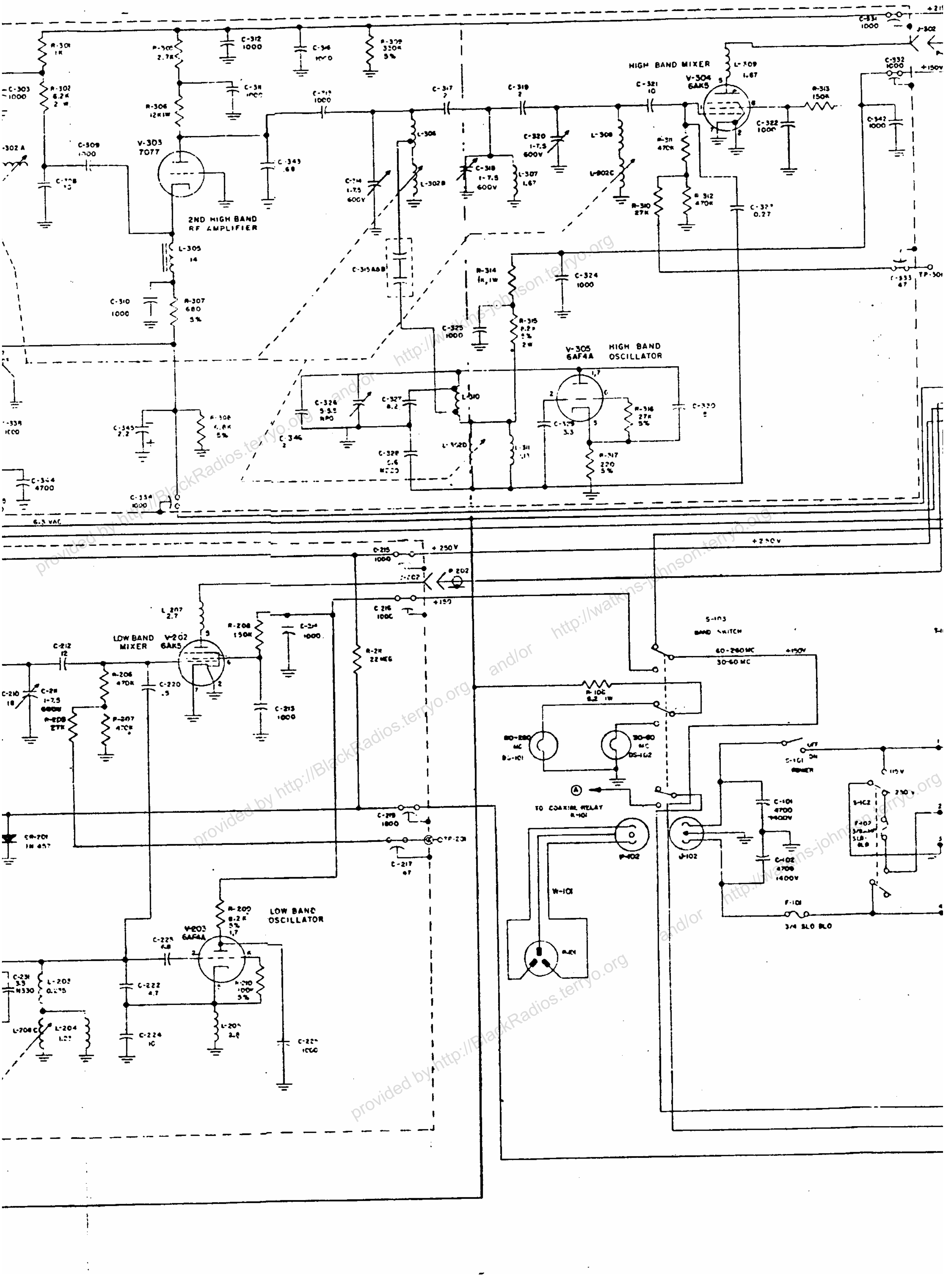
REPLACEMENT PARTS LIST—Continued

Symbol No.	Name of Part and Description
R–432	Same as R–123.
R–433	RESISTOR, FIXED COMP: 33k ±5% 1/2w, AB EB 3335.
R–434	Same as R–433.
R–435	RESISTOR, FIXED COMP: 10k ±10% 1/2w, AB EB 1031.
R–436	Same as R–301.
R–437	Same as R–435.
R–438	Same as R–408.
R–439	Same as R–406.
R–440	RESISTOR, FIXED COMP: 4.7Ω ±10% 1w, AB GB 47G1.
R–441	Same as R–406.
R–501	RESISTOR, FIXED COMP: 4.7 meg ±10% 1/2w, AB EB 4751.
R–502	RESISTOR, FIXED COMP: 510k ±5% 1/2w, AB EB 5145.
R–503	RESISTOR, FIXED COMP: 1 meg ±10% 1/2w, AB EB 1051.
R–504	RESISTOR, FIXED COMP: 47k ±10% 1w, AB GB 4731.
R–505	RESISTOR, FIXED COMP: 11k ±5% 2w, AB HB 1135.
R–506	Same as R–505.
R–507	RESISTOR, FIXED COMP: 20k ±5% 1/2w, AB EB 2035.
R–508	NOT USED.
R–509	RESISTOR, FIXED COMP: 100k ±10% 1/2w, AB EB 1041.
R–510	RESISTOR, FIXED COMP: 68k ±10% 1/2w, AB EB 6831.
R–511	RESISTOR, FIXED COMP: 300Ω ±5% 1/2w, AB EB 3015.
R–512	Same as R–503.
S–101	SWITCH TOGGLE: spst, Cutler-Hammer 8280–K16.
S–102	SWITCH TOGGLE: dpdt 3 amp at 250v, Cutler-Hammer 8363–K7.
S–103	SWITCH ROTARY: 3 pole 2 position non-shorting, Grayhill 5–003–2.
S–104	SWITCH ROTARY: 3 pole 4 position non-shorting, Grayhill 5–003–4.
S–105	SWITCH: spdt P/O R–111, not separately replaceable.
S–106	SWITCH COMBINATION LAMPHOLDER: Con. of Amer. #A3234W.
T–101	TRANSFORMER POWER: per Nems-Clarke AB–31,869.
T–401	TRANSFORMER IF: per Nems-Clarke AA–25,274.
T–402	TRANSFORMER IF: per Nems-Clarke AA–25,275.
T–403	Same as T–401.
T–404	Same as T–401.
T–405	TRANSFORMER IF: per Nems Clarke AA–25,276.
T–406	Same as T–402.
T–407	TRANSFORMER IF: per Nems-Clarke AA–25,277.
T–408	Same as T–407.
T–409	TRANSFORMER IF DISCRIMINATOR: per Nems-Clarke AB–32,064.
T–410	TRANSFORMER IF TUNING: BFO per Nems-Clarke AB–32,095.
TB–101	TERMINAL STRIP: Cinch Jones #6–140–Y.
TP–201	TERMINAL OF C–217.
TP–301	TERMINAL OF C–333.
V–201	ELECTRON TUBE: 6688 Amperex.
V–202	ELECTRON TUBE: 6AK5.
V–203	ELECTRON TUBE: 6AF4A.
V–301	ELECTRON TUBE: GE 7077.
V–302	Same as V–301.
V–303	Same as V–301.
V–304	Same as V–202.
V–305	Same as V–203.
V–401	ELECTRON TUBE: 6DC6
V–402	Same as V–401.
V–403	ELECTRON TUBE: 6BC6.

