INSTRUCTION MANUAL
FOR
TYPE 901-5 RECEIVER

WATKINS-JOHNSON

COMPARISON OF 901-1 AND 901-5 RECEIVERS

The 901-5 Receiver consists of a 901-1 Receiver plus an additional IF strip (30kc) and relay (K103). The IF strip has been installed so that it operates in place of the 300/20-kc bandwidth IF strip when the IF BANDWIDTH is turned to the 30 KC position. The inputs of the two IF strips are in parallel and the strip desired is selected for operation by switching the B+ supply to it.

A complete schematic diagram and modified parts list of the 901-5 Receiver are included at the end of this manual.

The functioning of the 30-kc bandwidth strip generally similar to that of the 300/20-kc bandwidth IF strip. A study of the theory of operation and maintenance of the latter will provide sufficient insight into the 30-kc bandwidth strip to permit field personnel to adequately operate and maintain the latter.

DS101	LAMP: 6-8 volts, 0.15 amp, GE 47	2
DS102	Same as DS101	
DS103	LAMP ASSEMBLY: With #345 lamp, polished chrome, Dialco 107-1930-971	1
F101	FUSE: 3/8 amp, Slo-Blo, Littelfuse	1
J101	Not Used	
J102	RECEPTACLE, JACK, BNC: p/o K101	
J103	RECEPTACLE, JACK, BNC: p/o K101	
J104	RECEPTACLE, JACK, BNC: p/o K101	
J105	RECEPTACLE, JACK, BNC: FXR UG-492A/U	2
J106	p/o J105	
J107A	RECEPTACLE, JACK, BNC, FXR UG-1094/U	4
J107B	ADAPTER, MICRODOT: Microdot 53-82	1
J108	Same as J107A	
J109	JACK, PHONE: Open-circuited, Switchcraft JJ-034	1
K101	SWITCH, COAXIAL: 26 vdc, relay operated, RF Products 317-010202-3	1
K102	RELAY: Sigma 22RJCC1000GSIL	2
K103	Same as K102	
L101	CHOKE: 6h, 60 ma, CEI 1070	1
M101	METER: 0-50 ua, dc, light gray SL-7858, Simpson MM-1	1
M102	METER: 100-0-100 ua, dc, light gray SL7858, Simpson MM-1	1
P101	POWER CORD & PLUG ASSEMBLY: Cornish 01753-001	1
P102	PLUG, CABLE, BNC: UG-88/U, FXR	8
P103	Same as P102	
P104	Same as P102	
P105	Same as P102	
P106	Same as P102	
P107	Same as P102	
R101	RESISTOR, FIXED COMPOSITION: 4300 Ω 5%, 2W, AB, HB4325	1
R102	RESISTOR, FIXED COMPOSITION: 2000Ω 5%, 1W, AB, GB2025	1
R103	RESISTOR, DEPOSITED CARBON: 130K 1%, 1/2W, Electra DCM1/2	1

R104	RESISTOR, DEPOSITED CARBON: 2700 ohms ±1% 1/2W, Electra DCM1/2	1
R105	RESISTOR, FIXED COMPOSITION: 82 ohms ±5% 1/2W, AB EB8205	1
R106	RESISTOR, FIXED COMPOSITION: 820 ohms ±5%, 1/2W, AB EB8215	1
R107	RESISTOR, WIRE WOUND: 250 ohms ±3%, 3W, Dage CS	1
R108	RESISTOR, VARIABLE, COMPOSITION: 10K ±20%, 1W with SPDT Switch, CTS KB22141	1
R109	RESISTOR, VARIABLE, COMPOSITION: 10K ±20%, 2W, AB JA1N052P103UA	1
R110	RESISTOR, VARIABLE, COMPOSITION: 0.1 meg, ±20%, 2W AB JS1N052P104UA	1
R111	RESISTOR, FIXED COMPOSITION: 390 ohms ±5%, 1/2W, AB EB3915	1
R112	RESISTOR, VARIABLE: 500K, 1/2W AB GA1G048P504UA	1
S101	SWITCH, TOGGLE, SPST: Cutler-Hammer 8280-K16	1
S102	SWITCH, ROTARY, NON-SHORTING: Oak 399235-A	1
S103	SWITCH, ROTARY, NON-SHORTING: Oak 399227-A	2
S104	Same as S103	
S105	SWITCH: Part of R108, not separately replaceable	
S106	SWITCH, TOGGLE, SPDT: Cutler-Hammer 8282-K14	1
T101	TRANSFORMER, POWER: CEI 1085	1
TB101	TERMINAL STRIP: Cinch-Jones 3-140-Y	1
TB102	Same as TB101	
2.	VIDEO MODULE	
C201	CAPACITOR, ELECTROLYTIC, TANTALUM: 0.47 μf ±20%, 35 wvdc Sprague 150D474X0035A2	3
C202	CAPACITOR, DIPPED MICA: 68 μuf ±5%, Arco DM10-680J	3
C203	CAPACITOR, ELECTROLYTIC, TANTALUM: 22 μf ±20%, 35 vdc Sprague 150D22 6X0035R0	1
C204	Same as C107	
CR201	DIODE, ZENER: 1N759A, PSI	2
Q201	TRANSISTOR: 2N335, Texas Instrument	6
Q202	Same as Q201	

C674	Same as C415	
C675	Same as C666	
C676	Same as C667	
C677	Same as C667	
CR601	DIODE, SILICON ZENER: P.S.I. 1N751A	2
CR602	DIODE, GERMANIUM: Sylvania 1N198A	2
CR603	Same as CR602	
CR604	Same as CR601	
E601	FEEDTHRU, TERMINAL: Taurus SFU-16	2
E602	Same as E601	
FB601	Same as FB401	
J601	Same as J402	
J602	Same as J402	
K601	RELAY: DPDT, Elgin MS24250-6	2
K602	Same as K601	
L601 L602	Part of T601, not separately replaceable	
L603	COIL, VARIABLE: CEI 1111-04	1
L604	COIL, VARIABLE: CEI 1111-05	1
L605	COIL, VARIABLE: CEI 1111-06	1
L606	COIL, VARIABLE: CEI 1111-03	1
L607	COIL, VARIABLE: CEI 1111-01	1
L608	COIL, VARIABLE: CEI 1111-07	1
L609	COIL, FIXED: 43 uh, CEI 1131-17	2
L610	COIL, VARIABLE: CEI 1111-02	1
L611	COIL, VARIABLE: CEI 1109	1
L612	Same as L609	
L613	Same as L513	
L614	COIL, FIXED: CEI 1131-11	1
L615	COIL, FIXED: CEI 1131-19	1

8. 30KC IF STRIP

C801	CAPACITOR, CERAMIC DISC: 1000pf 20%, RMC, Type SM	1
C802	Same as C801	
C803	Same as C801	
C804	Same as C801	
C805	CAPACITOR, CERAMIC STANDOFF: 1000pf, GMV, AB, SS5A102W	4
C806	CAPACITOR, CERAMIC TUBULAR: 4.3pf 0.25pf, Erie, NPOA	2
C807	CAPACITOR, CERAMIC TUBULAR: 0.1pf 10%, QC, Type QC	1
C808	Same as C806	
C809	CAPACITOR, CERAMIC TUBULAR: 0.27pf 10%, QC, Type QC	1
C810	CAPACITOR, DIPPED MICA: 33pf 5%, Arco, DM10-330J	1
C811	Same as C801	
C812	CAPACITOR, DIPPED MICA: 22pf 5%, Arco, DM10220J	2
C813	Same as C812	
C814	Same as C805	
C815	Same as C801	
C816	Same as C801	
C817	CAPACITOR, DIPPED MICA: 180pf 5%, Arco, DM10-181J	4
C818	CAPACITOR, DIPPED MICA: 30pf 5%, Arco, DM10-300J	1
C819	CAPACITOR, CERAMIC TUBULAR: 6.2pf 0.5pf, Erie NPOA	2
C820	Same as C817	
C821	CAPACITOR, DIPPED MICA: 270pf 5%, Arco, DM10-2715	1
C822	Same as C801	
C823	Same as C805	
C824	Same as C801	
C25	CAPACITOR, DIPPED MICA: 39pf 5%, Arco, DM10-390J	1
C826	Same as C817	
C827	Same as C801	
C828	Same as C801	
C829	Same as C817	

C830	CAPACITOR, DIPPED MICA: 68pf 5%, Arco, DM10-680J	1
C831	CAPACITOR, DIPPED MICA: 360pf 5%, Arco, DM10-361J	4
C832	Same as C831	
C833	Same as C831	
C834	Same as C805	
C835	Same as C831	
C836	CAPACITOR, CERAMIC DISC: 1.0μf 20%, 35V, Sprague, 150D105X0035A2	1
C837	CAPACITOR, CERAMIC FEEDTHRU: 1000pf, GMV, AB, FA5C-102	8
C838	Same as C837	
C839	Same as C837	
C840	Same as C837	
C841	Same as C837	
C842	Same as C837	
C843	Same as C837	
C844	Same as C837	
C845	CAPACITOR, CERAMIC TUBULAR: 8.2pf 0.5pf, Erie, NPOA	1
C846	Same as C819	
C847	Same as C801	
C848	Same as C831	
J801	CONNECTOR JACK: FXR, 27-3	2
J802	Same as J801	
L801	INDUCTOR, VARIABLE: CEI, 1472-4	2
L802	Same as L801	
L803	INDUCTOR, VARIABLE: CEI, 1032-2	1
L804	INDUCTOR, VARIABLE: CEI, 1034-3	1
L805	INDUCTOR, VARIABLE: CEI, 1472-10	1
L806	INDUCTOR, FIXED: 1.0mh, Wilco, 11000-15	1
L807	INDUCTOR, VARIABLE: CTC, 2060-8	1
L808	INDUCTOR, VARIABLE: CEI, 1041-2	1
P801	CONNECTOR, PLUG: FXR 27-1	2
P802	Same as P801	
R801	RESISTOR, FIXED COMPOSITION: 220K 5%, 1/4W, AB, CB2245	2
R802	RESISTOR, FIXED COMPOSITION: 100K 5%, 1/4W, AB, CB1045	5

R803	RESISTOR, FIXED COMPOSITION: 1K 5%, 1/4W, AB, CB1025	3
R804	RESISTOR, FIXED COMPOSITION: 1 meg 5%, 1/4W, AB, CB1055	2
R805	Same as R803	
R806	Same as R802	
R807	RESISTOR, FIXED COMPOSITION: 56K 5%, 1/4W, AB, CB5635	1
R808	RESISTOR, FIXED COMPOSITION: 22K 5%, 1/4W, AB, CB2235	1
R809	Same as R804	
R810	RESISTOR, FIXED COMPOSITION: 10K 5%, 1/4W, AB, CB1035	2
R811	Not used	
R812	RESISTOR, FIXED COMPOSITION: 820K 5%, 1/4W, AB, CB8245	1
R813	Same as R802	
R814	Same as R803	
R815	Same as R810	
R816	RESISTOR, FIXED COMPOSITION: 56Ω 5%, 1/4W, AB, CB5605	1
R817	Same as R802	
R818	RESISTOR, FIXED COMPOSITION: 4.7K 5%, 1/4W, AB, CB4725	1
R819	Same as R801	
R820	RESISTOR, FIXED COMPOSITION: 150K 5%, 1/4W, AB, CB1545	2
R821	RESISTOR, FIXED COMPOSITION: 75K 5%, 1/4W, AB, CB7535	1
R822	Same as R802	
R823	RESISTOR, FIXED COMPOSITION: 36K 5%, 1/4W, AB, CB3635	1
R824	RESISTOR, FIXED COMPOSITION: 18K 5%, 1/4W, AB, CB1835	1
R825	RESISTOR, FIXED COMPOSITION: 430K 5%, 1/4W, AB, CB4345	1
R826	Same as R820	
R827	RESISTOR, FIXED COMPOSITION: 1.5meg, 5%, 1/4W, AB, CB1555	1
R828	RESISTOR, FIXED COMPOSITION: 750K 5%, 1/4W, AB, CB7545	1
R829	Same as R818	
T801	TRANSFORMER: CEI, 1126	1
V801	TUBE, ELECTRON: RCA, 7587	4
V802	Same as V801	
V803	Same as V801	
V804	Same as V801	
V805	TUBE, ELECTRON: RCA, 6CW4	1
Y801	CRYSTAL: 20.400MC, Piezo, 4202	1

INSTRUCTION BOOK
FOR
TYPE 901-1 RECEIVER

WATKINS—JOHNSON COMPANY
700 Quince Orchard Road
Gaithersburg, Maryland 20760

WARNING

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

NOTICE

This instruction book for the Type 901-1 Receiver has been made by ammending an instruction book for the Type 901 Receiver as follows:

1. The page immediately following this contains a discussion of the carrier-operated relay (COR) circuit and the differences between a 901 receiver and a 901-1 receiver.

2. Section VI has been changed to include all of the 901-1 components.

3. A complete schematic diagram of the 901-1 receiver is included.

CARRIER OPERATED RELAY

Except for the operating controls and the relay, K102, the carrier operated relay circuit is contained on an etched circuit board mounted plug-in fashion on the main chassis. The circuit consists of a two-stage DC amplifier, relay driver, release time delay, and relay. A sensitivity control is provided to permit selection of the signal level at which the relay operates. A selection of slow (6 seconds) or fast release time is provided by a front panel switch. The COR circuit derives its input from the current flowing in the signal strength meter in the receiver and is therefore connected in series from the meter to ground. In order not to affect the signal strength meter calibrations, the input voltage drop of the COR is held to less than 0.5 volt through the use of diode clamps. The COR circuit will function with inputs of zero to 40 microamperes and provide a pull-in to drop out differential sensitivity of less than two microamperes over the entire range. Since the signal strenth meter calibrations are approximately logarithmic, this method of COR operation provides uniform sensitivity for inputs from zero to 80% of the maximum receiver RF input.

ELECTRICAL CHARACTERISTICS

Input Current Range.	0 to 40 microamperes, DC
Input Voltage Drop	0.5 V, approximately
Differential Sensitivity . .	2 microamperes, maximum
Release Time Delay	Fast - Less than 0.5 sec. Slow - 6 sec.
Output	DPDT contacts
Contact Rating	2 amperes at 28 VDC or 120 VAC

As shown in the shcematic diagram the COR is in the unactuated state, i.e., the state in the absence of a carrier.

The following differences exist between a 901 receiver and a 901-1 receiver:

1. The 901-1 has its power switch incorporated with the AUDIO GAIN control.

2. The 901-1 front panel mounts three additional items: a COR light, a COR DELAY control, and a COR SENSITIVITY control.

3. The 901-1 chassis rear apron contains a second terminal board, TB102, on which the three output terminals from the COR appear.

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TABLE 1

TUBE, TRANSISTOR, AND DIODE COMPLEMENT, TYPE 901 RECEIVER

Symbol	Type	Function
V401	6CW4	1st RF Amplifier, 30-60 mc Tuner
V402	6CW4	2nd RF Amplifier, 30-60 mc Tuner
V403	7587	Mixer, 30-60 mc Tuner
V404	6CW4	Local Oscillator, 30-60 mc Tuner
V501	7077	1st RF Amplifier, 60-300 mc Tuner
V502	7077	2nd RF Amplifier, 60-300 mc Tuner
V503	7587	Mixer, 60-300 mc Tuner
V504	6CW4	Local Oscillator, 60-300 mc Tuner
V601	7587	1st IF Amplifier
V602	7587	2nd IF Amplifier
V603	7587	AM: 3rd IF Amplifier; FM: 1st Limiter
V604	7587	AM: Detector; FM: 2nd Limiter
V605	6CW4	BFO Buffer Amplifier
V606	6CW4	BFO
Q201 Q202	2N333	DC Amplifier
Q203 Q204	2N333	Video Amplifier
Q301 Q302	2N333	Audio Amplifier
Q303	2N1700	Audio Output Amplifier
CR101 thru CR104	1N2615	Rectifier
CR105 thru CR110	1N2610	Rectifier
CR201 CR301	1N759A	Voltage Regulator
CR601 CR604	1M756A	Gain Control Voltage Delay
CR602 CR603	1N198A	FM Demodulator

SECTION I

SPECIFICATIONS

Type of Reception	AM-FM-CW
Frequency Range	30-300 mc in two bands Low band: 30-60 mc High band: 60-300 mc
Inputs	Two BNC type connectors, one with coaxial switch, permitting operation across full frequency range with single antenna or operation with separate antennas for each band
Input Impedance	Suitable for 50-ohm source
Noise Figure	Low band: 4 db, maximum High band: 6.5 db, maximum

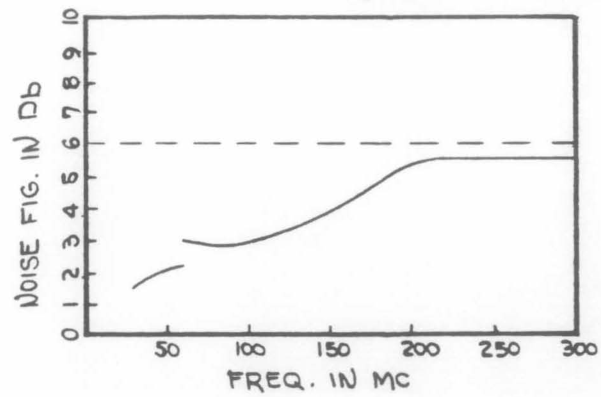


Figure 1-1. Type 901 Receiver, Noise Figure vs Frequency

Image Rejection	Low band: 60 db, minimum High band: 50 db, minimum

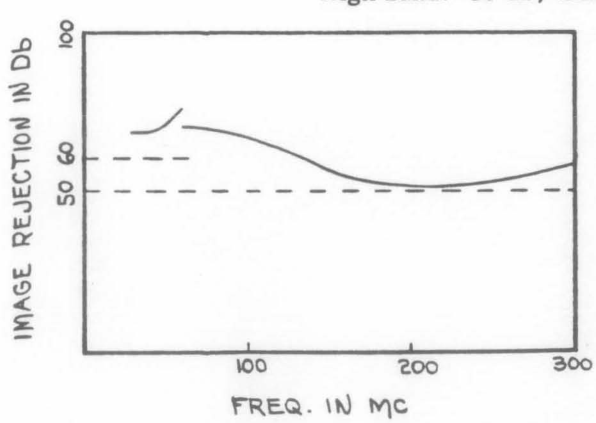


Figure 1-2. Type 901 Receiver, Image Rejection vs Frequency

IF Frequency	21.4 mc
IF Bandwidths	300 kc or 20 kc, selectable from front panel
IF Rejection	Low band: Above 40 mc, 75 db minimum Below 40 mc, 54 db minimum High band: Greater than 100 db

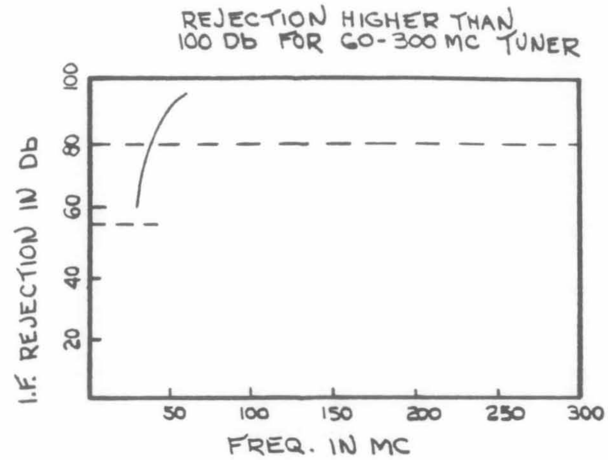


Figure 1-3. Type 901 Receiver, IF Rejection vs Frequency

Oscillator to Antenna Conduction	Low band: 15 microvolts, maximum High band: Below 260 mc, 15 microvolts maximum Above 260 mc, 25 microvolts maximum

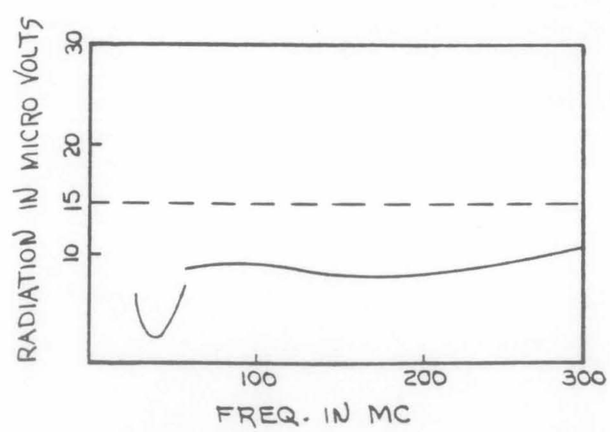


Figure 1-4 Type 901 Receiver, Oscillator to Antenna Conduction vs Frequency

Sensitivity	
300-kc Bandwidth	AM: 4 uv input, modulated 50%, produces 11-db $\frac{S+N}{N}$, minimum FM: 4 uv input, modulated at 1 kc with 100-kc deviation, produces 21-db $\frac{S+N}{N}$, minimum
20-kc Bandwidth	AM: 2 uv input, modulated 50%, produces 17-db $\frac{S+N}{N}$, minimum FM: 2 uv input, modulated at 1 kc with 7-kc deviation, produces 20-db $\frac{S+N}{N}$, minimum
Audio Output Power	100 milliwatts, minimum, into 600-ohm load, balanced or unbalanced, using either headphones jack or speaker connection terminals
Audio Response	100 cps to 40 kc at 3-db points
Video Output	5 volts, rms, across a 10K-ohm, unbalanced load
Video Response	50 cps to 500 kc at 3-db points (300-kc IF Bandwidth, FM)
Signal Monitor Output	21.4-mc center frequency IF signal output, for use with CEI signal monitors
Output Stability with AGC	FM: Output varies less than 2 db for inputs above 1.5 uv AM: Output varies less than 15 db for input range of 2-10,000 uv
BFO	21.4-mc center frequency, variable ± 20 kc, for use with both bandwidths
Power Input	115 vac, 50-400 cps
Power Consumption	40 watts, maximum
Weight	18.5 pounds
Size	19" x 3 1/2" x 15 1/2"

FIGURE 2-1. TYPE 901 RECEIVER

SECTION II

GENERAL DESCRIPTION

1. ELECTRICAL CHARACTERISTICS.

The CEI Type 901 Receiver is an FM-AM-CW superheterodyne receiver covering the frequency range 30 to 300 mc in two bands, 30-60 mc and 60-300 mc. The receiver uses single conversion to a 21.4-mc IF. The IF bandwidth can be set to either 20 kc or 300 kc. The input impedance is suitable for a 50-ohm source. The audio output impedance is 600 ohms. The video output impedance is suitable for a 10K-ohm, unbalanced load.

2. MECHANICAL CHARACTERISTICS.

The front panel (see fig. 2-1) mounts the following: the BANDWIDTH switch with positions marked 300 KC and 20 KC; the TUNING meter; the mode selector, a switch with three positions, marked FM, AM, and CW; the low band tuning dial, illuminated, recessed behind a window, inscribed with a mark for each 500 kc from 30 mc to 62 mc, and controlled by means of a tuning crank so that 40 turns are required to cross the band; the band selector, a switch with two positions, marked 30-60 MC and 60-300 MC; the high band tuning dial, illuminated, recessed behind a window, inscribed with a mark for each megacycle from 60 mc to 300 mc, and controlled by means of a tuning crank so that 47 turns are required to cross the band; the SIGNAL STRENGTH meter; the PHONES jack; the BFO TUNING control; the VIDEO GAIN control; the AUDIO GAIN control; the IF GAIN control, with an AGC position; and the POWER switch.

The chassis rear apron (see fig. 2-2) mounts the following: a fuse marked F 101 3/8 AMP SLOW-BLOW; a type BNC connector marked J102 INPUT; a type BNC connector marked J105 AUX INPUT; a type BNC connector marked J107 SM OUTPUT; a type BNC connector marked J108 VIDEO OUTPUT; and a three-terminal barrier strip marked TB101 AUDIO OUTPUT with the terminals marked respectively G, 1, and 2. The power cord is permanently connected through the rear of the receiver.

The panel and main chassis are constructed of aluminum. The main chassis top and bottom are covered with aluminum dust covers. The panel is overlaid with a black-anodized etched plate. Within the main chassis are three separate subassemblies: the 30-60 mc RF tuner; the 60-300 mc RF tuner; and the IF strip. Mounted plug-in fashion on the chassis top are two transistorized modules: the audio amplifier module and the video module. Those small parts not included in the subassemblies or modules are mounted on a component board located on the chassis underside.

The receiver is designed for mounting in a standard 19-inch rack. It measures 3-1/2" high, 19" wide, and 15-1/2" deep (front panel to rearmost projection). There are handles on both the front panel and the chassis rear apron. Provision for Grant slides has been made by the inclusion of three captive floating bolts spaced along the side aprons plus a hole in both the left and right extension of the front panel through which the Grant slide release bars can project. The weight is 18.5 pounds.

3. EQUIPMENT SUPPLIED.

The 901 receiver is shipped complete with power cord, a mating connector for each input and output receptacle, and a three-pin to two-pin power cord plug adapter.

4. ADDITIONAL EQUIPMENT REQUIRED FOR OPERATION.

To use the audio output, either a set of headphones or a speaker is necessary. To use the signal monitor output, a CEI type signal monitor is needed.

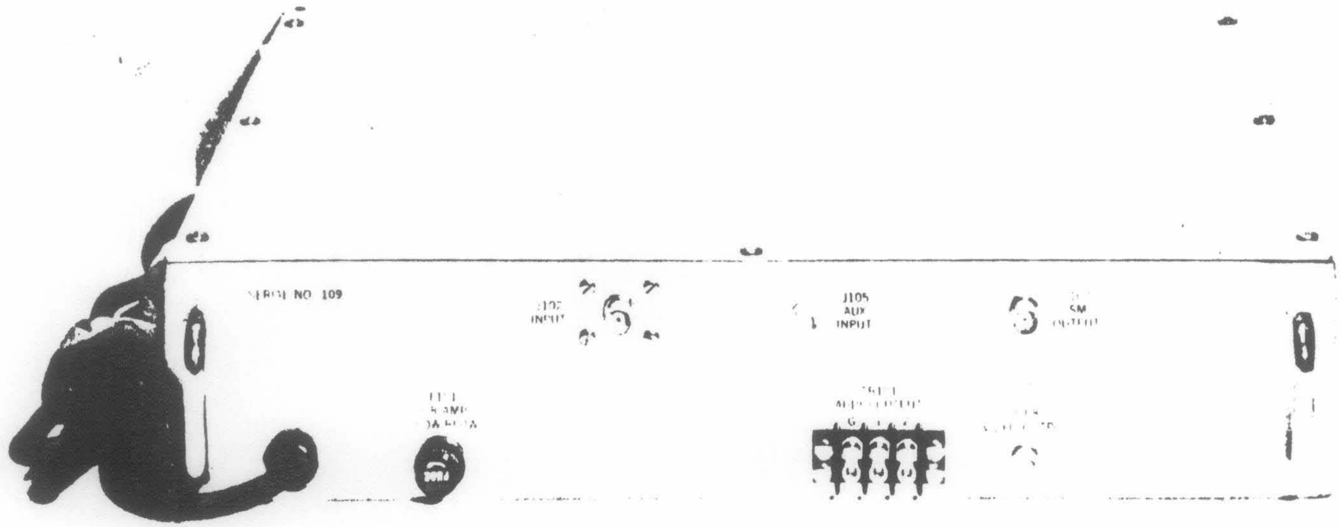
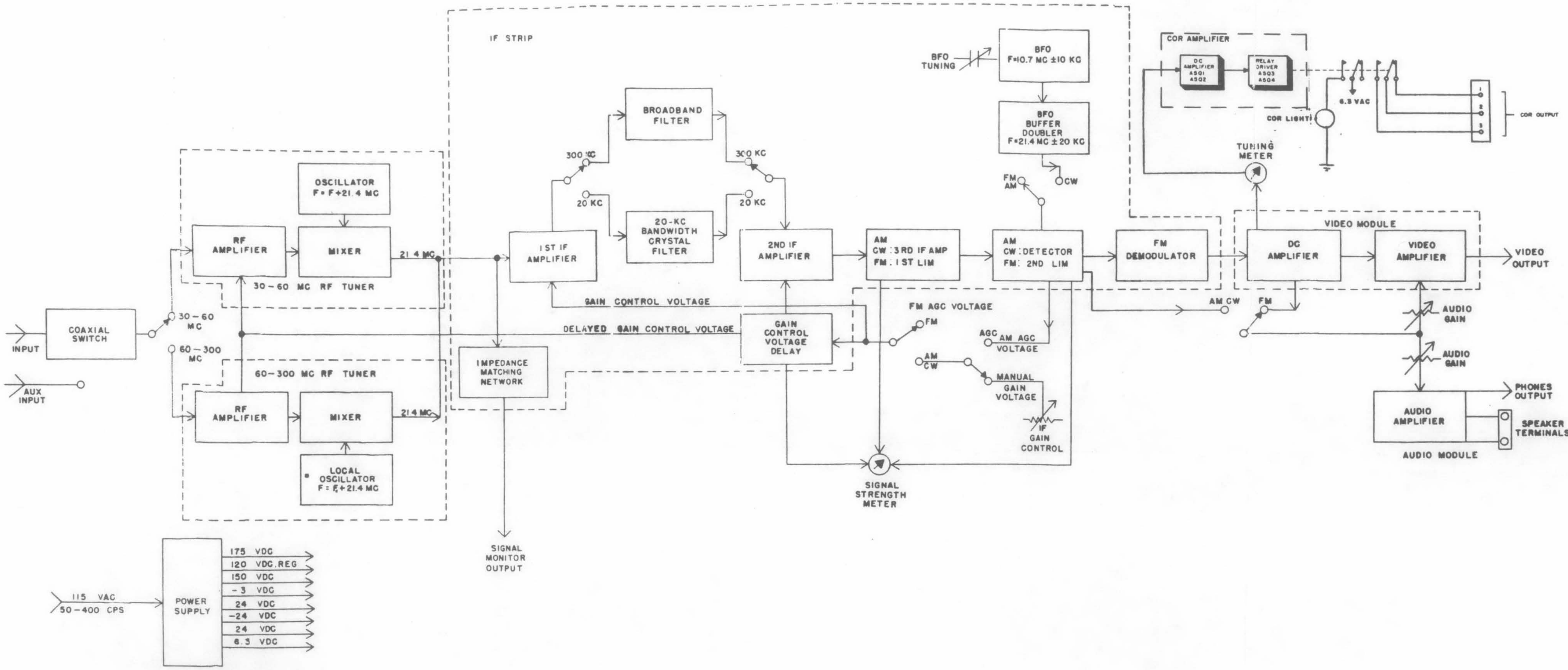


FIGURE 2-2. TYPE 901 RECEIVER, REAR VIEW



COMMUNICATION ELECTRONICS, INC.
BETHESDA 14, MD.

FIGURE 3—1. TYPE 901 RECEIVER FUNCTIONAL BLOCK DIAGRAM

SECTION III

CIRCUIT DESCRIPTION

1. FUNCTIONAL ANALYSIS.

The Type 901 Receiver (depicted by functional block diagram in fig. 3-1) tunes the frequency range 30-300 mc in two bands, 30-60 mc and 60-300 mc. Either a 300-kc or a 20-kc IF bandwidth is available, and four outputs are present: a signal monitor output providing a 21.4-mc IF signal, a video signal output, and two audio outputs, one a headphones jack and the other terminals for a speaker.

When only one antenna is used, it is connected to the INPUT connector, and the coaxial switch automatically switches the antenna to the RF tuner of the frequency band in use. To use separate antennas for each frequency, the AUX. INPUT can be used to connect one antenna directly to the low band RF tuner, while the second antenna reaches the other tuner through the coaxial switch. (See Section IV, Installation and Operation for use of the antenna inputs.)

The receiver contains two RF tuners, one for the 30-60 mc band and one for the 60-300 mc band. Each tuner contains an RF amplifier, a local oscillator, and a mixer. Each local oscillator is operated at a frequency 21.4 mc above the carrier being received. Thus the output from either mixer is a 21.4-mc IF signal. A portion of the 21.4-mc IF signal is applied through an impedance-matching network to the signal monitor output. The remainder of the IF signal is applied to the IF strip.

The first stage of the IF strip is the first IF amplifier. From there the signal is coupled to the second IF amplifier through either one or the other of two different paths. During operation when the 300-kc IF bandwidth has been selected, the connection to the second IF amplifier is through a broad-band filter. During operation when the 20-kc bandwidth has been selected, the connection to the second IF amplifier is through a 20-kc bandwidth crystal filter. Thus, selectable bandwidth is obtained.

From the second IF amplifier the signal is further coupled through a series of two stages. The functions of these two stages change according to the mode of receiver operation. In the AM or CW mode the two stages following the second IF amplifier operate as a third IF amplifier and detector, respectively. In the FM mode the same two stages operate as a first and second limiter, respectively, and the signal from the second limiter is applied successively to an FM demodulator and a dc amplifier.

In the AM and CW modes the demodulated signal is taken from the stage functioning as detector and simultaneously applied, through the VIDEO GAIN control, to the video amplifier and, through the AUDIO GAIN control, to the audio amplifier. In the FM mode the demodulated signal, coming through the dc amplifier, is applied in the same manner to the video amplifier and the audio amplifier. The video amplifier terminates in the VIDEO OUTPUT; the audio amplifier terminates in the PHONES jack and speaker terminals.

Operation in the CW mode is obtained by applying the output of the BFO buffer-doubler stage to the stage functioning as detector. The BFO TUNING control varies the BFO frequency approximately ± 20 kc.

The gain control circuit makes use of either an AGC voltage or a manual gain control voltage. It applies a gain control voltage simultaneously to the RF amplifiers and to the first and second IF amplifiers. To the first IF amplifier the gain control voltage is applied directly. But to the RF amplifiers and the second IF amplifier it is applied only after being subjected to a delay. In the FM mode, only AGC is possible, and the AGC voltage is obtained from the stage functioning as the first limiter. In the AM mode with AGC, an AGC voltage is derived from the stage functioning as a detector. AGC should not be used in the CW mode (see Section IV, Installation and Operation). When manual gain control is used (which can be in either the AM or CW mode) the gain control voltage is derived from a fixed bias supply and applied through the IF GAIN control.

The SIGNAL STRENGTH meter receives operating voltage from three sources: the gain voltage delay circuit, the detector/second limiter stage, and the third IF amplifier/first limiter stage. The TUNING meter is operated by the dc amplifier, whose output is proportional to the deviation of the IF from its center frequency of 21.4 mc.

The power supply operates on 115 vac, 50-400 cps, and provides the eight voltages required for the receiver. These are: 175 vdc; 120 vdc, regulated; 150 vdc; -3 vdc; -24 vdc; two sources of 24 vdc; and 6.3 vac.

2. INPUT.

The receiver INPUT, J102, is connected to the coaxial switch, K101, which has two outputs. Normally, each RF tuner input is coupled to one of the coaxial switch outputs, allowing the use of a single antenna which is automatically switched to the RF tuner of the band in operation. The coaxial switch has a built-in 24-vdc relay and is actuated by a 24-vdc source when the bandswitch is in the 60-300 mc position. In the unactuated position it connects the INPUT to the 30-60 mc tuner.

If separate antennas are desired for each frequency band, the connection from the input to one of the tuners can be transferred from the coaxial relay to the AUX. INPUT (see Section IV, Installation and Operation). Then the AUX. INPUT is used for one antenna and the INPUT is used for the other.

3. LOW BAND TUNER, 30-60 MC.

A. RF Amplifier. The low band tuner RF amplifier consists of two type 6CW4 Nuvistor triodes, V401 and V402, in cascode amplifier configuration. In the low band tuner, the input circuit provides an impedance as seen by the first tube of a value which is near the optimum required for low noise figure operation.

Input tuning is accomplished by inductor L402A, one section of a four-section Mallory inductuner, in the grid circuit of V401. Output tuning is accomplished by inductor L402B, another inductuner section, in the plate circuit of V402.

Neutralization is achieved by feeding a small out-of-phase signal from the plate to the grid of V401 through broadband transformer T401. To extend the dynamic range of the receiver, the RF amplifier signal handling capability is improved by applying a delayed gain control voltage derived in the IF strip (see subsection 4 of this section). The delay of the gain control voltage is accomplished by Zener diode CR601 (in the IF strip). Delaying the gain control voltage to the RF amplifier permits the IF signal to reach a suitable level before RF amplification is reduced. To the low band tuner RF amplifier, the gain control voltage is tapped from a voltage divider composed of R404 and R417.

The low band tuner RF amplifier is placed in operation by means of bandswitch section S102A. It applies B+ voltage to the V402 plate when the bandswitch is rotated to the 30-60 MC section.

B. Local Oscillator. The low band tuner local oscillator is a type 6CW4 Nuvistor triode, V404, operated in a Colpitts configuration with the plate at RF ground. The tank circuit is tuned by inductor L402D, a section of the inductuner. The frequency of operation is maintained 21.4 mc above the carrier. To minimize drift due to variations in filament or plate voltage, the oscillator tube itself is appropriately decoupled from the main tank circuit by capacitor C421.

The low band local oscillator is placed in operation by bandswitch section S102A. It applies B+ voltage to the stage when the bandswitch is rotated to the 30-60 mc position.

C. Mixer. The low band tuner mixer, V403, is a type 7587 Nuvistor tetrode with its input circuit tuned by inductuner section L402C. Both the signal from the RF amplifier and the output of the local oscillator are applied to its grid, and the two signals are mixed to produce a 21.4-mc IF. Test point TP401, decoupled from the grid, can be used to check oscillator injection and also to check RF tuning by means of an oscilloscope.

To obtain uniform bandwidth through the tuning range, two means of coupling are used from the RF amplifier to the mixer. One means is capacitive coupling through C410. The other is by the mutual coupling of L402B and L402C.

The mixer output is a plate circuit pi-network consisting of inductor L405 and capacitors C416 and C417. This network is tuned to the IF frequency, 21.4 mc, and is so designed that, at the tuner output, J403, the plate impedance of V403 is transformed down to approximately 50 ohms. When J403 is connected to a 50-ohm load, the IF has a single-tuned response with a bandwidth of one megacycle at the 3-db points.

The operating voltage to the low band mixer screen grid, like that to the RF amplifier, is switched off when the band is not in use.

4. HIGH BAND TUNER, 60-300 MC.

A. RF Amplifier. The high band tuner RF amplifier consists of two type 7077 ceramic triodes, V501 and V502, connected in a cascode configuration. The impedance as seen by the first tube is of a value near the optimum required for low noise figure operation. Input tuning is by means of inductor L502A, part of a four-section Mallory Inductuner in the grid circuit of V501. RF amplifier output tuning is by means of inductuner section L502B in the V502 plate circuit.

To achieve a low noise figure and high stability, neutralization is used. This is in the form of a capacitive bridge, with capacitor C507 as one arm and the combination of C504 and C505 as another arm, those two arms balancing the grid-to-plate capacitance and the input capacitance of V501.

To extend the receiver's dynamic range, gain control is applied to the high band RF amplifier by means of the same gain control voltage applied to the low band RF amplifier (see subsection 3, paragraph A, of this section). But compared to the low band RF amplifier, there is a difference. The gain control voltage to the high band RF amplifier is not passed through a voltage divider.

The cathodes of V501 and V502 return to -3 vdc through a 620-ohm dropping resistor, R504 for the V501 cathode and R505 for the V502 cathode. This design provides dc degeneration which normalizes the effect of tube variations. Such degeneration also causes the tubes to function with a more remote cutoff, and such cutoff makes it possible to apply full gain control voltage to the high band RF amplifier, rather than through a voltage divider.

The high band tuner RF amplifier is placed in operation by bandswitch section S102A. It applies B+ to the V501 plate when the bandswitch is rotated to the 60-300 MC position.

B. Local Oscillator. The high band tuner local oscillator, V504, is a type 6CW4 Nuvistor triode operated in a balanced Colpitts configuration. It is tuned by L502D, a section of the induc-tuner and is maintained at a frequency 21.4 mc above that of the RF carrier. Capacitors C524 and C525 of the tank circuit have a negative temperature coefficient to compensate for frequency drift due to ambient temperature change. Oscillator energy is taken from the grid side of the tank circuit through capacitor C520. To reduce radiation at the antenna from this oscillator, a small portion of the oscillator signal is fed back, in phase opposition, through capacitors C111 and C112, to the plate of V502. This feedback tends to cancel the oscillator energy which is coupled to the antenna through the tuned circuits.

C. Mixer. The high band tuner mixer, V503, is a type 7587 Nuvistor tetrode. Both the signal from the RF amplifier and the output of the local oscillator are applied to its grid, and the two signals are mixed to produce a 21.4-mc IF. Test point TP501, decoupled from the grid, can be used to check oscillator injection and also to check RF tuning by means of an oscilloscope.

The output circuit of the RF amplifier second stage and the mixer grid circuit form a tuned, two-section, bandpass filter in which a T-network serves as the coupling device. The T-network series arms are capacitors C513 and C514. The shunt arm consists of inductor L508 in parallel with the series combination of inductor L507 and variable capacitor C515. The shunt arm is resonated below 60 mc and becomes capacitive at higher frequencies. This capacitive shunting helps maintain a nearly constant bandwidth throughout the entire tuning range.

Output from the high band mixer is through the same plate load IF network used for the low band mixer (see subsection 3, paragraph C of this section). This use of a common plate load for the two mixers is arranged by having their plates tied together through a coaxial cable.

The high band mixer is placed in operation by means of bandswitch section S102A, which applies screen voltage to V503 when the bandswitch is in the 60-300 MC position.

5. IF STRIP.

A. Input. The input to the IF strip is through connector J601, which is coupled to the low band tuner output by coaxial cable. From J601, a portion of the IF signal is coupled through a 50-ohm T-pad composed of resistors R601, R602, and R603, to the SM OUTPUT, J107. At J107 a signal monitor may be connected to view the 21.4-mc IF signal. In parallel with the T-pad input is the primary of transformer T601, a broadband transformer whose secondary applies the IF signal to the first IF amplifier.

B. First and Second IF Amplifiers. The first and second IF amplifiers, V601 and V602, are type 7587 Nuvistor tetrodes. Coupling between them is according to the IF bandwidth selected and is determined by relays K601 and K602. When the bandwidth switch, S103, is in the 300 KC position, K601 is actuated, K602 is unactuated, and coupling is through a broadband coupling network consisting of inductor L603, capacitors C613 through C617, and inductor L604. When the bandswitch is in the 20 KC position, K601 is unactuated, K602 is actuated, and coupling is through crystal filter Y601. The crystal filter's low impedance level requires impedance transformation, which is achieved by capacitive tapping of the V601 plate circuit, through C611 and C612, and of the V602 grid circuit, through C618 and C620. When the crystal filter is not in use, the relays ground each end of it.

Gain control of the first and second IF amplifiers is by application of a grid bias. The gain control voltage is applied directly to the first stage, but is applied to the second stage after being delayed by Zener diode CR601. This permits signal build-up to a sufficient level in the first IF stage before the gain of the second stage is reduced.

To keep the limiters driven to saturation, only automatic gain control voltage is used during FM operation. The FM AGC voltage is developed in the stage functioning as a first limiter, V603, and reaches the first IF stage through mode selector switch section S104A and feedthrough capacitor C602. During AM operation with AGC, an AGC voltage from the stage functioning as a detector, V604, is applied to the first IF stage through a series consisting of switch section S104A, the AGC contact of switch S105, and the AM or CW contact of switch section S104B.

During operation with manual gain control (possible during both the AM and CW modes) the gain control voltage is derived from the IF GAIN potentiometer R108. This potentiometer, in series with resistor R111 is connected between -24 vdc and ground. The voltage tapped from R111 for manual gain control reaches the first IF amplifier through the manual gain position contact of S105 and the AM or CW contacts of S104A. From there it is conducted to other stages as has been described above for AGC voltages.

During either manual or automatic gain control, the delayed gain control voltage from Zener diode CR601 is also applied to the two RF amplifiers (see subsection 3, paragraph A, and subsection 4, paragraph A, of this section).

To avoid regeneration (which might distort the response curve shape or even bring about oscillation) the plate-to-grid capacitance in the first and second IF amplifier stages is neutralized. This is done by connecting a three-capacitor pi-network between the plate and screen grid circuits. These capacitors are C605, C606, and C607 in the V601 circuit, and C624, C625, and C626 in the V602 circuit.

C. AM Third IF Amplifier/FM First Limiter. A type 7587 Nuvistor tetrode, V603, is used as a third IF amplifier in the AM mode and as a first limiter in the FM mode. This change of functions according to the mode of operation is brought about by using mode selector switch section S104C to vary the screen grid potential, a higher potential being used to operate the tube as an IF amplifier and a lower potential being used to operate it as a limiter. In the FM mode it grounds resistor R618, and that resistor acts as a screen grid bleeder, reducing the V603 screen voltage. In the AM position S104C removes the ground from R618, raising the V603 screen voltage. In the CW position S104C also grounds R618.

A double-tuned circuit is used to couple to this stage from the second IF amplifier. The output from this stage is through the mutual inductance of inductors L607 and L608.

In the FM mode the AGC voltage for FM is developed by grid rectification across resistor R615 and is conducted to the FM position contact of S104A. From there, it functions as the FM AGC voltage (see subsection 5, paragraph B, and subsections 3 and 4, paragraphs A, of this section).

D. AM Detector/FM Second Limiter. A type 7587 Nuvistor tetrode, V604, is used as a grid detector in the AM and CW modes, and as a second limiter in the FM mode. Its input is through a transformer of a bandwidth wide enough to prevent IF response shape distortion resulting from the grid circuit detuning during signal level changes.