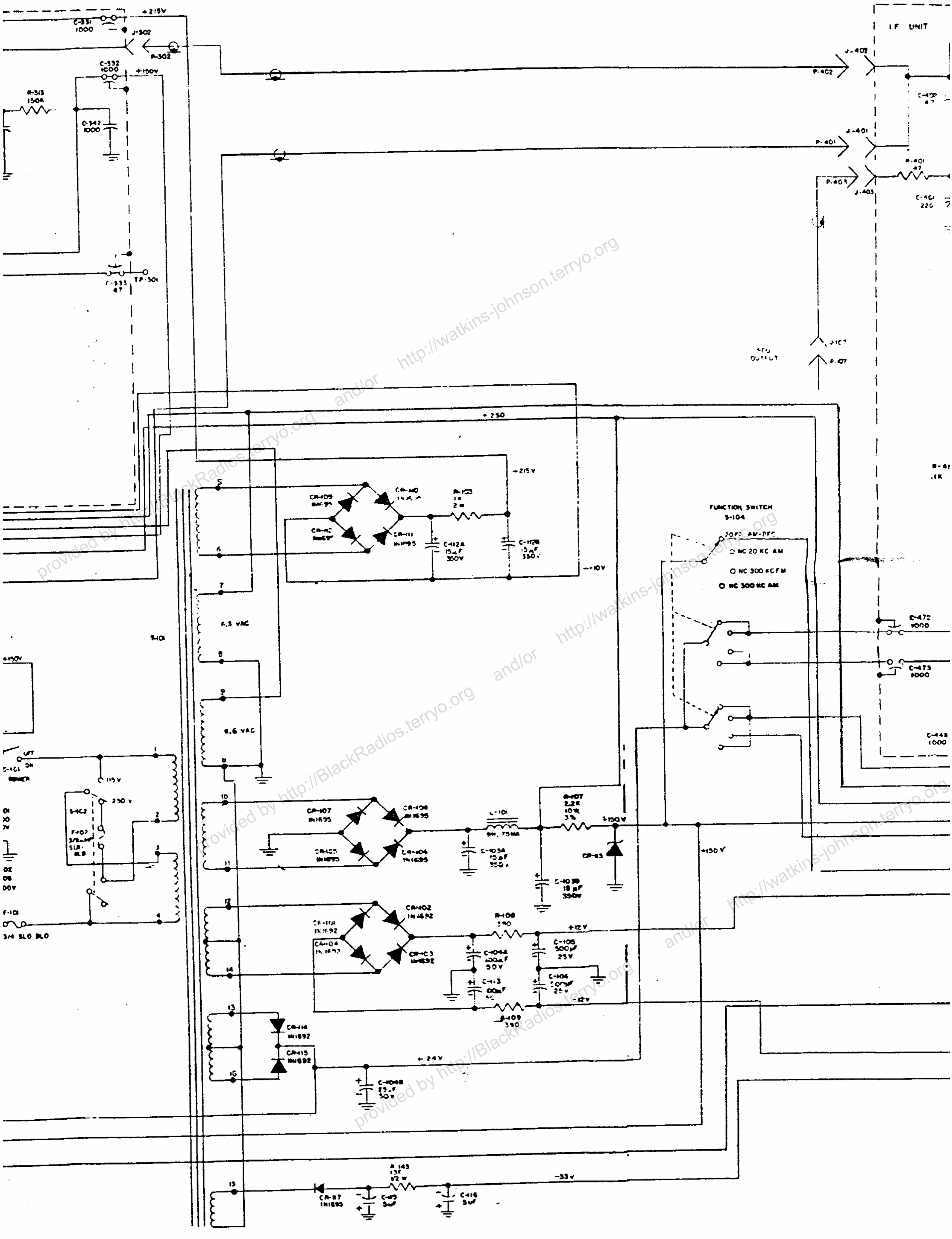
REPLACEMENT PARTS LIST—Continued

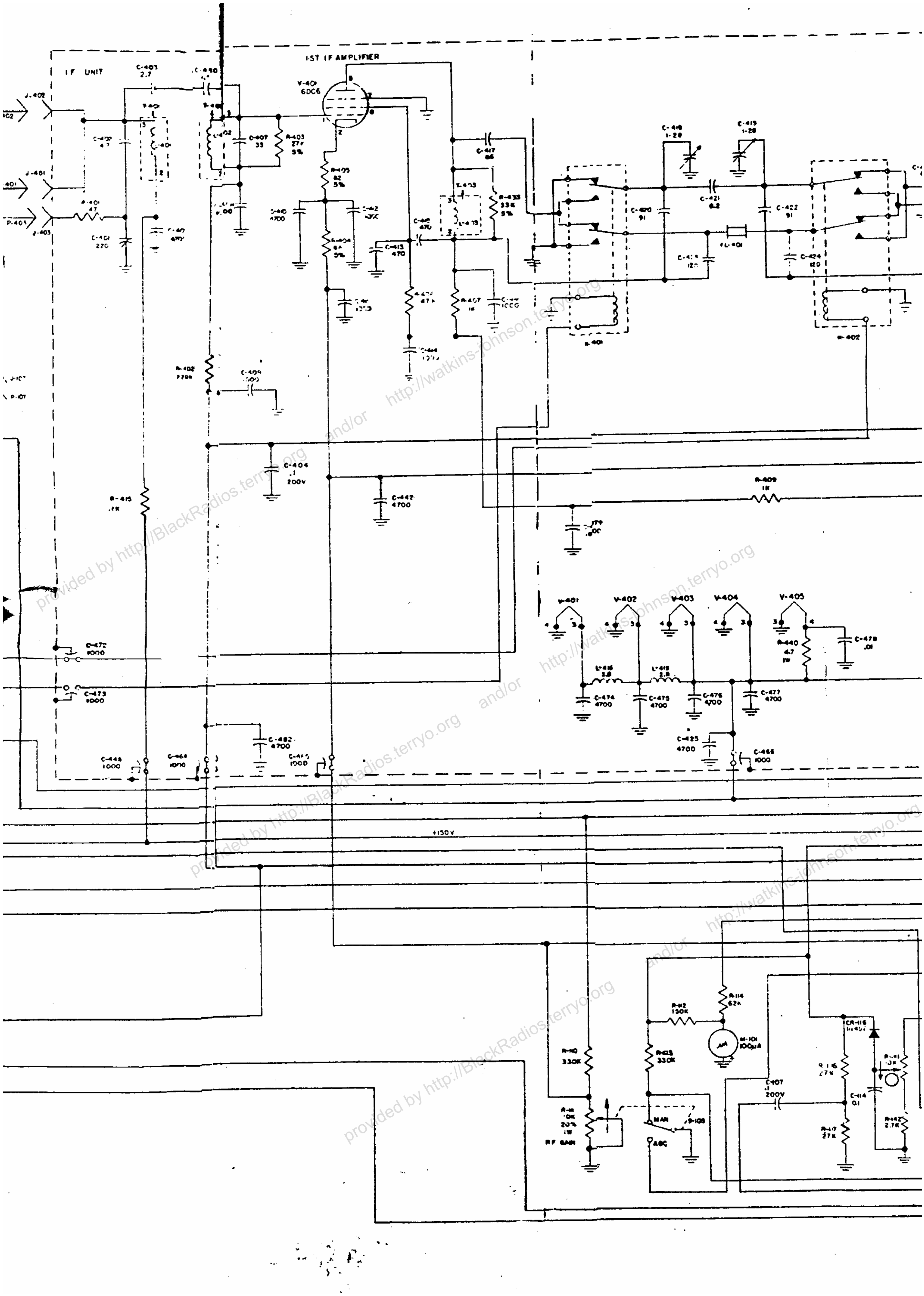
Symbol No.	Name of Part and Description	Symbol No.	Name of Part and Description
V-404	Same as V-202.	XV-202	SOCKET ELECTRON TUBE: Phenolic 7 pin, Elco BR-151-BC-125.
V-405	ELECTRON TUBE: 6AL5.	XV-203	Same as XV-202.
V-406	Same as V-403.	XV-301	SOCKET ELECTRON TUBE: Phenolic, Jettron 8670.
V-501	ELECTRON TUBE: 12AU7.	XV-302	Same as XV-301.
V-502	Same as V-501.	XV-303	Same as XV-301.
W-101	CABLE ASSEMBLY of P-101 & P-102, Cornish 3533 w/Hubbell 7484 per Nems-Clarke AA-19,709.	XV-304	Same as XV-202.
XDS-101	LAMPHOLDER: Dialco 107-1930-975.	XV-305	Same as XV-202.
XDS-102	Same as XDS-101.	XV-401	Same as XV-202.
XF-101	FUSEHOLDER: Bussmann HKP.	XV-402	Same as XV-202.
XF-102	Same as XF-101.	XV-403	Same as XV-202.
XQ-101	SOCKET TRANSISTOR: Elco 3305.	XV-404	Same as XV-202.
XQ-102	Same as XQ-101.	XV-405	Same as XV-202.
XQ-103	Same as XQ-101.	XV-406	Same as XV-202.
XQ-104	Same as XQ-101.	XV-501	Same as XV-201.
XV-201	SOCKET ELECTRON TUBE: Phenolic 9 pin, Elco BR-283-BC-125.	XV-502	Same as XV-201.