In the AM and FM modes the stage performs its required function without circuit change. However, in the CW mode, plate voltage is removed from the stage. This is to block the BFO signal from feeding on through the FM demodulator and dc amplifier to the TUNING meter, since the meter would respond to the BFO and not to the IF signal in the CW mode.

In the AM and CW modes, the detector load is formed by resistors R626 and R627. Inductor L609 is a self-resonant choke which filters IF from the output. From the junction of the load resistors, the demodulated output is taken off through blocking capacitor C642 and conducted to mode selector switch section S104D, which applies the signal to both the AUDIO GAIN and the VIDEO GAIN.

In the AM mode with AGC, this stage also provides an AGC voltage. This AGC voltage is taken from the junction of resistors R624 and R639, which form a relatively high resistance shunt to the detector load. From the junction of these resistors the AM AGC voltage is conducted through S104B to the AGC position of S105, from which it may be applied to the gain control line through S104A.

In the CW mode this stage receives the BFO signal from the BFO buffer-doubler stage through capacitor C647.

In the FM mode this stage applies its output to the FM demodulator stage, through the discriminator transformer made up of inductors L610 and L611.

E. FM Demodulator. A Foster-Seeley type FM demodulator with a capacitance tapping of the secondary circuit is used. This method of tapping provides a high degree of balance unaffected by coil characteristics or tuning slug positions. Germanium diodes, CR602 and CR603, type 1N198A, are used for phase detection. C646 and C675 of the primary and secondary circuits have negative temperature coefficients and are used to compensate for the center frequency drift caused by ambient temperature variation. A self-resonant choke, L612, is placed in series with the demodulator output to attenuate the IF signal. Output from this stage is always to the first stage of the dc amplifier, Q201 in the video module. During FM operation mode selector switch section S104D conducts the demodulated FM signal from the second dc amplifier stage to the AUDIO GAIN and VIDEO GAIN potentiometers.

F. Beat Frequency Oscillator. The BFO uses a type 6CW4 triode, V606, connected in a Clapp oscillator circuit. It oscillates at 10.7 mc, one half of the IF frequency. BFO pitch control is accomplished by adjusting capacitor C661, which changes the cathode-to-ground capacitance of the oscillator. The values chosen provide a reasonable degree of control linearity over the range of ± 20 kc. Effects of oscillator frequency drift caused by temperature changes are reduced by the temperature compensating capacitor C665 in the tank circuit, which has a negative temperature coefficient. The plate circuit is tuned to 21.4 mc. Output of the BFO is taken from the plate circuit and fed to the BFO buffer-doubler stage through C659.

G. BFO Buffer-Doubler. To achieve isolation between the BFO and the signal circuit and therefore to reduce oscillator pulling, a 6CW4 buffer-doubler stage, V605, is used. Stray coupling is eliminated by complete shielding of the oscillator circuit. The BFO signal is connected to the grid of V604, through C647. CW operation is obtained when mode selector switch section S104E applies B+ voltage to V605 and V606.

H. DC Amplifier. The dc amplifier consists of two 2N333 transistors, Q201 and Q202, in a cascaded emitter-follower configuration. The input is permanently connected to the output of the FM demodulator, to which the dc amplifier presents a high impedance. The output presents a low impedance across which the AUDIO GAIN and VIDEO GAIN potentiometers are shunted during FM operation. This shunt connection is made through switch section S104D.

Through resistor R204, the TUNING meter is shunted across the dc amplifier output. A bleeder current from +12 vdc through resistor R205 and the meter to ground holds the meter to a center indication (zero) when the meter is not receiving a voltage from the dc amplifier. Therefore the TUNING meter circuit is self-balancing, eliminating the need for a zero-adjust control. When receiver tuning is inexact, a dc component appears in the FM demodulator output, and this dc component is amplified and applied to the meter.

Thus, in the AM and FM modes the TUNING meter functions by indicating the value of the dc component of the FM demodulator output, a component which is zero when tuning is exactly at the carrier center frequency, and when tuning is inexact is of a polarity and level such as to indicate the direction and extent to which the tuning is off.

I. Video Amplifier. The video amplifier consists of two 2N333 transistors, Q203 and Q204. From the VIDEO GAIN potentiometer, R109, input is to a common emitter amplifier through an RC network, resistor R202 in parallel with capacitor C202, designed to give high frequency boost. To give the video amplifier a low output impedance, the output stage is an emitter follower. Over-all response improvement is gained by resistor R208, which feeds back from the output to the input. A Zener diode, CR201, establishes a regulated 12 vdc supply for application to the video amplifier, as well as to the dc amplifier. A -24 vdc voltage is also used in establishing the bias levels of the four transistors in the video module.

J. Audio Amplifier. The audio amplifier module uses three dc-coupled transistors, Q301, Q302, and Q303. The first stage is a conventional voltage amplifier in a common emitter configuration. The input signal from the AUDIO GAIN potentiometer R116, is applied to this stage through capacitor C301 and resistor R301. The second stage is an emitter follower used to match the high impedance of the first stage output to the low input impedance of the third stage, the power amplifier. High frequency response improvement is obtained by a coupling between the second and third stages. This coupling is made up of capacitor C302 and resistor R308 in parallel. Resistor R307 provides direct feedback from the third to the first stage. Resistor R310 in the emitter lead of the output stage, provides signal frequency current feedback.

Operating voltages are provided by a +12 vdc, regulated by Zener diode CR301 for application to the first two stages. The positive voltage applied to the output stage collector is not regulated, since the collector current is relatively independent of collector voltage.

The output is through transformer T301, which forms the third stage collector load. T301 provides a balanced output of 600 ohms impedance. In parallel across the secondary of T301 are connected the PHONES jack, J101, and terminals 1 and 2 on TB101, for connecting a speaker.

K. Power Supply. The power supply is operated from a 115-vac, 50-400 cps source. A 3/8-ampere fuse of the slo-blo type is used in the primary winding of transformer T101. Four secondary windings are used to supply all necessary voltages to the receiver. One 6.3-vac winding supplies all the filaments. One supplies a full-wave rectifier whose output is LC filtered and taken off at 175 vdc. From the same rectifier a Zener diode, CR111, and a resistor, R101, are used to obtain a 120-vdc regulated supply. A third winding supplies another full-wave rectifier, whose output is 150 vdc, used only to power the 60-300 mc RF tuner. The negative side of this rectifier is held at -3 vdc and used as cathode return for V501 and V502. The fourth secondary winding supplies power for three full-wave rectifying circuits, two of which employ RC filtering and provide +24 vdc and -24 vdc for the video and audio stages. The third full-wave rectifying circuit uses a capacitive input filter and supplies +24 vdc for relay operation.

SECTION IV

INSTALLATION AND OPERATION

1. INSTALLATION.

A. Mounting. The receiver is designed for installation in a standard 19-inch rack. It requires 3 1/2" of vertical space and will project 15 1/2" back into the rack. Adequate ventilation should be allowed.

B. Power Connections. Plug the power cord into a 115 vac, 60-400 cps source. The third pin of the power cord plug grounds the receiver. If a three-pin receptacle is not available, use the adapter provided.

C. Single Antenna Operation. For operation with a single antenna, connect it to the INPUT, J102, using a 50-ohm coaxial cable.

D. Two-Antenna Operation. For operation with two antennas proceed as follows:

(1) At J103 on the coaxial switch, disconnect the cable leading from J401 on the low band tuner chassis.

(2) Connect the free end of the disconnected cable to J106, the connector leading to the AUX, INPUT, J105.

(3) Connect the low band (30-60 mc) antenna to the AUX. INPUT, J105, using a 50-ohm coaxial cable.

(4) Connect the high band (60-300 mc) antenna to the INPUT, J102.

E. Signal Monitor Connection. To use a signal monitor with the receiver, connect its input to the SM OUTPUT, J107, using a 50-ohm coaxial cable.

F. Video Output Connection. Connect the video amplifier load to the VIDEO OUTPUT, J108.

G. Audio Output Connection. To use headphones, plug them into the PHONES jack. If a speaker is to be used, it should be of 600-ohm impedance and should be connected across terminals 1 and 2 of the AUDIO OUTPUT terminal strip, TB101.

H. Ground Connection. System ground should be connected to terminal G of TB101.

2. OPERATION.

The following list is for the guidance of those operating the receiver:

(1) The POWER switch applies ac power to the receiver when the switch is in the up position. One of the tuning dials will light up when power is turned on. The receiver should be allowed a few minutes warm-up prior to use.

(2) For tuning, the bandswitch should be rotated to select operation in the 30-60 mc band or in the 60-300 mc band. As a certain band is selected the dial light for the selected band will come on. The tuning controls may each be preset, allowing rapid switching between two RF carriers in different bands. Each division of the 30-60 mc dial corresponds to 500 kc. Each division of the 60-300 mc dial corresponds to one megacycle.

(3) The mode selector should be set to FM, AM, or CW prior to tuning. When using the CW position, the IF GAIN control should never be at the AGC position.

(4) The BANDWIDTH switch should be set to 300 KC for wideband operation and to 20 KC for narrow band operation. When searching for signals, it is advisable to use wideband operation. For CW operation, only narrow band is recommended.

(5) The SIGNAL STRENGTH meter indicates the relative magnitude of the carrier being received and is not calibrated in any specific units. It is of maximum usefulness when tuning in AM or CW signals, which should be tuned in to maximum signal strength.

(6) The TUNING meter indicates zero when tuning is exactly to the center of the carrier, to the left of center when tuning is below the carrier frequency and to the right of center when tuning is above the carrier frequency. The amount of meter deviation indicates the relative degree of detuning, but the meter is not calibrated to interpret detuning in frequency units. This meter is useful in tuning in both AM and FM signals but will not indicate during CW operation.

(7) The IF GAIN control may be used in the AM mode to obtain manual control of the IF gain, or set at AGC to obtain automatic control. In the CW mode, only manual gain control should be used. In the FM mode, the IF GAIN control may be left in any position, since only automatic gain control is possible during FM operation.

(8) The BFO TUNING control may be adjusted during CW operation to obtain the desired pitch of the beat note.

(9) The AUDIO GAIN control should be adjusted for the desired audio output level.

(10) The VIDEO GAIN control should be adjusted for the desired video output level.

SECTION V

MAINTENANCE

1. GENERAL.

The type 901 receiver will give comparatively trouble-free performance. However, should trouble occur, it is important that maintenance personnel be familiar with Section III, in which the circuits are described. In addition, use should be made of Figures 5-1 through 5-9, in which the location of components is shown; Figure 6-1, the complete schematic diagram; and Table 2, in which the tube socket and transistorized module pin voltages are given. The receiver presents no special maintenance problems and normally requires no care beyond being kept clean. This is best accomplished by the use of compressed air at not more than 60 psi.

CAUTION

All maintenance work within this receiver should be kept to a minimum and performed only by trained and experienced personnel. The placement of components and the dress of leads in the equipment (especially within the RF tuners) have been carefully engineered to give optimum performance. In replacing any components, great care should be exercised to duplicate the exact physical layout of the original assembly.

2. MAINTENANCE OF GEAR TRAINS AND TUNING DIALS.

The gear train mechanisms use friction drive and rely on the stops of the inductuners to halt the turning of the inductuners. The only maintenance normally needed for the mechanisms is the occasional application of a few drops of light oil on the shaft bearings. Be careful not to get oil on the friction drive plates.

The tuning dials are rigidly attached to their shafts and are geared to the tuners in a manner such as to make it quite unlikely they will ever get out of position. However, if it becomes necessary to mechanically realign either dial (such as after an inductuner replacement), follow these steps:

(1) By releasing the Allen setscrews on each side of it, loosen the coupling between the gear train shaft and the inductuner shaft.

(2) Rotate the inductuner shaft to maximum clockwise position.

(3) Turn the dial until the hairline is at the second mark above 62, in the case of the low band dial, or at the first mark above 300, in the case of the high band dial.

(4) Tighten the coupling between the gear train and inductuner shaft.

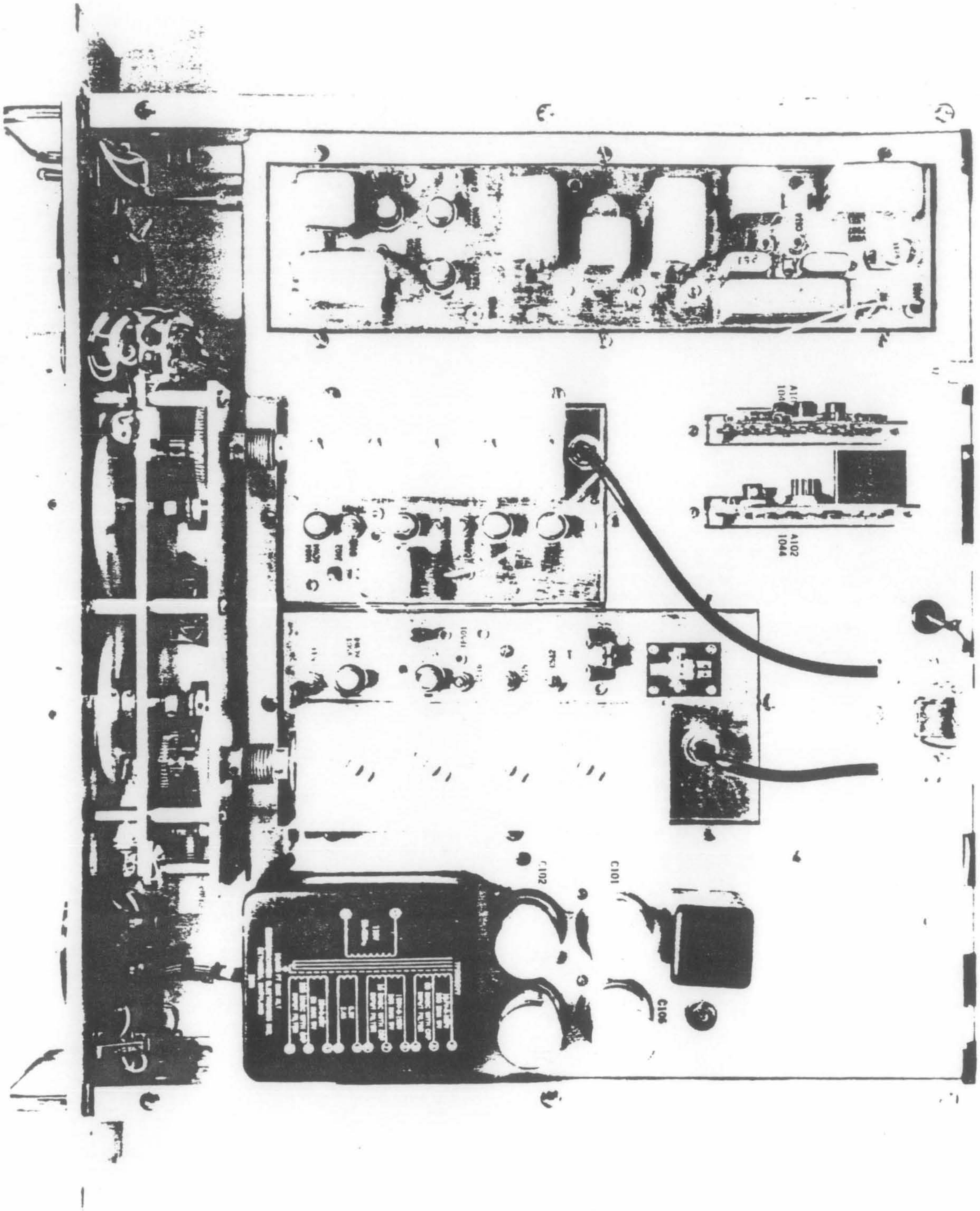


FIGURE 5-1. TYPE 901 RECEIVER, CHASSIS TOP

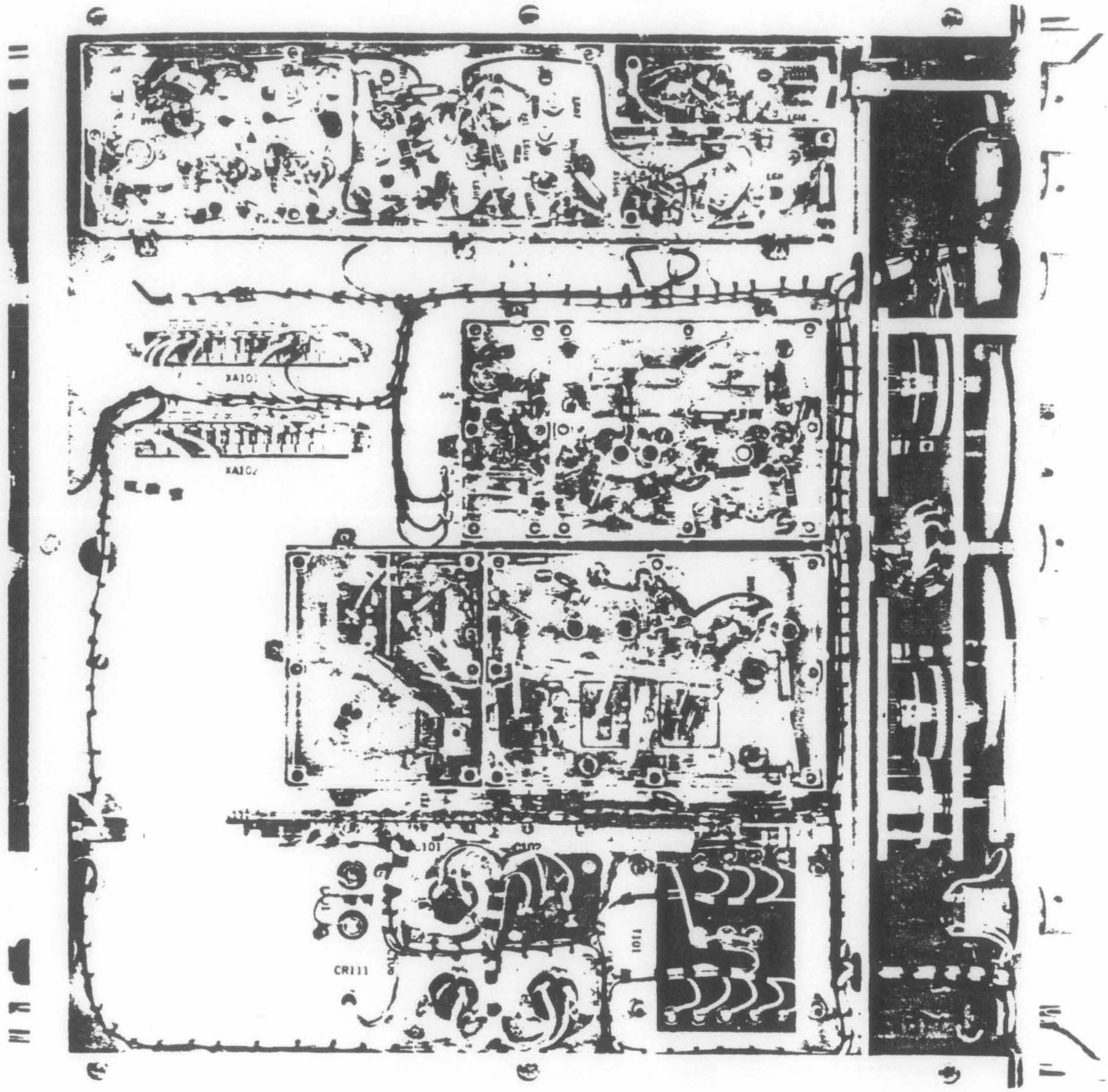


FIGURE 5-2. TYPE 901 RECEIVER, CHASSIS BOTTOM

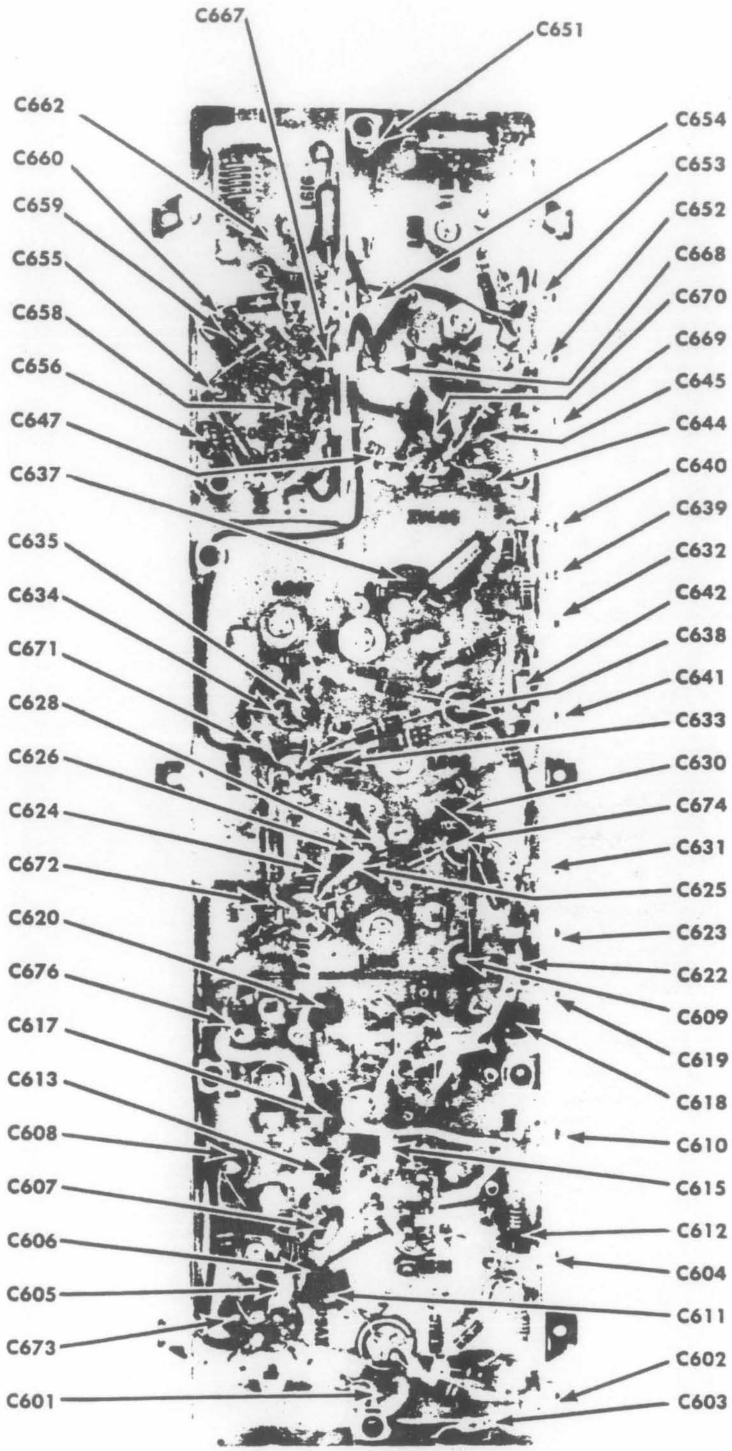


FIGURE 5-3. TYPE 901 RECEIVER, IF STRIP, CAPACITOR LOCATION

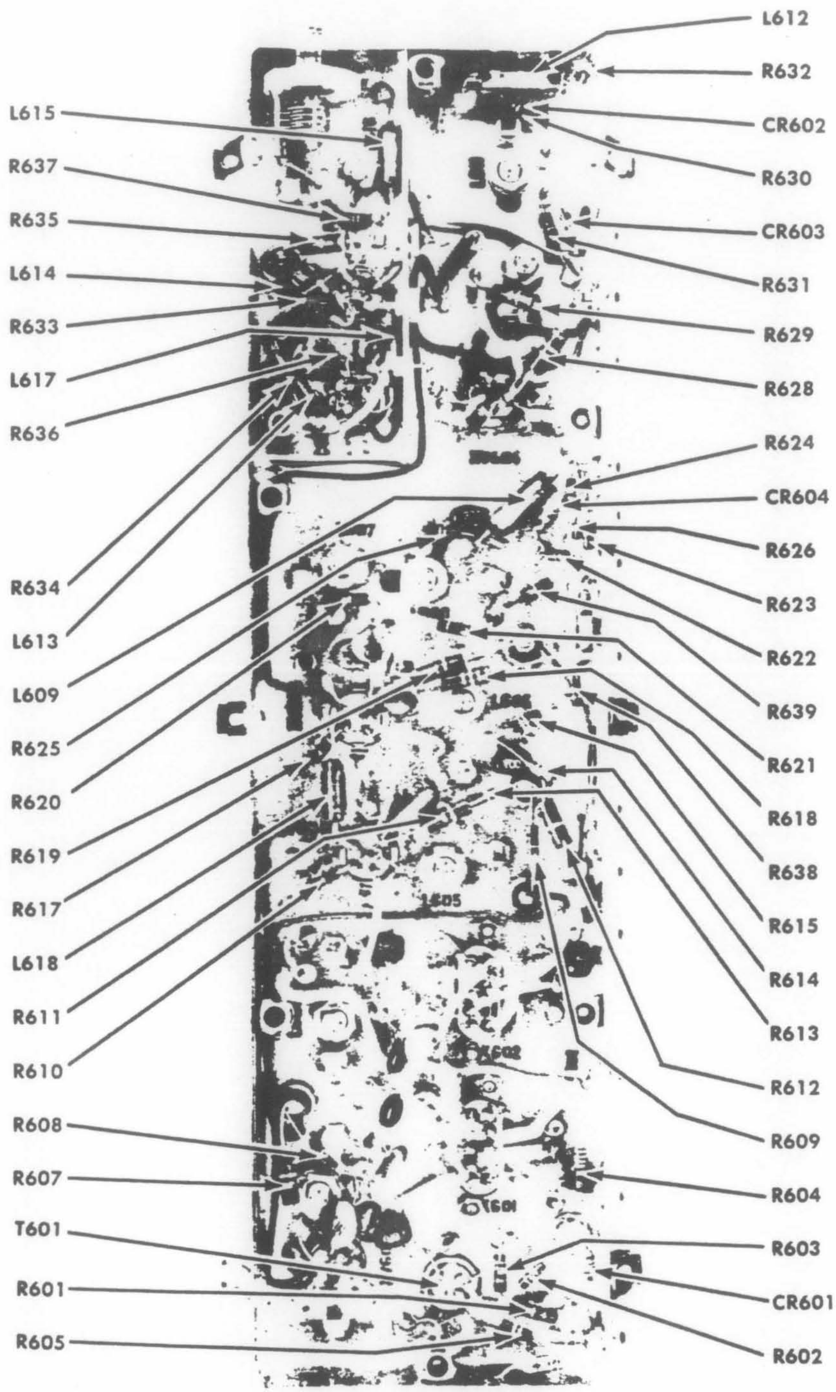


FIGURE 5-4. TYPE 901 RECEIVER, IF STRIP, RESISTOR AND INDUCTOR LOCATION

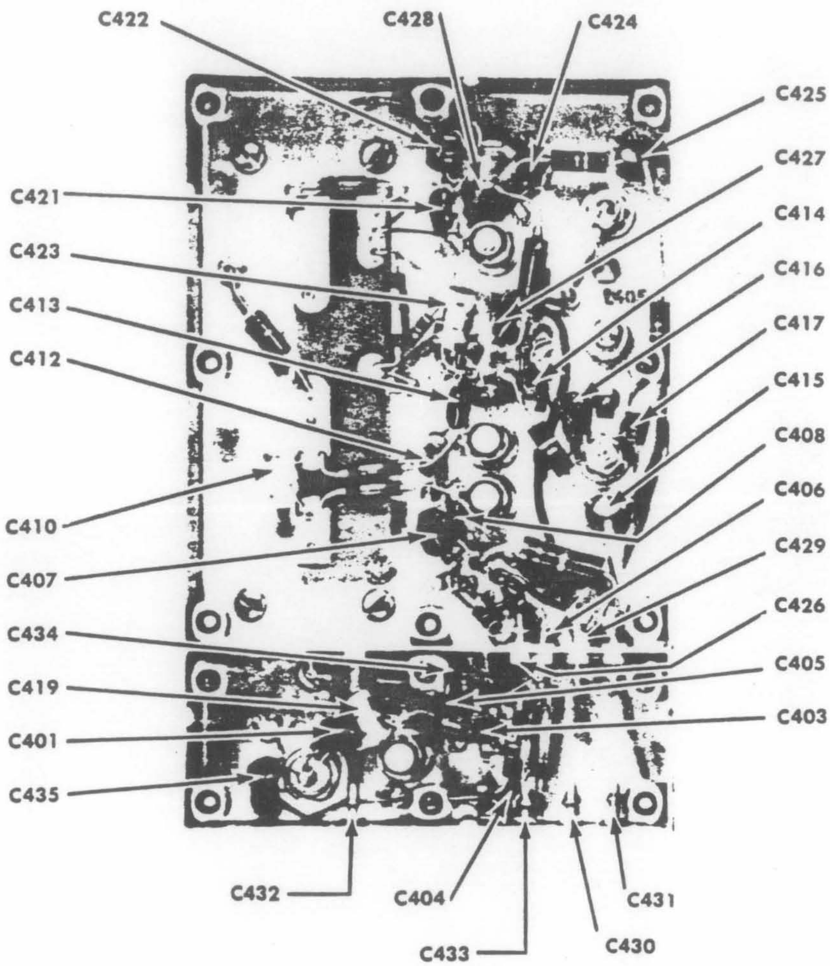


FIGURE 5-5. TYPE 901 RECEIVER, LOW BAND TUNER, CAPACITOR LOCATION

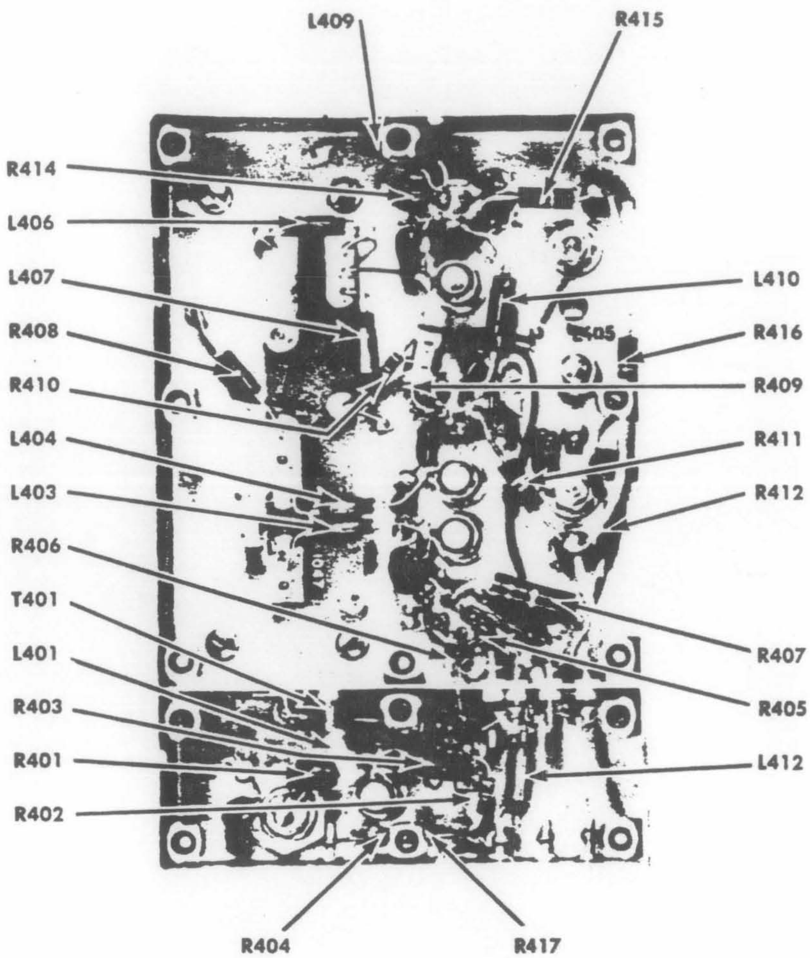


FIGURE 5-6. TYPE 901 RECEIVER, LOW BAND TUNER, RESISTOR AND INDUCTOR LOCATION

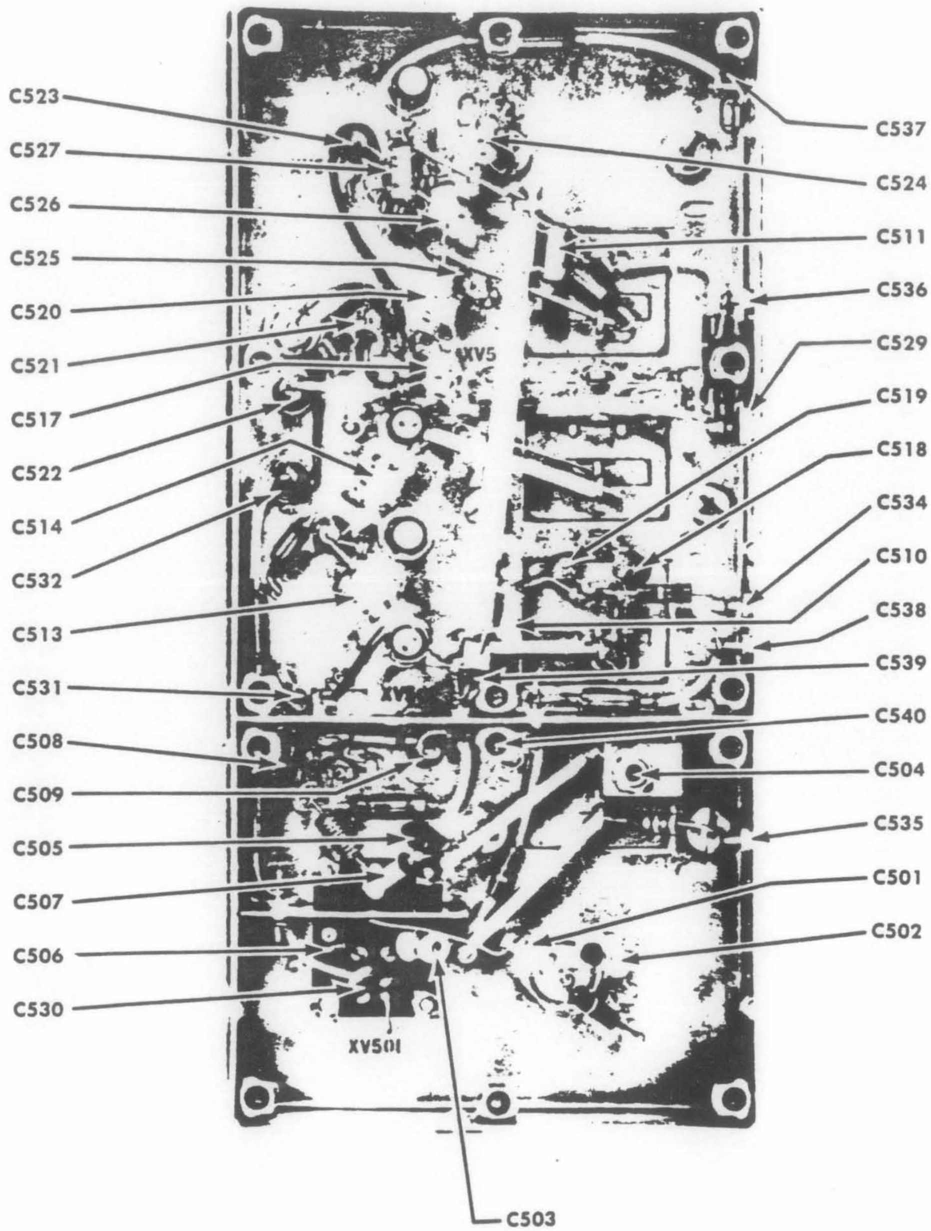


FIGURE 5-7. TYPE 901 RECEIVER, HIGH BAND TUNER, CAPACITOR LOCATION

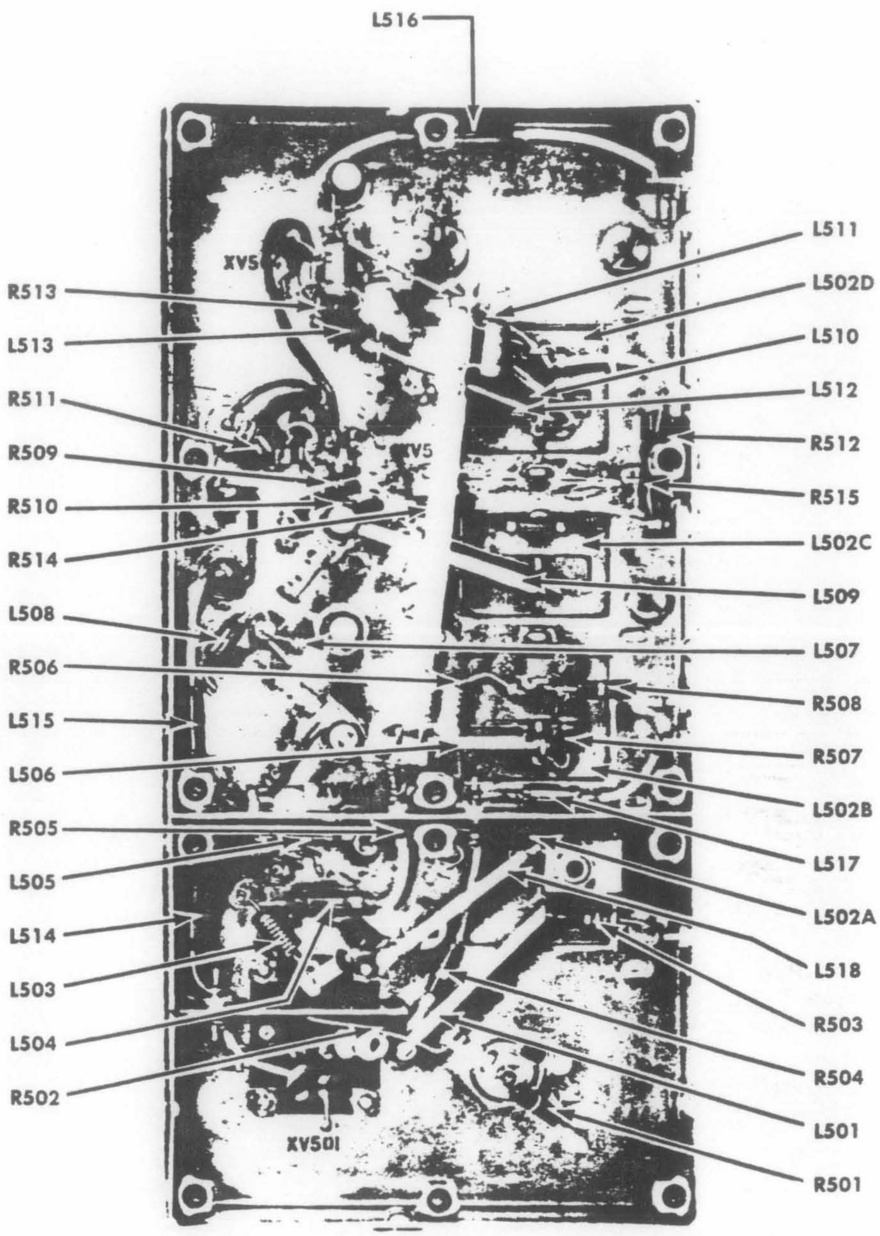


FIGURE 5-8. TYPE 901 RECEIVER, HIGH BAND TUNER, RESISTOR AND INDUCTOR LOCATION

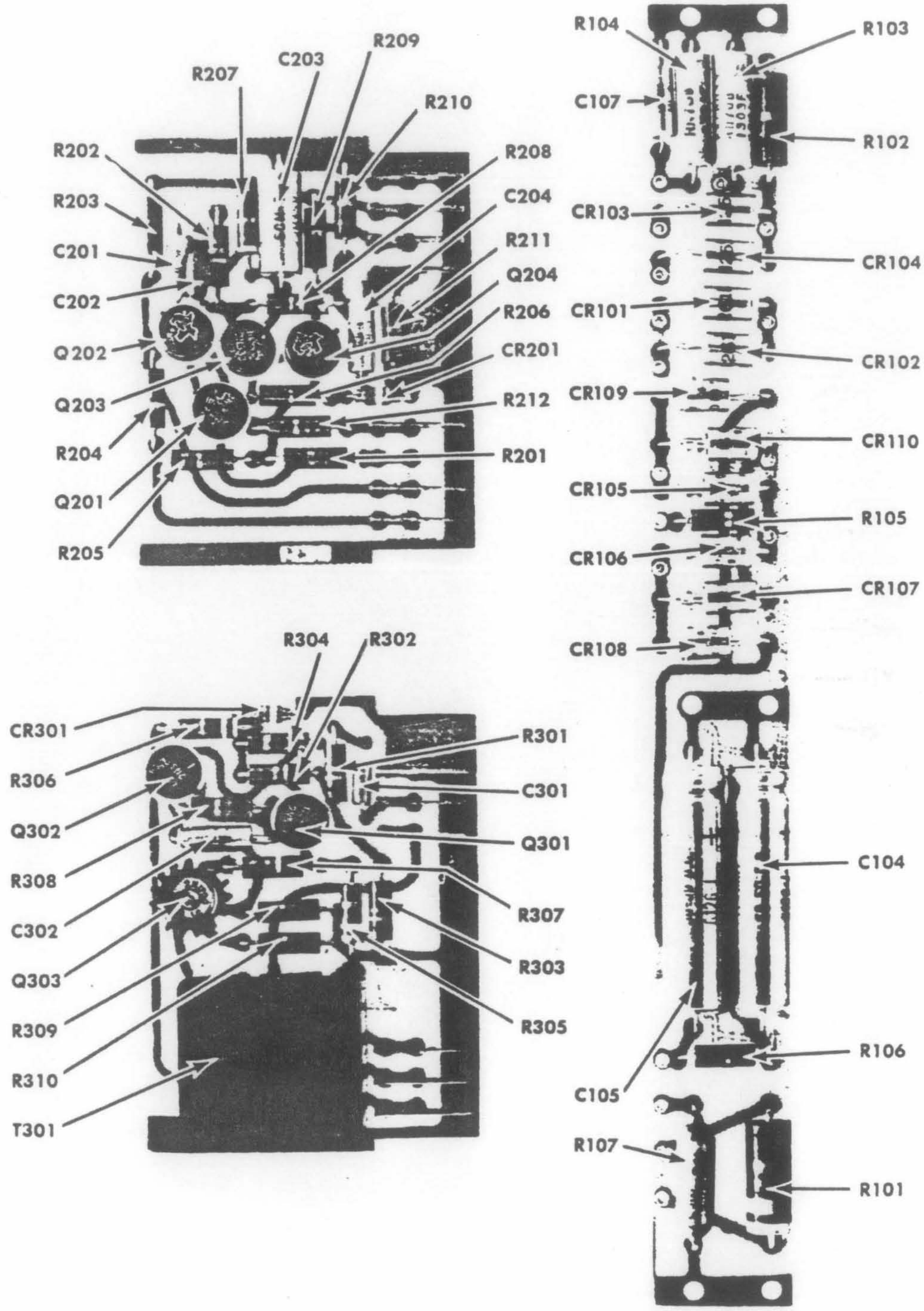


FIGURE 5-9. TYPE 901 RECEIVER, AUDIO MODULE, VIDEO MODULE, AND COMPONENT BOARD

TABLE 2

TUBE SOCKET AND MODULE PIN VOLTAGES, TYPE 901 RECEIVER

Symbol	Type	Tube Socket Pin Numbers					Plate	Grid*	Cathode	Heater	Heater
		2	4*	8	10	12					
V401***	6CW4	75	- .06	.23	6.0 vac	0					
V402***	6CW4	138	72	76.5	6.0 vac	0					
V403***	7587	24.5	-1.5**	0	0	6.0 vac	165				
V404***	6CW4	74.5	-1.85 to -1.22**	0	6.2 vac	0					
V501⁑	7077						145	-.47	.86	6.0 vac	0
V502⁑	7077						143	0	1.8	6.0 vac	0
V503⁑	7587	22	-1.5**	0	6.0 vac	0	165				
V504⁑	6CW4	74	-3.45 to -4.2**	0	0	6.0 vac					
V601	7587	24	-4.4	0	0	6.0 vac	150				
V602	7587	45*** 50⁑	- .035	1.4	0	6.0 vac	170				
V603	7587	24 39****	- .05 - .04****	.20 .35****	0	6.0 vac	170 160****				
V604	7587	15	-1.5	0	0	6.0 vac	27.5				
V605	6CW4	- .58 106 ≠	- .30 -3.0 ≠	0	0	6.0 vac					
V606	6CW4	- .94 105 ≠	- .7 -7.4 ≠	0	0	6.0 vac					

Video Module Pin Numbers							
1	2	3	4	9	10	11	12
0	-23.5	-1.1	0	25	0	-1.1	0

Audio Module Pin Numbers				
2	3	4	11	13
0	-1.1	25	0	0

Note: All readings taken with reference to ground, using RCA VoltOhmyst WV-98B. All readings are positive dc unless otherwise noted. All readings taken with receiver powered by 115 vac, 60 cps; no signal input; controls set as follows unless otherwise noted: BANDWIDTH switch at 300 KC; mode selector at FM; IF GAIN control at AGC; AUDIO GAIN maximum clockwise; VIDEO GAIN maximum clockwise.

* Voltages in this column taken with 1 megohm resistor in series with probe.
** Readings will vary with frequency.
*** Readings taken with bandswitch at 30-60 MC position.
⁑ Readings taken with bandswitch at 60-300 MC position.
**** Readings taken with mode switch in AM position.
≠ Readings taken with mode switch in CW position.

(5) Check the operation by turning the tuning crank counterclockwise until the induc-tuner no longer turns. The dial should read at the mark just beyond 30 in the case of the low band tuner, and just beyone 60 in the case of the high band tuner.