60-260 MC
RF UNIT
1ST HIGH BAND
RF AMPLIFIER
V-301
7077
V-302
7077
R-301
1K
C-303
1000
R-302
6.2K
2 W
L301
L-302 A
C-309
1000
C-301
1000
J-301
L-315
P-301A
C-302
1000
L-303
4.7
L-304
4.7
C-305
2
C-306
1-4
600V
C-304
1000
R-303
680
5%
R-304
680
5%
C-307
1000
C-310
1000
V-304
6AF4A
V-305
V-303
L-313A
L-313B
C-339
1000
C-336
1000
C-341
1000
C-344
4700
C-335
1000
C-338
1000
L-312
2.8
C-345
2.2
6.3 VAC
COAXIAL RELAY ASS'Y.
J-103
P-103
J-105
P-105
P-104
J-104
P-106
J-106
K-101
TO BAND SWITCH
P-301B
30-60 MC
RF UNIT
1ST LOW BAND
RF AMPLIFIER
R-204
820
R-202
6.8K
1W
5%
C-208
1000
R-203
39K
5%
C-209
5.6
V-201
6688
C-204
47
C-201
12
L-201
0.158
L-208A
C-230
62
P-201
C-205
1.5-10
600V
R-212
100K
R-201
160
5%
C-206
4700
C-207
1000
L-202
0.156
L-208B
C-212
12
C-210
18
C-211
1-7.5
600V
LOW BAND
MIXER
R-206
470K
R-208
27K
R-207
470K
CR-201
1N 457
V-201
V-202
V-203
L-208
2.8
C-226
4700
C-227
4700
C-229
4700
C-228
1000
C-231
3.3
N330
L-202
0.435
L-208C
L-204
NPO

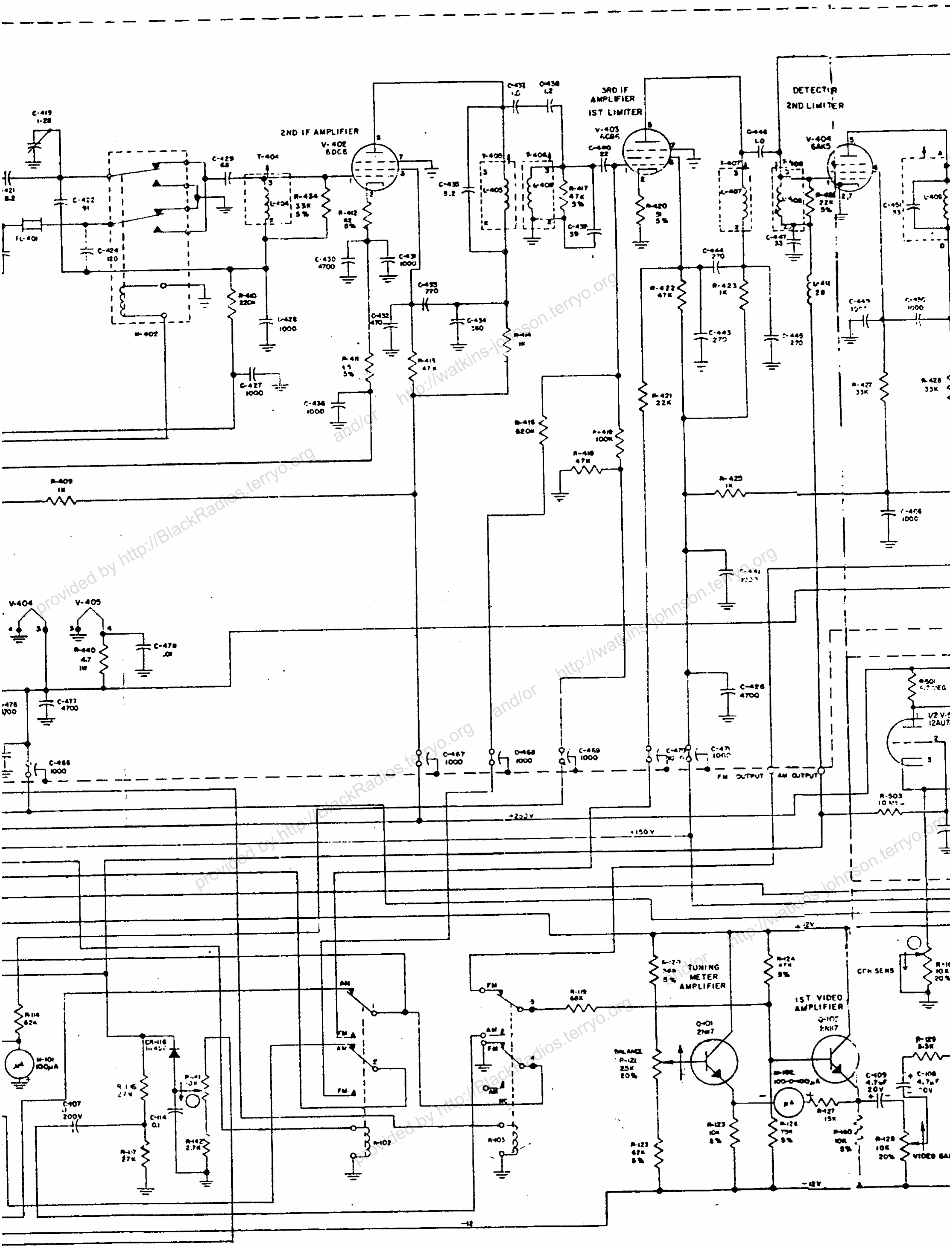


HIGH BAND MIXER
V-304
6AK5
V-303
7077
2ND HIGH BAND
RF AMPLIFIER
V-305
6AF4A
HIGH BAND
OSCILLATOR
6.3 VAC
+250 V
+150
LOW BAND
MIXER
V-202
6AK5
LOW BAND
OSCILLATOR
V-203
6AF4A
S-103
BAND SWITCH
60-260 MC
30-60 MC
TO COAXIAL RELAY
K-101
S-101
POWER
F-101
3/4 SLO BLO


+215V
C-531
1000
J-502
P-502
C-532
1000
+150V
R-513
150K
C-542
1000
C-533
47
TP-501
IF UNIT
J-402
P-402
J-401
P-401
P-403
J-403
R-401
47
C-401
220
J-107
P-107
+250
+215V
CR-109
CR-110
CR-111
R-103
C-112A
C-112B
350V
-10V
FUNCTION SWITCH
S-104
NC 20 KC AM
NC 300 KC FM
NC 300 KC AM
6.3 VAC
T-101
6.6 VAC
C-472
1000
C-473
1000
C-448
1000
+150V
OFF
ON
S-101
POWER
115 V
230 V
S-102
F-102
F-101
3/4 SLO BLO
CR-107
IN1695
CR-108
IN1695
CR-105
IN1695
CR-106
IN1695
L-101
C-103A
R-107
2.2K
10W
5%
+150V
CR-113
C-103B
350V
+150 V
CR-102
IN1692
CR-104
IN1692
CR-103
IN1692
R-108
390
+12 V
C-105
500 µF
25 V
C-104A
50 V
C-113
C-106
25 V
-12V
R-109
390
CR-114
IN1692
CR-115
IN1692
+ 24 V
C-104B
50 V
R-145
1/2 W
-33 V
CR-87
IN1695
C-116
5 µF



I F UNIT
1ST IF AMPLIFIER
J-402
J-401
J-403
V-401
6DC6
C-403
2.7
C-402
4.7
R-401
47
C-401
220
C-407
33
R-403
27K
5%
R-405
82
5%
C-410
4700
R-404
68
5%
C-415
470
C-416
470
C-417
68
R-435
33K
5%
C-418
1-28
C-419
1-28
C-420
91
C-421
8.2
C-422
91
C-424
120
FL-401
R-407
1K
R-402
C-409
1000
C-404
.1
200V
C-442
4700
R-409
1K
R-415
V-401
V-402
V-403
V-404
V-405
R-440
4.7
1W
C-478
.01
L-416
2.8
L-415
2.8
C-474
4700
C-475
4700
C-476
4700
C-477
4700
C-425
4700
C-466
1000
C-482
4700
C-448
1000
C-464
1000
C-465
1000
C-472
1000
C-473
1000
+150V
R-114
62K
R-112
150K
M-101
100μA
R-113
330K
R-110
330K
R-111
10K
20%
1W
RF GAIN
MAN
AGC
C-107
.1
200V
R-116
27K
R-117
27K
C-114
0.1
R-142
2.7K