3. PLUG-IN MODULES.

The modules used for the video amplifier and the audio amplifier can be easily removed by pulling them out of the receptacles into which they are fitted. The numbers on the pins coming out of the modules correspond to the numbers indicated on the complete schematic diagram, Figure 6-1, at the points where the connecting leads pass through the dashed lines outlining each module on the schematic. For example, the output from the audio amplifier to the PHONES jack is through pins 11 and 13 of the receptacle into which the audio amplifier module is plugged.

4. PRINTED CIRCUIT COMPONENT REPLACEMENT.

In cases where electronic parts are to be removed from printed circuit boards, do not damage the printed circuit board by applying too much heat from the soldering iron. Parts on printed circuit boards may be replaced as shown in Figure 5-10. The leads of the faulty part should be clipped with cutters so that sufficient length remains to wrap around the leads of the replacement part.

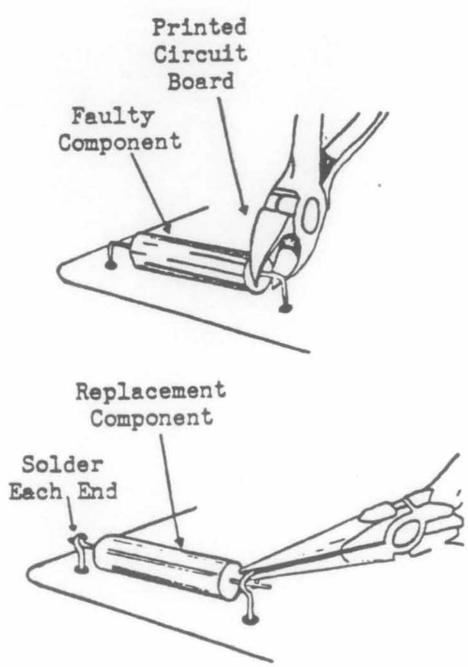


Figure 5-10. Printed Circuit Board Component Replacement

5. TROUBLESHOOTING.

The greatest percentage of troubles will be caused by failures of the fuse, tubes, diodes, or relays. The proper functioning of all these parts should be assured either by test or by replacement with parts known to be good before any further troubleshooting is carried out.

After the above measure has been carried out, initial troubleshooting should be directed toward localizing the problem to a specific portion of the receiver. In the case of the plug-in modules, a quick check can be made by simply plugging in a new module known to be good. Another procedure which should be considered for localizing troubles is to feed in a signal at the antenna jack and then check the signals present at each test point. To this end, it is desirable that all maintenance personnel familiarize themselves with the alignment procedures, even if an alignment is not required, because those procedures include methods of checking performance which may help in other work. Lastly, it should be borne in mind that the power supply should be known to be functioning perfectly before any other circuit is suspected.

6. ALIGNMENT INSTRUCTIONS.

A. General. The alignment procedures in this book are suitable for performance in the field when making periodic performance checks or when making adjustments after replacing tubes or components. Only those controls specifically referred to within a series of steps given for aligning a particular circuit affect the work in that circuit. Those controls not mentioned in any one series of steps may be left in any position. The alignment of this receiver should be performed only with suitable equipments by technicians thoroughly familiar with their use and thoroughly familiar with the receiver. Allow a 30-minute warm-up period before beginning the work.

A post-detection type of marker adder is recommended, and the alignment procedures in this book assume that one is to be used. However, if such a marker adder is not available, the marker generator output should be loosely coupled to the sweep generator output. This can be done by connecting the marker signal source 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 insure that the addition of the marker is not affecting the response curve, disconnect the marker generator and observe that no change in the curve's shape or symmetry occurs.

A low-capacity shielded cable should be used to connect to the oscilloscope, and the shield should be grounded as closely as possible to the point to which the center conductor is connected.

B. Equipments Required. The following equipments or their equivalents are required to perform the complete receiver alignment.

(1) Oscilloscope, Tektronix Type 503.

(2) VTVM, RCA Type WV-98B.

(3) Signal Generator, Boonton Type 202E.

(4) Univerter, Boonton Type 207E.

(5) Signal Generator, Hewlett-Packard 606A.

(6) Audio Signal Generator, Hewlett-Packard 200 CD.

(7) Sweep Generator, Jerrold 900-A with external marker generator, or Telonic Model HD-1 with built-in 10-mc harmonic generator.

(8) Signal Generator, Hewlett-Packard 608D.

(9) Assorted cables, connectors, attenuation pads and alignment tools.

7. IF STRIP ALIGNMENT PROCEDURES.

A. General. For each circuit of the IF strip a separate alignment procedure is given under C, D, E, F, G, and H below. Any one of the procedures may be carried out without disturbing other portions of the IF strip.

B. Initial Settings. The following steps should be performed before beginning the alignment procedures given under C, D, E, and F below. These include all IF alignment procedures except those for the BFO. For aligning only the BFO, they may be omitted.

(1) Set receiver function switch to AM position.

(2) At C602, ground gain control voltage line to IF strip chassis.

(3) By removing P601 from J601, disconnect IF strip from RF tuners.

(4) Set oscilloscope horizontal sensitivity to 0.2 volt per cm.

C. First to Second IF Amplifier, V601 to V602, Interstage Alignment, 20-kc Bandwidth.

(1) Set up test equipment as shown in Figure 5-11.

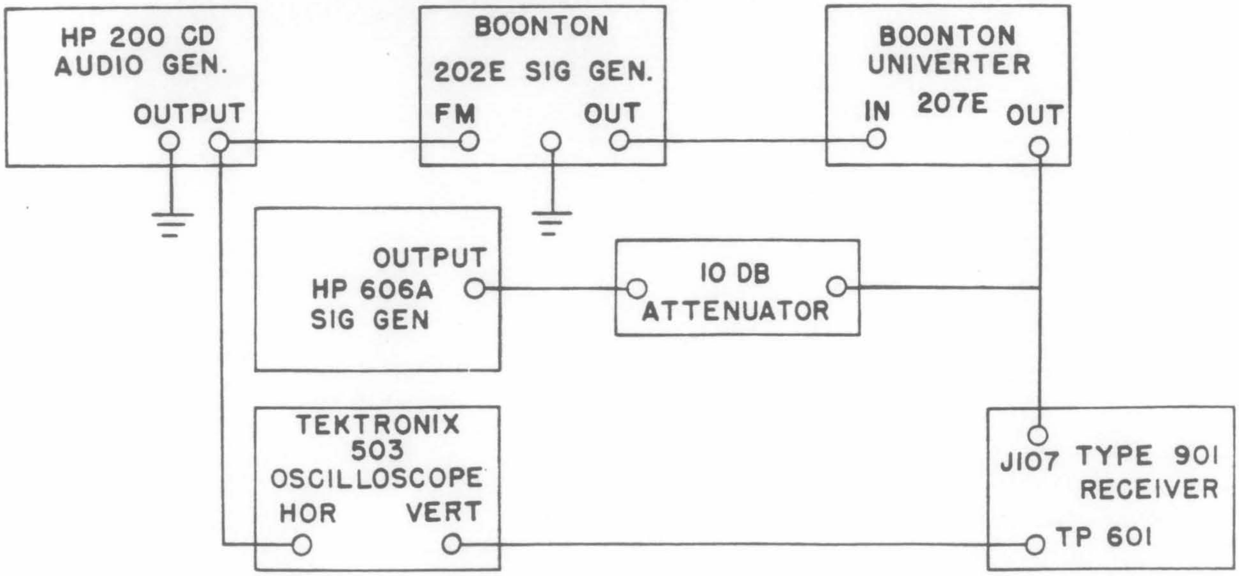


Figure 5-11. Type 901 Receiver, Equipment Setup, V601 to V602 Interstage Alignment, 20-kc Bandwidth

(2) Set audio generator output to 5 cps.

(3) Set oscilloscope vertical sensitivity to 50 mv per cm.

(4) Set Boonton 202E output to 171.4 mc.

(5) Set Boonton Univerter dial at 0 KC.

(6) Adjust sweep width by setting FM deviation to approximately 60 kc.

(7) Set receiver BANDWIDTH switch to 20 KC position.

(8) Adjust L603 and L604 of receiver for a symmetrical response curve centered at 21.4 mc, on oscilloscope screen, as shown in Figure 5-12.

(9) Adjust Hewlett-Packard 606A output for use as a 21.4-mc marker with marker output level such that marker barely appears on response curve.

(10) Check bandwidth by tuning Boonton Univerter dial so that response curve moves across oscilloscope screen. Bandwidth will be the frequency difference read from dial when 3-db curve points intersect 21.4-mc marker line, as shown in Figure 5-12.

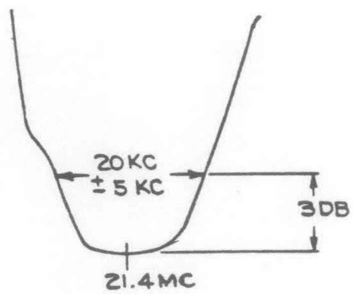


Figure 5-12. Type 901 Receiver, Typical Response Curve, V601 to V602 Interstage Alignment, 20-kc Bandwidth

D. <u>First to Second IF Amplifier, V601 to V602, Interstage Alignment, 300-kc Bandwidth.</u>

(1) Set up test equipment as shown in Figure 5-13.

(2) Adjust Jerrold 900-A sweep generator near 21.4 mc for narrow sweep width with its detector switch at external detector position.

(3) Set oscilloscope vertical sensitivity at 50 mv per cm and adjust sweep generator sweep width until a response curve is well displayed on oscilloscope screen.

(4) Set receiver BANDSWITCH to 300 KC position.

(5) Adjust C614 and C616 for a symmetrical response centered at 21.4 mc, as shown in figure 5-14.

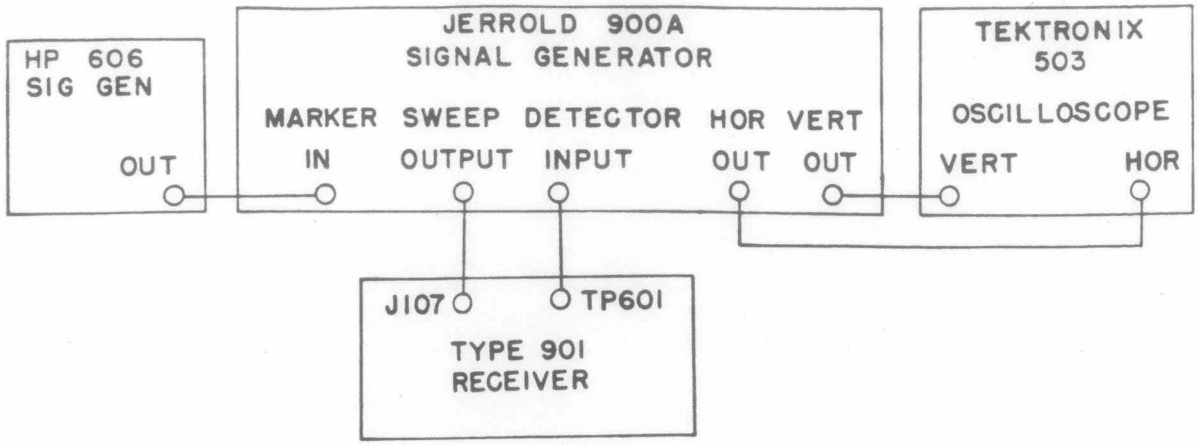


Figure 5-13. Type 901 Receiver, Equipment Setup, V601 to V602 Interstage Alignment, 300-kc Bandwidth

(6) Using calibrated 21.4-mc signal from Hewlett-Packard 606A signal generator as a marker, check bandwidth by moving the marker along response curve. Bandwidth will be the frequency difference read from signal generator dial at points where marker intersects 3-db points of response curve, as shown in Figure 5-14.

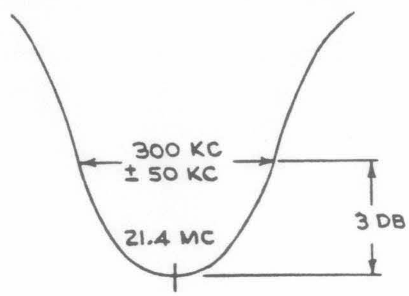


Figure 5-14. Type 901 Receiver, Typical Response Curve, V601 to V602 Interstage Alignment, 300-kc Bandwidth

E. Second IF Amplifier to Third IF Amplifier/First Limiter, V602 to V603, Interstage Alignment.

(1) Set up test equipment as shown in Figure 5-13 except that sweep output of sweep generator should be connected to pin 4 of V602.

(2) By removing P601 from J601, disconnect IF strip from RF tuners.

(3) Adjust Jerrold 900-A sweep generator near 21.4 mc for narrow sweep width with its detector switch at external detector position.

(4) Set oscilloscope vertical sensitivity at 50 mv per cm and adjust sweep generator sweep width until a response curve is well displayed on oscilloscope screen.

(5) Set receiver bandswitch to 300 KC position.

(6) Adjust L605 and L606 for a symmetrical response centered at 21.4 mc, as shown in Figure 5-15.

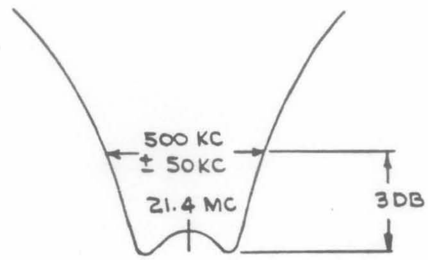


Figure 5-15. Type 901 Receiver, Typical Response Curve, V602 to V603 Interstage Alignment

F. Third IF Amplifier/First Limiter to AM Detector/FM Second Limiter, V603 to V604, Interstage Alignment.

(1) Set up test equipment as shown in Figure 5-13 except that sweep output of sweep generator should be connected to pin 4 of V603.

(2) Adjust Jerrold 900-A sweep generator near 21.4 mc for narrow sweep width with its detector switch at external detector position.

(3) Set oscilloscope vertical sensitivity at 50 mv per cm and adjust sweep generator sweep width until a response curve is well displayed on oscilloscope screen.

(4) Set receiver bandswitch to 300 KC position.

(5) Adjust L607 and L608 for a symmetrical response curve centered at 21.4 mc, as shown in Figure 5-16.

(6) Adjust C657 for dip in center of response curve, as shown in Figure 5-16.

G. Discriminator Alignment.

(1) Set up equipment as shown in Figure 5-13 except that sweep output of sweep generator should be connected to pin 4 of V603 and the detector input should be connected to the receiver's FM output, E602.

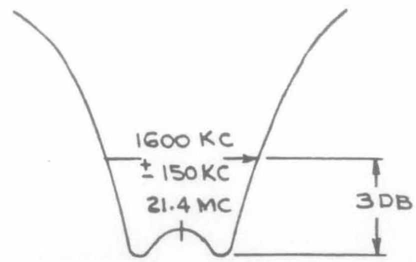


Figure 5-16. Type 901 Receiver, Typical Response Curve, V603 to V604 Interstage Alignment

(2) Adjust Jerrold 900-A sweep generator near 21.4 mc for narrow sweep width with its detector switch at external detector position.

(3) Set oscilloscope vertical sensitivity at 50 mv per cm and adjust sweep generator sweep width until a response curve is well displayed on oscilloscope screen.

(4) Set receiver bandswitch to 300 KC position.

(5) Adjust phasing of the sweep generator.

(6) Adjust L611 for zero crossing of S-curve at 21.4 mc and adjust L610 for symmetry of S-curve, as shown in Figure 5-17.

(7) Using calibrated 21.4-mc marker from Hewlett-Packard 606A signal generator, check that the S-curve has the following characteristics:

(a) centered at 21.4 mc.

(b) equal amplitude and symmetry.

(c) peak-to-peak separation of 750 $\pm$30 kc, as shown in Figure 5-17.

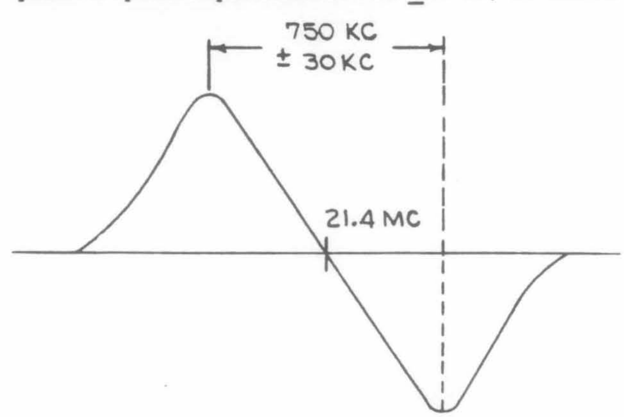


Figure 5-17. Type 901 Receiver, Typical Response Curve, Discriminator Alignment

H. BFO, V606, Alignment.

(1) Set receiver function switch to CW position.

(2) Set receiver BANDWIDTH switch to 20 KC position.

(3) Connect the Hewlett-Packard 606A signal generator to receiver's SM OUTPUT, J107.

(4) Connect a set of headphones to the receiver PHONES jack.

(5) Set the receiver BFO TUNING control with the white dot at the upward midpoint position.

(6) Adjust L616 for zero beat.

8. LOW BAND RF TUNER ALIGNMENT PROCEDURES.

A. General. For each circuit of the low band RF tuner a separate alignment procedure is given under C, D, E, and F below. Any one of the procedures may be carried out without disturbing other portions of the tuner. However, all low band RF tuner alignment procedures are critical and should not be attempted in the field unless considered absolutely necessary, such as after replacement of a component.

B. Initial Settings. The following steps are necessary for the alignment procedures in all parts of the low band RF tuner and should be carried out prior to performing any work listed under C, D, E, and F below.

(1) Set the receiver function switch to the AM position.

(2) Set the receiver bandswitch to the 30-60 MC position.

(3) Connect the VTVM positive lead to C432, negative lead to the tuner chassis, and adjust the IF GAIN control until the VTVM indicates -1.5 vdc.

C. Low Band Mixer, V403, Plate Coil, L405, Alignment.

(1) Set BANDWIDTH switch to 20 KC position.

(2) From the Hewlett-Packard 606A signal generator, feed a calibrated 21.4-mc signal to the INPUT jack, J102.

(3) Adjust signal generator output until receiver SIGNAL STRENGTH meter indicates at 1/2 deflection.

(4) Adjust L405 for maximum indication on the SIGNAL STRENGTH meter.

D. Low Band Local Oscillator, V404, Alignment.

(1) Set the BANDWIDTH switch to the 300 KC position.

(2) Set the receiver dial exactly at 30 mc.

(3) Feed the output of the Hewlett-Packard 608D VHF signal generator to the INPUT jack, J102.

(4) Calibrate the VHF signal generator to produce exactly 30 mc.

(5) Adjust the output level of the VHF signal generator until the SIGNAL STRENGTH meter indicates at 3/4 deflection.

(6) Recalibrate the VHF signal to exactly 30 mc.

(7) Adjust C420 until the TUNING meter indicates exactly at the center of its scale.

(8) Tune the dial exactly to 60 mc.

(9) Calibrate the VHF signal exactly to 60 mc. If the TUNING meter again indicates exactly at the center of its scale, the alignment is completed. If not, adjust C420 for center indication of TUNING meter.

(10) Repeat steps (2) through (9) until the TUNING meter indicates at its center for both 30 mc and 60 mc.

E. Low Band RF Amplifier to Mixer, V402 to V403, Interstage Alignment.

(1) Remove bottom cover from the 30-60 mc tuner chassis.

(2) Unsolder C403 from C402, carefully noting the positions of the two capacitors so that they may later be resoldered together exactly the same.

(3) Set up equipment as shown in Figure 5-18.

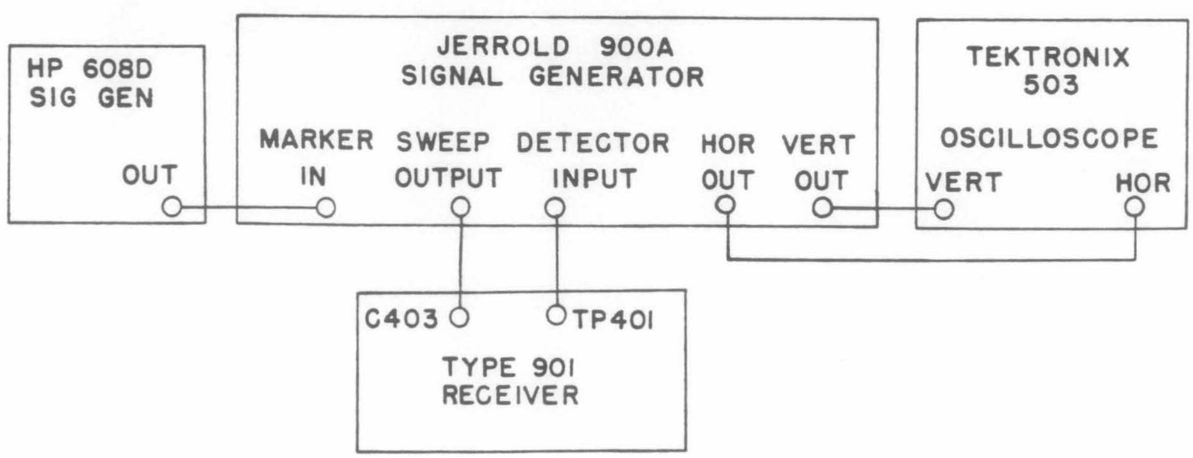


Figure 5-18. Type 901 Receiver, Equipment Setup, V402 to V403 Interstage Alignment

(4) Set the oscilloscope vertical sensitivity to 10 mv per cm and the vertical input to the ac-coupled position.

(5) Set the oscilloscope horizontal sensitivity such that the total trace of the horizontal sweep is 10 cm.

(6) Set the receiver dial to 30 mc and sweep generator at approximately 30 mc.

(7) Using a calibrated 30-mc signal from the Hewlett-Packard 608D signal generator as a marker, adjust C409 and C411 for a symmetrical double-tuned response centered at 30 mc.

(8) Change receiver dial to 60 mc and sweep generator to approximately 60 mc.

(9) Using a calibrated 60-mc signal from the Hewlett-Packard 608D signal generator as a marker, check the response for a symmetrical double-tuned response with a center dip of approximately 10%. If the response seems acceptable, the alignment is finished. Otherwise, adjust C409 and C411 to produce proper centering and symmetry.

(10) Repeat steps (6) through (9) until the response curve has an acceptable symmetry and centering at both ends of the band.

F. Low Band RF Tuner Input Circuit Alignment.

(1) If C403 and C402 have been unsoldered, resolder them in the exact position they were in originally.

(2) Set up the equipments as shown in Figure 5-18 except that the output of the sweep generator is moved from C403 to the INPUT jack, J102.

(3) Set the oscilloscope vertical sensitivity to 10 mv per cm and the vertical input to the ac-coupled position.

(4) Set the oscilloscope horizontal sensitivity such that the total trace of the horizontal sweep is 10 cm.

(5) Set the receiver dial and sweep generator center frequency to 30 mc.

(6) Using a calibrated 30-mc signal from the Hewlett-Packard 608D signal generator as a marker, adjust C402 for a maximum symmetrical response centered at 30 mc.

(7) Change receiver dial to 60 mc and sweep generator frequency to approximately 60 mc.

(8) Using a calibrated 60-mc signal from the Hewlett-Packard 608D signal generator as a marker, adjust C402 for a maximum symmetrical response centered at 60 mc.

(9) Repeat steps (5) and (6).

9. HIGH BAND RF TUNER ALIGNMENT PROCEDURES.

A. General. For each circuit of the high band RF tuner a separate alignment procedure is given under C, D, and E below. Any one of the procedures may be carried out without disturbing other portions of the tuner. However, all high band RF tuner alignment procedures are critical and should not be attempted in the field unless considered absolutely necessary, such as after replacement of a component.

B. Initial Settings. The following steps should be performed before proceeding to any one of the procedures listed below under C, D, or E.

(1) Set the function switch to the FM position.

(2) Set the bandswitch to the 60-300 MC position.

C. High Band Local Oscillator, V504, Alignment.

(1) Set the BANDWIDTH switch to the 300 KC position.

(2) Connect the output of a Hewlett-Packard 608D VHF signal generator to the INPUT jack, J102.

(3) Calibrate the VHF signal generator to produce a 270-mc signal.

(4) Adjust the VHF signal generator output level until the receiver SIGNAL STRENGTH meter reads approximately 3/4 deflection.

(5) Recalibrate the VHF signal exactly to 270 mc.

(6) Set the receiver dial exactly at 270 mc.

(7) Adjust C533 until the TUNING meter indicates exactly at center.

(8) Set the dial exactly to 100 mc.

(9) Tune and calibrate the VHF signal generator to produce a 100-mc signal. If the TUNING meter again indicates exactly at the center of its scale, the alignment is completed. If not, adjust C533 for center indication of TUNING meter.

(10) Repeat steps (5) through (9) until TUNING meter indicates at its center for both 100 mc and 270 mc.

D. High Band RF Amplifier to Mixer, V502 to V503, Interstage Alignment.

(1) Remove bottom cover from the 60-300 mc tuner chassis.

(2) Unsolder C508 from the junction of L503 and L504, carefully noting the capacitor's position so that it may later be resoldered to exactly the same point.

(3) Set up the equipment as shown in Figure 5-19.

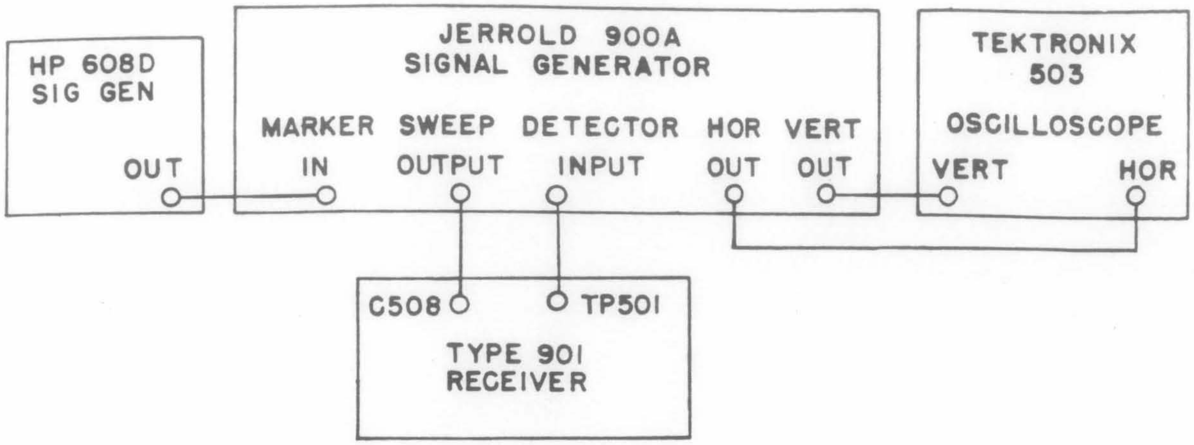


Figure 5-19. Type 901 Receiver, Equipment Setup, V502 to V503 Interstage Alignment

(4) Set the oscilloscope vertical sensitivity to 10 mv per cm and the vertical input to the ac-coupled position.

(5) Set the oscilloscope horizontal sensitivity so that the total trace of the horizontal sweep is 10 cm.

(6) Set the receiver dial to 290 mc and sweep generator to approximately 290 mc.

(7) Using a calibrated 290-mc marker from the Hewlett-Packard 608D signal generator as a marker, adjust C512, C516, and C515 for a symmetrical flat-topped response with the 290-mc marker appearing 6% down on the higher frequency slope as shown in Figure 5-20.

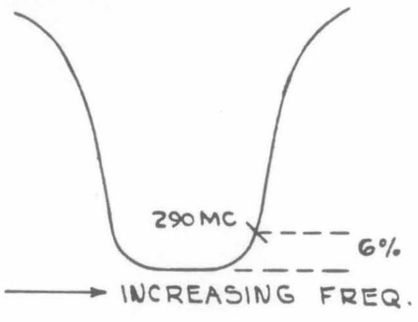


Figure 5-20. Type 901 Receiver, Typical Response Curve V502 to V503 Interstage Alignment, Receiver Dial at 290 mc, Bottom Cover On

(8) Set the receiver dial to 100 mc and sweep generator to approximately 100 mc.

(9) Using a calibrated 100-mc marker from the Hewlett-Packard 608D signal generator, adjust C512 and C516 for a symmetrical double-tuned response with the 100-mc marker appearing at the low frequency peak as shown in Figure 5-21.

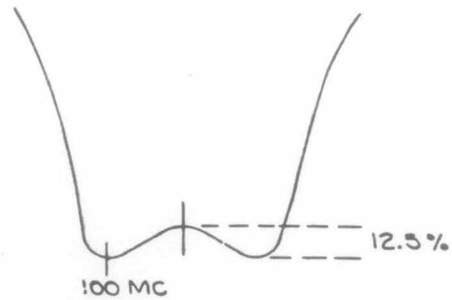


Figure 5-21. Type 901 Receiver, Typical Response Curve, V502 to V503 Interstage Alignment, Receiver Dial at 100 mc, Bottom Cover On

(10) Adjust C515 for 12.5% center dip as shown in Figure 5-21.

(11) Repeat steps (9) and (10) until the final response curve assumes the proper shape with the bottom cover on.

E. High Band RF Tuner Input Circuit Alignment.

(1) If C508 has been unsoldered from the junction of L503 and L504, resolder it to the exact position from which it was taken.

(2) Set up equipment as shown in Figure 5-19 except that the output of the sweep generator is now connected to the INPUT, J102.

(3) Set the oscilloscope vertical sensitivity to 10 mv per cm and the vertical input to the ac-coupled position.

(4) Set the oscilloscope horizontal sensitivity so that the total trace of the horizontal sweep is 10 cm.

(5) Set the receiver dial to 290 mc and the sweep generator to approximately 290 mc.

(6) Adjust C504 for maximum gain and symmetrical response.

(7) Set the receiver dial to 100 mc and the sweep generator to approximately 100 mc.

(8) If the response is symmetrical, the alignment is completed. If not, adjust C504 for a symmetrical response.

(9) Repeat step (6) through (8) as necessary.

SECTION VI

PARTS LIST

Symbol	Description	Vendor Part No.	Vendor Name
1.	MAIN CHASSIS		
A101	ASSEMBLY, VIDEO MODULE	1355	CEI
A102	ASSEMBLY, VIDEO MODULE	1044-A	CEI
A103	ASSEMBLY, CARRIER-OPERATED RELAY MODULE	1124	CEI
C101A, B	CAPACITOR, ELECTROLYTIC: Twist-Lock 15 uf-15 uf, 350-350 wvdc	43F2299B, Revision 0	GE
C102A, B	Same as C101A, B		
C103A, B	CAPACITOR, ELECTROLYTIC: Twist-Lock 100 uf-100 uf, 50-50 wvdc	43F2300B, Revision 0	GE
C104	CAPACITOR, ELECTROLYTIC: 50 uf, 50 wvdc	TE-1307	Sprague
C105	Same as C104		
C106	Same as C103A		
C107	CAPACITOR, ELECTROLYTIC, TANTALUM: 10 uf, 20 vdc, ±20%	150D106X0020B0	Sprague
CR101	DIODE, SILICON RECTIFIER	1N2615	Motorola
CR102	Same as CR101		
CR103	Same as CR101		
CR104	Same as CR101		
CR105	DIODE, SILICON RECTIFIER	1N2610	Motorola
CR106	Same as CR105		
CR107	Same as CR105		
CR108	Same as CR105		
CR109	Same as CR105		
CR110	Same as CR105		
CR111	DIODE, SILICON ZENER	1N3008B/10M120Z5	Motorola

DS101	LAMP: 6-8 volts, 0.15 amp	47	GE
DS102	Same as DS101		
DS103	LAMP ASSEMBLY: With #345 lamp polished chrome	107-1930.971	Dialco
F101	FUSE: 3/8 amp, Slo-Blo		Littelfuse
J101	NOT USED		
J102	RECEPTACLE, JACK, BNC: p/o K101		
J103	RECEPTACLE, JACK, BNC: p/o K101		
J104	RECEPTACLE, JACK, BNC: p/o K101		
J105 J106	ADAPTER: Straight Single Hole Bulkhead Feedthru (Jack-Jack), BNC	UG-492A/U	Amphenol
J107A	RECEPTACLE, JACK, BNC	UG-1094/U	Amphenol
J107B	ADAPTER, MICRODOT	53-82	Microdot
J108	Same as J107A		
J109	JACK, PHONE: Open-circuited	C-11	Switchcraft
K101	SWITCH, COAXIAL: 26 vdc, relay operated	317-010202-3	RF Products
K102	RELAY	22RJCC1000GS1C	Sigma
L101	CHOKE: 6h, 60 ma	1070	CEI
M101	METER: 0-50 ua, dc, light gray SL-7858	MM-1	Marion
M102	METER: 100-0-100 ua, dc, light gray SL-7858	MM-1	Marion
P101	POWER CORD & PLUG ASSEMBLY	01753-001	Cornish
P102	PLUG, CABLE, BNC	UG-88/U	Amphenol
P103	Same as P102		
P104	Same as P102		
P105	Same as P102		
P106	Same as P102		
P107	Same as P102		
R101	RESISTOR, FIXED COMPOSITION: 4300 ohms $\pm$5%, 2 W	HB 4325	AB
R102	RESISTOR, FIXED COMPOSITION: 2000 ohms $\pm$5%, 1 W	GB 2025	AB

R103	RESISTOR, DEPOSITED CARBON: 130K ohms ± 1%, 1/2 W	DCM1/2	Electra
R104	RESISTOR, DEPOSITED CARBON: 2700 ohms ± 1%, 1/2 W	DCM1/2	Electra
R105	RESISTOR, FIXED COMPOSITION: 82 ohms ± 5%, 1/2 W	EB 8205	AB
R106	RESISTOR, FIXED COMPOSITION: 820 ohms ± 5%, 1/2 W	EB 8215	AB
R107	RESISTOR, WIRE WOUND: 250 ohms ± 3%, 3 W	CS	Sage
R108	RESISTOR, VARIABLE, COMPOSITION: 10K ohms ± 20%, 1W with SPDT Switch	KB22141	CTS
R109	RESISTOR, VARIABLE, COMPOSITION: 10K ohms ±20%, 2W	JAIN052P103UA	AB
R110	RESISTOR, VARIABLE, COMPOSITION: 0.1meg ±20%, 2W	JAIN052P104UA	AB
R111	RESISTOR, FIXED COMPOSITION: 390 ohms ±5%, 1/2 W	EB 3915	AB
R112	RESISTOR, VARIABLE: 200K 1/2 W	RV6NAYSD204A	AB
S101	SWITCH, TOGGLE, SPST	8280-K16	Cutler-Hammer
S102	SWITCH, ROTARY, NON-SHORTING	399213-A	Oak
S103	SWITCH, TOGGLE, SPDT	8282-K14	Cutler-Hammer
S104	SWITCH, ROTARY, NON-SHORTING	399211-A	Oak
S105	SWITCH: Part of R108, not separately replaceable		
S106	Same as S103		
T101	TRANSFORMER, POWER	1085	CEI
TB101	TERMINAL STRIP	3-140-Y	Cinch
TB102	Same as TB101		

2. VIDEO MODULE.

C201	CAPACITOR, ELECTROLYTIC, TANTALUM: 0.47 uf ±20% 35 wvdc	150D474X0035A2	Sprague
C202	CAPACITOR, DIPPED MICA: 68 uuf ± 5%	DM-10-680J	Arco
C203	CAPACITOR, ELECTROLYTIC, TANTALUM: 22uf ±20% 35 vdc	150D226X0035R0	Sprague
C204	Same as C107		
CR201	DIODE, ZENER: 1N759A	1N759A	P.S.I.
Q201	TRANSISTOR	2N335	Texas Inst.
Q202	Same as Q201		

Q203	Same as Q201		
Q204	Same as Q201		
R201	RESISTOR, FIXED COMPOSITION: 3.9 megohm ± 5%, 1/2W	EB 3955	AB
R202	RESISTOR, FIXED COMPOSITION: 10K ohm ± 5%, 1/2 W	EB 1035	AB
R203	RESISTOR, FIXED COMPOSITION: 8200 ohm ± 5%, 1/2 W	EB 8225	AB
R204	RESISTOR, FIXED COMPOSITION: 100K ohm ± 5%, 1/2 W	EB 1045	AB
R205	RESISTOR, FIXED COMPOSITION: 1 megohm ± 5%, 1/2 W	EB 1055	AB
R206	RESISTOR, FIXED CARBON FILM: 4.75K ohms 1% 1/8 W	CG1/8	Texas Inst.
R207	Same as R206		
R208	Same as R204		
R209	RESISTOR, FIXED COMPOSITION: 5600 ohms ± 5%, 1/2 W	EB 5625	AB
R210	Same as R209		
R211	Same as R204		
R212	RESISTOR, FIXED COMPOSITION: 680 ohms ± 5%, 1/2 W	EB 6815	AB
R213	RESISTOR, FIXED CARBON FILM: 392K ohms ±1% 1/8 W	CG1/8	Texas Inst.

3. AUDIO MODULE

C301	Same as C201		
C302	Same as C107		
CR301	Same as CR201		
Q301	Same as Q201		
Q302	Same as Q201		
Q303	TRANSISTOR: 2N1700	2N1700	RCA
R301	Same as R202		
R302	RESISTOR, FIXED CARBON FILM: 68.1K ohms ±1% 1/8 W	CG1/8	Texas Inst.
R303	RESISTOR, FIXED CARBON FILM: 10K ohms ±1% 1/8W	CG1/8	Texas Inst.
R304	RESISTOR, FIXED CARBON FILM: 6.81K ohms ±1% 1/8 W	CG1/8	Texas Inst.
R305	RESISTOR, FIXED CARBON FILM: 619 ohms ±1% 1/8W	CG1/8	Texas Inst.

R306	RESISTOR, FIXED COMPOSITION: 3900 ohms ±5%, 1/2 W	EB 3925	AB
R307	Same as R204		
R308	RESISTOR, FIXED COMPOSITION: 620 ohms ± 5%, 1/2 W	EB 6215	AB
R309	Same as R308		
R310	RESISTOR, FIXED CARBON FILM: 68.1 ohms ±1% 1/8W	CG1/8	Texas Inst.
T301	TRANSFORMER, AUDIO	1170	CEI

4. LOW BAND TUNER, 30-60 MC.

C401	CAPACITOR, DIPPED MICA: 15 pf ± 5%	DM10-150J	Arco
C402	CAPACITOR, VARIABLE TRIMMER: 0.7-9.0 pf	VC1G	JFD
C403	CAPACITOR, DIPPED MICA: 500 pf ± 10%	DM-15-501K	Arco
C404	CAPACITOR, CERAMIC DISC: 0.001 uf ± 20%	40C214A	Sprague
C405	Same as C404		
C406	Same as C404		
C407	CAPACITOR, DIPPED MICA: 270 pf ± 5%	DM-10-271J	Arco
C408	CAPACITOR, DIPPED MICA: 18 pf ± 5%	DM-10-180J	Arco
C409	Same as C402		
C410	CAPACITOR, CERAMIC TUBULAR: 2.2 pf ± 0.25 pf	NPOA	Erie
C411	Same as C402		
C412	CAPACITOR, DIPPED MICA: 12 pf ± 5%	DM-10-120J	Arco
C413	CAPACITOR, DIPPED MICA: 47 pf ± 5%	DM-10-470J	Arco
C414	Same as C404		
C415	CAPACITOR, CERAMIC BUTTONHEAD: 0.001 uf, GMV	SS5A-102W	AB
C416	CAPACITOR, DIPPED MICA: 360 pf ± 5%	DM-15-361J	Arco
C417	Same as C404		
C418	Same as C404		
C419	CAPACITOR, CERAMIC TUBULAR: 1.5 pf ± .25 pf	NPOA	Erie

C420	Same as C402		
C421	CAPACITOR, DIPPED MICA: 10 pf ± 5%	DM-10-100J	Arco
C422	CAPACITOR, DIPPED MICA: 22 pf ± 5%	DM-10-220J	Arco
C423	CAPACITOR, CERAMIC TUBULAR: 0.68 pf ±0.1 pf	NPOA	Erie
C424	Same as C404		
C425	Same as C415		
C426	Same as C404		
C427	Same as C404		
C428	Same as C404		
C429	Same as C404		
C430	CAPACITOR, CERAMIC DISC FEEDTHRU: 1000 pf, GMV	Type FA5C-102W	AB
C431	Same as C430		
C432	Same as C430		
C433	Same as C430		
C434	Same as C404		
C435	Same as C422		
J401	Same as J107A		
J402	RECEPTACLE, JACK	31-50	Microdot
J403	Same as J402		
L401	COIL: 0.2 uh	1131-06	CEI
L402A L402B L402C L402D	TUNER: Four-section inductuner	2026	CEI
L403	Same as L401		
L404	Same as L401		
L405	COIL, ADJUSTABLE: 2.2-4.3 uh	1111-08	CEI
L406	COIL: 0.24 uh	1131-07	CEI

L407	COIL: 1.3 uh	1131-08	CEI
L408	Not used		
L409	NOT USED		
L410	COIL: 3.3 uh	W33G	Wilco
L411	Not used		
L412	COIL: 2.7 uh	1114	CEI
P401	Same as P102		
P402	PLUG, CABLE	32-21	Microdot
P403	Same as P402		
R401	RESISTOR, FIXED COMPOSITION: 100K ohms ± 10%, 1/2 W	EB 1041	AB
R402	RESISTOR, FIXED COMPOSITION: 47K ohms ± 5%, 1/4 W	CB 4735	AB
R403	RESISTOR, FIXED COMPOSITION: 56 ohms ± 5%, 1/4 W	CB 5605	AB
R404	RESISTOR, FIXED COMPOSITION: 270K ohms ± 10%, 1/4W	CB 2741	AB
R405	RESISTOR, FIXED COMPOSITION: 10 ohms ± 10%, 1/4 W	CB 1001	AB
R406	Same as R402		
R407	RESISTOR, FIXED COMPOSITION: 6800 ohms ± 5%, 1 W	GB 6825	AB
R408	RESISTOR, FIXED COMPOSITION: 4.7K ohms ±5% 1/2 W	EB 4725	AB
R409	RESISTOR, FIXED COMPOSITION: 470K ohms ± 10%, 1/4 W	CB 4741	AB
R410	Same as R409		
R411	RESISTOR, FIXED COMPOSITION: 220K ohms ± 5%, 1/2 W	EB 2245	AB
R412	RESISTOR, FIXED COMPOSITION: 2700 ohms ± 5%, 1/2 W	EB 2725	AB
R413	RESISTOR, FIXED COMPOSITION: 33K ohms ± 5%, 1/2 W	EB 3335	AB
R414	Same as R402		
R415	RESISTOR, FIXED COMPOSITION: 10K ohms ±5%, 1/2 W	EB 1035	AB
R416	Same as R415		
R417	Same as R404		
R418	RESISTOR, FIXED, COMPOSITION: 22K 1/2W 5%	EB2235	AB
R419	RESISTOR, FIXED, COMPOSITION: 1K 1/2W 5%	EB1025	AB
R420	Same as R419		

T401	TRANSFORMER	1134	CEI
TP401	TEST POINT	TI-6	Taurus
V401	TUBE, ELECTRON: Nuvistor Triode	6CW4	RCA
V402	Same as V401		
V403	TUBE, ELECTRON: Nuvistor Tetrode	7587	RCA
V404	Same as V401		

5. HIGH BAND TUNER, 60-300 MC.

C501	CAPACITOR, CERAMIC TUBULAR: 5.6 pf $\pm$ 0.25 pf	NPOA	Erie
C502	CAPACITOR, CERAMIC TUBULAR: 6.0 pf $\pm$ 0.25 pf	NPOA	Erie
C503	CAPACITOR, CERAMIC TUBULAR: 47 pf $\pm$ 5%	NPO-T	Erie
C504	CAPACITOR, VARIABLE TRIMMER: 0.8-4.5 pf	VC-21G	JFD
C505	Same as C421		
C506	Same as C404		
C507	CAPACITOR, CERAMIC TUBULAR: 3.3 pf $\pm$ 0.25 pf	NPOA	Erie
C508	Same as C403		
C509	Same as C415		
C510	CAPACITOR, CERAMIC TUBULAR: 0.5 pf $\pm$ 0.1 pf	NPOA	Erie
C511	CAPACITOR, CERAMIC TUBULAR: 1.0 pf $\pm$ 0.1 pf	NPOA	Erie
C512	Same as C402		
C513	CAPACITOR, CERAMIC TUBULAR: 2.0 pf $\pm$ 0.1 pf	NPOA	Erie
C514	Same as C513		
C515	Same as C402		
C516	Same as C402		
C517	CAPACITOR, CERAMIC TUBULAR: 5.0 pf $\pm$ 0.25 pf	NPOA	Erie
C518	Same as C404		
C519	Same as C404		

C520	Same as C510		
C521	Same as C404		
C522	Same as C415		
C523	Same as C404		
C524	CAPACITOR, CERAMIC TUBULAR: 3.3 pf ± 0.5 pf Temperature compensated capacitor	N750A	Erie
C525	CAPACITOR, CERAMIC TUBULAR: 3.3 pf ± 0.5 pf Temperature compensated capacitor	N470A	Erie
C526	Same as C507		
C527	Same as C511		
C528	Not used		
C529	Same as C415		
C530	Same as C404		
C531	Same as C404		
C532	Same as C415		
C533	Same as C402		
C534	Same as C430		
C535	Same as C430		
C536	Same as C430		
C537	Same as C430		
C538	Same as C430		
C539	Same as C404		
C540	Same as C404		
J501	Same as J107A		
J502	Same as J402		
L501	INDUCTOR, PADDING	1108	CEI
L502A, B, C, D	TUNER: Four-Section VHF Inductuner	2027	CEI
L503	CHOKE: 0.125 uh	1129-01	CEI