2ND IF AMPLIFIER
V-402
6DC6
3RD IF
AMPLIFIER
IST LIMITER
V-403
6CB6
DETECTOR
2ND LIMITER
V-404
6AK5
T-404
T-405
T-406
T-407
T-408
FL-401
K-402
R-434
33K
5%
R-410
220K
R-409
1K
R-415
47K
R-416
820K
R-418
47K
R-419
100K
R-421
22K
R-422
47K
R-423
1K
R-425
1K
R-427
33K
R-440
4.7
1W
C-477
4700
C-478
.01
C-426
4700
C-467
1000
C-468
1000
C-469
1000
C-471
1000
FM OUTPUT
AM OUTPUT
+250V
+150V
+12V
-12V
TUNING
METER
AMPLIFIER
1ST VIDEO
AMPLIFIER
Q-101
2N117
BALANCE
R-121
25K
20%
M-101
100μA
R-114
62K
CR-116
C-407
.1
200V
C-114
0.1
R-117
27K
R-119
68K
R-122
62K
5%
R-123
10K
5%
K-102
K-103
AM
FM
NC
VIDEO GAIN
R-501
12AU7
R-503

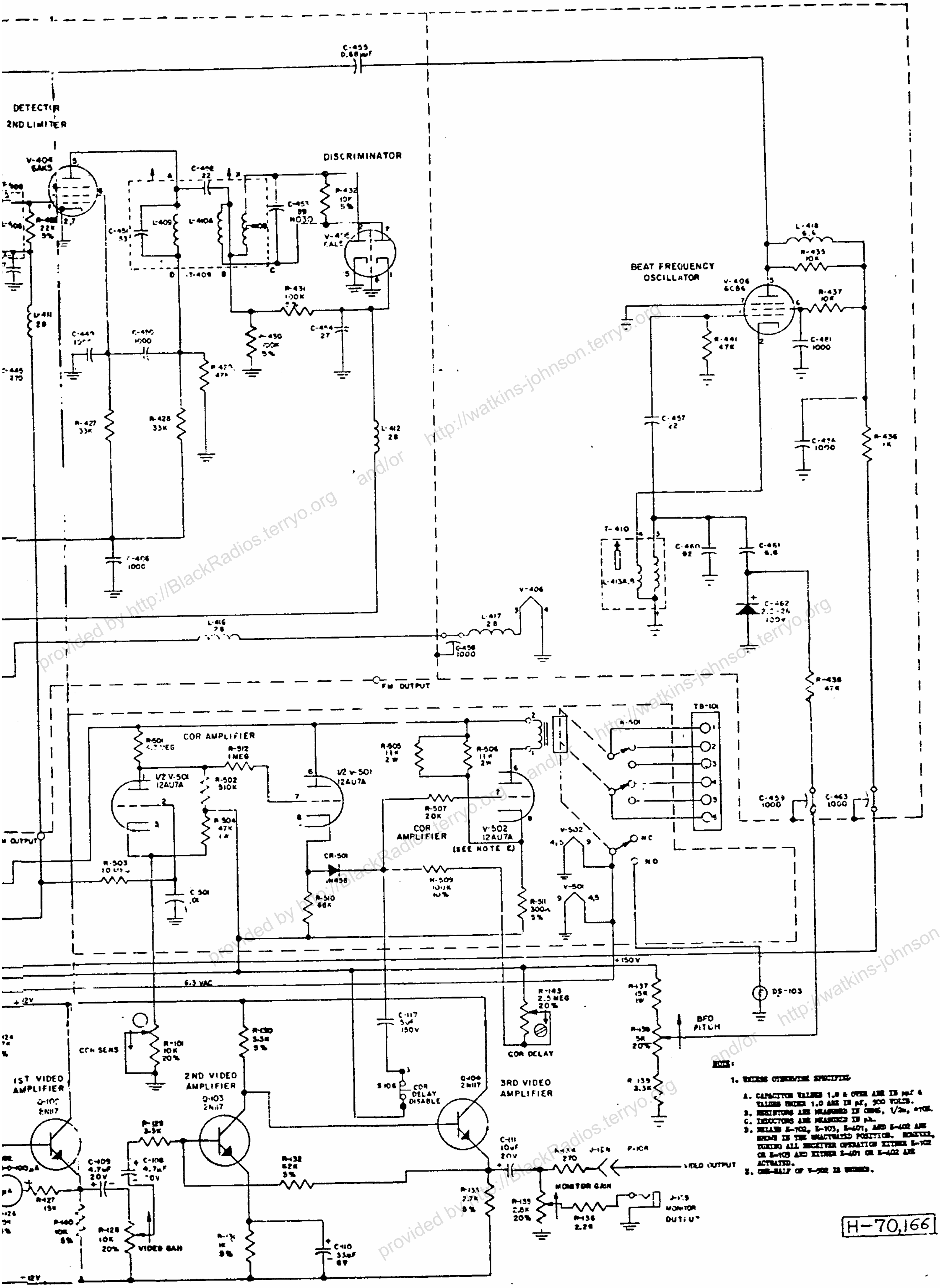


Figure 5-1. Schematic Diagram, Model 1907 Special Purpose Receiver

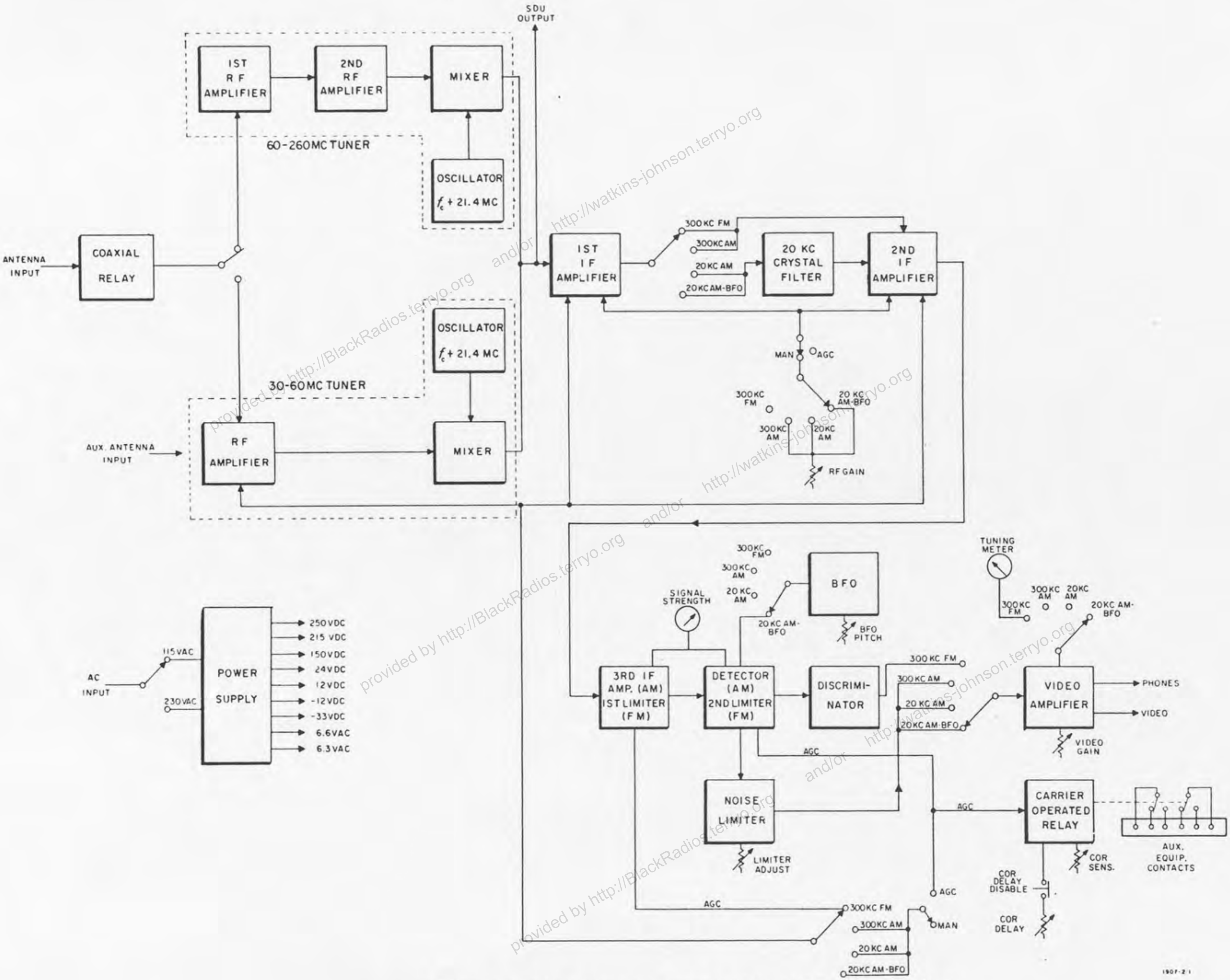
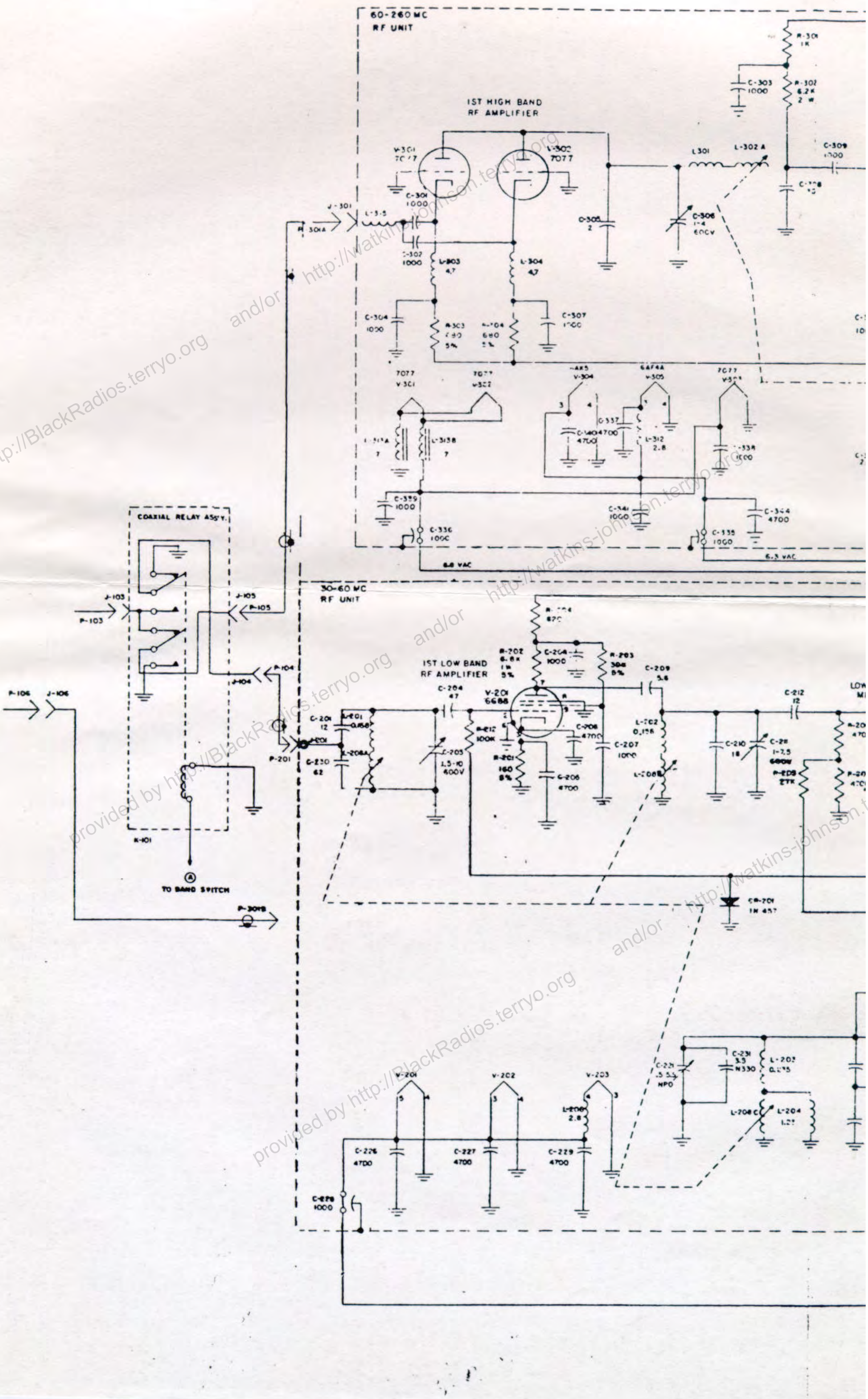
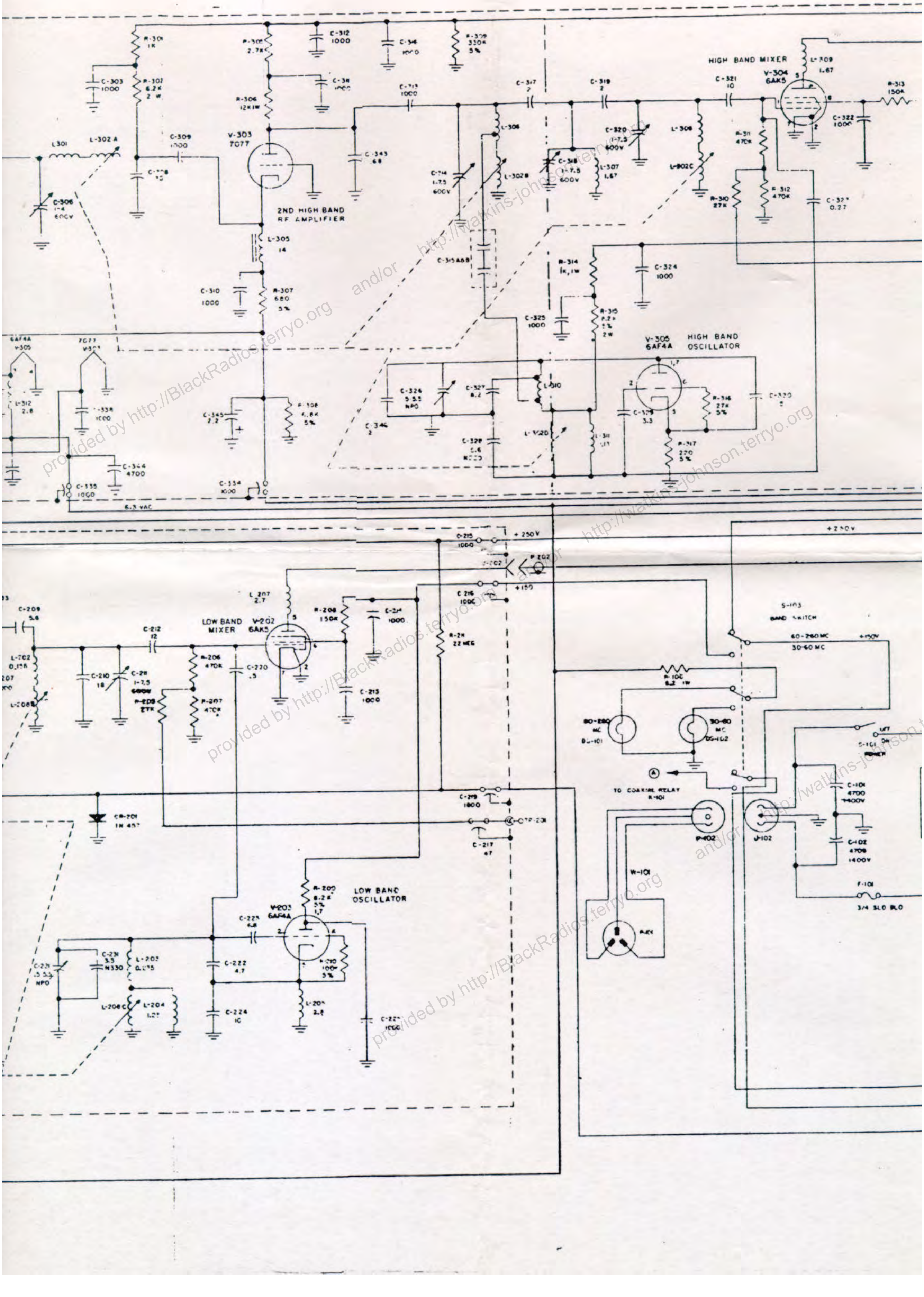
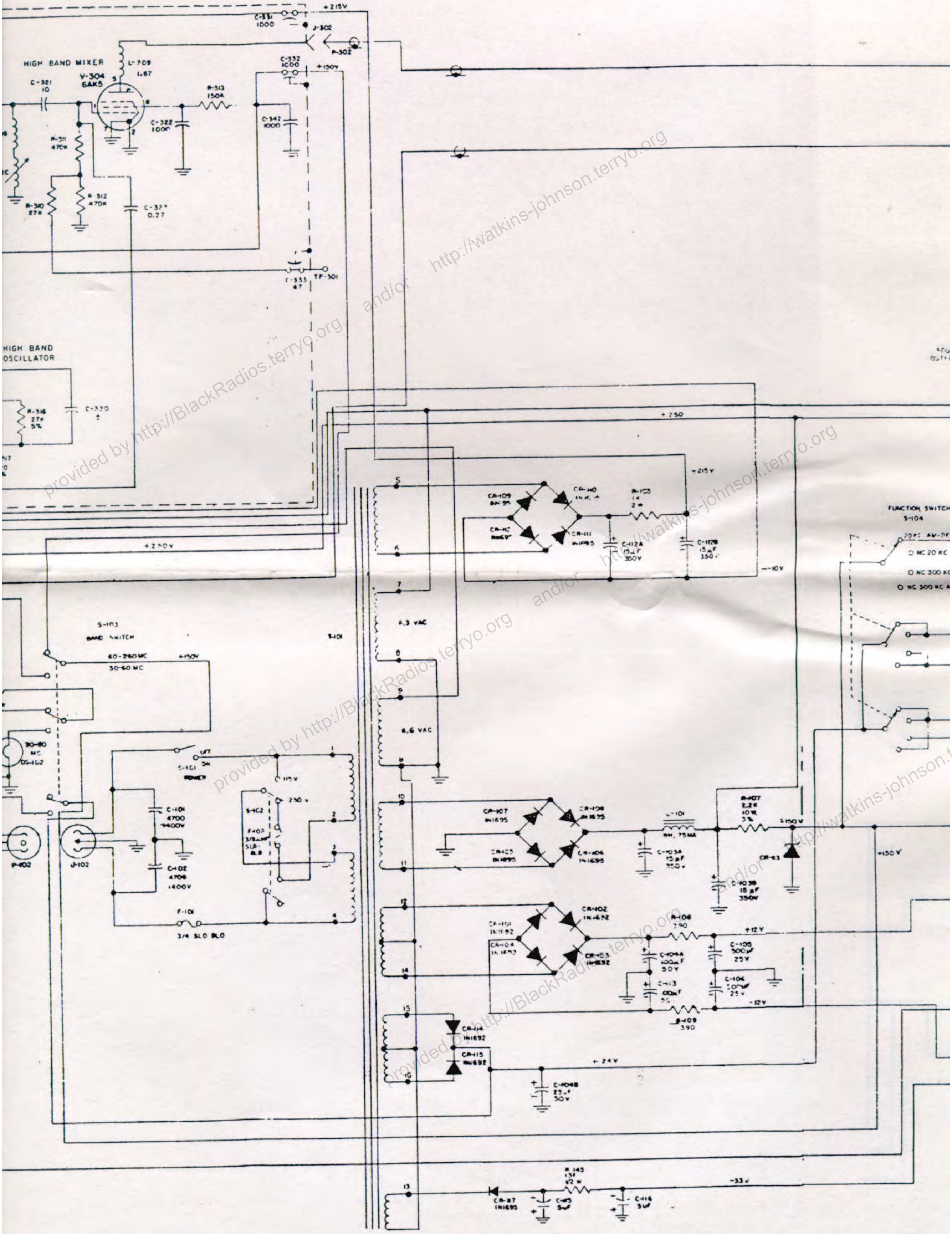


Figure 2-1. Block Diagram, Model 1907 Special Purpose Receiver

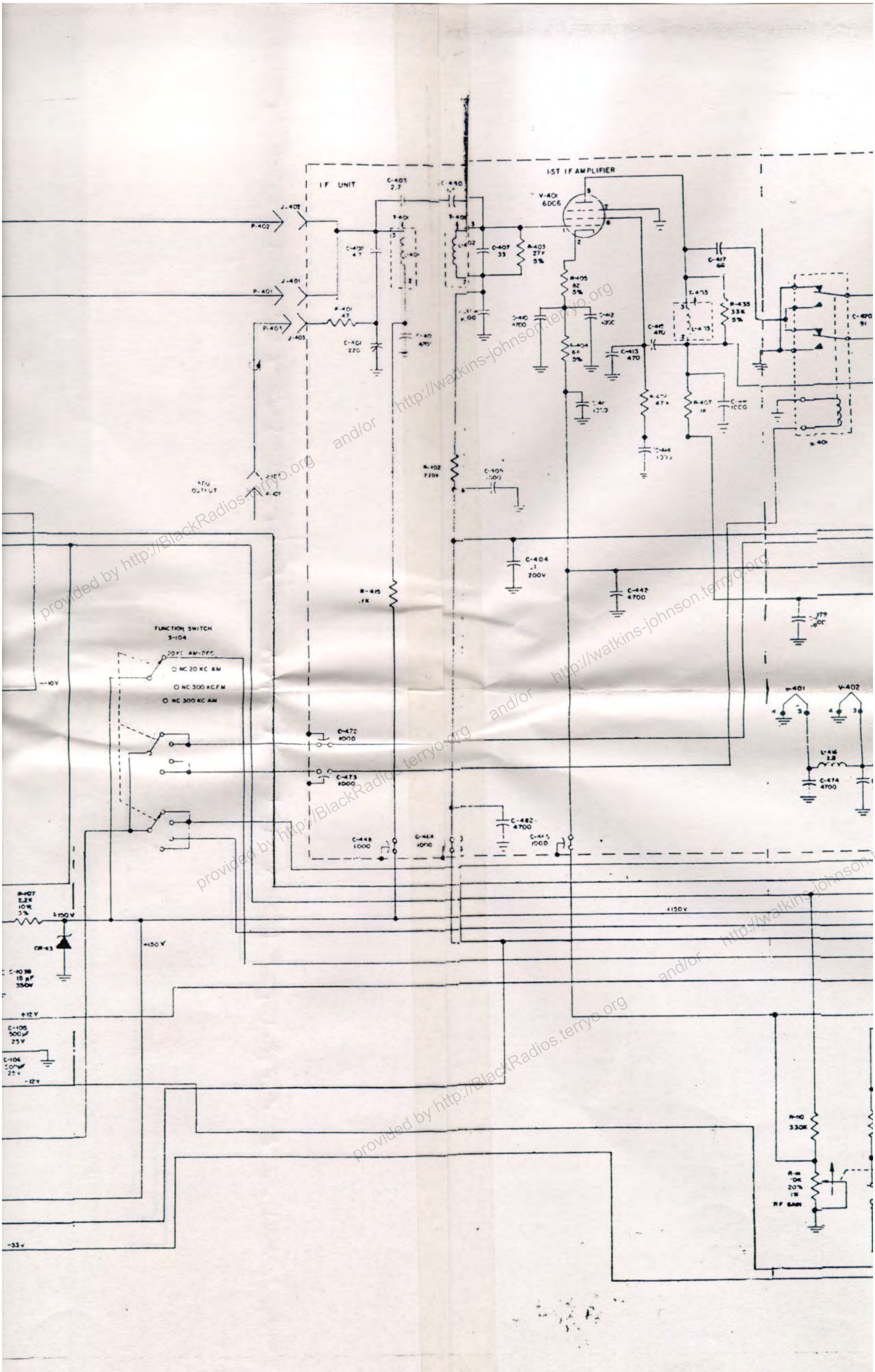

60-260 MC
RF UNIT
1ST HIGH BAND
RF AMPLIFIER
30-60 MC
RF UNIT
1ST LOW BAND
RF AMPLIFIER
COAXIAL RELAY ASS'Y.
TO BAND SWITCH
6.3 VAC
V-201
6688
V-302
7077
CR-201
1N 457



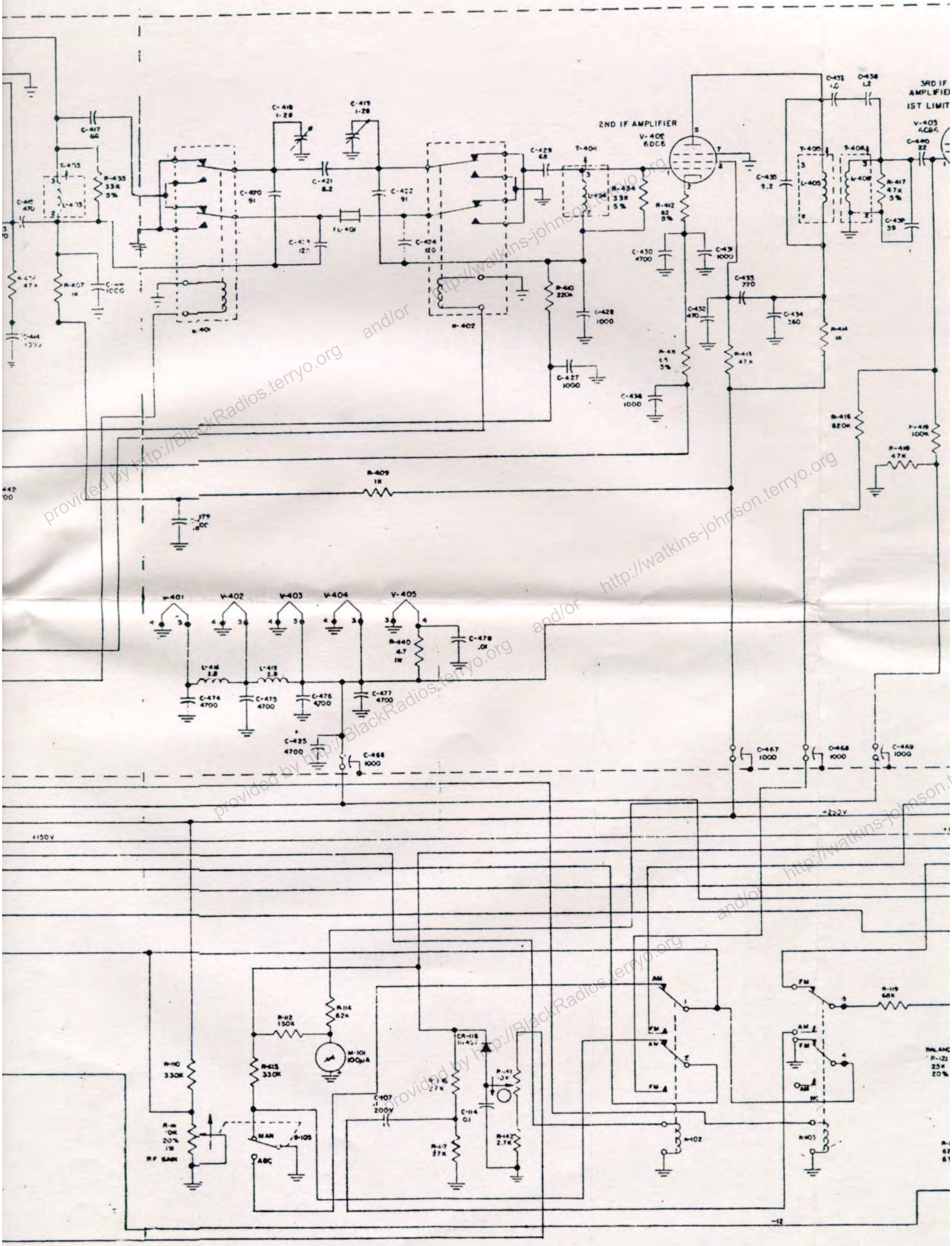
HIGH BAND MIXER
V-304
6AK5
2ND HIGH BAND
RF AMPLIFIER
V-303
7077
V-305
6AF4A
HIGH BAND
OSCILLATOR
R-301
1K
R-302
8.2K
2 W
R-305
2.7K
R-306
12K 1W
R-307
680
5%
R-308
6.8K
5%
R-309
330K
5%
R-310
27K
R-311
470K
R-312
470K
R-313
150K
R-314
1K, 1W
R-315
8.2K
5%
2W
R-316
27K
5%
R-317
220
5%
C-303
1000
C-306
1-4
600V
C-309
1000
C-310
1000
C-312
1000
C-317
2
C-319
2
C-320
1-7.5
600V
C-321
10
C-322
1000
C-324
1000
C-325
1000
C-326
5-5.5
NPO
C-328
0.6
C-329
3.3
C-338
1000
C-343
.68
C-344
4700
C-345
2.2
C-334
1000
C-335
1000
C-315A&B
L301
L-302A
L-302B
L-302C
L-305
14
L-307
1.67
L-309
1.67
L-310
L-311
L-312
2.8
6.3 VAC
C-215
1000
+250V
+150
P-202
J-202
C-216
1000
LOW BAND
MIXER
V-202
6AK5
L-207
2.7
C-209
5.6
C-210
18
C-211
1-7.5
600V
C-212
12
C-213
1000
C-220
.5
R-206
470K
R-207
470K
R-208
27K
R-208
150K
R-211
22 MEG
L-202
0.156
L-206B
C-219
1000
C-217
47
CR-201
1N 457
LOW BAND
OSCILLATOR
V-203
6AF4A
R-209
8.2K
5%
1.7
R-210
100K
5%
C-223
6.8
C-222
4.7
C-224
10
C-231
3.3
N330
C-221
.5-5.5
NPO
L-203
0.235
L-204
1.21
L-206C
L-205
2.8
+250V
S-103
BAND SWITCH
60-260 MC
30-60 MC
+150V
R-100
8.2 1W
60-260
MC
DS-101
30-60
MC
DS-102
TO COAXIAL RELAY
K-101
P-102
J-102
W-101
S-101
POWER
OFF
ON
C-101
4700
1400V
C-102
4700
1400V
F-101
3/4 SLO BLO



HIGH BAND MIXER
V-304
6AK5
L-309
1.67
C-321
10
R-311
470K
R-312
470K
R-310
27K
C-322
1000
R-313
150A
C-331
1000
J-302
P-302
+215V
C-332
1000
+150V
C-342
1000
C-333
47
TP-301
HIGH BAND
OSCILLATOR
R-316
27K
5%
+250
+215V
+250V
-10V
C-112A
15µF
350V
C-112B
15µF
350V
S-103
BAND SWITCH
60-260 MC
30-60 MC
+150V
T-101
6.3 VAC
6.6 VAC
30-60
MC
DS-102
S-101
POWER
OFF
ON
115V
230V
S-102
F-102
3/8 AMP
SLO-BLO
C-101
4700
1400V
C-102
4700
1400V
P-102
J-102
F-101
3/4 SLO BLO
CR-107
IN1695
CR-106
IN1695
CR-105
IN1695
CR-104
IN1695
L-101
8H, 75MA
R-107
2.2K
10W
5%
+150V
C-103A
15µF
350V
C-103B
15µF
350V
+150V
CR-102
IN1692
R-108
390
+12V
C-104A
100µF
50V
C-105
500µF
25V
C-113
100µF
C-106
500µF
25V
-12V
R-109
390
CR-103
IN1692
CR-114
IN1692
CR-115
IN1692
+24V
C-104B
25µF
50V
R-145
13K
1/2W
-33V
CR-87
IN1695
C-115
5µF
C-116
5µF
FUNCTION SWITCH
S-104
NC 20 KC
NC 300 KC
NC 300 KC



IF UNIT
1ST IF AMPLIFIER
V-401
6DC6
C-403
2.7
J-402
P-402
J-401
P-401
J-403
R-401
47
C-401
220
R-403
27K
5%
C-407
33
R-405
82
5%
R-404
5%
C-417
C-413
470
R-433
33K
5%
R-407
1K
C-420
91
R-402
220K
C-404
.1
200V
C-442
4700
R-415
FUNCTION SWITCH
S-104
NC 20 KC AM
NC 300 KC FM
NC 300 KC AM
C-472
1000
C-473
1000
C-482
4700
C-448
1000
C-445
1000
V-401
V-402
C-474
4700
+150 V
-10V
R-107
2.2K
10W
CR-23
C-103B
15 µF
350V
+12 V
C-105
500µF
25V
C-104
25 V
-12V
-33 V
R-110
330K
10K
20%
RF GAIN


2ND IF AMPLIFIER
V-402
6DC6
3RD IF
AMPLIFIER
IST LIMIT
V-403
T-403
T-404
T-405
T-406
L-403
L-405
R-433
33K
5%
R-434
33K
5%
R-409
1K
V-401
V-402
V-403
V-404
V-405
C-474
4700
C-475
4700
C-476
4700
C-477
4700
R-440
4.7
1W
C-467
1000
C-468
1000
C-469
1000
+150V
+200V
R-110
330K
R-113
330K
R-112
150K
R-114
62K
M-101
100µA
RF GAIN
MAN
AGC
S-105
C-407
200V
K-102
K-103
R-119
68K
FM
AM
-12

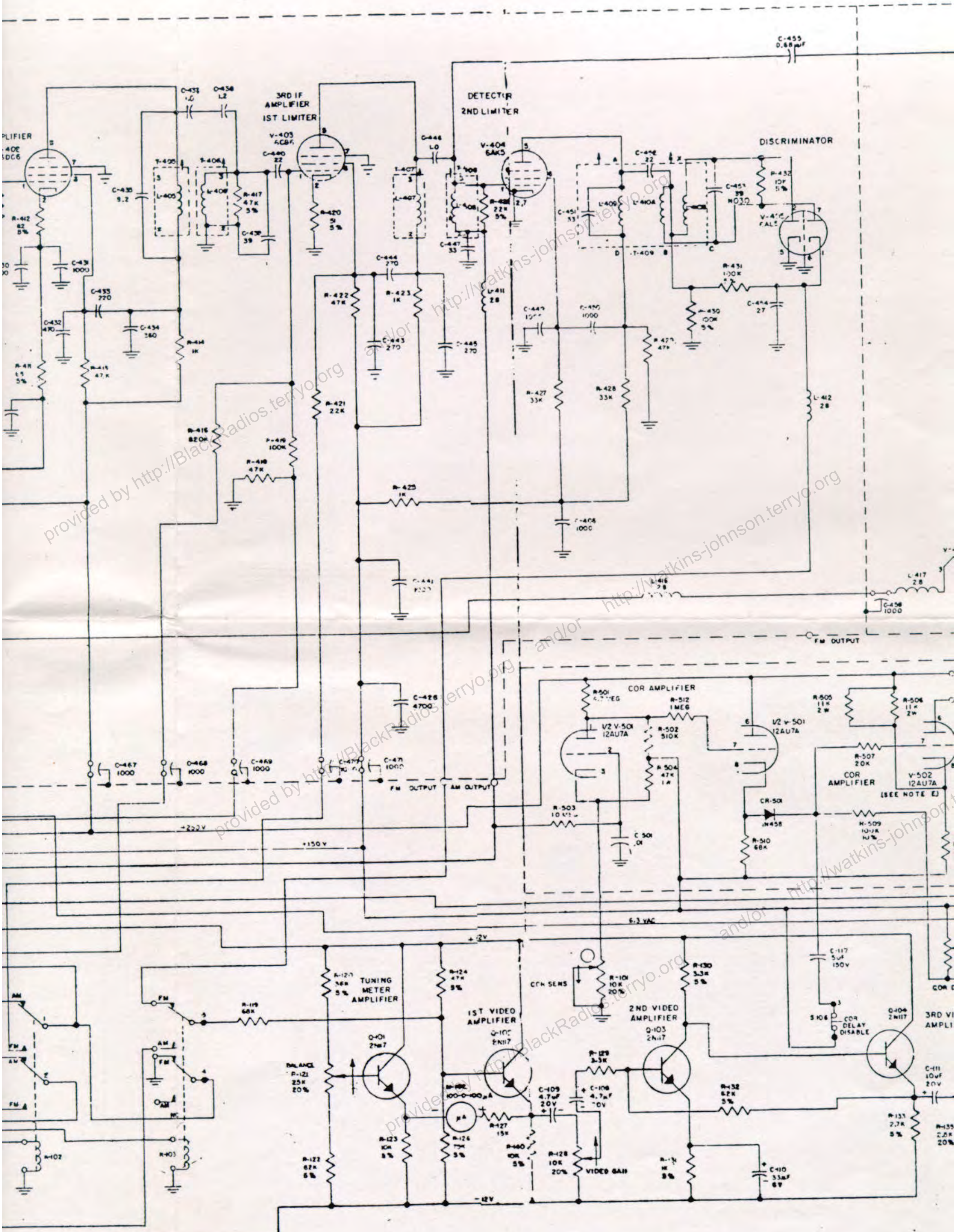


Figure 5–1. Schematic Diagram, Model

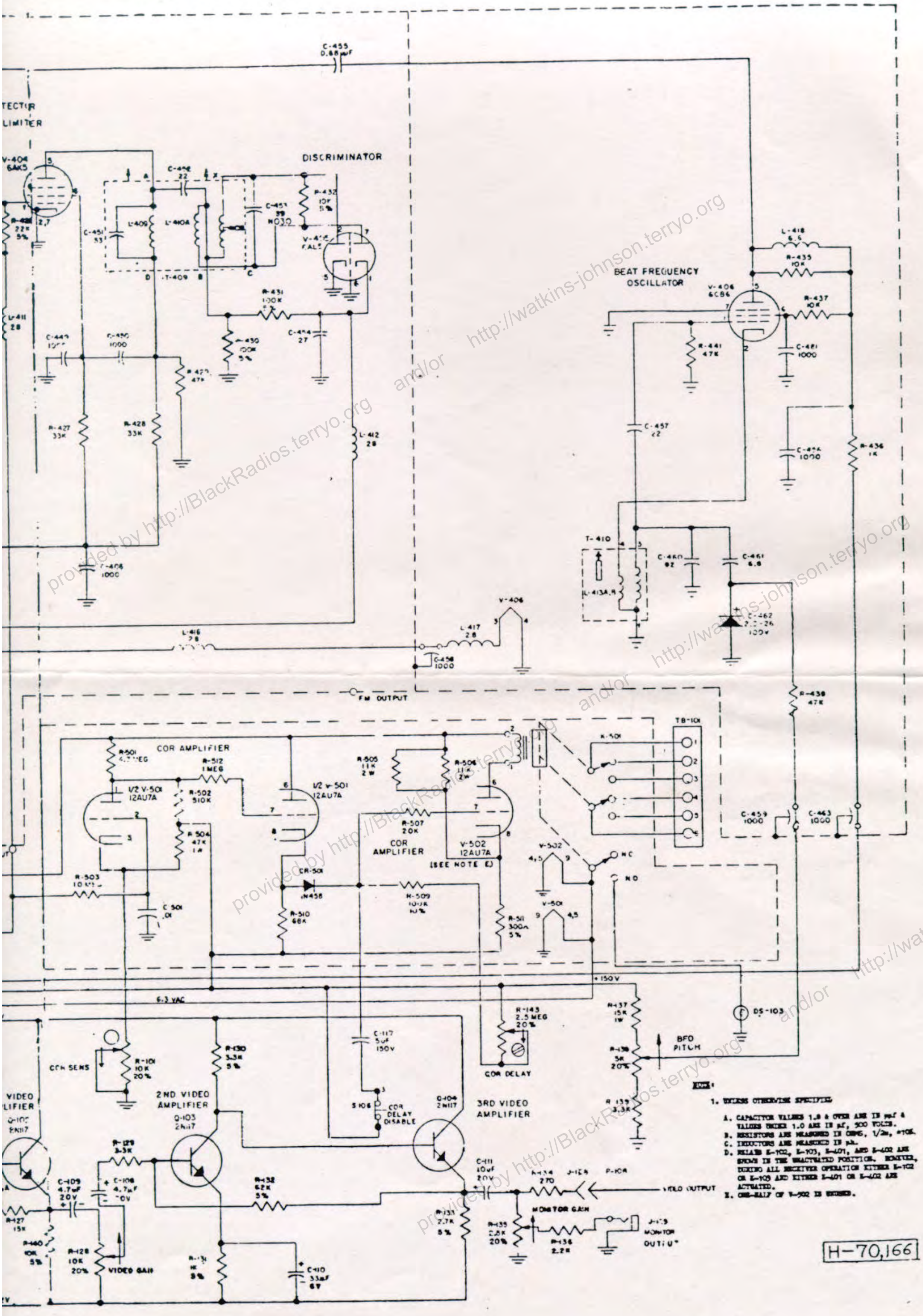


Figure 5–1. Schematic Diagram, Model 1907 Special Purpose Receiver