L504	CHOKE: 1.0 uh	W10G	Wilco
L505	CHOKE: 0.41 uh	1131-01	CEI
L506	INDUCTOR, PADDING	1234	CEI
L507	CHOKE	1129-02	CEI
L508	CHOKE: 1.62 uh	1131-02	CEI
L509	INDUCTOR, PADDING	1235	CEI
L510	CHOKE: 1.39 uh	1131-03	CEI
L511	INDUCTOR, PADDING	1107	CEI
L512	INDUCTOR, PADDING	1106-01	CEI
L513	CHOKE: 2.2 uh	W22G	Wilco
L514	CHOKE: 3.4 uh	1131-04	CEI
L515	Same as L514		
L516	CHOKE: 5.4 uh	113105	CEI
L517	CHOKE: 1.8 uh	208-11-18	Wilco
L518	INDUCTOR, PADDING	1200-1	CEI
P501	Same as P102		
P502	Same as P402		
R501	Same as R401		
R502	Same as R402		
R503	RESISTOR, FIXED COMPOSITION: 47K ohms $\pm$ 5%, 1/2 W	EB 4735	AB
R504	Same as R308		
R505	Same as R308		
R506	RESISTOR, FIXED COMPOSITION: 100 ohms $\pm$ 5%, 1/2 W	EB 1015	AB
R507	Same as R415		
R508	Same as R506		
R509	Same as R409		

R510	Same as R409		
R511	Same as R411		
R512	RESISTOR, FIXED COMPOSITION: 15K ohms ± 5%, 1 W	GB 1535	AB
R513	Same as R402		
R514	RESISTOR, FIXED COMPOSITION: 1000 ohms ± 5%, 1/2 W	EB 1025	AB
R515	Same as R514		
TP501	Same as TP401		
V501	TUBE, ELECTRON: Ceramic Triode	7077	GE
V502	Same as V501		
V503	Same as V403		
V504	Same as V401		

6. IF STRIP.

C601	CAPACITOR, CERAMIC DISC: .001 uf, 500 wvdc ± 20%	20C114A2	Sprague
C602	Same as C430		
C603	Same as C201		
C604	Same as C430		
C605	Same as C601		
C606	CAPACITOR, DIPPED MICA: 120 pf, 500 wvdc ± 5%	DM10-121J	Arco
C607.	Same as C601		
C608	Same as C415		
C609	Same as C415		
C610	Same as C430		
C611	Same as C202		
C612	Same as C606		
C613	CAPACITOR, DIPPED MICA: 100 pf ± 5%, 500 wvdc	DM10-101J	Arco
C614	CAPACITOR, VARIABLE: 1-28 pf	MC-603	JFD

C615	Same as C501		
C616	Same as C614		
C617	CAPACITOR, DIPPED MICA: 91 pf ± 5%, 500 wvdc	DM10-910J	Arco
C618	Same as C606		
C619	Same as C430		
C620	Same as C202		
C621	Not used		
C622	CAPACITOR, CERAMIC DISC: .0047 uf ± 20%, 1000 wvdc	29C203A	Sprague
C623	Same as C430		
C624	CAPACITOR, CERAMIC DISC: 470 pf ± 20%, 1000 wvdc	40C209A	Sprague
C625	Same as C601		
C626	Same as C624		
C627	Same as C401		
C628	CAPACITOR, CERAMIC TUBULAR: 0.75 pf ± 10%	MC 0.75	Quality Comp.
C629	CAPACITOR, DIPPED MICA: 33 pf ± 5%, 500 wvdc	DM10-330J	Arco
C630	Same as C613		
C631	Same as C430		
C632	Same as C430		
C633	Same as C624		
C634	Same as C624		
C635	Same as C624		
C636	CAPACITOR, CERAMIC TUBULAR: 4.7 pf ± 0.25 pf	NPOA	Erie
C637	Same as C629		
C638	Same as C415		
C639	Same as C430		
C640	Same as C430		

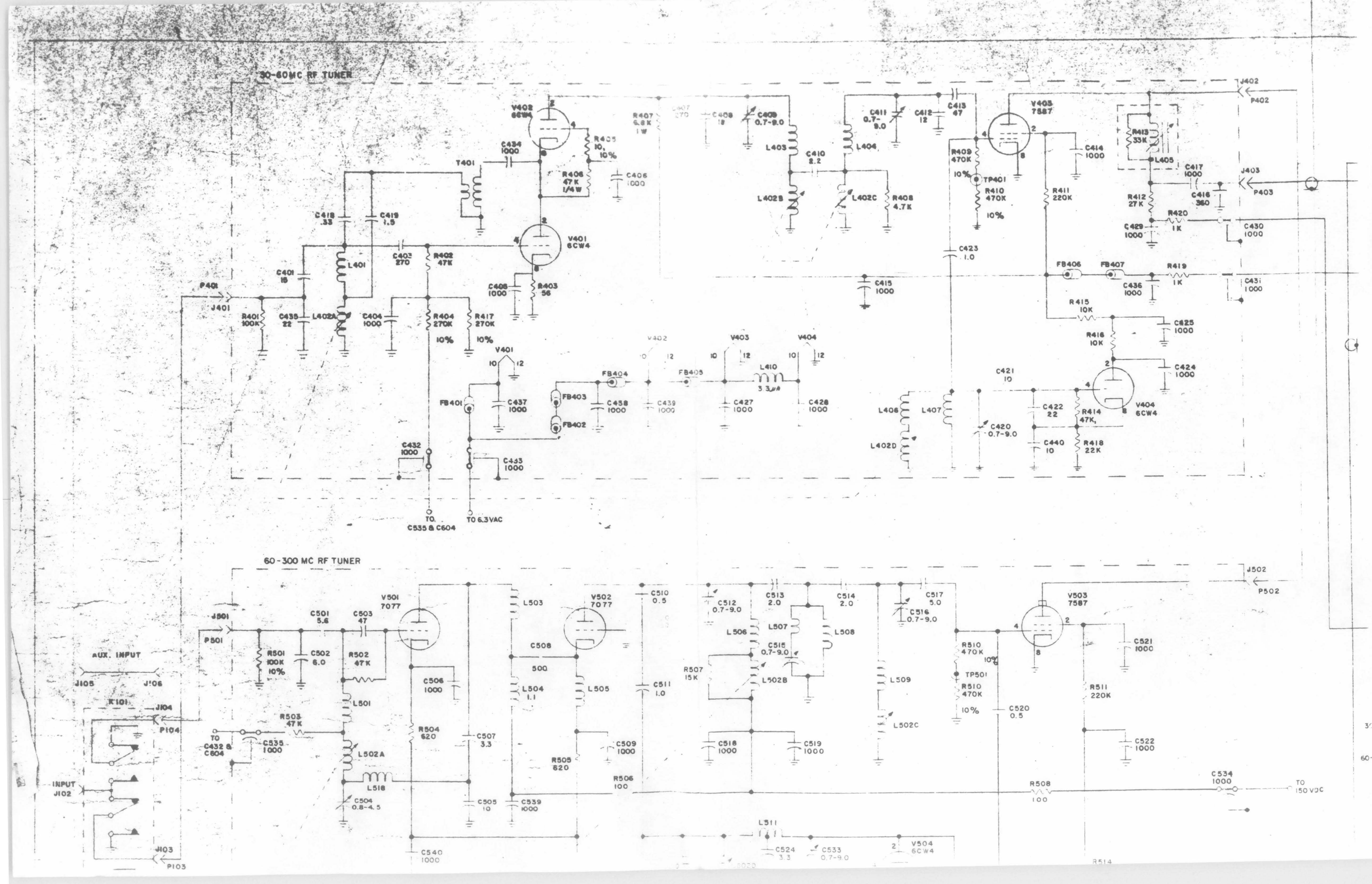
C641	Same as C430		
C642	CAPACITOR, CERAMIC DISC: 0.1 uf + 80% - 20%, 50 wvdc	33C41	Sprague
C643	Same as C636		
C644	Same as C601		
C645	Same as C601		
C646	CAPACITOR, CERAMIC TUBULAR: 22pf ± 5%, Temperature compensated	N150A	Erie
C647	CAPACITOR, CERAMIC TUBULAR: 0.82 pf ± 10%	MC 0.82	Quality Comp.
C648	Same as C422		
C649	Same as C613		
C650	Same as C613		
C651	Same as C629		
C652	Same as C430		
C653	Same as C430		
C654	Same as C430		
C655	Same as C415		
C656	Same as C401		
C657	CAPACITOR, VARIABLE TRIMMER: 2-12 pf	CST-50	CTC
C658	Same as C421		
C659	CAPACITOR, DIPPED MICA: 220 pf ± 5%, 500 wvdc	DM10-221J	Arco
C660	Same as C415		
C661	CAPACITOR, VARIABLE TRIMMER: 1.8-8.7 pf, 9M11	160-104	E. F. Johnson
C662	Same as C501		
C663	Same as C407		
C664	Same as C606		
C665	Same as C413		
C666	CAPACITOR, CERAMIC TUBULAR: 10 pf ± 0.5 pf Temp. Comp. Cap.	N750A	Erie

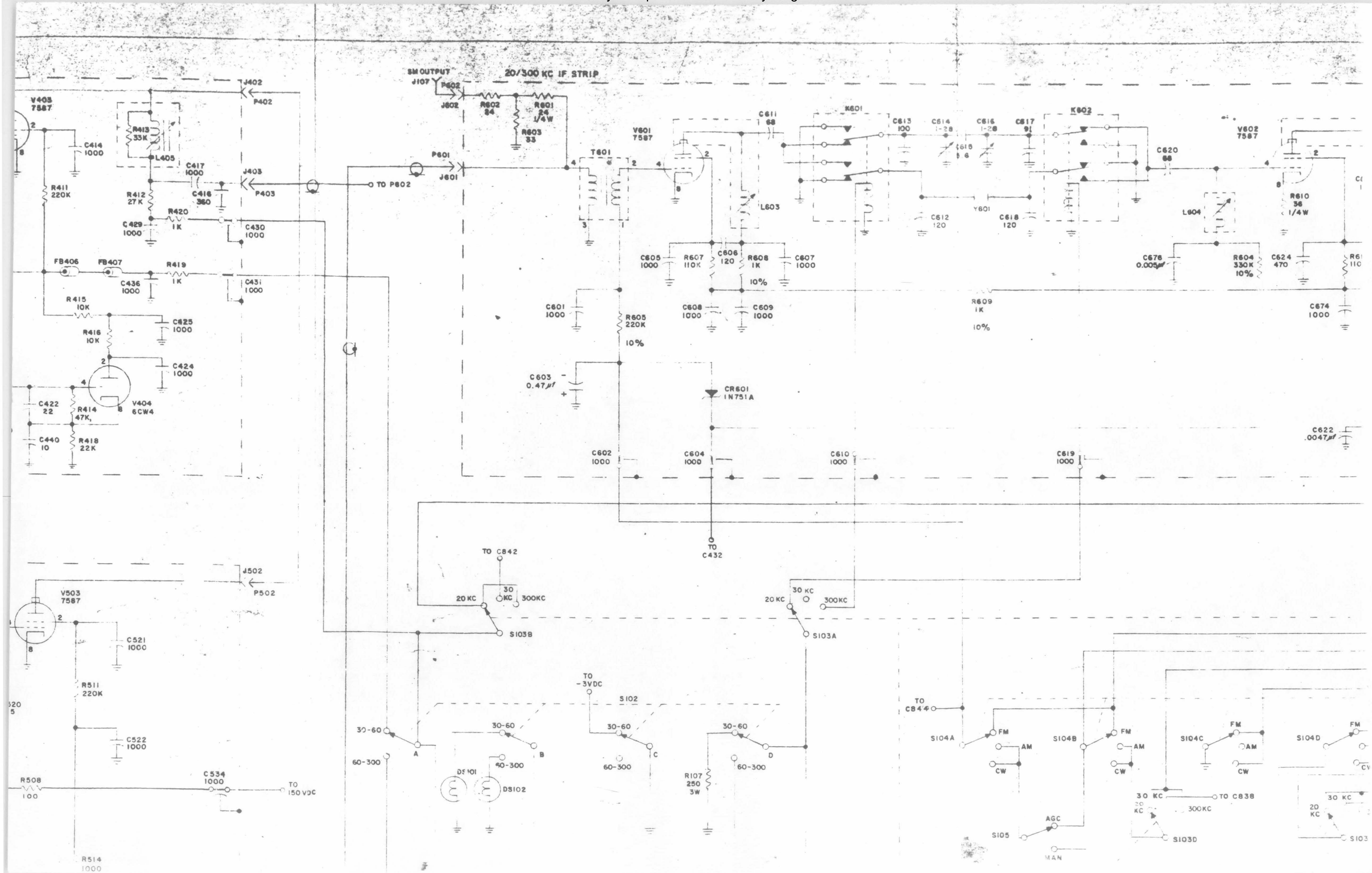
C667	CAPACITOR, CERAMIC DISC: 0.005 uf ± 20%, 50 wvdc	TGD50	Sprague
C668	Same as C430		
C669	Same as C430		
C670	Same as C667		
C671	Same as C667		
C672	Same as C667		
C673	Same as C667		
C674	Same as C415		
C675	Same as C666		
C676	Same as C667		
C677	Same as C667		
CR601	DIODE, SILICON ZENER	1N756A	P.S.I.
CR602	DIODE, GERMANIUM	1N198A	Sylvania
CR603	Same as CR602		
CR604	Same as CR601		
E601	FEEDTHRU, TERMINAL	SFU-16	Taurus
E602	Same as E601		
J601	Same as J402		
J602	Same as J402		
K601	RELAY: DPDT	MS24250-6	Elgin
K602	Same as K601		
L601 L602	Part of T601, not separately replaceable	1126	CEI
L603	COIL, VARIABLE	1111-04	CEI
L604	COIL, VARIABLE	1111-05	CEI
L605	COIL, VARIABLE	1111-06	
L606	Coil, VARIABLE	1111-03	CEI
L607	COIL, VARIABLE	1111-01	CEI
L608	COIL, VARIABLE	1111-07	CEI
L609	COIL, FIXED: 43 uh	1115	CEI

LIST OF MANUFACTURERS

Abbreviation	Name and Address
RF Products	RF Products 33 East Franklin Street Danbury, Connecticut
RCA	Radio Corporation of America Electron Tube Division 415 S. Fifth Street Harrison, New Jersey
Sage	Sage Electronics Corp. Country Club Road East Rochester, New York
Sealectro	Sealectro Corporation 610 Fayette Avenue Mamaroneck, New York
Sprague	Sprague Electric Company 91 Marshall Street North Adams, Mass.
Switchcraft	Switchcraft, Inc. 5555 North Elston Avenue Chicago, Illinois
Sylvania	Sylvania Electric Products, Inc. 1740 Broadway New York, New York
Texas Inst.	Texas Instrument, Inc. 6000 Lemmon Avenue Dallas, Texas
Wilco	Wilco Corporation 546 Drover Street Indianapolis, Indiana

Abbreviation	Name and Address
RCA	Radio Corporation of America Electron Tube Division 415 South Fifth Street Harrison, New Jersey
RF Products	RF Products 33 East Franklin Street Danbury, Connecticut
Sage	Sage Electronics Corp. Country Club Road East Rochester, New York
Sealectro	Sealectro Corporation 610 Fayette Avenue Mamaroneck, New York
Sprague	Sprague Electric Company 91 Marshall Street North Adams, Mass.
Switchcraft	Switchcraft, Inc. 5555 North Elston Avenue Chicago, Illinois
Sylvania	Sylvania Electric Products, Inc. 1740 Broadway New York, New York
Texas Inst.	Texas Instrument, Inc. 6000 Lemmon Avenue Dallas, Texas
Wilco	Wilco Corporation 546 Drover Street Indianapolis, Indiana


30-60MC RF TUNER
60-300 MC RF TUNER
AUX. INPUT
INPUT
TO C535 & C604
TO 6.3VAC
TO C432 & C604
TO 150 VDC


20/300 KC IF STRIP
SM OUTPUT
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P602
J602
J402
P402
J403
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P502
P601
J601
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V403
7587
V404
6CW4
V503
7587
V601
7587
V602
7587
K601
K602
T601
L405
L603
L604
Y601
CR601
1N751A
R602
24
R601
24
1/4W
R603
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R413
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R419
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R605
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R607
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R608
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R609
1K
10%
R604
330K
10%
R610
36
1/4W
R511
220K
R508
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3W
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C416
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C431
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C436
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C424
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C422
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C611
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C618
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C620
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C608
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C603
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C604
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C610
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C619
1000
C676
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C624
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C674
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C622
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C521
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C522
1000
C534
1000
R514
1000
FB406
FB407
TO C432
TO C842
20 KC
30 KC
300KC
S103B
S103A
TO -3VDC
S102
30-60
60-300
A
B
C
D
DS101
DS102
TO 150 VDC
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FM
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CW
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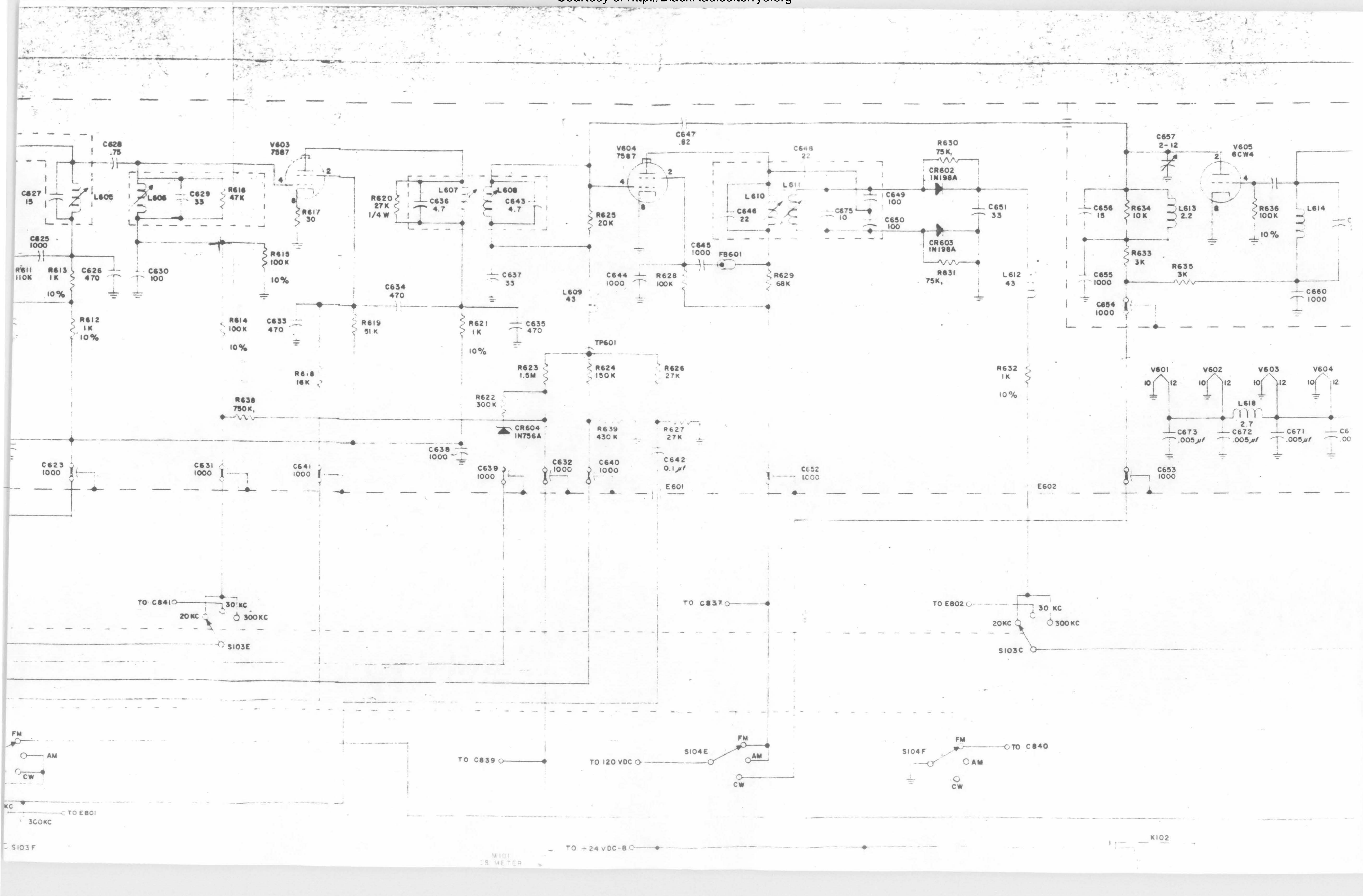
S105
AGC
MAN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R617
30
R620
27K
1/4 W
C636
4.7
L607
L608
C643
4.7
R625
20K
C647
.82
C648
22
L610
L611
C646
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C675
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C649
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R630
75K
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CR603
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R631
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33
C657
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10K
L613
2.2
R636
100K
L614
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3K
R635
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C625
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R613
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C626
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R615
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R612
1K
R614
100K
C633
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C634
470
R619
51K
R621
1K
C635
470
C637
33
L609
43
C644
1000
C645
1000
FB601
R628
100K
R629
68K
L612
43
TP601
R623
1.5M
R624
150K
R626
27K
R618
16K
R622
300K
R638
750K
CR604
1N756A
R639
430K
R627
27K
R632
1K
V601
V602
L618
2.7
C673
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C672
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C671
.005μf
C623
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C641
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C638
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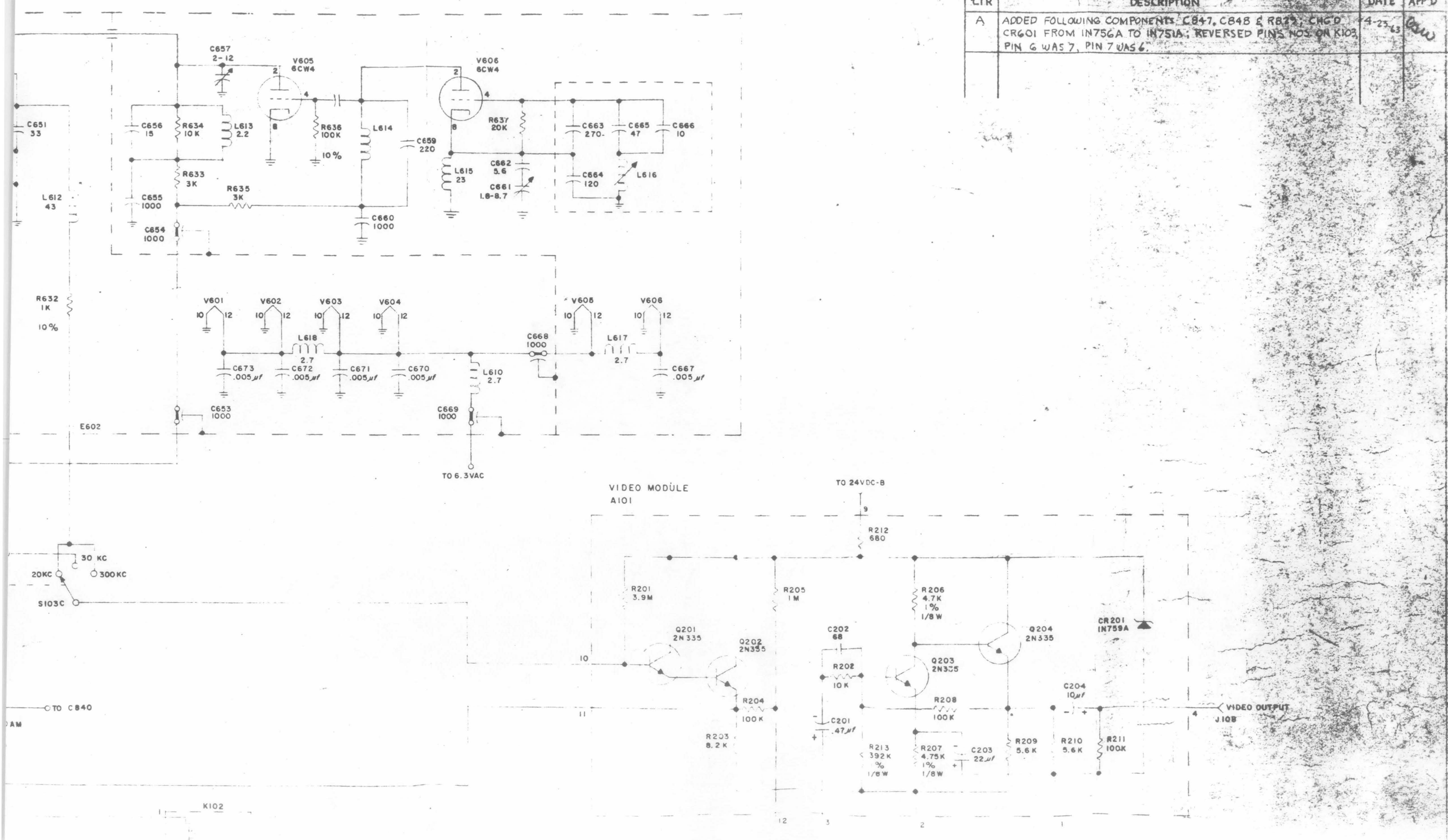
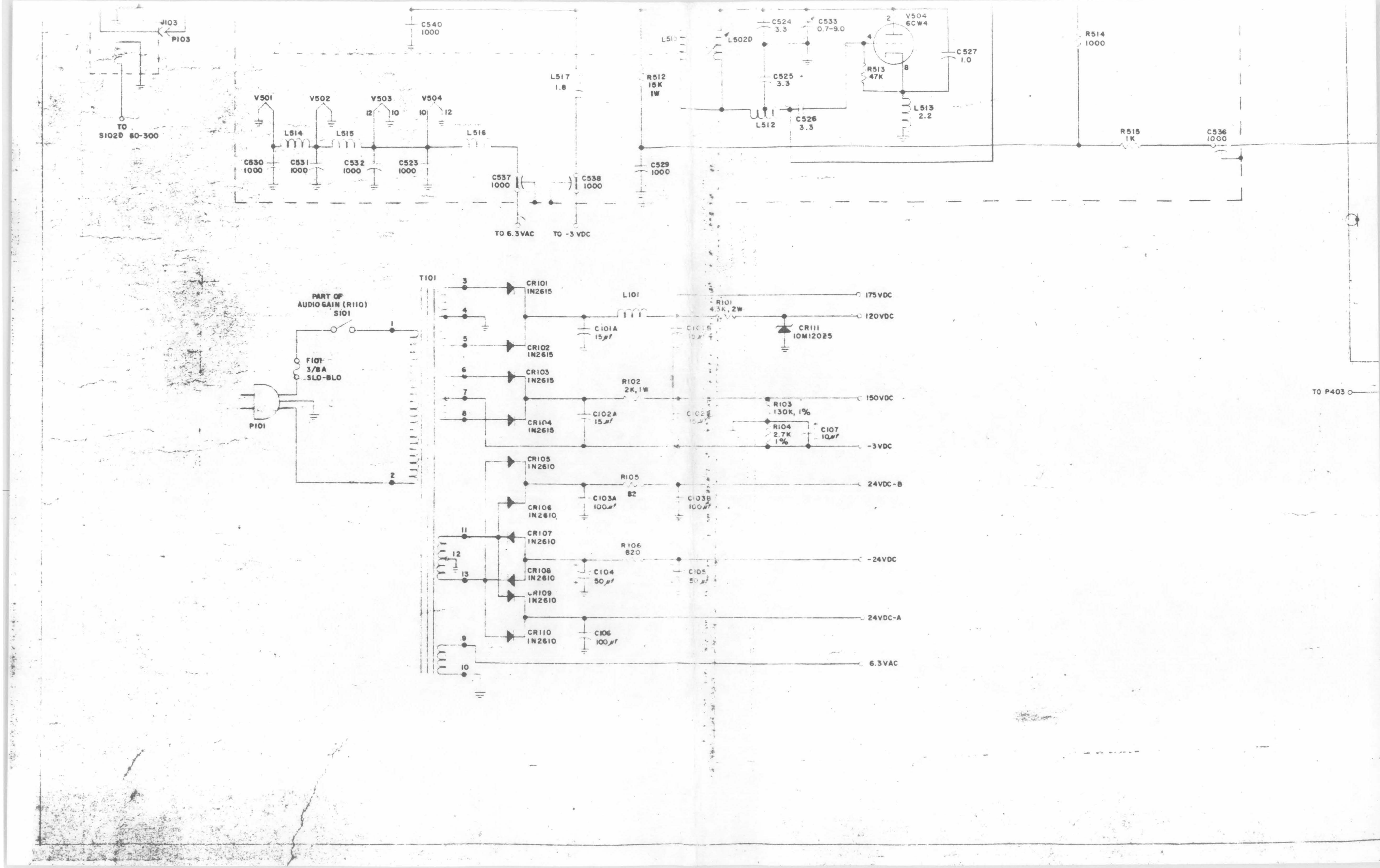
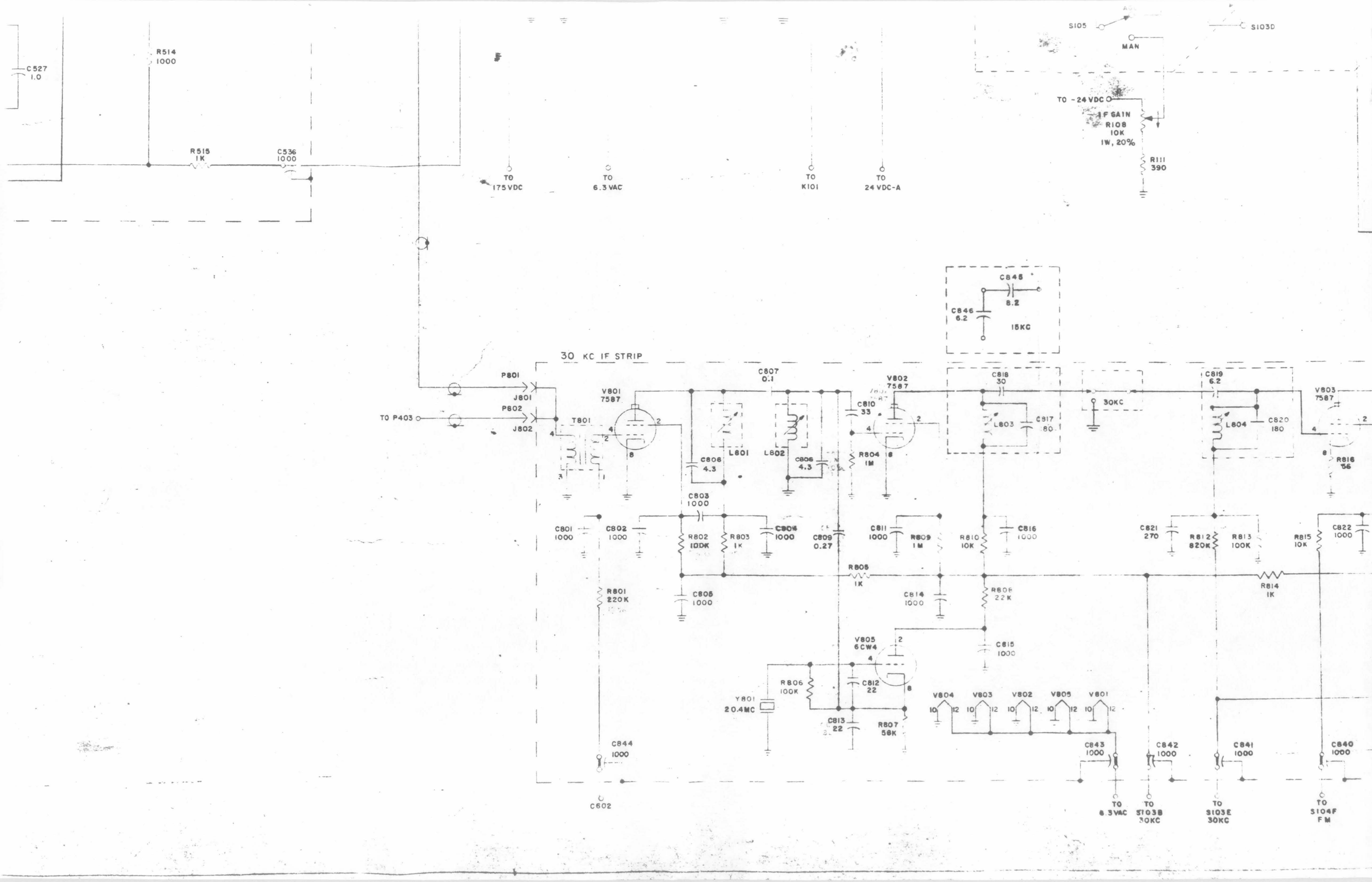
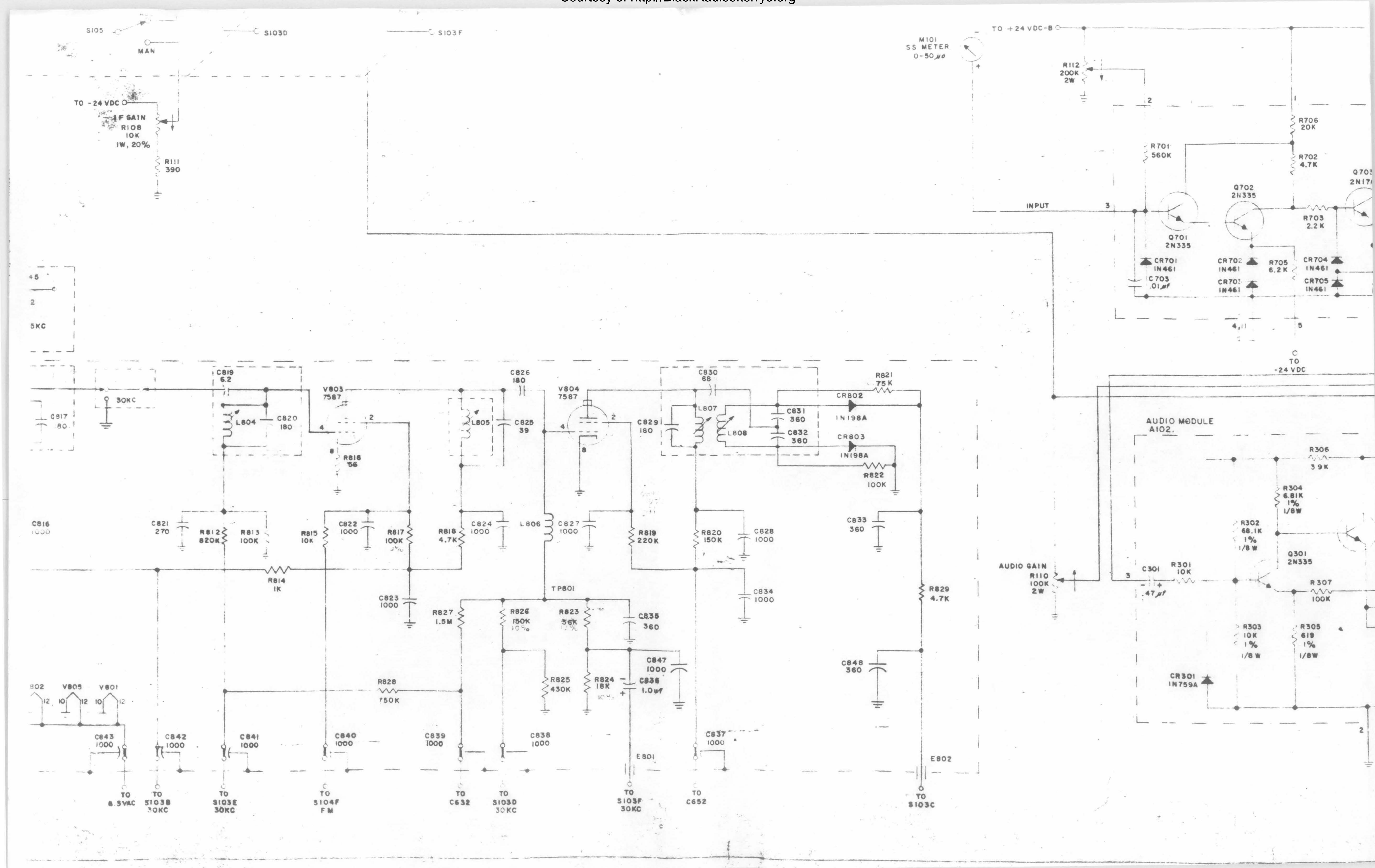
C639
1000
C632
1000
C640
1000
C642
0.1μf
E601
C652
1000
C653
1000
E602
TO C841
30 KC
20KC
300KC
S103E
TO C837
TO E802
S103C
FM
AM
CW
TO E801
300KC
S103F
TO C839
TO 120 VDC
S104E
S104F
TO C840
TO +24 VDC-B
K102
M101
S METER

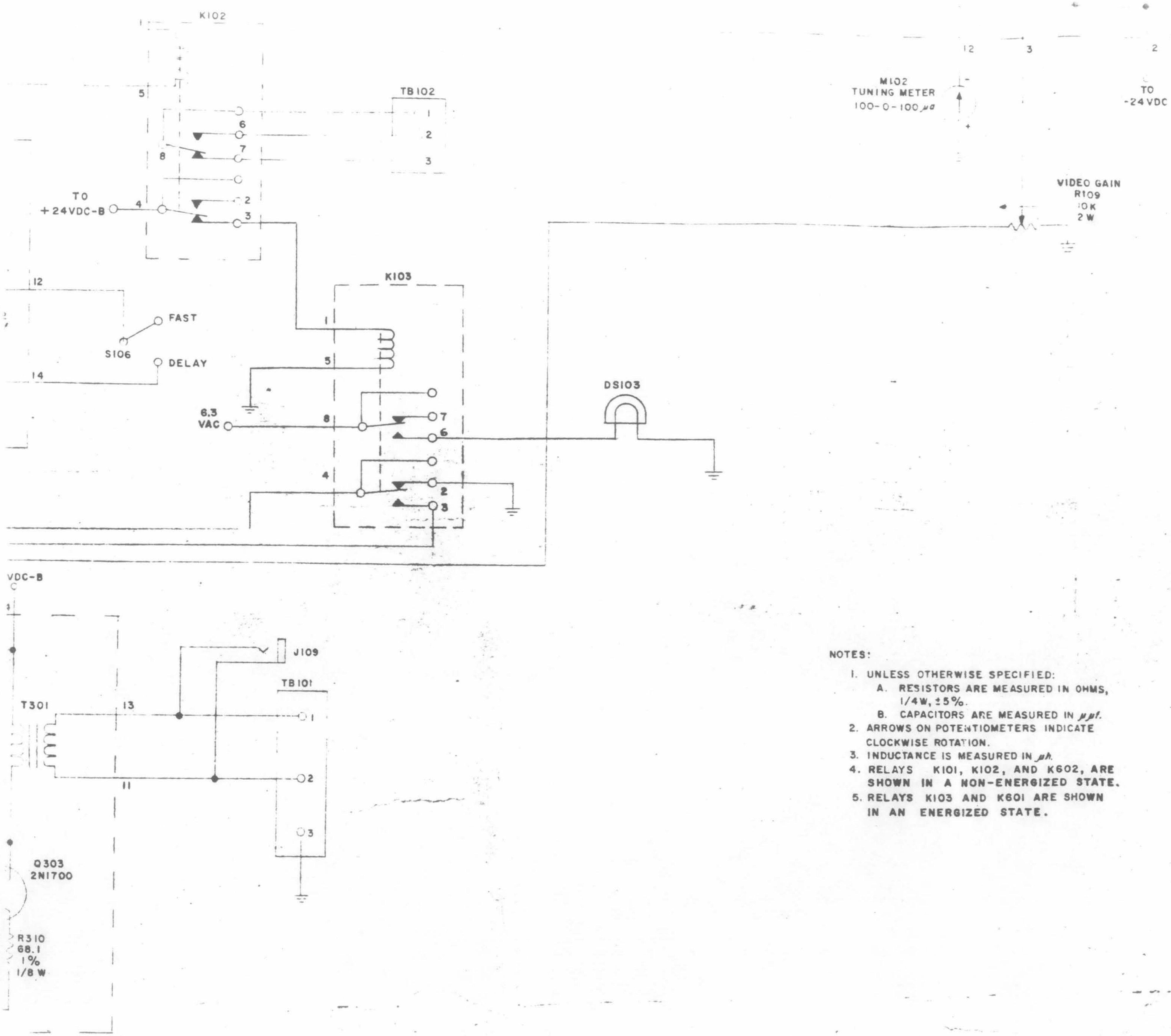
REVISION			
LTR	DESCRIPTION	DATE	APP'D
A	ADDED FOLLOWING COMPONENTS, C847, C848 & R832; CHG'D CR601 FROM IN756A TO IN751A; REVERSED PINS NOS ON K103, PIN 6 WAS 7, PIN 7 WAS 6.	4-23-63	




J103
P103
TO
S102D 60-300
C540
1000
V501
V502
V503
V504
L514
L515
L516
L517
1.8
C530
1000
C531
1000
C532
1000
C523
1000
C537
1000
C538
1000
TO 6.3VAC
TO -3 VDC
R512
15K
1W
C529
1000
L502D
C524
3.3
C533
0.7-9.0
C525
3.3
L512
C526
3.3
V504
6CW4
C527
1.0
R513
47K
L513
2.2
R514
1000
R515
1K
C536
1000
TO P403
T101
PART OF
AUDIO GAIN (R110)
S101
F101
3/8A
SLO-BLO
P101
CR101
1N2615
L101
R101
4.3K, 2W
C101A
15µf
C101B
15µf
CR111
10M12025
CR102
1N2615
CR103
1N2615
R102
2K, 1W
C102A
15µf
C102B
15µf
R103
130K, 1%
R104
2.7K
1%
C107
10µf
CR104
1N2615
CR105
1N2610
R105
82
C103A
100µf
C103B
100µf
CR106
1N2610
CR107
1N2610
R106
820
CR108
1N2610
C104
50µf
C105
50µf
CR109
1N2610
CR110
1N2610
C106
100µf
175VDC
120VDC
150VDC
-3VDC
24VDC-B
-24VDC
24VDC-A
6.3VAC


30 KC IF STRIP
C527 1.0
R514 1000
R515 1K
C536 1000
TO 175 VDC
TO 6.3 VAC
TO K101
TO 24 VDC-A
S105
MAN
S103D
TO -24 VDC
IF GAIN R108 10K 1W, 20%
R111 390
C845 8.2
C846 6.2
15KC
P801
J801
P802
J802
TO P403
T801
V801 7587
V802 7587
V803 7587
C807 0.1
C810 33
L801
L802
C808 4.3
C806 4.3
R804 1M
C818 30
L803
C817 180
30KC
C819 6.2
L804
C820 180
R816 56
C803 1000
C801 1000
C802 1000
R802 100K
R803 1K
C804 1000
C809 0.27
C811 1000
R809 1M
R810 10K
C816 1000
C821 270
R812 820K
R813 100K
R815 10K
C822 1000
R805 1K
C805 1000
C814 1000
R808 22K
R814 1K
R801 220K
V805 6CW4
C815 1000
R806 100K
C812 22
Y801 20.4MC
C813 22
R807 56K
V804
V803
V802
V805
V801
C844 1000
C843 1000
C842 1000
C841 1000
C840 1000
C602
TO 6.3VAC
TO S103B 30KC
TO S103E 30KC
TO S104F FM


S105
MAN
S103D
S103F
TO -24 VDC
IF GAIN
R108
10K
1W, 20%
R111
390
M101
SS METER
0-50 μa
TO +24 VDC-B
R112
200K
2W
R706
20K
R701
560K
R702
4.7K
Q702
2N335
INPUT
Q701
2N335
R703
2.2 K
CR701
IN461
C703
.01 μf
CR702
IN461
R705
6.2 K
CR704
IN461
CR705
IN461
TO
-24 VDC
5KC
30KC
C817
C819
6.2
L804
C820
180
V803
7587
R816
56
C826
180
L805
C825
39
V804
7587
C829
180
C830
68
L807
L808
C831
360
C832
360
R821
75 K
CR802
IN198A
CR803
IN198A
R822
100K
AUDIO MODULE
A102.
R306
3.9K
R304
6.81K
1%
1/8W
R302
68.1K
1%
1/8 W
Q301
2N335
C816
1000
C821
270
R812
820K
R813
100K
R815
10K
C822
1000
R817
100K
R818
4.7K
C824
1000
L806
C827
1000
R819
220K
R820
150K
C828
1000
C833
360
R814
1K
C823
1000
TP801
C834
1000
R829
4.7K
AUDIO GAIN
R110
100K
2W
C301
.47 μf
R301
10K
R307
100K
R827
1.5M
R826
150K
10%
R823
56K
C835
360
C847
1000
R825
430K
R824
18K
C836
1.0 μf
C848
360
R303
10K
1%
1/8 W
R305
619
1%
1/8W
CR301
IN759A
R828
750K
V805
V801
C843
1000
C842
1000
C841
1000
C840
1000
C839
1000
C838
1000
C837
1000
E801
E802
TO
6.3VAC
TO
S103B
30KC
TO
S103E
30KC
TO
S104F
FM
TO
C632
TO
S103D
30KC
TO
S103F
30KC
TO
C652
TO
S103C



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. RESISTORS ARE MEASURED IN OHMS, 1/4W, ±5%.
   B. CAPACITORS ARE MEASURED IN µµf.
2. ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.
3. INDUCTANCE IS MEASURED IN µh.
4. RELAYS K101, K102, AND K602, ARE SHOWN IN A NON-ENERGIZED STATE.
5. RELAYS K103 AND K601 ARE SHOWN IN AN ENERGIZED STATE.

6024

ORIGINAL JOB NO.	
UNIT	NEXT ASSY NO.
901-2	
APPROVED FOR SAMPLES	
APPROVED FOR PRODUCTION	

COMMUNICATION ELECTRONICS, INC.
BETHESDA 14, MD.

SCHEMATIC
901 S RECEIVER

MATERIAL:

FINISH:

SCALE: