SPECIFICATIONS

Power supply	117 volts 50/60 cycles AC
Power consumption	95 watts
Power output	10 watts
Intermediate frequency	455 kc./10.7 mc.
Tuning frequency range:	
Broadcast Band	540-1620 kc.
FM Band	88-108 mc.
Tubes:	
R-F Amplifier	6BA6
Converter	6BE6
1st I-F Amplifier (AM-FM)	6BA6
2nd I-F (FM), Detector and AVC (AM)	6BA6
Limiter	6AU6
Discriminator	6AL5
First Audio	6AV6
Inverter	6SN7GT
Power output (push-pull stage)	(2) 6V6GT
Rectifier	5Y3GT
Dial Lamps	Mazda No. 44
Speaker:	
Field coil resistance	500 ohms
Voice coil impedance (400 cycles)	3.0 ohms
Output transformer	8,000/3 ohms

ALIGNMENT PROCEDURE

Alignment of this receiver requires the use of an accurately calibrated r-f signal generator, range 455 kc. to 107 mc., an output meter, and a vacuum tube voltmeter of greater than 10 megohm input impedance. All trimmer condensers can be identified by stampings on the chassis and gang condenser cover and are shown on the chassis layout diagram.

The pointer on the radio dial should line up with the first vertical mark on the low frequency end of the dial glass. If the pointer does not line up, loosen the pointer on the dial string and move it to correct position. Re-tighten and re-cement the pointer to the string. Be sure the gang is fully meshed for this pointer alignment. Align AM first.

AM ALIGNMENT

I-F ALIGNMENT

1. Set treble control to SHARP TUNE position. Set volume and bass controls to maximum, the Band Switch to Broadcast position, and dial pointer to 1000 kc.
2. Tune the signal generator to EXACTLY 455 kc.
3. Connect output of modulated signal generator to the signal grid of the 6BE6 (pin 7) through a .01 mfd. capacitor and signal generator ground to radio chassis.
4. AM and FM i-f transformers on this model separate and can be identified on the chassis lay diagram Figure 3.
5. Connect output meter across voice coil of spea and adjust the i-f transformers for peak out as indicated on the output meter.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Connect 455 kc. sweep generator having appr mately 20 kc. sweep to signal grid of 6BE6 (pin through a .01 mfd. capacitor. Connect an osci scope through a 1 meghom isolating resistor acr the 220,000 ohm diode load resistor. Align for l possible peak in sharp tune position and symme in full range position.

R-F ALIGNMENT

1. Remove the signal generator lead from the 6I grid and connect it across H and L on termi strip on the rear of the chassis. The high side of signal generator should be connected to H and signal generator ground to L.
2. Check the tuning dial pointer adjustment. Wl the plates of the tuning condenser are complet meshed, the dial pointer must be in line with last calibration mark at the low frequency end the dial. If it is not, slide the pointer on its str to the correct position. Be sure to crimp the lugs the rear of the pointer) tightly around the string hold the pointer in adjustment.
3. Set the signal generator and the radio recei to 1400 kc., adjust the 1400 kc. oscillator trimr and the 1400 kc. r-f trimmer for maximum outp
4. Set the signal generator and radio receiver 600 kc. Adjust the oscillator and r-f coil slugs maximum output. If considerable adjustment v necessary re-check the 1400 kc. trimmer settings.
5. Replace chassis in cabinet and connect l antenna leads to proper terminals on the rear the chassis.
6. Form three turns of wire into a loop, connect t loop to the signal generator and loosely couple i the receiver loop antenna.
7. With the signal generator and dial at 1400 l adjust the loop antenna trimmer for maximum outp

10 KC FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit eliminate the beat note heard as a whistle betwe stations on the broadcast band. If the trimmer is of adjustment, the following procedure should observed:

1. Set the Selectivity Switch to FULL RANGE turning the Treble Control knob clockwise as far possible.

2. Connect the output of an audio oscillator to the phonograph pickup socket on the radio chassis and adjust the oscillator to EXACTLY 10,000 cycles.

3. Set the band selector to PHONO and adjust the 10 kc. trimmer for minimum output.

4. If an audio oscillator is not available for making this adjustment, set the band selector to BDCST, connect an antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

FM ALIGNMENT

DISCRIMINATOR ALIGNMENT

1. Tune signal generator to EXACTLY 10.775 mc. and connect to pin 1 of the 6AU6 Limiter tube socket through a .01 mfd. capacitor.

2. Connect a DC vacuum tube voltmeter between point "B" on schematic diagram and ground.

3. Peak both discriminator slugs at 10.775 mc.

4. Retune signal generator to exactly 10.7 mc. and adjust bottom slug for zero volts.

5. The DC voltage at 10.625 mc. should be within 10% of the voltage at 10.775 mc. and of opposite polarity.

Note: If the signal generator is not capable of sufficient output to produce a readable DC voltage, the amplification of the last i-f stage can be used to increase the signal input to the limiter for discriminator alignment. To accomplish this, align the last i-f stage as indicated in "I-F Alignment". Then align discriminator as above leaving the signal generator connected to the grid of the 6BA6 2nd i-f tube.

I-F ALIGNMENT

1. Connect high side of signal generator, through a .01 mfd. capacitor and a 1000 ohm resistor in series, to pin 4 of the 6SG7 2nd i-f tube. Connect low side of generator to chassis.

2. Close gang condenser and connect vacuum tube voltmeter across 220,000 ohm limiter grid resistor; (Point "A" on schematic to ground). Adjust signal generator output until a reading of at least 3 volts is obtained. In order to reduce regeneration caused by the vacuum tube voltmeter leads, a 1-megohm isolating resistor, connected with as short leads as possible to point "A" should be used in series with the vacuum tube voltmeter. Align the 3rd i-f transformer for best peak as indicated on voltmeter.

3. Repeat above for each succeeding transformer by connecting signal generator to signal grid of first i-f tube 6BA6 then to the signal grid of 6BE6 converter. The i-f stages should be aligned in this order.

WARNING—After each i-f stage has been aligned, do not repeak with the signal into the grid of the 6BE6.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Replace signal generator with sweep generator having approximately 300 kc. sweep and tune generator to 10.7 mc. Connect oscilloscope across 220,000 ohm limiter grid resistor through a 1-megohm isolating resistor. The order of alignment is the same as when using a vacuum tube voltmeter. Each i-f transformer should be individually aligned for best peak and symmetry.

R-F ALIGNMENT

1. Connect vacuum tube voltmeter across limiter grid resistor as in FM I-F alignment.

2. Ground one side of the FM Antenna by placing a wire jumper from one FM connection on the antenna terminal strip to the ground connection.

3. Connect unmodulated signal generator through a 300 ohm resistor to ungrounded antenna post and chassis, and tune signal generator to 107 mc.

4. Set radio dial to 107 mc. and tune oscillator trimmer to peak output on vacuum tube voltmeter. Adjust signal generator output until a reading of at least 3 volts is obtained.

5. Tune 107 mc. r-f and antenna trimmers for maximum indication on voltmeter—it may be necessary to rock the dial while adjusting the r-f trimmer.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:	
600 kc.	5.00
98 mc.	1.15
R-F Grid to Converter Grid at:	
600 kc.	14.5
98 mc.	9.4
R-F on Converter Grid to 455 kc. on I-F Grid at:	
600 kc.	25.0
98 mc.	3.2

I-F on Converter Grid to 1st I-F Grid at:
455 kc. (gang closed)..... 28.0

1st I-F Grid to 2nd I-F Grid** at:
455 kc..... 95
10.7 mc..... 33

2nd I-F Grid to Limiter Grid at:
10.7 mc..... 33.4

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid Resistor:

600 kc..... 6.6
98 mc..... 6.0

or 0.3 ma. through 22,000 ohm Oscillator Gr Resistor at 600 kc. and 0.27 ma. at 98 mc.

AUDIO GAIN

Voltage required across the Volume Control to pr duce 0.1 watt speaker output*** at 400 cycles is .0 volt with Input Selector Switch in BDCST settin

*Variations of ± 20% are permissible. All readings made with sufficient input signa provide 0.5 watt speaker output. 0.5 speaker output at 400 cycles is equivalent to a rea of 1.25V. as measured by a high resistance AC voltmeter across the voice coil of the spea
**Detector Plate on AM.
***0.1 watt speaker output at 400 cycles is equivalent to a reading of 0.55 volts measured by a high resistance AC voltmeter across the voice coil of speaker.

DIAL CORD REPLACEMENT

Two separate drive cables are used in the CR-321 dial assembly. One cable is used to transmit the motion from the tuning knob to the large pulley that is coupled to the condenser gang; the other cable actuates the dial pointer whenever the large pulley on the condenser gang is rotated. Separate instructions for replacing either of these cables is given in the following paragraphs.

CONDENSER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out four screws on each side of chassis. Slide a short length (approximately ½ inch) of sleeving over one end of a length of dial cable, form a small loop and tie a knot in the manner shown on Figure 1. Tie spring to opposite end of cable making length excluding spring 19½ inches. Hook loop over the metal hook in pulley "D" and lace the cable through the pulley slot and around the pulley in a counterclockwise direction when viewed from the rear of the dial assembly keeping the cable to the rear of the pulley groove. Lace the cable around the smaller diameter portion of the tuning control shaft wrapping 2½ turns **from front to back**; then around the opposite side of pulley "D" into the pulley through the slot. Hook the end of tension spring "F" in the hole provided in pulley "D", completing this operation.

DIAL POINTER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out four screws on each side of chassis. Slip a one-half inch length of sleeving over a 42-inch length of dial cable. T the two ends to the loop end of the cable spring "] securely so that the cable doubled measures 19 inches end to end excluding spring.

Place spring hook in top hole and draw cable throu slot of pulley "D". Loop one end of cable arou pulley "D" in a clockwise direction in front of co denser drive cable (viewing dial assembly fro front) then loop the remaining end around pulley a counterclockwise direction. Secure both ends cable to chassis at edge of pulley slot with scot tape, keeping piece of sleeving on remaining loc of cable.

Replace dial assembly and loop cable over pull "A". While holding cable taut remove scotch ta and loop cable over pulleys "B" and "C" as show in Figure 1.

Turn the tuning control shaft until the condens gang is completely meshed and slide the dial point on its track until it is in line with the last calibratio mark at the low frequency end of the dial. The sho piece of sleeving installed prior to the stringin operation should be slid to the rear of the dial point and the crimping lug on the pointer pressed over th sleeving. After checking to make certain that th condenser gang is completely meshed and the dia pointer is in the position specified previously, appl a few drops of cement to each end of the sleevin to which the dial pointer is fastened. This complete the operation.

CHASSIS CR-321

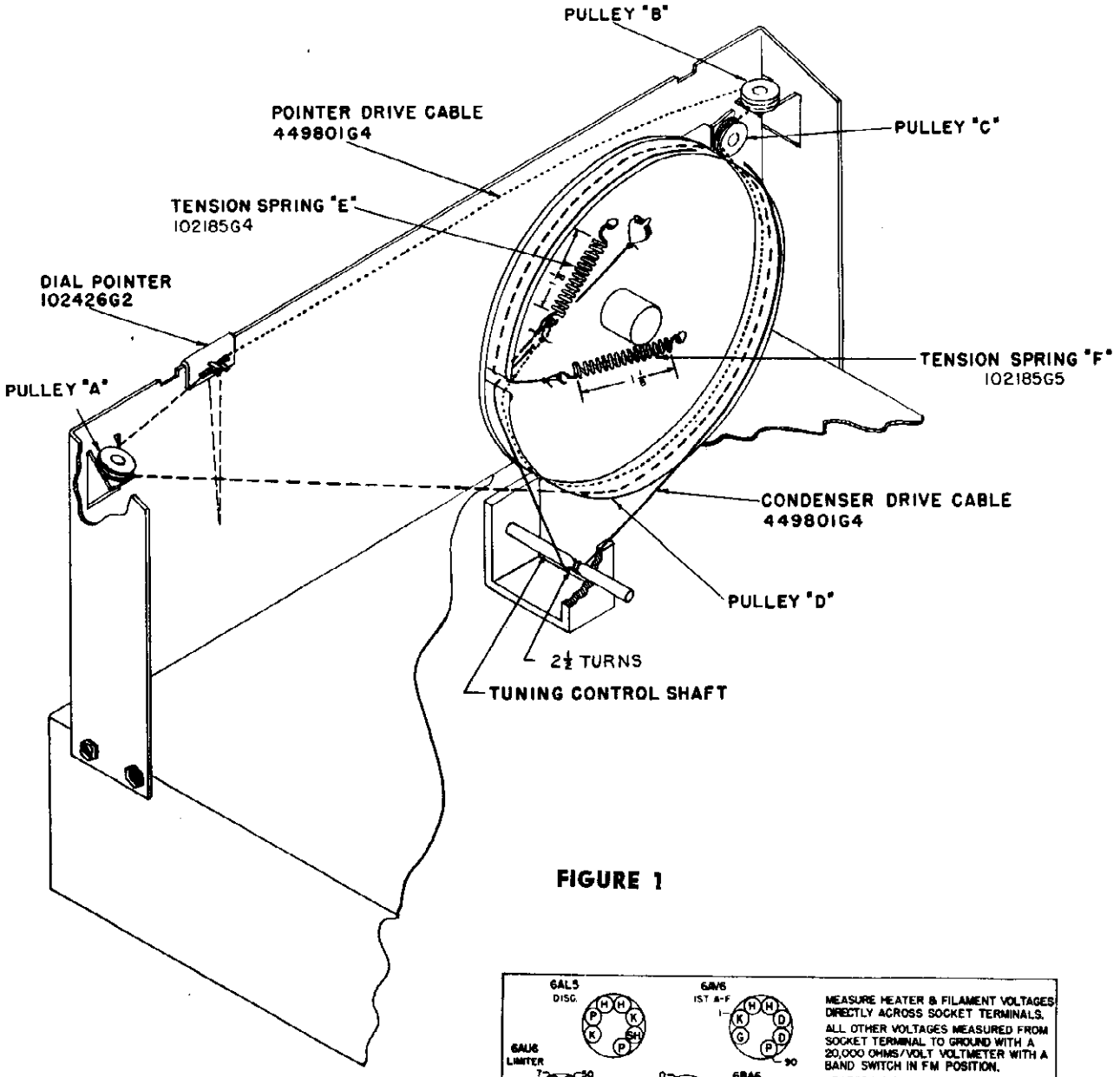
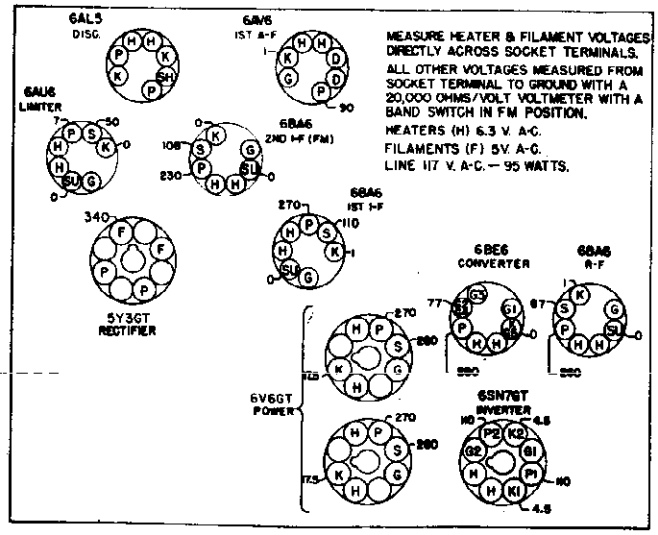


FIGURE 1



I-F'S

FM 10.7 MC.
AM 455 KC.

NOTES

BAND SWITCH SHOWN IN COUNTERCLOCKWISE (FM) POSITION WHEN VIEWED FROM THE FRONT PANEL.

ALL ELECTRICAL VALUES SHOWN ARE IN OHMS OR MMF UNLESS OTHERWISE SPECIFIED.

LETTERS SHOWN IN SQUARES DESIGNATE METER CONNECTION POINTS FOR ALIGNMENT DESCRIBED IN TEXT.

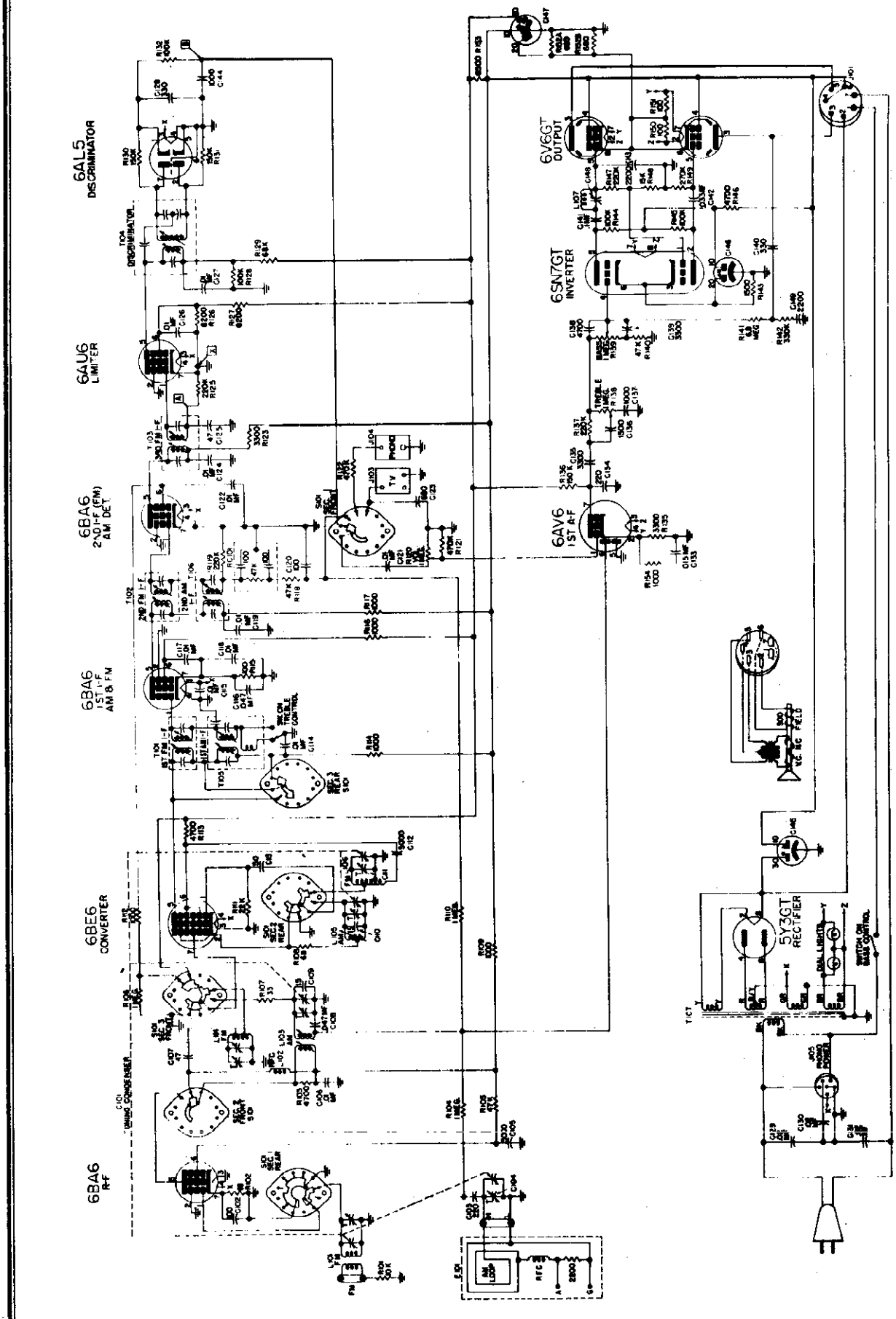

6AL5
DISCRIMINATOR
6AU6
LIMITER
6BA6
2ND I-F (FM)
AM DET
6BA6
1ST I-F
AM & FM
6BE6
CONVERTER
6BA6
R-F
6V6GT
OUTPUT
6SN7GT
INVERTER
6AV6
1ST A-F
5Y3GT
RECTIFIER

FIGURE 2

CHASSIS CR-321

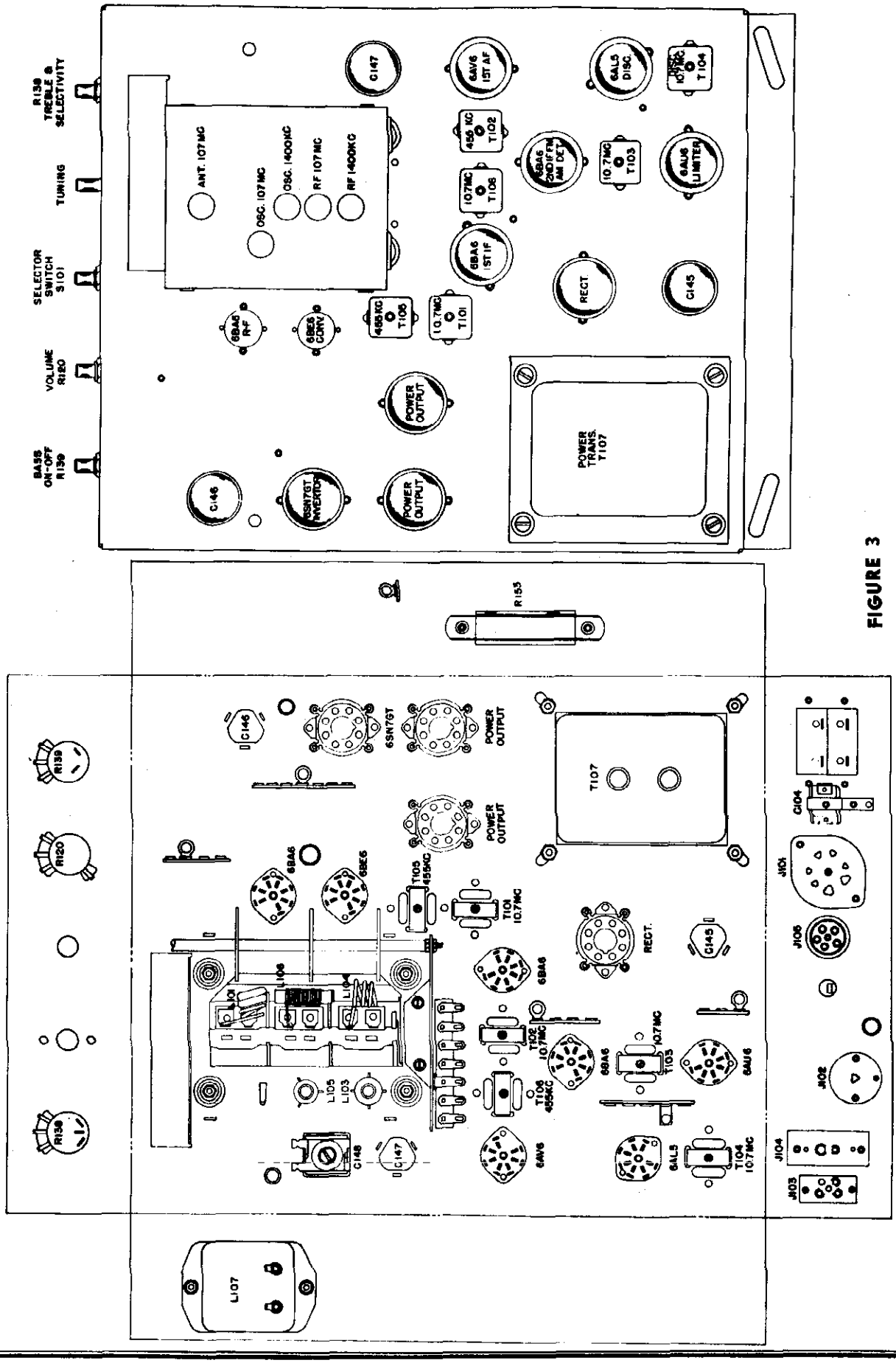


FIGURE 3

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.	LIST PRICE
T 101	Transformer, 1st i-f (FM)	360374-1	1.10
T 102	Transformer, 2nd i-f (FM)	360374-1	1.10
T 103	Transformer, 3rd i-f (FM)	360374-1	1.10
T 104	Transformer, discriminator	360375-1	1.40
T 105	Transformer, 1st i-f (AM)	360508-1	1.45
T 106	Transformer, 2nd i-f (AM)	360373-1	1.25
T 107	Transformer, power	300050-2	12.00
L 101	Coil assembly, antenna (FM)	360321-2	.65
L 102	Coil, choke	360284-1	.20
L 103	Coil assembly, r-f (AM)	360348-1	1.00
L 104	Coil assembly, r-f (FM)	360322-2	2.55
L 105	Coil assembly, oscillator (AM)	360407-1	.55
L 106	Coil assembly, oscillator (FM)	360323-1	.90
L 107	Coil assembly, 10 kc.	360244-2	1.55
C 101	Capacitor, tuning	260103-1	5.20
C 102	Capacitor, mica, 100 mmf. 500 V.	250187-53	.15
C 103	Capacitor, mica, 220 mmf. 500 V.	250159-86	.25
C 104	Capacitor, trimmer	250046-2	.20
C 105	Capacitor, ceramic, 5000 mmf.	250175-1	.20
C 106	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 107	Capacitor, mica, 47 mmf. 500 V.	250187-49	.15
C 108	Capacitor, paper, .047 mfd. 200 V.	250205-11	.20
C 109	Capacitor, mica, 15 mmf.	250187-43	.15
C 110	Capacitor, mica, 15 mmf.	250187-43	.15
C 111	Capacitor, trimmer	260067-6	.70
C 112	Capacitor, ceramic, 5000 mmf.	250175-1	.20
C 113	Capacitor, ceramic, 50 mmf. ±10%, 500 V.	250088-39	.15
C 114	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 115	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 116	Capacitor, paper, .047 mfd. 200 V.	250205-11	.20
C 117	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 118	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 119	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 120	Capacitor, mica, 100 mmf. 500 V.	250187-53	.15
C 121	Capacitor, paper, .01 mfd. 600 V.	250203-7	.20
C 122	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 123	Capacitor, mica, 680 mmf. ±10%, 500 V.	250160-62	.20
C 124	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 125	Capacitor, mica, 47 mmf. 500 V.	250187-49	.15
C 126	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 127	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 128	Capacitor, mica, 330 mmf. 500 V.	250159-88	.25
C 129	Capacitor, paper, .02 mfd. 600 V.	250129-3	.25
C 130	Capacitor, paper, .02 mfd. 600 V.	250129-3	.25
C 131	Capacitor, paper, .02 mfd. 600 V.	250129-3	.25
C 133	Capacitor, paper, .015 mfd. 200 V.	250185-1	.20
C 134	Capacitor, paper, 220 mmf. 500 V.	250159-86	.20
C 135	Capacitor, paper, 3300 mmf. 600 V.	250203-4	.15
C 136	Capacitor, paper, 1500 mmf. 600 V.	250203-2	.15
C 137	Capacitor, paper, 1000 mmf. 600 V.	250203-1	.15
C 138	Capacitor, paper, 4700 mmf. 600 V.	250203-5	.15
C 139	Capacitor, paper, 3300 mmf. 600 V.	250203-4	.15
C 140	Capacitor, mica, 330 mmf. 500 V.	250159-88	.25
C 141	Capacitor, paper, .1 mfd. 600 V.	250203-13	.25
C 142	Capacitor, paper, .033 mfd. 600 V.	250203-10	.20
C 143	Capacitor, paper, 2200 mmf. 600 V.	250203-3	.15
C 144	Capacitor, paper, 1000 mmf. 600 V.	250203-1	.15
C 145	Capacitor, electrolytic, 30-10 mfd. 475 V.	270023-2	1.60
C 146	Capacitor, electrolytic, 20 mfd. 25 V.—10 mfd. 475 V.	270023-13	.85
C 147	Capacitor, electrolytic, 20-10 mfd. 475 V.—20 mfd. 25 V.	270023-12	1.65
C 148	Capacitor, trimmer, 10 kc.	259610-2	.55
C 149	Capacitor, mica, 2200 mmf. 600 V.	250203-3	.15

CHASSIS CR-321

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.	LIST PRICE
R 101	Resistor, carbon, 10,000 ohms, ½ W.	230104-74	.05
R 102	Resistor, carbon, 68 ohms, ½ W.	230104-48	.05
R 103	Resistor, carbon, 4700 ohms, ½ W.	230104-70	.05
R 104	Resistor, carbon, 1 megohm, ½ W.	230104-98	.05
R 105	Resistor, carbon, 47,000 ohms, 1 W.	230105-82	.10
R 106	Resistor, carbon, 1 megohm, ½ W.	230104-98	.05
R 107	Resistor, carbon, 33 ohms, ½ W.	230104-44	.05
R 108	Resistor, carbon, 68 ohms, ½ W.	230104-48	.05
R 109	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 110	Resistor, carbon, 1 megohm, ½ W.	230104-98	.05
R 111	Resistor, carbon, 22,000 ohms, ½ W.	230104-78	.05
R 112	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 113	Resistor, carbon, 4700 ohms, ½ W.	230104-70	.05
R 114	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 115	Resistor, carbon, 100 ohms, ½ W.	230104-50	.05
R 116	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 117	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 118	Resistor, carbon, 47,000 ohms, ½ W.	230104-82	.05
R 119	Resistor, carbon, 220,000 ohms, ½ W.	230104-90	.05
R 120	Potentiometer, volume control	220074-1	.65
R 121	Resistor, carbon, 470,000 ohms, ½ W.	230104-94	.05
R 122	Resistor, carbon, 470,000 ohms, ½ W.	230104-94	.05
R 123	Resistor, carbon, 3300 ohms, 1 W.	230105-68	.05
R 125	Resistor, carbon, 220,000 ohms, ½ W.	230104-90	.05
R 126	Resistor, carbon, 8200 ohms, 1 W.	230105-73	.05
R 127	Resistor, carbon, 8200 ohms, 1 W.	230105-73	.05
R 128	Resistor, carbon, 100,000 ohms, ½ W.	230104-86	.05
R 129	Resistor, carbon, 68,000 ohms, ½ W.	230104-84	.05
R 130	Resistor, carbon, 150,000 ohms, ½ W.	230104-88	.05
R 131	Resistor, carbon, 150,000 ohms, ½ W.	230104-88	.05
R 132	Resistor, carbon, 100,000 ohms, ½ W.	230104-86	.05
R 135	Resistor, carbon, 3300 ohms, ½ W.	230104-68	.05
R 136	Resistor, carbon, 150,000 ohms, ½ W.	230104-88	.05
R 137	Resistor, carbon, 330,000 ohms, ½ W.	230104-90	.05
R 138	Potentiometer, treble control, 1 megohm	220071-4	1.15
R 139	Potentiometer, bass control, 1 megohm	220073-18	.80
R 140	Resistor, carbon, 47,000 ohms, ½ W.	230104-82	.05
R 141	Resistor, carbon, 6.8 megohm, ½ W.	230104-108	.05
R 142	Resistor, carbon, 330,000 ohms, ½ W.	230104-92	.05
R 143	Resistor, carbon, 1500 ohms, ½ W.	230104-64	.05
R 144	Resistor, carbon, 100,000 ohms, 1 W.	230105-86	.10
R 145	Resistor, carbon, 100,000 ohms, 1 W.	230105-86	.10
R 146	Resistor, carbon, 4700 ohms, ½ W.	230104-70	.05
R 147	Resistor, carbon, 220,000 ohms, ±5%, ½ W.	230094-215	.10
R 148	Resistor, carbon, 15,000 ohms, ±5%, ½ W.	230094-187	.10
R 149	Resistor, carbon, 270,000 ohms, ½ W.	230104-91	.05
R 150	Resistor, carbon, 100 ohms, ½ W.	230104-50	.05
R 151	Resistor, carbon, 100 ohms, ½ W.	230104-50	.05
R 152a	Resistor, carbon, 680 ohms, 1 W.	230105-60	.10
R 152b	Resistor, carbon, 680 ohms, 1 W.	230105-60	.10
R 153	Resistor, wire wound, 6500 ohms	240035-9	.50
R 154	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
RC 101	Printed circuit (capacitor-resistor filter)	250170-1	.30
S 101	Selector switch	160194-1	2.25
J 101	Socket, speaker	180504-16	.15
J 103	Socket, T.V.	180060-1	.10
J 104	Socket, phono	189741-1	.10
J 105	Socket, phono power	180520-4	.20
F 101	Loop antenna	*	

*The part number of the Loop Antenna Assembly changes with different cabinets. It is therefore important that you specify the style number of the instrument when ordering a replacement Loop Antenna Assembly.

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

SPECIFICATIONS

Power supply	117 volts 50/60 cycles AC
Power consumption	160 watts
Power output	20 watts
Intermediate frequency	455 kc./10.7 mc.
Tuning frequency range:	
Broadcast Band	540-1620 kc.
FM Band	88-108 mc.
Tubes:	
R-F Amplifier	6BA6
Converter	6BE6
1st I-F Amplifier (AM-FM)	6BA6
2nd I-F (FM), Detector and AVC (AM)	6BA6
Limiter	6AU6
Discriminator	6AL5
First Audio	6AV6
Inverter	6SN7GT
Power output (push-pull stage)	(2) 6L6
Rectifier	5U4G
Tuning Indicator	6U5
Dial Lamps	Mazda No. 44

Speaker: coaxial	15" Dynamic	5" PM
Field coil resistance	500 ohms	None
Voice coil impedance (400 cycles)	15 ohms	3.8 ohms
Output transformer	5000/15	

ALIGNMENT PROCEDURE

Alignment of these receivers requires the use of an accurately calibrated r-f signal generator, range 455 kc. to 107 mc., an output meter, and a vacuum tube voltmeter of greater than 10 megohm input impedance. All trimmer condensers can be identified by stampings on the chassis and gang condenser cover and are shown on the chassis layout diagram.

The pointer on the radio dial should line up with the first vertical mark on the low frequency end of the dial glass. If the pointer does not line up, loosen the pointer on the dial string and move it to correct position. Re-tighten and re-cement the pointer to the string. Be sure the gang is fully meshed for this pointer alignment. Align AM first.

AM ALIGNMENT

I-F ALIGNMENT

1. Set treble control to SHARP TUNE position. Set volume and bass controls to maximum, the Band Switch to Broadcast position, and dial pointer to 1000 kc.

2. Tune the signal generator to EXACTLY 455 kc.

3. Connect output of modulated signal generator to the signal grid of the 6BE6 (pin 7) through a .01 mfd. capacitor and signal generator ground to radio chassis.

4. AM and FM i-f transformers on these models are separate and can be identified on the chassis layout diagram Figure 3.

5. Connect output meter across voice coil of speaker and adjust the i-f transformers for peak output as indicated on the output meter.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Connect 455 kc. sweep generator having approximately 20 kc. sweep to signal grid of 6BE6 (pin 7) through a .01 mfd. capacitor. Connect an oscilloscope through a 1 meghom isolating resistor across the 220,000 ohm diode load resistor. Align for best possible peak in sharp tune position and symmetry in full range position.

R-F ALIGNMENT

1. Remove the signal generator lead from the 6BE6 grid and connect it across H and L on terminal strip on the rear of the chassis. The high side of the signal generator should be connected to H and the signal generator ground to L.

2. Set the signal generator and the radio receiver to 1400 kc., adjust the 1400 kc. oscillator trimmer and the 1400 kc. r-f trimmer for maximum output.

3. Set the signal generator and radio receiver to 600 kc. Adjust the oscillator and r-f coil slugs for maximum output. If considerable adjustment was necessary re-check the 1400 kc. trimmer settings.

4. Replace chassis in cabinet and connect loop antenna leads to proper terminals on the rear of the chassis.

5. Form three turns of wire into a loop, connect this loop to the signal generator and loosely couple it to the receiver loop antenna.

6. With the signal generator and dial at 1400 kc. adjust the loop antenna trimmer for maximum output.

10 KC. FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit to eliminate the beat note heard as a whistle between stations on the broadcast band. If the trimmer is out of adjustment, the following procedure should be observed:

1. Adjust the treble control switch to the No. 4 setting.

2. Connect the output of an audio oscillator to the phonograph pickup socket on the radio chassis and adjust the oscillator to EXACTLY 10,000 cycles.

3. Set the band selector to PHONO and adjust the 10 kc. trimmer for minimum output.

4. If an audio oscillator is not available for making this adjustment set the band selector to BDCST, set the treble control to position 4, connect the antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

FM ALIGNMENT

DISCRIMINATOR ALIGNMENT

1. Tune signal generator to EXACTLY 10.775 mc. and connect to pin 1 of the 6AU6 Limiter tube socket through a .01 mfd. capacitor.

2. Connect a DC vacuum tube voltmeter between point "B" on schematic diagram and ground.

3. Peak both discriminator slugs at 10.775 mc.

4. Retune signal generator to exactly 10.7 mc. and adjust bottom slug for zero volts.

5. The DC voltage at 10.625 mc. should be within 10% of the voltage at 10.775 mc. and of opposite polarity.

Note: If the signal generator is not capable of sufficient output to produce a readable DC voltage, the amplification of the last i-f stage can be used to increase the signal input to the limiter for discriminator alignment. To accomplish this, align the last i-f stage as indicated in "I-F Alignment". Then align discriminator as above leaving the signal generator connected to the grid of the 6BA6 2nd i-f tube.

I-F ALIGNMENT

1. Connect high side of signal generator, through a .01 mfd. capacitor and a 1000 ohm resistor in series, to pin 1 of the 6BA6 2nd i-f tube. Connect low side of generator to chassis.

2. Close gang condenser and connect vacuum tube voltmeter across 220,000 ohm limiter grid resistor; (Point "A" on schematic to ground). Adjust signal generator output until a reading of at least 3 volts is obtained. In order to reduce regeneration caused by the vacuum tube voltmeter leads, a 1-megohm isolating resistor, connected with as short leads as possible to point "A" should be used in series with the vacuum tube voltmeter. Align the 3rd i-f transformer for best peak as indicated on voltmeter.

3. Repeat above for each succeeding transformer by connecting signal generator to signal grid of first i-f tube 6BA6 then to the signal grid of 6BE6 converter. The i-f stages should be aligned in this order.

WARNING—After each i-f stage has been aligned, do not repeak with the signal into the grid of the 6BE6.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Replace signal generator with sweep generator having approximately 300 kc. sweep and tune generator to 10.7 mc. Connect oscilloscope across 220,000 ohm limiter grid resistor through a 1-megohm isolating resistor. The order of alignment is the same as when using a vacuum tube voltmeter. Each i-f transformer should be individually aligned for best peak and symmetry.

R-F ALIGNMENT

1. Connect vacuum tube voltmeter across limiter grid resistor as in FM I-F alignment.

2. Ground one side of the FM Antenna by placing a wire jumper from one FM connection on the antenna terminal strip to the ground connection.

3. Connect unmodulated signal generator through a 300 ohm resistor to ungrounded antenna post and chassis, and tune signal generator to 107 mc.

4. Set radio dial to 107 mc. and tune oscillator trimmer to peak output on vacuum tube voltmeter. Adjust signal generator output until a reading of at least 3 volts is obtained.

5. Tune 107 mc. r-f and antenna trimmers for maximum indication on voltmeter—it may be necessary to rock the dial while adjusting the r-f trimmer.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:

600 kc	5.00
98 mc	1.15

R-F Grid to Converter Grid at:
600 kc. 14.5
98 mc. 9.4

R-F on Converter Grid to 455 kc. on I-F Grid at:
600 kc. 25.0
98 mc. 3.2

I-F on Converter Grid to 1st I-F Grid at:
455 kc. (gang closed) 28.0

1st I-F Grid to 2nd I-F Grid** at:
455 kc. 95
10.7 mc. 33

2nd I-F Grid to Limiter Grid at:
10.7 mc. 33.4

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid *Resistor:*

600 kc. ..... 6.6V.
98 mc. ..... 6.0V.

or 0.3 ma. through 22,000 ohm Oscillator Grid Resistor at 600 kc. and 0.27 ma. at 98 mc.

AUDIO GAIN

Voltage required across the Volume Control to produce 0.1 watt speaker output*** at 400 cycles is .016 volt with Input Selector Switch in BDCST setting.

*Variations of ±20% are permissible. All readings made with sufficient input signal to provide 0.5 watt speaker output. 0.5 watt speaker output at 400 cycles is equivalent to a reading of 2.74 V. as measured by a high resistance AC voltmeter across the output transformer secondary.

**Detector Plate on AM.

***0.1 watt speaker output at 400 cycles is equivalent to a reading of 1.25 volts as measured by a high resistance AC voltmeter across the voice coil of speaker.

DIAL CORD REPLACEMENT

Two separate drive cables are used in the CR-322 dial assembly. One cable is used to transmit the motion from the tuning knob to the large pulley that is coupled to the gang condenser; the other cable actuates the dial pointer whenever the large pulley on the gang condenser is rotated. Separate instructions for replacing either of these cables is given in the following paragraphs.

CONDENSER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out four screws on each side of chassis. Slide a short length (approximately ½ inch) of sleeving over one end of a length of dial cable, form a small loop and tie a knot in the manner shown on Figure 1. Tie spring to opposite end of cable making length excluding spring 19 inches. Hook loop over the metal hook in pul "D" and lace the cable through the pulley slot a around the pulley in a counterclockwise direct when viewed from the rear of the dial assem keeping the cable to the rear of the pulley groo Lace the cable around the smaller diameter port of the tuning control shaft wrapping 2½ turns fr front to back; then around the opposite side *pulley "D" into the pulley through the slot. Hc* the end of tension spring "F" in the hole provid in pulley "D", completing this operation.

DIAL POINTER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out four scre on each side of chassis. Slip a one-half inch len of sleeving over a 42-inch length of dial cable. *the two ends to the loop end of the cable spring* securely so that the cable doubled measures 19 inches end to end excluding spring.

Place spring hook in top hole and draw cable throu slot of pulley "D". Loop one end of cable arou pulley "D" in a clockwise direction in front of c denser drive cable (viewing dial assembly fr front) then loop the remaining end around pulley a counterclockwise direction. Secure both ends cable to chassis at edge of pulley slot with scot tape, keeping piece of sleeving on remaining lo of cable.

Replace dial assembly and loop cable over pul "A". While holding cable taut remove scotch ta and loop cable over pulleys "B" and "C" as sho in Figure 1.

Turn the tuning control shaft until the gang c denser is completely meshed and slide the dial poin on its track until it is in line with the last calibrati mark at the low frequency end of the dial. The sh piece of sleeving installed prior to the stringi operation should be slid to the rear of the dial poin and the crimping lug on the pointer pressed over t sleeving. After checking to make certain that t gang condenser is completely meshed and the d pointer is in the position specified previously, ap a few drops of cement to each end of the sleevi to which the dial pointer is fastened. This comple the operation.

CHASSIS CR-322

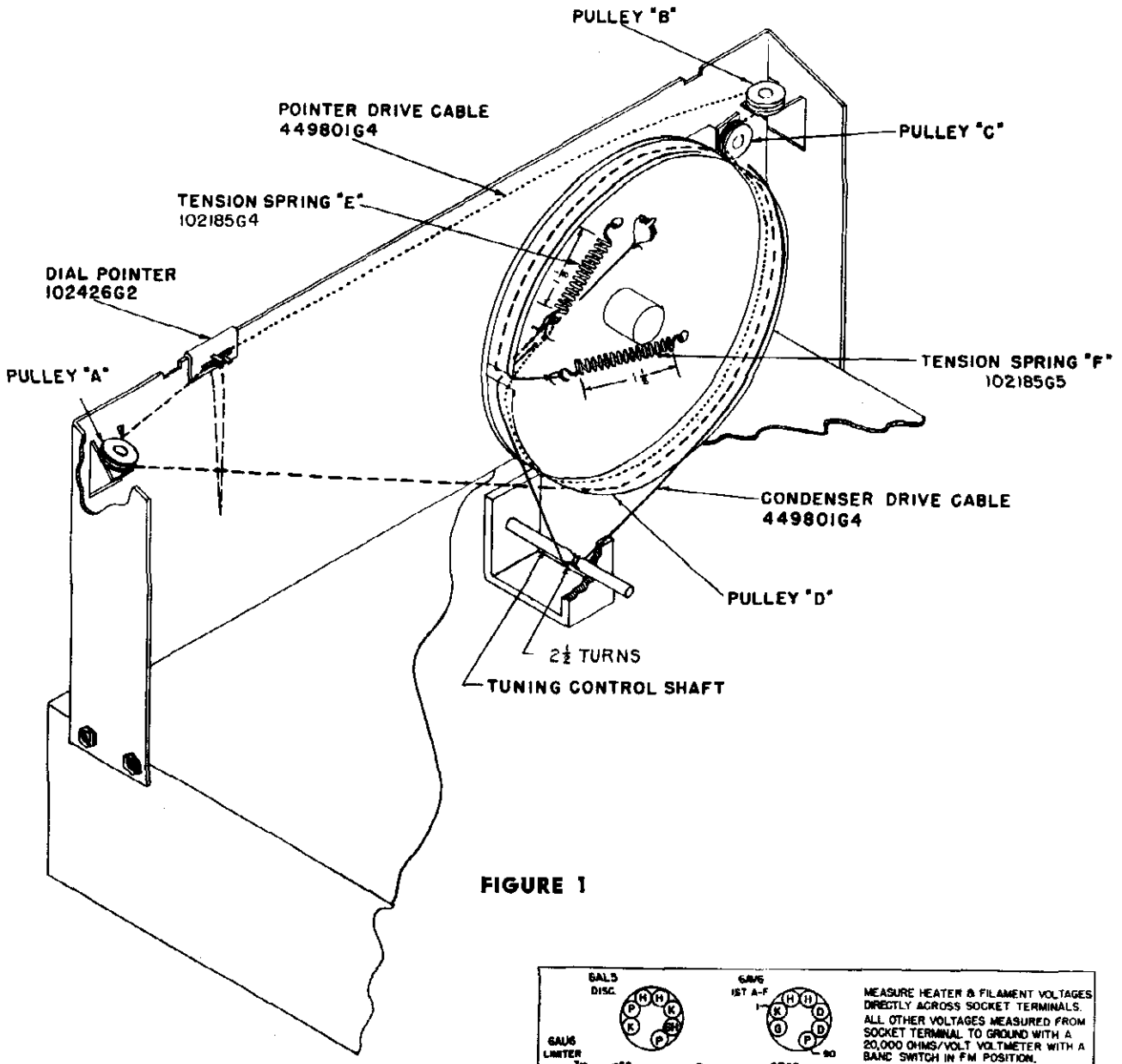
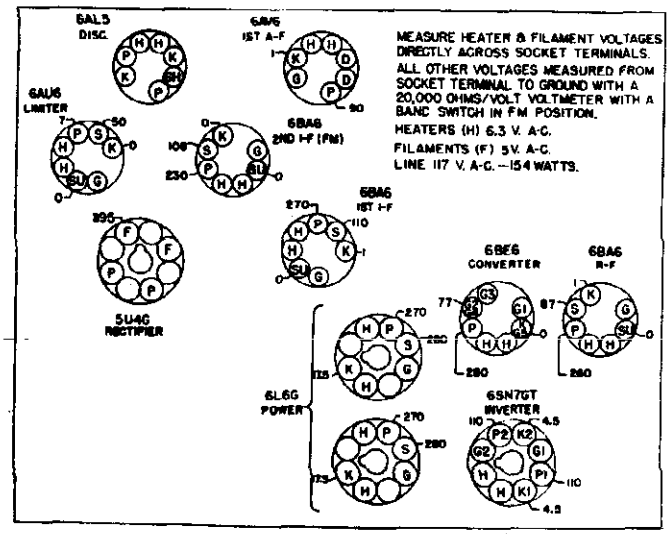


FIGURE 1



I-F'S

FM 10.7 MC.
AM 455 KC.

NOTES

BAND SWITCH SHOWN IN COUNTERCLOCKWISE (FM) POSITION WHEN VIEWED FROM THE FRONT PANEL.

ALL ELECTRICAL VALUES SHOWN ARE IN OHMS OR MMF UNLESS OTHERWISE SPECIFIED.

LETTERS SHOWN IN SQUARES DESIGNATE METER CONNECTION POINTS FOR ALIGNMENT DESCRIBED IN TEXT.

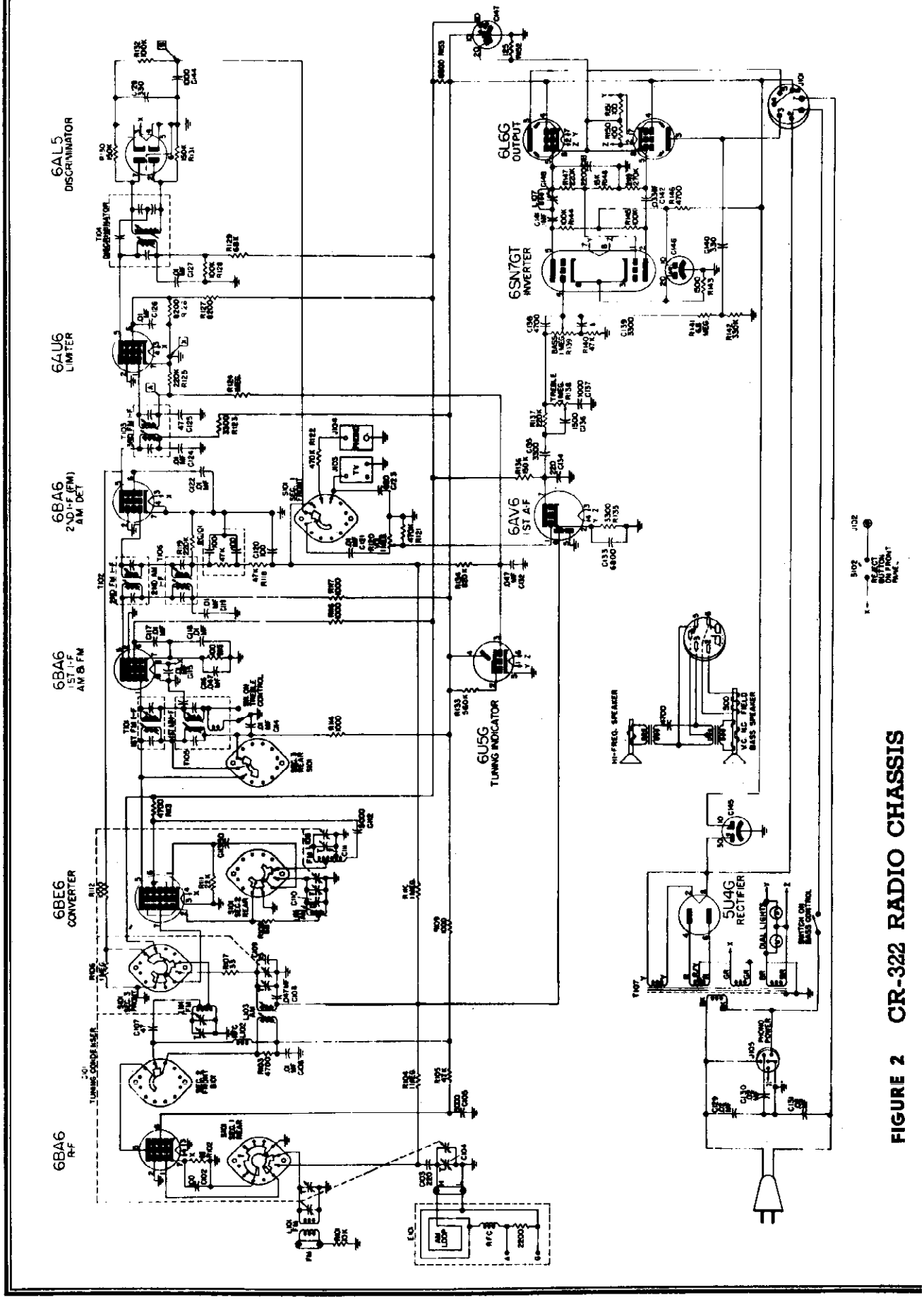


FIGURE 2 CR-322 RADIO CHASSIS

CHASSIS CR-322

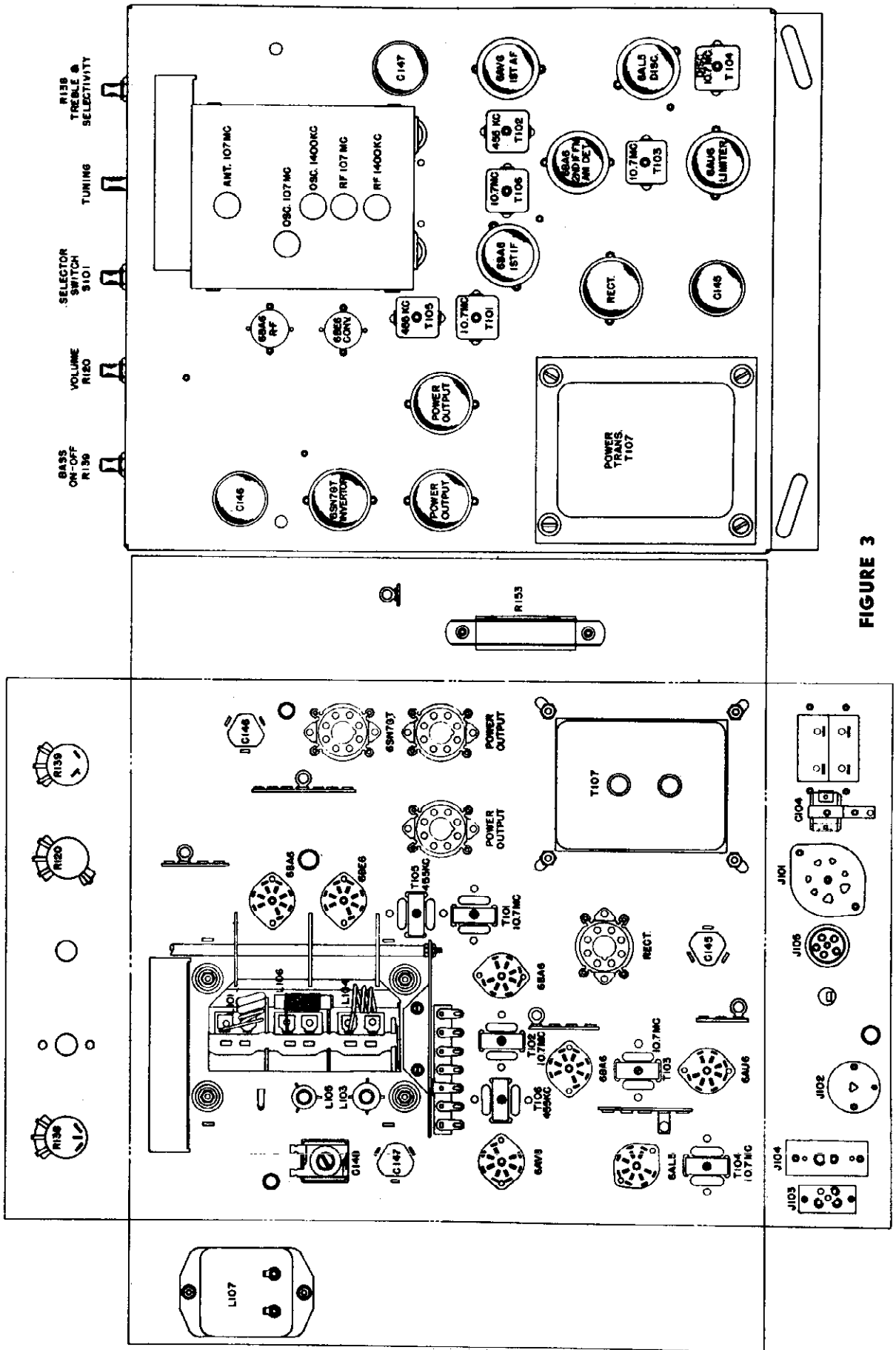


FIGURE 3

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.	LIST PRICE
T 101	Transformer, 1st i-f (FM)	360374-1	$ 1.10
T 102	Transformer, 2nd i-f (FM)	360374-1	1.10
T 103	Transformer, 3rd i-f (FM)	360374-1	1.10
T 104	Transformer, discriminator	360375-1	1.40
T 105	Transformer, 1st i-f (AM)	360508-1	1.45
T 106	Transformer, 2nd i-f (AM)	360373-1	1.25
T 107	Transformer, power	300052-2	12.25
L 101	Coil assembly, antenna (FM)	360321-2	.65
L 102	Coil, choke	360284-1	.20
L 103	Coil assembly, r-f (AM)	360348-1	1.00
L 104	Coil assembly, r-f (FM)	360322-2	2.55
L 105	Coil assembly, oscillator (AM)	360407-1	.55
L 106	Coil assembly, oscillator (FM)	360323-1	.90
L 107	Coil assembly, 10 kc	360244-2	1.55
C 101	Capacitor, tuning	260103-1	5.20
C 102	Capacitor, mica, 100 mmf. 500 V.	250187-53	.15
C 103	Capacitor, mica, 220 mmf. 500 V.	250159-86	.25
C 104	Capacitor, trimmer	250046-2	.20
C 105	Capacitor, ceramic, 5000 mmf.	250175-1	.20
C 106	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 107	Capacitor, mica, 47 mmf. 500 V.	250187-49	.15
C 108	Capacitor, paper, .047 mfd. 200 V.	250205-11	.20
C 109	Capacitor, mica, 15 mmf.	250187-43	.15
C 110	Capacitor, mica, 15 mmf.	250187-43	.15
C 111	Capacitor, trimmer	260067-6	.70
C 112	Capacitor, ceramic, 5000 mmf.	250175-1	.20
C 113	Capacitor, ceramic, 50 mmf. ±10%, 500 V.	250088-39	.15
C 114	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 115	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 116	Capacitor, paper, .047 mfd. 200 V.	250205-11	.20
C 117	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 118	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 119	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 120	Capacitor, mica, 100 mmf. 500 V.	250187-53	.15
C 121	Capacitor, paper, .01 mfd. 600 V.	250203-7	.20
C 122	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 123	Capacitor, mica, 680 mmf. ±10%, 500 V.	250160-62	.20
C 124	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 125	Capacitor, mica, 47 mmf. 500 V.	250187-49	.15
C 126	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 127	Capacitor, ceramic, .01 mfd.	250175-2	.20
C 128	Capacitor, mica, 330 mmf. 500 V.	250159-88	.25
C 129	Capacitor, paper, .02 mfd. 600 V.	250129-3	.25
C 130	Capacitor, paper, .02 mfd. 600 V.	250129-3	.25
C 131	Capacitor, paper, .02 mfd. 600 V.	250129-3	.25
C 132	Capacitor, paper, .047 mfd. 200 V.	250205-11	.20
C 133	Capacitor, paper, 6800 mmf. 600 V.	250203-6	.15
C 134	Capacitor, paper, 220 mmf. 500 V.	250159-86	.20
C 135	Capacitor, paper, 3300 mmf. 600 V.	250203-4	.15
C 136	Capacitor, paper, 1500 mmf. 600 V.	250203-2	.15
C 137	Capacitor, paper, 1000 mmf. 600 V.	250203-1	.15
C 138	Capacitor, paper, 4700 mmf. 600 V.	250203-5	.15
C 139	Capacitor, paper, 3300 mmf. 600 V.	250203-4	.15
C 140	Capacitor, mica, 330 mmf. 500 V.	250159-88	.25
C 141	Capacitor, paper, .1 mfd. 600 V.	250203-13	.25
C 142	Capacitor, paper, .033 mfd. 600 V.	250203-10	.20
C 143	Capacitor, paper, 2200 mmf. 600 V.	250203-3	.15
C 144	Capacitor, paper, 1000 mmf. 600 V.	250203-1	.15
C 145	Capacitor, electrolytic, 30-10 mfd. 475 V.	270023-2	1.60
C 146	Capacitor, electrolytic, 20 mfd. 25 V.—10 mfd. 475 V.	270023-13	.85
C 147	Capacitor, electrolytic, 20-10 mfd. 475 V.—20 mfd. 25 V.	270023-12	1.65
C 148	Capacitor, trimmer, 10 kc.	259610-2	.55
R 101	Resistor, carbon, 10,000 ohms, ½ W.	230104-74	.05

CHASSIS CR-322

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.	LIST PRICE
R 102	Resistor, carbon, 68 ohms, ½ W.	230104-48	.05
R 103	Resistor, carbon, 4700 ohms, ½ W.	230104-70	.05
R 104	Resistor, carbon, 1 megohm, ½ W.	230104-98	.05
R 105	Resistor, carbon, 47,000 ohms, 1 W.	230105-82	.10
R 106	Resistor, carbon, 1 megohm, ½ W.	230104-98	.05
R 107	Resistor, carbon, 33 ohms, ½ W.	230104-44	.05
R 108	Resistor, carbon, 68 ohms, ½ W.	230104-48	.05
R 109	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 110	Resistor, carbon, 1 megohm, ½ W.	230104-98	.05
R 111	Resistor, carbon, 22,000 ohms, ½ W.	230104-78	.05
R 112	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 113	Resistor, carbon, 4700 ohms, ½ W.	230104-70	.05
R 114	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 115	Resistor, carbon, 100 ohms, ½ W.	230104-50	.05
R 116	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 117	Resistor, carbon, 1000 ohms, ½ W.	230104-62	.05
R 118	Resistor, carbon, 47,000 ohms, ½ W.	230104-82	.05
R 119	Resistor, carbon, 220,000 ohms, ½ W.	230104-90	.05
R 120	Potentiometer, volume control	220074-1	.65
R 121	Resistor, carbon, 470,000 ohms, ½ W.	230104-94	.05
R 122	Resistor, carbon, 470,000 ohms, ½ W.	230104-94	.05
R 123	Resistor, carbon, 3300 ohms, 1 W.	230105-68	.05
R 124	Resistor, carbon, 1 megohm, ½ W.	230104-98	.05
R 125	Resistor, carbon, 220,000 ohms, ½ W.	230104-90	.05
R 126	Resistor, carbon, 8200 ohms, 1 W.	230105-73	.05
R 127	Resistor, carbon, 8200 ohms, 1 W.	230105-73	.05
R 128	Resistor, carbon, 100,000 ohms, ½ W.	230104-86	.05
R 129	Resistor, carbon, 68,000 ohms, ½ W.	230104-84	.05
R 130	Resistor, carbon, 150,000 ohms, ½ W.	230104-88	.05
R 131	Resistor, carbon, 150,000 ohms, ½ W.	230104-88	.05
R 132	Resistor, carbon, 100,000 ohms, ½ W.	230104-86	.05
R 133	Resistor, carbon, 560,000 ohms, ½ W. (in tuning eye)	230104-95	.05
R 134	Resistor, carbon, 820,000 ohms, ½ W.	230104-97	.05
R 135	Resistor, carbon, 3300 ohms, ½ W.	230104-68	.05
R 136	Resistor, carbon, 150,000 ohms, ½ W.	230104-88	.05
R 137	Resistor, carbon, 220,000 ohms, ½ W.	230104-90	.05
R 138	Potentiometer, treble control, 1 megohm	220071-4	1.15
R 139	Potentiometer, bass control, 1 megohm	220073-18	.80
R 140	Resistor, carbon, 47,000 ohms, ½ W.	230104-82	.05
R 141	Resistor, carbon, 6.8 megohm, ½ W.	230104-108	.05
R 142	Resistor, carbon, 330,000 ohms, ½ W.	230104-92	.05
R 143	Resistor, carbon, 1500 ohms, ½ W.	230104-64	.05
R 144	Resistor, carbon, 100,000 ohms, 1 W.	230105-86	.10
R 145	Resistor, carbon, 100,000 ohms, 1 W.	230105-86	.10
R 146	Resistor, carbon, 4700 ohms, ½ W.	230104-70	.05
R 147	Resistor, carbon, 220,000 ohms, ±5%, ½ W.	230094-215	.10
R 148	Resistor, carbon, 15,000 ohms, ±5%, ½ W.	230094-187	.10
R 149	Resistor, carbon, 270,000 ohms, ½ W.	230104-91	.05
R 150	Resistor, carbon, 100 ohms, ½ W.	230104-50	.05
R 151	Resistor, carbon, 100 ohms, ½ W.	230104-50	.05
R 152	Resistor, wire wound, 125 ohms, 5 W.	240021-11	.55
R 153	Resistor, wire wound, 6500 ohms	240035-9	.50
RC 101	Printed circuit (capacitor-resistor filter)	250170-1	.30
S 101	Selector switch	160194-1	2.25
S 102	Switch, reject	160224-1	.50
J 101	Socket, speaker	180504-16	.15
J 102	Socket, reject	182776-1	.05
J 103	Socket, T.V.	180060-1	.10
J 104	Socket, phono	189741-1	.10
J 105	Socket, phono power	180520-4	.20
E 101	Loop antenna	*	

*The part number of the Loop Antenna Assembly changes with different cabinets. It is therefore important that you specify the style number of the instrument when ordering a replacement Loop Antenna Assembly.

SPECIFICATIONS

Intermediate frequency	455 kc.
Tuning frequency range:	
Broadcast band	530—1610 kc.
Short wave band	4.9—18.1 mc.
Tubes:	
R-F Amplifier	6SK7
Converter	6SA7
I-F Amplifier	6SK7
Detector and AVC	6J5
First Audio	6J5
Second Audio	6J5
Tuning Indicator	6U5
Dial lamps	Mazda No. 51

GENERAL

Model CR-188 radio chassis is a two-band tuner that must be used in conjunction with a power amplifier, such as the Model AMP-101 for speaker operation. Heater and plate voltages for the CR-188 radio chassis are supplied from the amplifier chassis; it is therefore essential that the radio and amplifier chas be interconnected during alignment or for other el trical service operations.

METHOD FOR REMOVING CHASSIS FROM CABINET

Model CR-188 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service. To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet—it has been properly positioned to bring the radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front, ride inside the flanges on the sides of the chassis tray. Push the chassis forwo as far as it will go and the hooks should then enga the slots in the chassis tray. Replace the two Philli head screws and nuts and tighten securely. Repla all plugs in their receptacles and the antenna lea on their correct terminals. The antenna termi board for the loop antenna connections is designat S-L-H. The end of the short wave antenna that fastened to the inside of the cabinet connects to Always disconnect this antenna from terminal when an outdoor antenna is used as it may pick noise. The two terminals on the loop are designat L and H. The leads connected to these termin should be wired to the corresponding terminals and H) on the chassis.

ALIGNMENT PROCEDURE

The alignment of this receiver requires the use of an accurately calibrated r-f signal generator and an output meter. All trimmer condenser locations are shown on the chassis layout diagram, Figure 5. The radio volume control should be turned to maximum and the signal generator output kept as low as possible during alignment to prevent the AVC from operating and giving false readings. *Always set the Treble Control to SHARP TUNE before aligning the i-f stages.* This is done by turning the Treble Control Knob to the No. 1 position.

I-F ALIGNMENT

1. Connect the output of the signal generator to the oscillator grid (pin No. 5) of the 6SA7 tube through a .00025 mfd. capacitor. The ground on the signal generator should be connected to the radio chassis ground.
2. Turn the condenser gang until it is completely meshed, (low-frequency end of dial calibration) and set the band selector switch to BDCST as for broadcast band reception.
3. Adjust the signal generator to EXACTLY 455 kc. and peak the second i-f transformer and the first i-f transformer trimmers in that order.

On early models of the CR-188 chassis, the two i-f trimmers are located in the top of the respective i-f transformers as shown in the layout diagram Figure 5. In later production, one trimmer is accessible from the top and the other from the bottom of each transformer.

BROADCAST BAND ALIGNMENT

1. Remove the signal generator lead from the 6SA7 grid and connect it to the radio antenna terminal through the .00025 mfd. capacitor. The ANT-LOOP switch (60) must be in the ANT. setting.
2. Check the tuning dial pointer adjustment. When the plates of the tuning condenser are completely meshed, the dial pointer must be in line with the last calibration mark at the low frequency end of the dial. If it is not, loosen the set screws in the hub of pulley "D" shown on Figure 1 and make the necessary adjustment.
3. With the band selector still set for broadcast band reception, adjust the signal generator and the radio receiver to 600 kc. While rocking the gang condenser a few degrees to the right and to the left, adjust the 600 kc. oscillator padder for maximum indication on the output meter.
4. Set the signal generator and the radio receiver to 1400 kc.; adjust the 1400 kc. oscillator trimmer and the 1400 kc. antenna trimmer for maximum output. If considerable adjustment was necessary, recheck the 600 kc. padder setting.
5. If the loop antenna trimmer is out of adjustment, it should be set after the radio chassis is in the cabinet. Set the ANT-LOOP switch (60) to the LOOP position. Adjust the signal generator to 1400 kilocycles and connect its output to a loop containing approximately five turns of wire eight inches in diameter placed eighteen inches from the receiver loop and in the same plane.
6. Set the receiver to 1400 kc. and adjust the trimmer on the receiver loop for maximum output.

SHORT WAVE BAND ALIGNMENT

1. Set the band selector switch to SW as for short wave reception and substitute a 400 ohm resistor for the capacitor in series with the signal generator lead connected to the antenna terminal on the receiver.
2. Set the signal generator and the radio receiver to 15 mc.; then adjust the 15 mc. oscillator trimmer and the 15 mc. antenna trimmer for maximum output. While adjusting the 15 mc. oscillator trimmer two peaks may be observed; only one is the correct peak for 15 mc. alignment. Screw in the trimmer to maximum capacity—then decrease the capacity until the first peak is observed. This is the correct one.

10 KC FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit to eliminate the beat note heard as a whistle between stations on the broadcast band. If the trimmer is out of adjustment, the following procedure should be observed.

1. Turn the Treble Control to FULL RANGE (No. 4 position).
2. Connect the output of an audio oscillator to the phonograph pickup socket on the radio chassis and adjust the oscillator to EXACTLY 10,000 cycles.
3. Set the band selector to PHONO and adjust the 10 kc. trimmer (8) for minimum output.
4. If an audio oscillator is not available for making this adjustment, set the band selector to BDCST, connect an antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:
- 600 kc. 7.0
- 6 mc. 1.63

R-F to Converter Grid at:
- 600 kc. 3.4
- 6 mc. 3.4

R-F on Converter Grid to I-F Grid at:
- 600 kc. 40.0
- 6 mc. 35.5

I-F on Converter Grid to . F Grid at:
- 455 kc. .....

I-F Grid to Detector Plate at:
- 455 kc. .....

AUDIO GAIN

Voltage required across Volume Control to produ .05 watt speaker output** at 400 cycles is .014 v with Band Selector Switch in BDCST setting.

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across Oscillator G Resistor (40) at:
- 600 kc. .....
- 6 mc. .....

* Variations of ±20% are permissible. All readings made with sufficient input sign provide .05 watt speaker output.

** .05 watt speaker output at 400 cycles is equivalent to a reading of 0.35 volts as meas by a high resistance AC voltmeter across the voice coil of either speaker.

DIAL CORD REPLACEMENT

Rotate the brass pulley designated "A" in Figure 1 until the dial pointer strikes the stop at the high frequency end of the dial calibration. In this condition the slot in pulley "A" should be approximately ten degrees to the left of being vertical—see Figure 1. If the slot in the pulley is in some other position under the above mentioned conditions, the pointer set screw is probably loose and has allowed the point to slip.

To correct this condition, first remove the glass di and loosen the pointer screw. Then while holdin pulley "A" so that its slot is approximately ten d grees to the left of vertical (when viewed from th rear) adjust the pointer until it is resting against th

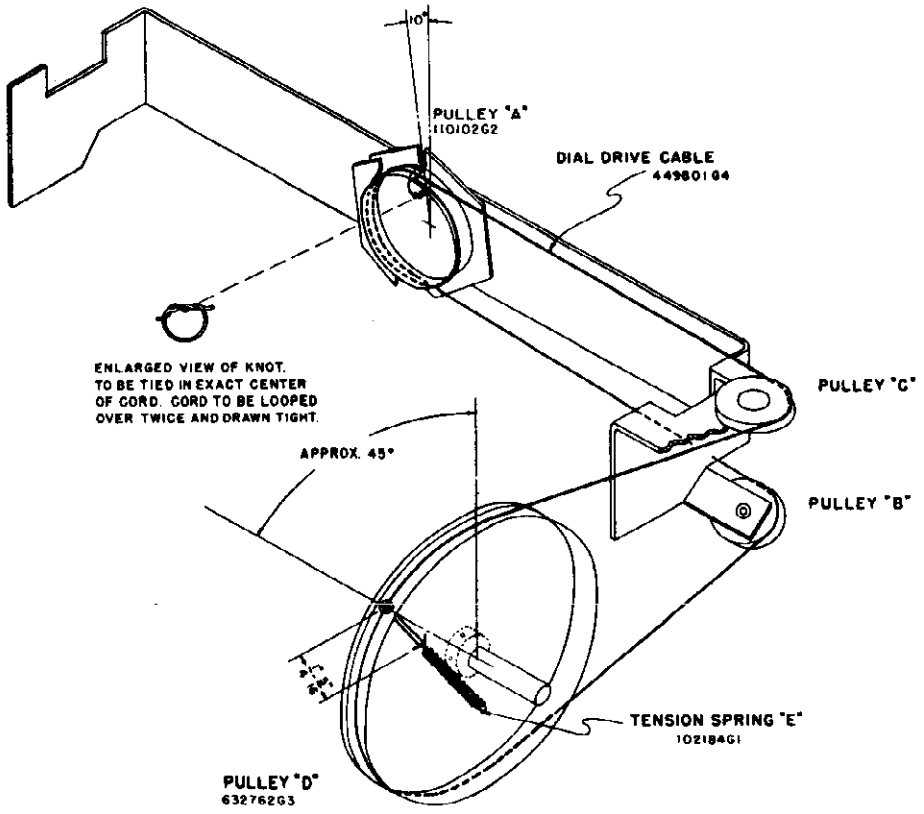


FIGURE 1

stop at the high frequency end of its travel. Then tighten the pointer set screw securely and replace the glass dial.

Completely unmesh the condenser gang and check the location of the hole or slot in pulley "D." If this hole is not approximately 45 degrees back from vertical as shown on Figure 1, loosen the two No. 6 Allen set screws in the hub of pulley "D" and slip the pulley on its shaft (while holding the condenser gang unmeshed) until the specified adjustment is obtained; then tighten one of the set screws securely. It will be shown later that this is a temporary setting.

Next, tie a double knot in the exact center of a 25-inch length of dial cable and fold the cable back on itself so that the knot is at one end. The correct method for tying this knot is shown as an inset on Figure 1. Grasp the cable near the knotted end and slide it into the pulley slot so that the knot is against the inside rim of the pulley as shown in the sketch. The piece of cable nearest the dial frame should be wound in the direction shown for one-half turn; then over the lower pulley "B," around the bottom of the large pulley "D" and into the hole. Pull the cable taut and wrap the end around the small hook on pulley "D" temporarily.

The remaining piece of cable should be wound around pulley "A" in the direction shown, for one complete turn, over the upper pulley "C," and over the top of pulley "D." Thread the end through the small hole in pulley "D" and pull both ends of the cable taut. With one end of tension spring "E" fastened to the hook on pulley "D" lace the two free ends of the cable through the opposite end of the spring and tie a knot at a point that will allow ¼" to 5/16" of cable between the spring and the inside rim of pulley "D." Be sure to tie the knot around one coil of the spring in the manner shown.

Now with the condenser gang completely meshed, check the position of the dial pointer. If it is not in line with the last calibration mark at the low frequency end of the dial, loosen the set screw in pulley "D" and turn it until the pointer is in the specified position. Be sure that the condenser gang does not move during this adjustment. Then tighten the two screws in pulley "D" securely completing the operation.

CONDENSER GANG DRIVE ADJUSTMENTS

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 2 and 3 are effected; otherwise the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. Assemble the Tuning Shaft, Drive Collar, Compression Spring, Spring Retainer and Flywheel in the manner shown on Figure 3. Note that the Tuning Shaft must extend ¾" from the front of the assembly and that the spacing between the rear of the Drive Collar and the front of the Flywheel must be 3-5/64". Any excess length in the Tuning Shaft may extend beyond the rear of the Flywheel. See Figure 2.

2. The distance between the rubber-tired Drive Wheel and the smaller diameter section of the Spring Retainer must be 1/32" to 1/16" (Figure 3). This adjustment is effected by loosening the two No. 6 Allen set screws in the Drive Wheel hub and sliding the wheel on its shaft until the required clearance is obtained. When the adjustment is completed, tighten the two screws in the hub of the Drive Wheel.

sure of the front surface of the Drive Collar, when the Tuning Shaft is pulled out. The function of this switch is to open the muting circuit when setting up the push buttons. As its contacts are wired in series with the large muting switch (contacts are shorted by pressing any push button), pulling out on the Tuning Shaft causes the small switch contacts to open the muting circuit so that a station can be heard while the push button is held in and tightened.

On rare occasions it may be necessary to adjust the

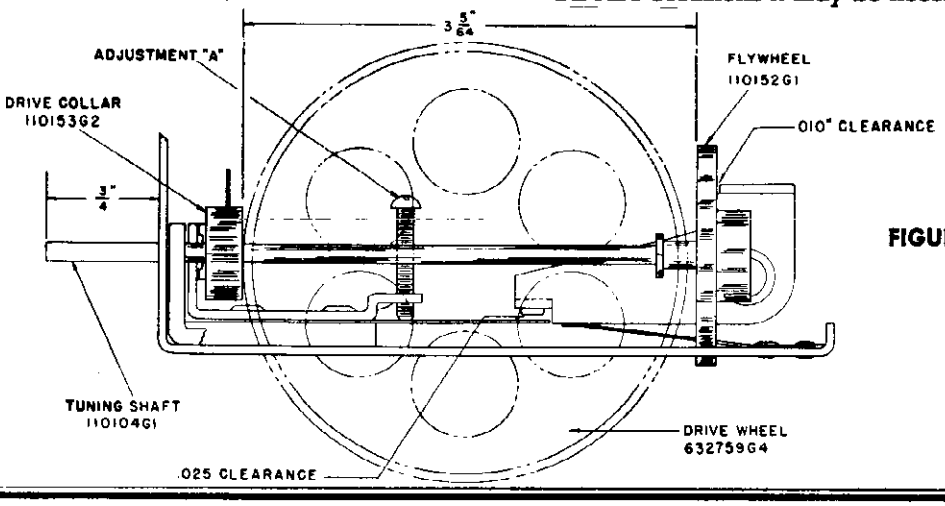


FIGURE 2

3. While pressing down on the Treadle Bar at the location shown on Figure 3, adjust the Thrust Bracket until the clearance between the rear of the Flywheel and the projection on the Thrust Bracket is .010" as shown on the diagram. To make this adjustment, loosen the two No. 6 Allen set screws (use No. 6 Allen Wrench—Magnavox Part No. 800044G2) in the hub of Thrust Bracket and rotate the bracket until the specified clearance is obtained when the push buttons are NOT actuated. Tighten the two screws securely when the adjustment is completed. Press each push button and check that the Drive Collar is pushed away from the rubber-tired Drive Wheel.

4. Next, adjust the clearance in the muting switch contacts by turning the Phillips-head screw designated Adjustment "A" on Figure 2, until the specified clearance of .025" is obtained (when the push buttons are NOT actuated.)

5. While pressing any one of the push buttons in a far as possible, turn the screw designated Adjustment "B" until a minimum clearance of .015" is obtained between the front surface of the Drive Collo and the switch spring directly in front of it. This setting should also cause a minimum clearance o .010" between the switch contacts actuated by pre relation between the push button bars and the Treadle Bar. Such adjustment might be required if whe pushing any of the push buttons, sufficient motion i not transmitted to the Treadle Bar to cause a disen gagement between the Drive Collar and the Drive wheel.

This can usually be accomplished by loosening th two screws designated "C" and "D" on Figure 3, an moving plate "B" in the direction required to correc this condition.

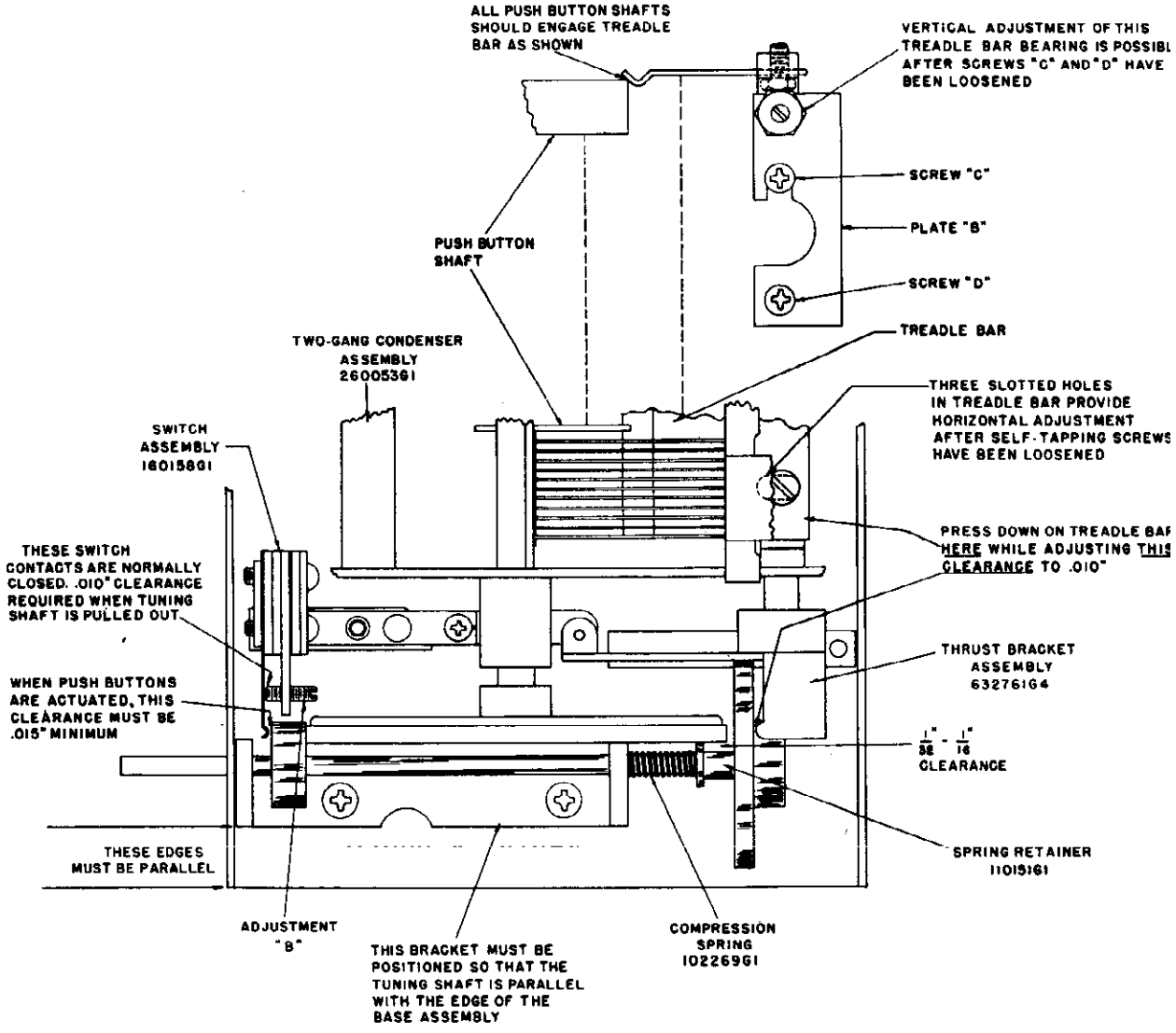


FIGURE 3

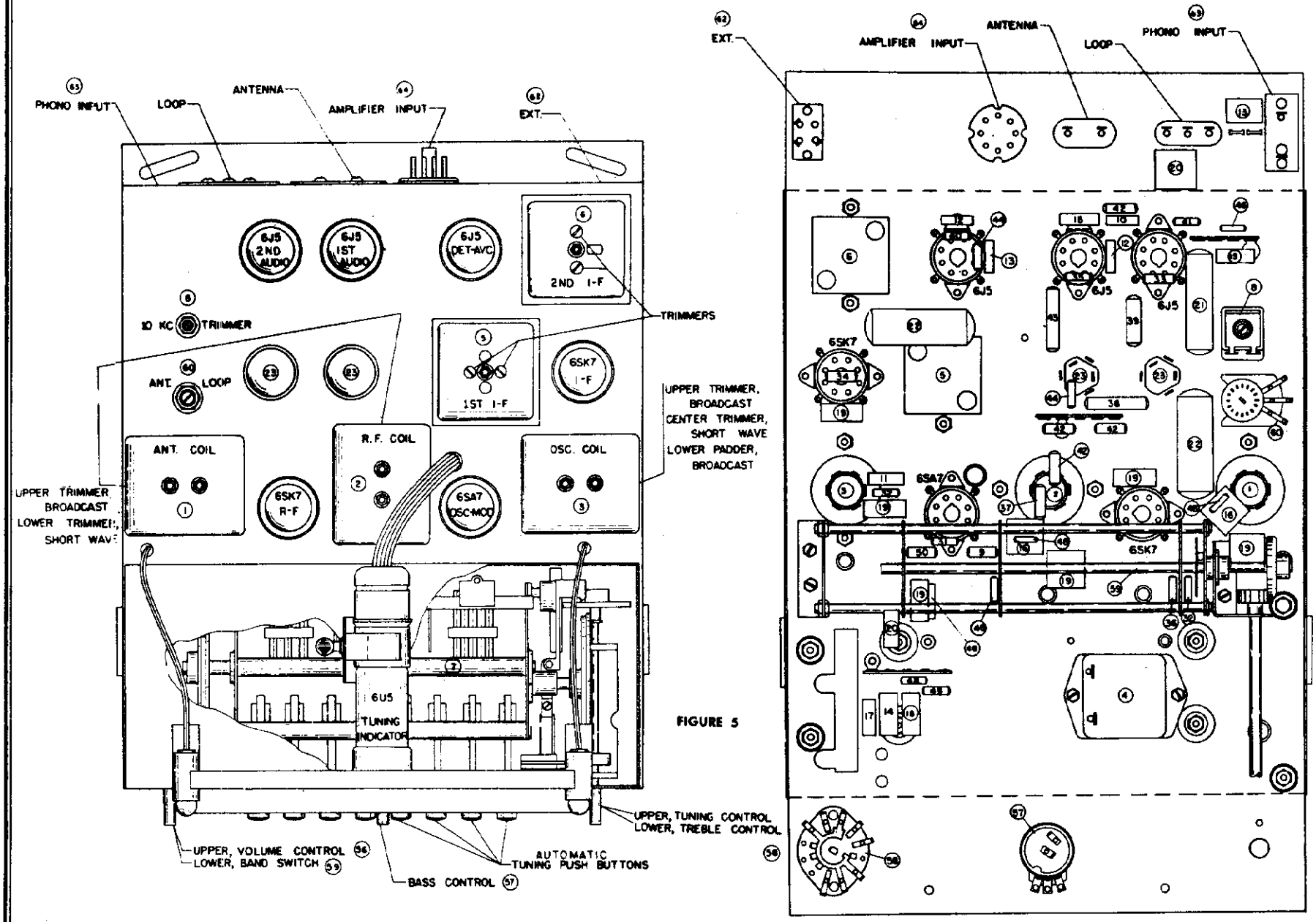
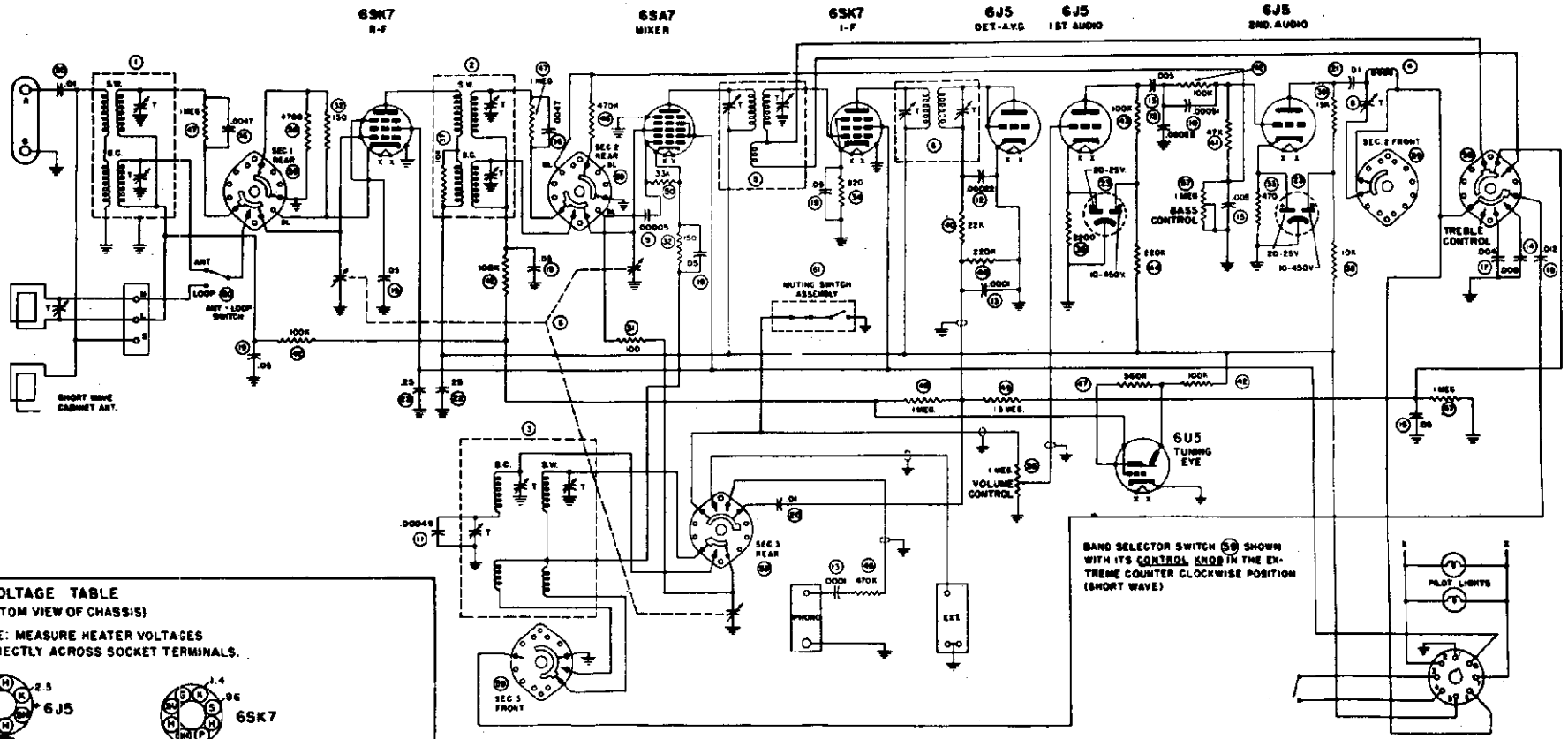
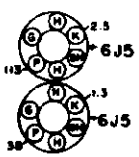

PHONO INPUT
LOOP
ANTENNA
AMPLIFIER INPUT
EXT.
6J5 2ND AUDIO
6J5 1ST AUDIO
6J5 DET-AVC
2ND I-F
10 KC TRIMMER
TRIMMERS
ANT. LOOP
1ST I-F
6SK7 I-F
ANT. COIL
R.F. COIL
OSC. COIL
6SK7 R-F
6SA7 OSC-MOD
6U5 TUNING INDICATOR
UPPER TRIMMER, BROADCAST
LOWER TRIMMER, SHORT WAVE
UPPER TRIMMER, BROADCAST
CENTER TRIMMER, SHORT WAVE
LOWER PADDER, BROADCAST
UPPER, VOLUME CONTROL
LOWER, BAND SWITCH
BASS CONTROL
AUTOMATIC TUNING PUSH BUTTONS
UPPER, TUNING CONTROL
LOWER, TREBLE CONTROL
6J5
6SK7
6SA7

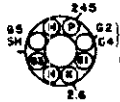
FIGURE 5



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

NOTE: MEASURE HEATER VOLTAGES DIRECTLY ACROSS SOCKET TERMINALS.

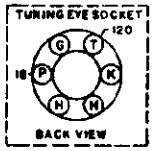




ALL OTHER VOLTAGES MEASURED FROM SOCKET TERMINALS TO GROUND WITH A 1000 OHM/VOLT VOLTMETER WITH BAND-SWITCH IN SHORT WAVE POSITION.
(H) HEATERS 6.3 VOLTS A.C.

MEASURE CATHODES ON 30 V. SCALE. ALL OTHERS ON 600 V. SCALE.
LINE VOLTAGE 117 V. A.C.

6U5



CHASSIS CR-188

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil Assembly, antenna, two band	360254G1
2	Coil Assembly, r-f, two band	360254G2
3	Coil Assembly, oscillator, two band	360253G1
4	Coil Assembly, 10 kc. filter	360244G1
5	Transformer, first i-f	360266G1
6	Transformer, second i-f	360267G1
7	Capacitor, variable, three-gang tuning	260054G1
8	Capacitor, variable, 10 kc. trimmer	259610G1
9	Capacitor, ceramic, 50 mmf.	250088G25
10	Capacitor, molded mica, 510 mmf.	250159G64
11	Capacitor, silvered mica, 490 mmf. ±1%	250085G32
12	Capacitor, molded mica, 220 mmf.	250159G100
13	Capacitor, molded mica, 100 mmf.	250159G98
14	Capacitor, paper, 008 mfd.	250129G11
15	Capacitor, paper, .005 mfd.	250129G10
16	Capacitor, molded mica, .0047 mfd.	250161G5
17	Capacitor, paper, .004 mfd.	250129G7
18	Capacitor, paper, .012 mfd.	250129G13
19	Capacitor, paper, .05 mfd.	250129G5
20	Capacitor, paper, .01 mfd.	250129G9
21	Capacitor, paper, 0.1 mfd.	250152G22
22	Capacitor, paper, 0.25 mfd.	250152G21
23	Capacitor, electrolytic, 20 mfd. 25V—10 mfd. 450V.	270023G6
31	Resistor, composition, 100 ohm ½ W.	230084G7
32	Resistor, composition, 150 ohm ½ W.	230084G8
33	Resistor, composition, 470 ohm ½ W.	230084G11
34	Resistor, composition, 820 ohm ½ W.	230084G61
35	Resistor, composition, 2200 ohm ½ W.	230084G15
36	Resistor, composition, 4700 ohm ½ W.	230084G17
37	Resistor, composition, 10,000 ohm ½ W.	230084G19
38	Resistor, composition, 10,000 ohm 1 W.	230085G19
39	Resistor, composition, 15,000 ohm 1 W.	230085G20
40	Resistor, composition, 22,000 ohm ½ W.	230084G21
41	Resistor, composition, 47,000 ohm ½ W.	230084G23
42	Resistor, composition, 100,000 ohm ½ W.	230084G25
43	Resistor, composition, 100,000 ohm 1 W.	230085G25
44	Resistor, composition, 220,000 ohm ½ W.	230084G27
46	Resistor, composition, 470,000 ohm ½ W.	230084G29
47	Resistor, composition, 560,000 ohm ½ W.	230084G95
48	Resistor, composition, 1 megohm ½ W.	230084G31
49	Resistor, composition, 1.5 megohm ½ W.	230084G32
50	Resistor, composition, 33,000 ohm ½ W.	230084G22
56	Control, volume, 1 megohm	220044G15
57	Control, bass, 1 megohm with switch	220045G2
58	Switch, rotary, treble control	160161G1
59	Switch, rotary, band selector	160160G1
60	Switch, rotary, loop to outdoor antenna	160157G1
61	Switch assembly, muting	160158G2
62	Socket, external input	180060G1
63	Socket, phonograph input	189741G1
64	Plug, octal, amplifier connection	180511G14
	Antenna, loop assembly	*
	Dial glass assembly	150285

*The part number of the loop antenna assembly changes with different cabinets. It is therefore important that you specify the *Style Number* of the instrument when ordering a replacement loop antenna assembly.

SPECIFICATIONS

Power supply	117 volts 50/60 cycles AC	
Power consumption	150 watts	
Power output	20 watts	
Intermediate frequency	455 kc.	
Tuning frequency range:		
Broadcast band	520—1620 kc.	
Short Wave band	5.0—18.2 mc.	
Tubes:		
Converter	6SA7	
I-F Amplifier	6SK7	
Detector and AVC	6J5	
First Audio	6J5	
Inverter	6SN7GT	
Power output (push-pull stage)	(2) 6L6G	
Rectifier	5U4G	
Tuning Indicator	6U5	
Dial lamps	Mazda No. 51	
Speakers:	No. 582815	No. 582847
Field coil resistance	250 ohms	250 ohms
Voice coil impedance (400 cycles)	5.7 ohms	5.4 ohms
Output transformer	None	5,000/3 ohms

Method for Removing Chassis from Cabinet

Model CR-193 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service.

To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet—it has been properly positioned to bring the radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front, ride inside the flanges on the sides of the chassis tray. Push the chassis forwar as far as it will go and the hook should then engag the slots in the chassis tray. Replace the two Phillip head screws and nuts and tighten securely. Replac all plugs in their receptacles and the antenna lead on their correct terminals. The antenna termin board for the loop antenna connections is designate S-L-H. The end of the short wave antenna that fastened to the inside of the cabinet connects to Always disconnect this antenna from terminal when an outdoor antenna is used as it may pick u noise. The two terminals on the loop are designate L and H. The leads connected to these termina should be wired to the corresponding terminals and H) on the chassis.

ALIGNMENT PROCEDURE

I-F ALIGNMENT

The alignment of this receiver requires the use of an accurately calibrated r-f signal generator and an output meter. All trimmer condenser locations are shown on the chassis layout diagram, Figure 5. The radio volume control should be turned to maximum and the signal generator output kept as low as possible during alignment to prevent the AVC from operating and giving false readings. *Always set the Selectivity Switch to SHARP TUNE before aligning the i-f stages.* This is done by turning the Treble Control counter-clockwise as far as possible.

1. Connect the output of the signal generator to th oscillator grid (pin No. 5) of the 6SA7 tube throug a .00025 mfd. capacitor. The ground on the signa generator should be connected to the radio chass ground.

2. Turn the condenser gang until it is completel meshed, (low-frequency end of dial calibration) an set the band selector switch to BDCST as for broa cast band reception.

3. Adjust the signal generator to EXACTLY 455 kc. and peak the second i-f transformer and the first i-f transformer trimmers in that order.

On early models of the CR-193 chassis, the two i-f trimmers are located in the top of the respective i-f transformers. In later production, one trimmer is accessible from the top and the other from the bottom of each transformer as shown in the layout diagram, Figure 5.

BROADCAST BAND ALIGNMENT

1. Remove the signal generator lead from the 6SA7 grid and connect it to the radio antenna terminal through the .00025 mfd. capacitor. The ANT-LOOP switch (70) must be in the ANT. setting.
2. Check the tuning dial pointer adjustment. When the plates of the tuning condenser are completely meshed, the dial pointer must be in line with the last calibration mark at the low frequency end of the dial. If it is not, loosen the set screws in the hub of pulley "D" shown on Figure 1 and make the necessary adjustment.
3. With the band selector still set for broadcast band reception, adjust the signal generator and the radio receiver to 600 kc. While rocking the gang condenser a few degrees to the right and to the left, adjust the 600 kc. oscillator padder for maximum indication on the output meter.
4. Set the signal generator and the radio receiver to 1400 kc., adjust the 1400 kc. oscillator trimmer and the 1400 kc. antenna trimmer for maximum output. If considerable adjustment was necessary, recheck the 600 kc. padder setting.
5. If the loop antenna trimmer is out of adjustment it should be set after the radio chassis is in the cabinet. Set the ANT-LOOP switch (70) to the LOOP position. Adjust the signal generator to 1400 kilocycles and connect its output to a loop containing approximately five turns of wire eight inches in diameter placed eighteen inches from the receiver loop and in the same plane.
6. Set the receiver to 1400 kc. and adjust the trimmer on the receiver loop for maximum output.

SHORT WAVE BAND ALIGNMENT

1. Set the band selector switch to SW as for short wave reception and substitute a 400 ohm resistor for the capacitor in series with the signal generator lead connected to the antenna terminal on the receiver.
2. Set the signal generator and the radio receiver to 15 mc.; then adjust the 15 mc. oscillator trimmer and the 15 mc. antenna trimmer for maximum output. While adjusting the 15 mc. oscillator trimmer two peaks may be observed; only one is the correct peak for 15 mc. alignment. Screw in the trimmer to maximum capacity—then decrease the capacity until the first peak is observed. This is the correct one.

10 KC FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit to eliminate the beat note heard as a whistle between stations on the broadcast band. If the trimmer is out of adjustment, the following procedure should be observed.

1. Set the Selectivity Switch to FULL RANGE by turning the Treble Control knob clockwise as far as possible.
2. Connect the output of an audio oscillator to the phonograph pickup socket on the radio chassis and adjust the oscillator to EXACTLY 10,000 cycles.
3. Set the band selector to PHONO and adjust the 10 kc. trimmer (7) for minimum output.
4. If an audio oscillator is not available for making this adjustment, set the band selector to BDCST, connect an antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a simliar measuring instrument available.

STAGE GAINS*

Antenna Post to Converter Grid at:

600 kc.	5.5
6 mc.	2.0

R-F on Converter to I-F Grid at:

600 kc.	28
6 mc.	22

I-F on Converter Grid to I-F Grid at:

455 kc.	34

I-F Grid to Detector Plate at:

455 kc.	67

AUDIO GAIN

Voltage required across Volume Control to produce .05 watt speaker output** at 400 cycles is .010 volt with Band Selector Switch in BDCST setting.

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across Oscillator Grid Resistor (48) at:

600 kc.	5.6
6 mc.	6.0

* Variations of ±20% are permissible. All readings made with sufficient input signal to provide .05 watt speaker output.
** .05 watt speaker output at 400 cycles is equivalent to a reading of 0.4 volts as measured by a high resistance AC voltmeter across the voice coil of either speaker.

DIAL CORD REPLACEMENT

Rotate the brass pulley designated "A" in Figure 1 until the dial pointer strikes the stop at the high frequency end of the dial calibration. In this condition the slot in pulley "A" should be approximately ten degrees to the left of being vertical—see Figure 1. If the slot in the pulley is in some other position under the above mentioned conditions, the pointer set screw is probably loose and has allowed the pointer to slip.

To correct this condition, first remove the glass dial and loosen the pointer screw. Then while holding pulley "A" so that its slot is approximately ten degrees to the left of vertical (when viewed from the rear) adjust the pointer until it is resting against the stop at the high frequency end of its travel. Then tighten the pointer set screw securely and replace the glass dial.

Completely unmesh the condenser gang and check the location of the hole or slot in pulley "D." If this hole is not approximately 45 degrees back from vertical as shown on Figure 1, loosen the two No. 6 Allen set screws in the hub of pulley "D" and slip the pulley on its shaft (while holding the condenser gang unmeshed) until the specified adjustment is obtained; then tighten one of the set screws securely. It will be shown later that this is a temporary setting.

Next, tie a double knot in the exact center of a 25-inch length of dial cable and fold the cable back on itself so that the knot is at one end. The correct method for tying this knot is shown as an inset on Figure 1. Grasp the cable near the knotted end slide it into the pulley slot so that the knot is ag the inside rim of the pulley as shown in the sk The piece of cable nearest the dial frame shoul wound in the direction shown for one-half turn; over the lower pulley "B," around the bottom o large pulley "D" and into the hole. Pull the c taut and wrap the end around the small hoo pulley "D" temporarily.

The remaining piece of cable should be w around pulley "A" in the direction shown, for complete turn, over the upper pulley "C," and the top of pulley "D." Thread the end through small hole in pulley "D" and pull both ends o cable taut. With one end of tension spring "E" tened to the hook on pulley "D" lace the two ends of the cable through the opposite end o spring and tie a knot at a point that will allow ½ 5/16" of cable between the spring and the inside of pulley "D." Be sure to tie the knot around one of the spring in the manner shown.

Now with the condenser gang completely mes check the position of the dial pointer. If it is n line with the last calibration mark at the low quency end of the dial, loosen the set screw in p "D" and turn it until the pointer is in the spec position. Be sure that the condenser gang does move during this adjustment. Then tighten the screws in pulley "D" securely completing the o tion.

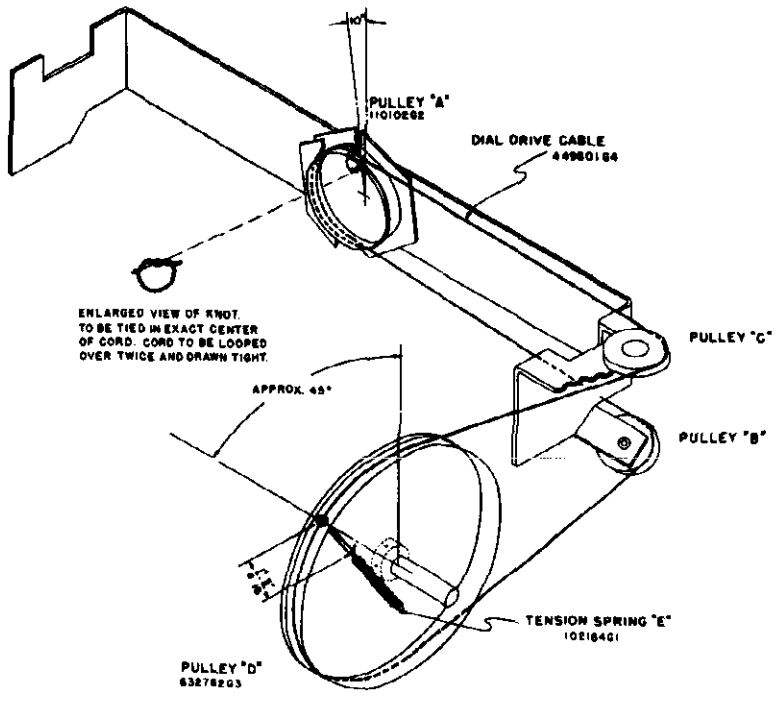


FIGURE 1

CONDENSER GANG DRIVE ADJUSTMENTS

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 2 and 3 are affected; otherwise the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. Assemble the Tuning Shaft, Drive Collar, Compression Spring, Spring Retainer and Flywheel in the manner shown on Figure 3. The Tuning Shaft must extend ¾" from the front of the assembly and that the spacing between the rear of the Drive Collar and the front of the Flywheel must be 3-5/64" as specified on Figure 2. Any excess length in the Tuning Shaft may extend beyond the rear of the Flywheel.

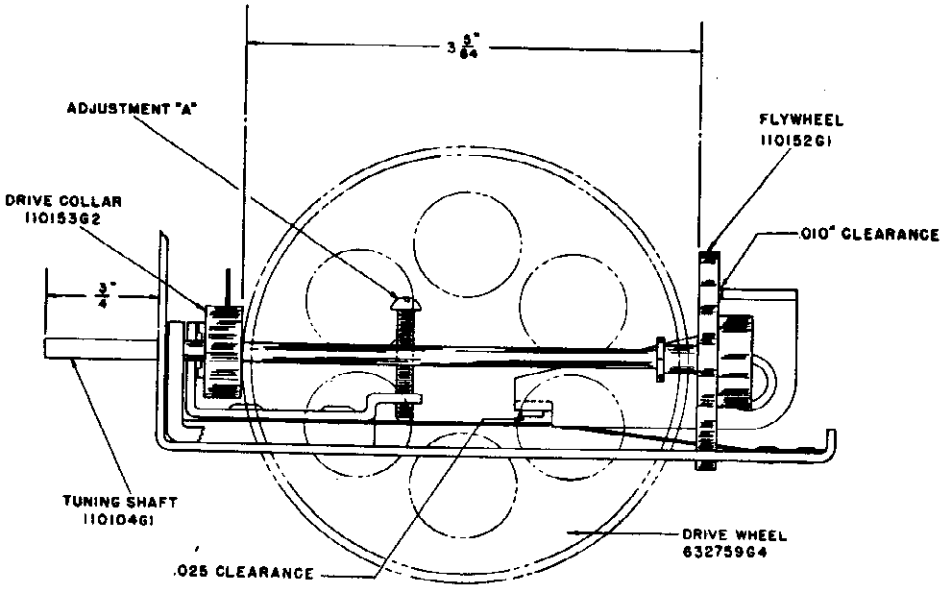


FIGURE 2

2. The distance between the rubber-tired Drive Wheel and the smaller diameter section of the Spring Retainer must be 1/32" to 1/16". This adjustment is effected by loosening the two No. 6 Allen set screws in the Drive Wheel hub and sliding the wheel on its shaft until the required clearance is obtained. When the adjustment is completed, tighten the two screws in the hub of the Drive Wheel. See Figure 3.

3. While pressing down on the Treadle Bar at the location shown on Figure 3, adjust the Thrust Bracket until the clearance between the rear of the Flywheel and the projection on the Thrust Bracket is .010" as shown on the diagram. To make this adjustment, loosen the two No. 6 Allen set screws (use No. 6 Allen Wrench—Magnavox Part No. 800044G2) in the hub of Thrust Bracket and rotate the bracket until the specified clearance is obtained when the push buttons are NOT actuated. Tighten the two screws securely when the adjustment is completed. Press each push button and check that the Drive Collar is pushed away from the rubber-tired Drive Wheel.

4. Next, adjust the clearance in the muting switch contacts by turning the Phillips-head screw designated Adjustment "A" on Figure 2, until the specified clearance of .025" is obtained (when the push buttons are NOT actuated.)

5. While pressing any one of the push buttons in as far as possible, turn the screw designated. Adjustment "B" (Figure 3) until a minimum clearance of .015" is obtained between the front surface of the Drive Collar and the switch spring directly in front of it. This setting should also cause a minimum clearance of .010" between the switch contacts actuated

by pressure of the front surface of the Drive Collar, when the Tuning Shaft is pulled out. The function of this switch is to open the muting circuit when setting up the push buttons. As its contacts are wired in series with the large muting switch (contacts are shorted by pressing any push button), pulling out on the Tuning Shaft causes the small switch contacts to open the muting circuit so that a station can be heard while the push button is held in and tightened. On rare occasions it may be necessary to adjust the relation between the push button bars and the Treadle Bar. Such adjustment might be required if when pushing any of the push buttons, sufficient motion is not transmitted to the Treadle Bar to cause a disengagement between the Drive Collar and the Drive wheel.

This can usually be accomplished by loosening the two screws designated "C" and "D" on Figure 3, and moving plate "B" in the direction required to correct this condition.

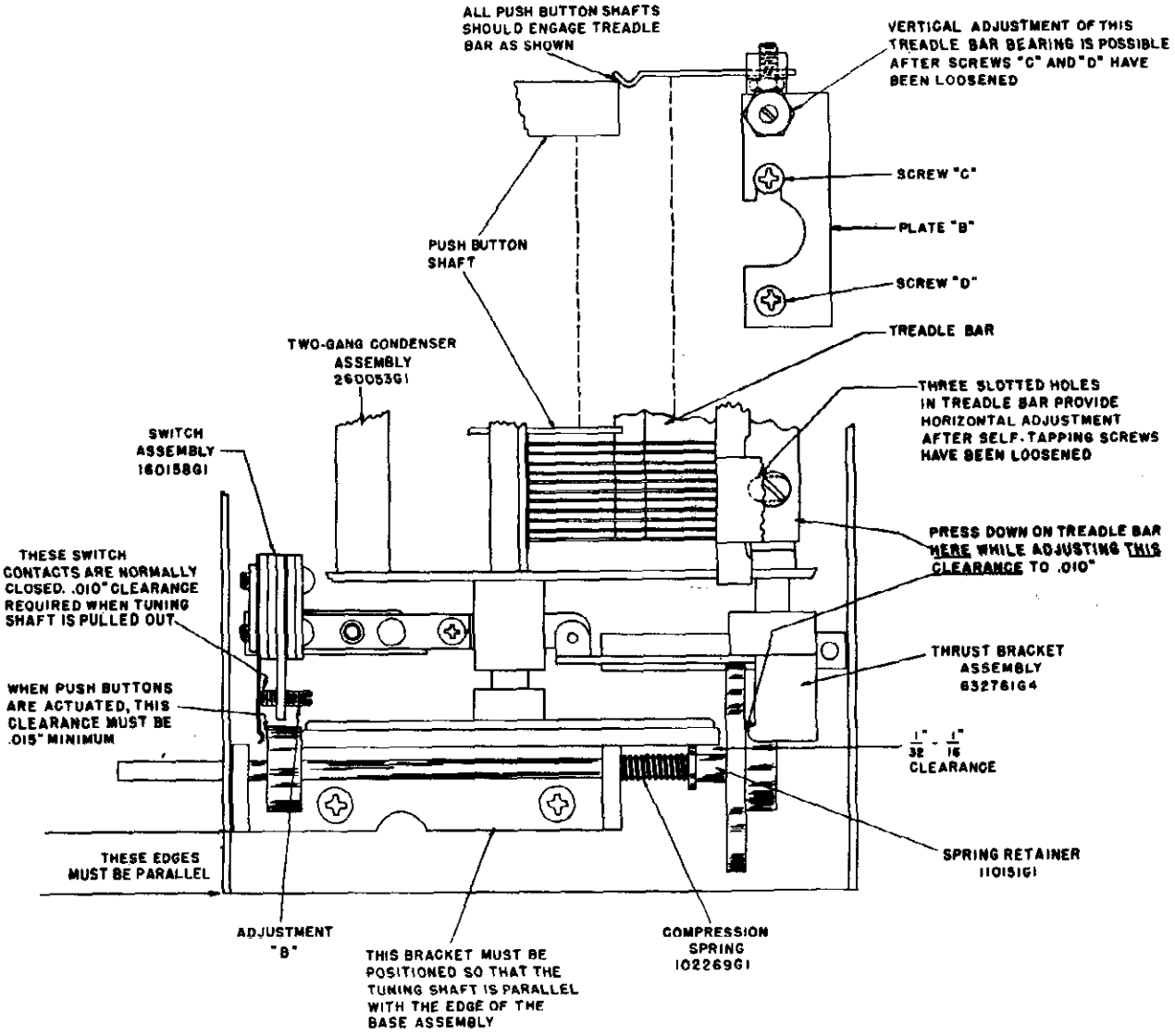
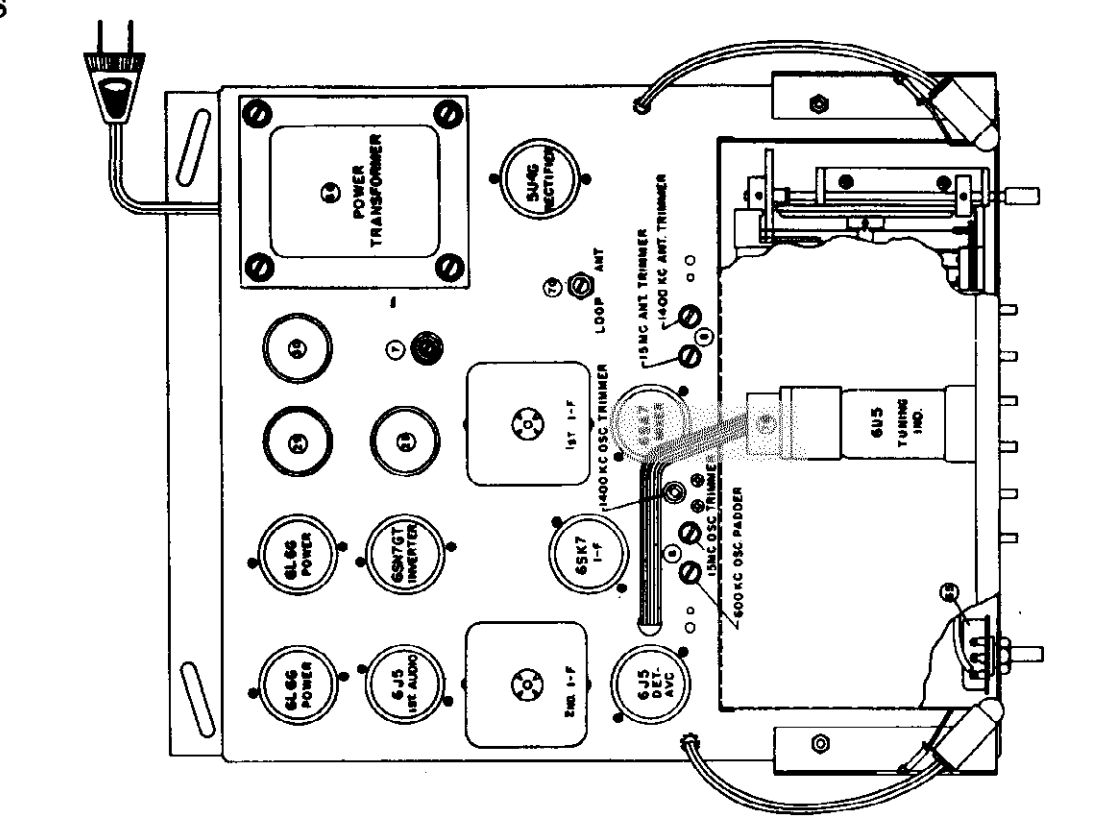


FIGURE 3

CHASSIS
CR-193



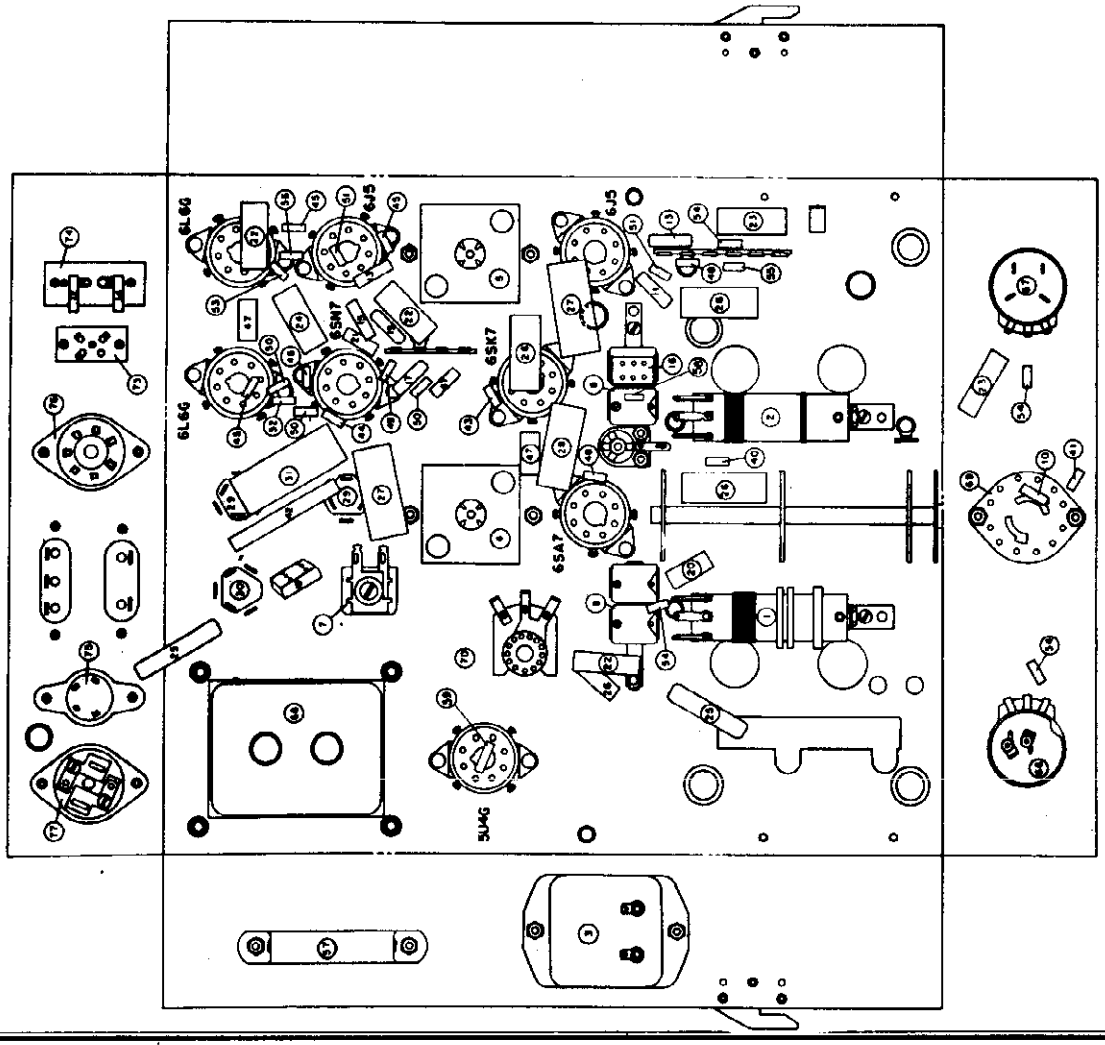
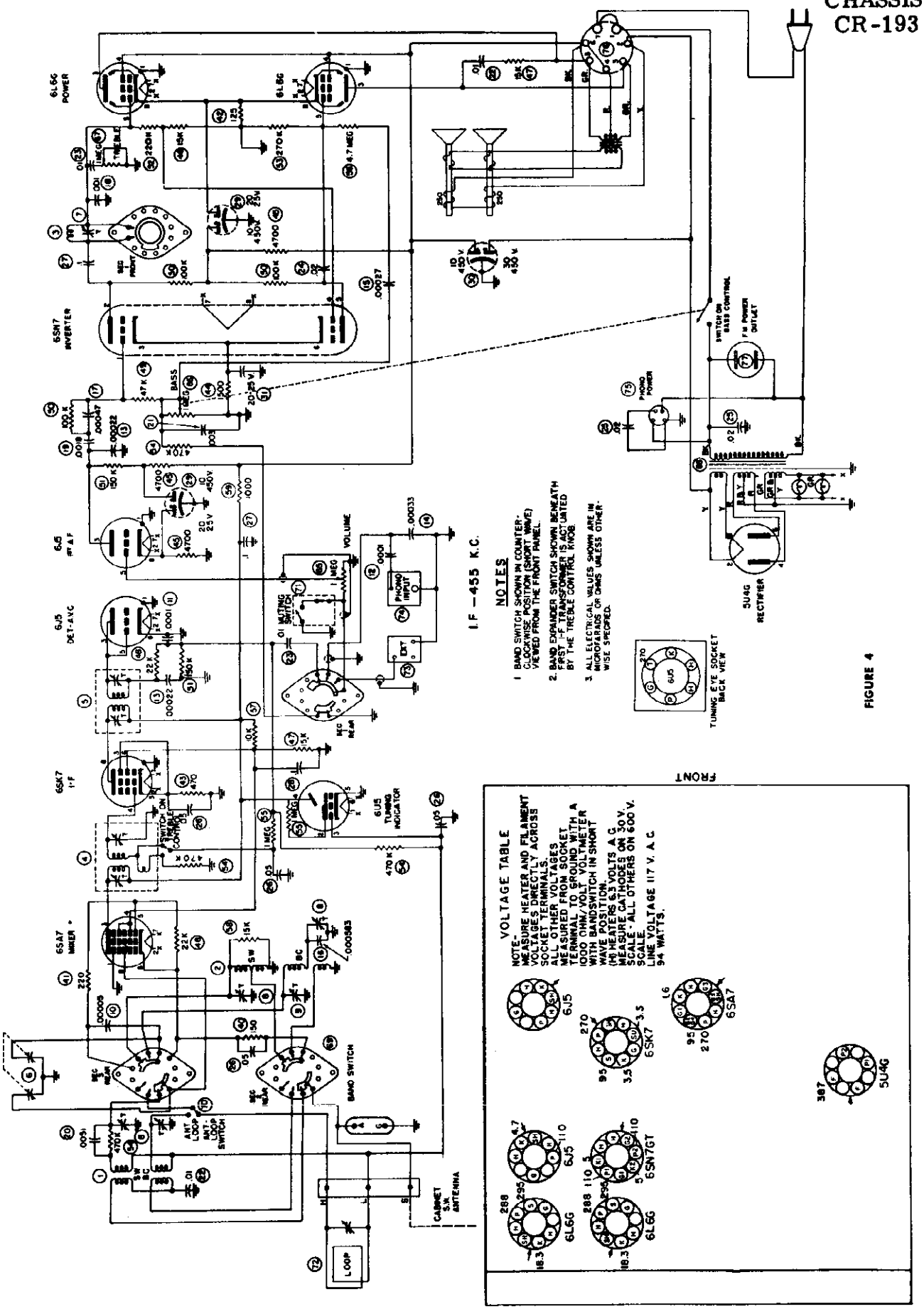


FIGURE 5


I.F. -455 K.C.
NOTES
1 BAND SWITCH SHOWN IN COUNTER-CLOCKWISE POSITION (SHORT WAVE) VIEWED FROM THE FRONT PANEL.
2. BAND EXPANDER SWITCH SHOWN BENEATH FIRST TRANSFORMER IS ACTUATED BY THE TREBLE CONTROL KNOB.
3 ALL ELECTRICAL VALUES SHOWN ARE IN MICROFARADS OR OHMS UNLESS OTHERWISE SPECIFIED.
VOLTAGE TABLE
NOTE- MEASURE HEATER AND FILAMENT VOLTAGES DIRECTLY ACROSS SOCKET TERMINALS. ALL OTHER VOLTAGES MEASURED FROM SOCKET TERMINAL TO GROUND WITH A 1000 OHM/VOLT VOLTMETER WITH BANDSWITCH IN SHORT WAVE POSITION. (#) HEATERS 6.3 VOLTS A.C. MEASURE CATHODES ON 30 V. SCALE- ALL OTHERS ON 600 V. LINE VOLTAGE 117 V. A.C. 94 WATTS.
6J5
6SK7
6SA7
6L6G
6SN7GT
6L6G
5U4G
FRONT
TUNING EYE SOCKET BACK VIEW
FIGURE 4

PARTS LIST

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil assembly, r-f, two band	360238G1
2	Coil assembly, oscillator, two band	360239G1
3	Coil assembly, 10 kc filter	360240G1
4	Transformer, first i-f	360266G1
5	Transformer, second i-f	360267G1
6	Capacitor, variable, two-gang tuning	260053G1
7	Capacitor, variable, 10 kc trimmer	250008G1
8	Capacitor, variable, 2 gang trimmer	260021G1
9	Capacitor, variable, oscillator padder	260042G2
10	Capacitor, ceramic, 50 mmf.	250088G24
11	Capacitor, molded mica, 100 mmf. ±20%	250159G98
12	Capacitor, molded mica, 100 mmf. ±10%	250159G82
13	Capacitor, molded mica, 220 mmf.	250159G100
14	Capacitor, molded mica, 330 mmf.	250159G88
15	Capacitor, molded mica, 270 mmf.	250159G87
16	Capacitor, silvered mica, 583 mmf. ±1%	250085G33
17	Capacitor, molded mica, 470 mmf.	250159G102
18	Capacitor, molded mica, 1000 mmf.	250160G82
19	Capacitor, molded mica, 1800 mmf.	250160G67
20	Capacitor, molded mica, 5100 mmf. ±2%	250161G6
21	Capacitor, paper, .003 mfd. 400 V.	250152G43
22	Capacitor, paper, .01 mfd. 600 V.	250152G38
23	Capacitor, paper, .01 mfd. 200 V.	250152G18
24	Capacitor, paper, .02 mfd. 400 V.	250152G26
25	Capacitor, molded paper, .02 mfd. 600 V.	250129G3
26	Capacitor, paper, .05 mfd. 200 V.	250152G15
27	Capacitor, paper, .1 mfd. 400 V.	250152G22
28	Capacitor, paper, .1 mfd. 200 V.	250152G13
29	Capacitor, electrolytic, 10 mfd. 450 V., 20 mfd. 25V.	270023G6
30	Capacitor, electrolytic, 10-30 mfd. 450 V.	270023G2
31	Capacitor, electrolytic, 20 mfd. 25V.	270027G2
40	Resistor, composition, 150 ohm ½ W.	230084G8
41	Resistor, composition, 220 ohm ½ W.	230084G9
42	Resistor, wire wound 125 ohm 10 W.	240021G11
43	Resistor, composition, 470 ohm ½ W.	230084G1
44	Resistor, composition, 1500 ohm ½ W.	230084G14
45	Resistor, composition, 4700 ohm ½ W.	230084G17
46	Resistor, composition, 15,000 ohm ±5% ½ W.	230084G187
47	Resistor, composition, 15,000 ohm 1 W.	230085G20
48	Resistor, composition, 22,000 ohm ½ W.	230084G21
49	Resistor, composition, 47,000 ohm ½ W.	230084G23
50	Resistor, composition, 100,000 ohm ½ W.	230084G25
51	Resistor, composition, 150,000 ohm ½ W.	230084G26
52	Resistor, composition, 220,000 ohm ±5% ½ W.	230084G215
53	Resistor, composition, 270,000 ohm ½ W.	230084G91
54	Resistor, composition, 470,000 ohm ½ W.	230084G29
55	Resistor, composition, 1 megohm ½ W.	230084G31
56	Resistor, composition, 4.7 megohm ½ W	230084G35
57	Resistor, wire wound, 10,000 ohm	240035G2
58	Resistor, composition, 15,000 ohm ½ W	230084G20
59	Resistor, composition, 1000 ohm 2 W.	230064G62
65	Control, volume, 1 megohm	220044G15
66	Control, bass, 1 megohm, with power switch	220045G2
67	Control, treble, 1 megohm, with band expander switch	220071G2
68	Transformer, power, 117 V. 50/60 cycle	300032G1
69	Switch, rotary, band selector	160156G1
70	Switch, rotary, loop to outdoor antenna	160157G1
71	Switch assembly, muting	160158G1
72	Antenna, loop assembly	*
73	Socket, external input	180060G1
74	Socket, phonograph input	189741G1
75	Socket, phonograph motor	180501G5
76	Socket, speaker	180393G3
77	Socket, FM power	180422G1
78	Socket & Cable assembly, tuning indicator	180423G1
	Dial glass assembly	150283G1

*The part number of the loop antenna assembly changes with different cabinets. It is therefore important that you specify the *Style Number* of the instrument when ordering a replacement loop antenna assembly.

Model 9030 Radio-Phonograph

GENERAL FEATURES

The Model 9030 is a combination designed for the reception of radio broadc programs and reproduction of phonograph records, television or other external sound. The combination includes: (1) radio-phono chassis, (2) record changer, and (3) high fidelity loudspeaker.

TECHNICAL DATA

Power Input

100 watts at 117 volts, 50-60 cycles. (Phono motor 60 cycles, 25 watts additiona

Tube Complement

Seven including one rectifier: (1) 6BE6 osc. converter, (1) 6BA6 I.F. amplifier, (1) 6SQ7 detector 1st audio, (1) 6SN7 phase splitter, (2) 6V6 power amplifier, (1) 5Y3GT rectifier.

Tuning Range

AM - 540 - 1600 kc

Speaker

10 inch high fidelity PM type.

Controls

Five - station selector, function switch, on-off bass control, volume control,treble control.

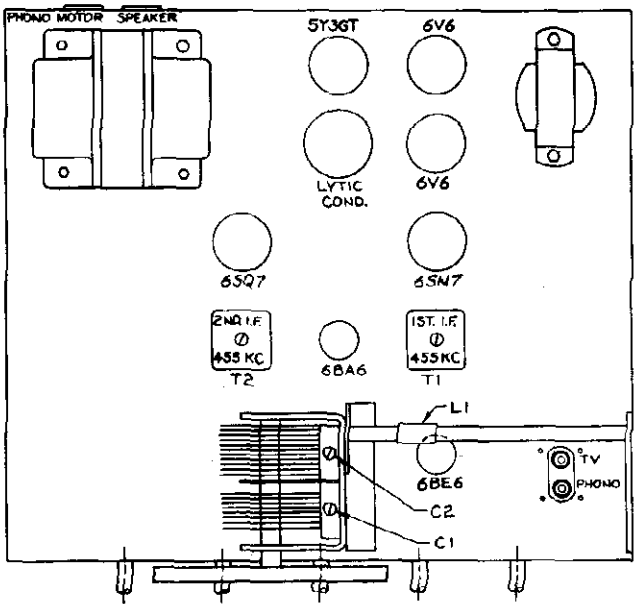


FIG. 1 ALIGNMENT ADJUSTMENT LOCATIONS AND TUBE LAYOUT

INSTALLATION

The Model 9030 Radio-Phonograph comes complete with all equipment insta and ready for operation after taking the following precautions:

1. Remove any packing material which may be used to hold the tubes in pla

2. Remove any tape or rubber bands which may be holding the pickup arm a accessories in place.

3. Insert the a.c. line plug into convenient electrical outlet.

MODEL 9030
Station Selector

OPERATION OF CONTROLS

The large center knob adjusts the receiver to the desired station. The dial pointer follows the rotation of the knob and indicates the frequency to which the receiver is tuned. Assigned frequencies of AM broadcast stations are on the radio page of your newspaper.

Volume Control

The knob directly to the left of the large station selector knob adjusts the volume of sound. Turn clockwise to increase volume and counter-clockwise to decrease volume. The control is designed to give smooth and gradual control of sound volume.

Function Switch

The knob directly to the right of the large station selector knob adjusts for the various functions desired. As indicated on the front escutcheon panel the positions are AM, TV and Phono. Turn to desired position.

Treble Control

The second knob to the left of the station selector controls the amount of high audio tones to be reproduced. Turn clockwise to increase high tones or counter-clockwise to decrease high tones. Set for individual preference.

Off-On Bass Control

This knob is the second knob to the right of the station selector. This control regulates the amount of low frequency or "Bass" response to be reproduced. Turn clockwise to increase Bass response and counter-clockwise to decrease. Set for individual preference.

TUNING THE RECEIVER

To receive broadcast station programs proceed as follows:

1. Turn the knob marked "Off-On Bass" clockwise about half way. The dial will illuminate indicating that the receiver is connected to the power source. Allow about thirty seconds as warm-up time for tubes.

2. Turn the function switch to AM position.

3. Turn the large station selector knob to a dial number of a local station.

4. Turn the volume control clockwise slowly to the desired level. Re-adjust the station selector knob until reception is clearest.

5. Adjust the "Bass" and "Treble" controls until the reproduction is most pleasing.

For phonograph or TV sound operation turn the function knob to the desired position and use Volume, Bass & Treble controls as described.

FUSE REPLACEMENT

A fuse is provided for the protection of the receiver against excessive powe line voltages or failure of any component which would cause heavy current drain and fire hazard. CAUTION: Always replace the defective fuse with one of the same rating. If the fuse continues to blow after replacement, remove the receiv chassis for examination and service by qualified personnel. The fuse is accessi at the rear panel of the chassis.

A license and rating label located on the cabinet wall gives the tube socket locations. Consult this chart when testing or replacing tubes.

I.F. Alignment - 455 kc

1. Connect suitable output meter with 8 ohm shunt load across speaker *terminals located on rear of chassis.*

2. Connect signal generator "hot side" through a .01 mfd. paper condenser to pin 7 on the 6BE6 socket. Connect generator ground to receiver chassis. Bas Treble and Volume in maximum position.

3. Set signal generator to 455 kc and receiver dial to 1600 kc. Adjust T2 To and Bottom Cores for maximum output. Adjust T1 Top and Bottom Cores for ma mum output. Always keep generator output at low level to assure sharp tuning of the cores. Repeat procedure until no increase in output is noted.

VOLTAGE CHART

Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin
6BE6	-15	0	A.C. 6.3	0	140	140	0	--
6BA6	.3	0	A.C. 6.3	0	130	140	1.6	--
6SQ7	0	-1	0	-5	-5	70	0	A.C 6.3
6SN7	0	80	3	22	120	30	0	A.C 6.3
6V6	0	0	230	240	6	30	A.C. 6.3	13
6V6	0	0	230	240	1.7	120	A.C. 6.3	13
5Y3GT	270	--	A.C. 280	--	A.C. 280	--	270	--

All voltages taken with Voltohmyst or equivalent VTVM between indicated pin a chassis frame. Unless indicated, voltages are d.c. and positive in respect to chassis.

MODEL 9030

Line voltage - 117V a.c.

Selector switch in AM position with no signal input.

R.F. Alignment

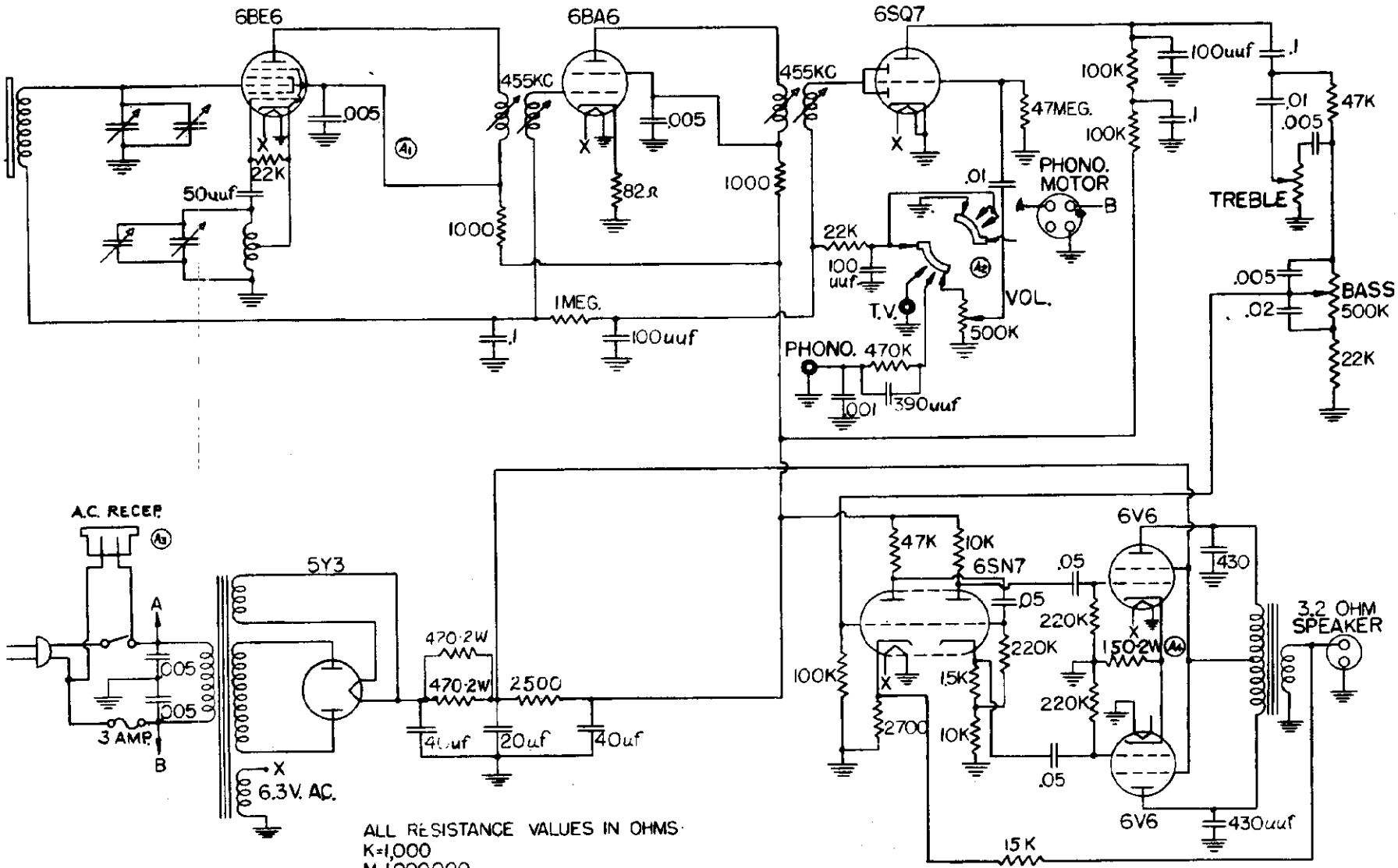
1. Connect signal generator "hot side" loosely to the loop antenna coil. (Clipping to the sleeving about 1/4" from coil winding gives adequate coupling.) Output meter connections remain the same as for I.F. alignment. Bass, Treble and Volume controls in maximum positions.

2. Set signal generator and receiver dial to 1600 kc. Adjust C1 trimmer on tuning gang for maximum output.

3. Set signal generator and receiver dial to 600 kc. Remove tape from Ferrite Rod coil L1 and slide to a position giving maximum output. Secure coil with tape after adjustment.

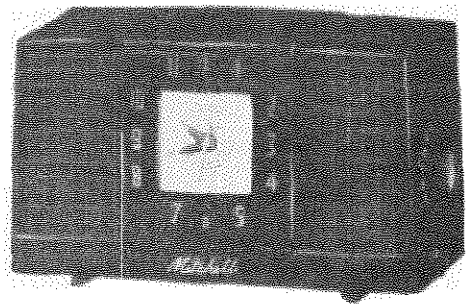
4. Set signal generator and receiver dial to 1400 kc. Adjust C2 trimmer on tuning gang for maximum output. Repeat steps 3 & 4 until uniform sensitivity is obtained across the entire tuning range.

PART NO.	DESCRIPTION
ALA-10032A	Antenna Ferrite Rod
CC-15500	50MMF 500V. Ceramic Condenser
CM-15680	68MMF 500V. Ceramic Condenser
CC-15101	100MMF 500V. Ceramic Condenser
CCX-10005	2 X 100MMF 500V. Condenser Ceramic
CL-10075	Electrolytic Condenser 40-20-40-450V
CM-15391	Mica Cap. 390MMF 500V
CM-15430	Mica Cap. 430MMF 500V
CMX-10002	Herlic .005MFD 500V Condenser
CVB-10028	Cond. Variable 2 Gang AM
DB-10000	Lamp-6-8V .150 Amp.
DD-10015	Idler Pulley Shaft
DD-10016	Dial Shaft Collar
DDA-10017	Shaft-Dial Drive
DI-10012	Dial Pointer
DM-10002	Dial Cord Tension Spring
DP-10015	Dial Idler Pulley
DSB-10119	Dial Glass With Calibration
FA-10000	Fuse-3 Amp. 3 AG
KA-10131	Knob-Brown-Red Arrow
KA-10132	Knob-#3000-Brown
RX-10030	Wire Wound Resistor-2500 Ohm 10 Watt
TOB-10059	Output Transformer
TP-10021	Power Transformer
TRC-10026	AM-Oscillator Coil
TSA-10058	IF-AM Coil
VCA-11110	Pot. Volume .5 Meg.
VCA-11111	Pot. Treble .5 Meg.
VCA-11112	Pot. Bass Off & On .5 Meg.
VSA-10021A	Switch Selector
6BE6	Tube
6BA6	Tube
6SQ7	Tube
6V6	Tube
5Y3	Tube



ALL RESISTANCE VALUES IN OHMS
K=1,000
M=1,000,000
ALL RESISTORS ARE ½ WATT UNLESS OTHERWISE SPECIFIED.
ALL CAPACITANCE VALUES LESS THAN ONE, IN MICROFARADS
AND GREATER THAN ONE IN MICROMICROFARADS UNLESS

MECK PAGE
MODEL 9



CONNECTING THE SET

POWER SUPPLY. This receiver is designed to operate on an alternating current supply (AC) ranging from 110 to 120 volts, 60 Cycles only. *Do Not Operate on Direct Current.*

Before connecting the set be sure that your house is wired for the voltage and current for which the set is designed. If in doubt, call your local power company for the necessary information. Connecting the set to a supply outlet furnishing the wrong type of current will result in improper operation or damage.

ANTENNA. This receiver has a built-in "loop" aerial. Its excellent design is such as to increase pick-up from stations having wide variations in signal strength. The efficiency and selectivity of the loop provide outstanding reception without the use of an external aerial.

TUBES. Four tubes (including rectifier) are used. Type numbers and locations are shown in the tube location diagram on the cabinet back.

GROUND. No ground connection should be used when operating this receiver. The receiver gets its ground connection through the power line and any external connection to the chassis may cause a short circuit and consequent damage.

CAUTION. Do not place receiver on hot objects such as stoves, radiators, etc. Heat will damage the cabinet and the internal components of the receiver.=

RADIO OPERATION

USE AUTO-OFF-ON SWITCH KNOB At 9 o'clock position on clock face. Turn this knob to the right (clockwise), so that the indicator points to "ON", to turn on the radio. To turn off the radio, turn this knob so that the indicator points to "OFF".

VOLUME CONTROL KNOB (Bottom Knob on Side of Cabinet). This knob controls the volume of the signal received. To reduce the volume, rotate this knob to the left (counter-clockwise). When this knob is rotated to the right it will increase the volume.

STATION SELECTOR KNOB (Large Knob on Side of Cabinet). Rotate this knob over a narrow range of the dial where the desired station is located, until the station is received with a maximum volume and clarity. Then readjust the volume control to the proper level. **NEVER** use the station selector knob to adjust the volume as this will result in the signal being received with distorted tone quality.

The dial scale is calibrated in Kilocycles with the last zero of the actual frequency omitted. For instance, the numeral 55 on the scale indicates 550 Kilocycles and 160 indicates 1600

SETTING OF CLOCK

This clock-radio is equipped with a self-starting clock. As soon as the power plug is inserted into the wall outlet, the sweep second hand will begin to operate.

To set the time hands, rotate the time set knob located at the rear of cabinet. Once the clock is set, it needs no further attention unless you remove the plug or there is a power interruption.

INSTRUCTIONS FOR USE OF CLOCK WITH RADIO OR EXTERNAL APPLIANCE

By carefully following the instructions illustrated below, the clock may be used to perform any of the following functions:

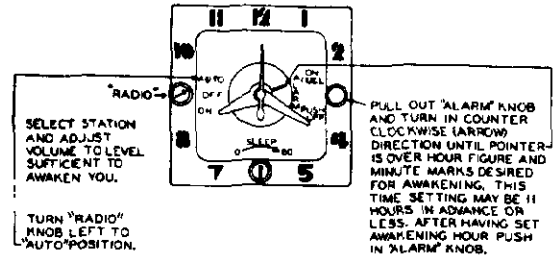


ILLUSTRATION 1

TO AWAKEN TO MUSIC

ILLUSTRATION 2

TO AWAKEN TO BUZZER ALARM

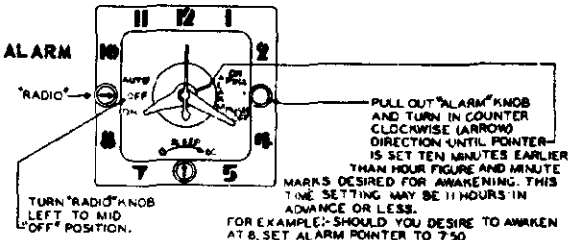


ILLUSTRATION 3

TO AWAKEN TO MUSIC AND BUZZER ALARM

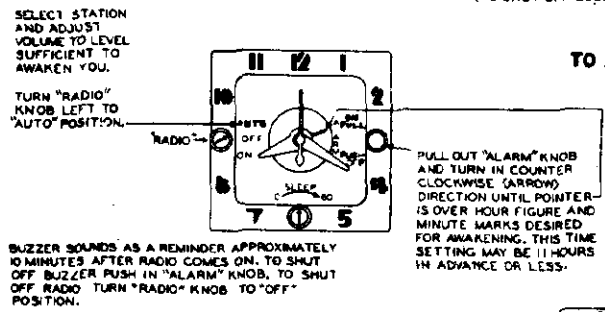
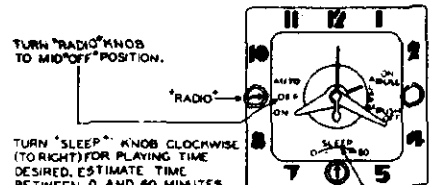
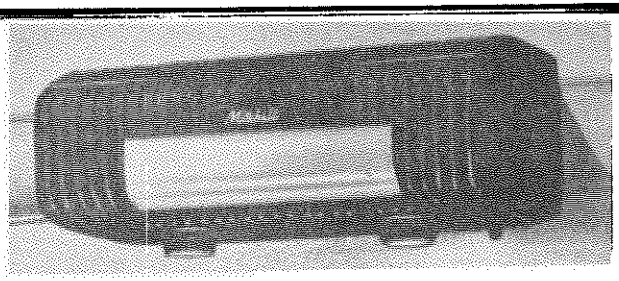


ILLUSTRATION 4

TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING





Model No. 1261 Mahogany
Model No. 1262 Ivory

This Bed Lamp-Radio incorporates the latest developments and refinements devised by radio engineers. In order to realize the advantages to the fullest, you must thoroughly understand its operation and use. PLEASE READ INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO USE RECEIVER.

CONNECTING THE SET

MOUNTING OF RECEIVER. Hardware for mounting this Bed Lamp-Radio is included in an envelope packed with this receiver. Instructions printed on this envelope should be followed for best results.

POWER SUPPLY. This receiver is designed to operate on any alternating current supply (AC) ranging from 110 to 120 volts, 50 to 60 cycles: or on any direct current supply (DC) ranging from 110 to 120 volts.

SPECIAL INSTRUCTIONS FOR DC OPERATION. When operating from a DC (direct current) power supply, it may be necessary to reverse the power cord plug in the wall socket before the receiver will function.

ANTENNA. This receiver has a built-in "loop" aerial. Its excellent design is such as to increase pick-up from stations having wide variations in signal strength. The efficiency and selectivity of the loop provide outstanding reception without the use of an external aerial.

GROUND. No ground connection should be used when operating this receiver. The receiver gets its ground connection through the power line and any external connection to the chassis may cause a short circuit and consequent dam-

CONTROLS AND OPERATION

RIGHT HAND KNOB. (Volume Control and "On-Off" Switch). Turn knob to the extreme right, wait for tubes to become heated, then adjust volume as desired.

LEFT HAND KNOB. (Station Selector). Rotate knob until desired station is received with maximum volume; then readjust volume to desired level. Never use the station selector to adjust volume as this practice results in distorted tone quality and deficient bass response.

LAMP SWITCH. (Small knob near base of receiver). Turn knob to right to turn on lamp. Turning knob again to right will turn off lamp. Lamp operates independently of radio.

TUNING RANGE

This receiver is designed to operate over the standard broadcast band which extends from 540 to 1600 Kilocycles (KC).

DIAL CALIBRATION. The scale is calibrated from 55 to 160 (Standard Broadcast). This band covers all Standard Broadcast frequencies of the United States, Canada, Mexico, Cuba and many Central and South American Countries. Add a zero to figures on the scale to obtain kilocycles.

TUBE AND LAMP DATA

TUBES. Five tubes (including rectifier) are used. Type numbers and locations are shown in the tube location diagram on the cabinet. If tubes are removed for test purposes, make certain each tube is replaced in its proper socket. Failure to replace tubes in their proper sockets may result in damage to the tube, or to the receiver, or both.

LAMP. This receiver uses a show case lamp of 120 volts, 25 watts with medium screw base. The lamp is accessible for replacement after removing shade. (Never use a lamp larger than 25 watts).

SHADE REMOVAL. Place thumbs at outside top edges of shade and pull down slowly until shade snaps out of upper slot.

SHADE REPLACEMENT. Insert shade into bottom slot and with fingers of both hands spaced along top edge of

MODELS 1261, 1262, The Lullaby

CARE MUST BE TAKEN NOT TO BOW SHADE MORE THAN NECESSARY.

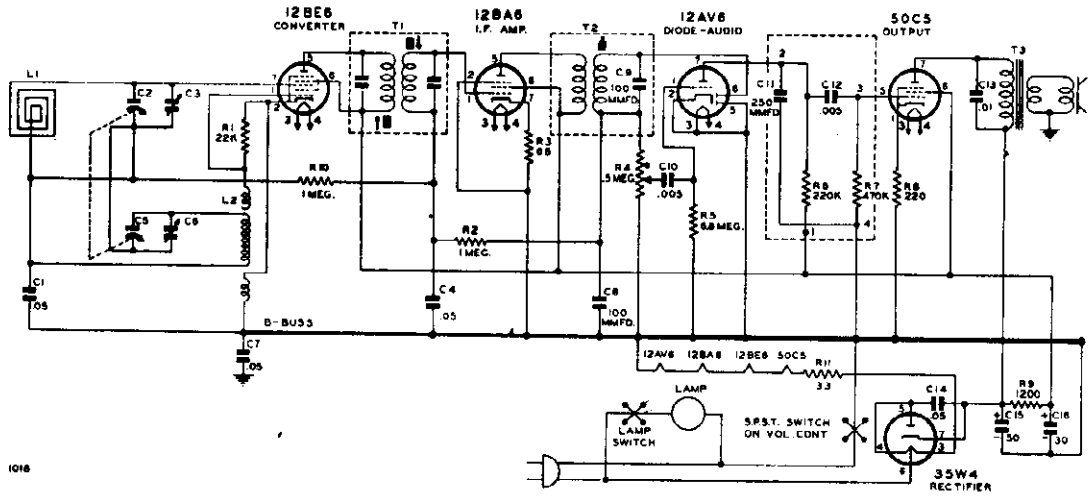
SERVICE DATA

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

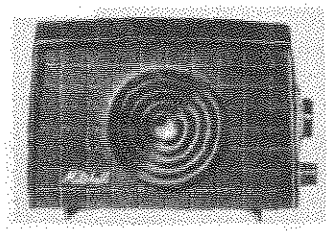
STEP NO.	POSITION OF GANG	SIGNAL GENERATOR FREQUENCY	GENERATOR CONNECTION	DUMMY ANTENNA	ADJUSTMENT	TYPE OF ADJUSTMENT
1.	Open	455 KC.	Rear Gang Terminal	.1 Mfd.	I.F. Slugs	Adjust for Maximum Output
2.	Open	1620 KC.	Dummy Antenna	2 Turns of Hookup Wire 2" in Dia. (Place Approx. a Foot from & parallel to loop.)	Front Gang Trimmer	Adjust for Maximum Output
3.	1400 KC.	1400 KC.			Rear Gang Trimmer	Adjust for Maximum Output
4.	600 KC.	600 KC.				Check Gang Alignment



REP. NO.	PART NO.	DESCRIPTION
C1,C4,C7	N-1345	Condenser, Paper .05 MFD. 200 V.
C2,C5	N-8801	Condenser, Gang Tuning
C3,C6	--	Trimmers on Gang Condenser
C8	N-6015	Condenser, Ceramic 100 MMFD. 500 V. 20%
C9	Part of	N-8796 2nd I.F. Coil
C10,*C12	N-4894	Condenser, Paper .005 MFD. 600 V.
*C11	N-6488	Condenser, Ceramic 250 MMFD. 500 V.
C13	N-1344	Condenser, Paper .01 MFD. 400 V.
C14	N-1346	Condenser, Paper .05 MFD. 400 V.
C15) C16)	N-8873	Electrolytic (50 MFD. 150 V.) (30 MFD. 150 V.)
R1	N-4025	Resistor 22,000 Ohms 1/2 Watt 20%
R2,R10	N-1262	Resistor 1.0 Megohm 1/2 Watt 20%
R3	N-6485	Resistor 68 Ohms 1/2 Watt 10%

REP. NO.	PART NO.	DESCRIPTION
R4	N-7890	Volume Control with switch 0.5 Megohm
R5	N-4028	Resistor 6.8 Megohms 1/2 Watt 20%
*R6	N-4026	Resistor 220,000 Ohms 1/2 Watt 20%
*R7	N-4027	Resistor 470,000 Ohms 1/2 Watt 20%
R8	N-4024	Resistor 220 Ohms 1/2 Watt 10%
R9	N-4900	Resistor 1200 Ohms 1.0 Watt 10%
R11	N-4068	Resistor 33 Ohms 1.0 Watt 20%
	N-8247	Speaker, 3½" P.M.
L1	N-8795	Loop Coil
L2	N-8797	Oscillator Coil
T1	N-7981	1st I.F. Transformer
T2	N-8796	2nd I.F. Transformer
T3	N-7899	Output Transformer

* Some sets were produced with an Audio Couplate, part number N-8215, to replace resistors (illus. No. R6 and R7) and Condensers (illus. No. C11 and C12).



MODEL NO. 1258 RED
MODEL NO. 1259 WHITE
MODEL NO. 1266 GREEN

CONNECTING THE SET

Before connecting the set, be sure that your home is wired for the voltage and current for which the set is designed. If in doubt, call your local power company for the necessary information. Connecting the set to a supply outlet furnishing the wrong type of current will result in improper operation or damage.

POWER SUPPLY. This receiver is designed to operate on any alternating current supply (AC) ranging from 110 to 120 volts, 50 to 60 cycles; or on any direct current supply (DC) ranging from 110 to 120 volts.

SPECIAL INSTRUCTIONS FOR DC OPERATION. When operating from a DC (direct current) power supply, it may be necessary to reverse the power cord plug in the wall socket before the receiver will function, due to the polarity condition of a direct current supply. If the receiver fails to perform after being turned on one minute, simply reverse the power plug.

TUBES. Four tubes (including rectifier) are used. Type numbers and locations are shown in the tube location diagram on the cabinet back.

ANTENNA. This receiver has a built-in "loop" aerial. Its excellent design is such as to increase pick-up from stations having wide variations in signal strength. The efficiency and selectivity of the loop provide outstanding reception without the use of an external aerial. The "loop" aerial used on this receiver is somewhat directional so reception from weak stations can be improved by turning the set in the proper direction.

GROUND. No ground connection should be used when operating this receiver. The receiver gets its ground connection through the power line and any external connection to the chassis may cause a short circuit and consequent damage.

CONTROLS AND OPERATION

BOTTOM KNOB. (Manual Volume Control and "On-Off" Switch). Turn this knob to the extreme right. Wait about a minute for the tubes to become heated. When signal comes in adjust volume as desired.

TOP KNOB. (Station Selector) Move the knob over a narrow range of the dial at a point where the desired station is located, until the station is received with maximum volume; then readjust the volume control to the proper level. Never use the station selector to adjust volume as this practice results in distorted tone quality and deficient bass response. The Volume Control only is to be used for this purpose. For maximum clarity the indicator should be adjusted to the center of the area covered by the station being tuned.

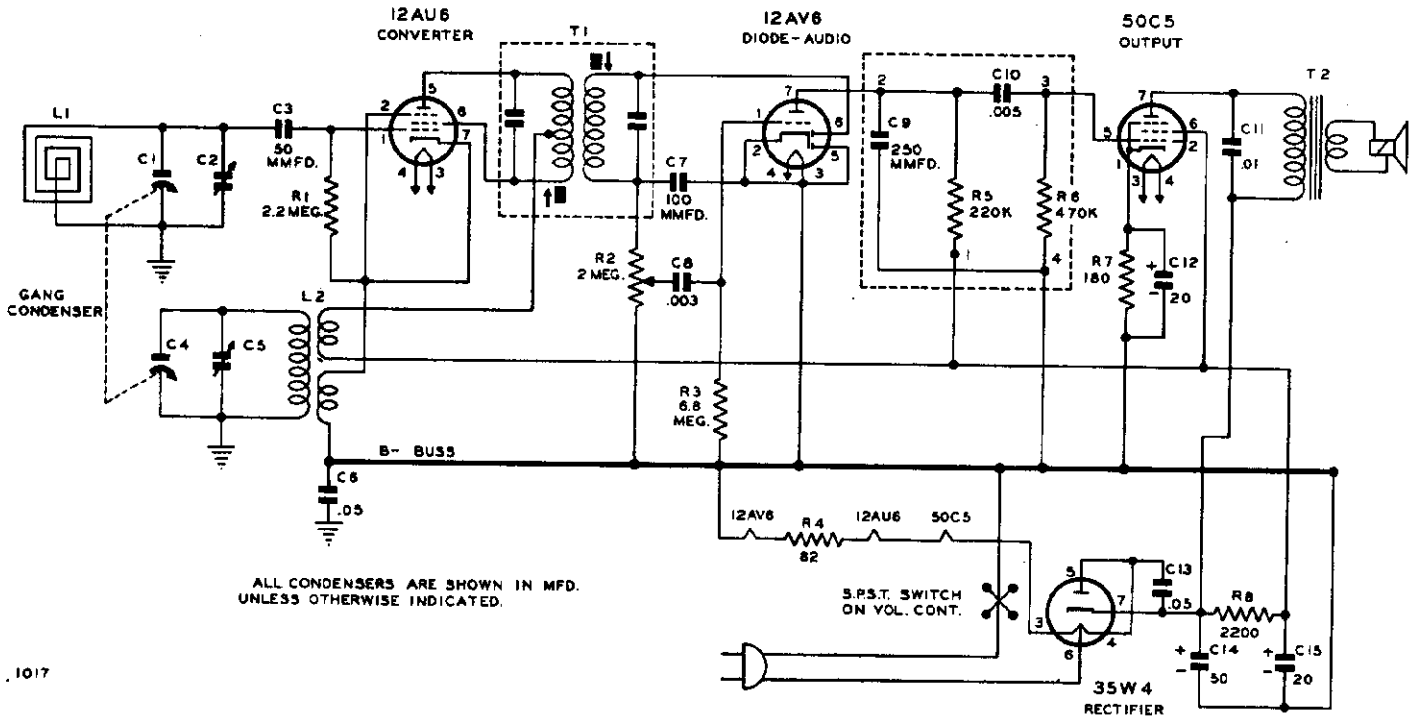
TUNING RANGE

This receiver is designed to operate over the standard broadcast band which extends from 540 to 1600 Kilocycles (KC).

DIAL CALIBRATION. The scale is calibrated from 55 to 160 (Standard Broadcast). This band covers all Standard Broadcast frequencies of the United States, Canada, Mexico, Cuba and many Central and South American Countries. Add a zero to figures on the scale to obtain kilocycles.

ALIGNMENT PROCEDURE

STEP NO.	POSITION OF GANG	SIGNAL GENERATOR FREQUENCY	GENERATOR CONNECTION	DUMMY ANTENNA	ADJUSTMENT	TYPE OF ADJUSTMENT
1.	Open	455 KC.	Rear Gang Terminal	1 Mfd.	I.F. Slugs	Adjust for Maximum Output
2.	Open	1620 KC.	Dummy Antenna	2 Turns of Hookup Wire 6" in Dia. (Place Approx. a foot from & parallel to loop.)	Front Gang Trimmer	Adjust for Maximum Output
3.	1400 KC.	1400 KC.			Rear Gang Trimmer	Adjust for Maximum Output
4.	600 KC.	600 KC.				Check Gang Alignment



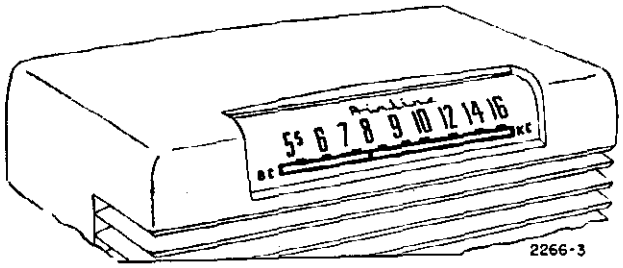
PARTS LIST

C1	N-6385	Capacitor - Ceramic	50 MMFD. 500 Volts	10%
C2,C5	N-8675	Gang Tuning Condenser		
C4	N-1345	Capacitor - Paper	.05 MFD. 200 Volts	
C7	N-2063	Capacitor - Paper	.003 MFD. 600 Volts	
C8	N-6015	Capacitor - Ceramic	100 MMFD. 500 Volts	
*C9	N-6488	Capacitor - Ceramic	250 MMFD. 500 Volts	
*C10	N-4894	Capacitor - Paper	.005 MFD. 600 Volts	
C11	N-1344	Capacitor - Paper	.01 MFD. 400 Volts	
C12	N-1346	Capacitor - Paper	.05 MFD. 400 Volts	
C13)			(20 MFD. 15 Volts)	
C14)	N-8677	Capacitor - Electrolytic	(50 MFD. 150 Volts)	
C15)			(20 MFD. 150 Volts)	

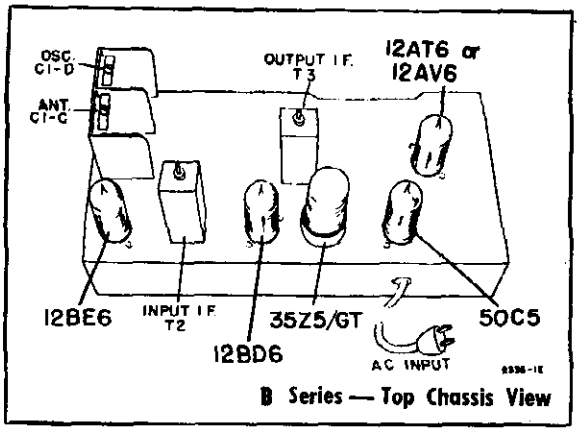
R1	N-4277	Resistor - 2.2 Megohm - 1/2 Watt	- 20%
R2	N-7142	Volume Control 2.0 Megohm	
R3	N-4028	Resistor - 6.8 Megohm - 1/2 Watt	- 20%
R4	N-4023	Resistor 82 82 Ohms - 2.0 Watts	- 10%
*R5	N-4026	Resistor - 220,000 Ohms - 1/2 Watt	- 20%
*R6	N-4027	Resistor - 470,000 Ohms - 1/2 Watt	- 20%
R7	N-4067	Resistor - 180 Ohms - 1/2 Watt	- 10%
R8	N-4896	Resistor - 2,200 Ohms - 1/2 Watt	- 10%
T1	N-7694	Coil - 1st, I.F.	
L1	N-8832	Coil - Loop Antenna	
L2	N-8681	Coil - Oscillator	
	N-7824	Speaker - 4" PM with Transformer	

* The resistors (R5 and R6) and condensers (C9 and C10) are replaced by N-8215 Couplate.

MODELS 05BR-1525B, C, -1526B
05BR-1531B, C, 05BR-1532B, C



Cabinet View

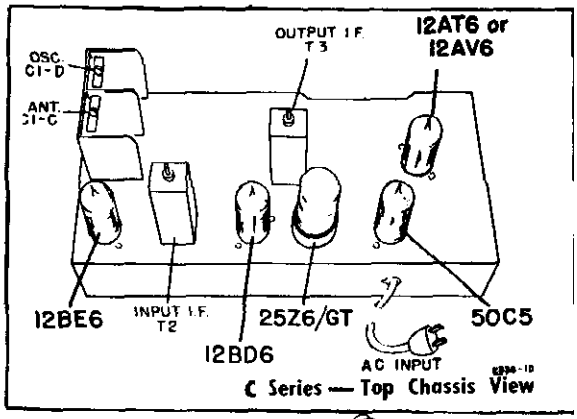


B Series — Top Chassis View

GENERAL DESCRIPTION

The above mentioned models are a 5 tube, AC, superheterodyne receiver, designed to operate on volts. The sets contain a built-in loop antenna and operate in the standard broadcast band of 540 to kilocycles.

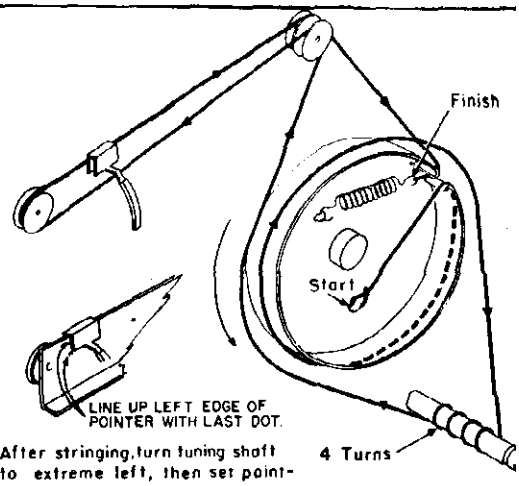
The only difference between the B and C series le at the end of each model number is the rectifier being used. The B series sets use a 35Z5 rectifier while the C series sets use a 25Z6.



C Series — Top Chassis View

SERVICE DATA

Power Supply	115 volts DC or 50-60 cycles AC, 24 watts.
Frequency Range	540 to 1600 kc.
Intermediate Freq.	455 kc.
Selectivity	At 1000 kc, 60 kc at 1000 x signal
Sensitivity	150 u.v. per meter.
Power Output	0.8 watts undistorted, 1.0 watts maximum.
Loud Speaker	4" PM., v.c. impedance, 3.2 ohms.
Tube Complement	12BE6, converter, 12BD6, IF Amplifier, 12AT6 or 12AV6, detector, AVC, audio, 50C5, Output amplifier 35Z5 or 25Z6, Rectifier



After stringing, turn tuning shaft to extreme left, then set pointer at last marker shown. Secure pointer to string with glue.

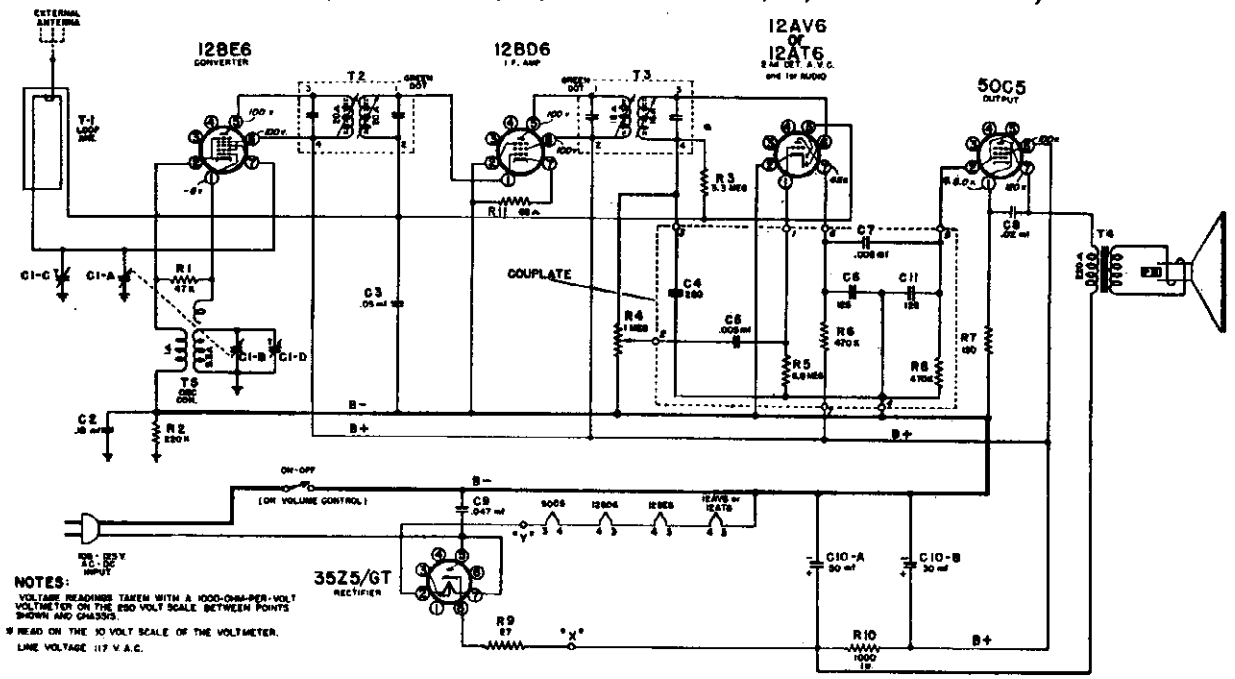
Dial Stringing Diagr

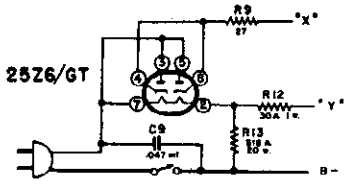
ALIGNMENT PROCEDURE

● Loop must be connected and volume set to maximum.

SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection		
455 kc.	.1 mf	12BE6, Pin 7	HEAVY BUSS LEAD ACROSS CENTER OF CHASSIS	Capacitor fully open (plates out of mesh)	Top and bottom Cores in output and input I.F. cans
1620 kc.	.1 mf	12BE6, Pin 7		Capacitor fully open (plates out of mesh)	Oscillator trimmer C1-D on gang
535 kc.	.1 mf.	12BE6, Pin 7		Capacitor fully closed	Check for adequate range
1400 kc.	———	Lay generator lead near back of cabinet		Tune in 1400 kc. signal	Antenna trimmer C-1C on gang

MODELS 05BR-1525B, C -1526B, C, 05BR-1531B, C, 05BR-1532B, C





NOTICE:
THIS MODEL USES ONE OF THE TWO RECTIFIER CIRCUITS SHOWN.

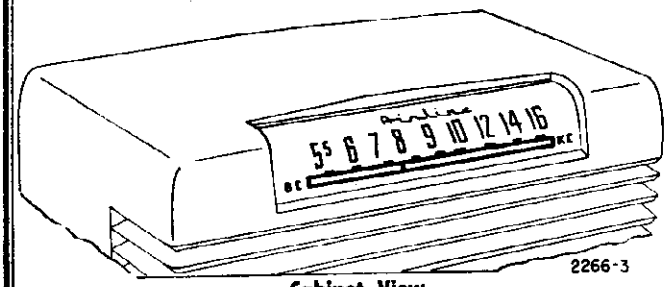
SCHEMATIC DIAGRAM

Ref. No.	Part No.	Description	Selling Price
		CAPACITORS	
C1A, B	8A-17377	2-gang condenser	1.44
C1C, D		Trimmers on gang	
C2	8D-11111	.18 mfd x 400 volts	.22
C3	8D-10770	.05 mfd x 200 volts	.14
C4-5-6-7-11, and R5-6-8	201-19303	Couplate	.54
C8	8D-17607	.02 mfd x 400 volts	.18
C9	8J-16081	.047 mfd x 400 volts	.18
C10A, B	8C-17391	Electrolytic condenser	.74
		RESISTORS	
R1	9B1-82	47K ohms, 1/2 watt, 10%	.14
R2	9B1-27	220K ohms, 1/2 watt, 20%	.14
R3	9B1-34	3.3 megohms, 1/2 watt, 20%	.14
R4	10A-19616	1 megohm, volume control and switch	.76
R5-6-8		See Couplate	
R7	9B1-52	150 ohms, 1/2 watt, 10%	.14
R9	9B1-43	27 ohms, 1/2 watt, 10%	.14
R10	9B2-62	1000 ohms, 1 watt, 10%	.20
R11	9B1-48	68 ohms, 1/2 watt, 20%	.14
R12	9C-19769	30 ohms, 1 watt, clarostat	.10
R13	9M-19602	618 ohms, 20 watts, clarostat	.66
		TRANSFORMERS AND COILS	
T1	13E-18755	Loop antenna	.76
or			
	13E-17587	Loop antenna	.52
T2	13B-17397	Input I. F. transformer	.88
T3	13B-17399	Output I. F. transformer	..82
T4	12C-19302	Output transformer	.60
or			
	12C-17595	Output transformer	.60
T5	13D-17583	Oscillator coil	.42

Ref. No.	Part No.	Description	Selling Price
		DIAL PARTS	
	3A-17590	Tuning shaft	.12
	40A-17591	Bushing	.02
	29E-17592	Spring washer	.02
	43D-17609	Tinnerman clip	.02
	29C-10630	"C" washer	.02
	2G-17382	Dial pointer	.06
	6D-17389	Dial scale	.58
	3M-18614	String guide	.06
	43D-17611	Tinnerman clip (dial scale)	.02
	49A-10078	Take up spring	.02
	2M-17585	Dial cross bar	.10
		MISCELLANEOUS	
	5C-17534-36	Cabinet (walnut)	1.98
	5C-17534-77	Cabinet (green)	2.96
	5C-17534-22	Cabinet (red)	2.94
	5C-17534-9	Cabinet (ivory)	2.26
	5B-10011-8	Knob (ivory), for green, red or ivory cabinets	.12
	5B-10011-37	Knob (walnut)	.12
	18A-17579	Speaker, 4" P.M.	1.98
	15B-10440	8-prong, octal socket	.10
	15C-16007	7-prong, miniature socket	.10
	2M-17589	Tube shield base	.04
	2H-18841	Tube shield	.10
	14M-10088-4	A.C. line cord and plug	.60
	23A-10344	Line cord lock	.02
	42A-10097	Chassis mounting bolt	.02
	29A-2164	Chassis mounting washer	.02
	134-103	Chassis rubber washer	.02
	2M-17580	I. F. mounting clip	.02

IMPORTANT—All prices in this literature are subject to change without notice and are subject to an additional charge to cover any applicable sales tax, use, occupation, or other tax affecting our purchase or sale of merchandise.

MODELS 15BR-1525D, 15BR-1526
15BR-1531D, 15BR-1532D



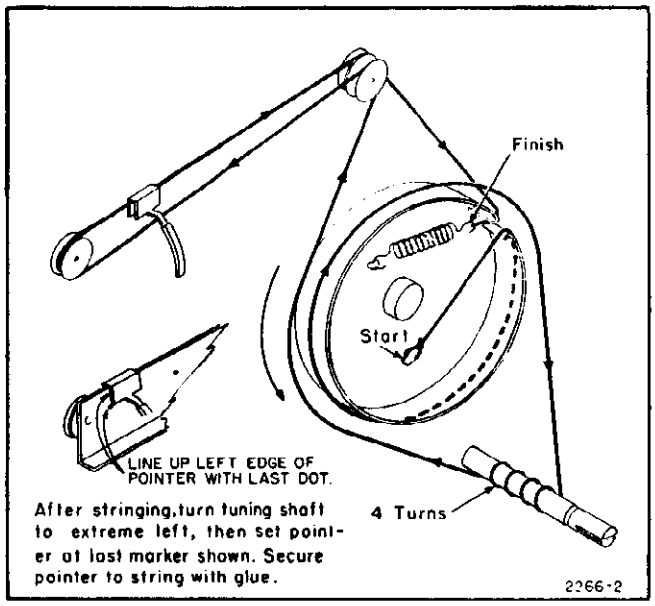
Cabinet View

SERVICE DATA

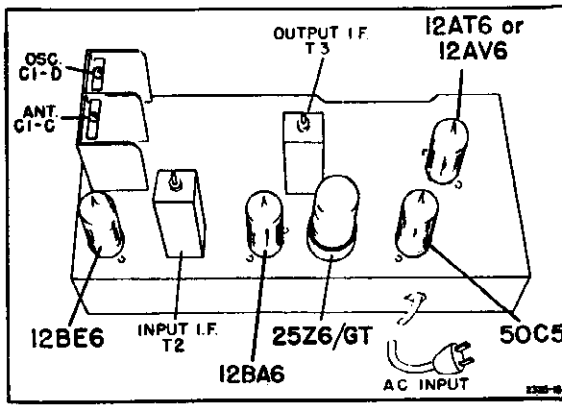
Power Supply	115 volts, DC or 50-60 cycle A 24 watts.
Frequency Range	540 to 1600 Kc.
Intermediate Freq.	455 Kc.
Selectivity	At 1000 Kc., 60 Kc. at 1000 signal
Sensitivity	150 u. v. per meter.
Power Output	0.8 watts undistorted, 1.0 wat max.
Loud Speaker	4" PM., v.c. impedance, 3.2 oh

Tube Complement

12BE6, Converter
12BA6, IF Amplifier
12AV6 or 12AT6, Detector, AVC, Audio
50C5, Audio output
25Z6, Rectifier



Dial Stringing Diagram

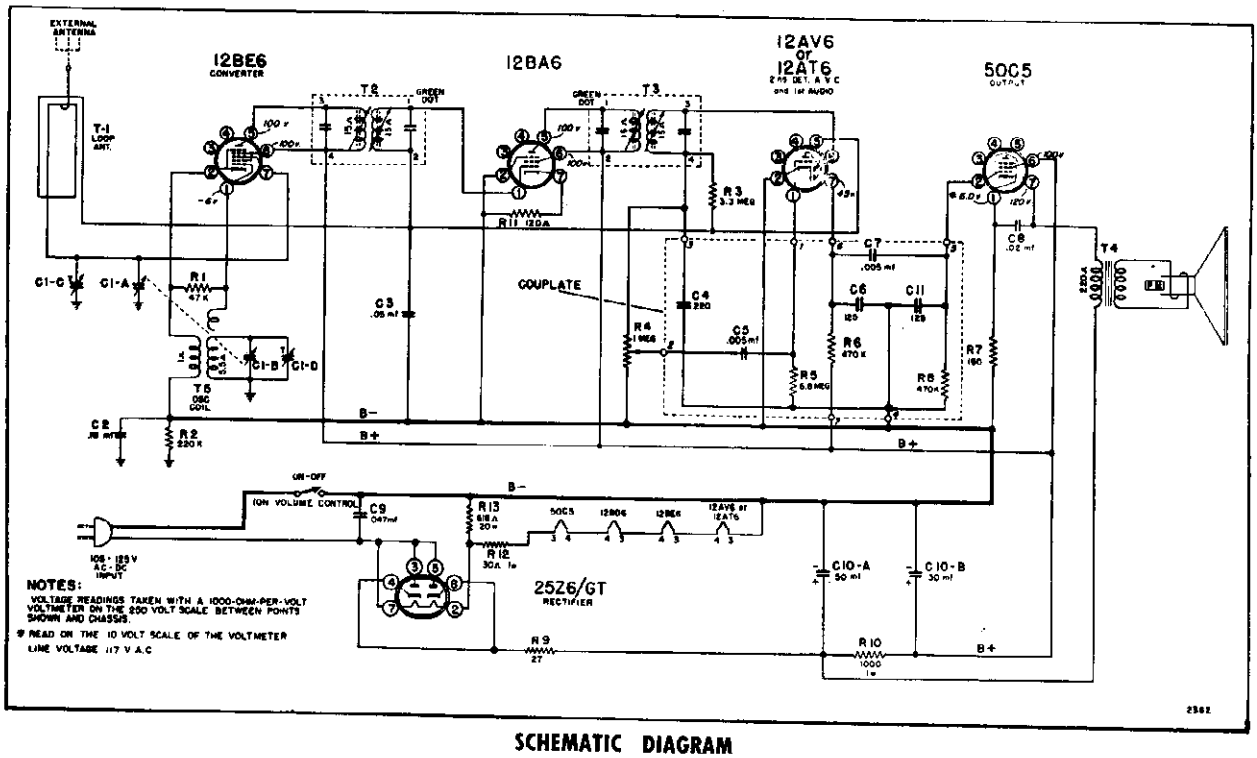


ALIGNMENT PROCEDURE

● Loop must be connected and volume set to maximum.

SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection		
455 kc.	.1 mf	12BE6, Pin 7	HEAVY BUSS LEAD ACROSS CENTER OF CHASSIS	Capacitor fully open (plates out of mesh)	Top and bottom Cores in output and input I.F. cans
1620 kc.	.1 mf	12BE6, Pin 7		Capacitor fully open (plates out of mesh)	Oscillator trimmer C1-D on gang
535 kc.	.1 mf.	12BE6, Pin 7		Capacitor fully closed	Check for adequate range
1400 kc.	_____	Lay generator lead near back of cabinet		Tune in 1400 kc. signal	Antenna trimmer C-1C on gang

MODELS 15BR-1525D, 15BR-1526D, 15BR-1531D, 15BR-1532D



SCHEMATIC DIAGRAM

PARTS LIST

Please specify part number and Model Number when ordering replacements.

Ref. No.	Part No.	Description	Selling Price
		CAPACITORS	
C1A, B	8A-17377	2-gang condenser	1.44
C1C, D		Trimmers on gang	
C2	8D-11111	.18 mfd x 400 volts	.22
C3	8D-10770	.05 mfd x 200 volts	.14
C4-5-6-7-11, and R5-6-8	201-19303	Couplate	.54
C8	8D-10774	.02 mfd x 400 volts	.14
C9	8J-16081	.047 mfd x 400 volts	.18
C10A, B	8C-17391	Electrolytic condenser	.74
		RESISTORS	
R1	9B1-82	47K ohms, 1/2 watt, 10%	.14
R2	9B1-27	220K ohms, 1/2 watt, 20%	.14
R3	9B1-34	3.3 megohms, 1/2 watt, 20%	.14
R4	10A-12540	1 megohm, volume control and switch	.64
R5-6-8		See Couplate	
R7	9B1-52	150 ohms, 1/2 watt, 10%	.14
R9	9B1-43	27 ohms, 1/2 watt, 10%	.14
R10	9B2-62	1000 ohms, 1 watt, 10%	.20
R11	9B1-51	120 ohms, 1/2 watt, 20%	.14
R12	9C-19769	30 ohms, 1 watt, clarostat	.10
R13	9M-19602	618 ohms, 20 watts, clarostat	.66
		TRANSFORMERS AND COILS	
T1	13E-18755	Loop antenna	.76
or			
	13E-17587	Loop antenna	.52
T2-3	13B-17731	I. F. transformer	.88
T4	12C-19302	Output transformer	.60
or			
	12C-17595	Output transformer	.60
T5	13D-17583	Oscillator coil	.42

Part No.	Description	Selling Price
	DIAL PARTS	
3A-17590	Tuning shaft	.12
40A-17591	Bushing	.02
29E-17592	Spring washer	.02
43D-17609	Tinnerman clip	.02
29C-10630	"C" washer	.02
2G-17382	Dial pointer	.06
6D-17389	Dial scale	.58
3M-18614	String guide	.06
43D-17611	Tinnerman clip (dial scale)	.02
49A-10078	Take up spring	.02
2M-17585	Dial cross bar	.10
	MISCELLANEOUS	
5C-17534-36	Cabinet (walnut)	1.98
5C-17534-77	Cabinet (green)	2.96
5C-17534-22	Cabinet (red)	2.94
5C-17534-9	Cabinet (ivory)	2.26
5B-10011-8	Knob (ivory), for green, red or ivory cabinets	.12
5B-10011-37	Knob (walnut)	.12
18A-17579	Speaker, 4" P.M.	1.98
15B-10440	8-prong, octal socket	.10
15C-16007	7-prong, miniature socket	.10
2M-17589	Tube shield base	.04
2H-18841	Tube shield	.10
14M-10088-4	A.C. line cord and plug	.60
23A-10344	Line cord lock	.02
42A-10097	Chassis mounting bolt	.02
29A-2164	Chassis mounting washer	.02
134-103	Chassis rubber washer	.02
2M-17580	I. F. mounting clip	.02

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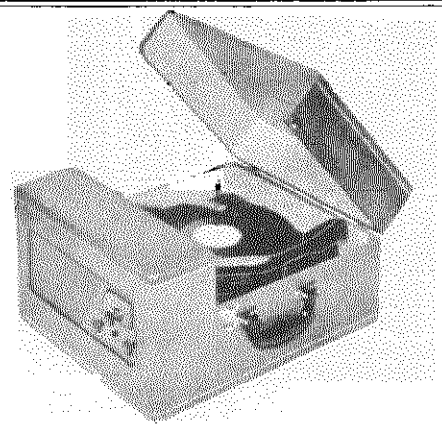


GENERAL DESCRIPTION

This is a four tube (plus rectifier) AC operated Radio or Record player. The record playing mechanism is designed to play any of the 33, 45, or 78 RPM records. Ten or twelve inch records may be intermixed provided they are of the same type.

INSTALLATION

PREPARING FOR OPERATION

Shipping Bolts: Before placing in operation, the changer must be floated freely on the mounting springs. During shipping, the mechanism is secured by means of two machine screws on either side of the base plate. These two screws are to be loosened sufficiently to allow the changer to float freely on its springs.

Location: The phonograph should be placed on a level surface convenient to an electric outlet. Do not place the phonograph near a radiator, or othe heater, since certain elements may be damaged.

Power Supply: This phonograph is designed fo operation from 105-125 volt, 60-cycle alternatin current (ac) supply only. If you are not sure o the power voltage and frequency at your home, you power company will furnish the information.

ELECTRICAL SPECIFICATIONS

Power Supply	105 to 125 volts A.C. 60 cycle. 50 watts wit record player operatin
Frequency Range	535 to 1620 KC
Intermediate Frequency	455 KC
Selectivity	40 KC broad at 1000 times signal, 1000 KC
Sensitivity	(.05 watt output with Hazeltine test loop) 350 Microvolt per meter average.
Power Output	1.1 watts max. .7 watts 10% distortion.
Loud Speaker	5" PM dynamic 1.47 oz. Alnico 5 magnet, voice coil impedance 3.2 ohm at 400 cycles
Tube Complement	1 - 12SA7 Mixer 1 - 12SK7 I.F. Amplifi 1 - 12SQ7 Det. & A.F. 1 - 50L6 Power Amp. 1 - 35Z5 Rectifier 1 - No. 47 Dial Lamp

SPECIAL INSTRUCTIONS

REMOVAL OF RADIO CHASSIS

Remove two screws holding record changer. Lift record changer and move back, tilting at the same time. Remove changer power cord and pick up lead.

Remove two wood screws holding back board. This will expose the antenna. Remove antenna plug.

Remove two wood screws holding back of chassis. Remove two nuts holding front panel. Chassis may now be removed.

ALIGNMENT PROCEDURE

The following equipment is required for aligning: A signal generator which will provide an accurately calibrated signal at the indicated test frequencies; an output indicating meter; a non-metallic screwdriver.

Radiation Loop: 2-turn loop, 6 inches in diameter.

Conditions for Alignment:

Tone - Treble

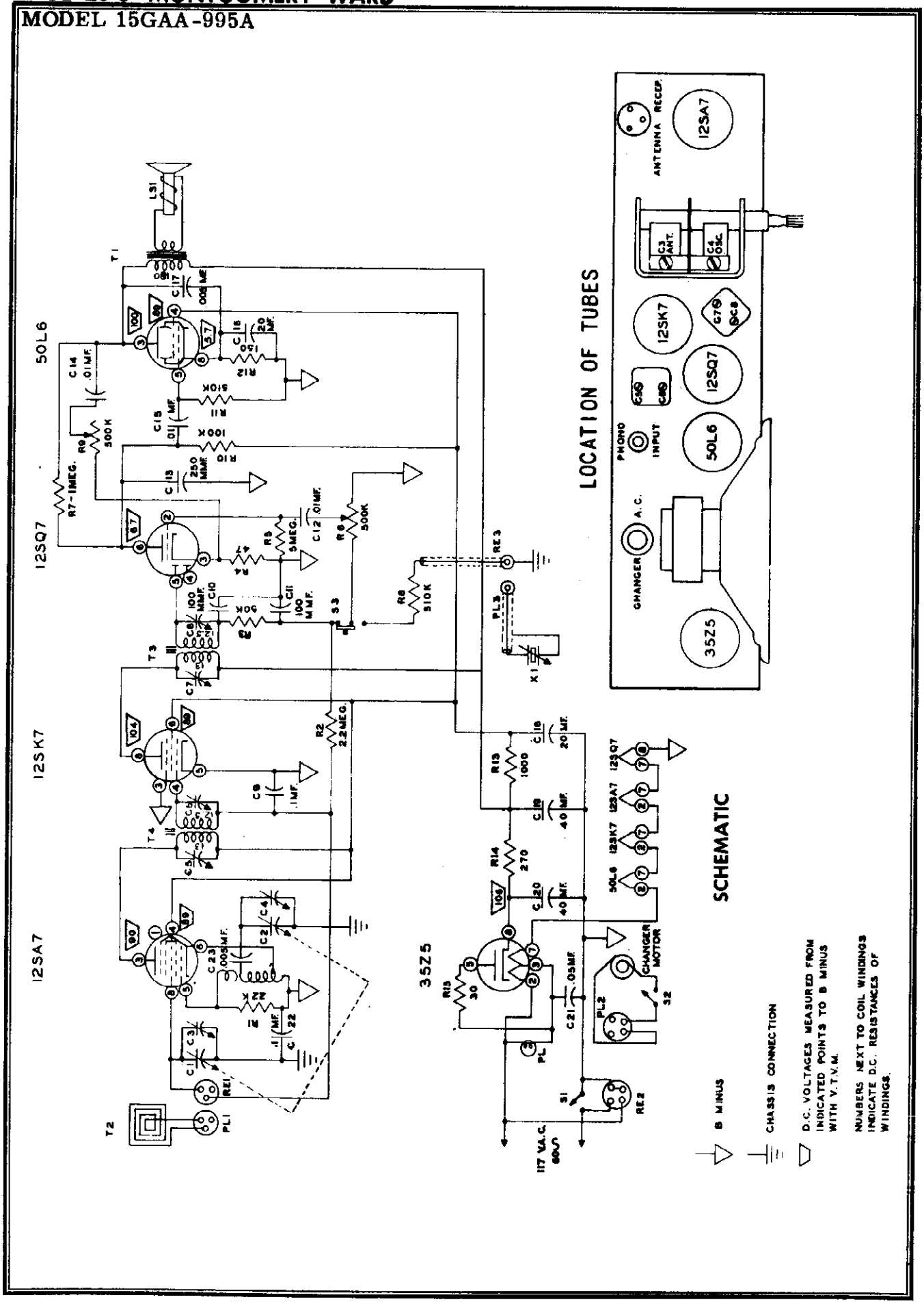
Volume - Maximum

Selector Switch - "Radio" position

Test loop coupled loosely to receiver by spacing - receiver loop in same position as it will be with chassis in cabinet.

SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	REMARKS	ADJUST FOR MAXIMUM OUTPUT
LOOP	455 KC	Low End of Band	Across Voice Coil	Short out osc. tuning gang section C-2; compress C-3	C-8, C-7, C-6, C-5
LOOP	1620 KC	High End of Band	"	Remove short across C-2	C-4
LOOP	1400 KC	Point of Maximum Output	"	Set pointer to 140 on dial	C-3
LOOP	600 KC	Point of Maximum Output	"	Knife C-1 plates for maximum output	
LOOP	1400 KC	1400	"	Recheck Alignment	C-3 if necessary

MODEL 15GAA-995A



HOW TO REPAIR ORDER PARTS

Repair Parts may be ordered from your nearest Wards Retail Store, Catalog Order Office, or Mail Order House. To have your order filled promptly and correctly, please furnish the following information:

1. MODEL NUMBER which appears on nameplate.
2. PART NUMBER AND NAME OF PART (see Repair Parts List).

PARTS LIST

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST PRICE
		RESISTORS	
R1	517	22,000 OHM ½ Watt	$ .14
R2	615	2.2 Meg OHM ½ Watt	.14
R3		See Capristors	
R4	520	47 OHM ½ Watt	.14
R5		See Capristors	
R6	401	500,000 OHM Vol. Control with Switch	1.12
R7	516	1 Meg OHM ½ Watt	.14
R8, R11	502	510,000 OHM ½ Watt	.14
R9	408	500,000 OHM Tone Control	.90
R10		See Capristors	
R12	505	150 OHM ½ Watt	.14
R13	607	1000 OHM 1 Watt	.18
R14	602	270 OHM 1 Watt	.18
R15	534	30 Ohm 1/2 W.	.14
		CAPACITORS	
C1, C2	1004A	Tuning Gang and Trimmer	4.96
C3, C4		Assembly	
C5, C6		Trimmer Condensors in	
C7, C8		I.F. Cans.	
C9, C22	804	.1 MFD. 200 V.	.28
C10, C11		See Capristors	
C12		See Capristors	
C13	817	250 MMF. Ceramic	.28
C14	825	.01 MF. Ceramic	.40
C15		See Capristors	
C17	824	.005 MF. Ceramic	.40
C18, C19	1003	40-40-20 MFD/150 Volts	2.34
C20, C16		20 MFD/25 Volts	
C21	803A	.05 400 V. Tubular	.28
		CAPRISTORS	
R3, C10	811	100 MMF. 50,000 OHM 100 MMF Dual Shunt Connection	.72
R5, C12	813	.01 MF 5 Meg OHM Common Terminal Connection	$ .5
R10, C15	814	.01 MF 100,000 OHM Common Terminal Connection	.5
		TRANSFORMERS	
T1	1201	Output Transformer	2.2
T3, T4	1402	I.F. Transformers	2.6
		MISCELLANEOUS	
S1	401	On-Off Switch on Volume Control	1.1
S2	407	Motor Switch on Changer Assembly	
S3	1892	Radio-Phono Slide Switch	.3
PL1	307A	Loop Antenna Plug	.3
PL2	307	Changer A.C. Plug	.3
PL3	305	Pickup Plug	.2
RE1	106A	Loop Antenna Receptacle	.3
RE2	106	Changer A.C. Receptacle	.3
RE3	104	Pickup Receptacle	.2
X1	2534	Pickup Cartridge EV-334	6.6
	62-349	.0023 Needle	1.4
V2503BZ		Tone Arm less Cartridge	1.6
V-2917		Strengthener and Bracket Assembly	.6
LS1 - T1	2607	5" Speaker and Output Transformer	6.
	2411	Knob	.3
T2	1512	Loop Antenna	2.3
	1736A	Dial Pointer	.2
	2307	Dial Bezel	.3
	2146	Front Panel	2.3
	1722C	Dial	.6

IMPORTANT - All prices in this literature are subject to change without notice and are subject to an additional charge to cover any applicable sales tax, use, occupation, or other tax affecting our purchase or sale of merchandise.

MODEL 15GHM-1070A

ELECTRICAL SPECIFICATIONS

POWER SUPPLY: 105-125 Volts AC or DC and #33 Battery

FREQUENCY RANGE: 540 to 1640 KC

INTERMEDIATE FREQUENCY: 455 KC

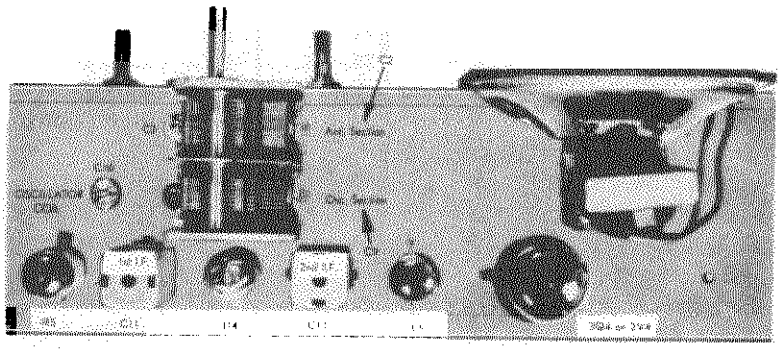
SENSITIVITY (For .05 Watt Output)
175 Microvolts per Meter

POWER OUTPUT: .190 Watt 10% Distortion

TUBE COMPLEMENT:
1—1R5 Converter
1—1T4 I.F. Amplifier
1—1U5 Det. Avc. 1st AF.
1—3V4 or 3Q4 Power Amplifier

LOUD SPEAKER: 4" PM Dynamic 3.2 VoiceCoil Impedance

TUBE AND TRIMMER CONDENSER LAYOUT



ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

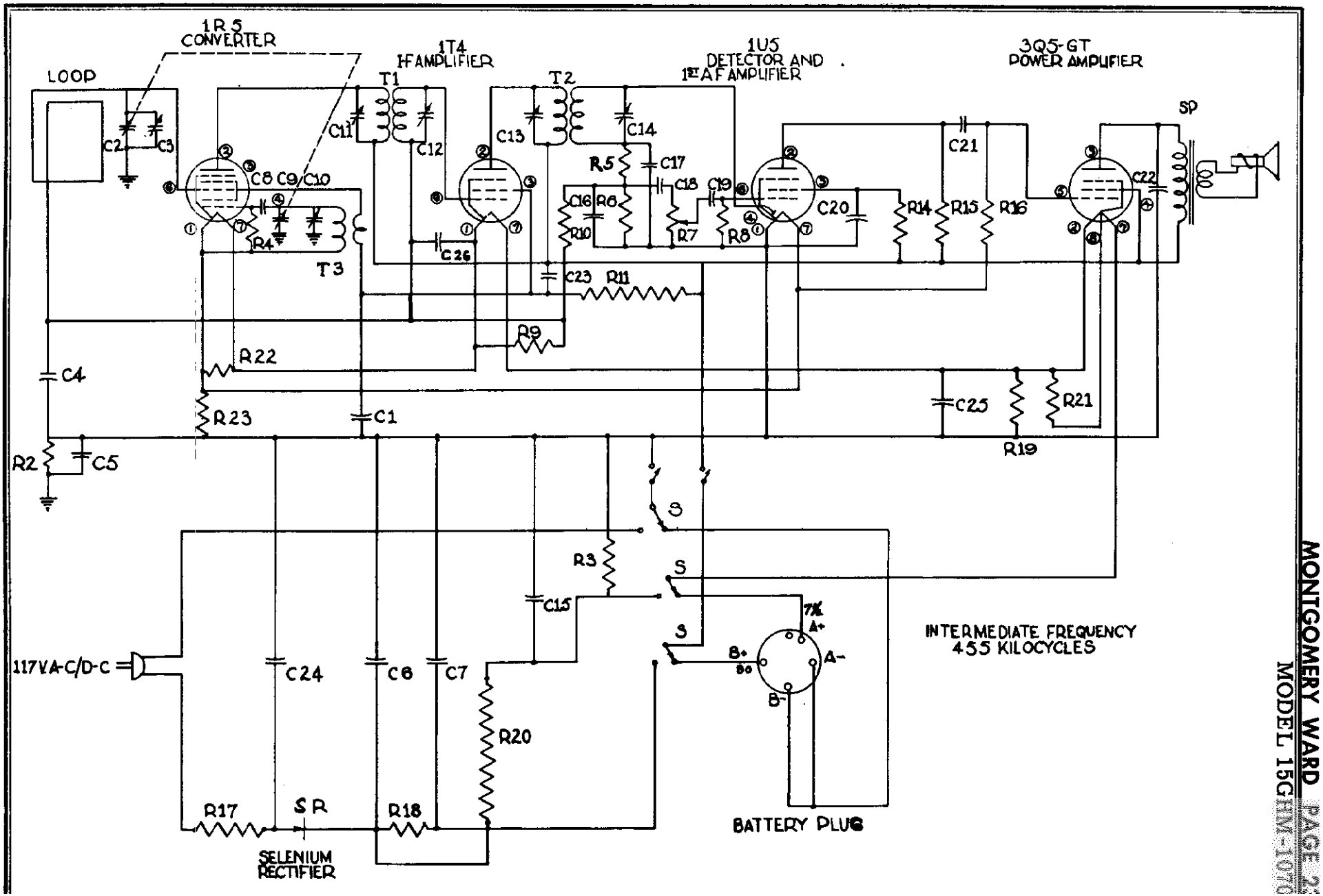
The equipment in column at right is required for aligning:

Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antenna —.1 mf.

Frequency Setting	SIGNAL GENERATOR		Ground Connection	Variable Condenser Setting	ADJUST TRIMMERS TO MAXIMUM See Trimmer Illustration
	Coupling Capacitor	Connection to Radio			
455 KC	.1	CONTROL GRID OF 1R5	TO B-BUS BAR	CLOSED	1st AND 2nd I.F. C11-C12-C13-C14
540 KC	.1	CONTROL GRID OF 1R5	TO B-BUS BAR	CLOSED	OSCILLATOR COIL SCREW
1640 KC	.1	CONTROL GRID OF 1R5	TO B-BUS BAR	WIDE OPEN	OSCILLATOR TRIMMER-C10
1400 KC	.1	CONTROL GRID OF 1R5	TO B-BUS BAR	TO 1400 KC SIGNAL	ANTENNA TRIMMER-C3

499-A

REPEAT PROCEDURE


1R5
CONVERTER
1T4
IF AMPLIFIER
1U5
DETECTOR AND
1ST AF AMPLIFIER
3Q5-GT
POWER AMPLIFIER
LOOP
T1
T2
T3
SP
C1
C2
C3
C4
C5
C6
C7
C8 C9/C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
S
S
S
SR
7%
A+
B+
90
A-
B-
117VA-C/D-C
INTERMEDIATE FREQUENCY
455 KILOCYCLES
BATTERY PLUG
SELENIUM
RECTIFIER

MODEL 15GHM-1070A

PARTS LIST

WHEN ORDERING PART, STATE MODEL NO. OF RADIO AND PART NO.

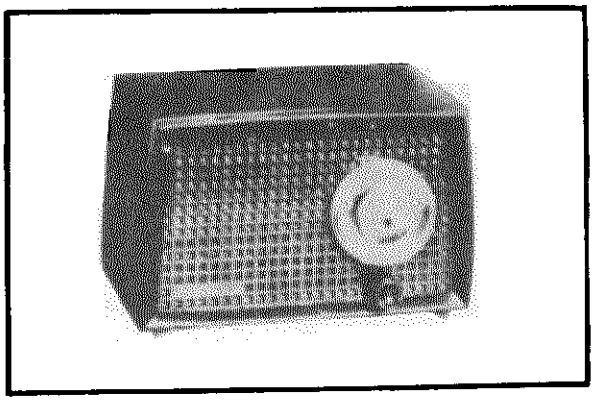
Ref. No.	Part No.	Description	Price
		CONDENSER	
C1-20-23 26	AC1	.05-150 V.	.20
C2-C3 C9-C10	AM1	2 Gang Var. Condenser	1.60
C4	AC2	.1-150 V.	.25
C5	AC3	.2-200 V.	.35
C6-C7 C15	AC4	50 MFD-150 V. (C6-C7) 200 MFD-25 V. (C15) 3 Section Filter Condenser	1.60
C8	AC5	50 MMF-150 V.	.20
C11-C12	.....	1st I.F. Trimmers Part of T-1	
C13-C14	.....	2nd I.F. Trimmers Part of T-2	
C16-C17	AC6	100 MMF-150 V.	.20
C18-C19	AC7	.005-150 V.	.20
C21	AC8	.01-150 V.	.20
C22	AC9	.006-150 V.	.20
C24	AC10	.05-400 V.	.25
C25	AC11	100 MFD-25 V.	.60
		RESISTORS	
R2-R15	AR1	470 K — 1/2 Watt	.20
R3	AR2	1800 OHM — 1/2 "	.20
R4	AR3	100 K — 1/2 "	.20
R5	AR4	47 K — 1/2 "	.20
R6	AR5	560 K — 1/2 "	.20
R7	AR6	2 Meg. Vol. Control With Switch	.80
R8-9	AR7	5.6 " — 1/2 Watt	.20
R10	AR8	2.2 " — 1/2 "	.20
R11	AR9	15 K — 1/2 "	.20
R12-R13		1 K — 1/2 "	.20
R14	AR11	2.5 Meg. — 1/2 "	.20
R16	AR12	1 Meg. — 1/2 "	.20
R17	AR13	25 OHM — 1 "	.25
R18	AR14	3000 " — 1 "	.25
R19	AR15	470 " — 1/2 "	.20
R20	AR16	2500 " — 10 "	.60
R21-R23	AR17	360 " — 1/2 "	.20
R22	AR18	510 " — 1/2 "	.20
		MISCELLANEOUS	
SP	AM2	4" Speaker with Output Trans.	4.20
SR	AM3	Selenium Rectifier, 100 Mil.	1.80
T1-T2	AM4	I.F. Transformer	.90
.....	AM5	I.F. Trans. Mounting Clip	.10
T3	AM6	Oscillator Coil	.60
S	AM7	Switch, "Electric-Battery"	1.00
	AM8	Socket, Tube, Miniature	.20
	AM9	Socket, Tube, Octal	.25
	AM10	Dial, Tuning	1.20
	AM11	Knob, "AC-DC-Battery" or "Volume"	.25
.....		Specify Push on Knob or Set Screw Knob	
	AM12	Loop Antenna	1.00
	AM13	Grill Cloth, Plastic	.80
	AM14	Cabinet-Leatherette Covered	9.50
	AM15	Line Cord with Plug	.50
	AM16	Battery Plug with Leads	.50

HOW TO ORDER REPAIR PARTS

Repair Parts may be ordered from your nearest Wards Retail Store, Catalog Order Office, or Mail Order House. To have your order filled promptly and correctly, please furnish the following information:

1. **Model Number** which appears on nameplate.
2. **Part Number and Name of Part** (see Repair Parts List).

MODELS 15GSL-1564A, 15GSL-1565 15GSL-1566A, 15GSL-1567A



ELECTRICAL SPECIFICATIONS

POWER SUPPLY - - 115 Volts, either DC or 50 to 60 cycles AC

FREQUENCY RANGE - 540 to 1600 kc

INTERMEDIATE FREQ. - 455 kc

SELECTIVITY - At 1000 kc, 100 kc at 1000 X signal.

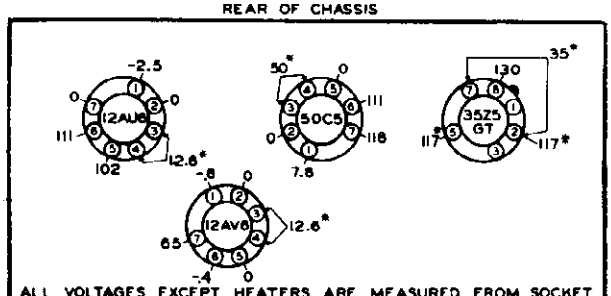
SENSITIVITY - 3000 microvolts average for .05 watts output.

POWER OUTPUT -
Undistorted - 0.9 Watt
Maximum - 1.8 Watts

LOUD SPEAKER - 4 Inch Round P.M.

VOICE COIL IMPEDANCE - 3.2 Ohms at 400 cycles.

REAR OF CHASSIS



ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO THE COMMON NEGATIVE WITH A 20000 OHM PER VOLT VOLTMETER. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS.
* A.C. EXCEPT WHEN SET IS USED ON D.C.

VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

GROUND - No ground connection should be used when operating this receiver. The receiver gets its ground connection through the power line and any external connection to the chassis may cause a short circuit and consequent damage.

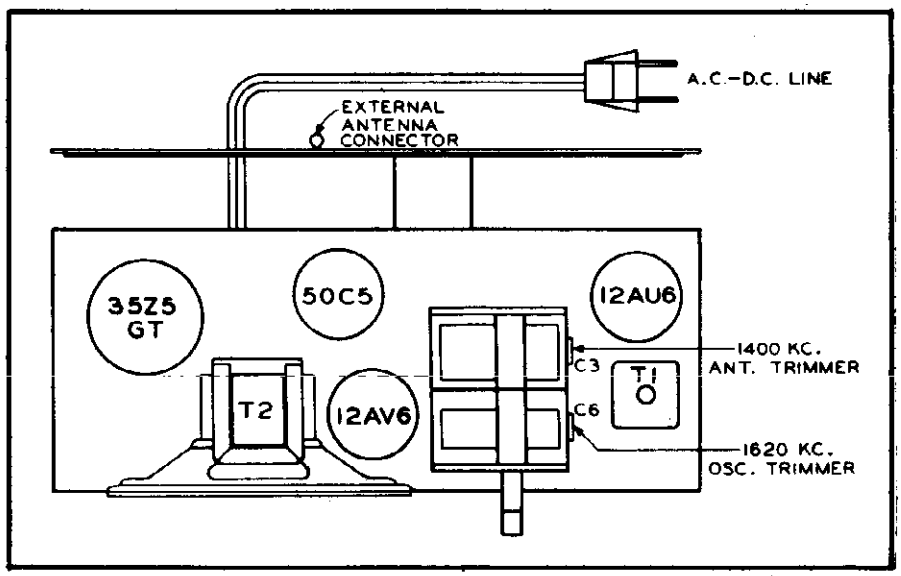
TUBE COMPLEMENT

12AU6 - Converter

12AV6 - Diode - 1st. Audio

50C5 - Power Output

35Z5GT - Rectifier



TOP VIEW OF CHASSIS

501A

MODELS 15GSL-1564A, 15GSL-1565A,
15GSL-1566A, 15GSL-1567A

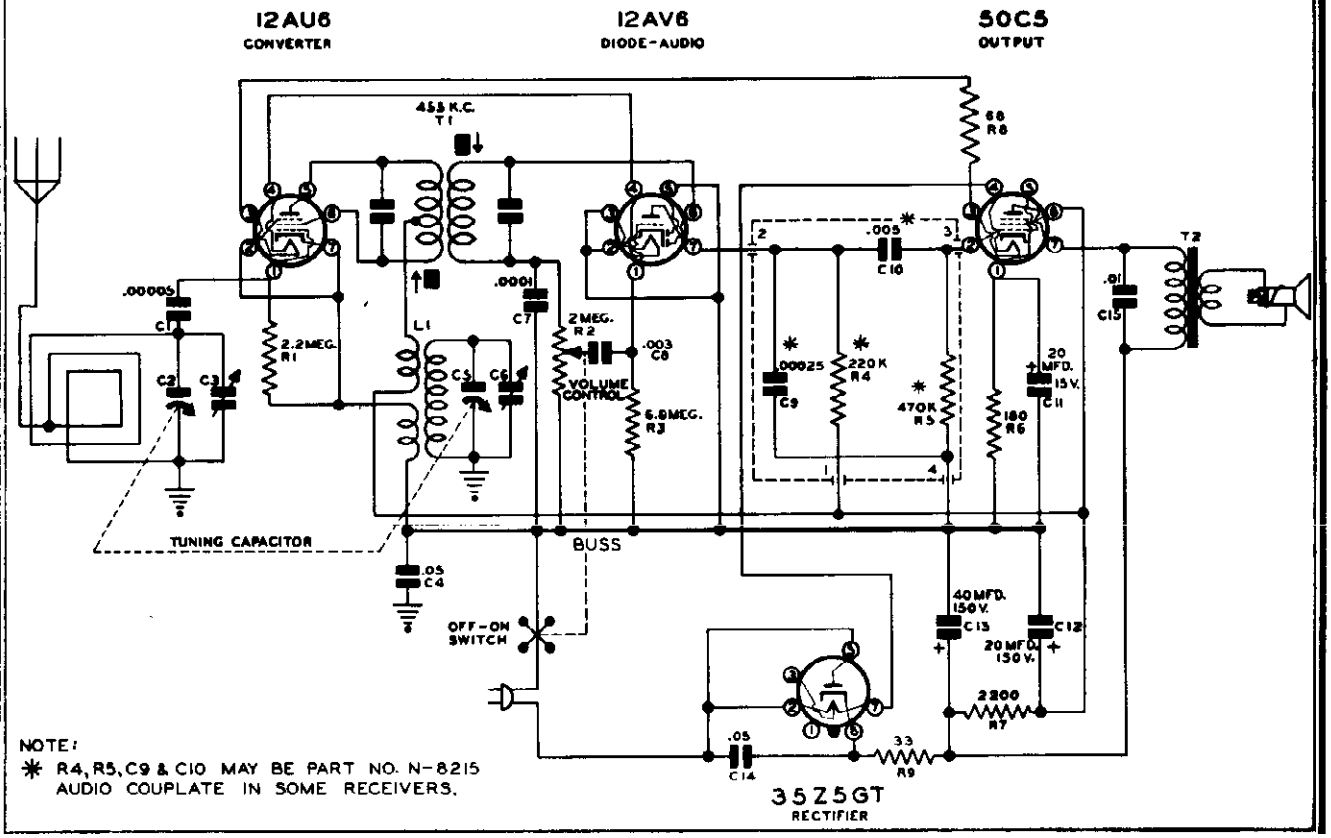
ALIGNMENT PROCEDURE

The signal source must be an accurately calibrated signal generator capable of supplying 455 Kc and up to 1620 Kc signals modulated 30% with a 400-cycle audio signal.
Volume control at maximum for all adjustments.

Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

Loop antenna should be connected to receiver and in its proper position when making the adjustments.

SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT
FREQUENCY	COUPLING CAPACITOR	CONNECTION TO RADIO	GROUND CONNECTION		
455 Kc	.05 Mfd.	Rear stator plates of tuning condenser.	Buss Lead	Any point near center where no interfering signal is received.	Slugs at top and bottom of I.F. Coil T-1
1620 Kc	.05 Mfd.	Rear stator plates of tuning condenser.	Buss Lead	Exactly 1620 Kc.	Oscillator trimmer of Gang. (C6)
1400 Kc	--	Lay Generator lead near back of cabinet	Buss Lead	Exactly 1400 Kc.	Antenna trimmer of Gang. (C3)



NOTE:
* R4, R5, C9 & C10 MAY BE PART NO. N-8215 AUDIO COUPLATE IN SOME RECEIVERS.

MODELS 15GSL-1564A, 15GSL-156
15GSL-1566A, 15GSL-1567A

HOW TO ORDER PARTS - Should it be necessary to write us or to order any repair parts, it is important that the complete model number which appears on the cabinet back of this receiver be specified. Repair parts should be ordered from your nearest Wards Retail Store, Catalog Order Office or Mail Order House.

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	SELLING PRIC
		CONDENSERS	
C1	N-6385	Ceramic 50 MMFD. 500 Volts 10%	$ .16
C2,C5	N-7141	Gang Tuning Condenser	1.70
C3,C6	N-8551	Gang Tuning Condenser B receivers. Trimmers on Gang	
C4	N-1345	Paper .05 MFD. 200 Volts	.16
C7	N-6015	Ceramic 100 MMFD. 500 Volts 20%	.16
C8	N-2063	Paper .003 MFD. 600 Volts	.16
* C9	N-6488	Ceramic 250 MMFD. 500 Volts 20%	.16
* C10	N-4894	Paper .005 MFD. 600 Volts	.16
C11) C12) C13)	N-8442	Electrolytic (20 MFD. 15 Volts) (20 MFD. 150 Volts) (40 MFD. 150 Volts)	1.20
C14	N-1346	Paper .05 MFD. 400 Volts	.16
C15	N-1344	Paper .01 MFD. 400 Volts	.16
		RESISTORS	
R1	N-4277	2.2 Megohm, 1/2 Watt, 20%	.14
R2	N-7142	2 Megohm, Volume Control & Switch	.94
R3	N-4028	6.8 Megohm, 1/2 Watt, 20%	.14
* R4	N-4026	220,000 Ohm, 1/2 Watt, 20%	.14
* R5	N-4027	470,000 Ohm, 1/2 Watt, 20%	.14
R6	N-4067	180 Ohms, 1/2 Watt, 10%	.14
R7	N-4896	2,200 Ohms, 1/2 Watt, 10%	.14
R8	N-6014	68 Ohms, 2 Watts, 10%	.20
R9	N-4022	33 Ohms, 1/2 Watt, 20%	.14
		TRANSFORMERS & COILS	
T1	N-7694	I. F. Transformer	1.40
T2	Part of N-7824	Output Transformer (Part of Speaker & Output Transformer Assembly)	
L1	N-7725	Oscillator Coil	.62
	N-8552	Oscillator Coil B receivers.	
	N-8429	Loop Antenna & Cabinet Back Assembly	.90
		MISCELLANEOUS ELECTRICAL PARTS	
	N-7824	Speaker, 4" P.M. with Transformer	4.30
	N-7334	Tube Socket, 7 Pin Miniature	.10
	N-7515	Tube Socket, Octal	.10
	N-1090	Line Cord and Plug	.40
	N-8215	Audio Couplate	.34

* The resistors (R4 and R5) and condensers (C9 and C10) are replaced by the above part in some receivers.

		MISCELLANEOUS PARTS	
	#342	Cabinet, Plastic - White (Model No. 15GSL-1564 A,B)	3.90
	#343	Cabinet, Plastic - Walnut (Model No. 15GSL-1565 A,B)	3.00
	#344	Cabinet, Plastic - Red (Model No. 15GSL-1566 A,B)	3.90
	#345	Cabinet, Plastic - Light Green (Model No.15GSL-1567 A,B)	3.90
	#346	Cabinet, Plastic - Dark Green (Model No.15GSL-1567 A,B)	3.90
	#347	Cabinet, Plastic - Gray (Model No. 15GSL-1567 A,B)	3.90
	N-8431	Knob, Volume Control - White	.10
	N-8432	Knob, Volume Control - Walnut	.10
	N-8433	Knob, Volume Control - Red	.10
	N-8434	Knob, Volume Control - Light Green	.10
	N-8446	Knob, Volume Control - Dark Green	.10
	N-8447	Knob, Volume Control - Gray	.10
	N-8430	Tuning Knob	.36
	N-8448	Dial Scale - White on Blue-Green Background	.12
	N-8435	Dial Scale - Maroon on Gold Background	.12
	N-8436	Dial Scale - Black on White Background	.12
	N-8437	Dial Scale - Maroon on Chartreuse Background	.12
	N-8438	Dial Scale - White on Light Green Background	.12
	N-8449	Dial Scale - White on Red Background	.12

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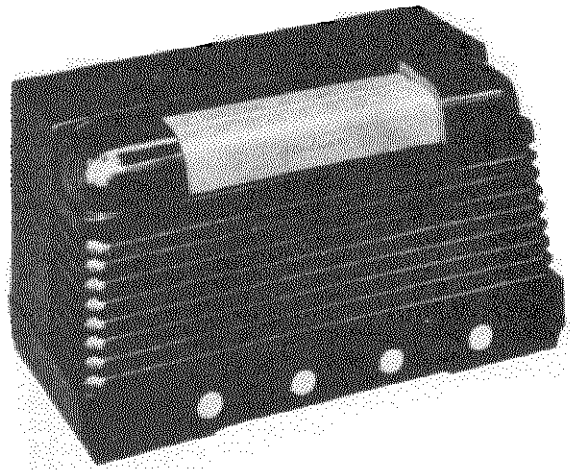
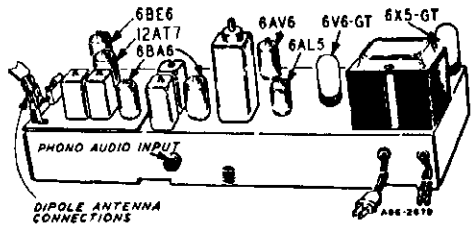
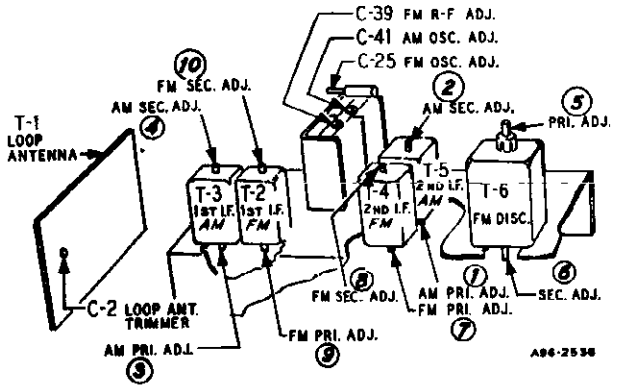
MODELS 15WG-1545A, 15WG-1546A



GENERAL DESCRIPTION

This is a two band, seven tube (plus rectifier tube) AM and FM receiver. Controls are provided at the front of the cabinet for tuning, volume, tone and band or phono selection. A phono input socket is provided at the rear of the receiver to which a record player may be connected. The I-F stages use high gain miniature type tubes. Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.





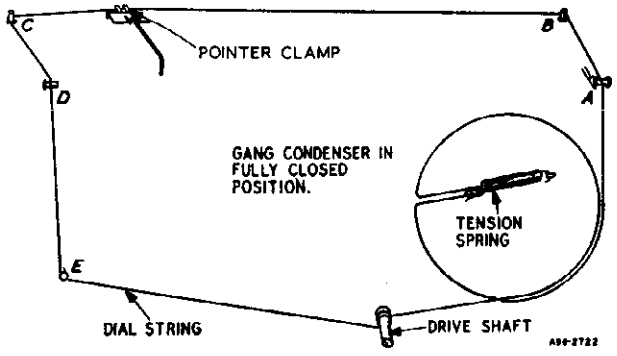
ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts AC 50-60 cycles, 40 watts.
Frequency Ranges	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	AM—455 KC FM—10.7 MC
Selectivity	AM—45 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—950 KC broad at 200 times down
AM Sensitivity	(For .5 watt output with external antenna) 25 microvolts average
FM Sensitivity	(For .5 watt output) 25 microvolts average
Power Output	1.9 watts maximum 0.8 watts 10% distortion
Loud Speaker	5" PM Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles
Tube and Dial Lamp Complement	1 12AT7 R-F Amplifier & Mixer 1 6BE6 AM Converter & FM Osc. 1 6BA6 1st I-F Amplifier 1 6BA6 2nd I-F Amplifier 1 6AL5 FM Discriminator 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC 1 6V6GT Audio Output 1 6X5GT Rectifier 2 No. 47 Dial Lamps

DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X80 drive cord assembly or a new length of cord 52 inches long for the installation. Install the cord as shown in the illustration, winding three turns counter-clockwise around the drive shaft with the turns progressing toward the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50 mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR						
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
Allow chassis and signal generator to "Heat Up" for several minutes.

	SIGNAL GENERATOR		THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Deflection Maximum
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

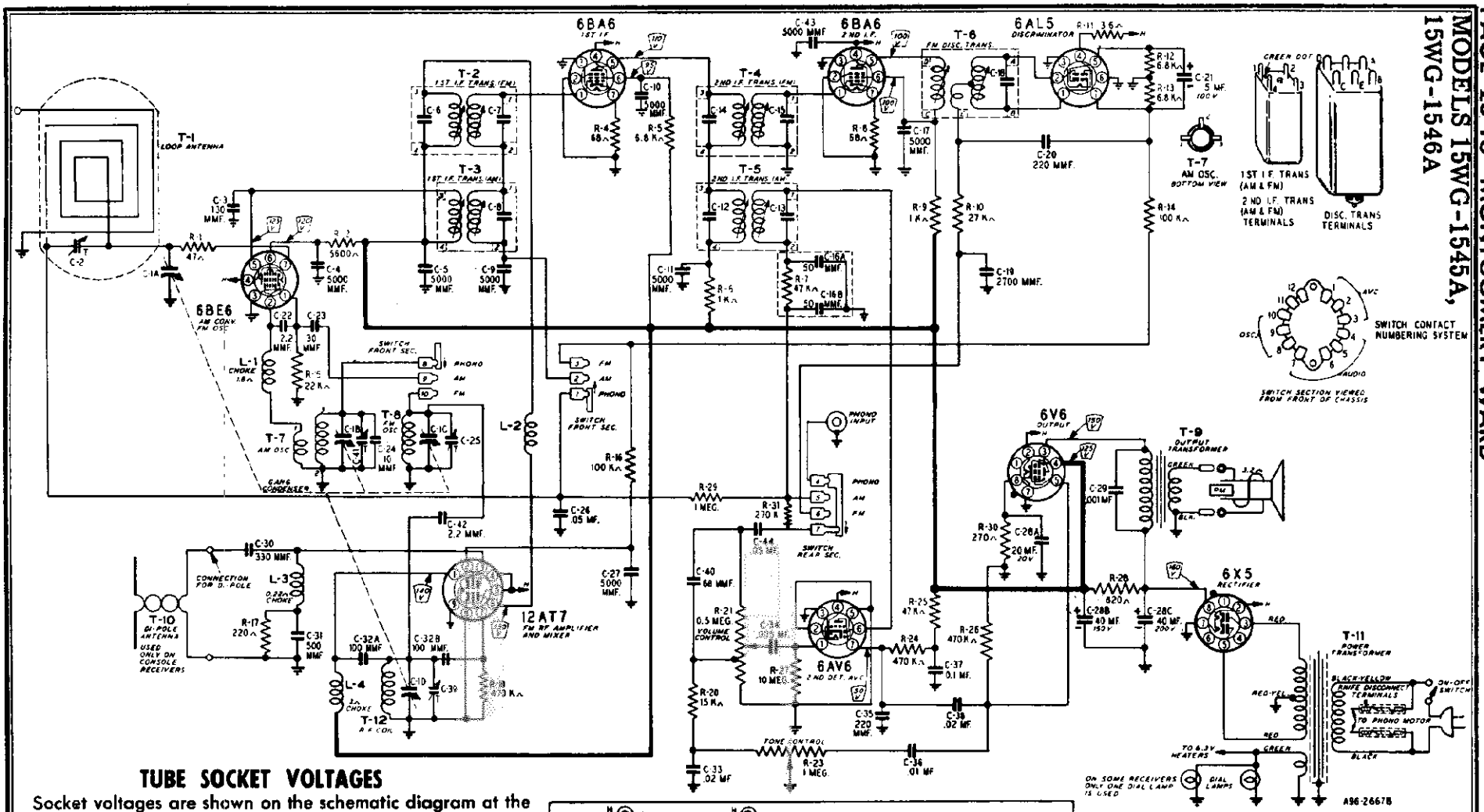
FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the 27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



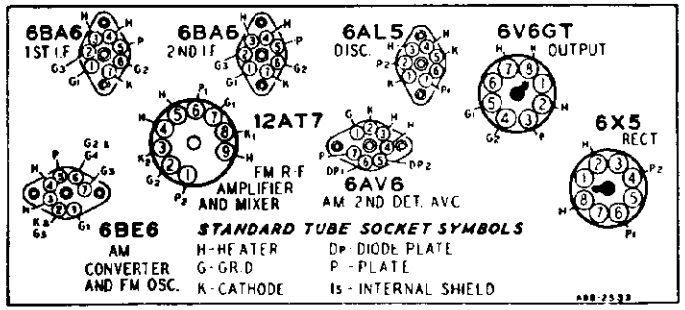
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage .....117 Volts AC

Signal Input .....None

A variation of ±10% is usually permissible.



Phono Motor Connections Not Used in Mantel Receivers.

MODELS 15WG-1545
15WG-1546A

PARTS INFORMATION

HOW TO ORDER REPAIR PARTS

Repair Parts may be ordered from your nearest Wards Retail Store, Catalog Order Office, or Mail Order House. To have your order filled promptly and correctly, please furnish the following information:

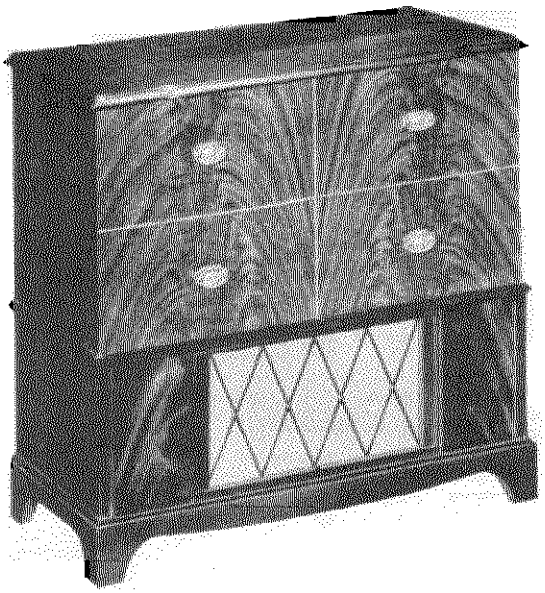
1. MODEL NUMBER which appears on model label o the rear of the chassis.
2. PART NUMBER AND NAME OF PART.

PARTS LIST

Use only genuine factory tested parts to insure service jobs you can depend on and to obtain original set performanc
Prices subject to change without notice.

Ref. No.	Part No.	Description	Qty. Used in Set	Selling Price
		CAPACITORS		
C-1	14A209	Gang Condenser Assembly	1	3.50
C-2	17A256	2-24 mmf Trimmer	1	.16
C-3	47X559	130 mmf Ceramic	1	.16
C-4, C-5, C-9, C-10, C-11, C-17, C-27, C-43	47X507	5000 mmf Ceramic	8	.18
C-6, C-7		Part of T-2 (1st I-F Trans. FM)		
C-8		Part of T-3 (1st I-F Trans. AM)		
C-12, C-13		Part of T-5 (2nd I-F Trans. AM)		
C-14, C-15		Part of T-4 (2nd I-F Trans. FM)		
C-16A, C-16B	47X112	50-50 mmf Dual Mica	1	.12
C-18		Part of T-6 (Discriminator Trans.)		
C-19	47X492	2700 mmf Molded Mica	1	.34
C-20	47X468	220 mmf Ceramic	1	.18
C-21	45X361	5 mf 100 V Dry Electrolytic	1	.60
C-22, C-42	47X557	2.2 mmf Ceramic	2	.06
C-23	47X558	30 mmf Ceramic	1	.16
C-24	47X523	10 mmf Ceramic	1	.16
C-25	17A255	1-8 mmf Trimmer	1	.30
C-26, C-44	B66503	.05 mf 200 V Tubular	2	.16
C-28A C-28B C-28C	45X360	20 mf 20 V 40 mf 150 V 40 mf 200 V Dry Electrolytic	1	1.56
C-29	H66102	.001 mf 900 V Tubular	1	.10
C-30	47X470	330 mmf Molded Mica	1	.18
C-31	47X508	500 mmf Ceramic	1	.16
C-32A, C-32B	76X4	100 mmf Dual Ceramic	1	.24
C-33	B66203	.02 mf 200 V Tubular	1	.12
C-34	D66502	.005 mf 400 V Tubular	1	.12
C-35, C-38		Part of 76X5 (See Miscellaneous)		
C-36	B66103	.01 mf 200 V Tubular	1	.12
C-37	D66104	.1 mf 400 V Tubular	1	.18
C-39, C-41		Part of C-1 (Gang Condenser)		
C-40	47X471	68 mmf Ceramic	1	.18
		RESISTORS		
		Ohms Watts		
R-1	885470	47 0.5 Carbon	1	.06
R-2	885562	5600 0.5 Carbon	1	.06
R-4, R-8	884680	68 0.5 Carbon	2	.08
R-5, R-12, R-13	884682	6800 0.5 Carbon	3	.08
R-6, R-9	885102	1000 0.5 Carbon	2	.06
R-7, R-25	885473	47 K 0.5 Carbon	2	.06
R-10	885273	27 K 0.5 Carbon	1	.06
R-11	43X233	3.6 0.5 Wirewound	1	.14
R-14, R-16	885104	100 K 0.5 Carbon	2	.06
R-15	885223	22 K 0.5 Carbon	1	.06
R-17	884221	220 0.5 Carbon	1	.08
R-18	885474	470 K 0.5 Carbon	1	.06
R-20	885153	15 K 0.5 Carbon	1	.06
R-21	36X381	.5 meg. Volume Control & Switch	1	.64
R-23	40X343	1.0 meg. Tone Control	1	.52
R-24, R-26		Part of 76X5 (See Miscellaneous)		
R-27	885106	10 meg. 0.5 Carbon	1	.06
R-28	D84821	820 0.5 Carbon	1	.16
R-29	885105	1 meg. 0.5 Carbon	1	.06
R-30	884271	270 0.5 Carbon	1	.08
R-31	884274	270 K 0.5 Carbon	1	.08
		TRANSFORMERS AND COILS		
L-1	35A5	Insulated Choke	1	.16
L-2	9A2103	Parasitic Choke Assembly	1	.16
L-3	35A9	Insulated Choke	1	.16
L-4	35A8	Insulated Choke	1	.16
T-1	9A2229	"B" Range Loop Antenna	1	1.46
T-2	9A2060	1st I-F Trans. (FM)	1	.94
T-3	9A2062	1st I-F Trans. (AM)	1	.90
T-4	9A2061	2nd I-F Trans. (FM)	1	.94
T-5	9A2063	2nd I-F Trans. (AM)	1	.94
T-6	9A2161	Discriminator Transformer	1	1.66
T-7	9A2065	Oscillator Coil (AM)	1	.58
T-8	9A2067	Oscillator Coil (FM)	1	.10
T-9	51X155	Output Transformer	1	1.40
T-11	53X322	Power Transformer	1	5.52
T-12	9A2066	Antenna Coil (FM)	1	.12
		MISCELLANEOUS		
	12A507	5" P.M. Speaker	1	3.10
	3A435	Tube Socket—Octal (8 prong) Molded	2	.10
	3A426	Tube Socket	4	.12
	3A427	Tube Socket	1	.16
	3A443	Tube Socket (12AT7)	1	.24
	3A305	Phono Socket—Single Pin Tip	1	.06
	2A395	Band Change Switch	1	.78
	13X546	Line Cord and Plug Assembly	1	.54
	10A760	Knob (Ivory)	4	.16
	10A761	Knob (Brown)	4	.16
	76X5	Resistor Capacitor Comb.	1	.40
	55X318	Cabinet, Brown (1545)	1	5.64
	55X418	Cabinet, Ivory (1546)	1	7.14
		DIAL AND DRIVE ASSEMBLY		
	58X754	Dial Glass	1	1.72
	15X269	Pointer	1	.12
	7A103	Pilot Light Socket Assembly	1	.24
	7A103	No. 47 Pilot Light Bulb	2	.16
	7A237	Pilot Light Socket Assembly	1	.24
	26X510	Drive Shaft	1	.22
	28X113	Drive Cord Tension Spring	1	.02
	10X80	Drive Cord Assembly	1	.12
	19X192	"C" Washer (Mtg. drive Shaft)	2	.02
	6X66	Rubber Grommet (Mtg. gang cond.)	3	.04

MODELS 15WG-2761A, 15WG-2765B, 15WG-2765C, 25WG-2765D



GENERAL DESCRIPTION

This is a two band, nine tube (plus rectifier tube) AM and FM receiver with an automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, compensator circuits to prevent oscillator drift, automatic volume control, push-pull pentode power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.

DRIVE CORD REPLACEMENT

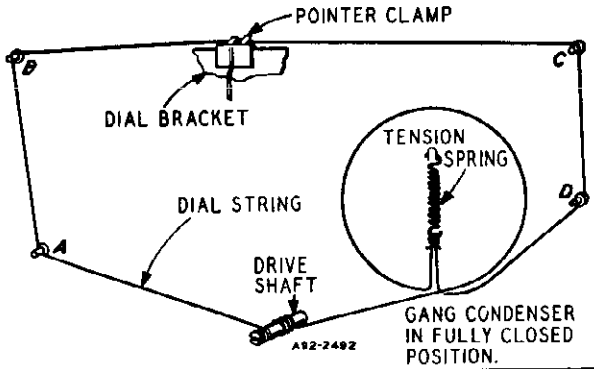
Use a new 10X54 drive cord assembly or a new length of cord 48 inches long for the installation, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation, rotate the drive shaft a few turns to take up the slack in the cord.

ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts AC 60 cycles, 80 watts, 100 watts with record changer
Frequency Ranges	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	AM—455 KC FM—10.7 MC
Selectivity	AM—43 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—760 KC broad at 200 times down
AM Sensitivity	(For .5 watt output with external antenna) 10 microvolts average
FM Sensitivity	(For .5 watt output) 30 microvolts average
Power Output	8.5 watts maximum 6.0 watts 10% distortion
Loud Speaker	12" PM Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles

Tube and Dial Lamp Complement

1 6BA6 AM-FM R-F Amplifier
1 12AT7 FM & AM Osc. & Mixer
1 6BA6 FM-AM 1st I-F Amplifier
1 6BA6 FM 2nd I-F Amplifier
1 6AL5 FM Detector
1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
2 6K6-GT Audio Output
1 5Y3-GT Rectifier
1 6AV6 Phase Inverter
2 No. 47 Dial Lamps



494C

MODELS 15WG-2761A
15WG-2765B, 15WG-2765C,25WG-2765D

ALIGNMENT PROCEDURE

AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas —.1 mf, 200 mmf.

Volume Control—Maximum all Adjustments
Connect Radio Chassis to Ground Post of Signal Generator with Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Sever Minutes.

SIGNAL GENERATOR		CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING						
I-F	455 kc	12AT7 Pin 7 and Chassis	.1 mf	Broadcast	Rotor Fully Open	2nd I-F Pri. & Sec. (1) & (2) 1st I-F Pri. & Sec. (3) & (4)	Maximum Output
Broadcast	1620 kc	External ant. term.	200 mmf	Broadcast	Rotor Fully Open	Broadcast Oscillator C-33	
	1400 kc	External ant. term.	200 mmf	Broadcast	Turn Rotor to Max. Output	Broadcast Interstage C-29	
	1400 kc	External ant. term.	200 mmf	Broadcast	Set pointer to 1400 kc See Note A	Loop Antenna C-48	

Note A—If the pointer is not at 1400 KC on dial, reset pointer at the 1400 KC mark on the dial scale.

FM STAGES

The following equipment is required for aligning:
An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—.01 mf, 300 ohms and 1000 ohms.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings.)
Allow chassis and signal generator to warm up for several minutes.

	SIGNAL GENERATOR		THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (6) Note C	Zero Cente
I-F	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	2nd I-F Pri. Note A and D (7) 2nd I-F Sec. Note A and E (8)	Maximum Deflection
Discriminator	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (6) Note C	Zero Cente
	10.7 MC Note F	FM-RF Gang Condenser terminal	.01 mf	FM	Rotor Fully Open	1st I-F Pri. (9) 1st I-F Sec. (10) Notes A, D & E	Maximum Deflection

Recheck I-F Adjustments in order given

R-F & Osc.	108.4 Note H	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Rotor Fully Open	Oscillator C-35 Note G	Maximum Deflection
	104.5	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	FM Interstage C-32	Maximum Deflection
	104.5	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	Ant. C-47	Maximum Deflection

Recheck R-F and Osc. Adjustments in order given

NOTE A—Test Equipment connections are as given in the table. The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line at the junction of resistor R-22 and condenser C-18 for all adjustments except the discriminator secondary adjustment, for which See Note C.

NOTE B—A signal of .1 volt must be fed into the receiver for this adjustment.

NOTE C—Disconnect zero center DC vacuum tube voltmeter from AVC and connect to junction of R-18 and C-62. Adjust for zero voltage indication.

NOTE D—Before adjusting Pri. core connect 1000 ohm load resistor across the 2nd I.F. secondary terminals. Input may have to be increased to .1 volt if receiver is *badly* mis-aligned

NOTE E—Disconnect 1000 ohm load resistor from secondary terminals and connect across the 2nd I.F. primary terminals Input may have to be increased to .1 volt if receiver is *badly* mis-aligned.

NOTE F—Input can be reduced to 10,000 microvolts.

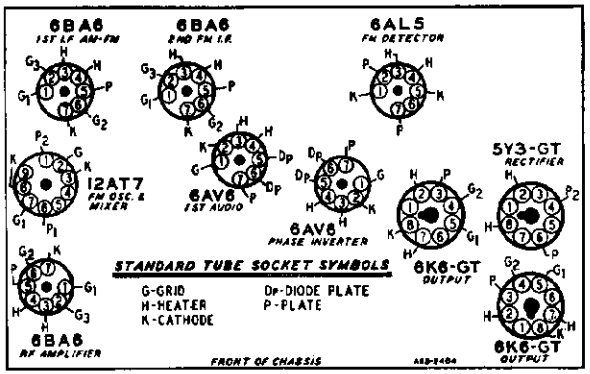
NOTE G—Oscillator frequency above signal frequency.

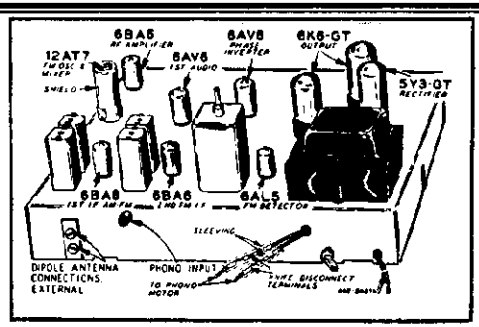
NOTE H—Remove the 1000 ohm load resistor before attempting to check the R-F and oscillator adjustments.

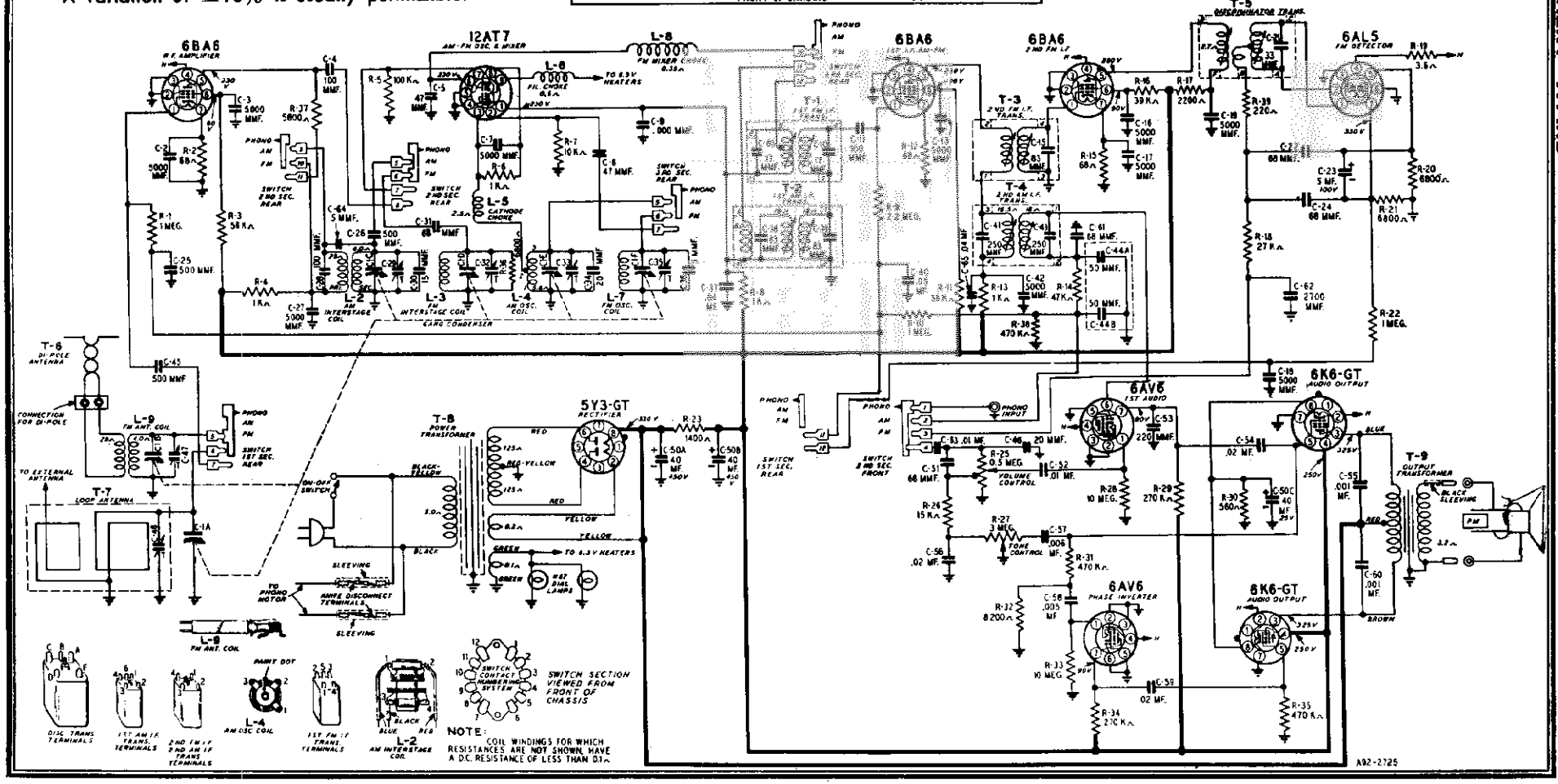
TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage .....117 Volts AC
Signal Input .....None
A variation of ±10% is usually permissible.







MODELS 15WG-2761
15WG-2765B, 15WG-
2765C, 25WG-2765D

PARTS INFORMATION

HOW TO ORDER REPAIR PARTS

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1. MODEL NUMBER which appears on the model lal on the rear of the chassis.
2. PART NUMBER AND NAME OF PART.

PARTS LIST

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Prices subject to change without notice.

Ref. No.	Part No.	Description	Qty. Used in Set	Selling Price
		CAPACITORS		
C-1	14A207	Gang Condenser	1	$ 5.26
C-2, C-3, C-7, C-9, C-13, C-16, C-17, C-18, C-19, C-27, C-42	47X507	5000 mmf Ceramic	11	.18
C-4	47X497	100 mmf Ceramic	1	.14
C-5	47X499	47 mmf Ceramic	1	.18
C-8	47X498	47 mmf Ceramic	1	.16
C-10, C-65	Part of T-1 1st I-F (FM)			
C-11, C-28	47X550	100 mmf Ceramic	2	.16
C-15	Part of T-3 2nd I-F (FM)			
C-21	Part of T-5 Discriminator			
C-22, C-24, C-31, C-51	47X501	68 mmf Ceramic	4	.12
C-23	45X361	5 mf 100 V Dry Electrolytic	1	.60
C-25, C-26, C-45	47X496	500 mmf Ceramic	3	.16
C-29, C-32, C-33, C-47	Part of Gang Condenser			
C-30	47X552	15 mmf Ceramic	1	.14
C-34, C-46	47X516	20 mmf Ceramit	2	.16
C-35	26A489	1-8 mmf Trimmer	1	.30
C-36, C-64	47X549	5 mmf Ceramic	2	.22
C-37, C-65	F66403	.04 mf 600 V Tubular	2	.16
C-38, C-39	Part of T-2 1st I-F (AM)			
C-40	B66503	.05 mf 200 V Tubular	1	.16
C-41, C-43	Part of T-4 2nd I-F (AM)			
C-44A, C-44B	47X112	50-50 mmf Dual Mica	1	.12

Ref. No.	Part No.	Description	Qty. Used in Set	Sellin Price
		CAPACITORS—Cont.		
C-48	Part of T-7 (Loop Antenna)			
C-50A, C-50B, C-50C	45X374	40 mf 450 V, 40 mf 450 V, 40 mf 25 V Dry Electrolytic	1	2.22
C-52	F66103	.01 mf 600 V Tubular	1	.10
C-53	47X468	220 mmf Ceramic	1	.18
C-54, C-59	F66203	.02 mf 600 V Tubular	2	.16
C-55, C-60	F66102	.001 mf 600 V Tubular	2	.12
C-56	B66203	.02 mf 200 V Tubular	1	.12
C-57	F66602	.006 mf 600 V Tubular	1	.12
C-58	B66502	.005 mf 200 V Tubular	1	.12
C-61	47X471	68 mmf Ceramic	1	.18
C-62	47X492	2700 mmf Molded Mica	1	.34
C-63	46X328	.01 mf 120 V Tubular	1	.12
		RESISTORS		
		Ohms Watts		
R-1, R-10, R-22	B85105	1 meg. 0.5 Carbon	3	.06
R-2, R-12, R-15	B83680	68 0.5 Carbon	3	.10
R-3, R-11	B84563	56K 0.5 Carbon	2	.08
R-4, R-6, R-8, R-13	B84102	1000 0.5 Carbon	4	.08
R-5	B85104	100K 0.5 Carbon	1	.06
R-7	B84103	10K 0.5 Carbon	1	.08
R-9	B85225	2.2 meg. 0.5 Carbon	1	.06
R-14	B85473	47K 0.5 Carbon	1	.06
R-16	C84393	39K 1.0 Carbon	1	.10
R-17	B85222	2200 0.5 Carbon	1	.06
R-18	B84273	27K 0.5 Carbon	1	.08
R-19	43X233	3.6 0.5 Wirewound	1	.14
R-20, R-21	B83682	6800 0.5 Carbon	2	.10
R-23	43X242	1400 5.0 Wirewound	1	.40
R-25	36X372	0.5 meg. Volume Control	1	.74
R-26	B85153	15K 0.5 Carbon	1	.06
R-27	40X285	3 meg. Tone Control	1	.48

MODELS 15WG-2761A, 15WG-2765B, 15WG-2765C, 25WG-2765D

RESISTORS—Cont.

R-28, R-33	B85106	10 meg.	0.5	Carbon..... 2	.06
R-29, R-34	B85274	270K	0.5	Carbon..... 2	.06
R-30	D83561	560	2.0	Carbon..... 1	.20
R-31, R-35, R-38	B85474	470K	0.5	Carbon..... 3	.06
R-32	B84822	8200	0.5	Carbon..... 1	.08
R-36	B84682	6800	0.5	Carbon..... 1	.08
R-37	B84562	5600	0.5	Carbon..... 1	.08
R-39	B84221	220	0.5	Carbon..... 1	.08

TRANSFORMERS AND COILS

L-2	9A2025	Interstage Coil (AM) 1		1.32
L-3	9A2024	Interstage Coil (FM) 1		.06
L-4	9A2022	Oscillator Coil (AM) 1		.10
L-5	35A5	Insulated Choke 1		.16
L-6	9A1881	Filament Choke 1		.48
L-7	9A2023	Oscillator Coil (FM) 1		.10
L-8	35A7	Mixer Choke (FM) 1		.20
L-9	9A2027	Antenna Coil (FM) 1		.64
T-1	9A2043	1st I-F Trans. (FM) 1		1.30
T-2	9A2029	1st I-F Trans. (AM) 1		1.20
T-3	9A2030	2nd I-F Trans. (FM) 1		1.12
T-4	9A2042	2nd I-F Trans. (AM) 1		.88
T-5	9A2064	Discriminator Coil 1		1.76
T-6	9A2004	Dipole Antenna 1		.58
T-7	9A2041	"B" Range Loop Antenna 1		1.56
T-8	53X286	Power Transformer 1		8.70
T-9	51X142	Output Transformer 1		1.88

DIAL AND DRIVE ASSEMBLY

58X723	Dial Glass 1		.50
25X1634	Dial Bracket 1		1.06
41X88	Dial Light Reflector 2		.10
15X251	Pointer 1		.10
10X54	Drive Cord Assembly 1		.12
28X113	Drive Cord Spring 1		.02
7A103	No. 47 Pilot Light 2		.16
7A199	Pilot Light Socket Assembly 1		.28
19X192	"C" Washer (mtg. Drive Shaft) 2		.02
26X512	Drive Shaft 1		.30
6X67	Rubber Grommet 4		.02

MISCELLANEOUS

12A502	Speaker 12" P.M. 1		9.22
3A305	Phono Socket—Single Pin Tip .. 1		.06
3A435	Tube Socket—Octal (8 prong) Molded 3		.10
3A436	Tube Socket—Noval (miniature) 1		.48
32X388	Tube Shield—Noval 1		.40
32X390	Tube Shield (miniature) 1		.06
3A439	Tube Socket (miniature) 6		.10
2A391	Band Change Switch 1		1.80
13X546	Line Cord & Plug Assembly 1		.54
10A713	Knobs (Mah.) 4		.10
4X1049	Escutcheon 1		2.76
10A765	Knobs (Blond.) 4		.16

TYPE V-28A180 RECORD CHANGER PARTS

MODEL 15WG-2761A 15WG-2765C

See Note	Motor Assembly, 60 cycles, 105-125 Volts AC 1		
V-2503B	Pickup Arm 1		1.20
W-R-A1SM-1	Crystal Cartridge & Needles 1		
W-R-13017	Needle, Microgroove (Red) 1		1.66
W-R-13016	Needle, Regular 1		1.66

NOTE — Specify part number stamped on motor assembly.

TYPE V-28A172 RECORD CHANGER PARTS

MODEL 15WG-2765B

See Note	Motor Assembly, 60 cycles, 105-125 Volts AC 1		
V-34298	Pickup Arm 1		1.62
W-R-A1M	Crystal Cartridge & Needle 1		9.36
W-R-13017	Needle, Microgroove (Red) 1		1.66
W-R-13016	Needle, Regular 1		1.66

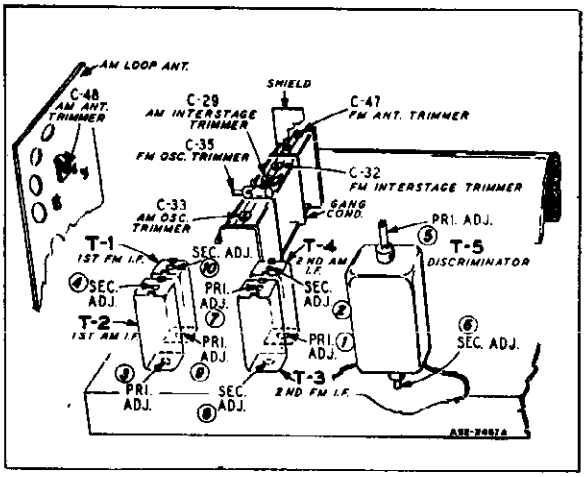
NOTE — Specify part number stamped on motor assembly.

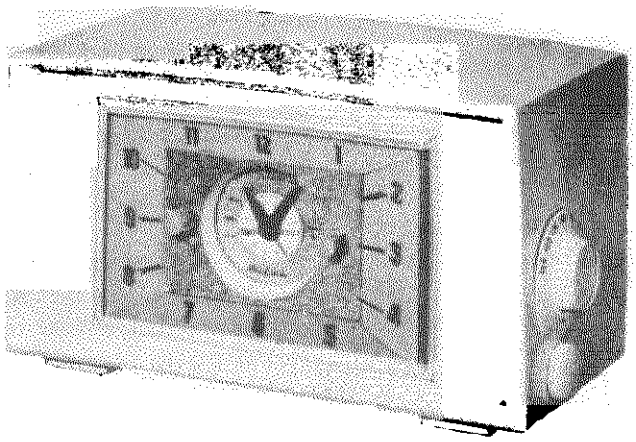
TYPE V-28A170 RECORD CHANGER PARTS

MODEL 25WG-2765D

See Note	Motor Assembly, 60 cycles, 105-125 Volts AC 1		
V-2503B	Pickup Arm 1		1.20
P-77	Crystal Cartridge & Needles (Use 60H17) 1		8.50
85-16	Needle, Regular (Use 61H2) 1		.98
85-18	Needle, Microgroove, Red (Use 61H13) 1		1.50

NOTE — Specify part number stamped on motor assembly.





GENERAL DESCRIPTION

RADIO

Four tubes including tube rectifier.
Built-In loop antenna.
Permanent Magnet Dynamic Speaker.

AUTOMATIC CLOCK

Self Starting.
Turns on radio automatically.
Turns on radio, and buzzer alarm sounds 10 minutes later.

TUBE COMPLEMENT

12AU6	Converter
12AV6	Diode - 1st Audio
50C5	Power Output
35W4	Rectifier

ELECTRICAL SPECIFICATIONS

POWER SUPPLY - 110 to 120 volts 60 cyl (Alternating Current)

FREQUENCY RANGE - 540 to 1600 K

INTERMEDIATE FREQ. - 455 K

POWER OUTPUT - Undistorted - 0.9 Wa
- Minimum - 1.8 Wa

SENSITIVITY - 3000 microvolts avera for .05 watts output

SELECTIVITY - At 1000 KC, 100 KC 1000 X signal

LOUD SPEAKER - 4 Inch Round P. M

VOICE COIL IMPEDANCE - 3.2 Ohms 400 cycles

512A

MODELS 25GSL-1560A,
25GSL-1561A

ALIGNMENT PROCEDURE

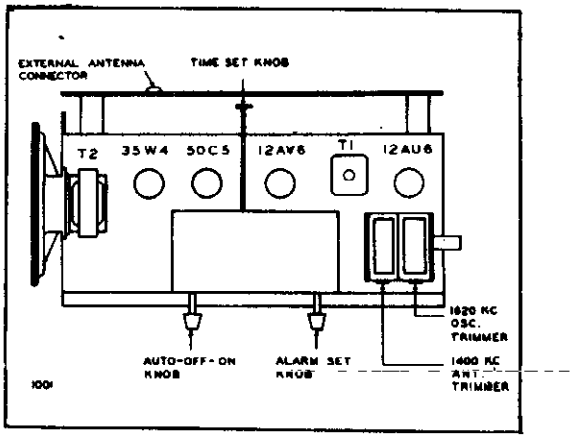
The signal source must be an accurately calibrated signal generator capable of supplying 455 Kc an up to 1620 Kc signals modulated 30% with a 400-cycle audio signal.

Volume control at maximum for all adjustments.

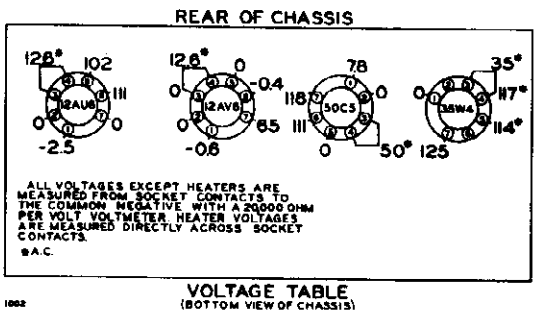
Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

Loop antenna should be connected to receiver and in its proper position when making the adjustments.

SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT
FREQUENCY	COUPLING CAPACITOR	CONNECTION TO RADIO	GROUND CONNECTION		
455 Kc	.05 Mfd.	Rear stator plates of tuning condenser.	B Minus Buss Lead	Any point near center where no interfering signal is received.	Slugs at top and bottom of I.F. Coil T-1
1620 Kc	.05 Mfd.	Rear stator plates of tuning condenser.	B Minus Buss Lead	Exactly 1620 Kc.	Oscillator trimmer of Gang. (C6)
1400 Kc	-- •	Lay Generator lead near back of cabinet	B Minus Buss Lead	Exactly 1400 Kc.	Antenna trimmer of Gang. (C3)



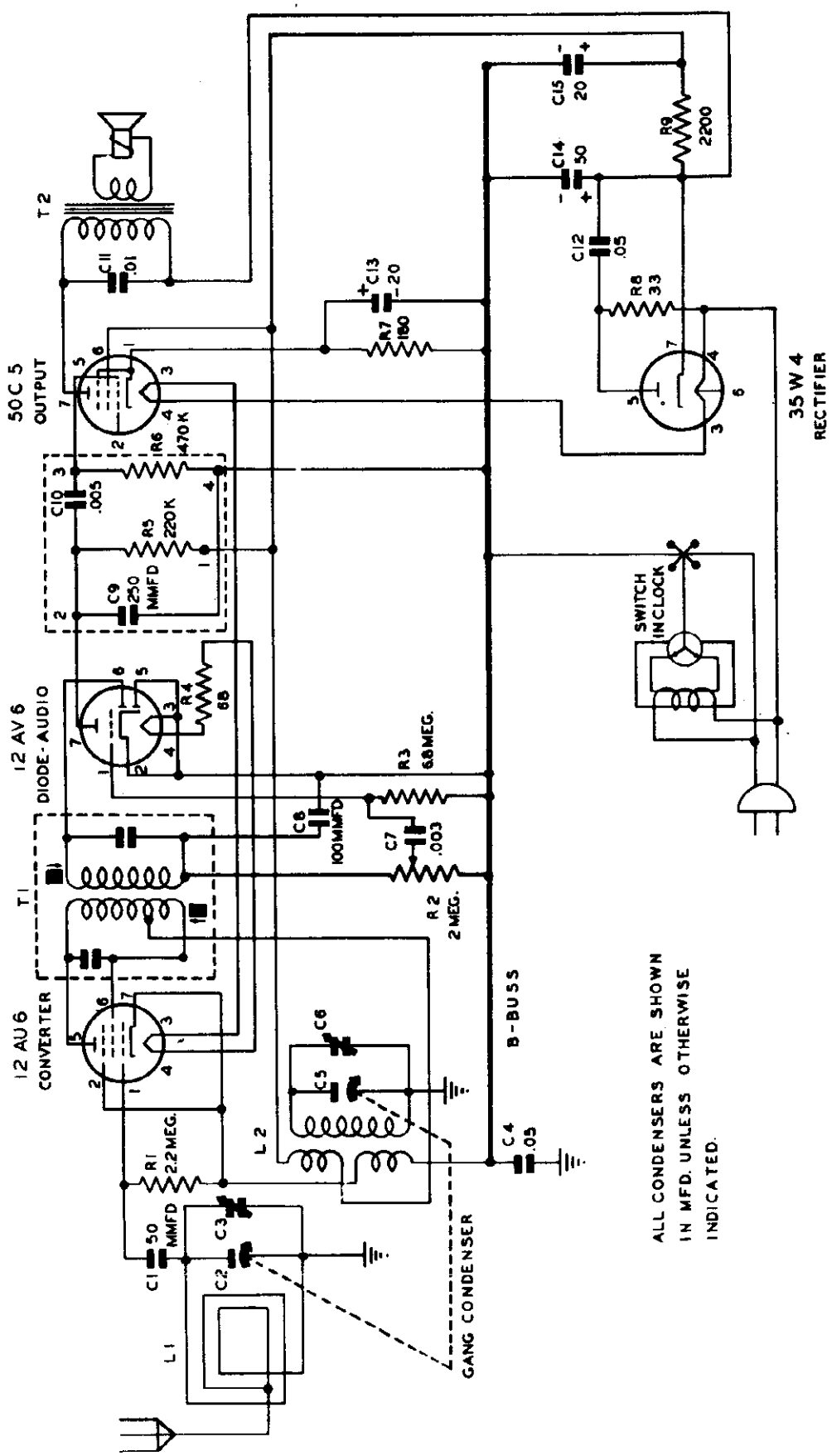
TOP VIEW OF CHASSIS



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

BOTTOM VIEW OF CHASSIS

MODELS 25GSL-1560
25GSL-1561A



MODELS 25GSL-1560A,
25GSL-1561A

REF. NO.	PART NO.	DESCRIPTION	SELLING PRICE
		CONDENSERS	
C1	N-6385	50 MMFD. 500 Volts 10%	$ .16
C2, C5 C3, C6	N-8675	Gang Tuning Condenser Trimmers on Gang Condenser	1.62
C4	N-1345	Paper .05 MFD. 200 Volts	.16
C7	N-2063	Paper .003 MFD. 600 Volts	.14
C8	N-6015	Ceramic 100 MMFD. 500 Volts	.14
*C9	N-6488	Ceramic 250 MMFD. 500 Volts	.16
*C10	N-4894	Paper .005 MFD. 600 Volts	.16
C11	N-1344	Paper .01 MFD. 400 Volts	.16
C12	N-1346	Paper .05 MFD. 400 Volts	.18
C13) C14) C15)	N-8677	Electrolytic (20 MFD. 15 Volts) (50 MFD. 150 Volts) (20 MFD. 150 Volts)	1.46
		RESISTORS	
R1	N-4277	2.2 Megohm, 1/2 Watt, 20%	.14
R2	N-8674	2.0 Megohm, Volume Control	.64
R3	N-4028	6.8 Megohm, 1/2 Watt, 20%	.14
R4	N-6014	68 Ohm, 2 Watts, 10%	.18
*R5	N-4026	220K Ohms, 1/2 Watt, 20%	.14
*R6	N-4027	470K Ohms, 1/2 Watt, 20%	.14
R7	N-4067	180 Ohms, 1/2 Watt, 10%	.14
R8	N-4022	33 Ohms, 1/2 Watt, 20%	.14
R9	N-4896	2,200 Ohms, 1/2 Watt, 10%	.14
		TRANSFORMERS & COILS	
T1	N-7694	Transformer, 1st, I.F. Output Transformer (Part of Speaker & Output Transformer Assembly)	1.32
L1	N-8657	Loop Antenna & Cabinet Assembly	1.24
L2	N-8681	Oscillator Coil	.76
		MISCELLANEOUS ELECTRICAL PARTS	
	N-7824	Speaker 4" PM with Transformer	3.68
	N-7334	Tube Socket, 7 Pin Miniature	.14
	N-1090	Line Cord and plug	.58
	N-8663	Clock, Electric.	8.68
	N-8215	Audio Couplate	.42

* The resistors (R5 and R6) and condensers (C9 and C10) are replaced by the Audio Couplate in some receivers.

		MISCELLANEOUS PARTS	
	#360	Cabinet, Plastic - White	3.32
	#367	Cabinet, Plastic - Yellow	3.32
	N-8665	Knob, Tuning - White	.30
	N-8711	Knob, Tuning - Yellow	.30
	N-8712	Knob, Volume - White	.14
	N-8713	Knob, Volume - Yellow	.14
	N-8664	Knobs, Clock - Gray	.14
	N-8662	Escutcheon, Clock	1.56

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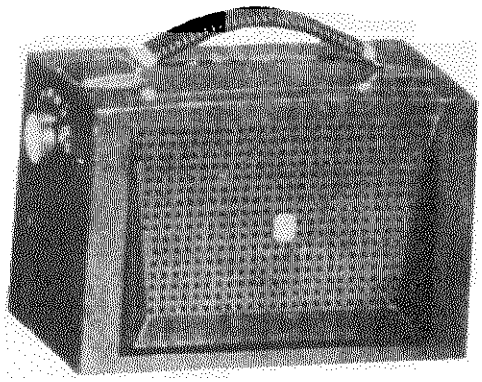


GENERAL DESCRIPTION

4 Tubes Plus Selenium Rectifier.
Operates Either On Electric Current or Self-Contained Batteries.
Built-in Iron Core Rod Type Antenna.
Permanent Magnet Dynamic Speaker.
Automatic Volume Control.

BATTERY INFORMATION

BATTERY TYPE	A - BATT. 4-1/2V	B - BATT. 90 V
MONTGOMERY WARD	62-26	62-46
Eveready	736	490
Burgess	F3	N-60
Ray-O-Vac	P93A	4390
General Dry Battery	38 OR 3F3	132

ELECTRICAL SPECIFICATIONS

POWER SUPPLY: VOLTAGE - 110-12 Volt Direct Curre or 110-120 Volt 50-6 Cycle Alternating Cu rent. 12 Watts
OR
BATTERIES - On 4-1/2 Volt "A" Ba tery (Cat. No. 62-26 One 90 Volt "B" Ba tery (Cat. No. 62-46

FREQUENCY RANGE: 540 to 1600 K

INTERMEDIATE FREQ: 455 K

POWER OUTPUT -
Undistorted - 180 M
Maximum - 300 M

LOUD SPEAKER - 4 Inch Round P. M

VOICE COIL IMPEDANCE - 3.2 Ohms 400 Cycle

TUBE COMPLEMENT

1R5 - Converter

1U4 - I. F. Amplifier

1U5 - Diode-Audio Amplifier

3V4 - Power Output

Rectifier - Selenium Type

ALIGNMENT PROCEDURE

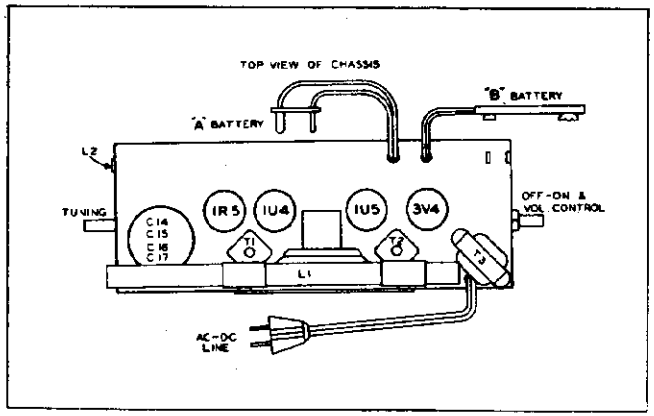
For alignment procedure read tabulations from left to right and make the adjustmen marked (1) first. (2) next. (3) third.

Before starting alignment:

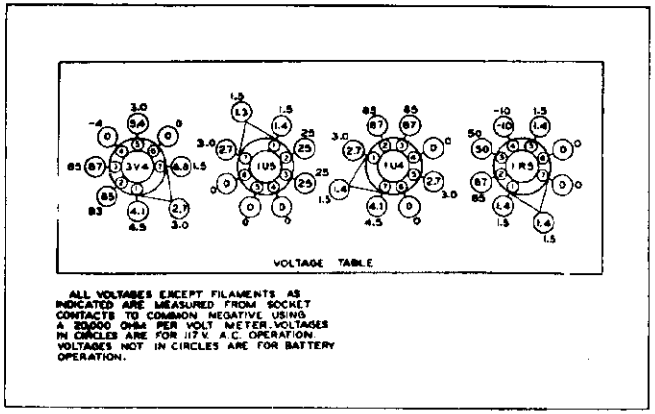
(A) Remove the chassis and loop antenna from the cabinet at the same time by r moving the battery connectors from the batteries, pulling off knobs and remo ing the two screws on the chassis tabs which fasten the chassis to the cabin

(B) Use an accurately calibrated test oscillator with some type of output measuri device.

STEP NO.	SIGNAL GENERATOR FREQUENCY	GENERATOR CONNECTION	POSITION OF GANG	DUMMY ANTENNA	ADJUSTMENT	TYPE OF ADJUSTMENT
1	Exactly 455 KC	High Side to grid of 1R5 tube. Low side to common negative.	Any point where no interfering signal is received.	.05 MFD. Condenser	Slug at top of 2nd. I.F. (T2) and then each of the slugs of the 1st. I.F.	For Maximum Output.
2	Exactly 1620 KC	DUMMY ANTENNA	Rotor fully open.	2 turns of hookup wire 6" in Dia. (Place approximately a foot from end of, and in same axis as, loop antenna.)	Front Gang Trimmer.	For Maximum Output.
3	Approximately 1400 KC.		Tune in signal from generator.		Rear Gang Trimmer.	For Maximum Output
4	Exactly 600 KC		Tune in signal from generator.		Slug in Oscillator Coil (L2) while rocking gang condenser.	For Maximum Output.
5					REPEAT STEPS 2 and 3	

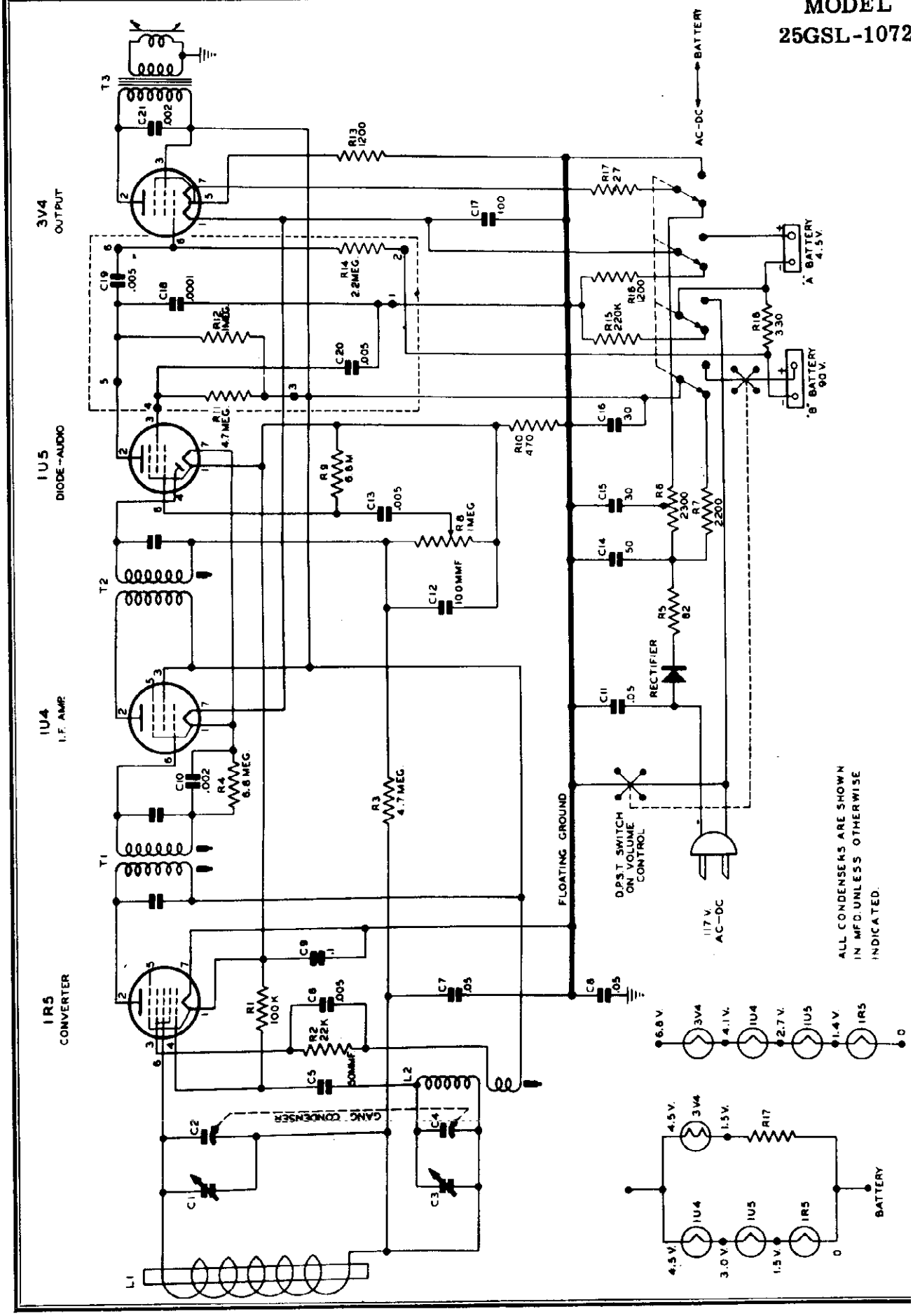


Top View of Chassis



Bottom View of Chassis

MODEL
25GSL-1072



MODEL 25GSL-1072A

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	SELLING PRICE
		CONDENSERS	
C1,C3		Trimmers on Gang Condenser	
C2,C4	N-8321	Gang Tuning Condenser	$ 1.60
C5	N-6375	Ceramic 50 MMFD. 500 Volts 20%	.16
C6,C13	N-4894	Paper .005 MFD. 600 Volts	.16
C7,C8	N-1345	Paper .05 MFD. 200 Volts	.16
C9	N-1351	Paper .1 MFD. 200 Volts	.20
C10,C21	N-6377	Paper .002 MFD. 600 Volts	.16
C11	N-1346	Paper .05 MFD. 400 Volts	.16
C12	N-6015	Ceramic 100 MMFD. 500 Volts 20%	.16
C14) C15) C16) C17)	N-6841	Electrolytic (50 MFD. 150 Volts) (30 MFD. 150 Volts) (30 MFD. 150 Volts) (100 MFD. 25 Volts)	2.02
C18,C19,C20		Part of N-8330 Pentode Couplate (See Miscellaneous Electrical Parts)	
		RESISTORS	
R1	N-2973	100K Ohms, 1/2 Watt, 10%	.14
R2	N-6012	22K Ohms, 1/2 Watt, 10%	.14
R3	N-4061	4.7 Megohms, 1/2 Watt, 20%	.14
R4,R9	N-4026	6.8 Megohms, 1/2 Watt, 20%	.14
R5	N-4023	82 Ohms, 2.0 Watts, 10%	.20
R6	N-8333	Candohm 2,300 Ohms, 5.6 Watts, 5% (Center Tapped)	.68
R7	N-4896	2,200 Ohms, 1/2 Watt, 10%	.14
R8	N-8332	1.0 Megohm, Volume Control & Switch	1.16
R10	N-4066	470 Ohms, 1/2 Watt, 10%	.14
R11,R12,R14		Part of N-8330 Pentode Couplate (See Miscellaneous Electrical Parts)	
R13,R16	N-6793	1,200 Ohms, 1/2 Watt, 10%	.14
R15	N-4026	220K Ohms, 1/2 Watt, 20%	.14
R17	N-6792	27 Ohms, 1/2 Watt, 10%	.14
R18	N-4420	330 Ohms, 1/2 Watt, 10%	.14
		TRANSFORMERS & COILS	
T1	N-7981	Transformer, 1st. I. F.	1.20
T2	N-8326	Transformer, 2nd. I. F.	1.12
T3	N-8329	Transformer, Output	1.44
L1	N-8328	Coil, Ferrite Loopstick	1.88
L2	N-8327	Coil, Oscillator	.76
		MISCELLANEOUS ELECTRICAL PARTS	
	N-6681	Speaker, 4" PM	2.90
	N-8331	Rectifier, Selenium	1.48
	N-5951	Switch, Power Changeover	.88
	N-8418	Line Cord and Plug	1.12
C18,C19) C20,R11) R12,R14)	N-8330	Pentode Couplate	.68
		MISCELLANEOUS PARTS	
	354-A	Cabinet Assembly (Less Handle)	5.18
	N-8410	Handle	.84
	354-B	Cabinet Back (Includes Hinge and retaining clips)	1.79
	N-8338	Hinge, Cabinet Back	.16
	N-8467	Spring Clip, Cabinet Back Retaining	.10
	N-8335	Knob, Tuning	.28
	N-8346	Knob, Volume	.28
	N-8649	Grille Cloth and Baffle	.80

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GENERAL DESCRIPTION

RADIO

- Six tubes including tube rectifier.
- Built-In loop antenna.
- Permanent Magnet Dynamic Speaker.
- Variable Tone Control.

PHONO

Motor Speeds of 33, 45 and 78 RPM.

Automatically plays either ten 12", twelve 10" or fourteen 7' records at either 33-1/3, 45 or 78 RPM.

Automatically shuts off after last record has played.

Automatically intermixes ten 10" and 12" records of sam speed.

Spindle adapters for 45 RPM record.

VM950 Changer —

ELECTRICAL SPECIFICATIONS

POWER SUPPLY — 110 to 120 volts 60 cycles (Alternating Current)

FREQUENCY RANGE — 540 to 1600 KC

INTERMEDIATE FREQUENCY — 455 KC

POWER OUTPUT — Undistored .8 Watt
Maximum 1.4 Watts

SENSITIVITY — 18 microvolts average for .05 watts output

SELECTIVITY — 1000 KC, 44 KC at 1000 X signal

LOUD SPEAKER — 8 Inch Round P.M.

VOICE COIL IMPEDANCE — 3.2 Ohms at 400 cycles

TUBE COMPLIMENT

12BA6	R. F. Amplifier
12BA6	I. F. Amplifier
12BE6	Converter
12AV6	Diode — 1st Audio
35C5	Power Output
35W4	Rectifier

520A

MODEL 35GSL-2770A

ALIGNMENT PROCEDURE

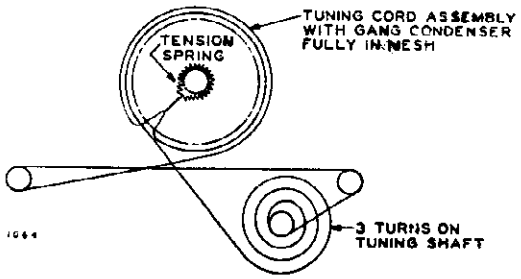
The signal source must be an accurately calibrated signal generator capable of supplying 455 Kc and up to 1620 Kc signals modulated 30% with a 400-cycle audio signal.

Volume control at maximum for all adjustments.

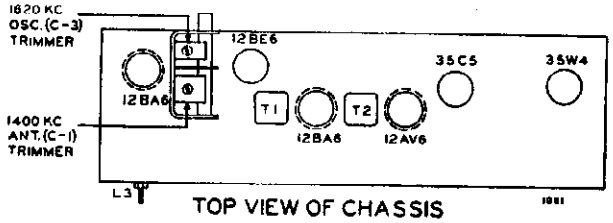
Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

Loop antenna should be connected to receiver and in its proper position when making the adjustments.

SIGNAL GENERATOR				TUNER SETTING	ADJUSTMENT
Frequency	Coupling Capacitor	Connection To Radio	Ground Connection		
455 Kc.	.05 MFD.	Pin 7 of 12BE6 Converter	B Minus Buss Lead	Any Point Near Center Where No Interfering Signal Is Received	Slugs at Top and Bottom of 2nd I. F. (T2) and then both Slugs of 1st I. F. (T1) for Maximum Output.
455 Kc.	—	Lay Generator Lead Near Loop	B Minus Buss Lead	Set At Maximum Capacity	I. F. Trap Slug (L3) for MINIMUM Output.
1620 Kc.	.05 MFD.	Antenna Stator Plates of Tuning Condenser	B Minus Buss Lead	1620 Kc.	Oscillator Trimmer of Gang (C3) for Maximum Output.
1400 Kc.	—	Lay Generator Lead Near Loop	B Minus Buss Lead	1400 Kc.	Antenna Trimmer of Gang (C1) For Maximum Output.



DIAL STRINGING

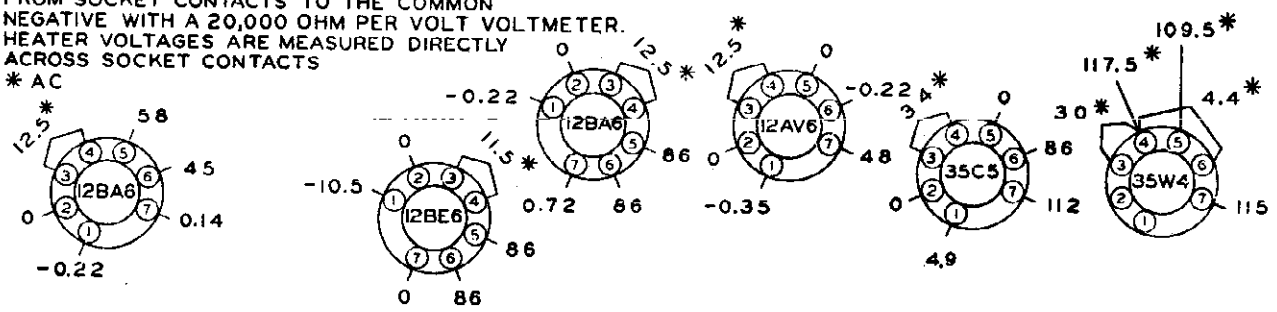


TOP VIEW OF CHASSIS

REAR OF CHASSIS

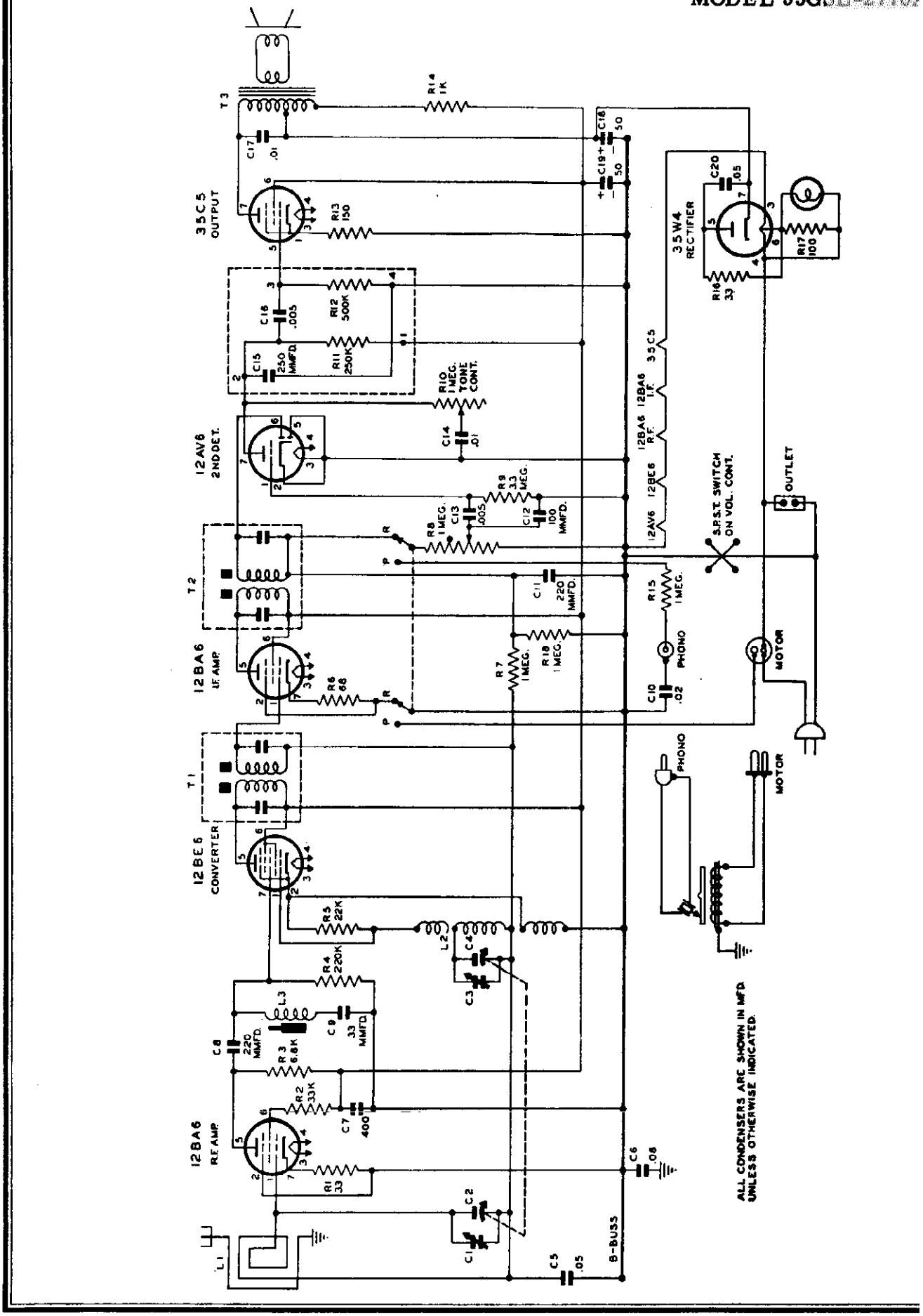
ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO THE COMMON NEGATIVE WITH A 20,000 OHM PER VOLT VOLTMETER. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS

* AC



VOLTAGE TABLE

(BOTTOM VIEW OF CHASSIS)


T3
R14 1K
C17 .01
C18 50
C19 50
35C5 OUTPUT
R13 150
C16 .005
R12 500K
C15 250 MMFD.
R11 250K
R10 1 MEG. TONE CONT.
C14 .01
12AV6 2ND DET.
R9 33 MEG.
C12 100 MMFD.
C13 .005
R8 1 MEG.
T2
C11 220 MMFD.
12BA6 I.F. AMP
R6 68
R7 1 MEG.
R18 1 MEG.
R15 1 MEG.
C10 .02
T1
12BE6 CONVERTER
R5 22K
R4 220K
L2
C4
C3
L3
C8 220 MMFD.
C9 33 MMFD.
R3 6.8K
R2 33K
C7 400
12BA6 R.F. AMP
R1 33
C2
C1
L1
C6 .06
C5 .05
B-BUSS
35W4 RECTIFIER
C20 .05
R16 33
R17 100
12BA6 I.F.
12BA6 R.F.
35C5
12BE6
12AV6
S.P.S.T. SWITCH ON VOL. CONT.
OUTLET
PHONO
MOTOR
ALL CONDENSERS ARE SHOWN IN MFD. UNLESS OTHERWISE INDICATED.

MODEL 35GSL-2770A

REF. NO.	PART NO.	DESCRIPTION	PRICE EACH
		CONDENSERS	
C1, C3		Trimmers on Gang Condenser	
C2, C4	N-9658	Assembly, Variable Gang Condenser & Pulley	$2.38
C5		Paper .05 MFD. 200 Volts	
C6	N-8092	Paper .08 MFD. 200 Volts	.19
C7, C17, C14		Paper .01 MFD. 400 Volts	
C8, C11	N-9655	Ceramic 220 MMFD. 500 Volts 20%	.14
C9	N-9577	Ceramic 33 MMFD. 600 Volts 10%	.14
C10		Paper .02 MFD. 400 Volts	
C12		Ceramic 100 MMFD. 500 Volts 10%	
C13, *C16		Paper .005 MFD. 600 Volts	
*C15		Ceramic 250 MMFD. 500 Volts	
C18, C19	N-9641	Electrolytic { 50 MFD. 150 Volts / 50 MFD. 150 Volts }	1.80
C20		Paper .05 MFD. 400 Volts	
		RESISTORS	
R1		33 Ohms ½ Watt 10%	
R2		33K Ohms ½ Watt 10%	
R3		6800 Ohms ½ Watt 10%	
R4, *R11		220K Ohms ½ Watt 20%	
R5		22K Ohms ½ Watt 20%	
R6		68 Ohms ½ Watt 10%	
R8	N-9639	Volume Control & Switch 1.0 Megohm	.97
R7, R15, R18		1 Megohm ½ Watt 20%	
R9		3.3 Megohms ½ Watt 20%	
R10	N-9642	Variable Tone Control 1.0 Megohm	.65
*R12		470K Ohms ½ Watt 20%	
R13		150 Ohms ½ Watt 10%	
R14		1000 Ohms 1.0 Watt 10%	
R16		33 Ohms ½ Watt 20%	
R17		100 Ohms ½ Watt 20%	
		TRANSFORMERS & COILS	
T1, T2	N-9657	1st & 2nd I. F. Transformers	1.28
T3	N-9664	Output Transformer	1.73
L1	N-9652	Loop Antenna Coil	1.40
L2	N-8709	Oscillator Coil	.70
L3	N-9650	I. F. Trap Coil	.70
		MISCELLANEOUS PARTS	
	N-8215	Audio Couplate (R11, R12, C15, C16)	.42
	N-9651	8" P.M. Speaker	**7.26
	N-7334	Tube Socket, 7 Pin Miniature W/ Center Shield	.14
	N-7336	Tubes Socket, 7 Pin Miniature W/O Center Shield	.14
	N-1147	Dial Lamp	.16
		Cartridge Shure P76V — 60H24 W/Needles	
		Needle (For 78 RPM Records) 61H29 Sapphire	
		Needle (For 33-45 RPM Records) 61H30 Sapphire	
	N-1090	Line Cord & Plug	.46
	N-7925	Fiber 45 RPM Record Adapter	.14
	N-9648	Dial Scale	.32
	N-9629	Dial Pointer	.24
	N-9732	Knob, Volume, Tuning, Tone & Switch	.14

* Replacement Parts for Couplate N-8215
** Excise Tax Included

NOTE: Use Universal Parts Where No Part Numbers or Prices Are Shown.

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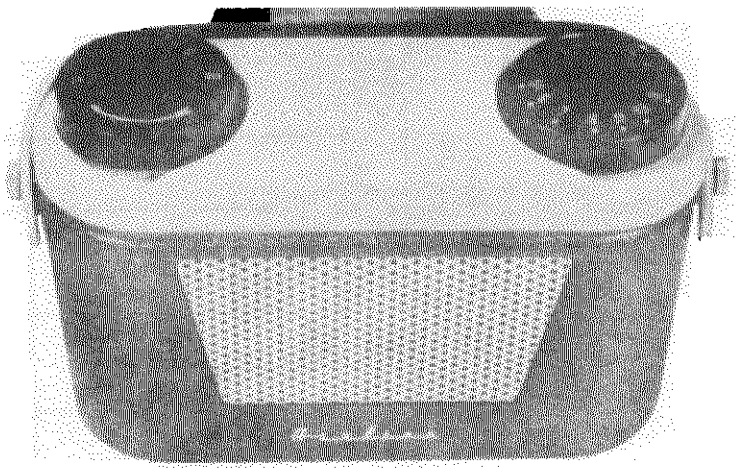


GENERAL

This radio is a personal receiver for broadcast reception, operated from batteries only. It has a tuning Range from 540 to 1640 KC and is equippe with the latest type Ferrite antenna.

TUBE COMPLIMENTS:	1R5—Converter 1T4 or 1L4 I.F. Amplifier 1U5 Det.—AVC 1st A.F. 3V4 Power Amp.
POWER SUPPLY:	Batteries as listed on pg.
POWER OUTPUT:	70 Milliwatt undistorted
SPEAKER:	3½" P.M.—V.C. impedance 3.2 ohm
SENSITIVITY:	320 Microvolts per meter for .05 watt output

BATTERY REQUIREMENTS

The following batteries are required:

QUANTITY	TYPE	MANUFACTURER
2	1½ Volt "A"	Airline #62-23 Everead size "D", Burgess # Ray-O-Vac size "D or equivalent.
1	67½ Volt "B"	Airline #62-43 Everead #467, Burgess typ XXD, Ray-O-Vac typ #4367 or equivalent

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

The equipment in column at right is required for aligning:

Signal Generator which will provide an accurately ca brated signal at the test frequencies as listed.
Output Indicating Meter: Non-Metallic Screwdriver.
Dummy Antenna —.1 mf.

Frequency Setting	SIGNAL GENERATOR Coupling Capacitor	SIGNAL GENERATOR Connection to Radio	Ground Connection	Variable Condenser Setting	ADJUST TRIMMERS TO MAXIMUM See Trimmer Illustration
455 KC	.1	CONTROL GRID OF 1R5	TO CHASSIS	CLOSED	1st AND 2nd I.F. A1 - A2 - A3 - A4
540 KC	.1	CONTROL GRID OF 1R5	TO CHASSIS	CLOSED	OSCILLATOR COIL SCREW
1640 KC	.1	CONTROL GRID OF 1R5	TO CHASSIS	WIDE OPEN	OSCILLATOR TRIMMER A5
1400 KC	.1	CONTROL GRID OF 1R5	TO CHASSIS	TO 1400 KC SIGNAL	ANTENNA TRIMMER A6

MODEL 15GHM-1067A

BATTERY INSTALLATION

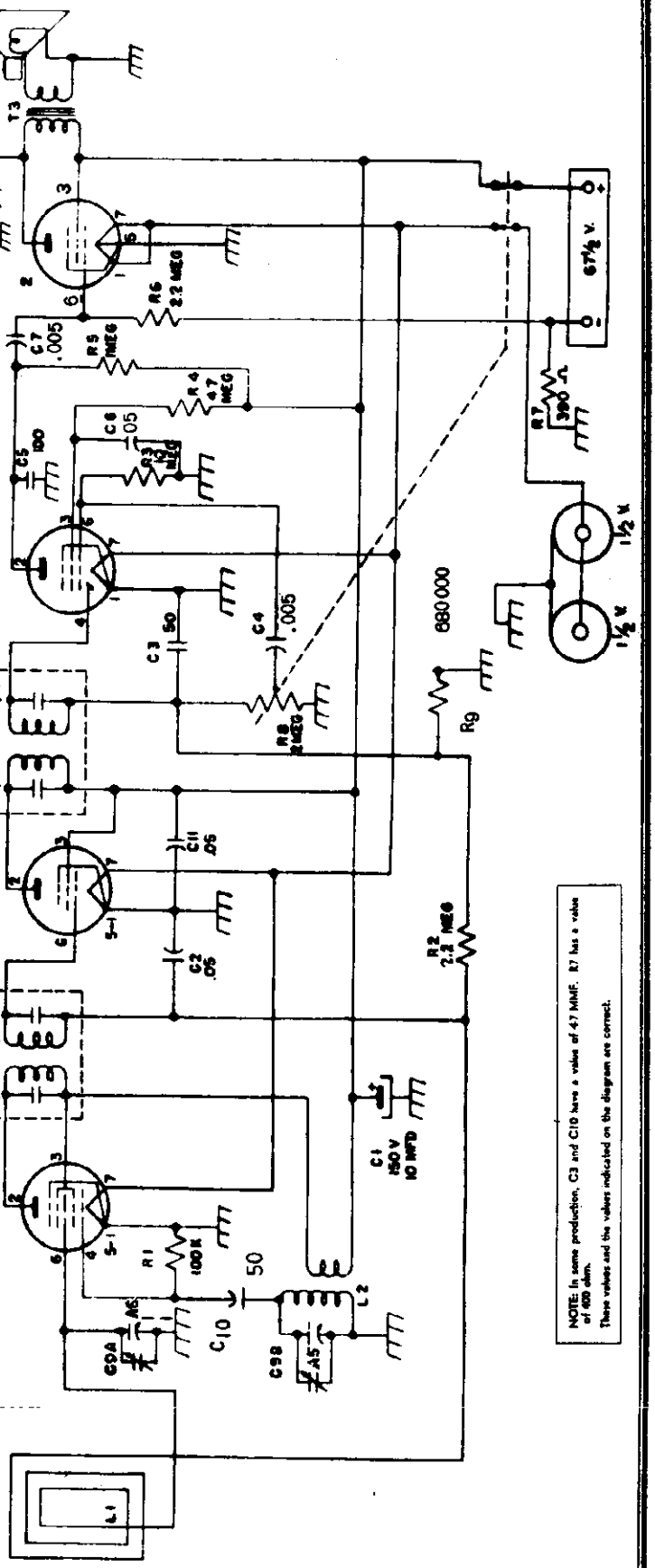
"A" Batteries:

Set radio on a table or solid object. Unscrew the thumb screws which hold the handle in place. Lift out Radio chassis carefully. Remove "A" batteries from the battery container and replace. Replace radio chassis with top cover carefully back in the cabinet. Replace thumb screws through handle slots.

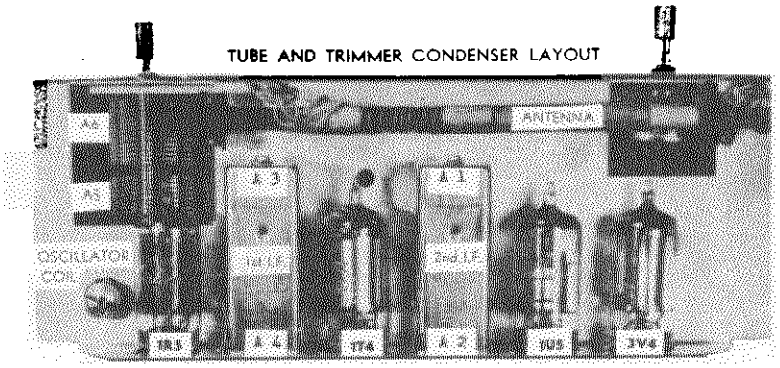
"B" Batteries:

Follow same procedure as above except detach "B" battery terminal clip and snap on fresh battery. Re-assemble as instructed in previous paragraph.

SCHEMATIC DIAGRAM FOR MODEL 15-GHM-1067A



TUBE AND TRIMMER CONDENSER LAYOUT



HOW TO ORDER REPAIR PARTS

Repair Parts may be ordered from your nearest Wards Retail Store, Catalog Order Office, or Mail Order House. To have your order filled promptly and correctly, please furnish the following information:

1. **Model Number** which appears on nameplate.*
2. **Part Number and Name of Part** (see Repair Parts List).

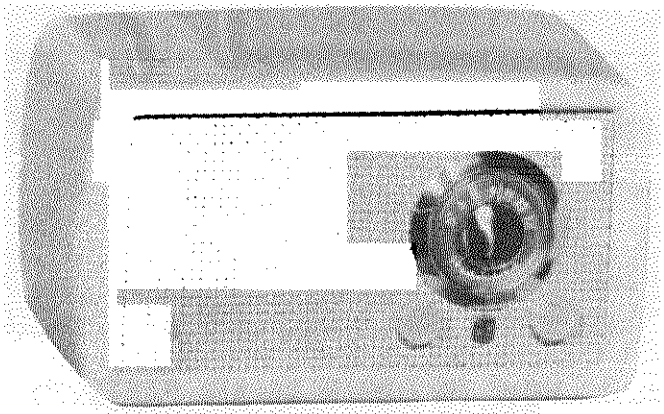
You pay charges from shipping point. Shipping charges are based on size and total weight of order. Use any one of the following shipping methods:

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PRICE
		CONDENSERS	
C1	1067-99	10 MFD—100 Volt	.64
C6-C2-C11	1067-100	.05—150 Volt	.26
C3-C10	1067-101	50 MMF—150 Volt	.26
C5	1067-103	100 MMF—150 Volt	.26
C7-C4	1067-105	.005—150 Volt	.26
C8	1067-106	.001—150 Volt	.26
C9-A C9-B	1067-107	Variable Condenser	1.60
		RESISTORS	
R1	1067-108	100K—1/4 Watt	.20
R2-R6	1067-109	2.2 Meg.—1/4 Watt	.20
R3	1067-110	10 Meg.—1/4 Watt	.20
R4	1067-111	4.7 Meg.—1/4 Watt	.20
R5	1067-112	1 Meg.—1/4 Watt	.20
R7	1067-113	390 Ohms—1/4 Watt	.20
R8	1067-114	Volume Control and Switch 2 Meg.	1.00
R9	1067-114-A	680 K—1/4 Watt	.20
		MISCELLANEOUS	
L1	1067-115	Antenna Assembly	1.24
L2	1067-116	Oscillator Coil Assemb'y	.60
SPR	1067-117	Speaker 3 1/4" P.M. with Output Transformer T3	3.80
T1 T2	1067-118	I.F. Transformer	1.40
	1067-119	Cabinet	6.50
	1067-120	Handle	1.00
	1067-121	"A" Battery Container	.76
	1067-123	"B" Battery Clips & Terminal Strip	.30
	1067-124	Dial "Tuning"	.76
	1067-125	Dial "Volume"	.76
	1067-126	Handle Thumb Screw	.26
	1067-127	Socket, Tube	.10

IMPORTANT—All prices in this literature are subject to change without notice and are subject to an additional charge to cover any applicable sa
tax, use, occupation, or other tax affecting our purchase or sale of merchandise.

Model 25GSE-1555A,
25GSE-1556A



ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

(A) Check tuning dial adjustment by tuning gang condenser until plates are completely in mesh, at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.

(B) Use an accurately calibrated test oscillator with some type of output measuring device.

(C) When the chassis is removed from the cabinet the loop must be mounted on the loop mounting brackets, and the two wires connected to the loop.

(D) When aligning the 1660 KC OSCILLATOR TRIMMER or the 1400 KC ANTENNA TRIMMER, couple test oscillator to receiver loop by: (1) make loop consisting of five to ten turns of NO. 20 to NO. 30 size wire, wound on a 2″ to 3″ form; (2) connect this loop across output of test oscillator; (3) place test oscillator loop near radio loop. BE SURE THAT NEITHER LOOP MOVES WHILE ALIGNING.

The 1400 KC ANTENNA TRIMMER should only be adjusted after all other adjustments are made.

ELECTRICAL SPECIFICATIONS

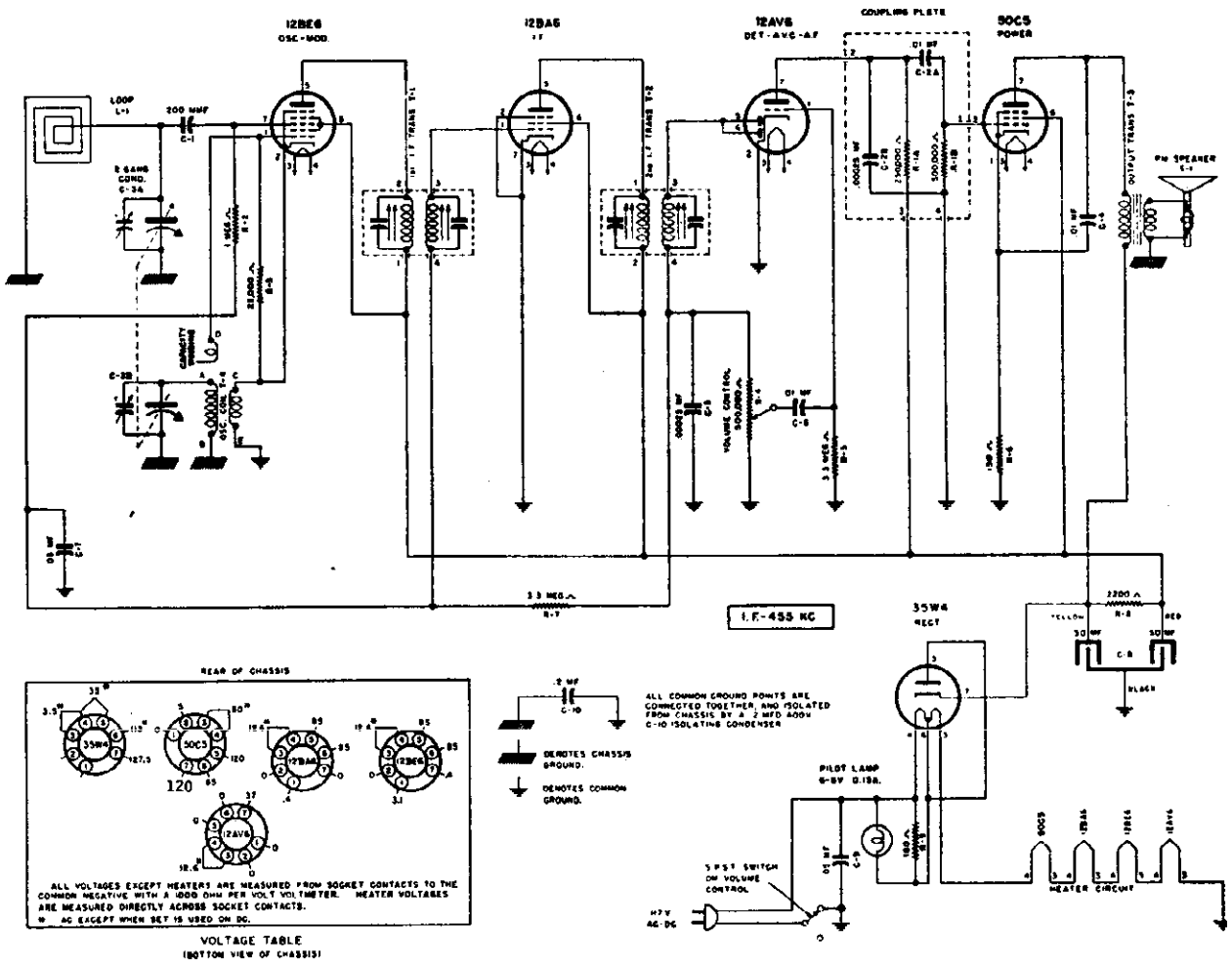
POWER SUPPLY	VOLTAGE: 110-120 Volt Direct Current or 110-120 Volt 50-60 cycle Alternating Current. 35 Watts.	
TUNING RANGE		540 to 1660 KC
INTERMEDIATE FREQ.		455 K.C.
I.F. STAGES		One
LOUD SPEAKER		5" P.M.
VOICE COIL IMPEDANCE		3.2 OHM
POWER OUTPUT	Undistorted	.09 Watts
	Maximum	1.5 Watts

TUBE COMPLEMENT

1	12BE6	MODULATOR:OSCILLATOR
1	12BA6	I.F. AMPLIFIER
1	12AV6	DETECTOR, AVC, 1ST AUDIO
1	50C5	POWER OUTPUT
1	35W4	RECTIFIER

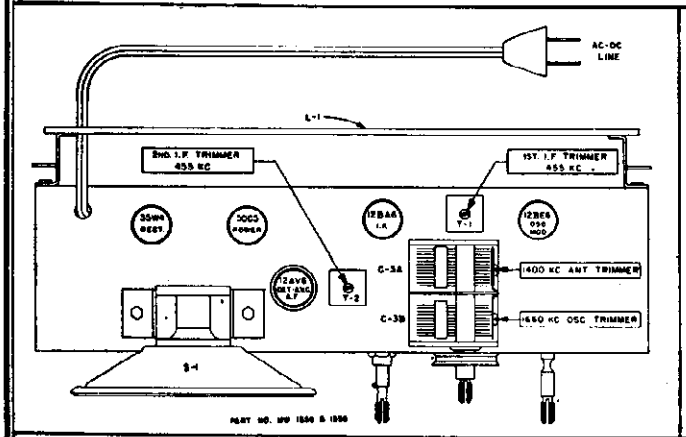
Model 25GSE-1555A
25GSE-1556A

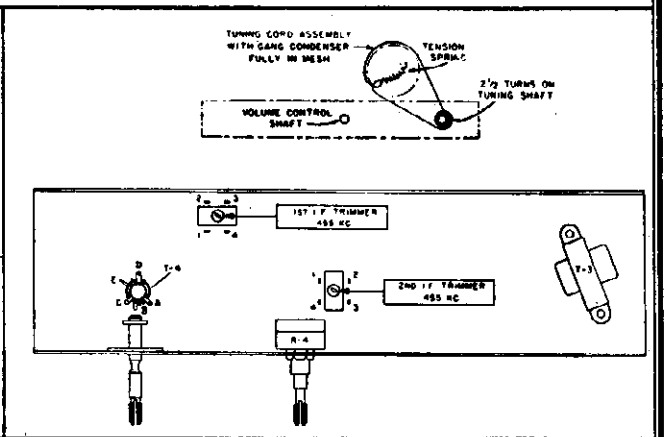
Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to rear stator plates of tuning condenser. Low side to common negative.	Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.
2	Exactly 1660 K. C.	Exactly 1660 K. C.	See paragraph (D) above.	See paragraph (D) above.	Adjust 1660 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	See paragraph (D) above.	See paragraph (D) above.	Adjust 1400 K. C. antenna trimmer for maximum output.



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

Model 25GSE-1555A, 25GSE-1556A





HOW TO ORDER PARTS—Should it be necessary to write us or to order any repair parts, it is **important** that the **complete model number** which appears on the label attached to the back of the radio chassis **be specified.** Repair parts should be ordered from your nearest Wards Retail Store, Catalog Order Office or Mail Order House.

PARTS LIST

Ref. No.	Part No.	DESCRIPTION	Selling Price
		CAPACITORS	
C-1	MW23E18	Fixed Ceramic, 200 MMF 500 V.	$0.18
C-2A, C-2B		Part of MW23E2041-2 Couplate (See Misc. Parts)	
C-3A, C-3B	MW24E58	Capacitor, 2 gang Condenser	2.70
C-4	MW23E411	Tubular, .01 MFD 400 V.	.20
C-5	MW23E2027	Fixed Ceramic, .00025 MF 500 V.	.30
C-6	MW23E211	Tubular, .01 MFD 200 V.	.20
C-7	MW23E216	Tubular, .05 MFD 200 V.	.22
C-8	MW25E24	Electrolytic, 50-50 MFD 150 V.	2.10
C-9	MW23E416	Tubular, .05 MFD 400 V.	.24
C-10	MW23E2021	Tubular, .2 MFD 400 V.	.80
		RESISTORS	
R-1A, R-1B		Part of MW23E2041-2 Couplate (See Misc. Parts)	
R-2	MW27E105	Carbon, 1 Megohm 1/3 W.	.06
R-3	MW27E223	Carbon, 22,000 Ohm 1/3 W.	.06
R-4	MW28E82	Control, Volume, 500,000 Ohm	1.06
R-5, R-7	MW27E335	Carbon, 3.3 Megohm 1/3 W.	.06
R-6	MW27E151	Carbon, 150 Ohm 1/3 W.	.06
R-8	MW27E222-5	Carbon, 2200 Ohm 2 W.	.22
R-9	MW27E181-2	Carbon, 180 Ohm 1/2 W.	.06
		COILS AND TRANSFORMERS	
T-1, T-2	MW20E732	1st & 2nd I.F. Transformer	1.56
T-3	MW22E49-2	Transformer, Output	1.50
T-4	MW20E733	Coil, Oscillator	1.34
L-1	MW7E308	Cabinet Back & Loop	1.22

Ref. No.	Part No.	DESCRIPTION	Selling Price
		MISCELLANEOUS	
	MW1E50	Speaker, 5" P.M.	5.42
	MW23E2041-2	Ceramic Coupling Plate	.62
	MW41E14	Line Cord and Plug Assembly	.54
	MW17E1-31	Tube Socket, Miniature for 35W4, 50B5 or 12AT6	.16
	MW17E1-22	Tube Socket, Miniature for 12BA6 or 12BE6	.14
	MW7E306-2	Cabinet, Green	8.92
	MW7E306-3	Cabinet, White	8.92
	MW10E42	Trimount Stud	.02
	MW20E736	Baffle Assembly for Green Cabinet	3.92
	MW20E736-2	Baffle Assembly for White Cabinet	4.14
	MW35E32	Dial Pointer	.50
	MW37E76	Knob for Green Cabinet	.24
	MW37E76-2	Knob for White Cabinet	.24
	MW48E25	Dial Bezel for Green Cabinet	1.76
	MW48E25-2	Dial Bezel for White Cabinet	1.76
	MW20E348-9	Dial Drive Shaft & Bracket Assembly	.34
	MW20E253-39	Dial Drive Cord	.12
	MW65E2	Dial Cord Tension Spring	.06

PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

MODELS 52M1U, 52M2
52M3U, Ch. HS-300

GENERAL INFORMATION

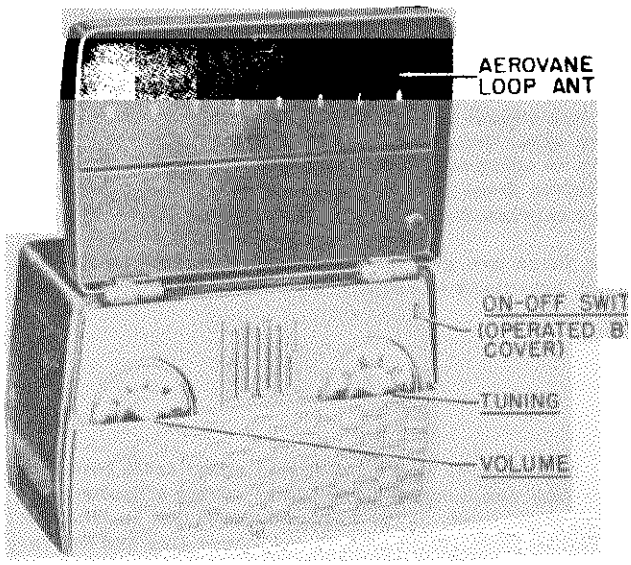
TYPE - Three-power (AC/DC, Battery) portable radio receiver. Four miniature type tubes and a selenium rectifier are used in a superheterodyne circuit.

RECEIVER MODELS	Model	Color
	52M1U	Green
	52M2U	Maroon
	52M3U	Gray

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY -

Operates from 117V AC/DC (15 watts)
or from the following batteries:
2-1-1/2 volt flashlight cells
Use: Eveready 950
or Burgess 2
or Ray-O-Vac 2LP
or any equivalent size "D" flashlight cell.
1-67-1/2 volt "B" battery
Use: Eveready 467
or Burgess XX45
or Ray-O-Vac 4367
or equivalent.



TUBE COMPLEMENT - Type	Function
1R5	Converter
1U4	IF Amplifier
1U5	Det, AVC & 1st AF Am
3S4	Power Amplifier
Rectifier	Selenium type -for AC/DC operation

OPERATING INSTRUCTIONS

TO OPEN FRONT COVER. The front cover is opened by pushing up on the cover release button, located in the center of the front cover. The receiver is automatically turned on when the front cover is opened and raised to a vertical position.

TO OPEN BACK COVER. The back cover is opened by grasping it at the top and gently pulling cover open. When closing the cover, be careful not to pinch the power line cord or other leads between the cover and the cabinet.

HOUSE CURRENT OPERATION. The power cord is located inside the cabinet and can be reached by opening the back cover. Pass the line cord through the slot on the side of the receiver before closing the cover. Plug the power cord into any 117 volt AC or DC power outlet. Reverse the line cord plug in power outlet if the receiver does not operate from DC power. When operating from AC power, reception may sometimes be improved by reversing the power plug in power outlet. It is not necessary that batteries be installed if the receiver is to be operated only from house power lines.

BATTERY OPERATION. Open the back cover and install batteries by following the instructions found on label located on back cover or as shown in Figure 2. Plug the power line cord into the receptacle on the receiver chassis, as shown on label, or the receiver will not play from batteries. If the receiver is to be operated for a long period of time from AC or DC house power lines, or is to be placed in storage, remove the batteries and store them in a cool place.

IMPORTANT: Never leave low or run-down batteries your receiver because they will leak or swell and dam your receiver.

TUNING CONTROL. Stations are tuned in with the rig hand knob. Tune carefully until you are exactly on a s tion; tuning to either side of it will result in poor tone qu ity and excessive noise. Do not regulate volume by detun the station; always tune exactly on the station, then adj volume control to desired loudness.

VOLUME CONTROL. The left-hand knob controls volur

Rotation to the right will increase volume; rotation to left will decrease it.

TO TURN OFF. Closing the front cover will automatica turn off the receiver.

ANTENNA. A super-sensitive "Aerovane" loop antenna built into the front cover of this receiver. Because of slightly directional characteristics of the loop antenna, ception from some stations may be improved by rotating receiver. In extremely noisy locations, rotate the receiv until minimum noise and maximum signal pick-up is tained.

BATTERY REPLACEMENT. If low volume or fuzzy t is noticed when operating from batteries, replace the fla light cells. Normally, the 67-1/2 volt "B" battery will l for 3 or 4 changes of the flashlight cells.
NOTE: The condition of the batteries will not affect oper tion of receiver from 117 volts AC or DC. Complete b tery replacement instructions will be found inside the r ceiver back cover.

MODELS 52M1U, 52M2U,
52M3U, Ch. HS-300

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor-choke assembly to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

The tubes are exposed when the rear cover is opened. It is not necessary to remove the chassis to replace tubes.

TO REMOVE THE CHASSIS FROM THE CABINET:

1. Open the rear cover and remove the batteries.
2. Remove the two hex head screws that mount the chassis to the cabinet.
3. Slide the chassis from the cabinet.
4. Disconnect the two loop antenna leads from the hinges.

ALIGNMENT

NOTE: The receiver may be operated either from batteries or from the commercial power lines during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. Adjust the signal generator output to produce .40 volts (.05 watts) across the voice coil. As stages are aligned, to avoid overloading the receiver, reduce the generator output to maintain the .40 volt level.
7. See Figure 1 for adjusting locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv (pin 6, 1R5)	455 Kc	Fully open	1, 2 & 3 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv (pin 6, 1R5)	1620 Kc	Fully open	4 (Osc)	Adjust for maximum.
3.	-	-	-	-	-	Install chassis in cabinet, leaving output meter connected to speaker.
4.	-	Radiation loop*	1400 Kc	Tune for max	5 (Ant)	Adjust for maximum. Trimmer is reached through hole under plug button on side of cabinet.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

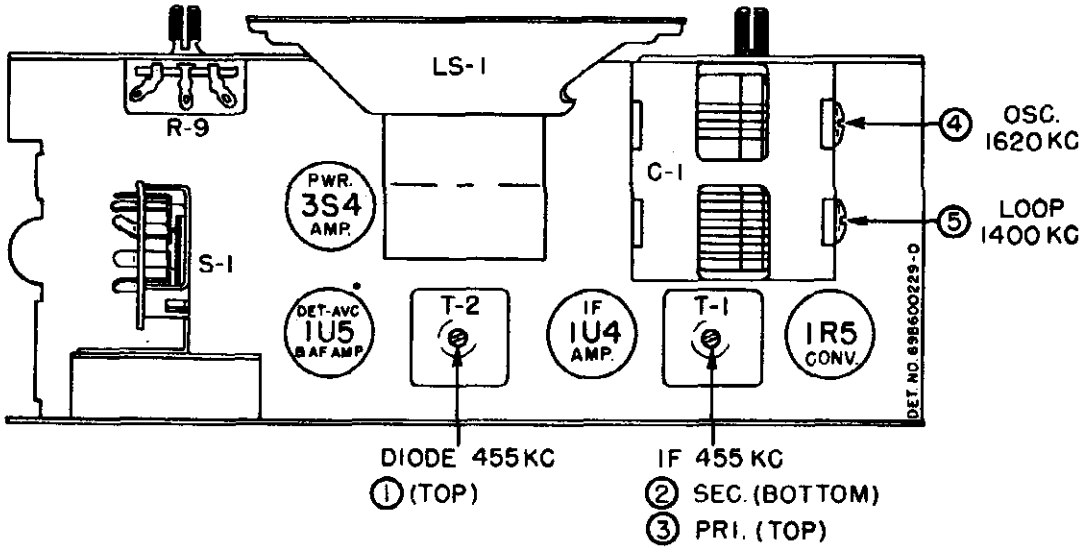


FIGURE 1. TUBE AND TRIMMER LOCATIONS

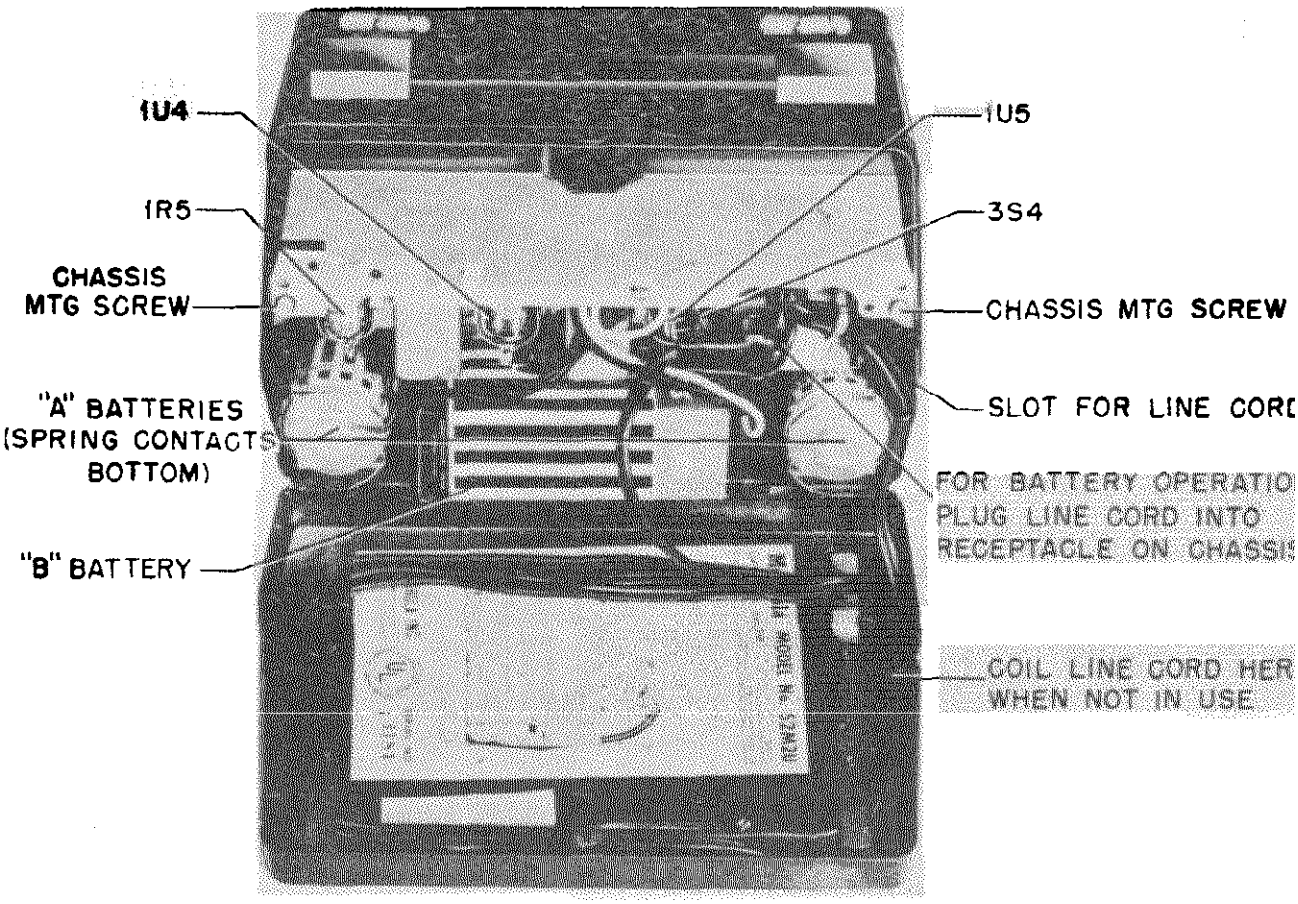
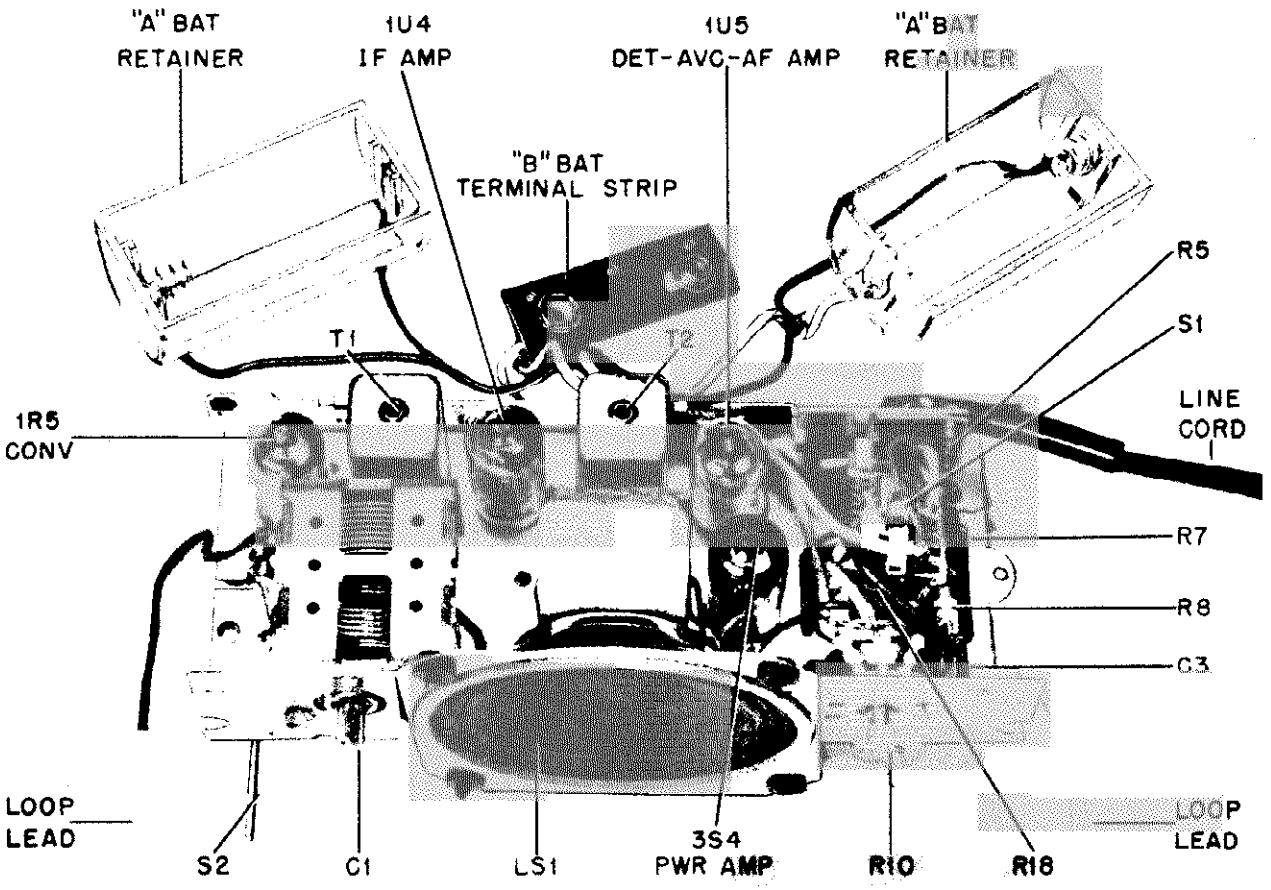


FIGURE 2. REAR VIEW OF RECEIVER

MODELS 52M1U, 52M2U,
52M3U, Ch. HS-300



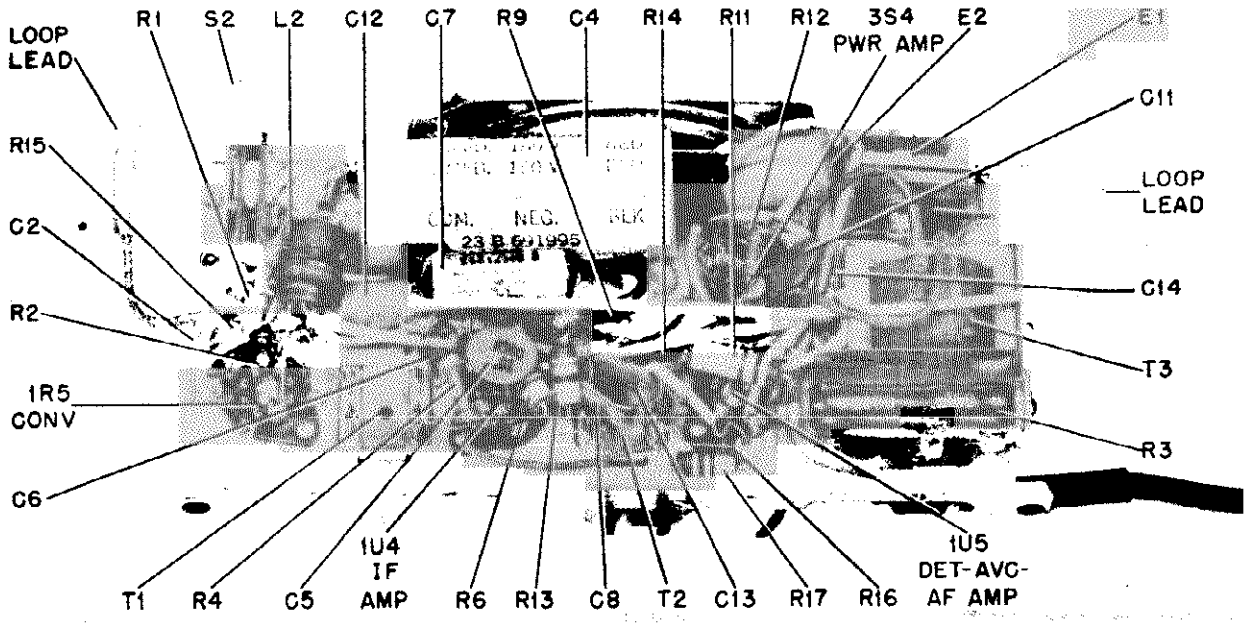


FIGURE 3. PARTS LOCATIONS

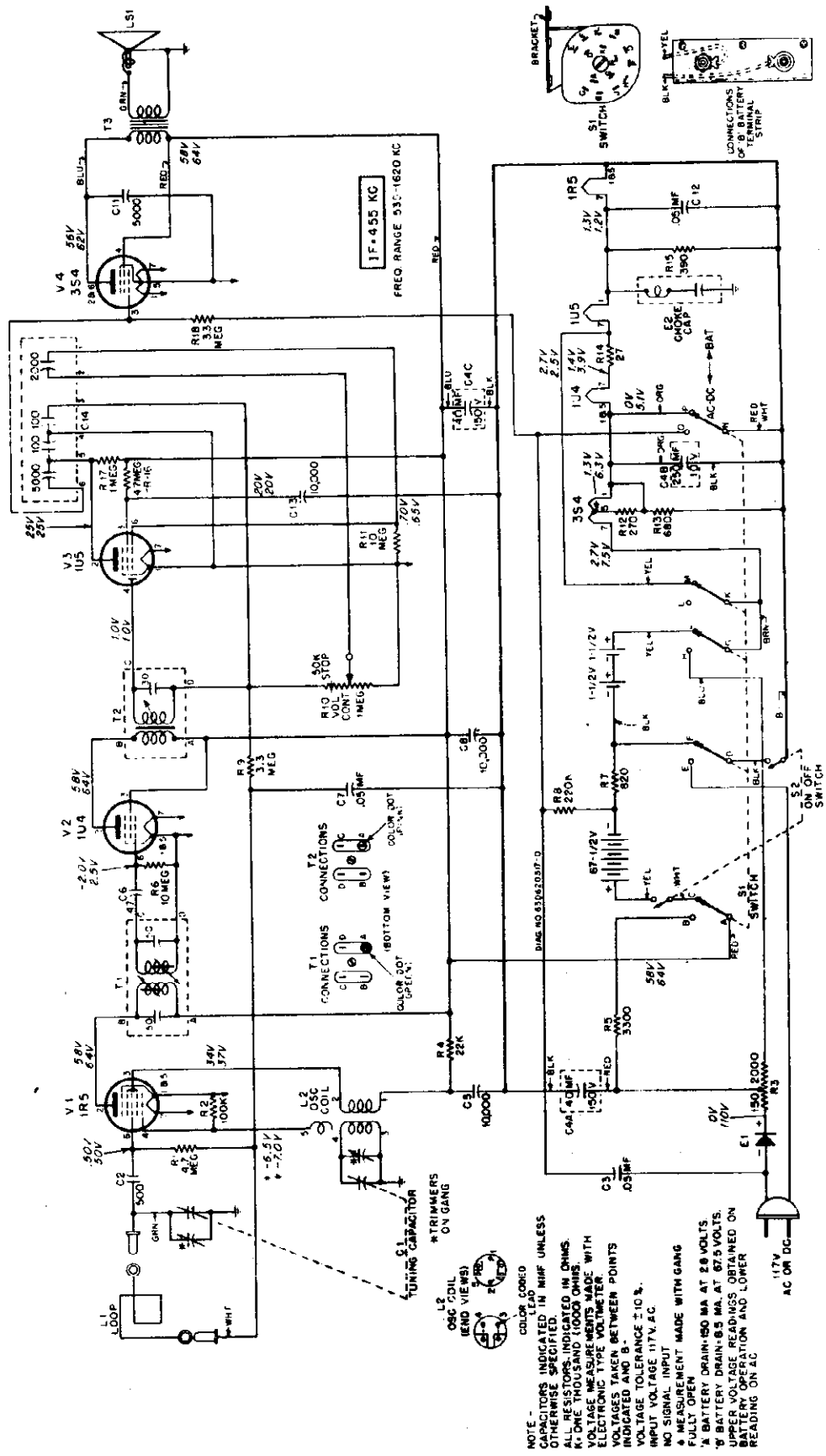


FIGURE 4. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 52M1U, 52M2U
52M3U, Ch. HS-300

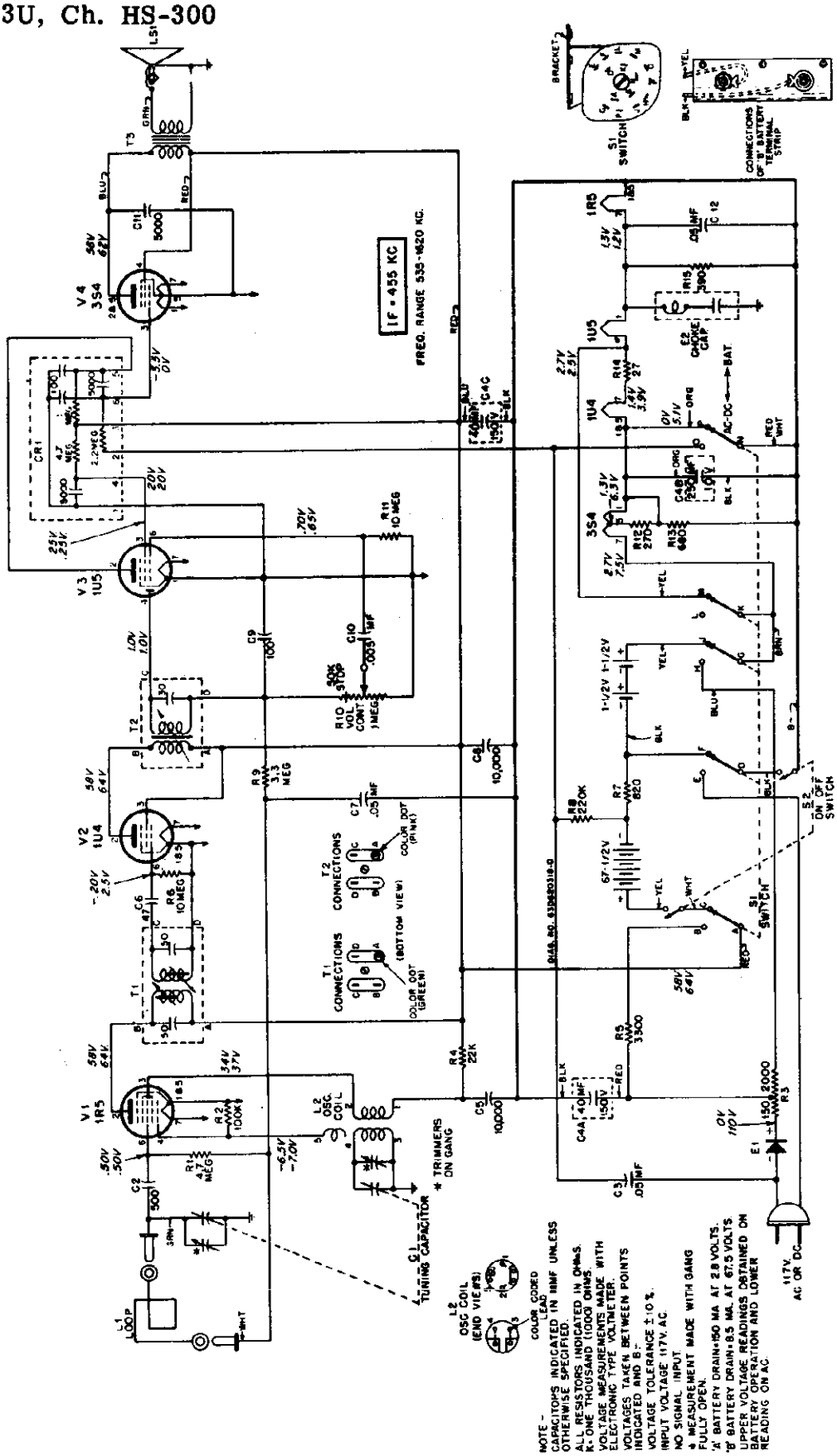


FIGURE 5. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR PLATE

PARTS LIST

NOTE: When ordering parts, specify model and chassis numbers of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	19K692007	Variable, 2-gang.....	2.50
C-2	21K481377	Ceramic: 500 mmf 500V.....	.20
C-3	8K471635	Paper: .05 mf 400V.....	.20
C-4	23B691995	Electrolytic: 40-40 mf 150V/250 mf 10V.....	1.75
C-5	21K482726	Ceramic, disc type: 10,000 mmf 450V.....	.30
C-6	21K77373	Ceramic: 47 mmf 500V.....	.20
C-7	8K71213	Paper: .05 mf 100V.....	.20
C-8	21K482726	Ceramic, disc type: 10,000 mmf 450V.....	.30
C-9	21B77286	Ceramic: 100 mmf 100V.....	.20
C-10	8K24966	Paper: .005 mf 100V.....	.20
C-11	21R115312	Ceramic, disc type: 5000 mmf 450V.....	.25
C-12	8K71213	Paper: .05 mf 100V.....	.20
C-13	21K482726	Ceramic, disc type: 10,000 mmf 450V.....	.30
C-14	21K691992	Ceramic, multiple: 2000 mmf, 100 mmf, 100 mmf, 5000 mmf.	.65
Capacitor-Resistor			
CR-1	21B601036	Capacitor-Resistor: 5000 mmf, 5000 mmf, 100 mmf, 100 mmf, 4.7 meg, 2.2 meg, 1 meg....	.65
Choke Capacitor			
E-2	24K691986	Choke & .05 mf 200V paper capacitor.....	.40
Rectifier			
E-1	48B791092	Selenium Rectifier: half-wave.....	1.40
Coils			
L-1	1X610665	Antenna Loop & Front Cover Assembly: complete; green plastic (52M1U).....	5.25*
	1X610666	Antenna Loop, Panel & Hinge Assembly: less front cover; green plastic (52M1U).....	2.90*
	24K601803	Antenna Loop & Panel Assembly: less hinges; green plastic (52M1U).....	1.40*
	1X610682	Antenna Loop & Front Cover Assembly: complete; maroon plastic (52M2U).....	5.25*
	1X610683	Antenna Loop, Panel & Hinge Assembly: less front cover; maroon plastic (52M2U).....	2.90*
	24B601802	Antenna Loop & Panel Assembly: less hinges; maroon plastic (52M2U).....	1.40*
	1X611241	Antenna Loop & Front Cover Assembly: complete; gray plastic (52M3U).....	5.25*
	1X611253	Antenna Loop, Panel & Hinge Assembly: less front cover; gray plastic (52M3U).....	2.90*
	24K620032	Antenna Loop & Panel Assembly: less hinges; gray plastic (52M3U).....	1.40*
L-2	24K610513	Oscillator coil (yellow code)	.85

Ref. No.	Part Number	Description	List Price
Speaker			
LS-1	50K600141		
or	50K600142		
or	50B610112	Speaker: 3-1/2" PM; 3.2 ohm VC.....	3.75
		exch	2.80
Resistors			
		Note: All resistors are insulated, carbon type unless otherwise specified.	
R-1	6R2122	4.7 meg 20% 1/2W.....doz	1.20
R-2	6R6031	100,000 10% 1/2W.....doz	1.20
R-3	17K692009	Wire wound: 2150 5% 10W; tapped.....	1.05
R-4	6R6397	22,000 10% 1/2W.....doz	1.20
R-5	6R5581	3300 10% 1/2W.....doz	1.20
R-6	6R2109	10 meg 20% 1/2W.....doz	1.20
R-7	6R6269	820 10% 1/2W.....doz	1.20
R-8	6R6015	220,000 20% 1/2W.....doz	1.20
R-9	6R2118	3.3 meg 20% 1/2W.....doz	1.20
R-10	18A691993	Volume control: 1 meg.....	.80
R-11	6R2109	10 meg 20% 1/2W.....doz	1.20
R-12	6R6432	270 10% 1/2W.....doz	1.20
R-13	6R6040	680 10% 1/2W.....doz	1.20
R-14	6R5683	27 10% 1/2W.....doz	1.20
R-15	6R5554	390 10% 1/2W.....doz	1.20
R-16	6R2122	4.7 meg 20% 1/2W.....doz	1.20
R-17	6R6004	1 meg 20% 1/2W.....doz	1.20
R-18	6R2118	3.3 meg 20% 1/2W.....doz	1.20
Switches			
S-1	40B471927	Rotary Switch, 5 PDT (AC/DC-Battery selector).....	1.15
S-2	40K601702	Slide Switch (on-off).....	.50
Transformers			
T-1	24K600824	IF Transformer, 455 Kc: complete with capacitors...	1.05
T-2	24K600825	Diode Transformer, 455 Kc: complete with capacitor....	1.05
T-3	25K692006	Output Transformer.....	.95

Part Number	Description	List Price
CHASSIS PARTS - MECHANICAL		
43A692011	Bushing, insulator: fibre (chassis mtg screw insulators).....doz	.40
43A692012	Bushing, line cord strain relief (use with 43K692013).....	.05
42K75826	Clip, electrolytic mtg.....doz	.40
42A485548	Clip, IF transformer mtg.....doz	.20
30K601777	Cord, line: with plug; 6 ft long..	.90
29R3020	Lug, soldering: battery contact (in "A" battery retainer).....doz	.20
9A470980	Receptacle, loop (on loop leads)doz	.25
15B481896	Retainer, "A" battery; plastic....	.15
43K692013	Retainer, strain relief bushing (on line cord bushing).....	.05
26B692001	Shield, back (on rear of chassis).	.15

MODELS 52M1U, 52M2U, 52M3U, Ch. HS-300

Part Number	Description	List Price
26A692005	Shield heat (around R-3).....doz	.30
26B691996	Shield, switch (over AC/DC-Battery switch).....	.20
9A690129	Socket, tube: miniature; 7-prong..	.15
41K680029	Spring, battery contact (in "A" battery retainer).....doz	.20
31K470880	Strip, "B" battery terminal: with leads.....	.40
31K37504	Strip, terminal: 1 insulated lug, #1 mtg.....	.05
31K470746	Strip, terminal: 3 insulated lugs, #2 mtg.....	.05
4K470939	Washer, fibre (R-3 mtg).....per/c	.50

MODEL 52M1U CABINET PARTS

Part Number	Description	List Price
35B611249	Baffle, speaker: cardboard.....	.05
38B601741	Button, cover release (on front cover).....	.15
38K692050	Button, plug: green finish (loop trimmer adj hole cover).....	.10
1X610664	Cabinet: complete; less handle, grille and antenna loop and front cover assembly; green.....	7.55*
55A692058	Cover, handle mtg (over ends of handle).....	.40
55A27113	Foot, cabinet bottom: felt.....doz	.60
1X610667	Front Cover Assembly: complete; less loop; green plastic.....	1.90
1X610668	Grille Assembly: complete with latch retainer stud, upper & lower speaker grilles.....	2.20
13A610656	Grille, speaker (upper).....	.10
13B610657	Grille, speaker (lower).....	.20
55K692166	Handle, carrying: green plastic; less spring.....	.20
55C601756	Hinge, front cover: complete; left-hand.....	1.30
55K601757	Hinge, front cover: complete; right-hand.....	1.30
55K30198	Hinge, rear cover.....doz	.25
14A601753	Insulator, cap: plastic (on grille assembly lugs).....	.05
14A601752	Insulator, hinge.....	.05
36C601724	Knob, control (tuning).....	.55
36K601725	Knob, control (volume).....	.55
1X601765	Latch and Plate Assembly (inside front cover).....	.30
4S8406	Lockwasher, int: #2 (loop)...per/c	.50
4S7695	Lockwasher, int: #5 (handle mtg) .....per/c	.50
29R5399	Lug, soldering (under front hinge, for loop connection).....per/c	.50
64C610735	Plate, background (behind control knobs).....	.55
64A692191	Plate, handle mtg (under handle mtg covers).....doz	.35
5S8487	Rivet: .088 x 3/32; stl; blk nkl (rear cover hinges & latch spring mtg).....per/c	.50
5S7770	Rivet: .088 x 5/32; stl; nkl pl (hinge insulator mtg).....per/c	.50
5S7786	Rivet: .088 x 3/16; stl; blk nkl (front hinge mtg).....per/c	.50
3S8144	Screw, self-tapping: #2 x 3/16; Phillips flat head; ant cop (mounts loop to front cover) .....per/c	1.00
3S400356	Screw, sheet metal: #4 x 1/4 hex head (chassis mtg).....per/c	.50
3S2995	Screw, machine: 5-40 x 5/16 pl hex head (handle mtg).....per/c	.50
41A470909	Spring, door latch (inside front cover).....doz	.55
41K692167	Spring, handle (inside plastic handle).....	.10
2S7981	Speednut: for 1/8" stud (grille mtg).....doz	.15
41K601712	Spring, rear cover latch.....doz	.35
46A601807	Stud, front hinge mtg & loop connectors.....	.05
46A601726	Stud, latch retainer (front cover latch on grille).....	.10
46K690079	Stud, trimount: blk nkl (on loop panel -for operating on-off switch).....	.25

MODEL 52M2U CABINET PARTS - Same as Model 52M1U except:

Part Number	Description	List Price
38K600106	Button, plug: maroon finish (loop trimmer adj hole cover).....	.10
1X610681	Cabinet: complete, less handle, grille and antenna loop and front cover assembly; maroon.....	7.55*
1X610684	Front Cover Assembly: complete, less loop; maroon plastic.....	1.90
55K600107	Handle, carrying: maroon plastic; less spring.....	.20
5S2828	Rivet: .088 x 3/16; stl; statuary bronze (front cover hinge mtg) .....per/c	.50
46K680035	Stud, trimount: statuary bronze (on loop panel -for operating on-off switch).....doz	.25

MODEL 52M3U CABINET PARTS - Same as Model 52M1U except:

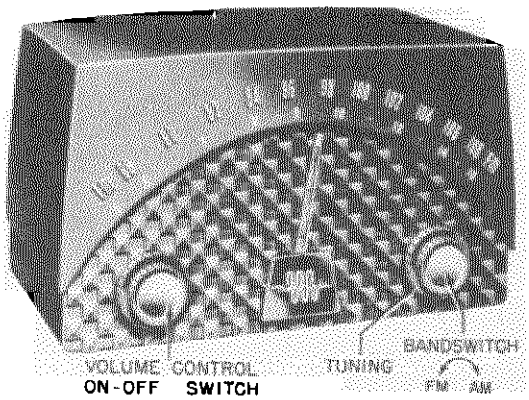
Part Number	Description	List Price
38K611116	Button, plug: gray finish (loop trimmer adj hole cover).....	.10
1X611139	Cabinet: complete, less handle, grille and loop antenna and front cover assembly; gray.....	7.55*
1X611254	Front Cover Assembly: complete less loop; gray plastic.....	1.90
55K692166	Handle, carrying: green plastic; less spring.....	.20

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

*Plus Federal Excise Tax At Current Rate

MODELS 72XM21, 72XM22, Ch. HS-

GENERAL INFORMATION



TYPE - FM-AM table model receiver

TUNING RANGE - AM 535 to 1620 Kc IF - 455 Kc
FM 88 to 108 Mc IF - 10.7 Mc

TUBE COMPLEMENT - 12BA6 - FM-AM RF Amplifier
12BA7 - FM-AM Converter
12BA6 - FM-AM IF Amplifier
12BA6 - FM IF Amplifier
19T8 - FM Ratio Detector, AM Detector & 1st Audio Amp
50C5 - Power Amplifier
Rectifier - Selenium type

POWER SUPPLY - 117V AC or DC, 40 watts

INSTALLATION & OPERATING INSTRUCTIONS

ANTENNA & GROUND

No outside antenna or ground is required for standard broadcast (AM) reception. A loop antenna for broadcast reception is located at the rear of the cabinet.

An FM antenna, built into the power cord, eliminates the need for an external FM antenna when the receiver is used in normal FM service areas such as are found in and for a few miles around metropolitan areas. In 'fringe' or weak signal areas, improved FM reception can be obtained by using an FM antenna mounted as high as possible. The FM antenna should be connected through a 300 ohm twin transmission line to the two screws on the rear of the set. Refer to the instructions on the antenna panel for proper transmission line connections. Orient the antenna so that maximum volume of FM station or stations is obtained.

NOTE: When the built-in FM antenna is used, connect the green lead from the chassis to the **RIGHT-HAND** terminal on the loop. Since the FM antenna is incorporated in the power line cord, stretch the line cord to its full length to obtain strong FM reception.

CAUTION: Do not connect antenna or chassis to water pipe, radiator, or other ground.

CONTROLS

POWER SWITCH & VOLUME CONTROL. The power switch and volume control are combined and are operated by the left-hand knob.

BANDSWITCH. The small (inner) right-hand knob selects FM or AM reception. Rotate the knob clockwise for AM or counterclockwise for FM.

TUNING. Tuning of both FM and AM is accomplished with the large (outer) right-hand knob. The standard broadcast dial (AM) is read in kilocycles by adding two zeros to the figures. The frequency modulation (FM) dial scale is read in megacycles (88 to 108).

Tuning of FM stations should be done very carefully, for best sound reproduction, not necessarily for strongest volume received.

SERVICE NOTES

OPERATING NOTES:

The chassis of this receiver is connected directly to the power line. When operating the chassis (from AC line) outside of its cabinet, use an isolation transformer between the power line and the receiver to reduce the possibility of electrical shock. If an isolation transformer is not available, check the AC voltage between the chassis and the bench ground. If there is any indication of voltage, reverse the line plug before handling the set.

When operating the receiver from an AC power line, reception can sometimes be improved by reversing the plug in the power outlet. If the receiver does not operate from a DC power line, after being turned on for a few minutes, reverse the plug in the power outlet.

TO CALIBRATE DIAL:

1. Turn the tuning knob counterclockwise until the end of its travel is reached.
2. Through the hole in the bottom of the cabinet, loosen the Allen head setscrew in the pointer sleeve.
3. Move the pointer until it coincides with the center of the "5" on the AM broadcast scale.
4. Tighten the setscrew.

NOTE: If the pointer is accidentally moved by hand, it will be released from a detent in the pointer collar assembly, and no damage to the tuning mechanism will result. To reset the pointer, merely move it back and forth until it again engages in the detent.

TO REMOVE CHASSIS FROM CABINET:

1. Remove the pointer, as described above.
2. Pull off the control knobs.
3. From the rear of the cabinet, remove the two screws holding the chassis to the cabinet.
4. Remove the two split plugs at the top of the loop, which hold the loop to the cabinet.
5. Slide the chassis from the cabinet.

TO REMOVE POINTER:

1. Remove the two screws holding the medallion, from beneath the cabinet.
2. Turn the tuning knob until the pointer reaches the low frequency end of its range.
3. Through the hole in the bottom of the cabinet, insert an Allen head wrench into the setscrew in the pointer sleeve and hold the wrench. This keeps the sleeve from turning and breaking the dial string.
4. Remove the nut and washers from the front of the pointer.
5. Pull off the pointer.

MODELS 72XM21,
72XM22, Ch. HS-303

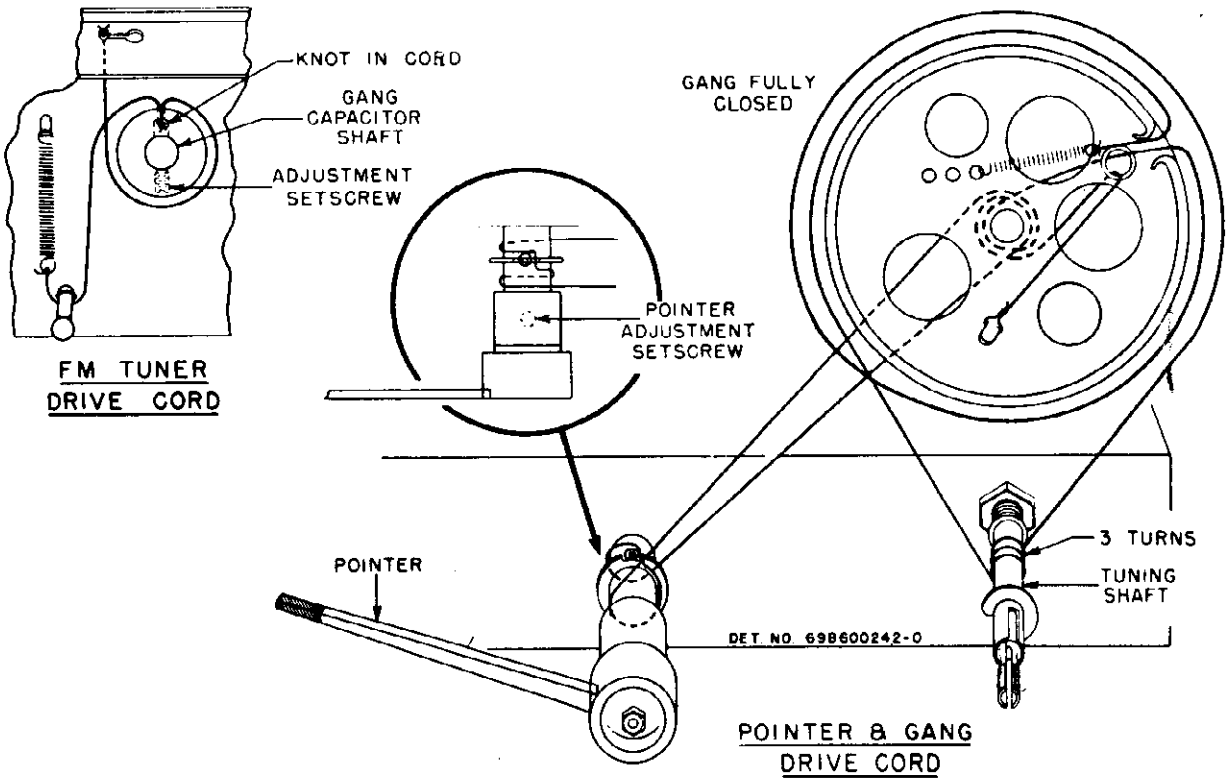


FIGURE 1. STRING DRIVE DETAIL

ALIGNMENT

GENERAL INFORMATION

1. Maximum performance can be obtained only if extreme care is exercised during alignment.

2. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver during alignment to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to the receiver chassis through a .1 mf capacitor.

3. Use a small fibre screwdriver for aligning the IF transformers.

4. Refer to Figure 2 for the location of all alignment trimmers and cores.

5. As the stages are brought into alignment, reduce the signal generator output to a low value to avoid overloading the receiver.

ORDER OF ALIGNMENT AND EQUIPMENT REQUIRED

1. Broadcast Band IF & RF Alignment
   a. 455 to 1620 Kc AM signal generator
   b. Low range output meter

2 (A) FM Band IF & RF Alignment (Preferred Method)
   a. 10.7 to 108 Mc FM signal generator
   b. Oscilloscope

(B) FM Band IF & RF Alignment (Alternate Method)
   a. 10.7 to 108 Mc signal generator (unmod.)
   b. Low range DC electronic voltmeter.

BROADCAST BAND - IF & RF ALIGNMENT

1. Connect the AM signal generator as in chart below, with 400 cycle, 30% modulation.

2. Connect the output meter across the speaker voice coil. Throughout alignment reduce the generator output to a level which produces less than .40 volts across the voice coil, to avoid overloading the receiver.

3. Set the bandswitch to the AM position.

4. Turn the receiver volume control to maximum.

5. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. V-2 (pin 7, 12BA7)	455 Kc	Fully opened	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. V-2 (pin 7, 12BA7)	1620 Kc	Fully opened	5 (BC osc)	Adjust for maximum.*
3.		Across radiation loop**	1400 Kc	Tune in signal	8 (BC ant)	Adjust for maximum.

4. If, after the receiver has been aligned as above, it is found to be badly off calibration, it will be necessary to adjust oscillator core (7) as follows: connect the generator to the grid of the converter tube and, with the gang fully closed, adjust core (7) at 535 Kc. It is advisable to repeat the oscillator adjustments at 1620 Kc and 535 Kc several times until the tuning range is correct. Core (7) has been pre-set at the factory and normally should require no retuning.

* If difficulty is encountered in tuning trimmer (5), adjust trimmer (6) to ½ turn from tight.

**Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

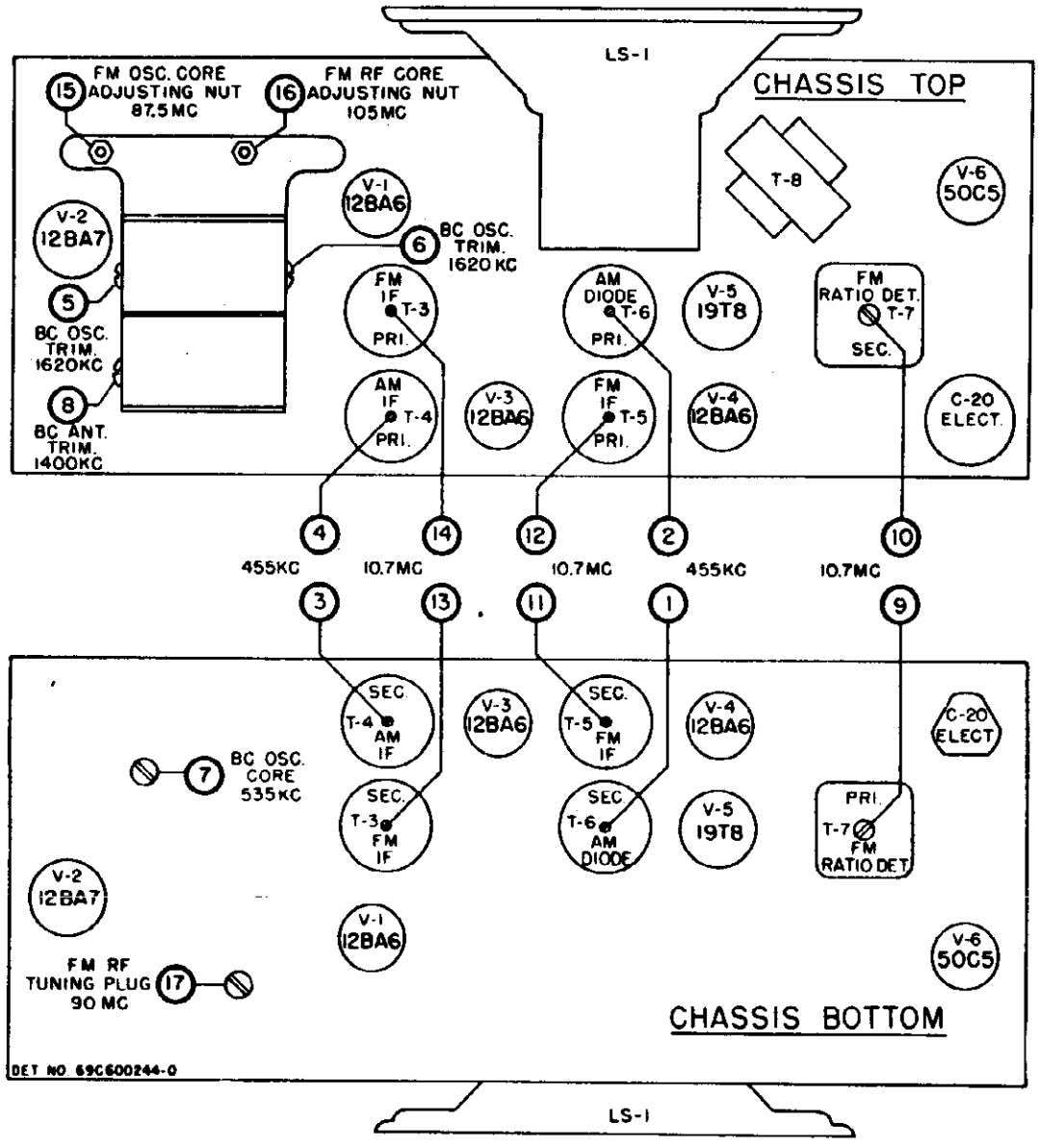


FIGURE 2. TUBE & TRIMMER LOCATIONS

MODELS 72XM21, 72XM22, Ch. HS-303

FM BAND - IF & RF ALIGNMENT (PREFERRED METHOD)

1. The following FM alignment procedure, using an FM signal generator and an oscilloscope, is to be preferred because the actual response pattern may be observed on the scope and adjusted for best symmetry and maximum amplitude.

2. Connect the vertical input terminals of the oscilloscope between the chassis and the junction of resistor R-24 (33K) and capacitor C-29 (1000 mmf)

3. Connect the FM signal generator sync voltage output terminals, through a phase shifting network, to the horizontal input terminals of the scope, as in Figure 3. (Other values of resistance and capacitance may be required, depending upon the scope). The phasing control should be adjusted to give only one trace on the scope. **NOTE:** If the FM generator has a built-in phase control, the phase shifting network is not necessary.

4. Set the bandswitch to the FM position.

5. Throughout alignment, reduce the generator output to keep the signal just above the noise level, to avoid overloading the receiver.

6. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 12BA6)	10.7 Mc ±100 Kc dev.	Fully opened	9 (ratio det pri)	Adjust for maximum amplitude of pattern.*
2.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 12BA6)	10.7 Mc ±100 Kc dev.	Fully opened	10 (ratio det sec)	Adjust for symmetrical curve, as shown in Figure 4.
3.	-	-	-	-	-	Repeat steps 1 & 2 for maximum amplitude and best symmetry.
4.	1000 mmf	Grid of 1st IF Amp V-3 (pin 1, 12BA6)	10.7 Mc ±100 Kc dev	Fully opened	11 & 12 (2nd IF sec & pri)	Adjust for maximum amplitude of pattern.*
5.	1000 mmf	Grid of conv. V-2 (pin 7, 12BA7)	10.7 Mc ±100 Kc dev	Fully opened	13 & 14 (1st IF sec & pri)	Adjust for maximum amplitude of pattern.*
6.	1000 mmf	Grid of conv. V-2 (pin 7, 12BA7)	10.7 Mc ±100 Kc dev	Fully opened	11, 12, 13 & 14	Readjust for maximum amplitude and best symmetry.
RF ALIGNMENT						
7.	270 ohms	FM terminals on loop	87.5 Mc ± 22½ Kc dev	Fully closed	15 (osc adj nut)	Adjust for maximum amplitude of pattern.*
8.	-	-	-	Fully closed	16 (RF adj nut)	Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise.
9.	270 ohms	FM terminals on loop	90 Mc ± 22½ Kc dev	Tune in signal	17 (RF tuning plug)	Adjust for maximum amplitude of pattern.*
10.	270 ohms	FM terminals on loop	105 Mc ± 22½ Kc dev	Tune in signal	16 (RF adj nut)	Adjust for maximum amplitude of pattern.*
11.	-	-	-	-	-	Repeat steps 9 & 10 until no further adjustment is necessary.

*An output meter across the speaker voice coil will also indicate maximum amplitude. It should not be used in place of the scope, however, since it will not show symmetry of the curve.

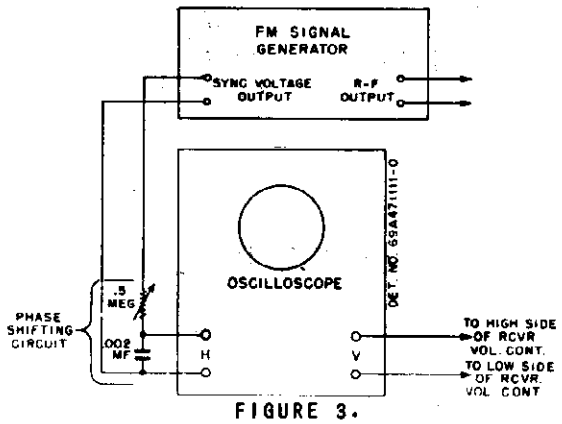


FIGURE 3.

FM SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP

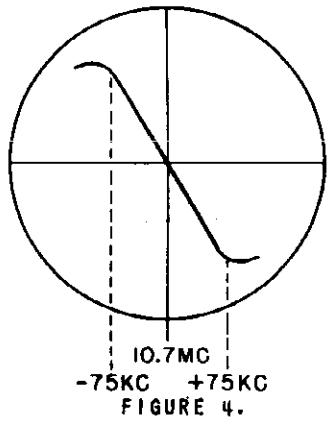


FIGURE 4.

RATIO DETECTOR WAVEFORM

FM BAND - IF & RF ALIGNMENT (ALTERNATE METHOD)

1. The following procedure for FM alignment, with an unmodulated carrier generator and a DC electronic voltmeter, is not as desirable as the preceding method; but it may be used if no FM generator is available.

2. Connect the signal generator as in chart below, with no modulation.

3. Set the bandswitch to the FM position.

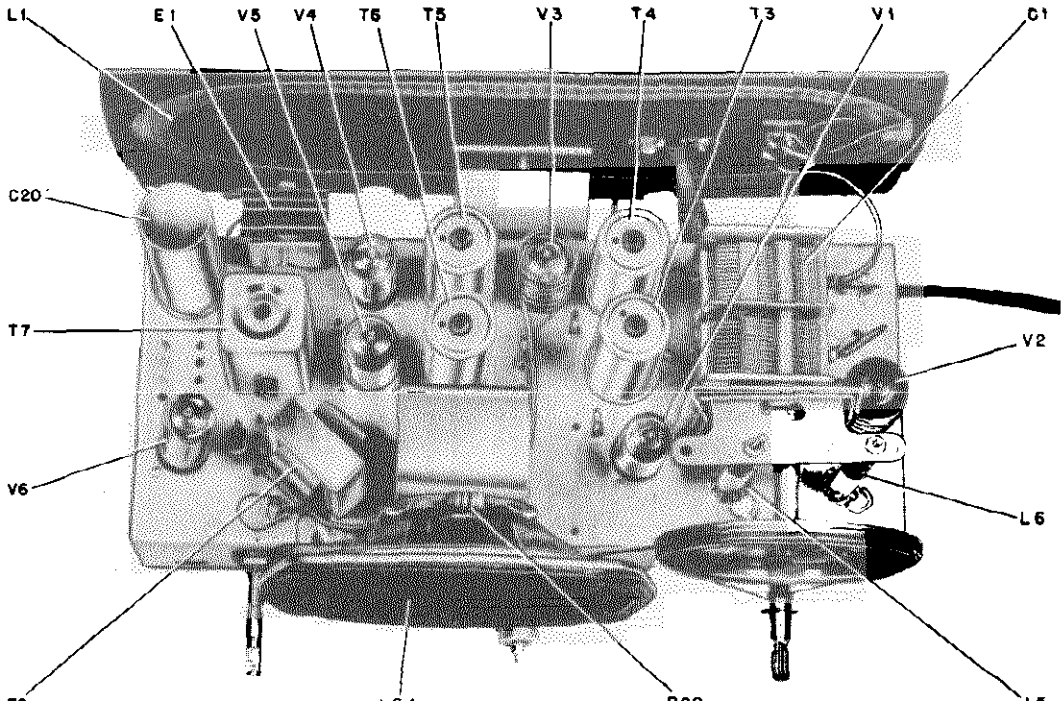
4. Except in step 2 below, connect the electronic voltmeter across resistor R-23 (15K) in the ratio detector stage.

5. Throughout alignment reduce the signal generator output to a value which produces no more than a 5 volt rise above no signal voltage, to avoid overloading the receiver.

6. In step 2 below, connect two 100K ohm resistors in series across R-23. Connect the electronic voltmeter between the volume control side of resistor R-24 (33K) and the junction of the two 100K resistors, with the low side of the meter at the 100K resistors.

7. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of conv. V-2 (pin 7, 12BA7)	10.7 Mc	Fully opened	9, 11, 12, 13 & 14 (IF cores)	Adjust for maximum.
2.	1000 mmf	Grid of conv. V-2 (pin 7, 12BA7)	10.7 Mc	Fully opened	10 (ratio det sec)	Adjust for zero. (Connect meter as in step 6 above)
RF ALIGNMENT						
3.	270 ohms	FM terminals on loop	87.5 Mc	Fully closed	15 (osc adj nut)	Adjust for maximum.
4.	-	-	-	Fully closed	16 (RF adj nut)	Turn counterclockwise unt core is at bottom of pipe then turn four turns cloc wise.
5.	270 ohms	FM terminals on loop	90 Mc	Tune in signal	17 (RF tuning plug)	Adjust for maximum.
6.	270 ohms	FM terminals on loop	105 Mc	Tune in signal	16 (RF adj nut)	Adjust for maximum.
7.	-	-	-	-	-	Repeat steps 5 & 6 until further adjustment is necessary.



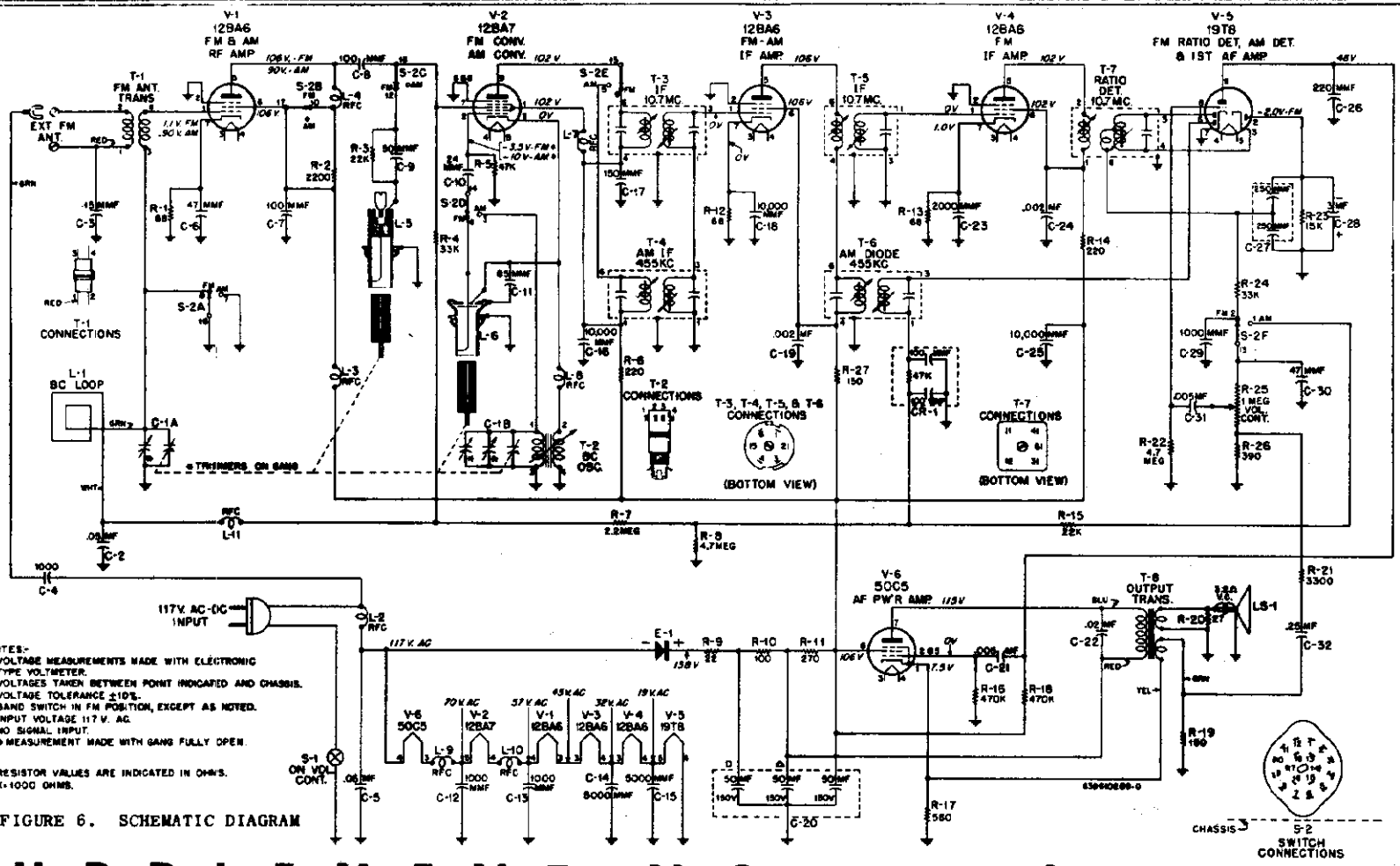


FIGURE 6. SCHEMATIC DIAGRAM

SUPPLEMENT NO. 1

(Supplement to HS-303 Service Manual, Part No. 68P620310)

GENERAL INFORMATION

Model 72XM22 is the same as 72XM21 except for the cabinet color and knobs which are listed below. The remaining chassis parts and cabinet parts are the same as listed in the HS-303 Service Manual.

PARTS LIST SUPPLEMENT

NOTE: When ordering parts, specify model and chassis number of set in addition to part number and description of part. The following parts are revisions of or additions to the original items listed in the HS-303 Service Manual.

Part Number	Description	List Price
	CABINET PARTS	
36K621700	Knob, control: dark gray (tuning).	.20
36K621698	Knob, control: dark gray (on-off-volume)	.60
16K621701	Cabinet, table model: plastic; metallic -brown	11.80*
36K621699	Knob, control: dark gray (band-switch)	.35

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*Plus Federal Excise Tax At Current Rate

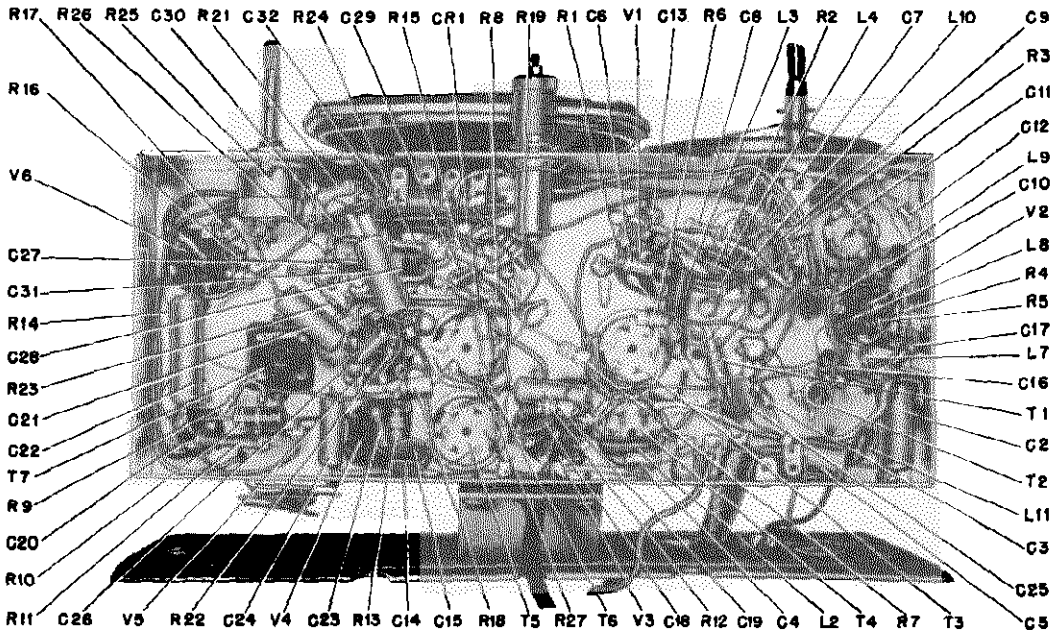


FIGURE 5. PARTS LOCATIONS

PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS HS-303 PARTS - ELECTRICAL			
Capacitors			
C-1A,B	19B691877	Variable: 2-gang.....	3.00
C-2	8R9821	Paper: .05 mf 200V.....	.20
C-3	21K470323	Ceramic: 15 mmf 500V.....	.25
C-4	21K478410	Ceramic: 1000 mmf 500V.....	.25
C-5	8K470606	Paper: .05 mf 400V.....	.25
C-6	21K77373	Ceramic: 47 mmf 500V.....	.20
C-7	21B77286	Ceramic: 100 mmf 500V.....	.20
C-8	21B77286	Ceramic: 100 mmf 500V.....	.20
C-9	21R2743	Mica: 50 mmf 5% 300V.....	.25
C-10	21R114992	Ceramic: 24 mmf 500V.....	.25
C-11	21A690688	Ceramic: 85 mmf 500V.....	.30
C-12	21K478410	Ceramic: 1000 mmf 500V.....	.25
C-13	21K478410	Ceramic: 1000 mmf 500V.....	.25
C-14	21A470789	Ceramic, disc type: 5000 mmf 450V.....	.30
C-15	21A470789	Ceramic, disc type: 5000 mmf 450V.....	.30
C-16	21K482726	Ceramic, disc type: 10,000 mmf 450V.....	.30
C-17	21K691948	Ceramic: 150 mmf 500V.....	.20
C-18	21K482726	Ceramic, disc type: 10,000 mmf 450V.....	.30
C-19	8K9824	Paper: .002 mf 400V.....	.20
C-20	23B690539	Electrolytic: 50-50-50 mf/ 150V.....	1.65
C-21	8R9813	Paper: .005 mf 600V.....	.20
C-22	8R9802	Paper: .02 mf 400V.....	.20
C-23	21K790912	Ceramic: 2000 mmf 500V.....	.20
C-24	8K9824	Paper: .002 mf 400V.....	.20
C-25	21K482726	Ceramic, disc type: 10,000 mmf 450V.....	.30
C-26	21K77375	Ceramic: 220 mmf 500V.....	.20
C-27	21B484337	Ceramic, dual: 250 mmf,250 mmf.....	.30
C-28	23K690543	Electrolytic: 3 mf 50V.....	.65
C-29	21K478410	Ceramic: 1000 mmf 500V.....	.25

Ref. No.	Part Number	Description	List Price
Speaker			
LS-1	50C692180		
or	50K610050	Speaker: 5-1/4" PM; 3.2 ohm VC.....	4.2
			exch 3.1
Resistors			
		Note: All resistors are insulated carbon type unless otherwise specified.	
R-1	6R2039	68 10% 1/2W.....doz	1.2
R-2	6R6069	2200 10% 1/2W.....doz	1.2
R-3	6R6028	22,000 20% 1/2W.....doz	1.2
R-4	6R6012	33,000 20% 1/2W.....doz	1.2
R-5	6R6056	47,000 20% 1/2W.....doz	1.2
R-6	6R3933	220 20% 1/2W.....doz	1.2
R-7	6R3927	2.2 meg 20% 1/2W.....doz	1.2
R-8	6R2122	4.7 meg 20% 1/2W.....doz	1.2
R-9	17A690578	Wire wound: 22 10% 1.5W.....	.2
R-10	6R3963	100 10% 2W.....	.2
R-11	6R476116	270 10% 2W.....	.2
R-12	6R2039	68 10% 1/2W.....doz	1.2
R-13	6R2039	68 10% 1/2W.....doz	1.2
R-14	6R3933	220 20% 1/2W.....doz	1.2
R-15	6R6028	22,000 20% 1/2W.....doz	1.2
R-16	6R6032	470,000 20% 1/2W.....doz	1.2
R-17	6R6291	560 10% 1/2W.....doz	1.2
R-18	6R6032	470,000 20% 1/2W.....doz	1.2
R-19	6R5660	180 10% 1/2W.....doz	1.2
R-20	6R5683	27 10% 1/2W.....doz	1.2
R-21	6R6036	3300 20% 1/2W.....doz	1.2
R-22	6R2122	4.7 meg 20% 1/2W.....doz	1.2
R-23	6R6477	15,000 10% 1/2W.....doz	1.2
R-24	6R6012	33,000 20% 1/2W.....doz	1.2
R-25	18A690549	Volume control: 1 meg; with on-off switch.....	1.0
R-26	6R5554	390 10% 1/2W.....doz	1.2
R-27	6R6373	150 10% 1/2W.....doz	1.2

MODELS 72XM21, 72XM22, Ch. HS-303

Part Number		Description	List Price
C-30	21K77373	Ceramic: 47 mmf 500V.....	.20
C-31	8R9813	Paper: .005 mf 600V.....	.20
C-32	8R9810	Paper: .25 mf 100V.....	.25
Capacitor-Resistor			
CR-1	21A473040	Capacitor-Resistor: 100-100 mmf & 47,000 ohms.....	.40
Rectifier			
E-1	48B482807	Rectifier, selenium: half-wave; 150 ma.....	1.90
Coils			
L-1	24C692186	Antenna Loop & Panel Assembly: complete.....	1.25
L-2	24A692148	RF choke.....	.20
L-3	24A692148	RF choke.....	.20
L-4	24A484025	RF choke.....	.20
L-5	24C690584	Inductor & Capacitor Assembly: FM RF; less tuning core	1.35
L-6	24K600519	Inductor & Capacitor Assembly: FM osc; less tuning core.....	1.50
L-7	24A691847	RF choke.....	.05
L-8	24A791081	RF choke.....	.20
L-9	24A692148	RF choke.....	.20
L-10	24K780128	RF choke.....	.20
L-11	24A791081	RF choke.....	.20
Switches			
S-1	-	On-Off Switch (on vol control)	-
S-2	40B690538	Bandswitch, AM-FM.....	1.15
Transformers			
T-1	24A690544	FM Antenna Input Transformer	.50
T-2	24K691878	BC oscillator coil.....	.50
T-3	24B690540	1st FM IF Transformer (orange dot): 10.7 mc; complete with capacitors and cores, less shield.....	1.60
T-4	24B692193	AM IF Transformer (blue dot): 455 Kc; complete with capacitors and cores; less shield	1.15
T-5	24B690541	2nd FM IF transformer (yellow dot): 10.7 mc; complete with capacitors and cores; less shield.....	1.60
T-6	24B692193	AM Diode transformer (blue dot): 455 Kc; complete with capacitors and cores; less shield.....	1.15
T-7	24B690542	Ratio Detector Transformer: 10.7 mc; complete with capacitors, cores, and shield..	2.00
T-8	25B690536	Audio Output Transformer....	1.25

CHASSIS HS-303 PARTS MECHANICAL

27A610586	Base, tube shield (for V-2)(also order 26A610579).....	.10
42K690561	Clip, anti-backlash: single (on core mtg bracket).....	.05
42A690560	Clip, anti-backlash; double (on tuner mtg bracket).....	.05
30K21859	Cord, line: with plug; 9 ft long..	1.00
46K692165	Core, iron and screw (FM RF tuning core).....	.40
46B692164	Core, iron and screw: green dot (FM osc tuning core).....	.40
5A19658	Eyelet, speaker mtg.....doz	.20
37A12691	Grommet, rubber (spkr cushion),doz	.35
14A690548	Insulator, bakelite (vol control & bandswitch mtg).....	.05
14A482844	Insulator, line cord: fibre; without lugs.....doz	.25
14K692187	Insulator, line cord: fibre; with lugs.....	.05
2S7051	Nut, hex palnut: 3/8-32 x 9/16; cad pl (vol control & bandswitch mtg).....doz	.15
1X692216	Pulley Assembly, pointer drive: 3-1/2" dia.....	.30
49A690562	Pulley, core drive: brass.....	.15
3S7103	Setscrew: 8-32 x 1/8 Allen head; cad pl (core drive pulley mtg)...	.10
3S9705	Setscrew: 8-32 x 1/4 Allen head; cad pl (pointer adj sleeve mtg)..	.10
1X692225	Shaft & Pulley Assembly, pointer: complete, but less pointer.....	1.10
47K690573	Shaft, tuning (fits over bandswitch shaft).....	.25
26A610579	Shield, tube (for V-2)(also order 27A610586).....	.10
9K484167	Socket, tube: miniature; 7-prong (for V-3,4 & 6).....	.20
9K610589	Socket, tube: miniature; 7-prong (for V-1).....	.15
9B692196	Socket, tube: noval; 9-prong (for V-5).....	.15
9K692197	Socket, tube: noval; 9-prong (for V-2).....	.15
41A690598	Spring, coil: 7 turns; cosmoline dipped (FM RF core mtg).....doz	.15
41K691840	Spring, coil: 8 turns; copper plated (FM osc core mtg).....doz	.20
41A14244	Spring, tension (core & pointer drive cord).....doz	.55
4A73639	Washer, "C" (holds tuning shaft).....doz	.20
4A70873	Washer, fibre (pointer drive cord spacer on gang shaft).....doz	.15
4K690571	Washer, shoulder: fibre (vol control & bandswitch mtg).....doz	.20
4K482859	Washer, shoulder: fibre (loop mtg brkt).....doz	.15

MODEL 72XM21 CABINET PARTS

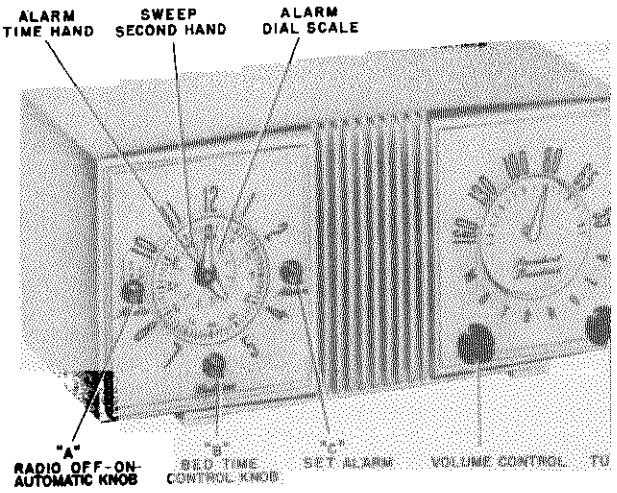
16K611099	Cabinet, table model: plastic; gray.....	6.55
36K611097	Knob, control: gray plastic (tuning knob).....	.20
36K611098	Knob, control: gray plastic (AM-FM selector).....	.35
36K611113	Knob, control: gray plastic (volume control).....	.60
4S7650	Lockwasher, internal: #6 (pointer mtg).....per/c	.50
2S7005	Nut, hex: 6-32 x 1/4 stl (pointer mtg).....per/c	.50
13B692039	Medallion: brass plated.....	.90
38A25507	Plug, split (mounts loop to cabinet).....doz	.15
52B692173	Pointer, dial.....	.35
3S2999	Screw, machine: 6-32 x 5/8 slotted locking hex head (medallion mtg).....doz	.15
3S7316	Screw, machine: 8-32 x 3/8 slotted locking hex head (chassis mtg)doz	.15
4S1720	Washer, flat: 3/8 x .156 x .030 stl; (medallion mtg).....per/c	.50
4S1765	Washer, flat: 1/2 x .147 x .015 stl (pointer mtg).....per/c	.50
4B600149	Washer, spring (pointer mtg),doz	

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

*Plus Federal Excise Tax At Current Rate

GENERAL INFORMATION

TYPE - AC table model superheterodyne with appliance outlet and self-contained electric clock for controlling automatically the operation of the radio and the outlet.



RECEIVER MODELS

Model	Color
52C6	Walnut
52C7	Ivory
52C8	Green

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT -

Type	Function
12BE6	Converter
12BD6	IF Amplifier
12AT6	Det, AVC & AF Amp
50C5	Power Amplifier
35W4	Rectifier

CLOCK - Telechron self-starting electric clock, w Motorola face and hands.

POWER SUPPLY - Operates from 117 volts, 60 cycle, alternating current only. Power consumption 37 watts.

APPLIANCE OUTLET - For use with 117 volt AC app ances only, rated at 1100 wa or less.

OPERATING INSTRUCTIONS

The locations and functions of the clock and radio controls are shown in the photo above.

NORMAL RADIO OPERATION

Knob "A" on the clock turns the radio on or off. Select stations with the TUNING knob, and adjust volume with the VOLUME control.

A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

CLOCK OPERATION

The clock will start as soon as the receiver is plugged into an electrical outlet. To set the hands to the correct time, rotate the TIME SET knob (on the rear of the radio) in a clockwise direction only.

ALARM OPERATION

To set the alarm, pull out knob "C" and rotate it i counterclockwise direction to the desired time on the ala dial scale. The alarm will ring for one hour, or until k "C" is pushed in. The alarm function is completely in pendent of the other controls on the clock.

APPLIANCE OUTLET

To control an electrical appliance automatically, plu into the receptacle on the back of the radio. See Figur It will then be turned on or off simultaneously with the ra CAUTION: Note that the rating of the outlet is 1100 w or less.

If radio reception is not desired when operating the pliance, rotate the radio volume control to the minimum ume position.

MODELS 52C6, 52C7, A, 52C8, Ch. HS-310

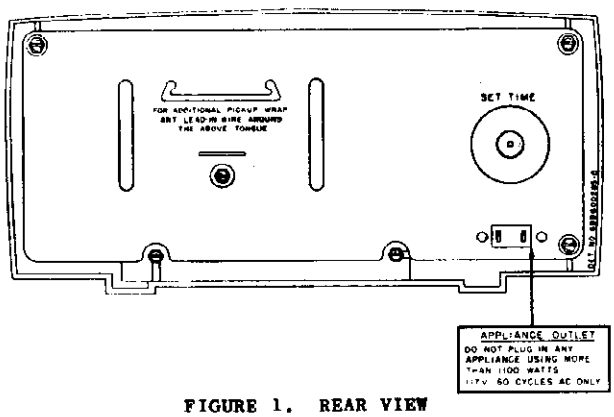


FIGURE 1. REAR VIEW

BEDTIME CONTROL

The BEDTIME control will turn the radio and appliance off after any pre-set interval of time up to one hour.

Turn knob "A" to the "OFF" position and rotate knob "B" to any period of time between 0 and 60 minutes. The radio and appliance will be turned off automatically after the proper time has elapsed, and they will remain off until turned on again manually.

AUTOMATIC RADIO OPERATION

The clock controls may be pre-set to turn the radio on automatically at any time up to twelve hours in advance.

If an appliance is plugged into the receptacle on the back of the receiver, it will be turned on automatically, along with the radio.

Pull out knob "C", rotate it counterclockwise to the desired time on the alarm dial scale, and push the knob back in. Rotate knob "A" first to the "OFF" and then to the "AUTO" position. At the pre-set time, the radio will come on and will continue to play until turned off manually. The alarm will ring also if the knob "C" is left pulled out. The radio will come on first and, after an interval of about ten minutes, the alarm will ring.

BEDTIME AND AUTOMATIC OPERATIONS COMBINED

By combining the operations in the two sections above, the radio may be turned off automatically and on again automatically.

When setting the BEDTIME control, rotate knob "A" to the "AUTO" position instead of "OFF". IMPORTANT: It is necessary to turn knob "A" first to the "OFF" position before proceeding to "AUTO", otherwise the radio may not shut off.

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.

2. Connect the low side of the signal generator to B-.

3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.

5. Use a small fibre screwdriver for aligning the IF and diode transformers.

6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.

7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	-	-	-	Fully closed	-	Set pointer to horizontal position.
3.	.1 mf	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (Osc)	Adjust for maximum.
4.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

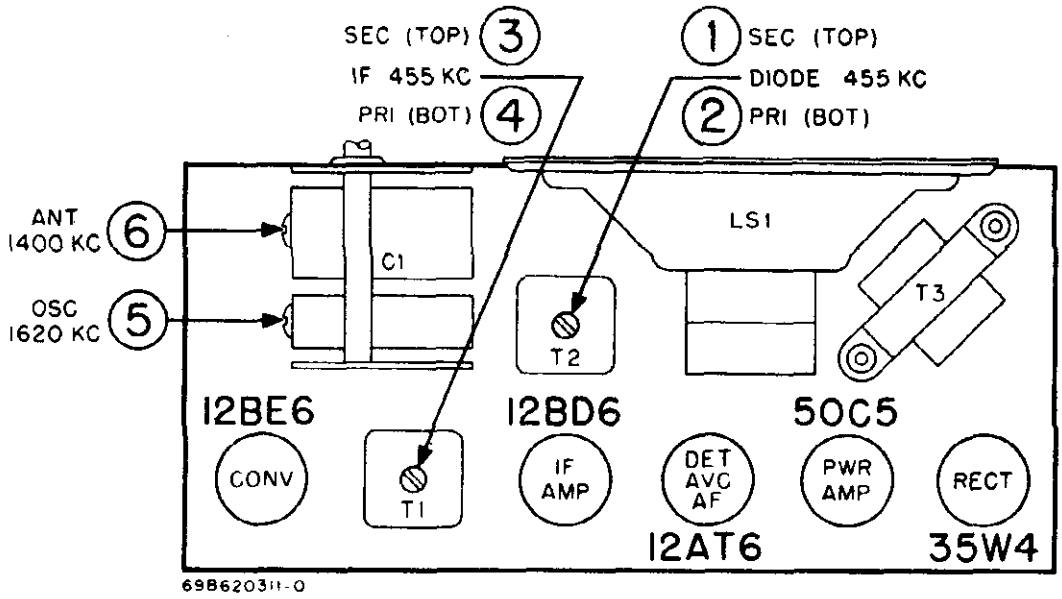


FIGURE 2. TUBE AND TRIMMER LOCATION

SERVICE NOTES

TO REMOVE RADIO CHASSIS FROM CABINET

1. Pull off the two radio control knobs.

2. Remove the three hex head screws which hold the loop to the cabinet.

3. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.

4. Slide the radio chassis and loop from the cabinet.

5. Disconnect the power leads to the radio chassis and to the appliance receptacle.

TO REMOVE CLOCK FROM CABINET

1. Remove the radio chassis as above.

2. Pull off the three clock control knobs.

3. From the back of the cabinet, remove the three hex head screws which hold the clock and its fibre insulator.

4. Carefully remove the clock, to prevent damage to its hands or face.

TO REPLACE CLOCK DIAL BACKGROUND

1. Remove the clock from the cabinet as above.

2. Carefully pull off the three hands.

3. Remove the alarm dial and dial background.

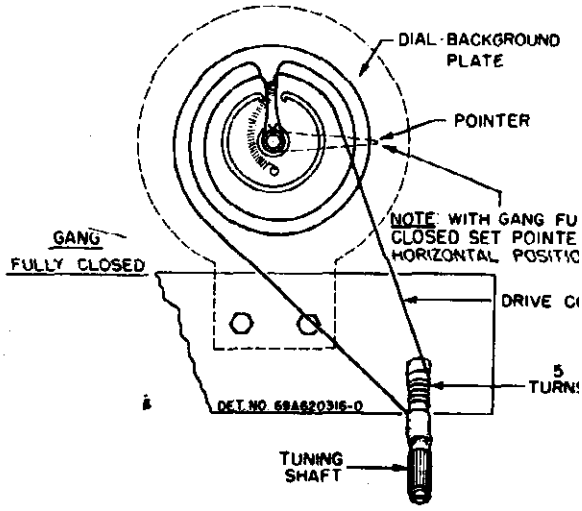


FIGURE 3. STRING DRIVE DETAIL

4. Install new background.

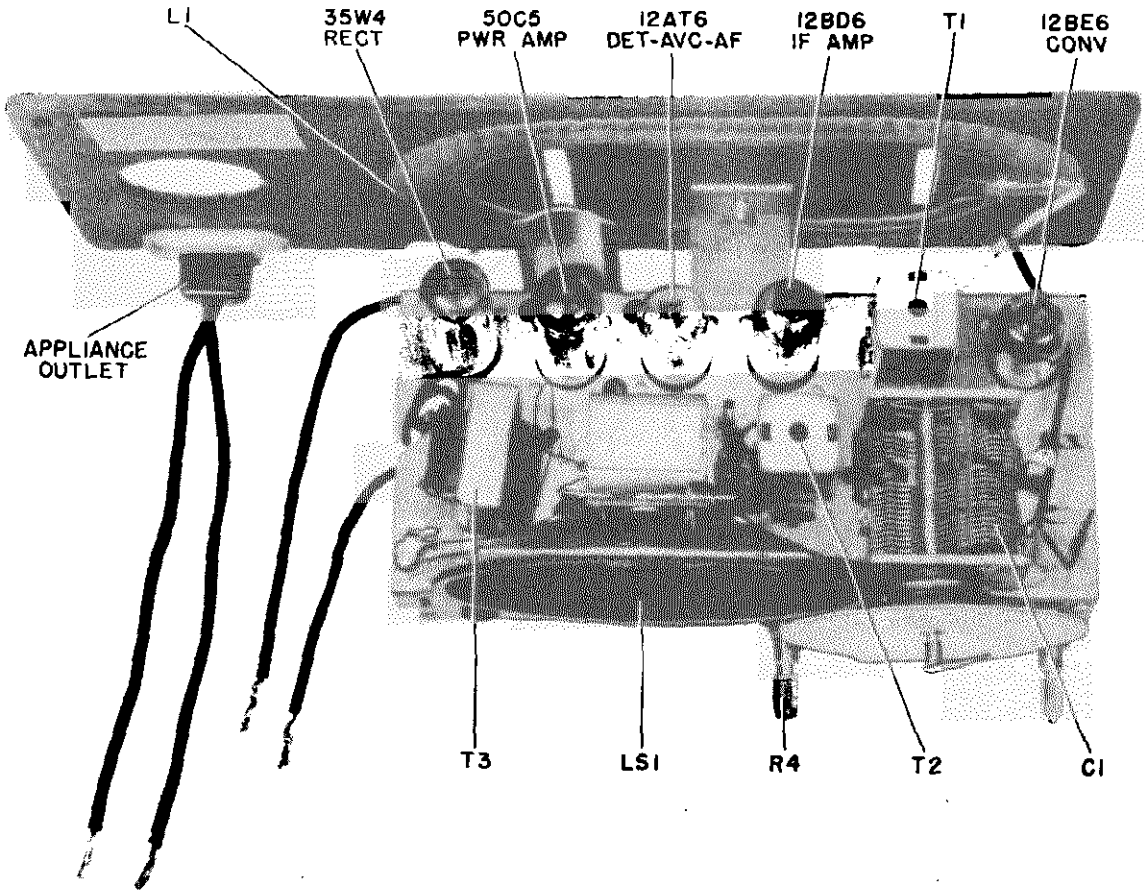
5. Turn the radio control shaft to "AUTO" position.

6. Slowly rotate the time set shaft clockwise until switch contacts behind the radio control shaft close.

7. Reassemble the alarm dial and three hands. Set all hands to indicate 12 o'clock. Set the figure "12" on alarm dial to index with the small pointer on the hour h

8. Check the automatic operation to be sure the switch tacts close at the time indicated on the alarm dial.

MODELS 52C6, 52C7, A,
52C8, Ch. HS-310



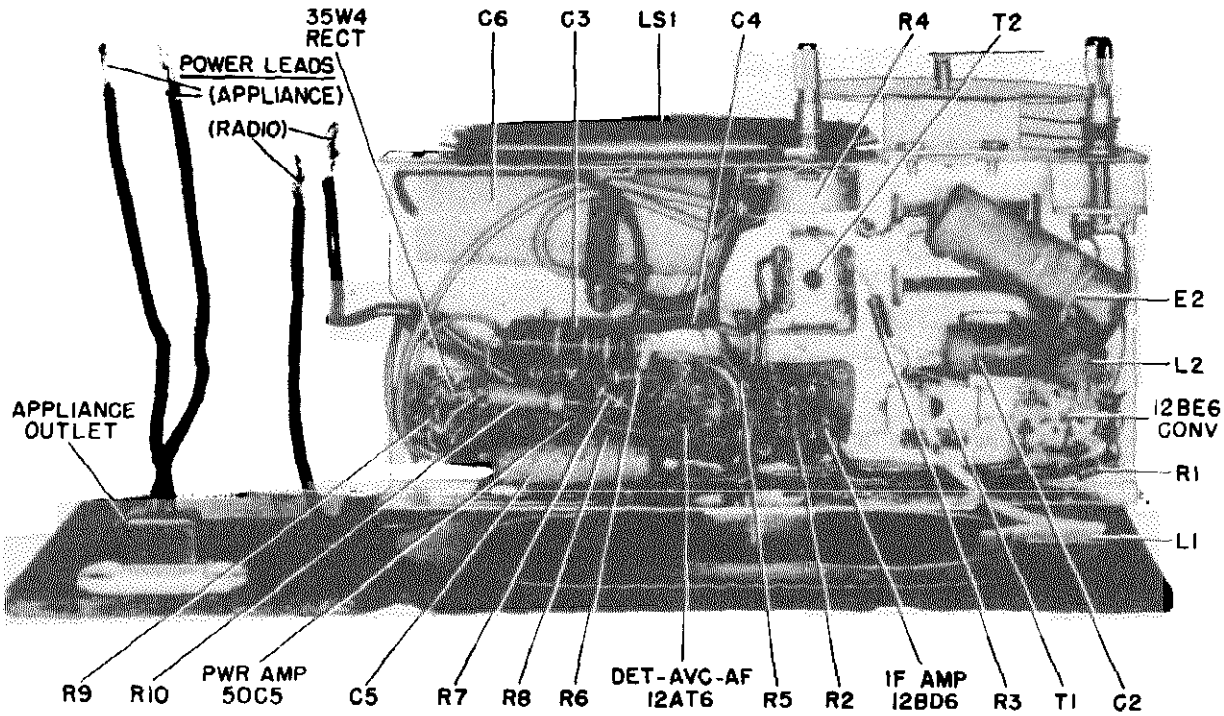
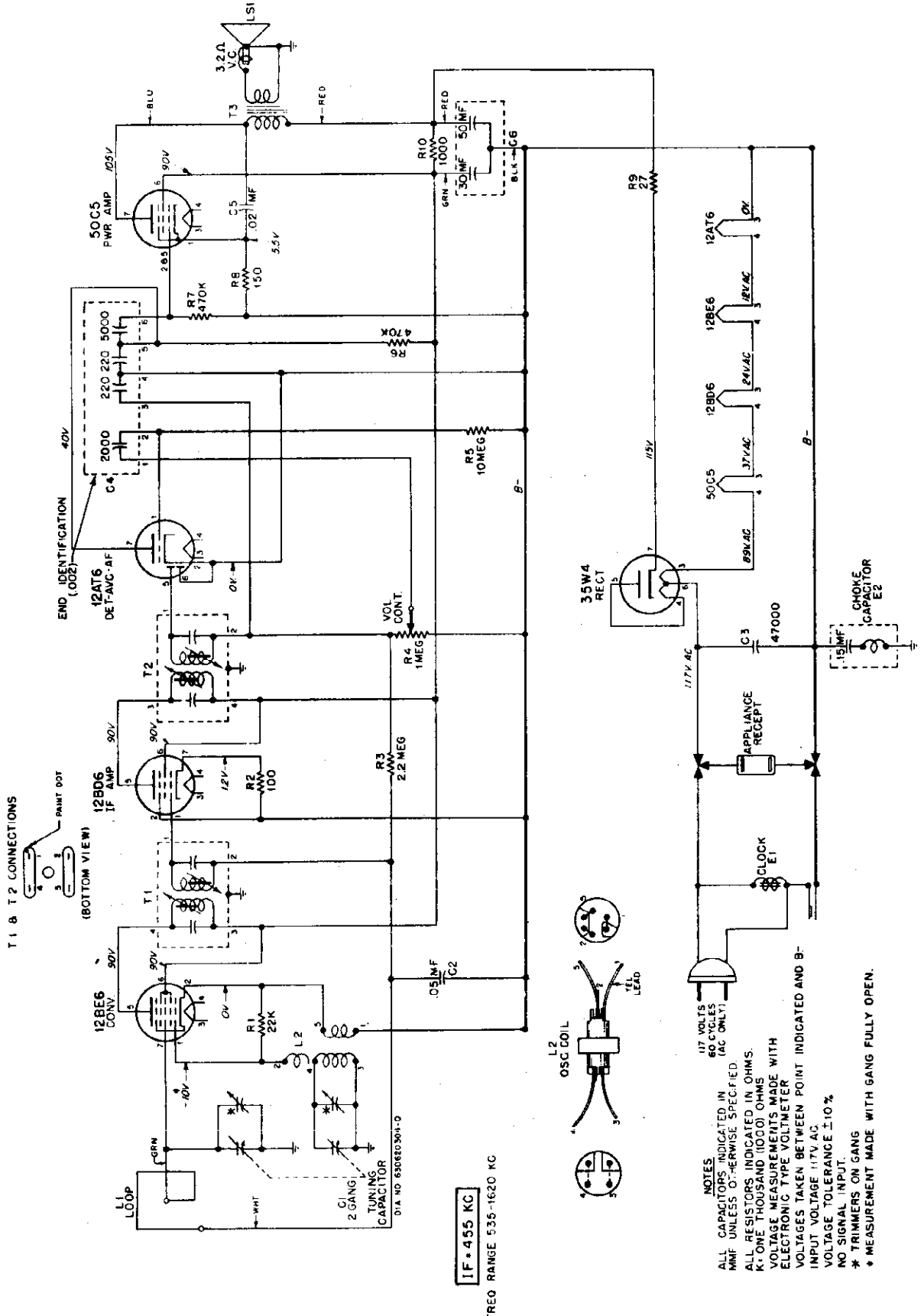


FIGURE 4. PARTS LOCATION

MODELS 52C6, 52C7, 52C8, Ch. HS-310



MODELS 52C6, 52C7, A,
52C8, Ch. HS-310

PARTS LIST

NOTE: When ordering parts, specify model and chassis numbers of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	19B610820	Variable: 2-gang; with pulley	2.85
C-2	8R9821	Paper: .05 mf 200V	.20
C-3	8R490232	Molded paper: 47,000 mmf 400V	.25
C-4	21B482847	Ceramic, multiple: 2000-220-220-5000 mmf/400V	.65
C-5	8R9802	Paper: .02 mf 400V	.20
C-6	23B600855	Electrolytic: 50-30 mf/150V.	1.10
Clock			
E-1	59K610835	Electric Clock Assembly: Telechron; with hands; less line cord	11.95
		exch	8.95
Choke-Capacitor			
E-2	8A690487	Choke and .15 mf paper capacitor	.30
Coils			
L-1	1X610854	Antenna Loop, Panel, and Receptacle Assembly: comp.	1.95*
			1.15
L-2	24B680364	Oscillator coil	.90
Speaker			
LS-1	50K610558 or 50K610557	Speaker: 4" PM; 3.2 ohm VC.	3.90*
		exch	2.95
Resistors			
		Note: All resistors are insulated carbon type unless otherwise specified.	
R-1	6R6028	22,000 20% 1/2W.....doz	1.20
R-2	6R6018	100 20% 1/2W.....doz	1.20
R-3	6R3927	2.2 meg 20% 1/2W.....doz	1.20
R-4	18A600018	Volume control: 1 meg	.80
R-5	6R2109	10 meg 20% 1/2W.....doz	1.20
R-6	6R6032	470,000 20% 1/2W.....doz	1.20
R-7	6R6032	470,000 20% 1/2W.....doz	1.20
R-8	6R3992	150 20% 1/2W.....doz	1.20
R-9	6R5683	27 10% 1/2W.....doz	1.20
R-10	6R3953	1000 20% 1W.....each	.20
Transformers			
T-1,2	24C485553	IF and diode transformer: 455 Kc; complete with capacitors, cores, and shield	.95
T-3	25K680345	Output transformer	1.05

Part Number	Description	List Price
CHASSIS PARTS - MECHANICAL		
7A478118	Bracket, loop mtg	.05
7A77337	Bracket, tuning shaft	.05
42B485548	Clip, IF trans mtg.....doz	.20
5A484268	Grommet, speaker mtg: rubber...doz	.20
14A478119	Insulator, loop brkt mtg:fibre.doz	.15
2S7051	Nut, hex palnut: 3/8-32 x 9/16 (volume control mtg).....doz	.15
35A601669	Pad, cushion: sponge rubber (spkr cushion)	.10
64B610782	Plate, radio dial background: silver color	.55
52A610809	Pointer, radio dial: light green	.25
9A601018	Receptacle, appliance (on loop panel)	.50
1A610808	Shaft, tuning: with pulley	.15
9K580218	Socket, tube: miniature; 7-prong; with dummy lug and center shield; wafer type	.15
41A73996	Spring, tension (electrolytic mtg)	.05
41A73619	Spring, tension (gang drive cord) .....doz	.40
4A70015	Washer, "C" (tuning shaft mtg)per/c	.50
14A11493	Washer, shoulder: fibre (loop bracket mtg).....doz	.35
CABINET PARTS		
1X610839	Cabinet, table model: walnut; less overlays and clock and radio scales (52C6)	4.75*
1X610855	Cabinet, table model: ivory; less overlays and clock and radio scales (52C7)	6.30*
1X610856	Cabinet, table model: green; less overlays and clock and radio scales (52C8)	6.30*
28A600064	Connector, wire (connects clock & radio power leads)	.05
14B611368	Insulator, clock: fibre (over back of clock)	.15
36B610817	Knob, clock control: black	.20
36B610815	Knob, radio control: black	.20
13K610803	Overlay, clock background: gold color	.10
13A610804	Overlay, radio background: gold color	.10
34C610821	Scale, clock dial: plastic	1.45
34C610791	Scale, radio dial: plastic	1.50
CLOCK PARTS		
	Note: The following Motorola parts are for use with Telechron clock movement, Part No. 59K610835.	
34K610826	Alarm dial: silver color	.40
42K601734	Clamp, line cord	.05
30K600980	Cord, line: with plug; 6 ft long	.85
64K620049	Dial background: silver color	.40
52K610836	Hand, hour: luminous	.40
52K610837	Hand, minute: luminous	.40
52K610829	Hand, second: black	.15
36K601002	Knob, time set	.20
59K610568	Motor, clock (rotor assembly only)	3.40

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

*Plus Federal Excise Tax At Current Rate

S U P P L E M E N T N O. 1

This manual contains a supplementary Replacement Parts List covering production revisions in the 52C6 series of receivers.

OUTPUT TRANSFORMER

An alternate output transformer, interchangeable with the original, has been added. Both transformers are listed below.

SPEAKER

Four alternate speakers have been added. All speakers are listed below.

DIAL BACKGROUND

In later production Model 52C7 receivers, the dial background color was changed from gold to silver. The color remains gold for Models 52C6 and 52C8.

PARTS LIST SUPPLEMENT

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Part Number	Description	List Price
25K680345 or 25B478121	Output Transformer	1.05
50K610558 or 50K610557 or 50C600017 or 50B610052 or 50C600857 or 50C610506	Speaker: 4" PM; 3.2 ohm VC	3.90* exch 2.95
13K620201	Overlay, clock background: silver color (52C7)(replaces 13K610803 on late model 52C7)	.2(
13K620200	Overlay, radio background: silver color (52C7) (replaces 13A610804 on late model 52C7)	.2(

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S U P P L E M E N T N O. 2

PARTS LIST SUPPLEMENT

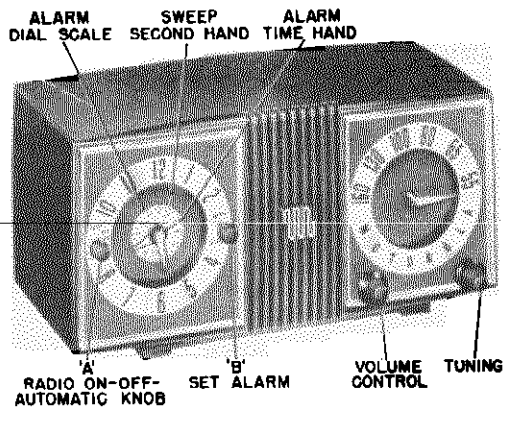
NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

The following parts are revisions of or additions to the original items listed in the HS-310 Service Manual.

GENERAL INFORMATION

Model 52C7A is the same as Model 52C7 except for styling. A complete listing of 52C7A cabinet parts is given below.

Refer to HS-310 Service Manual for service instructions, chassis replacement parts, and clock replacement parts.



Part Number	Description	List Price
CABINET PARTS		
1V621721	Cabinet, table model: ivory; with medallion; less overlays and clock & radio crystals	6.30*
61C621528	Crystal, plastic (clock face cover)	1.45
61K621529	Crystal, plastic (radio face cover)	.85
36K621520	Knob, clock control (black)	.20
13K621670	Medallion (on spkr grille)	.55
13K621669	Overlay, clock background: silver color	.80
13C621668	Overlay, radio background: silver color	.80
28490840	Speednut: for 1/16" stud (medallion mtg) doz	.15

MODELS 52H11U, 52H12U, 52H13U, 52H14U, Ch. HS-313

GENERAL INFORMATION

TYPE - AC-DC table model superheterodyne receiver with loop antenna.

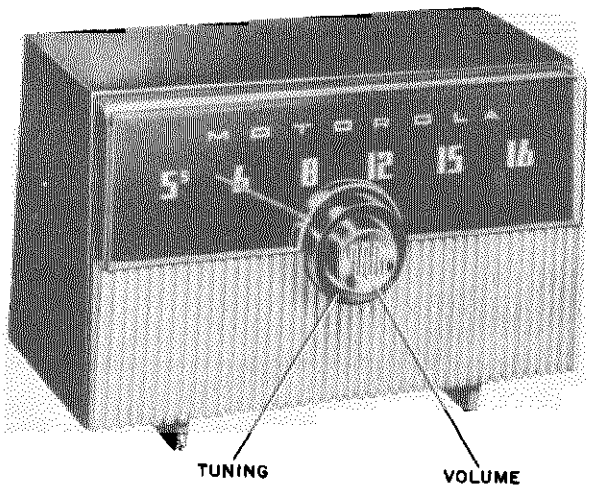
RECEIVER MODELS

Model	Color
52H11U	Walnut
52H12U	Ivory
52H13U	Green
52H14U	Gray

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT -

Type	Function
12BE6	Converter
12BD6	IF Amplifier
12AT6	Det, AVC & 1st AF Amp
50C5	Power Amplifier
35W4	Rectifier



POWER SUPPLY - 117 volts AC or DC, 35 watts

OPERATING INSTRUCTIONS

POWER SWITCH AND VOLUME CONTROL. Operated with the inner knob. NOTE: Reverse the line cord plug in the wall outlet if radio does not operate from DC. When operating from AC, reversing the line cord plug in the wall outlet may sometimes improve reception.

TUNING. Tune stations with the outer knob.

ANTENNA. A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

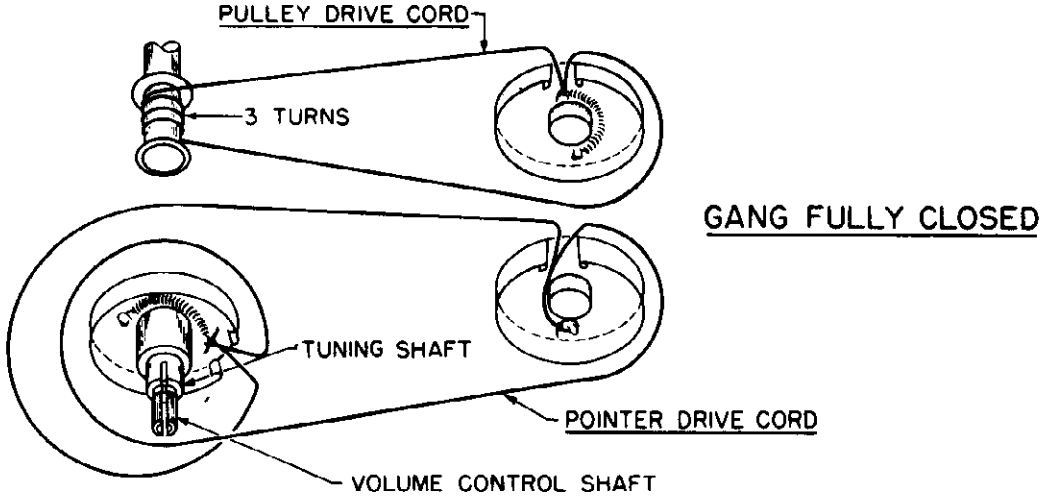


FIGURE 1. DIAL RESTRINGING DETAIL

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

TO REMOVE CHASSIS FROM CABINET:

1. Pull off the two radio control knobs. A flat head screw holding the dial scale will be exposed.

2. Remove the flat head screw.

3. Remove the dial scale.

4. Pull off the pointer.

5. Remove the split plugs which hold the loop to the cabinet.

6. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.

7. Slide the radio chassis and loop from the cabinet.

ALIGNMENT

NOTE: If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.

2. Connect the low side of the signal generator to B-.

3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.

5. Use a small fibre screwdriver for aligning the IF ar diode transformers.

6. As stages are brought into alignment, reduce the sign generator output to a level which produces less than . volts (.05 watt) across the voice coil to avoid overloadi the receiver.

7. See Figure 2 for adjustment locations and the followi chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (Osc)	Adjust for maximum.
3.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

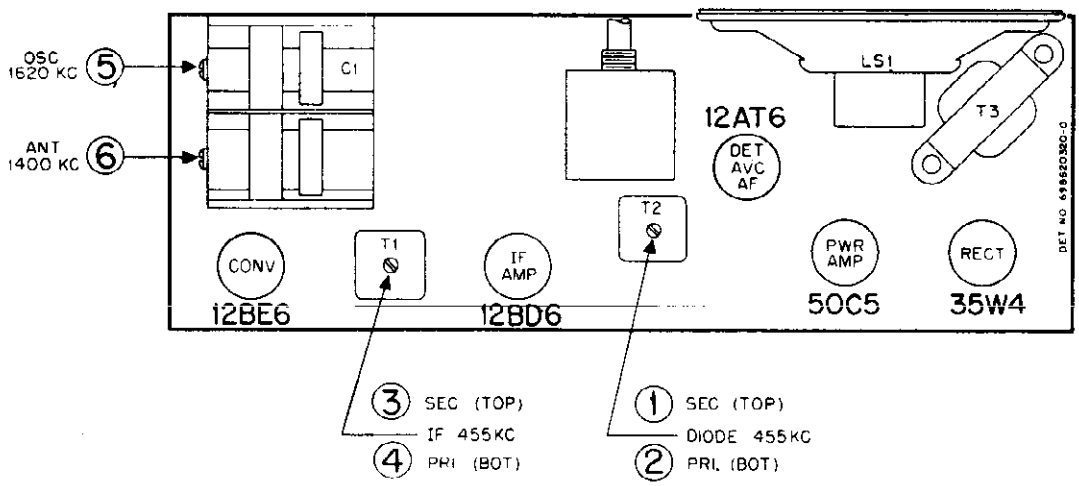
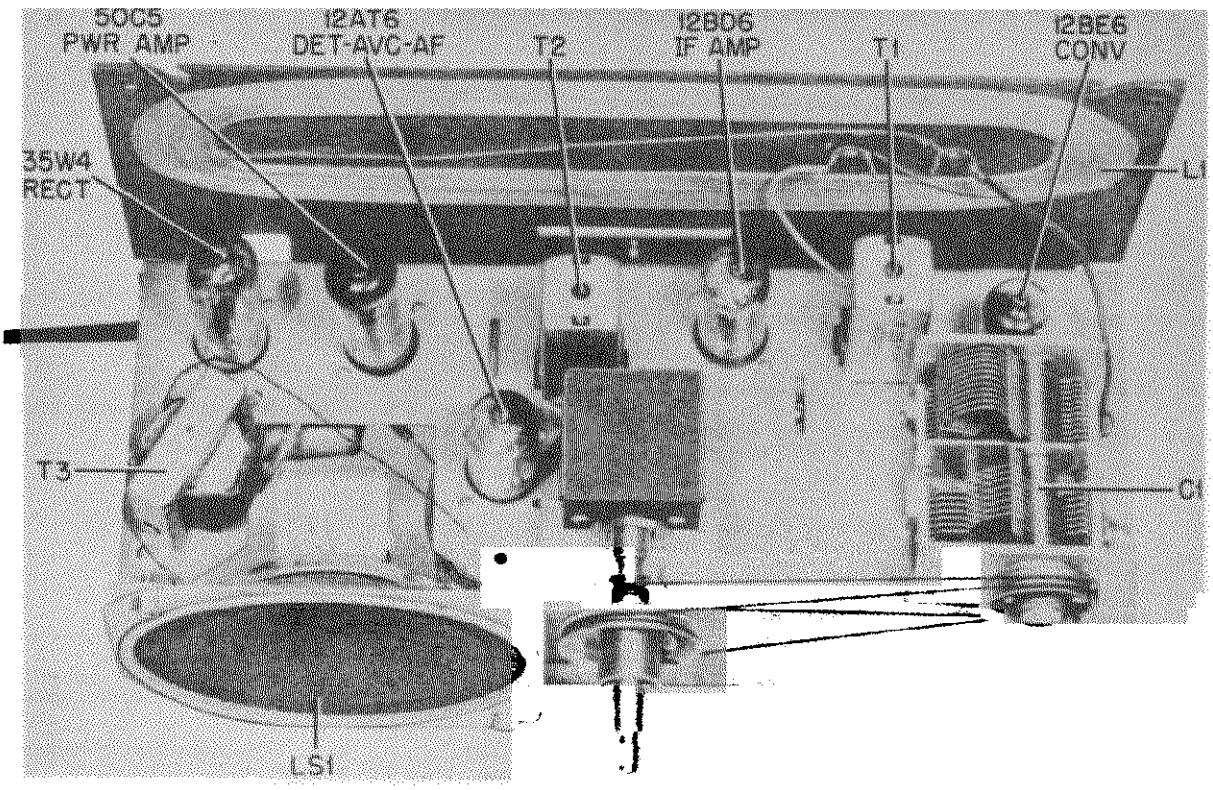


FIGURE 2. TUBE AND TRIMMER LOCATIONS



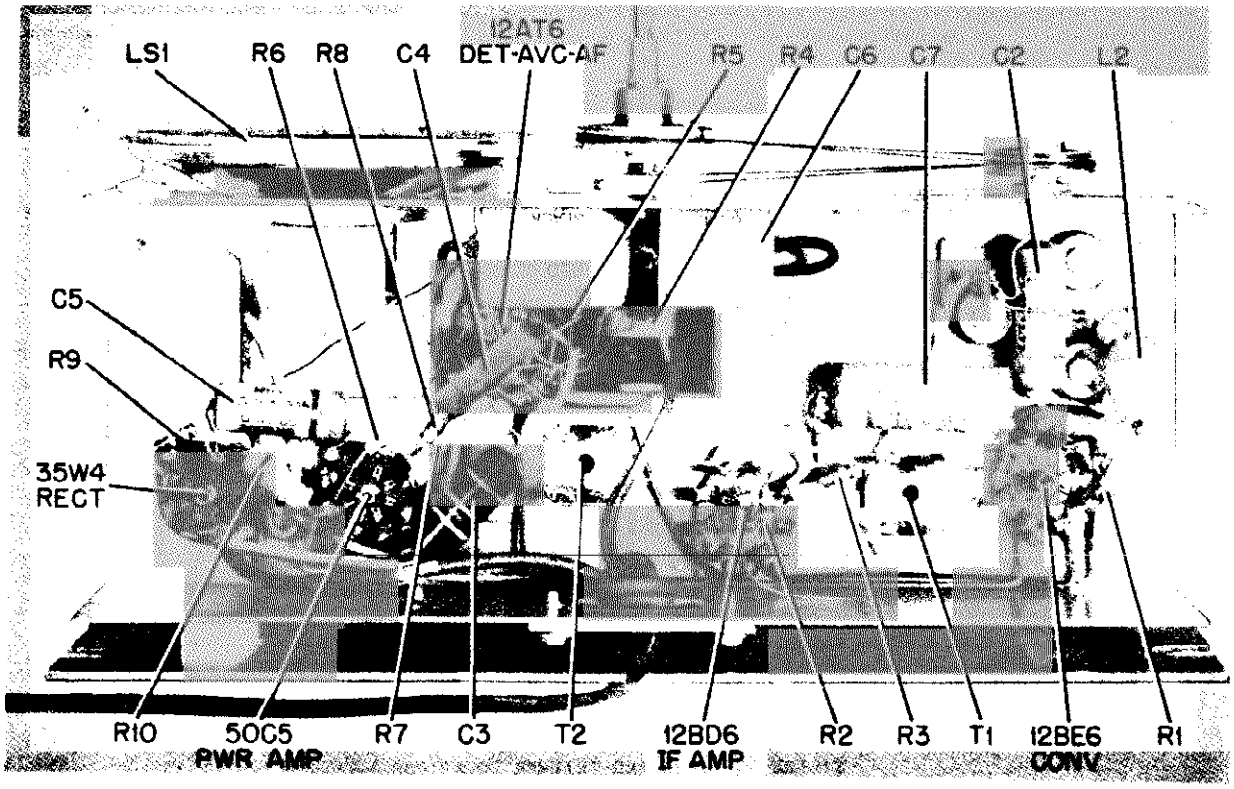
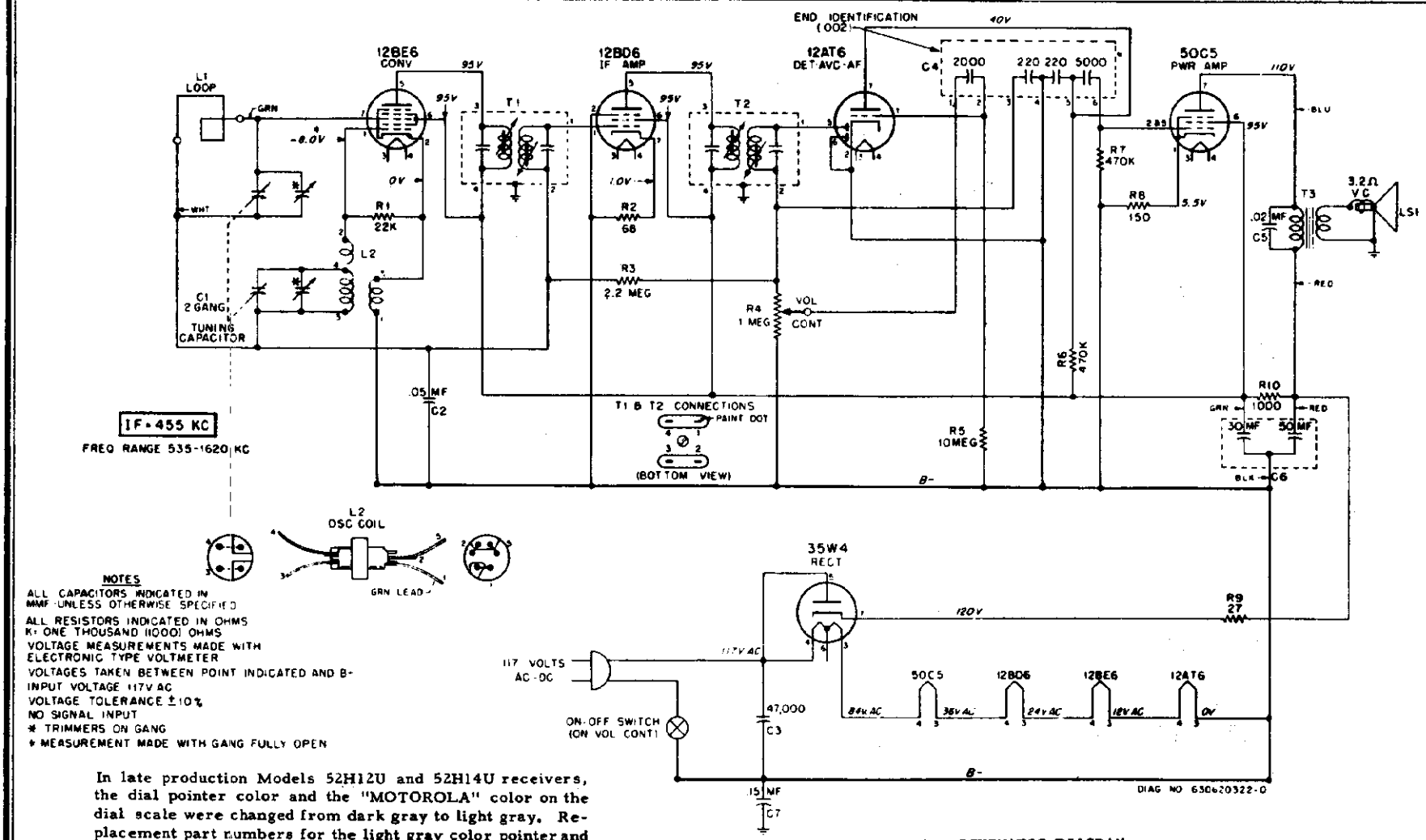


FIGURE 3. PARTS LOCATIONS



NOTES

ALL CAPACITORS INDICATED IN MMF UNLESS OTHERWISE SPECIFIED
ALL RESISTORS INDICATED IN OHMS K= ONE THOUSAND (1000) OHMS
VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER
VOLTAGES TAKEN BETWEEN POINT INDICATED AND B-
INPUT VOLTAGE 117V AC
VOLTAGE TOLERANCE ±10%
NO SIGNAL INPUT
* TRIMMERS ON GANG
+ MEASUREMENT MADE WITH GANG FULLY OPEN

FIGURE 4. SCHEMATIC DIAGRAM

In late production Models 52H12U and 52H14U receivers, the dial pointer color and the "MOTOROLA" color on the dial scale were changed from dark gray to light gray. Replacement part numbers for the light gray color pointer and dial scale are the same as listed in the Service Manual for Model 52H13U.

PARTS LIST SUPPLEMENT

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Part Number	Description	List Price
52A611011	Pointer, dial: red (52H11U).....	.20
52K611089	Pointer, dial: light gray (52H12U, 52H13U, 52H14U)(replaces 52K611088	
34D610859	Scale, dial: plastic (52H11U).....	1.35
34K611078	Scale, dial: plastic (52H12U, 52H13U, 52H14U)(replaces 34K611077	

MODELS 52H11U, 52H12U,
52H13U, 52H14U, Ch. HS-313

PARTS LIST

NOTE: When ordering parts specify model and chassis numbers of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	19B610878	Variable, 2-gang: with pulley	2.70
C-2	8R9821	Paper: .05 mf 200V	.20
C-3	8R490232	Molded paper: 47,000 mmf 400V	.25
C-4	21B482847	Ceramic, multiple: 2000, 220, 220, 5000 mmf	.65
C-5	8R9802	Paper: .02 mf 400V	.20
C-6	23B600855	Electrolytic: 50-30 mf/150V.	1.10
C-7	8K72686	Paper: .15 mf 200V	.25
Coils			
L-1	24C610884	Antenna Loop and Panel Assembly	1.30*
L-2	24K600812	Oscillator coil	.85
Speaker			
LS-1	50B611018		
or	50C611450	Speaker: 4" PM; 3.2 ohm VC	3.90*
		exch	2.95
Resistors			
		Note: All resistors are insulated carbon type unless otherwise specified.	
R-1	6R6028	22,000 20% 1/2W.....doz	1.20
R-2	6R2039	68 10% 1/2W.....doz	1.20
R-3	6R3927	2.2 meg 20% 1/2W.....doz	1.20
R-4	18B611017	Volume control: 1 meg; includes on-off switch	1.50
R-5	6R2109	10 meg 20% 1/2W.....doz	1.20
R-6	6R6032	470,000 20% 1/2W.....doz	1.20
R-7	6R6032	470,000 20% 1/2W.....doz	1.20
R-8	6R6373	150 10% 1/2W.....doz	1.20
R-9	6R5683	27 10% 1/2W.....doz	1.20
R-10	6R6327	1000 10% 1W	.20
Transformers			
T-1,2	24C485553	IF and Diode Transformer: 455 Kc; complete with capacitors, cores and shield	.95
T-3	25K485973	Output transformer	.80

Part Number	Description	List Price
CHASSIS PARTS - MECHANICAL		
7K485971	Bracket, loop mtg	.05
7A610861	Bracket, speaker mtg (top)	.10
7A610865	Bracket, speaker mtg (bottom)	.10
7K610875	Bracket, tuning shaft mtg	.05
7K610870	Bracket, volume control mtg	.05
42A610858	Clip, electrolytic mtg	.05
42A485548	Clip, IF trans mtg.....doz	.20
30A470651	Cord, line: with plug; 6 ft lg	.75
5S7805	Eyelet, snap-in (vol control insulator mtg).....doz	.15
5A19658	Eyelet, spacer (gang mtg).....doz	.20
5A70404	Grommet, gang mtg: rubber	.05
14A482844	Insulator, line cord outlet: fibre.....doz	.25
14A611064	Insulator, volume control: fibre (over vol control)	.10
2S7051	Nut, hex:palnut: 3/8-32 x 9/16 (volume control mtg).....doz	.15
1X611087	Pulley and Bushing Assembly, pointer drive	.20
47A611028	Shaft, tuning	.15
9K580218	Socket, tube: miniature; 7-prong; with dummy lug and center shield; wafer type	.15
41A471681	Spring, tension (drive cord)...doz	.40
4A73639	Washer, "C" (tuning shaft retainer).....doz	.20
4A21491	Washer, flat (on tuning shaft).doz	.15
4K482859	Washer, insulated shoulder (loop brkt mtg).....doz	.15
CABINET PARTS		
64A611499	Baffle, speaker: cardboard	.05
16E610760	Cabinet, table model: plastic; walnut; less speaker grille and dial scale (52H11U)	4.30*
16K610761	Cabinet, table model: plastic; ivory; less speaker grille and dial scale (52H12U)	5.95*
16K610762	Cabinet, table model: plastic; green; less speaker grille and dial scale (52H13U)	5.95*
16K610763	Cabinet, table model: plastic; gray; less speaker grille and dial scale (52H14U)	5.95*
13A610872	Grille, speaker: perforated metal	.20
36B610880	Knob, tuning: walnut (52H11U)	.25
36K610881	Knob, tuning: ivory (52H12U)	.25
36K610882	Knob, tuning: green (52H13U)	.25
36K610883	Knob, tuning: gray (52H14U)	.25
36B611024	Knob, volume: walnut (52H11U)	.25
36K611025	Knob, volume: ivory (52H12U)	.25
36K611026	Knob, volume: green (52H13U)	.25
36K611027	Knob, volume: gray (52H14U)	.25
38A25507	Plug, split (loop panel mtg)...doz	.15
52A611011	Pointer, dial: red (52H11U)	.20
52K611088	Pointer, dial: dark gray (52H12U & 52H14U)	.20
52K611089	Pointer, dial: light gray (52H13U)	.20
34D610859	Scale, dial: plastic (52H11U)	1.35
34K611077	Scale, dial: plastic (52H12U & 52H14U)	1.35
34K611078	Scale, dial: plastic (52H13U)	1.35
2S7092	Speednut (speaker grille mtg)..doz	.15

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*Plus Federal Excise Tax At Current Rate

GENERAL INFORMATION

TYPE - AC-DC operated table model superheterodyne receiver with loop antenna.

RECEIVER MODELS -

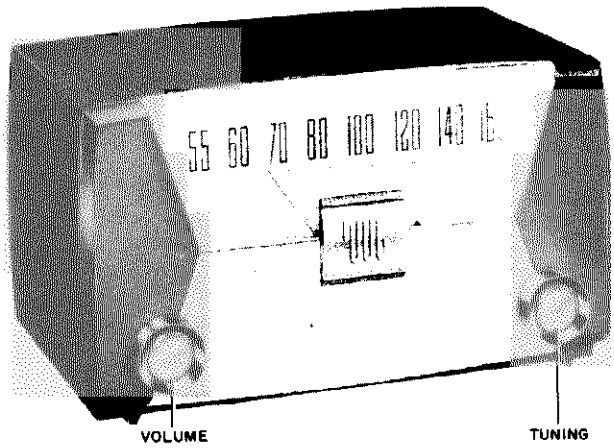
Model	Color
62X11U	Walnut
62X12U	Ivory
62X13U	Green

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT -

Type	Function
12BD6	RF Amplifier
12BE6	Converter
12BD6	IF Amplifier
12AT6	Det, AVC & 1st AF Amp
35C5	Power Amplifier
35W4	Rectifier

POWER SUPPLY - 117 volts AC or DC, 35 watts



OPERATING INSTRUCTIONS

POWER SWITCH AND VOLUME CONTROL. Operated with left-hand knob. NOTE: Reverse the line cord plug in the electrical outlet if the radio does not operate from DC. When operating from AC, reversing the plug in the wall outlet may sometimes improve reception.

TUNING. Tune stations with right-hand knob.

ANTENNA. A built-in loop antenna eliminates the need fo an outside antenna in most locations. When receiving weak station, rotate the receiver slightly for best signa strength. If additional pick-up is necessary, connect an ex ternal antenna to the radio by following the instruction printed on the rear panel. CAUTION: Never connect th radio chassis to a water pipe, radiator, or other ground

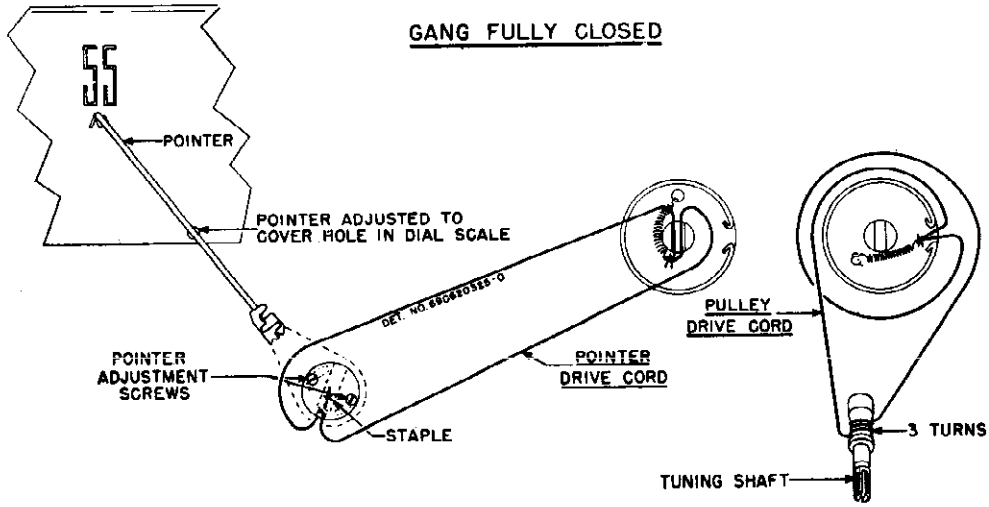


FIGURE 1. DIAL RESTRINGING DETAIL

MODELS 62X11U, 62X12U, 62X13U, Ch. HS-314

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

TO REMOVE THE CHASSIS FROM THE CABINET

1. Pull off the two control knobs.
2. Remove split plugs which hold the loop to the cabinet.
3. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.
4. Slide the radio chassis and loop from the cabinet.

ALIGNMENT

NOTE: If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.

2. Connect the low side of the signal generator to B-.

3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.

5. Use a small fibre screwdriver for aligning the IF and diode transformers.

6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.

7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Rear stator of tuning capacitor	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
WAVETRAP						
2.	.1 mf	Rear stator of tuning capacitor	455 Kc	Fully open	5 (Wavetrap)	Adjust for minimum.
RF ALIGNMENT						
3.	.1mf	Rear stator of tuning capacitor	1620 Kc	Fully open	6 (Osc)	Adjust for maximum.
4	-	Radiation loop*	1400 Kc	Tune for max	7 (Ant)	Adjust for maximum.

*Connect generator output to 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

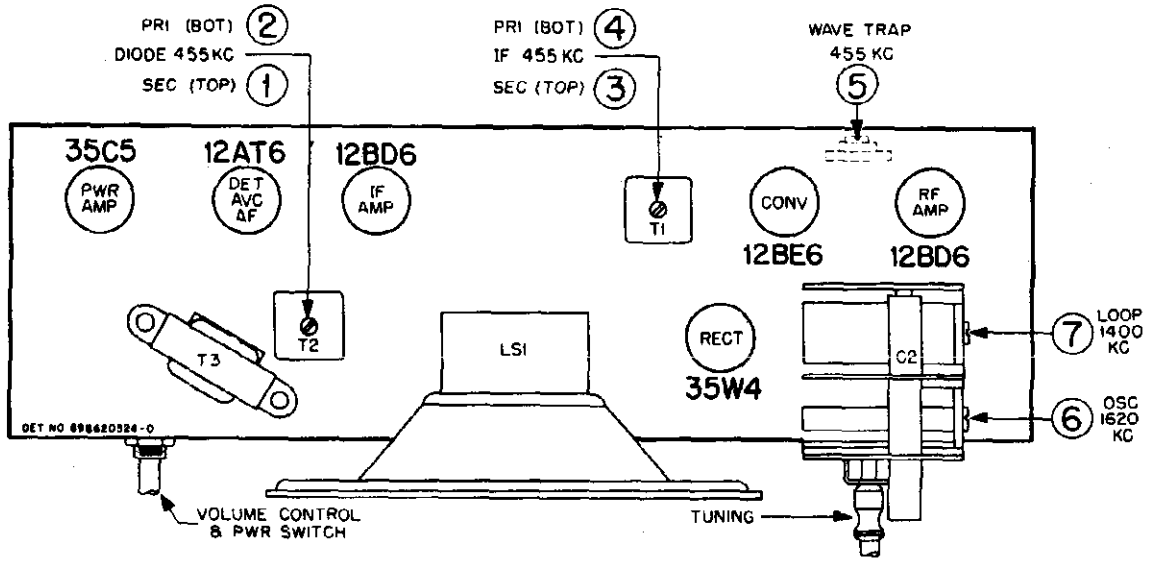
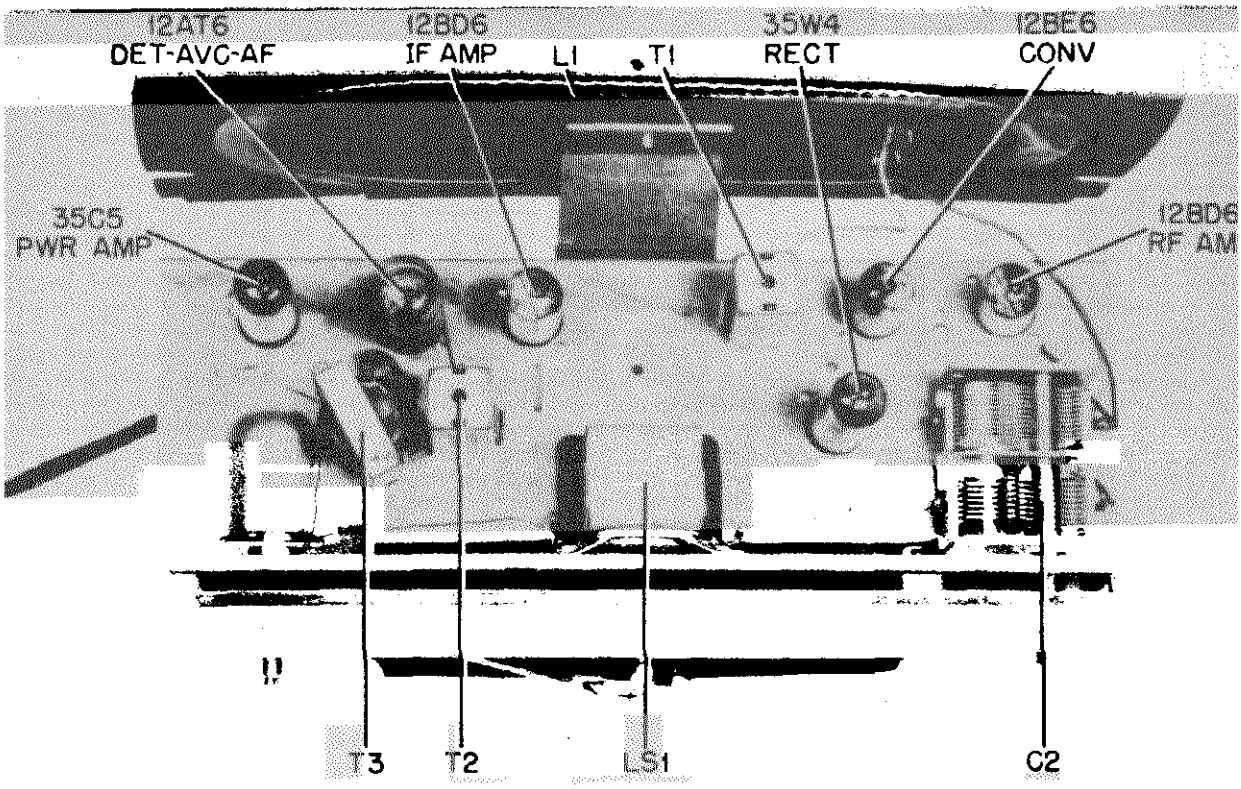


FIGURE 2. TUBE AND TRIMMER LOCATIONS



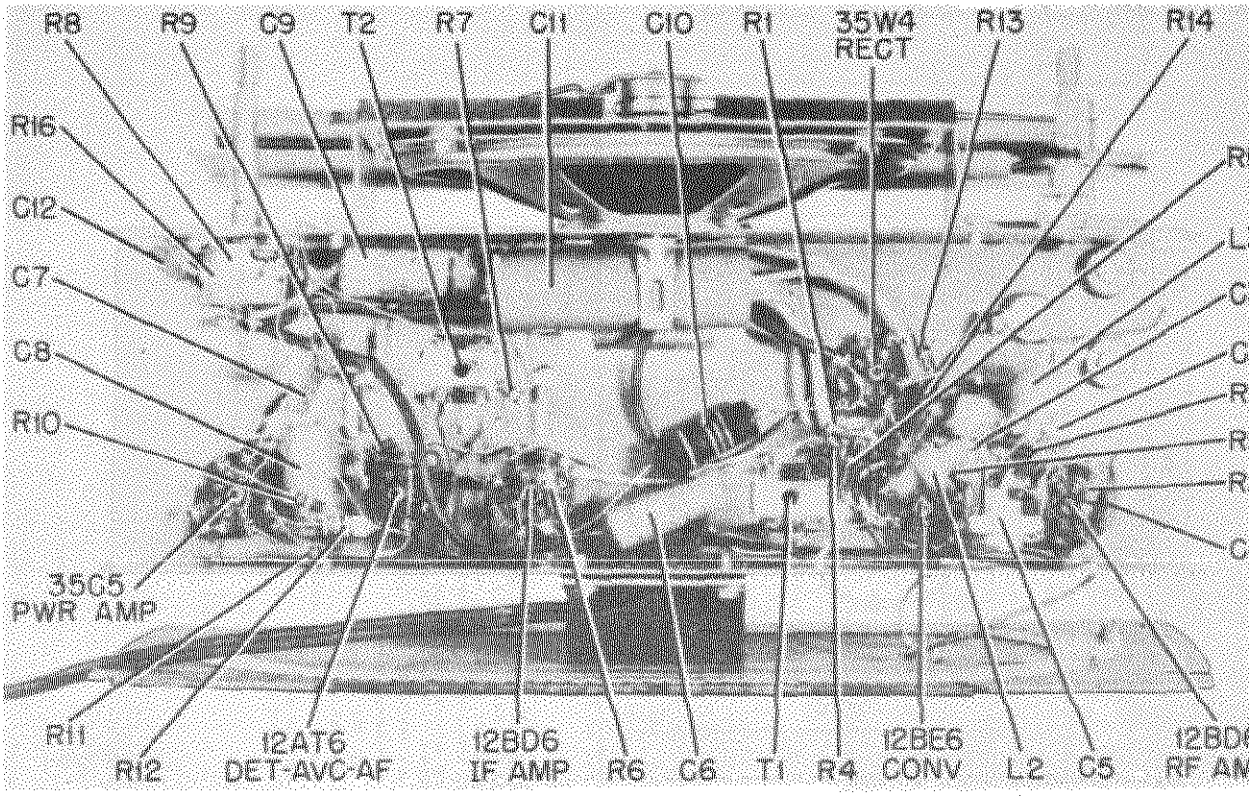


FIGURE 3. PARTS LOCATIONS

MODELS 62X11U, 62X12U, 62X13U, Ch. HS-314

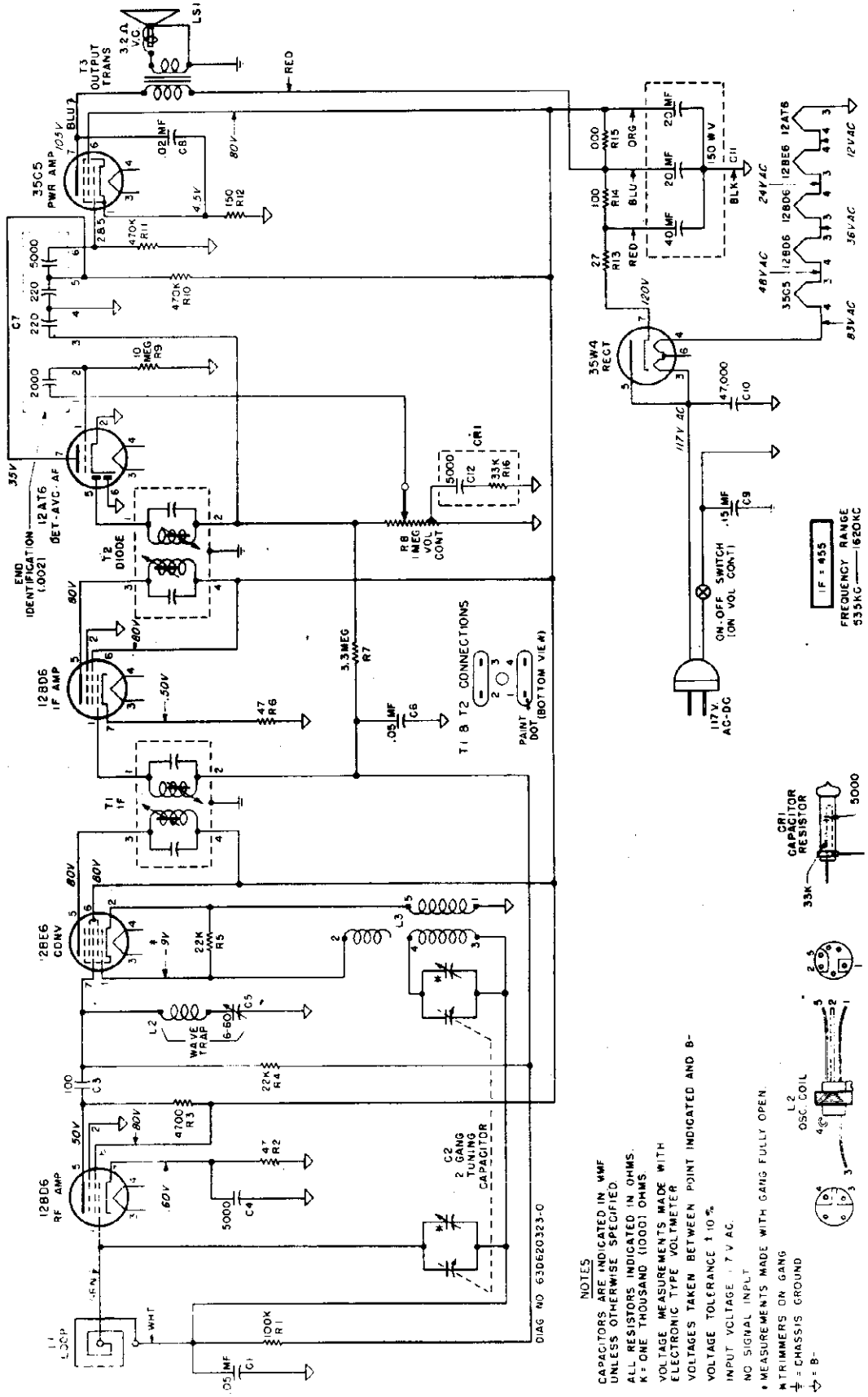


FIGURE 4. SCHEMATIC DIAGRAM

PARTS LIST

NOTE: When ordering parts, specify model and chassis number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	8R9821	Paper: .05 mf 200V.....	.20
C-2	19B611094	Variable, 2-gang; with pulley	2.80
C-3	21R6641	Mica: 100 mmf 500V.....	.20
C-4	21R115312	Ceramic, disc: 5000 mmf 500V	.25
C-5	20A26941	Mica, variable: 6 mmf-60 mmf; includes bracket.....	.30
C-6	8R9821	Paper: .05 mf 200V.....	.20
C-7	21B482847	Ceramic, multiple: 2000 mmf, 220 mmf, 220 mmf, 5000 mmf.	.65
C-8	8R9802	Paper: .02 mf 400V.....	.20
C-9	8R9843	Paper: .15 mf 200V.....	.20
C-10	8R490232	Molded paper: 47,000 mmf 400V	.25
C-11	23K484234	Electrolytic: 40-20-20 mf/150V	1.40
C-12	21R115312	Ceramic, disc: 5000 mmf 500V (in some sets).....	.25
Capacitor-Resistor			
CR-1	21B484227	Capacitor-Resistor: 2 lead; 33,000 ohms, 5000 mmf (in some sets).....	.35
Coils			
L-1	24C611037	Antenna Loop and Panel Assembly.....	1.20*
L-2	24A77336	Wavetrap.....	.40
L-3	24K600813	Oscillator coil.....	.80
Speaker			
LS-1	50C611019	Speaker: 4" x 6" PM; 3.2 ohm VC.....	4.45*
		exch	3.35
Resistors			
		Note: All resistors are insulated carbon type unless otherwise specified.	
R-1	6R6075	100,000 20% 1/2W.....doz	1.20
R-2	6R5550	47 10% 1/2W.....doz	1.20
R-3	6R6039	4700 20% 1/2W.....doz	1.20
R-4	6R6028	22,000 20% 1/2W.....doz	1.20
R-5	6R6028	22,000 20% 1/2W.....doz	1.20
R-6	6R5550	47 10% 1/2W.....doz	1.20
R-7	6R2118	3.3 meg 20% 1/2W.....doz	1.20
R-8	18K611039	Volume control: 1 meg; includes on-off switch.....	1.50
R-9	6R2109	10 meg 20% 1/2W.....doz	1.20
R-10	6R6032	470,000 20% 1/2W.....doz	1.20
R-11	6R6032	470,000 20% 1/2W.....doz	1.20
R-12	6R3992	150 20% 1/2W.....doz	1.20
R-13	6R5683	27 10% 1/2W.....doz	1.20
R-14	6R488025	100 20% 1W.....each	.20
R-15	6R3953	1000 20% 1W.....each	.20
R-16	6R6012	33,000 20% 1/2W (in some sets).....doz	1.20
Transformers			
T-1,2	24C485553	IF and Diode Transformer: 455 Kc; complete with capacitors, cores, and shield.....	.95
T-3	25B482858	Output Transformer.....	.95

Part Number	Description	List Price
CHASSIS PARTS - MECHANICAL		
45A610890	Arm, pointer support.....	.05
7K600579	Bracket, loop mtg.....	.10
7A600476	Bracket, tuning shaft.....	.10
42A610858	Clip, electrolytic mtg.....	.05
42B485548	Clip, IF trans mtg.....doz	.20
30A470651	Cord, line: with plug; 6 ft lg....	.75
5A19658	Eyelet, spacer (gang mtg).....doz	.20
5A70404	Grommet, gang mtg: rubber.....	.05
14A482844	Insulator, line cord outlet: fibre.....doz	.25
2S7051	Nut, hex palnut: 3/8-32 x 9/16 (volume control mtg).....doz	.15
35K611043	Pad, cushion: sponge rubber: 2-5/8" lg x 1/4" wide x 1/4" thick (on spkr mtg plate).....	.05
35K611045	Pad, cushion: sponge rubber; 7-1/4" lg x 1/4" wide x 3/8" thick (on spkr mtg plate).....	.10
1X611179	Plate, speaker mtg: with pointer bearing; less cushion pads.....	.90
1X620123	Pointer, dial: with tubing.....	.15
49A611183	Pulley, pointer mtg.....	.25
34C611032	Scale, dial.....	1.15
3S114795	Screw, machine: 3-48 x 5/16" slotted binder head (pointer arm mtg).....doz	.25
1K611042	Shaft, tuning: with pulley.....	.15
26A481521	Shield, spring (for 12AT6 tube)doz	.50
41A471681	Spring, tension (pointer drive cord).....doz	.40
41A14244	Spring, tension (gang drive cord).....doz	.55
9K580218	Socket, tube: miniature; 7-prong; with dummy lug and center shield; wafer type.....	.15
4K501364	Washer, "C" (tuning shaft and pointer pulley mtg).....doz	.15
4K482859	Washer, insulated shoulder (loop brkt mtg).....doz	.15
CABINET PARTS		
16R610796	Cabinet, table model: plastic; walnut; less speaker grille and dial crystal (62X11U).....	6.80*
16K610797	Cabinet, table model: plastic; ivory; less speaker grille and dial crystal (62X12U).....	8.35*
16K610798	Cabinet, table model: plastic; green; less speaker grille and dial crystal (62X13U).....	8.35*
61D610814	Crystal, dial.....	1.50
13A611181	Grille, speaker.....	.30
36B611132	Knob, control: walnut (62X11U)....	.10
36K611133	Knob, control: ivory (62X12U).....	.15
36K611134	Knob, control: green (62X13U).....	.15
38A25507	Plug, split (loop panel mtg)...doz	.15
3S3394	Screw, thread cutting: 8-18 x 1/4 plain hex head; cad pl (dial crystal mtg).....doz	.15
2S476112	Speednut (spkr grille mtg)...per/c	.50

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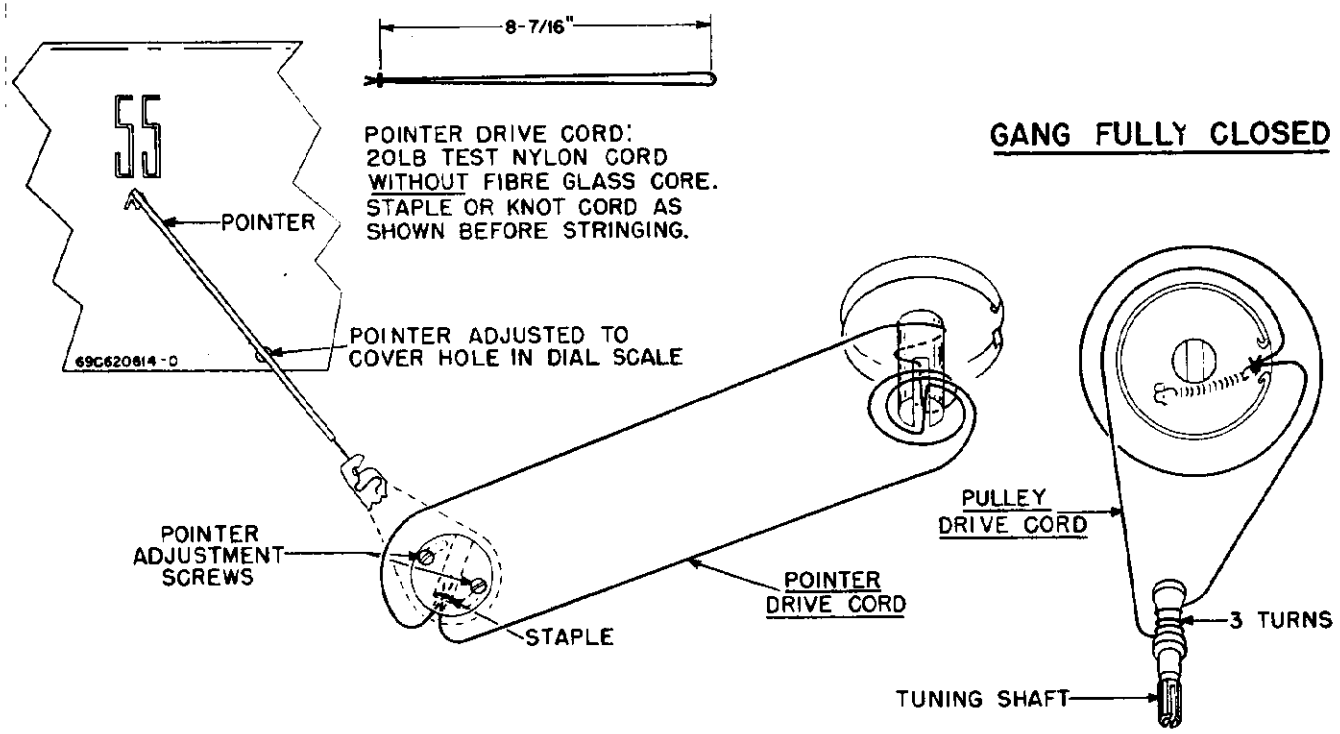
S U P P L E M E N T N O . 1

This supplement contains dial restringing information for late Model 62X11U series receivers. Refer to the drawing below for instructions. Note that the pointer drive cord is pre-cut and knotted before it is looped around the gang drive shaft. The cord should be nylon, without a fibre glass core, to allow it to stretch during the stringing process.



GENERAL INFORMATION

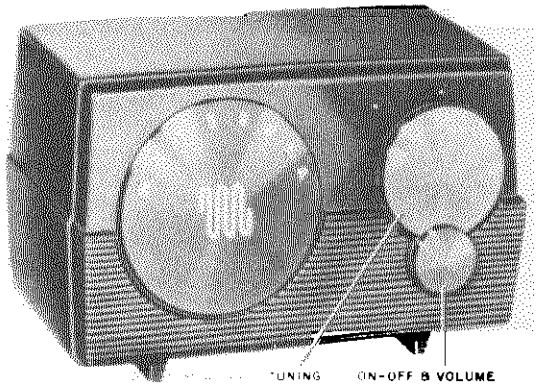
TYPE - AC-DC table model superheterodyne receiver with "printed" circuit and Ferrite Magnetic Iron Core Antenna.

RECEIVER MODELS -

Model	Color
52R11	Walnut
52R12	Ivory
52R13	Maroon
52R14	Gray
52R15	Green
52R16	Red

TUBE COMPLEMENT -

Type	Function
12BE6	Converter
12BD6	IF Amplifier
12AT6	Det, AVC & AF Amp
50C5	Power Amplifier
35W4	Rectifier



TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 117 volts AC or DC; 35 watts

INSTALLATION & OPERATING INSTRUCTIONS

POWER SWITCH & VOLUME CONTROL. Operated with the small lower knob. NOTE: Reverse the line cord plug in the wall outlet if radio does not operate from DC. When operating from AC, reversing the line cord plug in the wall outlet may sometimes improve reception.

TUNING. Stations are tuned in with the large upper knob.

ANTENNA. A built-in Ferrite Magnetic Iron Core Antenna eliminates the need for an outside antenna. When receiving a weak station, rotate the receiver slightly for best signal strength.

CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

SERVICE NOTES

TO REMOVE CHASSIS FROM CABINET:

1. Remove the four screws which hold the back cover, and remove the cover and line cord.

2. Pull off the two control knobs from the front of the receiver.

3. Remove the Phillips head screw under the tuning knob, on the front of the receiver.

4. From the back, remove the screw which holds the line cord plug.

5. Disconnect the leads from the speaker.

6. From the back, remove the three screws which mount the chassis. CAUTION: Do not lose the insulating washers on the screws -they prevent damage to the printed circuit by the heads of the screws. See Figure 1.

7. Slide the chassis from the cabinet.

CIRCUIT DESCRIPTION

1. The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are printed on both sides of the chassis base, thereby replacing the usual connecting wires and making wiring more uniform.

2. The metal printing extends through all the holes on the chassis, connecting circuits on the front with those on the rear.

3. Reference to the schematic diagram and to Figures 3 and 4 will permit the circuit to be traced easily. Figures 3 and 4 show the front and rear of the chassis, wired and unwired.

MODELS 52R11, 52R12, 52R13, 52R14, 52R15, 52R16, Ch. HS-289

SAFETY PRECAUTIONS

1. The chassis of this receiver is connected directly to the power line. However, the power cord circuit is broken by an interlock when the cabinet back is removed for replacing tubes. When aligning or servicing the chassis from AC, an isolation transformer should be inserted between the power line and the chassis.
2. Do not service the chassis on a metal plate, because of the possibility of a short circuit.
3. Use caution when handling the chassis with power applied, because all high voltage leads are exposed.
4. The outer edges of the chassis and the large printed areas in the center are at ground potential.

COMPONENT REPLACEMENT

1. To prevent tube breakage, remove them before replacing components. CAUTION: Remove the tubes only by pulling them straight out. Wiggling a tube may bend a socket clip causing poor contact with the tube pin.
2. WHEN REMOVING DEFECTIVE COMPONENTS USE ONLY A SMALL SOLDERING IRON (60 WATTS OR LESS) TO AVOID DAMAGE TO THE WIRING. DO NOT USE A SOLDERING GUN. WARNING: THE LEADS ARE VERY THIN, AND EXCESSIVE HEAT WILL BURN THEM OR LOOSEN THEM FROM THE BASE MATERIAL.
3. Printed connections or leads, if damaged, may be replaced with a jumper of regular hookup wire.
4. It is recommended that IF transformers, the volume control, or the electrolytic capacitor be removed by immersing all the lugs simultaneously into a small soldering pot. The component may then be lifted off the chassis easily. If a soldering pot is not available, heat each lug individually with a small soldering iron, and shake off as much molten solder as possible. Then, by alternately heating and loosening each lug, the entire component will be freed. The disadvantage of using a soldering iron instead of a soldering pot is that the printed connections may be pulled loose from the chassis.
5. An individual tube clip may be removed by squeezing it with a pliers and then unsoldering it. The new clip snaps into the hole.
6. Resistors or capacitors may be removed by unsoldering one end at a time.

CAUTION: Clean all the solder from the holes before installing a new component. Do not let the solder run onto an adjacent lead, as a short circuit will be created.

7. Be careful, when removing or replacing the volume control mounting nut or gang mounting screws, that the printing around the holes is not damaged.
8. When the chassis is fastened into place in the cabinet, be sure the insulating washers are on the mounting screws, otherwise the heads of the screws may damage the printing.

ANTENNA

1. A Ferrite Magnetic Iron Core Antenna replaces the conventional "pancake" loop in this receiver. This newer loop is more compact and efficient than the previous type. Its inductance has been pre-set at the factory and requires no adjustment in the field.
2. Under certain circumstances, in early models, AC hum was induced into the loop antenna. This condition was corrected in later models by repositioning the loop. Figure 3 shows the revised location.
3. The service man may convert early models, if necessary, by replacing the loop mounting insulator with the later type, shown in Replacement Parts List. The loop coil itself remains the same.

ALIGNMENT

NOTE: If AC power is used, insert an isolation transformer between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to ground (the outer edges of the chassis) through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.

2. Connect the low side of the signal generator to ground.

3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.

5. Use a small fibre screwdriver for aligning the IF and diode transformers (a "K-Tran" alignment tool is recommended).

6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.

7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (Osc)	Adjust for maximum.
3.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

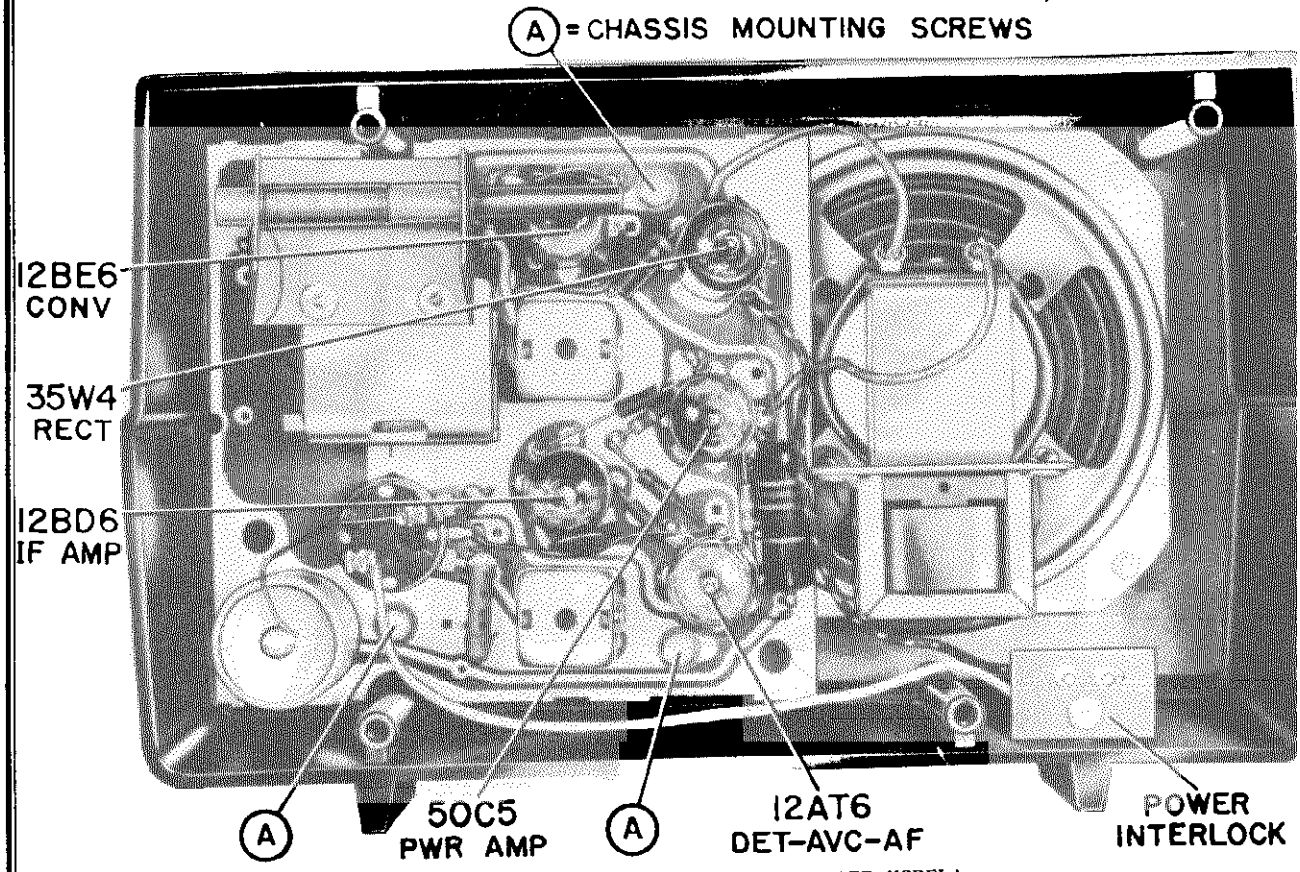
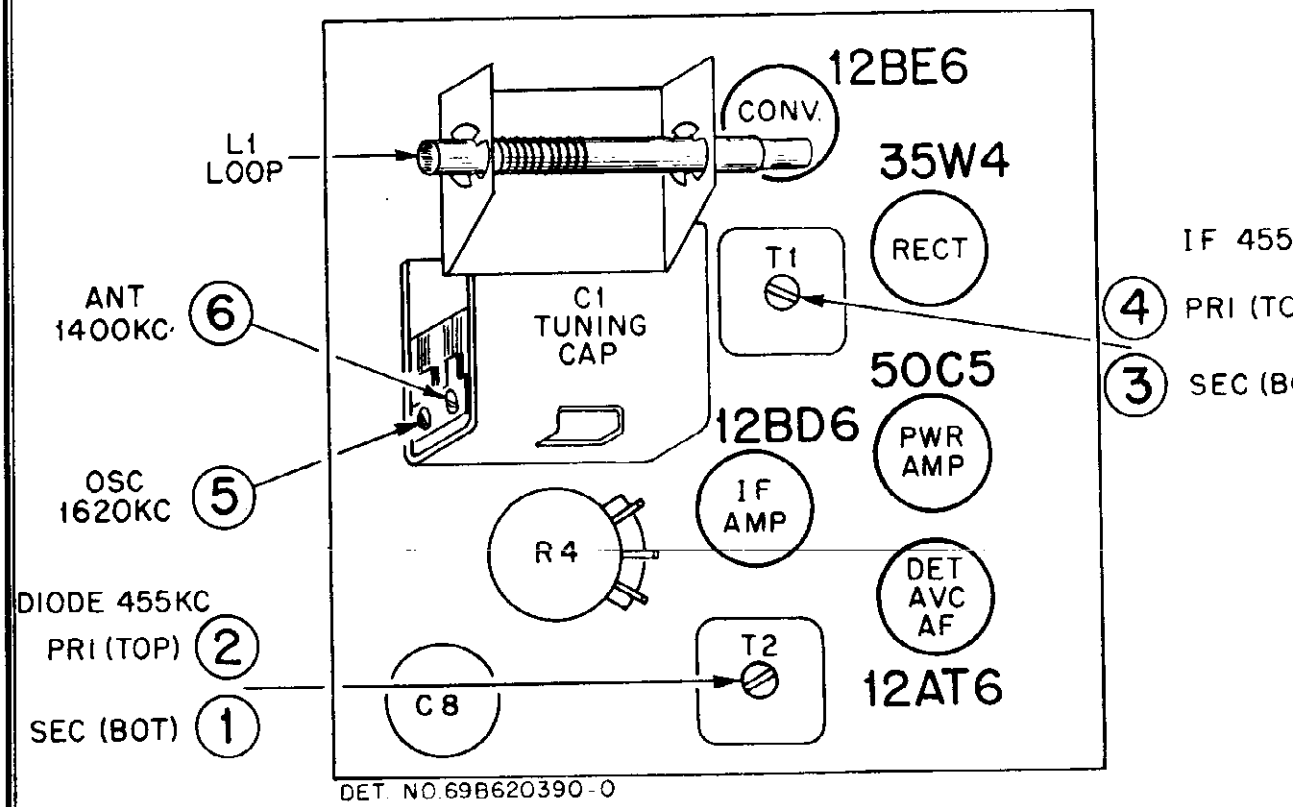


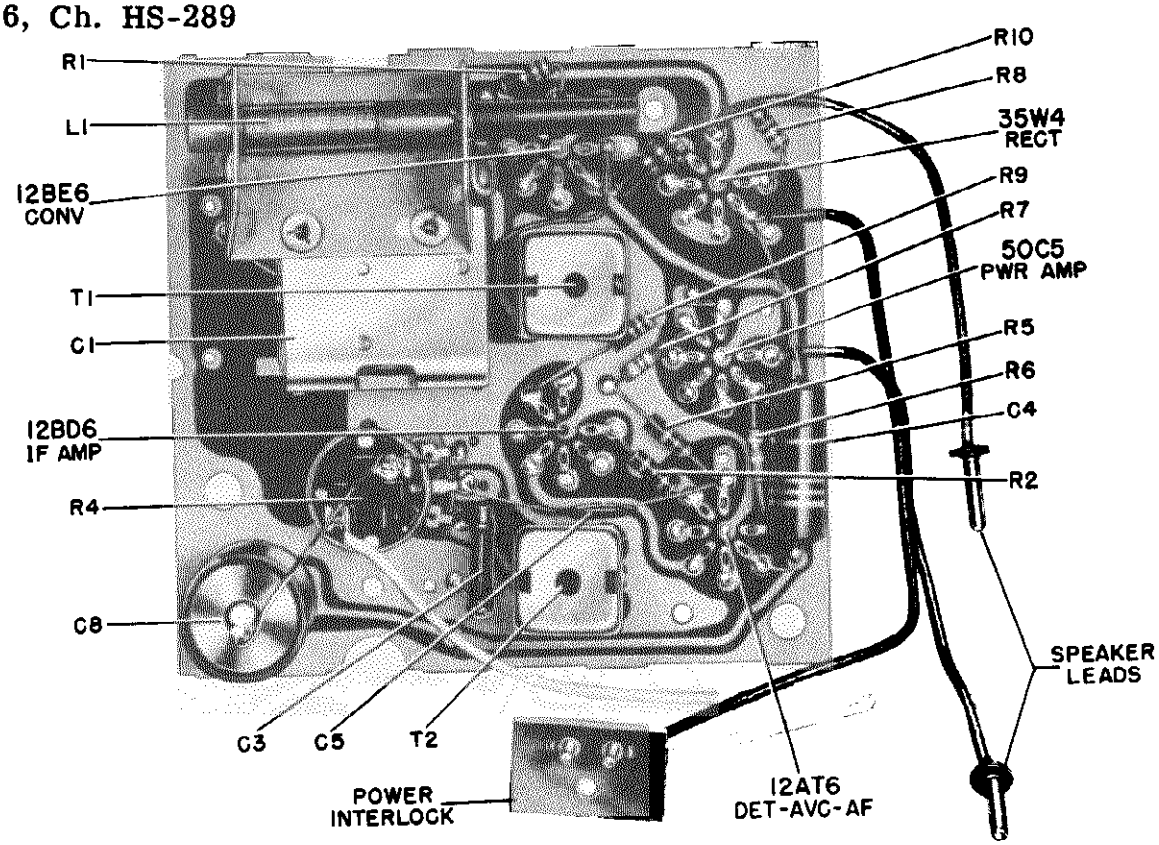
FIGURE 1. REAR VIEW OF RECEIVER (LATE MODEL)



DET. NO.69B620390-0

FIGURE 2. TUBE AND TRIMMER LOCATIONS (LATE MODEL)

MODELS 52R11, 52R12,
52R13, 52R14, 52R15,
52R16, Ch. HS-289



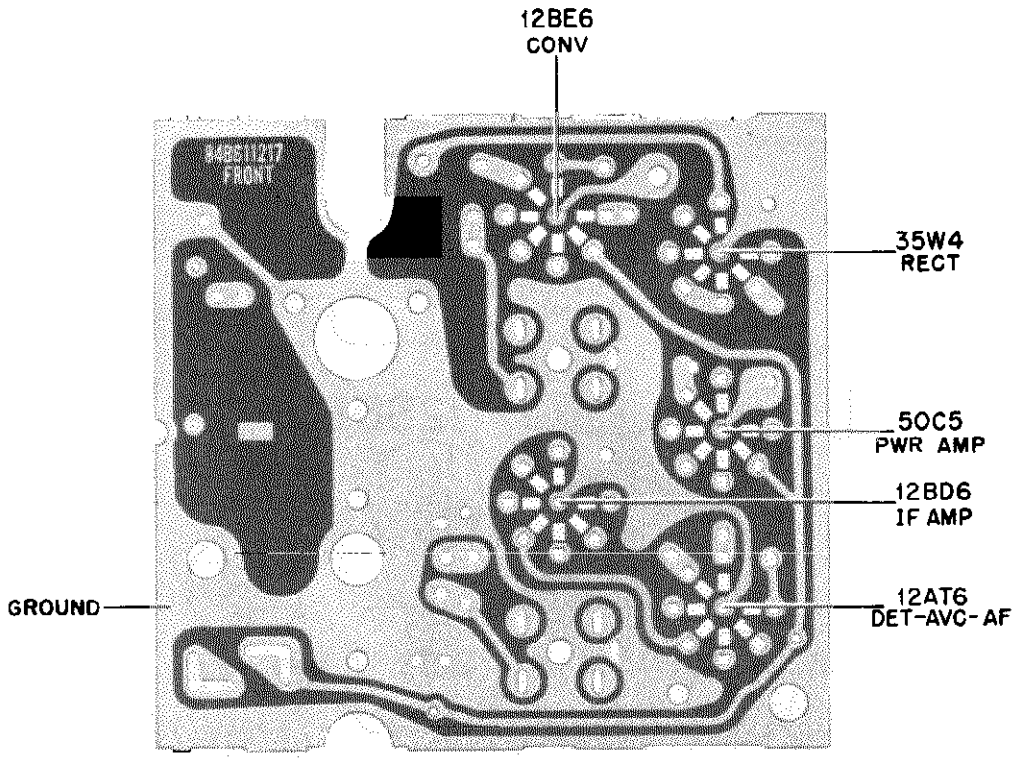
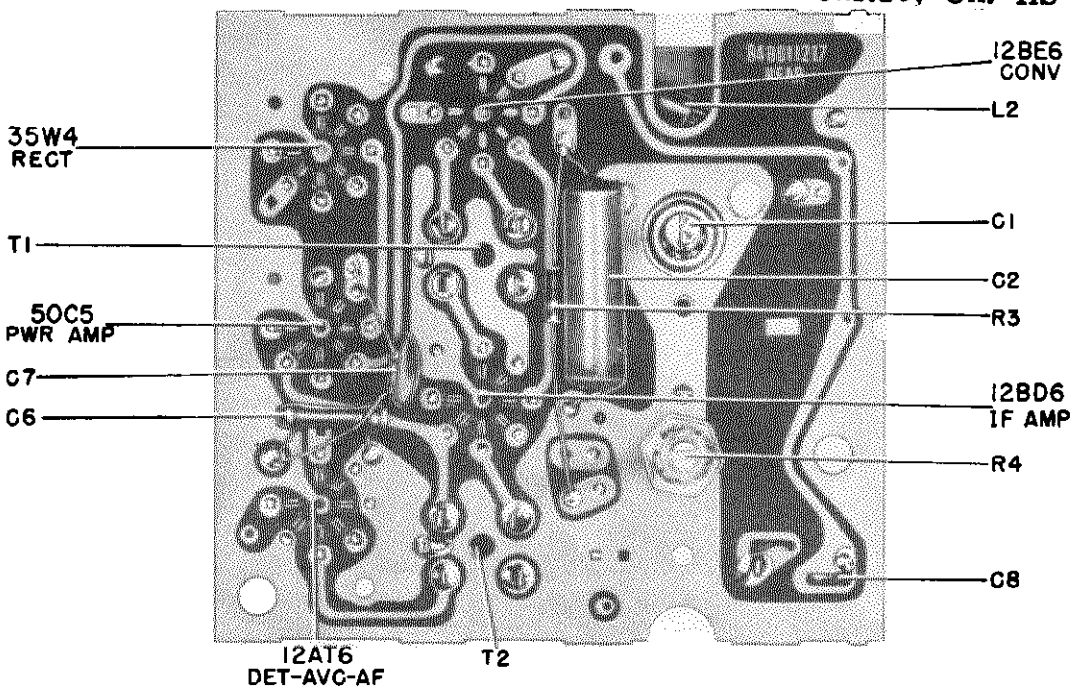


FIGURE 3. FRONT VIEW OF CHASSIS - WIRED AND BLANK (LATE MODEL)



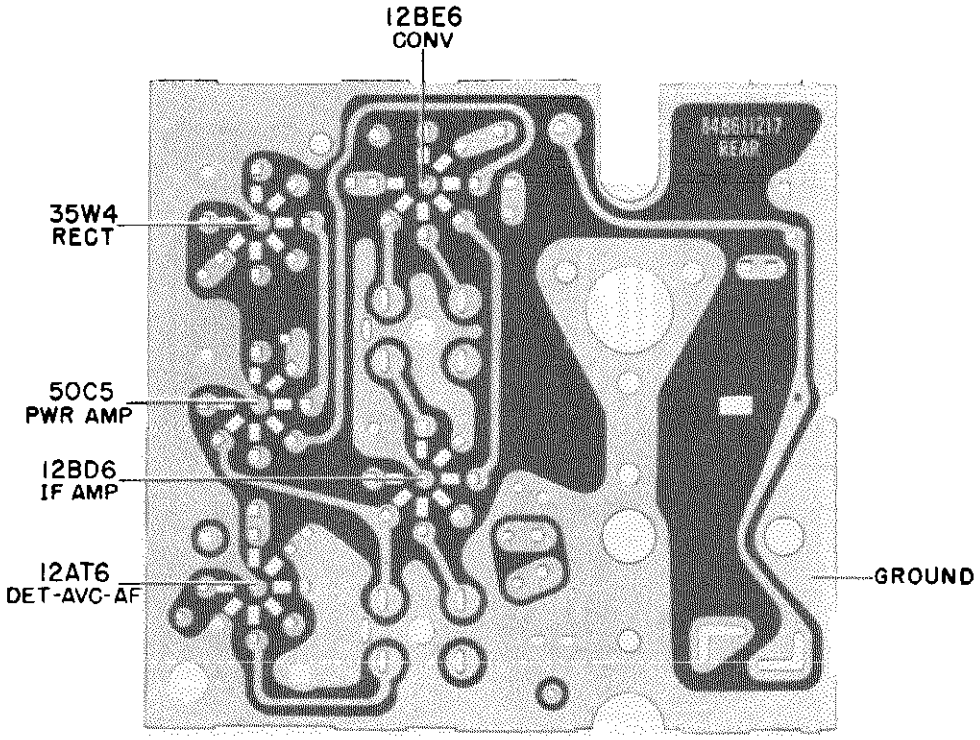


FIGURE 4. REAR VIEW OF CHASSIS - WIRED AND BLANK (LATE MODEL)

MODELS 52R11, 52R12,
52R13, 52R14, 52R15, 52R16, Ch. HS-289

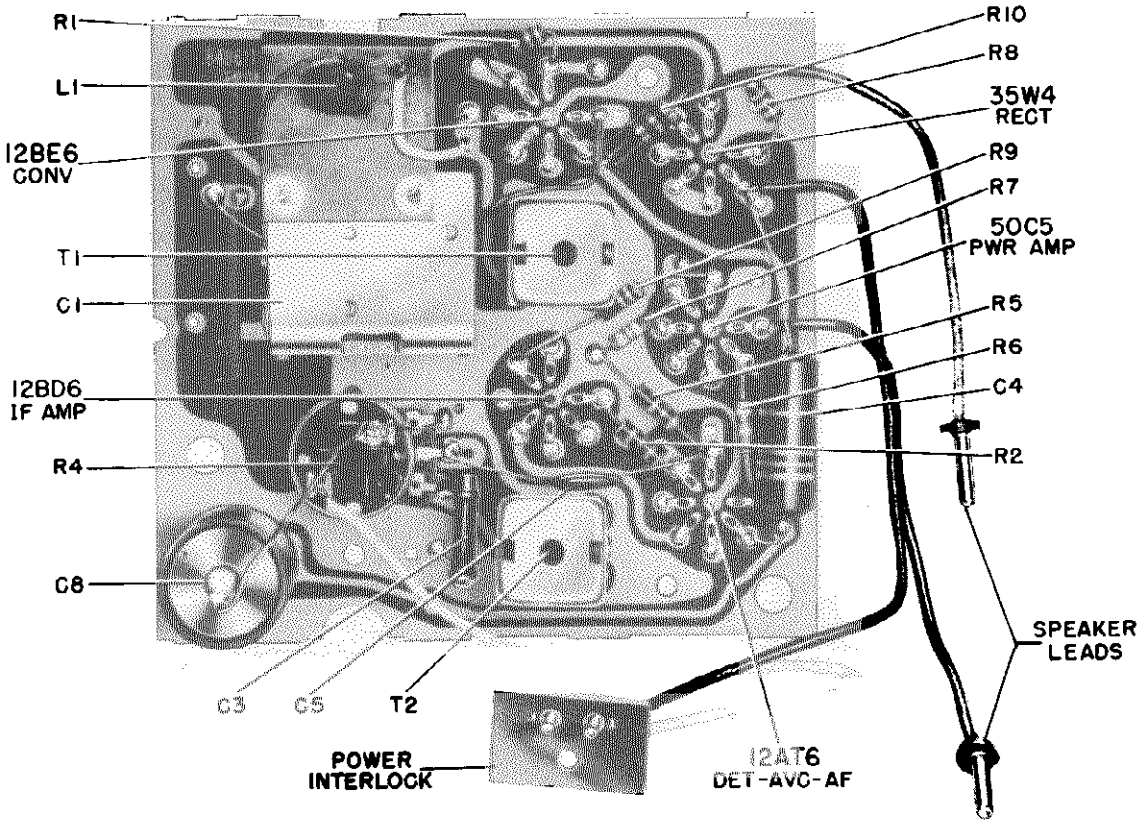


FIGURE 5. FRONT VIEW OF CHASSIS (EARLY MODEL)

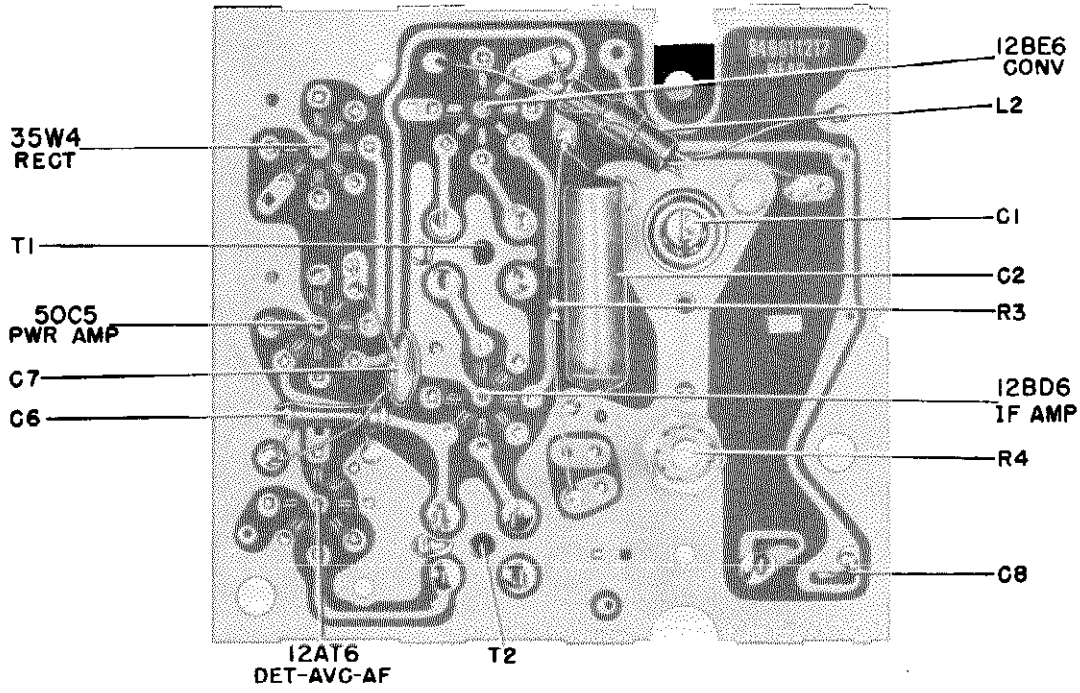
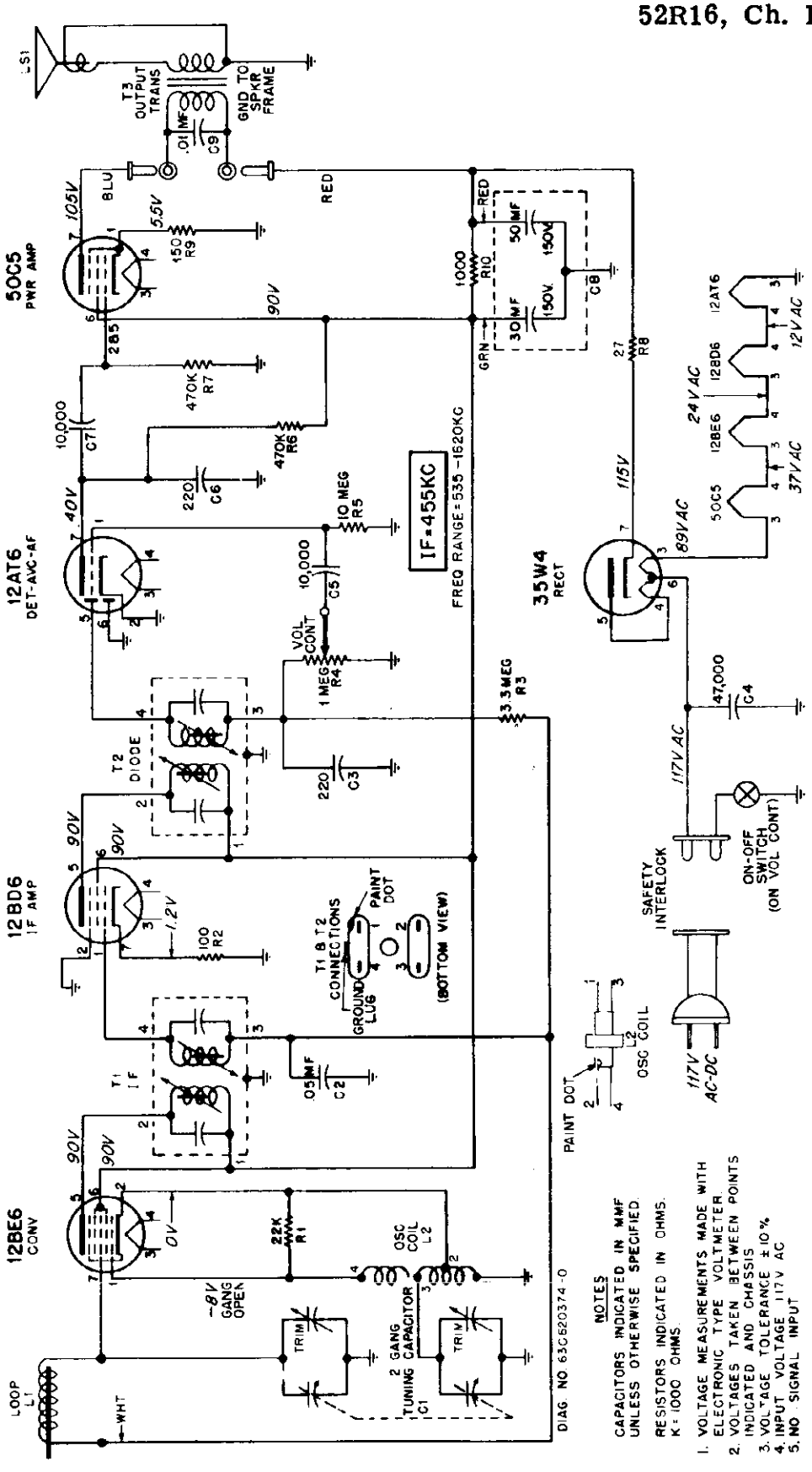


FIGURE 6. REAR VIEW OF CHASSIS (EARLY MODEL)



NOTES

CAPACITORS INDICATED IN MMF UNLESS OTHERWISE SPECIFIED

RESISTORS INDICATED IN OHMS. K=1000 OHMS.

1. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
2. VOLTAGES TAKEN BETWEEN POINTS INDICATED AND CHASSIS
3. VOLTAGE TOLERANCE ±10%
4. INPUT VOLTAGE 117V AC
5. NO SIGNAL INPUT

FIGURE 7. SCHEMATIC DIAGRAM

MODELS 52R11, 52R12, 52R13, 52R14, 52R15, 52R16, Ch. HS-289

PARTS LIST

NOTE: When ordering parts, specify model and chassis numbers of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	19B610626	Variable: 2-gang.....	2.75
C-2	8R9821	Paper: .05 mf 200V.....	.20
C-3	21R115905	Ceramic: 220 mmf 500V.....	.25
C-4	8R490232	Molded paper: 47,000 mmf 400V	.30
C-5	21R482726	Ceramic disc: 10,000 mmf 450V	.30
C-6	21R115905	Ceramic: 220 mmf 500V.....	.25
C-7	21R482726	Ceramic disc: 10,000 mmf 450V	.30
C-8	23B610627	Electrolytic: 50-30 mf/150V.	1.35
C-9	8R9801	Paper: .01 mf 100V.....	.20
Coils			
L-1	24A610646	Antenna Loop: with core.....	.50*
L-2	24A620875	Oscillator coil.....	.90
Speaker			
LS-1	50K620141		
or	50K620142	Speaker: 4" PM; 3.2 ohm VC; includes T-3 and C-9.....	4.95*
		exch	3.70
Resistors			
		Note: All resistors are insulated carbon type unless otherwise specified.	
R-1	6R6028	22,000 20% 1/2W.....doz	1.20
R-2	6R6018	100 20% 1/2W.....doz	1.20
R-3	6R2118	3.3 meg 20% 1/2W.....doz	1.20
R-4	18A610857	Volume control: 1 meg; with switch.....	1.00
R-5	6R2109	10 meg 20% 1/2W.....doz	1.20
R-6	6R6032	470,000 20% 1/2W.....doz	1.20
R-7	6R6032	470,000 20% 1/2W.....doz	1.20
R-8	6R5683	27 10% 1/2W.....doz	1.20
R-9	6R3992	150 20% 1/2W.....doz	1.20
R-10	6R3953	1000 20% 1W.....	.20
Transformers			
T-1,2	24K610639	IF and Diode Transformer: 455 Kc; complete.....	1.35
T-3	25K610631	Output Transformer.....	1.05

Part Number	Description	List Price
CHASSIS PARTS - MECHANICAL		
42A610632	Clip, tube pin.....per/c	.50
1X620210	Insulator, antenna loop: fibre; with lug (replaces 51A610757 insulator shown in Fig. 5).....	.20
2S7051	Nut, hex: Palnut; 3/8-32 x 9/16 (volume control mtg).....doz	.15
28A610679	Plug, line cord (interlock).....	.15
46B480108	Stud, trimount (ant insulator mtg).....doz	.15
29A620057	Terminal, pin (on spkr leads)..doz	.20
CABINET PARTS		
16C611255	Cabinet, table model: walnut (52R11).....	3.60*
16K611256	Cabinet, table model: ivory (52R12).....	4.80*
16K611258	Cabinet, table model: maroon (52R13).....	4.80*
16K611259	Cabinet, table model: gray (52R14).....	4.80*
16K611260	Cabinet, table model: green (52R15).....	4.80*
16K611261	Cabinet, table model: red (52R16).	4.80*
30K610638	Cord, line: with plug & receptacle	.95
1X610655	Cover, cabinet back: with line cord	1.40
15K620103	Cover, speaker: walnut (52R11)....	.70
15K620104	Cover, speaker: ivory (52R12).....	.70
15K620105	Cover, speaker: maroon (52R13)....	.70
15K620106	Cover, speaker: gray (52R14).....	.70
15K620107	Cover, speaker: green (52R15).....	.70
15K620108	Cover, speaker: red (52R16).....	.70
36K611308	Knob, tuning: black (52R11, 52R13, 52R14, 52R15, 52R16).....	.40
36K620090	Knob, tuning: ivory (52R12).....	.40
36K620156	Knob, volume control: black (52R11, 52R13, 52R14, 52R15, 52R16).....	.10
36K610642	Knob, volume control: ivory (52R12)	.10
3S115138	Screw, machine: 6-32 x 1-9/16 Phillips flat head; cad pl (chassis mtg - through front of cabinet).....doz	.20
3S115237	Screw, thread cutting: 6-20 x 5/16 pl hex head; cad pl (spkr mtg)doz	.40
3S488009	Screw, thread cutting: 6-20 x 3/8 pl hex head; cad pl (power plug mtg).....doz	.15
3S115240	Screw, thread cutting: 6-20 x 1/2 pl hex head; cad pl (chassis mtg & back cover mtg).....	.05
2S400014	Speednut (spkr cover mtg).....	.05
4K611121	Washer, flat: paper (chassis mtg screws).....per/c	.50

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

*Plus Federal Excise Tax At Current Rate

SUPPLEMENT NO. 1

GENERAL INFORMATION

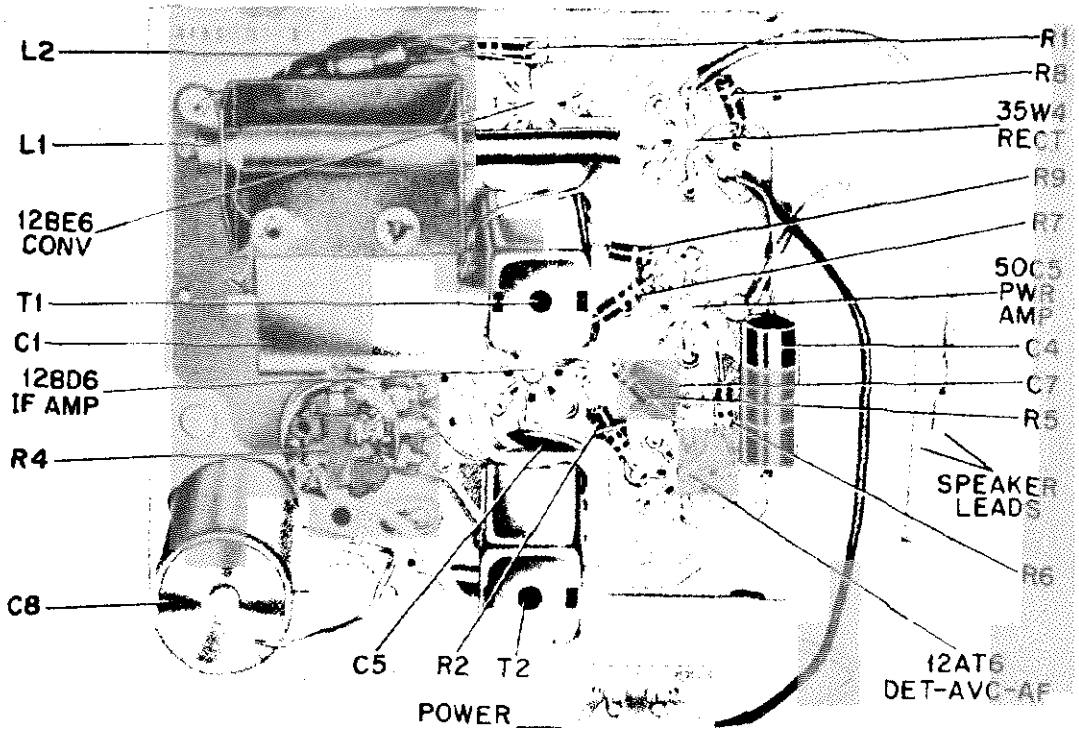
Chassis HS-289A is the same as HS-289 except for the locations of electrical components (see Figures 1 and 2). For information on Operating Instructions, Service Notes and Alignment refer to HS-289 Service Data.

A dual 250 mmfd ceramic capacitor replaces capacitors C-3 and C-6 used in chassis HS-289. All other chassis parts and cabinet parts remain the same as listed in the HS-289 Service Data.

PARTS LIST SUPPLEMENT

NOTE: When ordering parts, specify model and chassis number of set in addition to part number and description of part. The following parts are revisions of or additions to the original items listed in the HS-289 Service Data.

Ref. No.	Part Number	Description	List Price
C-3,6	21B484337	Ceramic: dual 250 mmfd/450V (Replaces C-3, C-6 21R115905).....	.30



MODELS 52B1U, 52B2U, 52B3U, 52B4U, Ch. HS-305

GENERAL INFORMATION

TYPE - Three-power (AC/DC, Battery) portable radio receiver. Four miniature-type tubes and a selenium rectifier are used in a superheterodyne circuit.

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - Operates from 117V AC/DC (15 watts) or from the following batteries:
Two 1-1/2V size "D" flashlight cells
Use: Eveready 950
or Burgess 2
or equivalent.
One 67-1/2V "B" battery
Use: Eveready 457
or Burgess K45
or equivalent.

TUBE COMPLEMENT -

Type	Function
1R5	Converter
1U4	IF Amplifier
1U5	Det, AVC & 1st AF Amp
3S4	Power Amplifier
Rectifier	Selenium type -for AC/DC operation

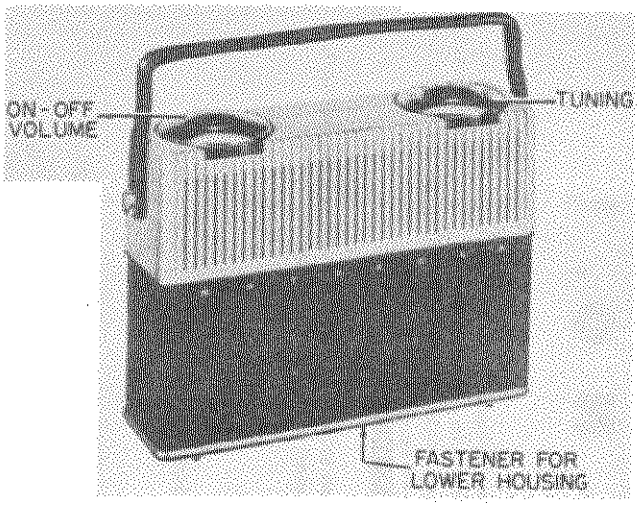


FIGURE 1. 52B1U RECEIVER

OPERATING INSTRUCTIONS

TO REMOVE LOWER HOUSING. Insert a large coin into the fastener on the bottom of the receiver (see Figure 1 for location), and rotate it counterclockwise until the housing is released. Then pull off the housing.

TO REPLACE LOWER HOUSING. Make certain, when the lower housing is assembled to the upper portion of the set, that the fastener is on the side of the housing which faces the speaker. Rotate the fastener clockwise until the housing is locked into place.

HOUSE CURRENT OPERATION. The power cord is located inside the cabinet and can be reached by removing the lower housing. Uncoil the line cord from its retainer and pass it through the slot in the end of the housing. Plug the cord into any 117 volt AC or DC power outlet. Reverse the plug in the outlet if the receiver does not operate from DC power. When operating from AC, reception may sometimes be improved by reversing the power plug in the outlet. It is not necessary that batteries be installed if the receiver is to be operated only from house power lines.

BATTERY OPERATION. Remove the lower housing and install batteries by following the instructions on the label located inside the housing, or refer to Figure 2. Plug the power line cord into the receptacle on the chassis, or the receiver will not play from batteries. If the radio is to be operated for a long period of time from house power lines, or is to be placed in storage, remove the batteries and keep them in a cool place. IMPORTANT: Never leave low or run-down batteries in the receiver, as they will leak or swell and damage it.

CONTROLS. The volume control and power switch are combined and are operated with the VOLUME knob (see Figure 1). Select stations with the TUNING knob. The markings around the TUNING knob can be read in kilocycles by adding one zero to the figures.

ANTENNA. A Ferrite Magnetic Iron Core Antenna is built into this receiver. Because of the slightly directional characteristics of the built-in antenna, reception from some stations may be improved by rotating the receiver. In extremely noisy locations, rotate the set until minimum noise and maximum signal pickup are obtained.

BATTERY REPLACEMENT. If low volume or fuzzy tone is noticed when operating from batteries, replace the flashlight cells. Normally, the 67-1/2 volt "B" battery will last for 3 or 4 changes of the flashlight cells. Complete battery replacement instructions will be found inside the lower housing of the receiver, or refer to Figure 2. NOTE: The condition of the batteries will not affect operation of the receiver from the house power lines.

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor-choke assembly to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

The tubes are exposed when the lower housing is removed. It is not necessary to remove the chassis to replace tubes.

TO REMOVE THE CHASSIS FROM THE CABINET:

1. Remove the lower housing (see Operating Instructions
2. Pull off the knobs.
3. Remove the two hex head screws under the knobs.
4. Pull outward on the two studs which hold the handle ar lift off the top housing.

ALIGNMENT

NOTE: The receiver may be operated either from batteries or from the commercial power lines during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF an diode transformers.
6. Adjust the signal generator output to produce .40 volt (.05 watts) across the voice coil. As stages are aligned reduce the generator output to maintain the .40 volt level to avoid overloading the receiver.
7. See Figure 3 for adjusting locations and the followin chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv (pin 6, 1R5)	455 Kc	Fully open	1, 2 & 3 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv (pin 6, 1R5)	1620 Kc	Fully open	4 (Osc)	Adjust for maximum.
3.	-	-	-	-	-	Install batteries in chas sis, leaving output mete connected to speaker.
4.	-	Radiation loop*	1400 Kc	Tune for max.	5 (Ant)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

MODELS 52B1U, 52B2U,
52B3U, 52B4U, Ch. HS-305

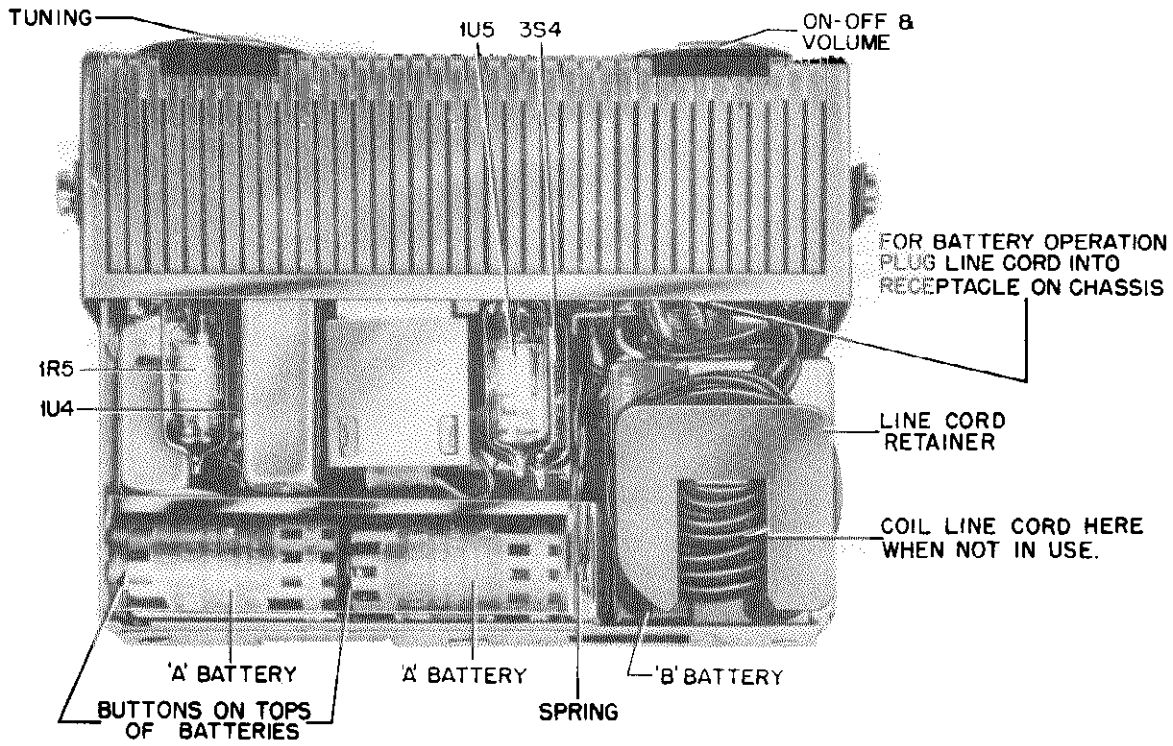


FIGURE 2. REAR VIEW OF RECEIVER

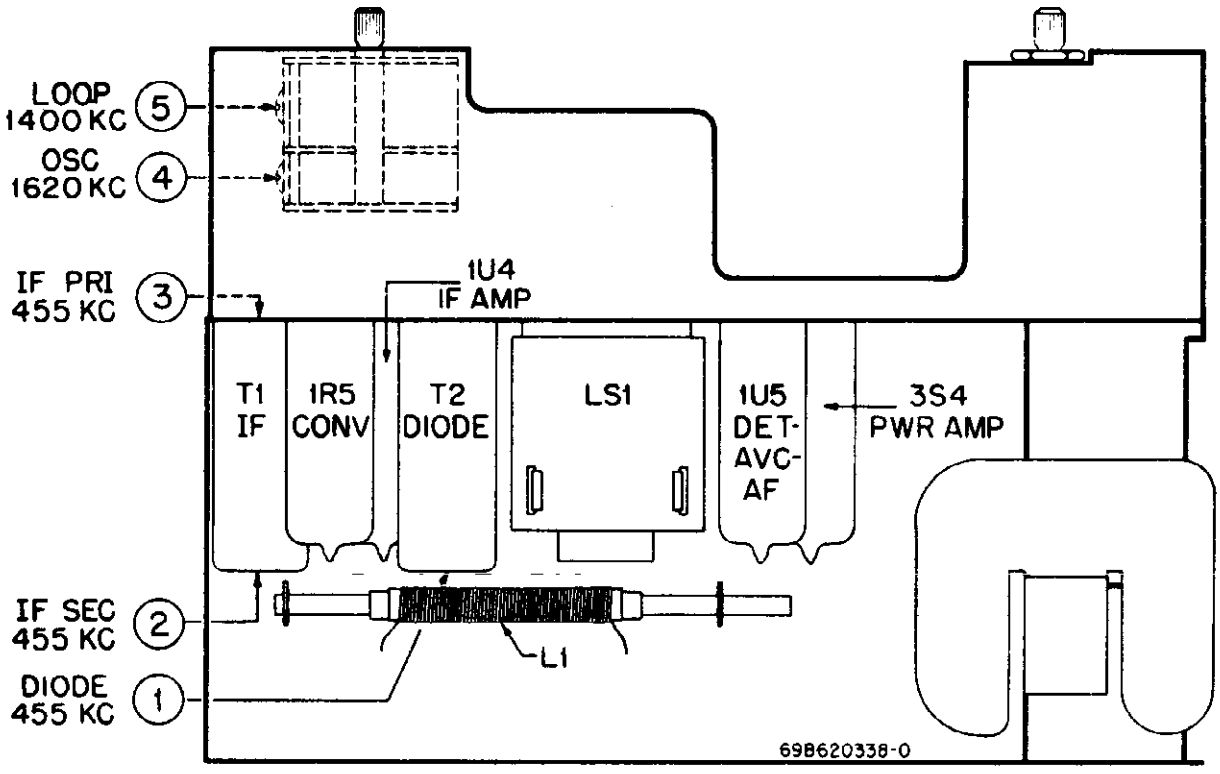
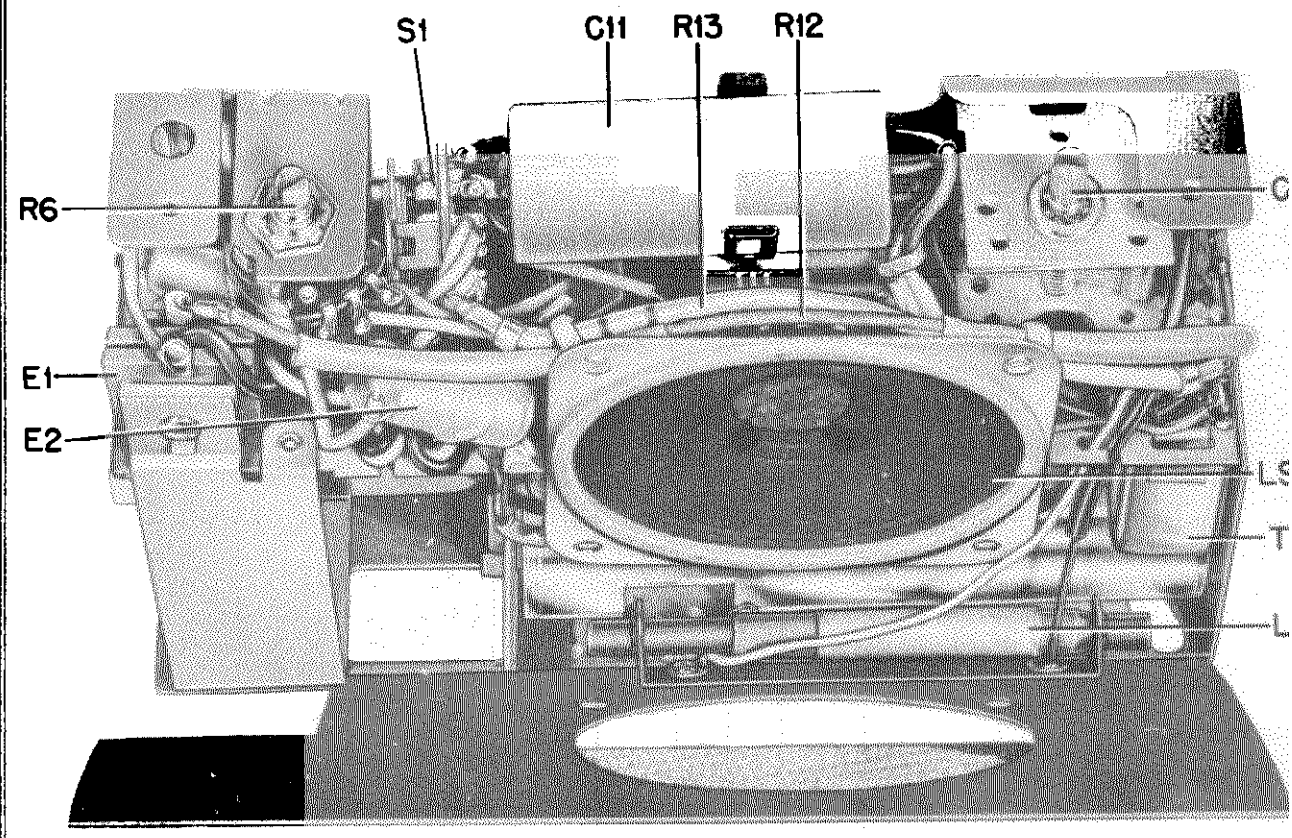


FIGURE 3. TUBE AND TRIMMER LOCATIONS



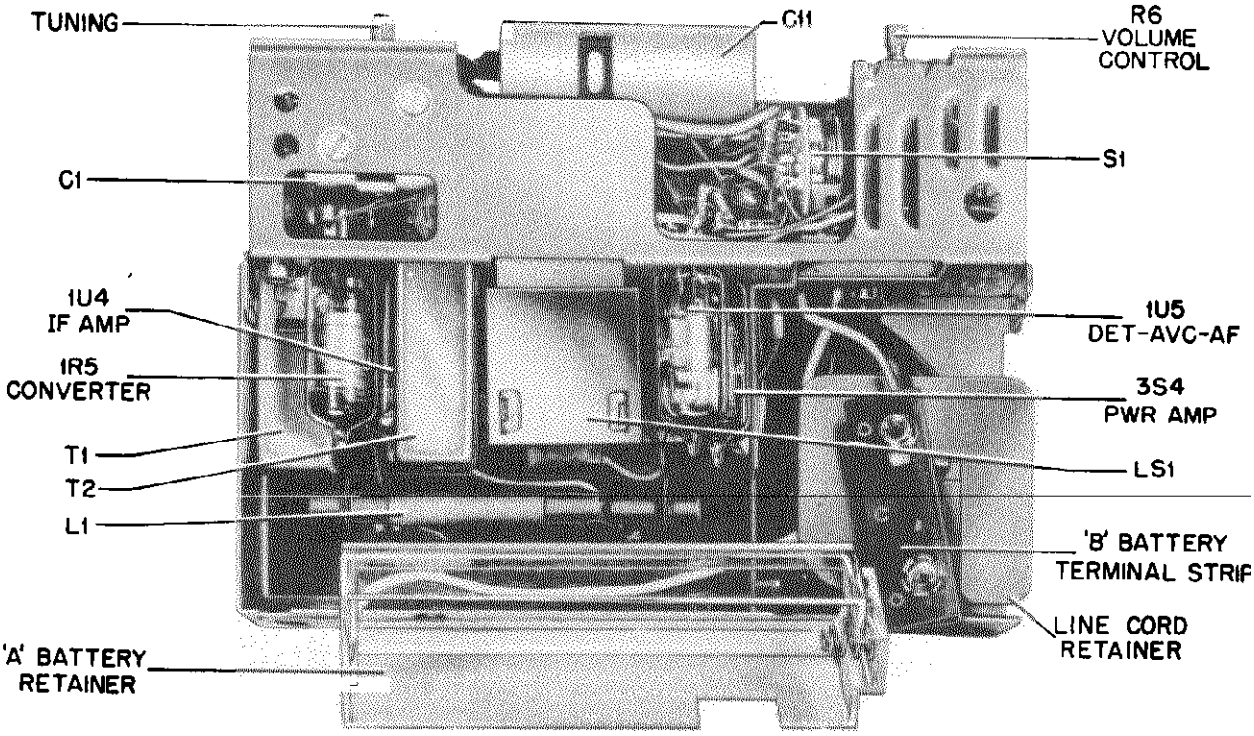
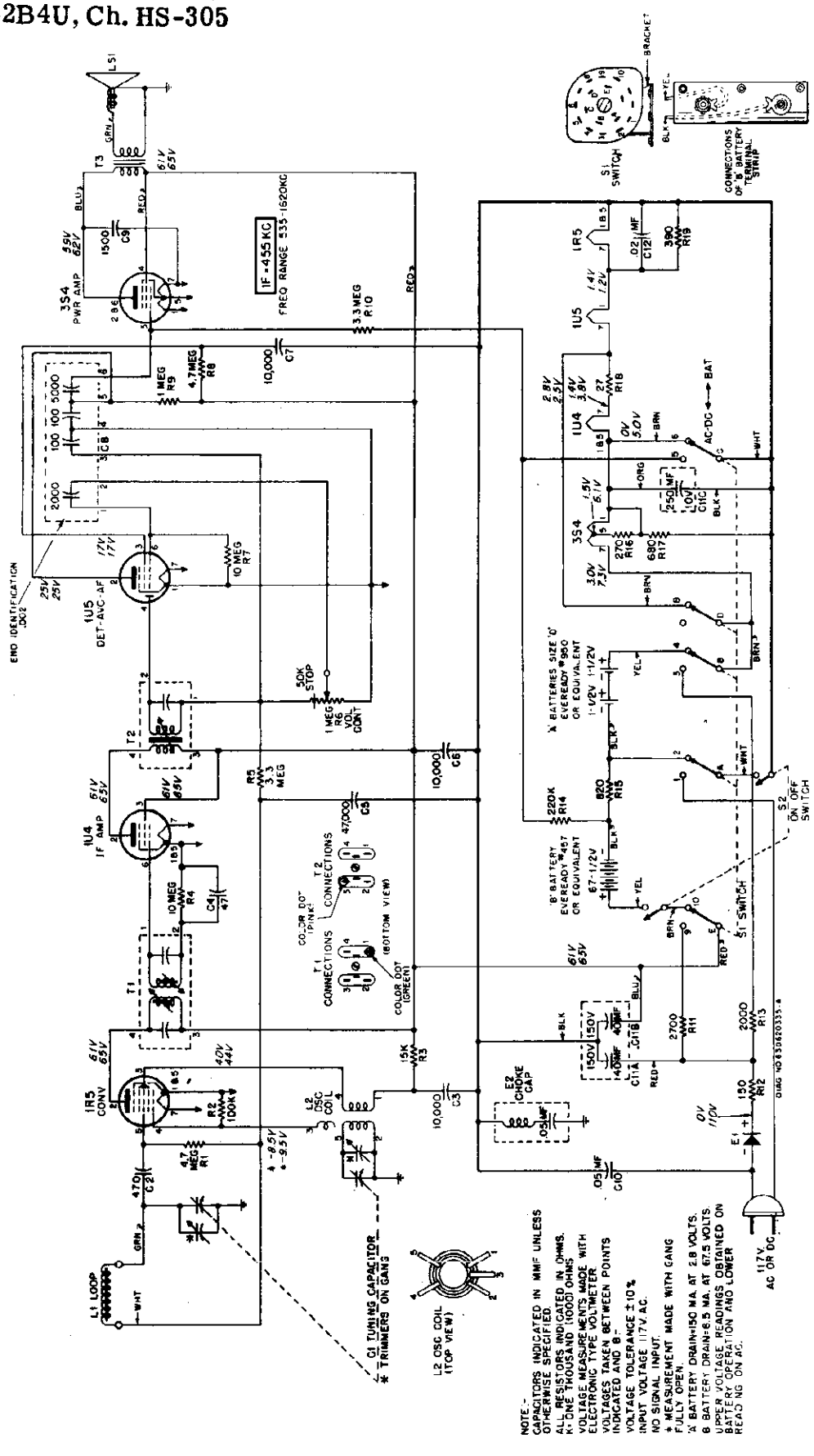


FIGURE 4. PARTS LOCATIONS

MODELS 52B1U, 52B2U, 52B3U, 52B4U, Ch. HS-305



NOTE:-
CAPACITORS INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS INDICATED IN OHMS. K= ONE THOUSAND (1000) OHMS
VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
VOLTAGES TAKEN BETWEEN POINTS INDICATED AND B-.
VOLTAGE TOLERANCE ±10%
INPUT VOLTAGE 117 V. AC.
NO SIGNAL INPUT
* MEASUREMENT MADE WITH GANG FULLY OPEN.
'A' BATTERY DRAIN=150 MA. AT 2.8 VOLTS.
'B' BATTERY DRAIN=6.5 MA. AT 67.5 VOLTS.
UPPER VOLTAGE READINGS OBTAINED ON BATTERY OPERATION AND LOWER READING ON AC.

FIGURE 5. SCHEMATIC DIAGRAM

MODELS 52B1U, 52B2U,
52B3U, 52B4U, Ch. HS-3(

PARTS LIST

NOTE: When ordering parts, specify model and chassis number of set in addition to part number and description of part

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	19B611415	Variable: 2-gang.....	2.60
C-2	21R115856	Ceramic: 470 mmf 500V.....	.20
C-3	21R115611	Ceramic, disc: 10,000 mmf 450V	.25
C-4	21R115593	Ceramic, disc: 47 mmf 500V..	.15
C-5	8R490232	Molded, paper: 47,000 mmf 400V	.25
C-6	21R115611	Ceramic, disc: 10,000 mmf 450V	.25
C-7	21R115611	Ceramic, disc: 10,000 mmf 450V	.25
C-8	21K691992	Ceramic, multiple: 2000, 100, 100, 5000 mmf.....	.65
C-9	21A701029	Ceramic, disc: 1500 mmf 500V	.25
C-10	8K471635	Paper: .05 mf 400V.....	.25
C-11	23K611436	Electrolytic: 40-40 mf/150V, 250 mf/10V.....	3.10
C-12	8R9817	Paper: .02 mf 100V.....	.25
Rectifier			
E-1	48B791092	Rectifier, selenium: half-wave; 65 ma.....	1.40
Choke & Capacitor			
E-2	24K611433	Choke & .05 mf paper capacitor.....	.40
Coils			
L-1	24B611428	Antenna Loop: with core.....	.70*
L-2	24B611429	Oscillator coil.....	.90
Speaker			
	1X611472	Speaker & Output Transformer Assembly.....	4.95*
		exch	3.70
LS-1 or	50C611578 50C620143	Speaker: 3-1/2" PM; 3.2 ohm VC; less output trans.....	3.75*
		exch	2.80
Resistors			
	Note:	All resistors are insulated, carbon type unless otherwise specified.	
R-1	6R2122	4.7 meg 20% 1/2W.....doz	1.20
R-2	6R6031	100,000 10% 1/2W.....doz	1.20
R-3	6R6477	15,000 10% 1/2W.....doz	1.20
R-4	6R2109	10 meg 20% 1/2W.....doz	1.20
R-5	6R2118	3.3 meg 20% 1/2W.....doz	1.20
R-6	18A692018	Volume control: 1 meg; with switch.....	1.20
R-7	6R2109	10 meg 20% 1/2W.....doz	1.20
R-8	6R2122	4.7 meg 20% 1/2W.....doz	1.20
R-9	6R6004	1 meg 20% 1/2W.....doz	1.20
R-10	6R2118	3.3 meg 20% 1/2W.....doz	1.20
R-11	6R5577	2700 10% 1/2W.....doz	1.20
R-12	17A620037	Wire wound, flexible: 150 ohms 4W.....	.35
R-13	17K620038	Wire wound, flexible: 2000 ohms 10W.....	.50
R-14	6R6015	220,000 20% 1/2W.....doz	1.20
R-15	6R6269	820 10% 1/2W.....doz	1.20
R-16	6R6432	270 10% 1/2W.....doz	1.20
R-17	6R6040	680 10% 1/2W.....doz	1.20
R-18	6R5683	27 10% 1/2W.....doz	1.20
R-19	6R5554	390 10% 1/2W.....doz	1.20
Switch			
S-1	40B611426	Rotary switch, 5PDT (AC/DC, battery selector).....	1.15

Ref. No.	Part Number	Description	List Price
Transformers			
T-1	24K611438	IF transformer (green dot): 455 Kc; complete.....	1.3
T-2	24K611439	Diode transformer (pink dot): 455 Kc; complete.....	1.3
T-3	25B611377	Output transformer.....	1.0

Part Number	Description	List Price
CHASSIS PARTS - MECHANICAL		
1X611568	Baffle, speaker: fibre; includes loop mtg insulator and grille cloth.....	.9
43A692012	Bushing, strain relief: line cord (use with 43K692013).....	.(
42A620012	Clip, baffle retaining (mts baffle to spkr).....doz	.2
42K620055	Clip, electrolytic mtg.....	.1
42B485548	Clip, IF trans mtg.....doz	.2
13A620221	Cloth, grille (on spkr baffle)....	.2
30K611437	Cord, line: with plug; 6 ft long..	.8
14A611424	Insulator, rectifier: fibre (under selenium rectifier).....doz	.(
29R3020	Lug, soldering (battery contact -in "A" battery retainer).....doz	.2
2S7051	Nut, hex: Palnut; 3/8-32 x 9/16 (volume control mtg).....doz	.
15B611416	Retainer, "A" battery: plastic....	.2
43K692013	Retainer, strain relief: line cord (use with 43A692012).....	.(
41K680029	Spring, battery contact (in "A" battery retainer).....doz	.
9K600976	Socket, tube: miniature; 7-prong..	.
31K611298	Strip, "B" battery terminal: with leads.....	.
CABINET PARTS		
46A620235	Button, plug (in top housing)..doz	.
13A611521	Cloth, grille (on chassis insulator)	.
3K620214	Fastener, locking (locks lower housing).....doz	.
55C611432	Handle.....	1.
1X620236	Housing, lower: plastic; with locking fastener.....	5.
15D611323	Housing, top: less handle and studs	3.
1B611479	Insulator, chassis: fibre; with grille cloth (inside top housing)	1.
36C611430	Knob, control (volume).....	.
36K611431	Knob, control (tuning).....	.
41A611538	Spring, compression (on handle mtg stud).....doz	.
46A611497	Stud, handle mtg: less spring.....	.
4K601456	Washer, "C" (on handle mtg stud).....doz	.
4A21577	Washer, "C" (locking fastener mtg).....per/c	
4A620230	Washer, fibre (locking fastener mtg).....doz	
4S1706	Washer, flat: 3/8 x .203 x .033; steel (locking fastener mtg)per/c	
4K620224	Washer, shoulder: fibre (chassis mtg to top housing).....doz	

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*Plus Federal Excise Tax At Current Rate

GENERAL INFORMATION

This supplement contains a complete cabinet Replacement Parts List for receiver models 52B2U, 52B3U, and 52B4U. Except for the lower housing locking nut, the chassis parts and 52B1U cabinet parts are the same as listed in 52B1U

On later model HS-305 chassis, the welded "tee" nut, which held the lower housing locking fastener, was replaced with a removable nylon nut and its retainer. The nut and retainer are listed below.

Cabinet colors are:

Model	Color
52B2U	Green
52B3U	Brown
52B4U	Tan

PARTS LIST SUPPLEMENT

NOTE: When ordering parts, specify model and chassis number of set in addition to part number and description of part. The following parts are revisions of or additions to the original items listed in the HS-305 Service Manual.

Part Number	Description	List Price
CHASSIS PARTS SUPPLEMENT		
2A620252	Nut, square: 10-32 x 7/16; nylon (lower housing locking).....	.05
2K620251	Retainer, nut (for lower housing locking nut).....	.05
MODEL 52B2U, 52B3U, 52B4U CABINET PARTS		
46K621231	Button, plug: satin brass finish (in top housing).....doz	.15
13A611521	Cloth, grille (on chassis insulator).....	.25
3A621293	Fastener, locking: bright brass finish (locks lower housing).....	.15
55K621229	Handle: green (52B2U).....	1.10
55K621228	Handle: brown (52B3U).....	1.10
55K621227	Handle: tan (52B4U).....	1.10
1V621252	Housing, lower: plastic; green; with locking fastener (52B2U)....	6.95*
1V621253	Housing, lower: plastic; brown; with locking fastener (52B3U)....	6.95*
1V621254	Housing, lower: plastic; tan; with locking fastener (52B4U).....	6.95*
15K621226	Housing, top: satin brass finish; less handle and studs.....	3.80*
1B611479	Insulator, chassis: fibre; with grille cloth (inside top housing)	.45
36K621220	Knob, volume control: green (52B2U)	.45
36K621222	Knob, volume control: brown (52B3U)	.45
36K621224	Knob, volume control: tan (52B4U).	.45
36K621221	Knob, tuning control: green (52B2U)	.45
36K621223	Knob, tuning control: brown (52B3U)	.45
36K621225	Knob, tuning control: tan (52B4U).	.45
41A611538	Spring, compression (on handle mtg stud).....doz	.15
46A621295	Stud, handle mtg: less spring; bright brass finish.....	.15
4K601456	Washer, "C" (on handle mtg stud).....doz	.15
4A21577	Washer, "C" (locking fastener mtg).....doz	.15
4A620230	Washer, fibre (locking fastener mtg).....doz	.15
4S1706	Washer, flat: 3/8 x .203 x .033; steel (locking fastener mtg).....per/c	.50
4K620224	Washer, shoulder: fibre (chassis mtg to top housing).....doz	.15

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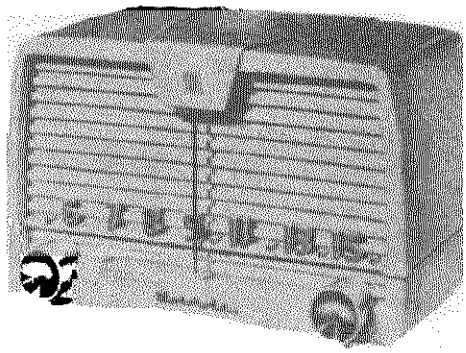
GENERAL INFORMATION



TYPE - AC-DC table model superheterodyne receiver with loop antenna.

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT - 12BE6 - Converter
12BA6 - IF Amplifier
12AT6 - Detector, AVC & 1st AF Amp
50C5 - Power Amplifier
35W4 - Rectifier

POWER SUPPLY - 117 volts AC or DC, 35 watts

INSTALLATION & OPERATING INSTRUCTIONS

POWER SWITCH AND VOLUME CONTROL. Operated with the left-hand knob. NOTE: Reverse the line cord plug in the wall outlet if radio does not operate from DC. When operating from AC, reversing the line cord plug in the wall outlet may sometimes improve reception and reduce hum.

TUNING. Tune stations with right-hand knob.

ANTENNA. A loop antenna is built into this receiver, eliminating the need for an external antenna. Reception from some stations may be improved by rotating the whole receiver; this is due to slight directional characteristic of the loop tenna. In extremely noisy locations, rotate entire receiver till minimum noise and maximum s nal pickup are obtained. For additional pick an external antenna may be connected by wind lead-in wire in slots on radio back panel.

GROUND. Never connect antenna or chassis to wa pipe, radiator or other ground, as one side of power line is connected directly to chassis.

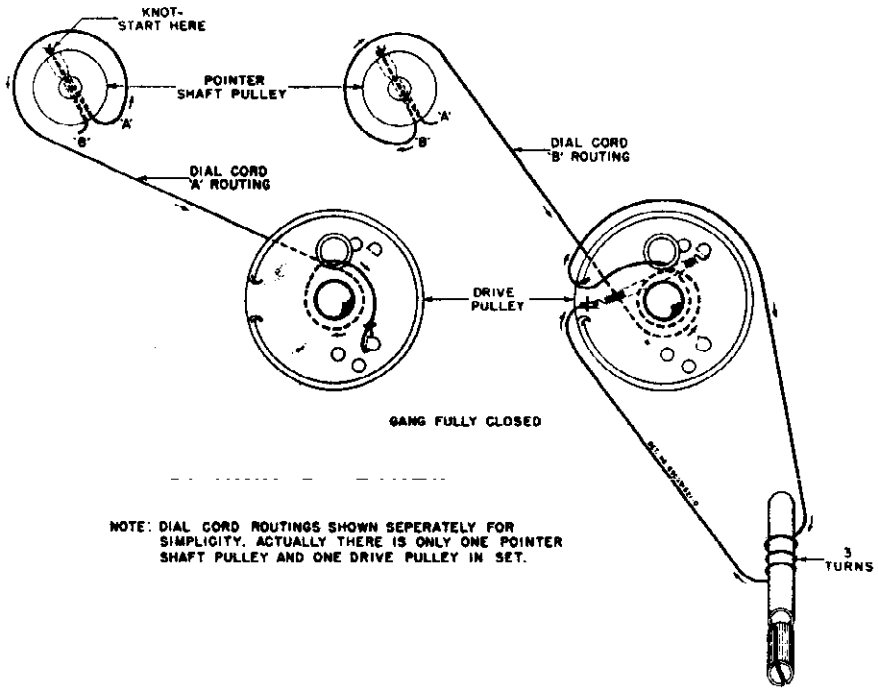


FIGURE 1. DIAL RESTRINGING DETAIL

MODELS 59H11,
59H12I, Ch. HS-206

SERVICE NOTE

The chassis of this receiver is connected directly to the power line. When operating chassis (from AC line) outside of its cabinet, use an isolation transformer between power line and receiver to reduce possibility of electrical shock. If isolation transformer is not available, check the AC voltage between chassis and bench ground; if there is any indication of voltage, reverse the line plug before handling set.

TO REMOVE CHASSIS FROM CABINET

1. Set pointer to extreme low frequency end to expose pointer setscrew. Loosen pointer setscrew with a slab head wrench.

2. Remove the knobs; they pull off.

3. Remove the two split plugs that hold top of loop panel to cabinet.

4. Remove the two screws that hold the chassis to the cabinet. These screws are accessible through slots in the loop panel.

ALIGNMENT

If AC power is used, use an isolation transformer between power line and receiver. If isolation transformer is not available, connect low side of signal generator to chassis through .1 mf capacitor.

Connect low range output meter across speaker voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at approximately .05 watt (.05 watt = .40 volt on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver for aligning IF & diode transformers.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SET TO	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Rear stator of tuning capacitor	455 Kc	Gang opened	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT						
2.	-	Radiation loop*	1620 Kc	Gang fully opened	5	Adjust for maximum.
3.	-	Radiation loop*	1400 Kc	Tune for maximum	6	Adjust for maximum.

* Connect generator output to 5" diameter, 3 turn loop and couple to receiver loop. Keep loops at least 12" apart.

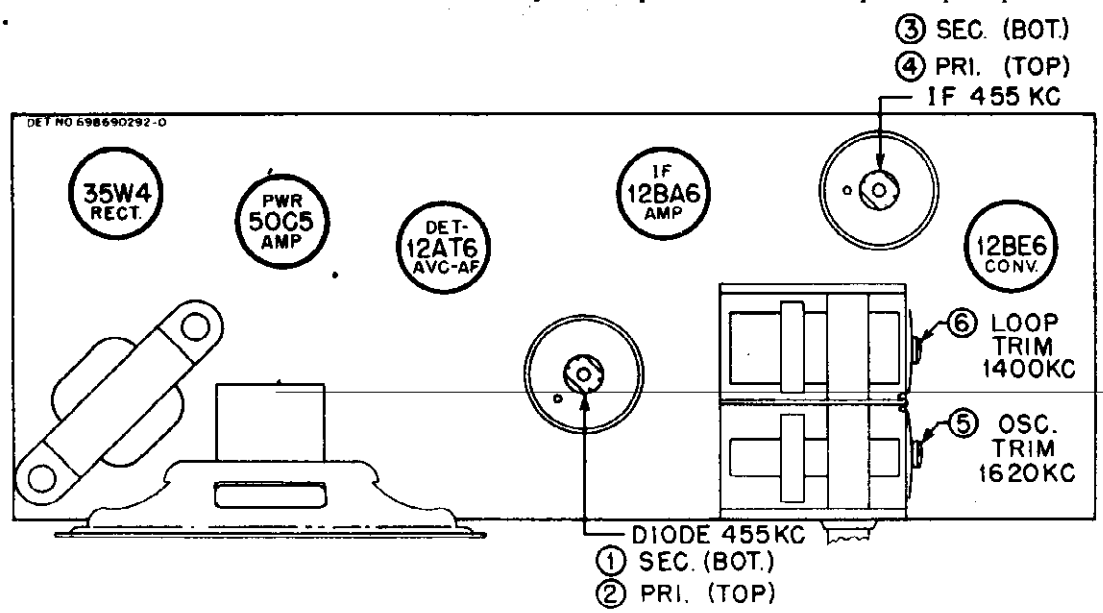


FIGURE 2. TUBE & TRIMMER LOCATION

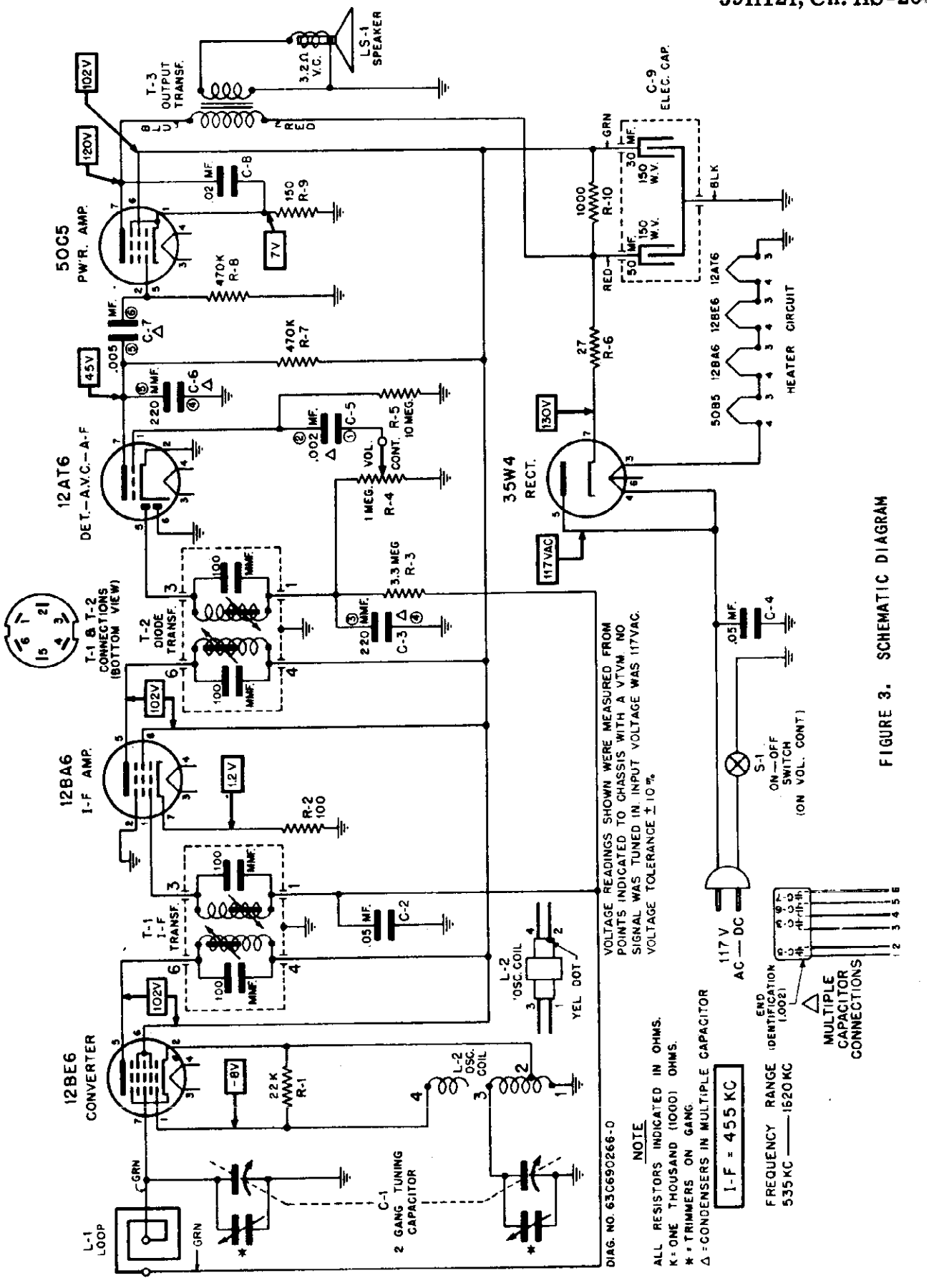


FIGURE 3. SCHEMATIC DIAGRAM

MODELS 59H11,
59H12I, Ch. HS-206

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	LIST PRICE
CHASSIS PARTS - ELECTRICAL			
CAPACITORS			
C-1	1X690702	Variable, 2-gang: includes pulley	2.65
C-2	8R9821	Paper: .05 mf 200V	.20
C-3,5, 6,7	21B482847	Ceramic, multiple: 220 mmf; .002 mf; 220 mf; .005 mf	.65
C-4	8R9816	Paper: .05 mf 400V	.20
C-8	8R9802	Paper: .02 mf 400V	.20
C-9	23K482857	Electrolytic: 50-30 mf/150V	1.00
COILS			
L-1	24C691086	Antenna loop: includes back panel	1.00
L-2	24K482855	BC oscillator	.60
SPEAKER			
LS-1	50C478138	Speaker, PM: 4"; 3.2 ohm VC	2.60
		exch	1.95
RESISTORS			
		Note: All resistors are insulated carbon type unless otherwise specified.	
R-1	6R6028	22,000 20% 1/2W ....doz	1.00
R-2	6R6018	100 20% 1/2W ....doz	1.00
R-3	6R2118	3.3 meg 20% 1/2W ....doz	1.00
R-4	18A70032	Volume Control: 1 meg; includes ON-OFF switch	1.00
R-5	6R2109	10 meg 20% 1/2W ....doz	1.00
R-6	6R5683	27 10% 1/2W ....doz	1.00
R-7	6R6032	470,000 20% 1/2W ....doz	1.00
R-8	6R6032	470,000 20% 1/2W ....doz	1.00
R-9	6R3992	150 20% 1/2W ....doz	1.00
R-10	6R3953	1000 20% 1W ....each	.15
		doz	1.45
SWITCH			
S-1	-	SPST Switch: part of volume control R-4	-
TRANSFORMERS			
T-1	24B482863	IF, 455 Kc: complete	1.70
T-2	24B482865	Diode, 455 Kc: complete	1.70
T-3	25K485973	Output Transformer	.65
CHASSIS PARTS - MECHANICAL			
	37A27142	Band, rubber: special (electrolytic mtg)....per/c	.50
	7K485971	Bracket, loop mtg	.05
	1X691092	Bracket, pointer mtg (mounts pointer to chassis)	.35
	7A77337	Bracket, tuning shaft mtg (cad pl)	.05
	11M8944	Cord, dial: 18# black ....yd	.10
	30A470651	Cord, line & plug: 6 ft long	.75
	46K680318	Core, iron: threaded (for T-1 & T-2)	.10
	5A19658	Eyelet, spacer (gang mtg)...doz	.20
	5A70404	Grommet, rubber (gang mtg)..doz	.60
	14A482844	Insulator, cord outlet ....doz	.25
	14A691080	Insulator, pointer mtg brkt	.05
	29R3010	Lug, soldering: #6 hot tin (gang) ....doz	.30
	2S7051	Palnut, hex: 3/8-32 x 9/16; cad pl (volume control mtg)doz	.15
	5S7771	Rivet: .088 x 3/16; stl; pol nkl (tube socket mtg & chassis mtg) ....per/c	.50
	5S7707	Rivet: .122 x 5/32; stl; pol nkl (transformer mtg)....per/c	.50
	5S7701	Rivet: .122 x 3/16; stl; pol nkl (tuning shaft mtg)...per/c	.50
	5S7703	Rivet: .122 x 7/32; stl pol nkl (pointer brkt mtg)...per/c	.50
	3S2294	Screw, machine: 6-32 x 1/2; plain; locking type; hex head; cad pl (gang mtg)....doz	.15
	3S7477	Screw, machine: 8-32 x 1/4; type 1; plain hex head; cad pl (loop mtg) ....doz	.15
	3S3398	Screw, sheet metal: #6 x 3/8; PKZ plain hex head; cad pl (loop brkt mtg) ....per/c	.50
	3S7454	Screw, sheet metal: #8 x 1/4; PKZ plain hex head; cad pl (speaker mtg) ....per/c	.50
	47A691075	Shaft, pointer: aluminum	.20
	47K691081	Shaft, tuning: cad pl	.15
	26K485936	Shield, coil	.20
	26A481521	Shield, spring (tube shield)doz	.50
	41A14111	Spring, tension coil ....doz	.40
	9A472534	Socket, tube: miniature	.15
	22S7906	Staple, flathead (on tuning cord) ....per/c	.50
	4A70015	Washer, 'C' (tuning shaft and pointer shaft mtg)....per/c	.50
	4S7633	Washer, flat: 9/16 x 11/64 x .033; stl; cad pl (loop mtg) ....doz	.15
	14A11493	Washer, insulating: fibre (pointer brkt mtg) ....doz	.35
	4K482859	Washer, insulated shoulder (loop brkt mtg) ....doz	.15
CABINET PARTS			
	16E691141	Cabinet, table model: plastic; mahogany (59H11)	-
	16K691142	Cabinet, table model: plastic; ivory (59H12I)	-
	36K691121	Knob, control: mahogany (59H11)	.35
	36K691122	Knob, control: ivory (59H12I)	.35
	38A25507	Plug, split (loop & back to cabinet mtg) ....doz	.15
	52A691073	Pointer & bushing: does not include setscrew	.35
	3S7374	Screw, machine: 8-32 x 5/16; plain hex head; cad pl (chassis mtg) ....per/c	.50
	3S7100	Setscrew: 8-32 x 5/16; slab head; cad pl (pointer and bushing mtg) ....doz	.35

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODELS 52L1, 52L2 52L3, Ch. HS-327

GENERAL INFORMATION

TYPE - Three-power (AC/DC, Battery) portable radio receiver. Four miniature type tubes and a selenium rectifier are used in a superheterodyne circuit.

RECEIVER MODELS

Model	Color
52L1	Green
52L2	Maroon
52L3	Gray

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

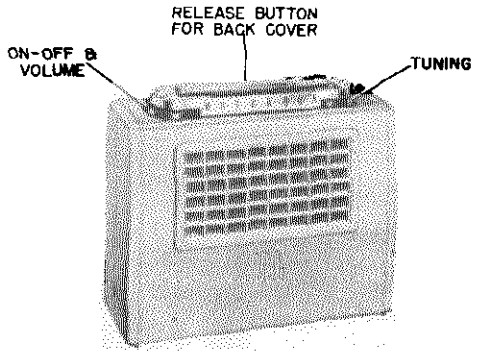


FIGURE 1. FRONT VIEW OF RECEIVER

POWER SUPPLY - Operates from 117V AC/DC (15 watts) or from the following batteries:

2 - 1-1/2V "A" batteries (Eveready #964 or equivalent)

1 - 67-1/2V "B" battery (Eveready #477 or equivalent)

TUBE COMPLEMENT -

Type	Function
1R5	Converter
1U4	IF Amplifier
1U5	Det, AVC & 1st AF Amp
3S4	Power Amplifier
Rectifier	Selenium type -for AC/DC operation

OPERATING INSTRUCTIONS

TO OPEN BACK COVER. Press the release button on the top of the cabinet and, with the fingers, pull the back cover open. When closing the cover, be careful not to pinch the power line cord or other leads between the cover and the cabinet.

HOUSE CURRENT OPERATION. The power cord is located inside the cabinet and can be reached by opening the back cover. Pass the cord through the slot on the side of the receiver before closing the cover. Plug the cord into any 117 volt AC or DC power outlet. Reverse the plug in the outlet if the receiver does not operate from DC power. When operating from AC, reception may sometimes be improved by reversing the power plug in the outlet. It is not necessary that batteries be installed if the receiver is to be operated only from house power lines.

BATTERY OPERATION. Open the back cover and install the batteries by following the instructions on the label located inside the cover, or refer to Figure 2. Plug the power line cord into the receptacle on the chassis, or the receiver will not operate from batteries. If the radio is to be operated for a long period of time from house power lines, or is to be placed in storage, remove the batteries and keep them in a cool place. IMPORTANT: Never leave low o run-down batteries in the receiver, as they will swell o leak and damage the set.

CONTROLS. The volume control and power switch are com bined and are operated with the VOLUME knob (see Fig ure 1). Select stations with the TUNING knob. The mark ings on the dial scale can be read in kilocycles by adding tw zeros to the figures.

ANTENNA. A Ferrite Magnetic Iron Core Antenna is buil into this receiver. Because of the slightly directional char acteristics of the built-in antenna, reception from som stations may be improved by rotating the receiver. In ex tremely noisy locations, rotate the set until minimum nois and maximum signal pickup are obtained.

BATTERY REPLACEMENT. Replace the batteries whe low volume or fuzzy tone is noticed. Complete battery re placement instructions will be found inside the back cover or refer to Figure 2. NOTE: The condition of the batterie will not affect operation of the receiver from the hous power lines.

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

The tubes are exposed when the rear cover is opened. It is not necessary to remove the chassis to replace tubes.

TO REMOVE THE CHASSIS FROM THE CABINET

Refer to Figure 2 for the locations of the items mentioned below.

1. Open the back cover and remove the batteries.

2. Remove the two wire clips which hold the plastic retainer blocks at each end of the "A" battery compartment.

3. Remove the screw holding the cover stop cord to th chassis.

4. Remove the chassis mounting screws, at the four cor ners of the chassis.

5. Slide the chassis, with knobs and escutcheon, from th cabinet.

6. Remove one of the handle clips. (Squeeze the sides the clip until it is released from the escutcheon.)

7. Remove the two screws located under the handle, a lift off the escutcheon.

8. Pull off the knobs.

REAR COVER HINGE INSTALLATION

The proper method for installing a new hinge is shov in Figure 3. Note that the under side of the cabinet shou rest on an iron block during the heating process to preve the formation of a heat bubble on the bottom of the cabine

MODELS 52L1, 52L2,
52L3, Ch. HS-327

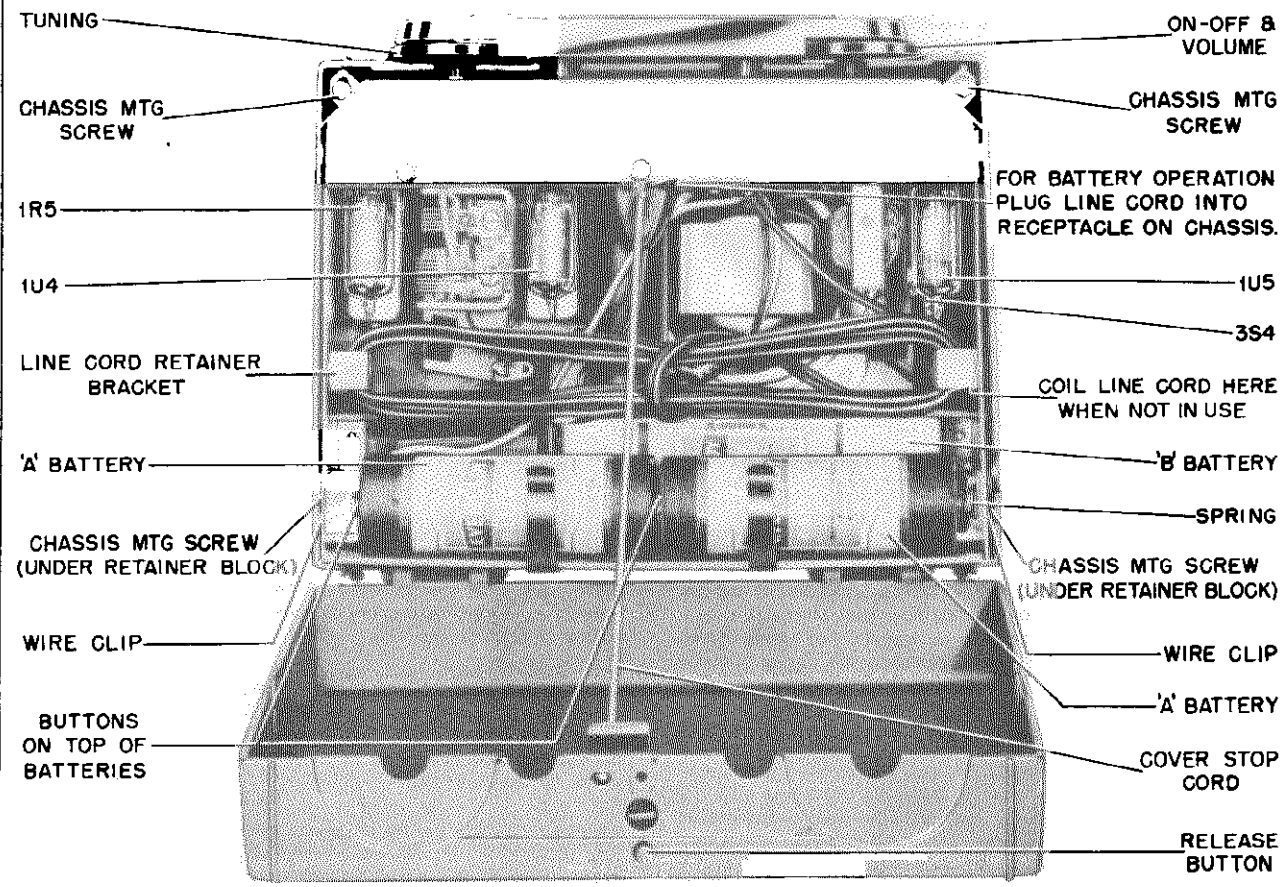


FIGURE 2. REAR VIEW OF RECEIVER

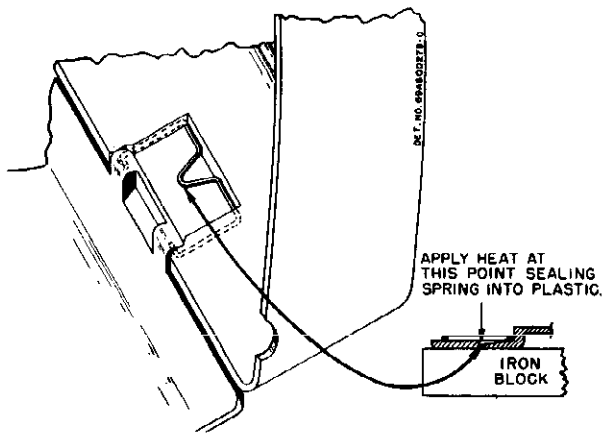


FIGURE 3. REAR COVER HINGE INSTALLATION

ALIGNMENT

NOTE: The receiver may be operated either from batteries or from the commercial power lines during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

PROCEDURE:-

1. Connect a low range output meter across the speaker voice coil.

2. Connect the low side of the signal generator to B-.

3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.

5. Use a small fibre screwdriver for aligning the IF and diode transformers.

6. Adjust the signal generator output to produce .40 volts (.05 watts) across the voice coil. As stages are aligned, reduce the generator output to maintain the .40 volt level, to avoid overloading the receiver.

7. See Figure 4 for adjusting locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Ant section of gang (green loop lead)	455 Kc	Fully open	1, 2 & 3 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	-	-	-	-	-	Attach chassis bottom cover.
3.	-	-	-	-	-	Install batteries in chassis.
4.	.1 mf	Ant section of gang (green loop lead)	1620 Kc	Fully open	4 (Osc trim)	Adjust for maximum.
5.	-	Radiation loop*	1400 Kc	Tune for maximum	6 (Ant trim)	Adjust for maximum.
6. **	-	Radiation loop*	600 Kc	Tune for maximum	5 (Osc core)	Simultaneously tune gang and adjust core for maximum signal.
7. **	-	Radiation loop*	1620 Kc	Fully open	4 (Osc trim)	Readjust for maximum, if necessary.
8. **	-	Radiation loop*	1400 Kc	Tune for maximum	6 (Ant trim)	Readjust for maximum, if necessary.

*Connect generator output across 5" diameter, 5-turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

**Steps 6, 7, & 8 need not be performed unless receiver is off calibration or mistracks badly at low frequencies.

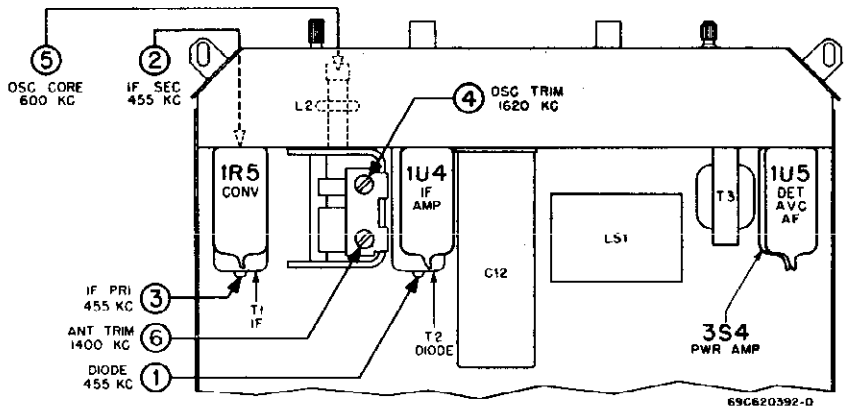
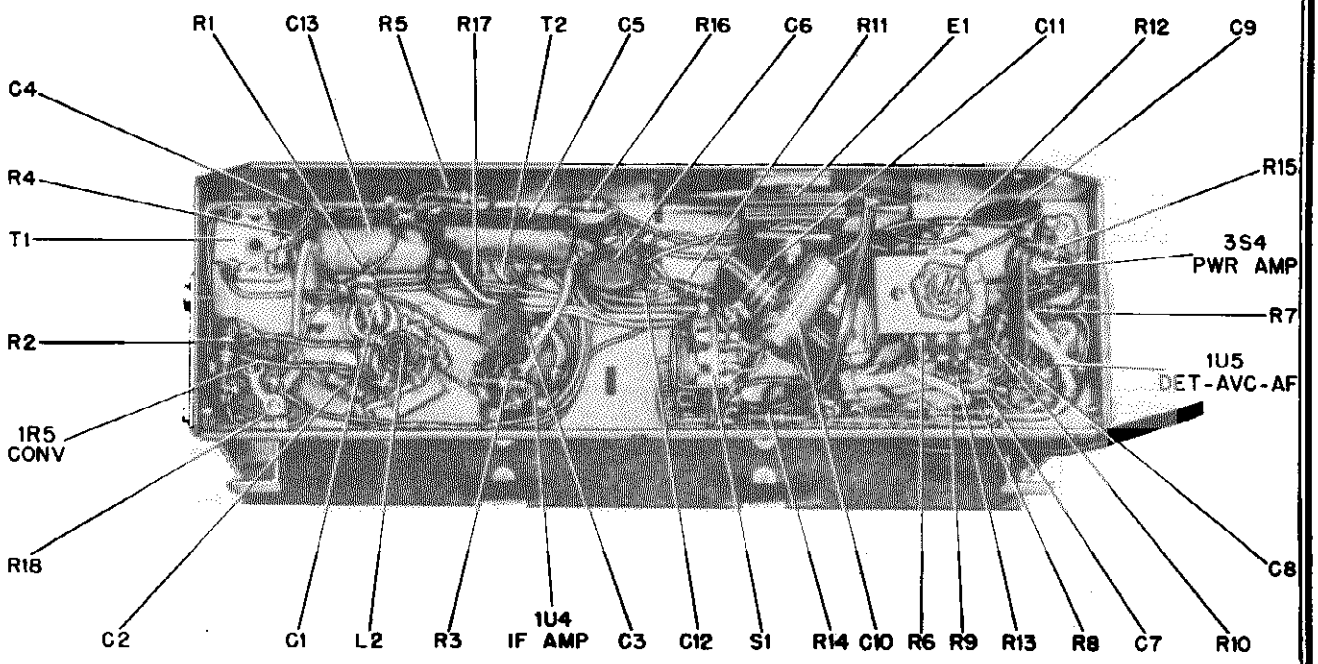


FIGURE 4. TUBE & TRIMMER LOCATIONS

MODELS 52L1, 52L2,
52L3, Ch. HS-327



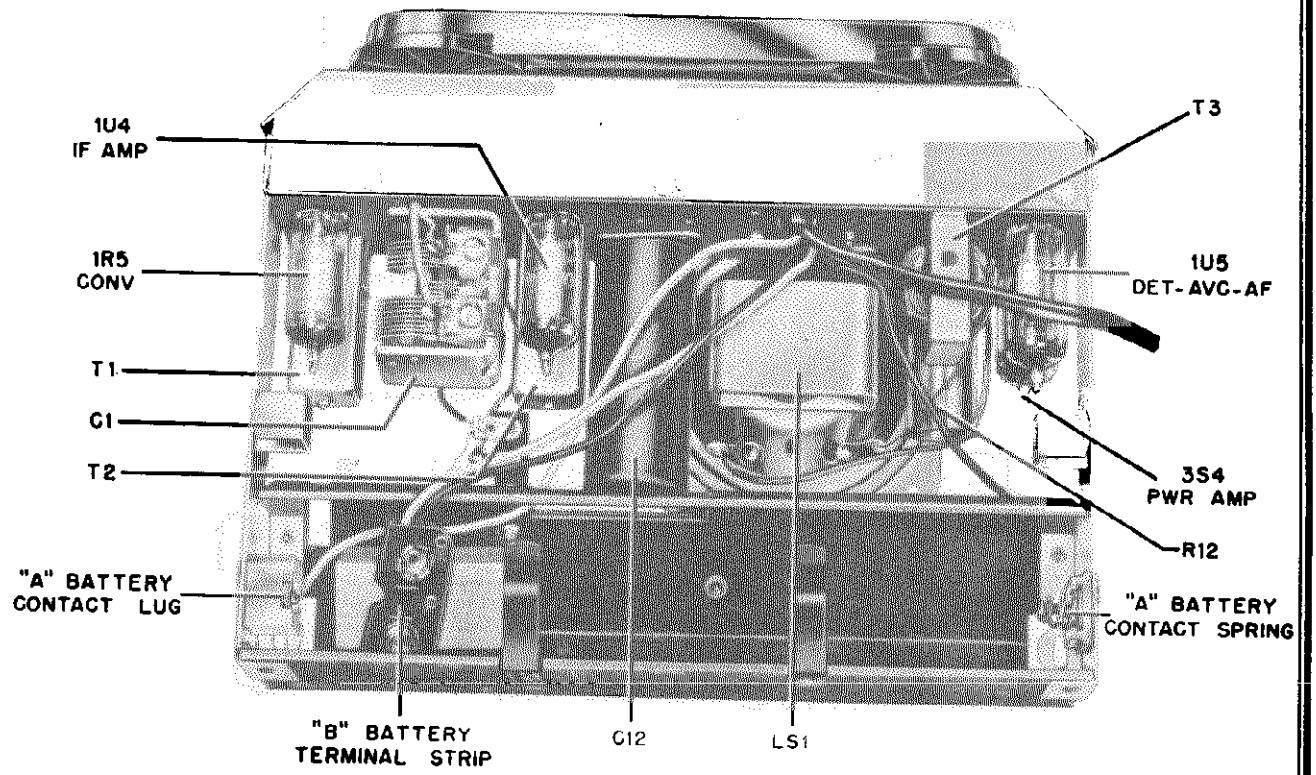


FIGURE 5. PARTS LOCATIONS

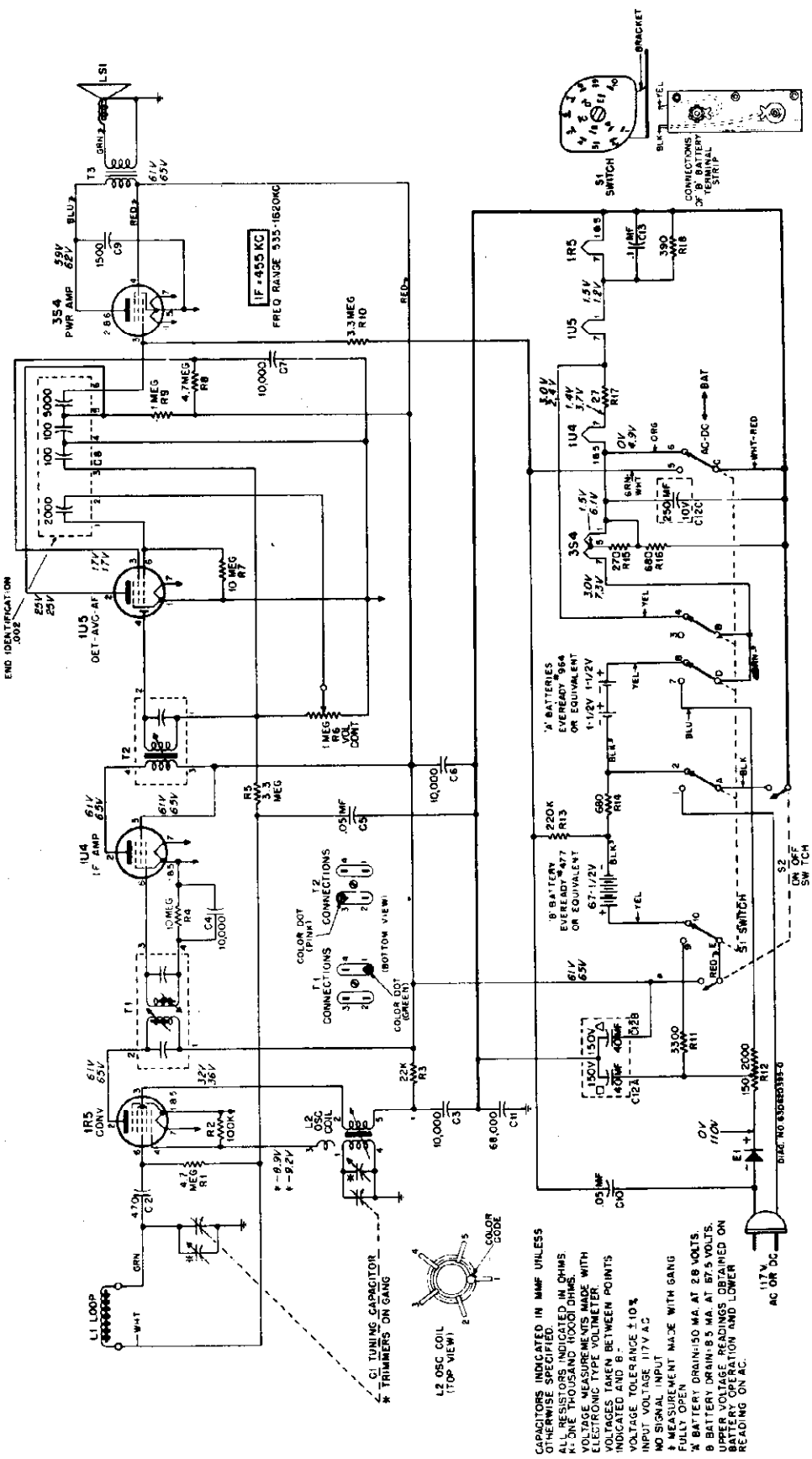


FIGURE 6. SCHEMATIC DIAGRAM

MODELS 52L1, 52L2, 52L3, Ch. HS-327

PARTS LIST

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	19B611239	Variable: 2-gang.....	2.65
C-2	21K115856	Ceramic: 470 mmf 500V.....	.20
C-3	21R482726	Ceramic, disc: 10,000 mmf 450V	.30
C-4	21R482726	Ceramic, disc: 10,000 mmf 450V	.30
C-5	8R9861	Paper: .05 mf 400V.....	.30
C-6	21R482726	Ceramic, disc: 10,000 mmf 450V	.30
C-7	21R482726	Ceramic, disc: 10,000 mmf 450V	.30
C-8	21K691992	Ceramic, multiple: 2000, 100, 100, 5000 mmf.....	.65
C-9	21A701029	Ceramic, disc: 1500 mmf 500V	.25
C-10	8K471635	Paper: .05 mf 400V.....	.25
C-11	8R490234	Molded paper: 68,000 mmf 400V	.30
C-12	23B611270	Electrolytic: 40-40 mf/150V, 250 mf/10V.....	2.70
C-13	8R9814	Paper: .1 mf 100V.....	.25
Rectifier			
E-1	48B791092	Rectifier, selenium: half-wave; 65 ma.....	1.40
Coils			
L-1	24B611234	Antenna Loop: with core.....	1.00*
L-2	24B611273	Oscillator coil.....	.95
Speaker			
LS-1	50B611272		
or	50B620039	Speaker: 3½" PM; 3.2 ohm VC.	3.75*
		exch	2.80
Resistors			
		Note: All resistors are insulated, carbon type unless otherwise specified.	
R-1	6R2122	4.7 meg 20% 1/2W.....doz	1.20
R-2	6R6031	100,000 10% 1/2W.....doz	1.20
R-3	6R6397	22,000 10% 1/2W.....doz	1.20
R-4	6R2109	10 meg 20% 1/2W.....doz	1.20
R-5	6R2118	3.3 meg 20% 1/2W.....doz	1.20
R-6	18K611379	Volume control: 1 meg; with switch.....	1.20
R-7	6R2109	10 meg 20% 1/2W.....doz	1.20
R-8	6R2122	4.7 meg 20% 1/2W.....doz	1.20
R-9	6R6004	1 meg 20% 1/2W.....doz	1.20
R-10	6R2118	3.3 meg 20% 1/2W.....doz	1.20
R-11	6R5581	3300 10% 1/2W.....doz	1.20
R-12	17K611149		
or	17B620181	Wire wound: tapped; 2150 5% 10W.....	1.10
R-13	6R6407	220,000 10% 1/2W.....doz	1.20
R-14	6R6040	680 10% 1/2W.....doz	1.20
R-15	6R6432	270 10% 1/2W.....doz	1.20
R-16	6R6040	680 10% 1/2W.....doz	1.20
R-17	6R5683	27 10% 1/2W.....doz	1.20
R-18	6R5554	390 10% 1/2W.....doz	1.20
Switch			
S-1	40B611284	Rotary switch, 5PDT (AC/DC, battery selector).....	1.10
Transformers			
T-1	24K600824	IF Transformer: 455 Kc; complete.....	1.35
T-2	24K620020	Diode Transformer: 455 Kc; complete.....	1.35
T-3	25B611271	Output Transformer.....	1.50
CHASSIS PARTS - MECHANICAL			
	7A611194	Bracket, volume control mtg.....	.10
	43A611210	Bushing, insulating: threaded (on chassis bottom cover).....	.30
	43A692012	Bushing, line cord strain relief (use with 43K692013 retainer)....	.05
	42K620265	Clamp, antenna loop: plastic (loop mtg).....	.10
	42A620184	Clip, battery contact retainer mtg: spring wire.....per/c	.50
	42B485548	Clip, IF trans mtg.....doz	.20
	42A620155	Clip, spring (holds "A" battery)..	.05
	30K611285	Cord, line: with plug; 6 ft long..	.75
	9A12705	Insulator, electrolytic mtg....doz	.30
	29R3020	Lug, soldering ("A" battery contact).....doz	.20
	2S7051	Nut, hex: Palnut; 3/8-32 x 9/16 (volume control mtg).....doz	.15
	1V620172	Retainer, battery: fibre; complete with brackets; less antenna loop.	1.60
	43K692013	Retainer, line cord strain relief bushing (use with 43A692012 bushing).....	.05
	42A620149	Retainer, lug: plastic ("A" battery contact lug mtg).....	.25
	42A620150	Retainer, spring: plastic ("A" battery contact spring mtg).....	.25
	26A611262	Shield, resistor (over R-12).....	.10
	9A690129	Socket, tube: miniature; 7-prong..	.15
	2S118403	Speednut: for 3/8" stud (insulating bushing mtg).....doz	.30
	41K680029	Spring, "A" battery contact....doz	.20
	31A620153	Strip, "B" battery terminal: with leads.....	.30
CABINET PARTS			
	64B611269	Baffle,speaker; fibre.....	.10
	1V620730	Cabinet Assembly: green; complete with grille and back cover (52L1)	5.80*
	1V620750	Cabinet Assembly: maroon; complete with grille and back cover (52L2)	5.80*
	1V620751	Cabinet Assembly: gray; complete with grille and back cover (52L3)	5.80*
	16E611142	Cabinet, front section: green; less grille (52L1).....	1.75
	16K611144	Cabinet, front section: maroon; less grille (52L2).....	1.75
	16K611146	Cabinet, front section: gray; less grille (52L3).....	1.75
	42A611333	Clip, handle (handle mtg).....	.15
	1V611583	Cover Assembly, cabinet back: green; complete with latch spring and stop cord (52L1).....	2.75
	1V611588	Cover Assembly, cabinet back: maroon; complete with latch spring and stop cord (52L2).....	2.75
	1V611593	Cover Assembly, cabinet back: gray; complete with latch spring and stop cord (52L3).....	2.75
	13C611335	Escutcheon, knob (on top of cabinet)	1.15
	13B611267	Grille, speaker: light green (52L1)	.50
	13K620046	Grille, speaker: red (52L2).....	.50
	13K620047	Grille, speaker: dark green (52L3)	.50
	55B611236	Handle, carrying: green; less clips (52L1 & 52L3).....	.55
	55K611237	Handle, carrying: maroon; less clips (52L2).....	.55
	36K611228	Knob, control: green (52L1 & 52L3)	.20
	36K611229	Knob, control: maroon (52L2).....	.20
	1V611584	Latch spring, back cover: with release button.....	.45
	3S488092	Screw, machine: 8-32 x 9/16 plain binder head; nickel plated (knob escutcheon mtg).....doz	.15
	3S488009	Screw, thread cutting: 6-20 x 3/8 plain hex head; cad pl (chassis mtg).....doz	.15
	2S7089	Speednut: for 3/16" stud (spkr baffle mtg).....doz	.20
	41A691939	Spring, hinge (back cover hinge).....doz	.30

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

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*Plus Federal Excise Tax At Current Rate

GENERAL INFORMATION

TYPE - Wall mounted, "Pin-Up" model superheterodyne radio, combined with an electric clock which may be set to automatically turn the radio on.

RECEIVER MODELS -

Model	Color
52CW1	Yellow
52CW2	White
52CW3	Green
52CW4	Red

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT -

Type	Function
12BE6	Converter
12BD6	IF Amplifier
12AT6	Det, AVC & AF Amp
50C5	Power Amplifier
35W4	Rectifier

POWER SUPPLY - Operates from 117 volts, 60 cycle, alternating current only.
Power consumption 35 watts.

CLOCK - Sessions self-starting electric clock, with Motorola, face and hands.

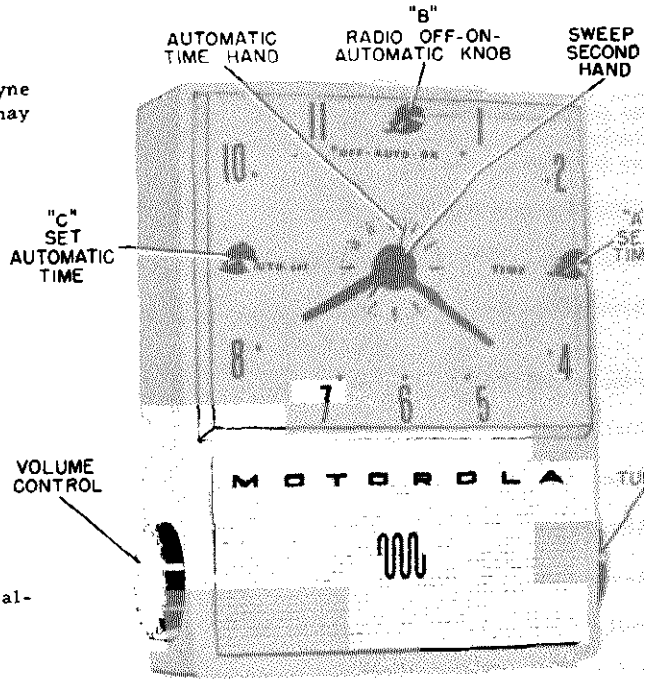

FIGURE 1. FRONT VIEW OF RECEIVER

MOUNTING

Mount the "Pin-Up" clock radio in a suitable location on the wall with two #10 x 1-1/4" round head wood screws or two 1" long picture hangers (furnished with each new "Pin-Up" clock radio). Use the screws for fastening the clock radio to a wooden wall or into a stud in a plastered wall, and the picture hangers for attaching the set to a plastered or plasterboard wall. The spacing between the two screws or hangers should be 6-7/8", as shown in Figure 2.

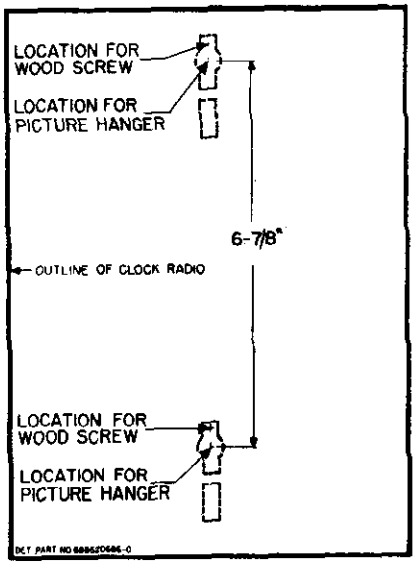

FIGURE 2. MOUNTING LOCATIONS

OPERATING INSTRUCTIONS

The locations and functions of the clock and radio controls are shown in Figure 1.

NORMAL RADIO OPERATION

Knob "B" on the clock turns the radio on or off. Select stations with the TUNING knob, and adjust volume with the VOLUME control.

A built-in ferrite magnetic iron core antenna eliminates the need for an outside antenna. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

CLOCK OPERATION

The clock will start as soon as the receiver is plugged into an electrical outlet. To set the hands to the correct time, pull out knob "A" and rotate it in a clockwise direction only.

AUTOMATIC RADIO OPERATION

The clock controls may be pre-set to turn the radio on automatically at any time up to ten hours in advance.

Rotate knob "C" clockwise to the desired time on automatic time dial scale. Rotate knob "B" to the "AU position. At the pre-set time the radio will begin to p

If the radio has been turned on automatically and is unattended, with knob "B" in the "AUTO" position, it shut off after approximately two hours. To permit tinuous operation, rotate knob "B" to the "ON" posi

MODELS 52CW1, 52CW2, 52CW3, 52CW4, Ch. HS-329

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor, to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver, an isolation transformer should be inserted between the power line and the chassis.

TO REMOVE CHASSIS FOR SERVICE

1. Pull off the two radio control knobs.
2. Remove the four screws from the back cover of the cabinet.
3. Pull off the back cover. See Figure 3.
4. Disconnect the speaker leads.
5. Disconnect the three leads to the clock.

TO REMOVE CLOCK FROM CABINET

1. Remove the radio chassis as above.
2. Pull off the three clock control knobs.
3. Remove the clock dial scale.
4. Remove the three speed nuts which fasten the clock to the cabinet.
5. Remove the clock carefully, to prevent damage to its hands or face.

TO REPLACE CLOCK DIAL BACKGROUND

1. Remove the clock from the cabinet as above.
2. Carefully pull off the four hands.
3. Remove the clock dial background.
4. Install new background.
5. Turn the radio control shaft ("B") to "AUTO" position.
6. Slowly rotate the automatic time set shaft ("C") clockwise until a "click" is heard, indicating that the switch contacts have closed. Do not overshoot this point.
7. Reassemble all four hands in the 12 o'clock position.
8. Check the operation of the clock to be sure the radio turns on at the time indicated on the automatic time dial scale.

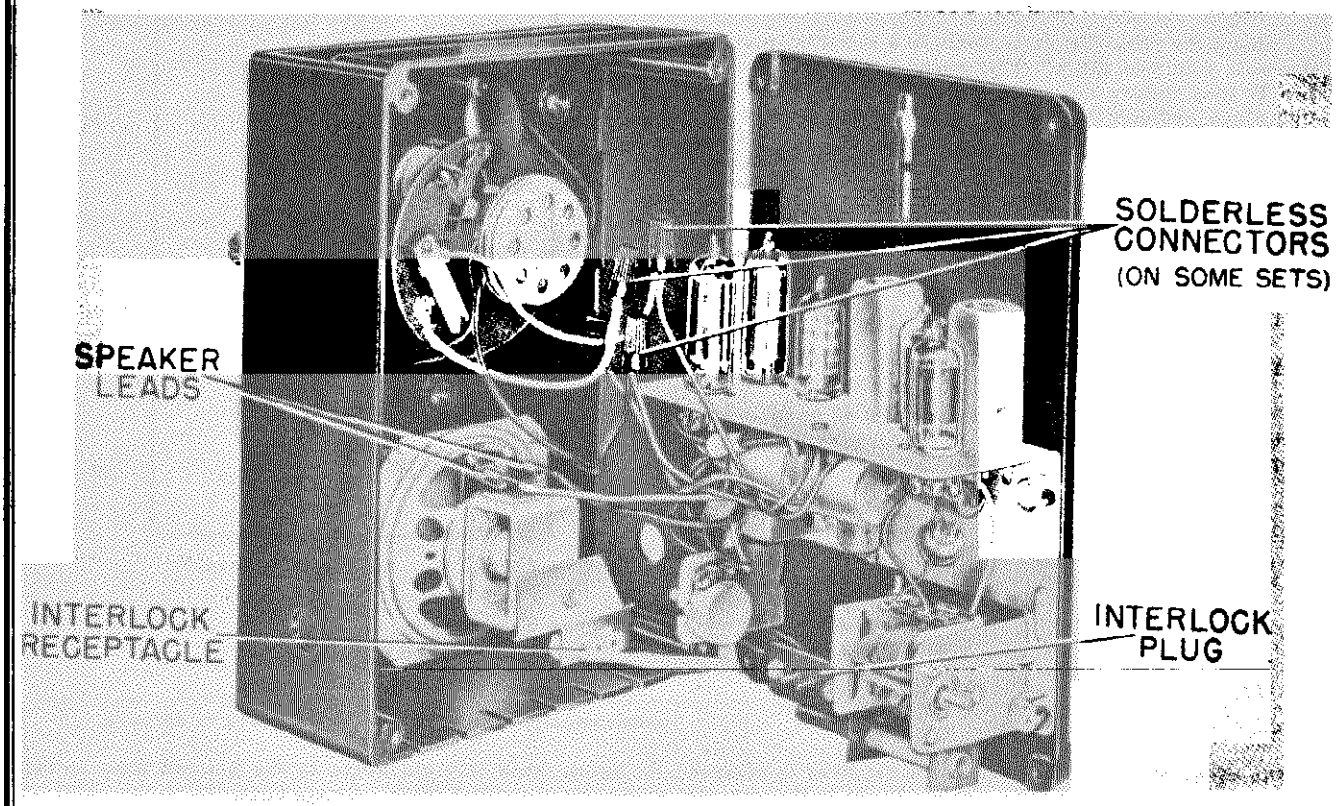

FIGURE 3. BACK COVER REMOVAL

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.

2. Connect the low side of the signal generator to B-.

3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.

5. Use a small fibre screwdriver for aligning the IF diode transformers.

6. As stages are brought into alignment, reduce the sig generator output to a level which produces less than volts (.05 watt) across the voice coil to avoid overloac the receiver.

7. See Figure 4 for adjustment locations and the follow chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (Osc)	**Adjust for maximum.**
3.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	**Adjust for maximum.**

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep generator l perpendicular to axis of and at least 12 inches from receiver iron core loop.

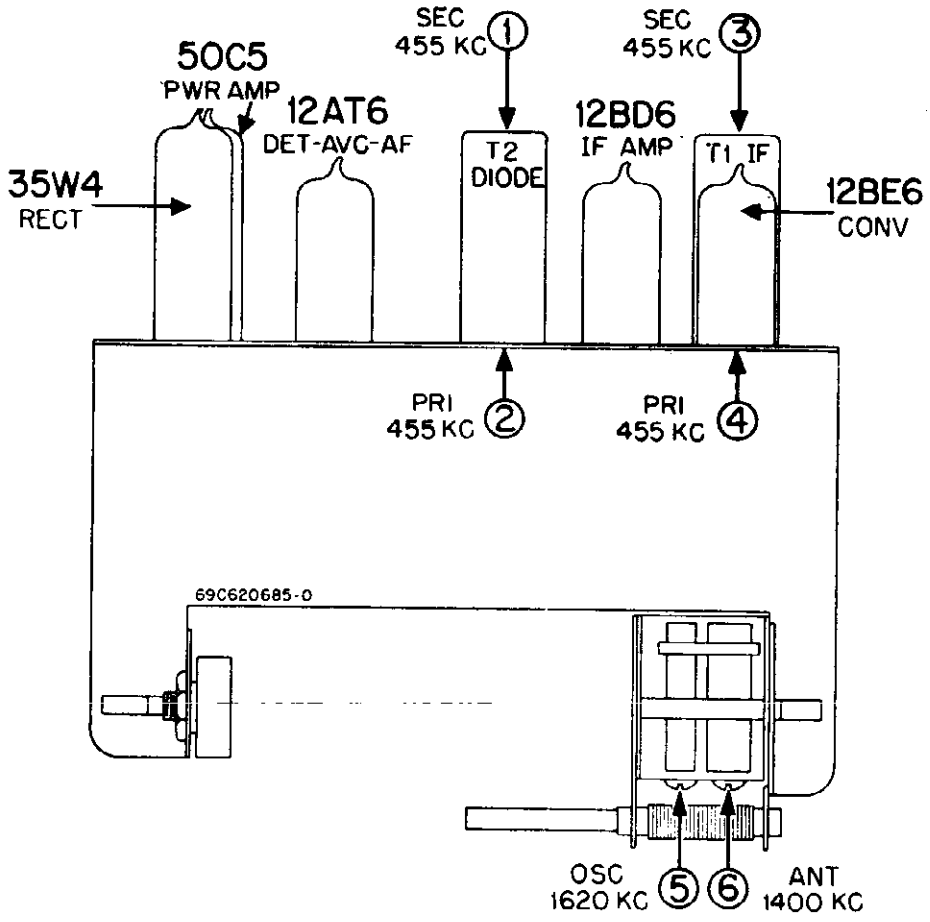

FIGURE 4. TUBE AND ALIGNMENT LOCATIONS

MODELS 52CW1, 52CW2,
52CW3, 52CW4, Ch. HS-329

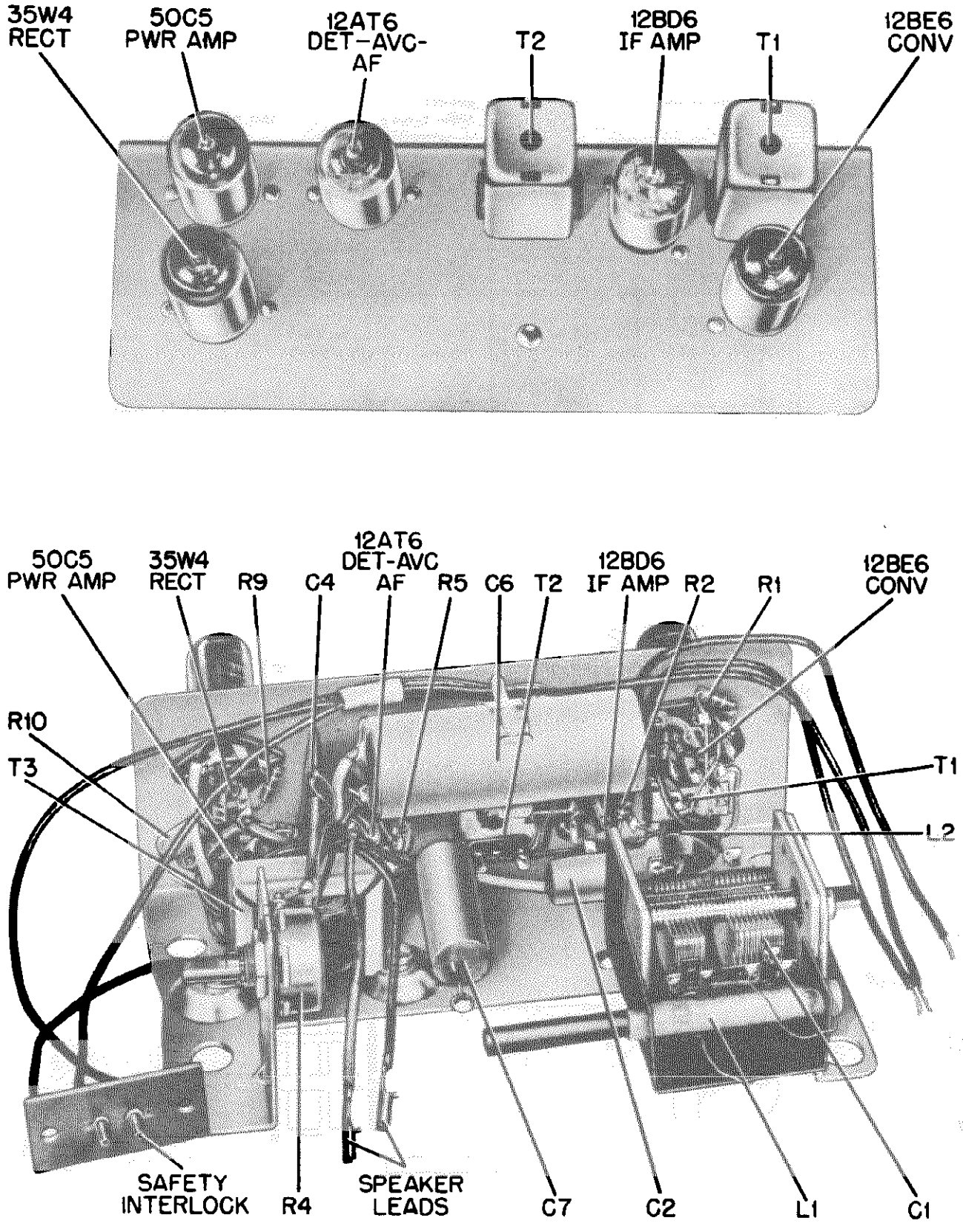

FIGURE 5. PARTS LOCATIONS

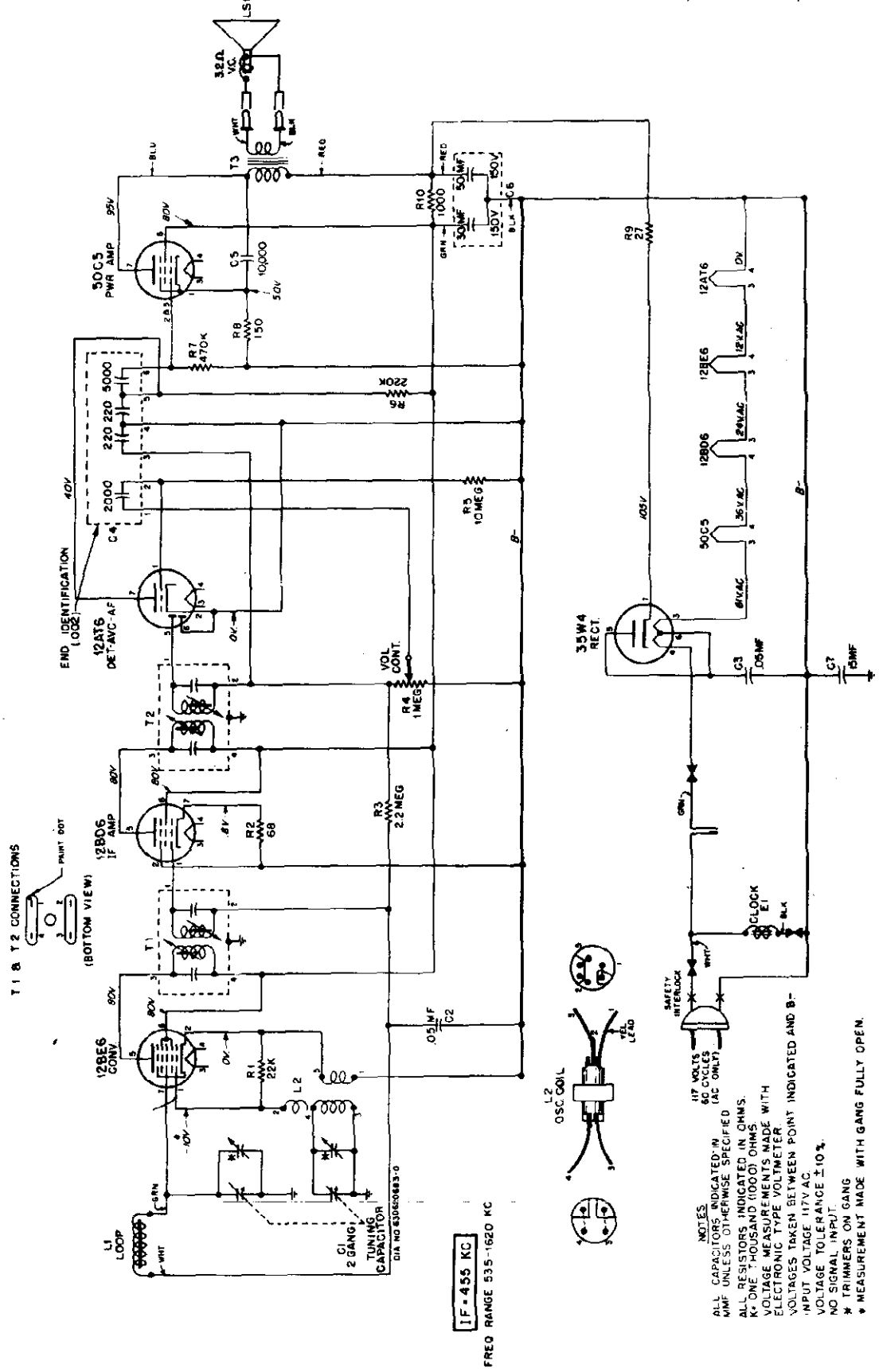

FIGURE 6. SCHEMATIC DIAGRAM

MODELS 52CW1, 52CW2, 52CW3, 52CW4, Ch. HS-329 PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	19B620710	Variable: 2-gang.....	2.65
C-2	8R9821	Paper: .05 mf 200V.....	.25
C-3	8R9816	Paper: .05 mf 400V.....	.25
C-4	21B482847	Ceramic, multiple: 2000-220-220-5000 mmf/400V.....	.65
C-5	21R482726	Ceramic, disc: 10,000 mmf 450V	.30
C-6	23B600855	Electrolytic: 50-30 mf/150V.	1.60
C-7	8K72686	Paper: .15 mf 200V.....	.25
Clock			
E-1	72D620276	Electric Clock Assembly: Sessions; complete, with hands & dial background plate.....	10.25
		exch	7.70
Coils			
L-1	24K620703	Antenna loop: with core.....	.85
L-2	24B680364	Oscillator coil.....	.90
Speaker			
LS-1 or	50B620713 50B620714	Speaker: 3½" PM; 3.2 ohm VC.	3.75 *
		exch	2.80
Resistors			
	Note:	All resistors are insulated carbon type unless otherwise specified.	
R-1	6R6028	22,000 20% 1/2W.....doz	1.20
R-2	6R2039	68 10% 1/2W.....doz	1.20
R-3	6R3927	2.2 meg 20% 1/2W.....doz	1.20
R-4	18A620719	Volume control: 1 meg.....	.80
R-5	6R2109	10 meg 20% 1/2W.....doz	1.20
R-6	6R6015	220,000 20% 1/2W.....doz	1.20
R-7	6R6032	470,000 20% 1/2W.....doz	1.20
R-8	6R6373	150 10% 1/2W.....doz	1.20
R-9	6R5683	27 10% 1/2W.....doz	1.20
R-10	6R6327	1000 10% 1W.....	.20
Transformers			
T-1,2	24C485553	IF and Diode Transformer: 455 Kc; complete.....	1.45
T-3	25C620715	Output Transformer.....	1.50

Part Number	Description	List Price
CHASSIS PARTS - MECHANICAL		
42A75825	Clip, electrolytic mtg.....	.05
42B485548	Clip, IF trans mtg.....doz	.20
5S7805	Eyelet, snap-in (ant insulator mtg).....doz	.15
1V620976	Insulator, antenna loop: fibre; with lead.....	.10
2S7051	Nut, hex: Palnut; 3/8-32 x 9/16 (volume control mtg).....doz	.15
29A620057	Pin, terminal (on spkr leads)..doz	.25
28K712319	Plug, line interlock.....	.15
9A690129	Socket, tube: miniature; 7-prong..	.15

Part Number	Description	List Price
CABINET PARTS		
7B620705	Bracket, line cord interlock receptacle mtg (on spkr).....	.10
1V621298	Cabinet, wall clock: yellow; with speaker cover, less clock dial scale (52CW1).....	3.55
1V621312	Cabinet, wall clock: white; with speaker cover, less clock dial scale (52CW2).....	3.55
1V621313	Cabinet, wall clock: green; with speaker cover, less clock dial scale (52CW3).....	3.55
1V621314	Cabinet, wall clock: red; with speaker cover, less clock dial scale (52CW4).....	3.55
28A600064	Connector, wire (clock and radio power leads solderless connector)	.05
30B620711	Cord, line: with interlock receptacle; less plug; 6 ft long.....	.85
15K620285	Cover, cabinet back: yellow (52CW1)	1.90
15K620286	Cover, cabinet back: white (52CW2)	1.90
15K620287	Cover, cabinet back: green (52CW3)	1.90
15K620288	Cover, cabinet back: red (52CW4)..	1.90
15K620289	Cover, speaker: yellow (52CW1)....	1.45
15K620290	Cover, speaker: white (52CW2).....	1.45
15K620291	Cover, speaker: green (52CW3).....	1.45
15K620292	Cover, speaker: red (52CW4).....	1.45
43A620298	Ferrule, chassis mtg (mounts chassis to back cover).....doz	.15
42A620709	Hanger, picture: 1" long; with nail (mounts radio to wall).....	.05
36B620717	Knob, clock control: black.....	.20
36C620718	Knob, tuning.....	.50
36K620297	Knob, volume control.....	.50
28A620712	Plug, line cord: removable type...	.30
15K790011	Rivet, shoulder (interlock receptacle mtg).....doz	.35
34C620284	Scale, clock dial: plastic.....	1.70
3S488012	Screw, thread-cutting: 6-20 x 1/4 plain hex head; cad pl (spkr mtg).....doz	.15
3S115237	Screw, thread-cutting: 6-20 x 5/16 plain hex head; cad pl (line cord interlock plug mtg).....doz	.40
3S488009	Screw, thread-cutting: 6-20 x 3/8 plain hex head; cad pl (chassis mtg).....doz	.20
3S119885	Screw, thread-cutting: 6-20 x 5/8 Phillips head; cad pl (back cover mtg).....doz	.25
3S118636	Screw, wood: #10 x 1-1/4 round head; cad pl (mounts radio to wall).....doz	.25
2S476112	Speednut: for .156" stud (clock mtg).....doz	.15
2S400014	Speednut: for 3/8" stud (spkr cover mtg).....	.05
CLOCK PARTS		
	Note:	The following Motorola parts are for use with Sessions clock movement, Motorola Part No. 72D620276.
72K620280	Hand, automatic time set: red.....	
72K620279	Hand, hour: black.....	
72K620278	Hand, minute: black.....	
72K620277	Hand, second: chrome finish.....	
59K621297	Motor, clock (electrical assembly only).....	
64C620270	Plate, dial background: white.....	

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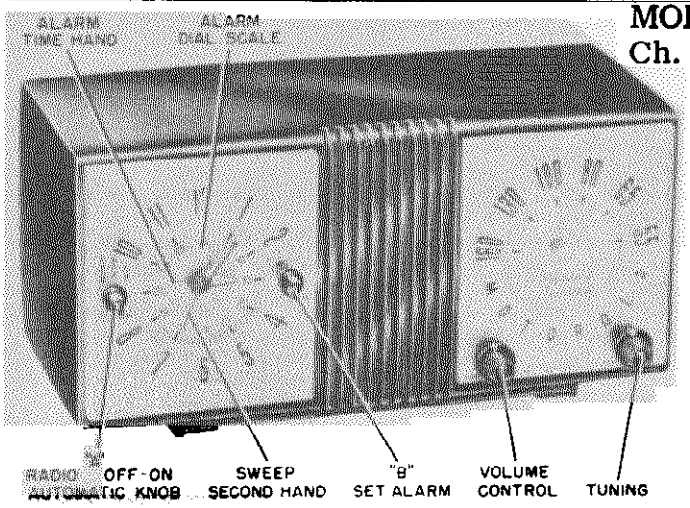


GENERAL INFORMATION

TYPE - AC table model superheterodyne with self-contained electric clock for controlling automatically the operation of the radio.

COLOR - Walnut

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT -

Type	Function
12BE6	Converter
12BD6	IF Amplifier
12AT6	Det, AVC & AF Amp
50C5	Power Amplifier
35W4	Rectifier

POWER SUPPLY - Operates from 117 volts, 60 cycle, ternating current only. Power consu tion 37 watts.

CLOCK - Telechron self-starting electric clock Motorola face and hands.

OPERATING INSTRUCTIONS

The locations and functions of the clock and radio controls are shown in the photo above.

NORMAL RADIO OPERATION

Knob "A" on the clock turns the radio on or off. Select stations with the TUNING knob, and adjust volume with the VOLUME control.

A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

CLOCK OPERATION

The clock will start as soon as the receiver is plugged into an electrical outlet. To set the hands to the correct time, rotate the TIME SET knob (on the rear of the radio) in a clockwise direction only.

ALARM OPERATION

To set the alarm, pull out knob "B" and rotate it counterclockwise direction to the desired time on the al dial scale. The alarm will ring for one hour, or until "B" is pushed in. The alarm function is completely in pendent of the other controls on the clock.

AUTOMATIC RADIO OPERATION

The clock controls may be pre-set to turn the radi automatically at any time up to twelve hours in advance.

Pull out knob "B"; rotate it counterclockwise to the sired time on the alarm dial scale, and push the knob b in. Rotate knob "A" first to the "OFF" position and the the "AUTO" position. At the pre-set time, the radio come on and will continue to play until turned off manua The alarm will ring also if the knob "B" is left pulled The radio will come on first and, after an interval of ab ten minutes, the alarm will ring.

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to chassis through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.

2. Connect the low side of the signal generator to chassis.

3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.

5. Use a small fibre screwdriver for aligning the IF and diode transformers.

6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watts) across the voice coil to avoid overloading the receiver.

7. See Figure 1 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	-	-	-	Fully closed	-	Set pointer to horizontal position.
3.	.1 mf	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (osc)	Adjust for maximum.
4.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

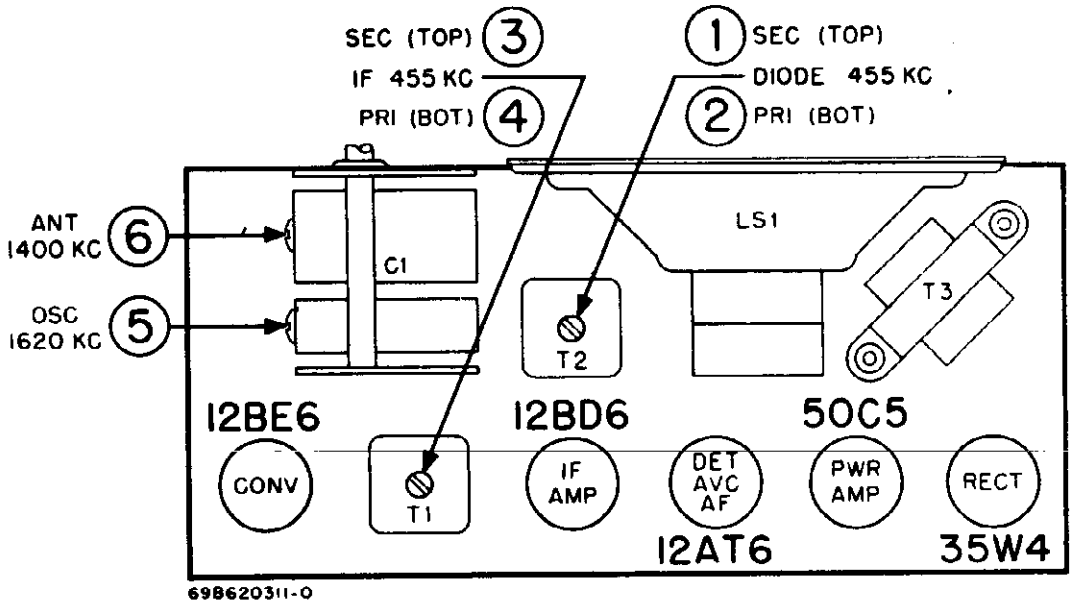


FIGURE 1. TUBE AND TRIMMER LOCATION

SERVICE NOTES

The chassis of this receiver is connected directly to the power line. When operating the chassis outside of its cabinet, use an isolation transformer between the power line and the receiver to reduce the possibility of an electrical shock.

TO REMOVE RADIO CHASSIS FROM CABINET

1. Pull off the two radio control knobs.
2. Remove the three hex head screws which hold the loop to the cabinet.
3. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.
4. Slide the radio chassis and loop from the cabinet.
5. Disconnect the power leads to the radio chassis.

TO REMOVE CLOCK FROM CABINET

1. Remove the radio chassis as above.
2. Pull off the two clock control knobs.
3. From the back of the cabinet, remove the three hex head screws which hold the clock and its fibre insulator.
4. Carefully remove the clock, to prevent damage to its hands or face.

TO REPLACE CLOCK DIAL BACKGROUND

1. Remove the clock from the cabinet as above.
2. Carefully pull off the three hands.
3. Remove the alarm dial and dial background.

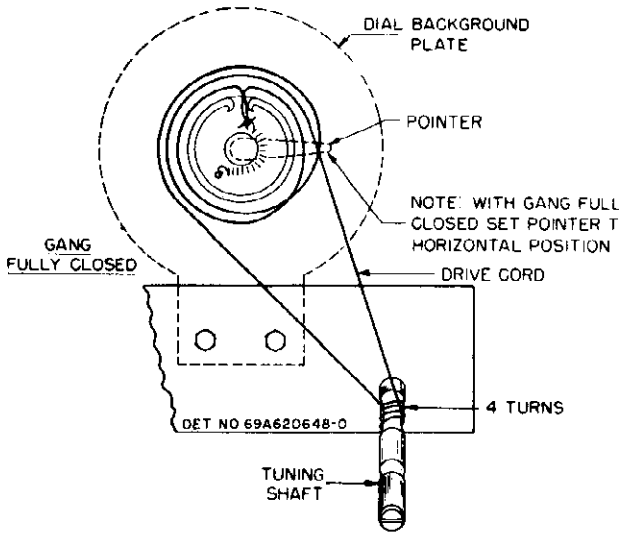


FIGURE 2. STRING DRIVE DETAIL

4. Install new background.
5. Turn the radio control shaft to "AUTO" position.
6. Slowly rotate the time set shaft clockwise until th switch contacts behind the radio control shaft close.
7. Reassemble the alarm dial and three hands. Set all th hands to indicate 12 o'clock. Set the figure "12" on th alarm dial to index with the small pointer on the hour hand
8. Check the automatic operation to be sure the switch con tacts close at the time indicated on the alarm dial.

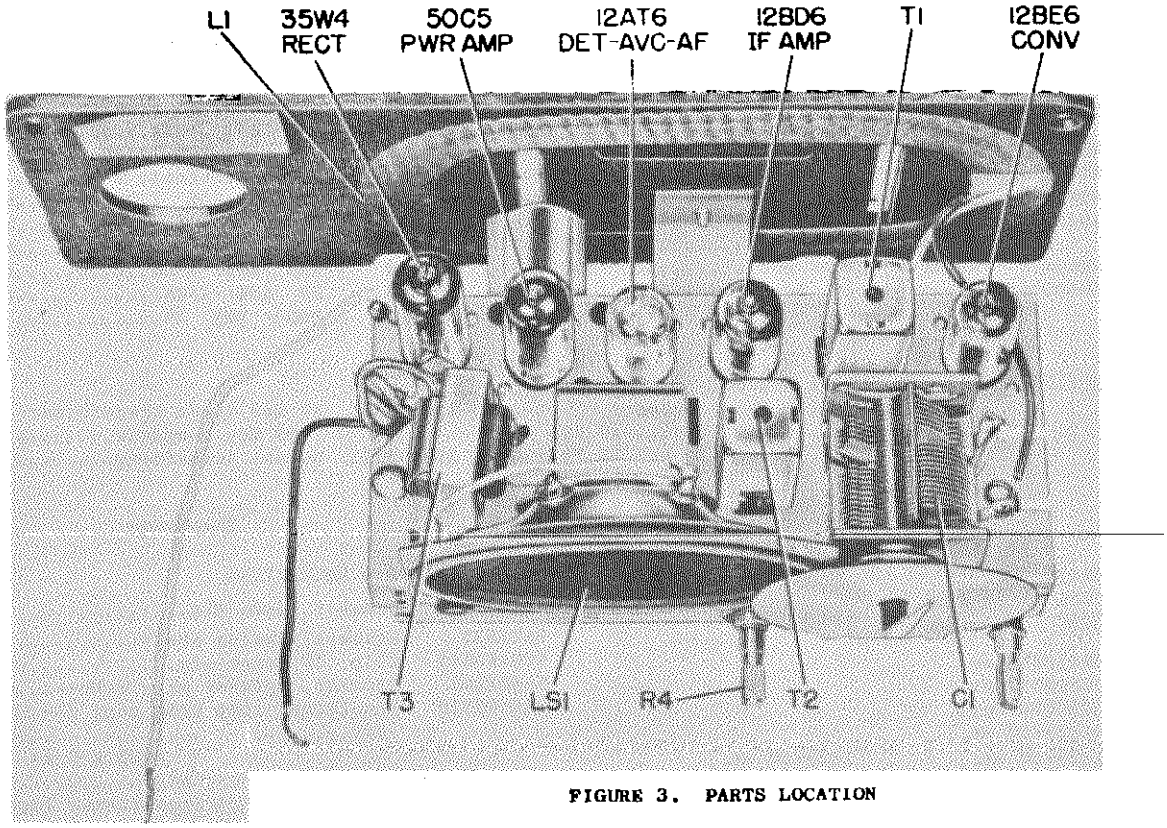
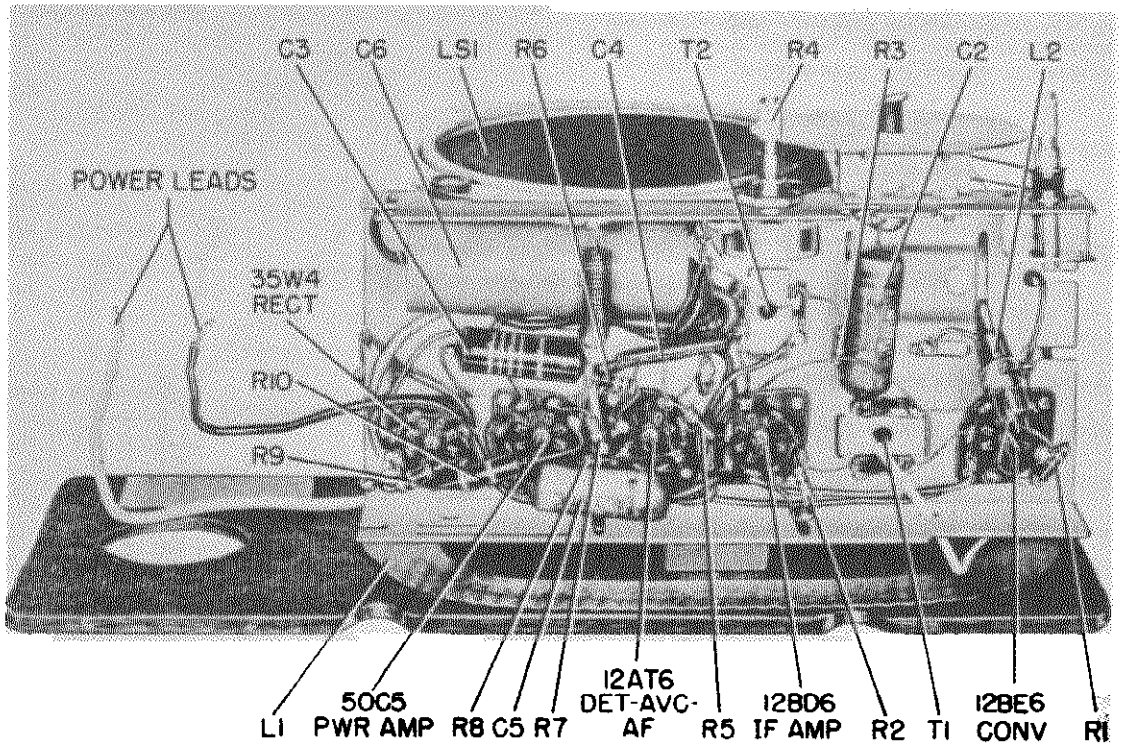


FIGURE 3. PARTS LOCATION

MODELS 52C1, 52C1A, Ch. HS-309



PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	19B610820	Variable: 2-gang; with pulley	2.85
C-2	8R9821	Paper: .05 mf 200V.....	.20
C-3	8R490232	Molded paper: 47,000 mmf 400V	.30
C-4	21B482847	Ceramic, multiple: 2000-220-220-5000 mmf/400V.....	.65
C-5	8R9802	Paper: .02 mf 400V.....	.20
C-6	23B600855	Electrolytic: 50-30 mf/150V.	1.10
Clock			
E-1	59D610825	Electric Clock Assembly: Telechron; with hands; less line cord.....	10.25
		exch	7.70
Coils			
L-1	24K610788	Antenna Loop & Panel Assembly	1.10*
L-2	24A478129	Oscillator coil.....	.90
Speaker			
LS-1	50K610558 or 50C600017 or 50C600857 or 50C610506 or 50B610052 or 50K610557	Speaker: 4" PM; 3.2 ohm VC..	3.90*
		exch	2.95

Resistors

Note: All resistors are insulated carbon type unless otherwise specified.

R-1	6R6028	22,000 20% 1/2W.....doz	1.20
R-2	6R6018	100 20% 1/2W.....doz	1.20
R-3	6R3927	2.2 meg 20% 1/2W.....doz	1.20
R-4	18A600018	Volume control: 1 meg.....	.80
R-5	6R2109	10 meg 20% 1/2W.....doz	1.20
R-6	6R6032	470,000 20% 1/2W.....doz	1.20
R-7	6R6032	470,000 20% 1/2W.....doz	1.20
R-8	6R3992	150 20% 1/2W.....doz	1.20
R-9	6R5683	27 10% 1/2W.....doz	1.20
R-10	6R3953	1000 20% 1W.....	.20

Transformers

T-1,2	24C485553	IF and diode transformer: 455 Kc; complete.....	.95
T-3	25B478121	Output transformer.....	1.05

Part Number	Description	List Price
CHASSIS PARTS - MECHANICAL		
7A478118	Bracket, loop mtg.....	.05
7A77337	Bracket, tuning shaft.....	.05
42B485548	Clip, IF trans mtg.....doz	.20
5A484268	Grommet, speaker mtg: rubber...doz	.20
14A478119	Insulator, loop brkt mtg: fiber.....doz	.15
2S7051	Nut, hex palnut: 3/8-32 x 9/16 (volume control mtg).....doz	.15
35A601669	Pad, cushion: sponge rubber (spkr cushion).....	.10

Part Number	Description	List Price
64B610782	Plate, radio dial background: silver color	.55
52A610809	Pointer, radio dial: light green	.25
JA610808	Shaft, tuning: with pulley	.15
9B472534	Socket, tube: miniature; 7-prong	.15
41A73996	Spring, tension (electrolytic mtg)	.05
41A73619	Spring, tension (gang drive cord)....doz	.40
4A70015	Washer, "C" (tuning shaft mtg)....per/c	.50
14A11493	Washer, shoulder: fibre (loop bracket mtg)....doz	.35
CABINET PARTS		
1X610824	Cabinet, table model: walnut; less overlays and clock and radio scales	4.75*
28A600064	Connector, wire (connects clock & radio power leads)	.05
14B611368	Insulator, clock: fibre (over back of clock)	.15
36B610817	Knob, clock control: black	.20
36B610815	Knob, radio control: black	.20
13A610802	Overlay, clock background: gold color	.15
13A610804	Overlay, radio background: gold color	.20
34K610822	Scale, clock dial: plastic	1.45
34C610791	Scale, radio dial: plastic	1.50

CLOCK PARTS

Note: The following Motorola parts are for use with Telechron clock movement Part No. 59D610825.

34K610826	Alarm Dial: silver color	
42A470832	Clamp, line cord	
30K478137	Cord, line: with plug; 6 ft long	
64K620049	Dial background: silver color	
52K610827	Hand, hour: green	
52K610828	Hand, minute: green	
52K610829	Hand, second: black	
36K601002	Knob, time set	
59K610568	Motor, clock (rotor assembly only)	3

PRICES SUBJECT TO CHANGE WITHOU NOTICE

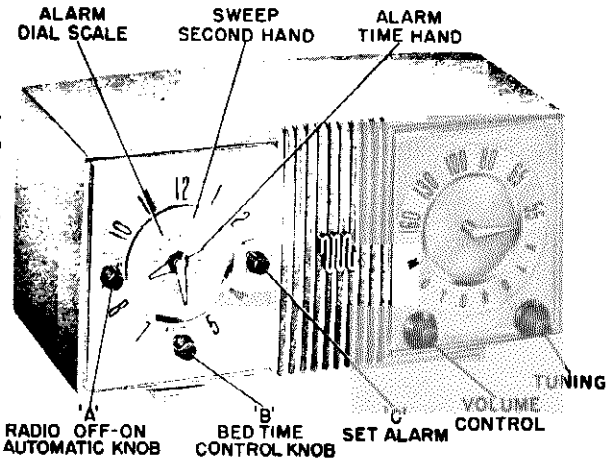
*Plus Federal Excise Tax At Current Rate

SUPPLEMENT NO. 1

GENERAL INFORMATION

Model 52C1A is the same as Model 52C1 except for styling. A complete listing of 52C1A cabinet parts is given below.

Refer to HS-309 Service Manual for service instructions, chassis replacement parts, and clock replacement parts.



PARTS LIST SUPPLEMENT

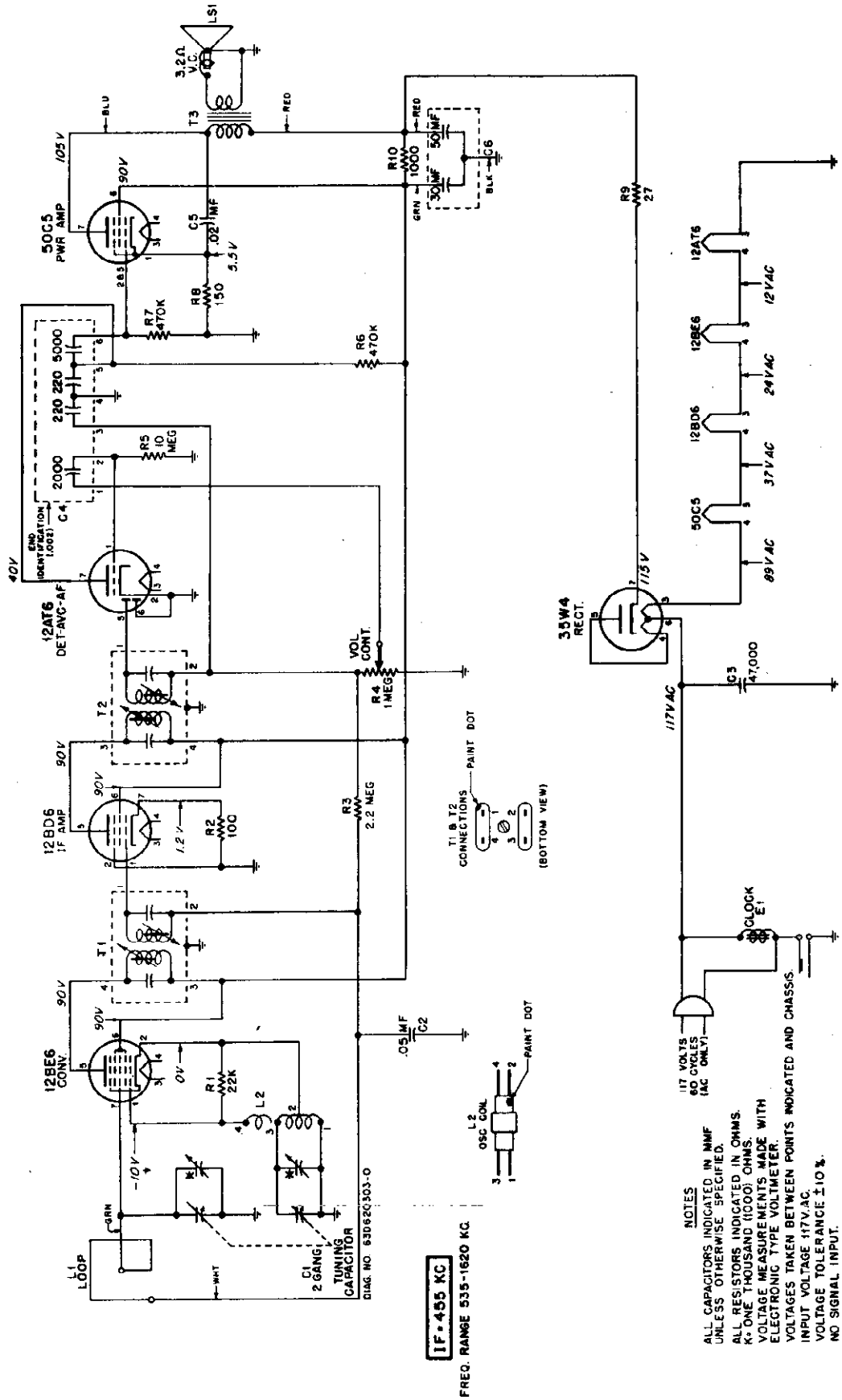
NOTE: When ordering parts, specify model and chassis number of set in addition to part number and description of part. The following parts are revisions of or additions to the original items listed in the HS-309 Service Manual.

Part Number	Description	List Price
CABINET PARTS		
1V622095	Cabinet, table model: walnut; with medallion; less overlays	5.85*
61K621891	Crystal, plastic (clock face cover)	.85
61K621529	Crystal, plastic (radio face cover)	.85
64K621523	Dial background	.45
59K621787	Electric Clock Assembly: Telechron; with hands; less line cord	10.25 exch 7.70
36K621520	Knob, clock control (black)	
13A792195	Medallion, on speaker grille	
13K621892	Overlay, clock background: with numbers	
13C621527	Overlay, radio background: with numbers	
43A600095	Sleeve, paper (on pointer shaft)....per/c	
2S490840	Speednut, medallion mtg....doz	

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

*Plus Federal Excise Tax At Current Rate

MODELS 52C1, 52C1A,
Ch. HS-309



NOTES

ALL CAPACITORS INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS INDICATED IN OHMS. K= ONE THOUSAND (1000) OHMS.
VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
VOLTAGES TAKEN BETWEEN POINTS INDICATED AND CHASSIS.
INPUT VOLTAGE 117 V.AC.
VOLTAGE TOLERANCE ±10 %.
NO SIGNAL INPUT.
* TRIMMERS ON GANG.
+ MEASUREMENT MADE WITH GANG FULLY OPEN.

FIGURE 4. SCHEMATIC DIAGRAM

GENERAL INFORMATION

TYPE - AC table model superheterodyne with appliance outlet and self-contained electric clock for automatically controlling the operation of the radio and the outlet.

RECEIVER MODELS -

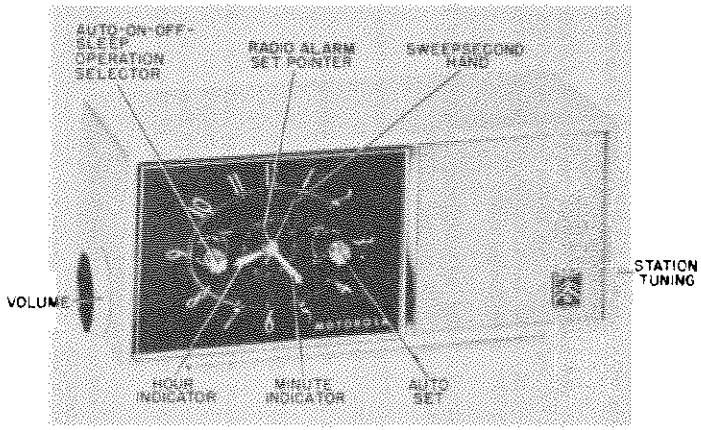
Model	Color
53C6	Walnut
53C7	Ivory
53C8	Green
53C9	Tan

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT -

Type	Function
12BE6	Converter
12BA6	IF Amplifier
12AT6	Det, AVC & AF Amp
50C5	Power Amplifier
35W4	Rectifier

POWER SUPPLY - Operates from 117 volts, 60 cycle, alternating current only. Power consumption 37 watts.



APPLIANCE OUTLET - For use with 117 volt AC appliances only, rated at 1100 watts or less.

CLOCK - Telechron self-starting electric clock, with Motorola face and hands.

OPERATING INSTRUCTIONS

The locations and functions of the clock and radio controls are shown in the photo above.

NORMAL RADIO OPERATION

The OPERATION SELECTOR knob on the clock turns the radio on or off. Select stations with the TUNING knob, and adjust volume with the VOLUME control.

A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by winding the antenna lead-in around the tongue on the rear panel. (This couples external antenna capacitively to loop.) CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

CLOCK OPERATION

The clock will start as soon as the receiver is plugged into an electrical outlet. To set the hands to the correct time, rotate the TIME SET knob (on the rear of the radio) in a clockwise direction only.

ALARM OPERATION

To set the alarm, pull out AUTO SET knob and rotate it in a counterclockwise direction to the desired time on the alarm dial scale. The alarm will ring for one hour, or until AUTO SET knob is pushed in. The alarm function is completely independent of the other controls on the clock.

SLEEP CONTROL

The SLEEP control will turn the radio and appliance off after any pre-set interval of time up to one hour.

MODELS 53C6, 53C7, 53C8, 53C9, Ch. HS-338

TO SET SLEEP CONTROL

Turn OPERATION SELECTOR knob counterclockwise. The farther the control is turned, the longer the radio will play, up to a maximum of 60 minutes.

AUTOMATIC RADIO OPERATION

The clock controls may be pre-set to turn the radio on automatically at any time up to twelve hours in advance.

If an appliance is plugged into the receptacle on the rear of the receiver, it will be turned on automatically along with the radio.

TO SET RECEIVER FOR AUTOMATIC OPERATION:

1. Turn OPERATION SELECTOR knob to ON. Allow a short period of time for tube warm-up.

2. Set the radio dial to the station you would like to hear at any pre-determined time, up to twelve hours in advance, and adjust volume to desired loudness.

3. Pull out and turn AUTO SET knob until RADIO ALARM SET POINTER indicates time radio is to be turned on automatically.

4. Turn OPERATION SELECTOR to OFF and then pull OPERATION SELECTOR out for AUTO. Leave in AUTO position.

5. The radio is now set to turn on automatically at the time indicated by RADIO ALARM SET POINTER. The radio will turn on at the pre-set time and will continue to play until OPERATION SELECTOR is pushed in and located in the OFF position.

SLEEP CONTROL AND AUTOMATIC OPERATIONS COMBINED

By combining the sleep control and automatic radio operation, it is possible to turn the radio off automatically and to turn it on again automatically.

TO USE THIS FEATURE, SET CONTROLS AS FOLLOWS:

1. Pull out and turn AUTO SET knob until RADIO ALARM SET POINTER indicates time radio is to be turned on automatically; push knob back in (if you wish alarm to ring, leave AUTO SET knob pulled out).

2. Turn OPERATION SELECTOR to OFF and then pull OPERATION SELECTOR out for AUTO.

3. Turn OPERATION SELECTOR counterclockwise for SLEEP CONTROL.

4. Tune in desired station and adjust volume.

APPLIANCE OUTLET

To control an electrical appliance automatically, plug it into the receptacle on the back of the radio. It will then be turned on or off simultaneously with the radio.

CAUTION: Note that the rating of the outlet is 1100 watts or less.

If radio reception is not desired when operating the appliance, rotate the radio volume control to the minimum volume position.

SERVICE NOTES

TO REMOVE RADIO CHASSIS FROM CABINET

1. Pull off the two radio control knobs.

2. Remove the four hex head screws which hold the loop to the cabinet, disconnect leads, and remove loop.

3. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.

4. Disconnect clock plug from radio chassis.

5. Slide the radio chassis from the cabinet.

6. To service chassis when clock is disconnected, connect jumper wire between pins 3 & 4 of clock receptacle on chassis to complete power circuit.

TO REMOVE CLOCK FROM CABINET

1. Remove radio chassis from cabinet as described above.

2. Remove clock control knobs. They pull off.

3. Carefully pry off the plastic crystal.

4. Lift off the clock background overlay.

5. From the inside of cabinet, remove two nuts that mount clock.

6. Carefully remove clock from cabinet.

TO SYNCHRONIZE HANDS AND ALARM

If the hands have been moved accidentally, it will be necessary to re-synchronize them with the alarm dial, as outlined below:

1. Pull out the OPERATION SELECTOR knob to the "AUTO" position.

2. Slowly rotate the time set knob clockwise (as viewed from rear) until the clock switch contacts close. This is indicated by an audible click, or an ohmmeter connected to pins 3 & 4 of the clock plug, can be used as a visual indicator.

3. Set all the hands to indicate 12 o'clock.

4. Check the automatic operation to be sure the switch contacts close at the time indicated on the alarm dial.

CLOCK REPAIR INFORMATION

Telechron timers can be repaired at Authorized Telechron Service Stations or at the Product Service Department, Ashland, Mass. Consult your Motorola Distributor for the name of the nearest Telechron Service Station, or refer to the classified section of the telephone directory in large cities.

The timer should be removed from the radio cabinet and packed carefully in order that no further damage results during shipment.

An acknowledgement with a quotation and a request for payment will be sent to the dealer before the repair is made. The timer will be returned to the dealer on receipt of payment. If the timer is within warranty, repairs will be made on a no-charge basis.

ALIGNMENT

NOTE: Use an isolation transformer placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across speaker voice coil.

2. Connect the low side of the signal generator through a .1 mf capacitor to B-

3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.

5. Use a small fibre screwdriver for aligning the IF diode transformers.

6. As stages are brought into alignment, reduce the sig generator output to a level which produces less than volts (.05 watt) across the voice coil to avoid overload the receiver.

7. See Figure 1 for adjustment locations and the follow chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST (SEE FIG. 1)	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (Osc)	Adjust for maximum.
3.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at leas 12" apart.

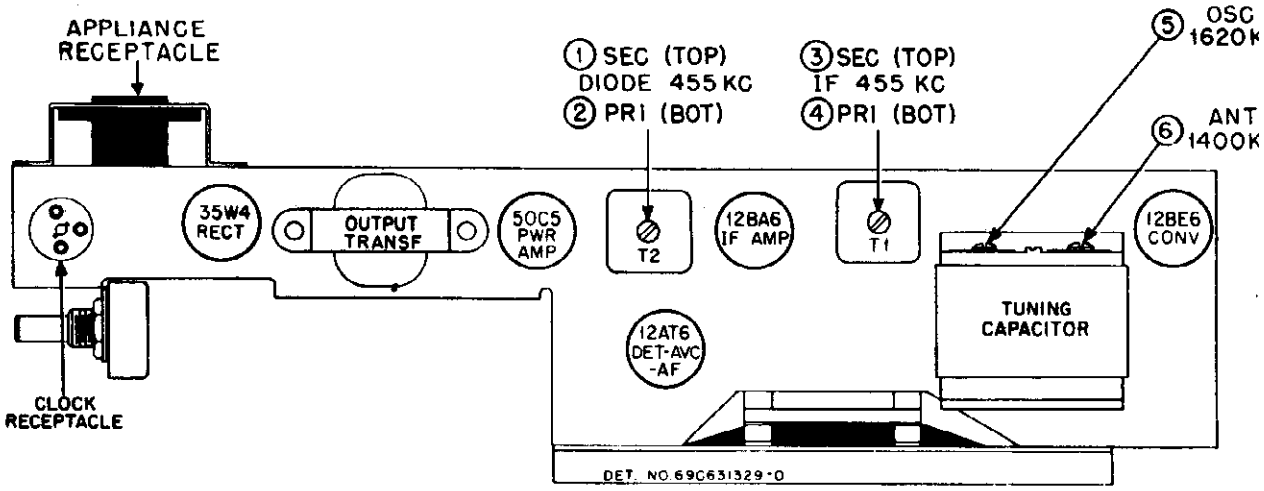


FIGURE 1. TUBE & TRIMMER LOCATIONS

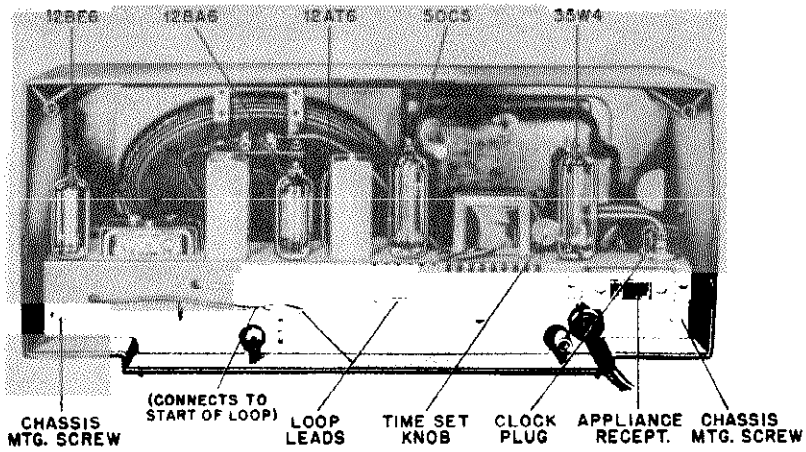
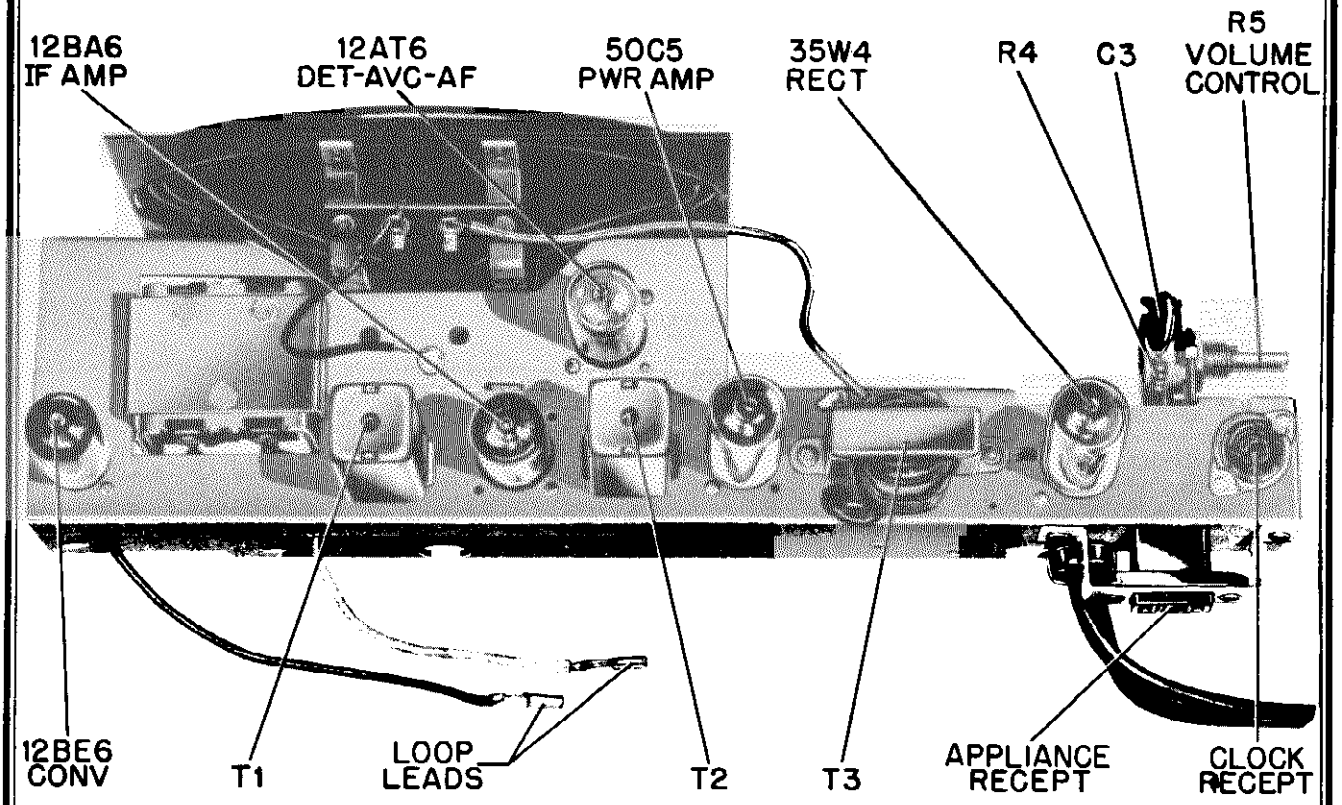


FIGURE 2. REAR VIEW OF SET

MODELS 53C6, 53C7,
53C8, 53C9, Ch. HS-338



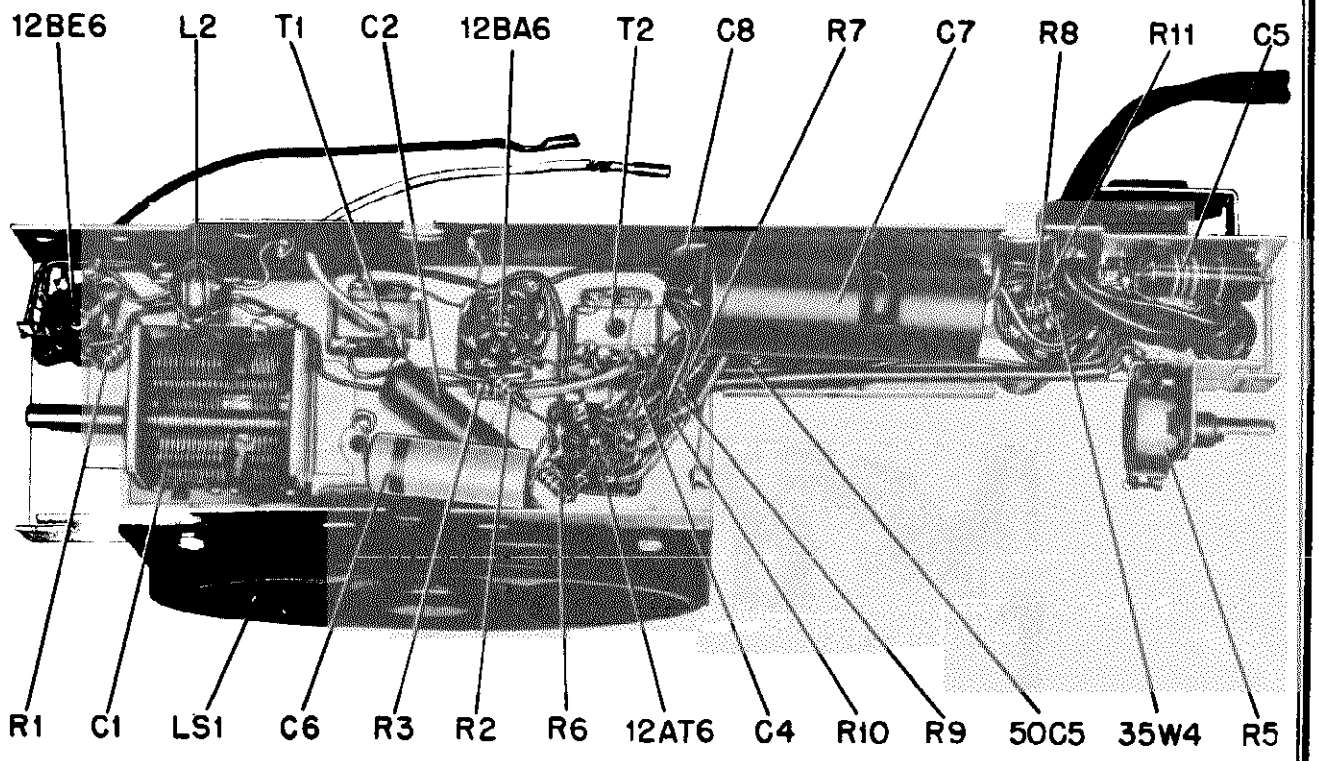
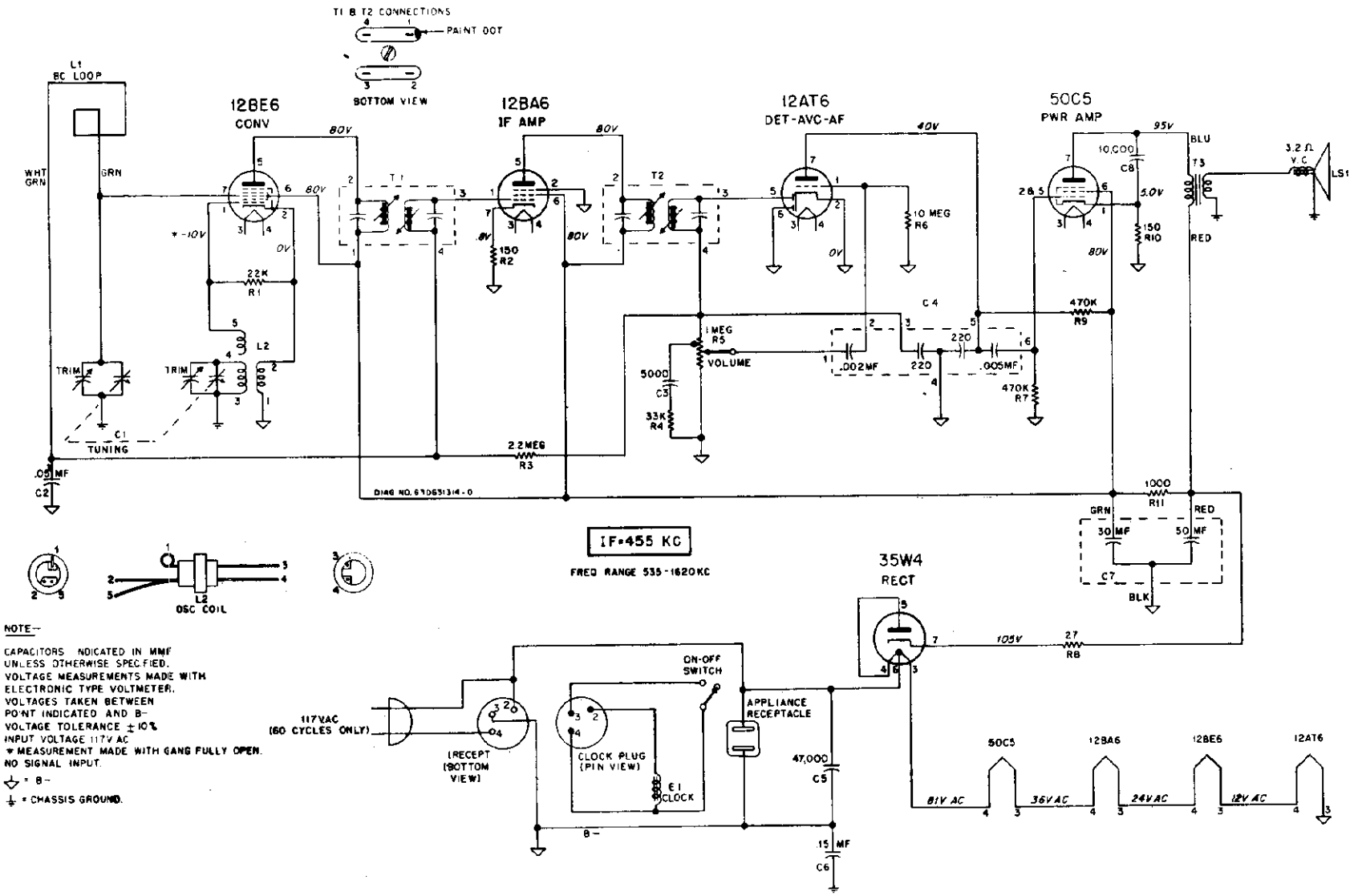


FIGURE 3. PARTS LOCATIONS



NOTE--

CAPACITORS INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
VOLTAGES TAKEN BETWEEN POINT INDICATED AND B-
VOLTAGE TOLERANCE ±10%
INPUT VOLTAGE 117V AC
* MEASUREMENT MADE WITH GANG FULLY OPEN.
NO SIGNAL INPUT.

⏚ = B-

⏚ = CHASSIS GROUND.

MODELS 53C6, 53C7, 53C8, 53C9, Ch. HS-338

PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL			
Capacitors			
C-1	19B630712	Variable: 2-gang.....	2.45
C-2	8R9821	Paper: .05 mf 200V.....	.25
C-3	21R115312	Ceramic; disc: 5000 mmf 450V	.25
C-4	21B482847	Ceramic, multiple: 2000, 220, 220, 5000 mmf/400V.....	.65
C-5	8K490232	Molded paper: 47,000 mmf 400V	.30
C-6	8R9843	Paper: .15 mf 200V.....	.20
C-7	23K722536	Electrolytic: 50-30 mf/150V.	2.90
C-8	21R482726	Ceramic, disc: 10,000 mmf 450V.....	.30
Clock			
E-1	59D630670	Electric Clock Assembly: Telechron; with hands; less leads.....	-
	NOTE: SEE SERVICE NOTES FOR CLOCK REPAIR INFORMATION.		
Coils			
L-1	24C630833	Antenna Loop, Panel and Receptacle Assembly: complete.....	1.40
L-2	24K630800	Oscillator coil.....	1.00
Speaker			
LS-1	50C630713	Speaker: 4" x 6" PM; 3.2 ohm VC.....	4.00*
		exch	3.00
Resistors			
	Note: All resistors are insulated carbon type unless otherwise specified.		
R-1	6R6028	22,000 20% 1/2W.....doz	1.20
R-2	6R3992	150 20% 1/2W.....doz	1.20
R-3	6R3927	2.2 meg 20% 1/2W.....doz	1.20
R-4	6R6012	33,000 20% 1/2W.....doz	1.20
R-5	18A630704	Volume control: 1 meg.....	.85
R-6	6R2109	10 meg 20% 1/2W.....doz	1.20
R-7	6R6032	470,000 20% 1/2W.....doz	1.20
R-8	6R5683	27 10% 1/2W.....doz	1.20
R-9	6R6032	470,000 20% 1/2W.....doz	1.20
R-10	6R3992	150 20% 1/2W.....doz	1.20
R-11	6R3953	1000 20% 1W.....	.20
Transformers			
T-1,2	24C485553	IF and diode transformer: 455Kc; complete.....	1.45
T-3	25K630836	Output transformer.....	1.55

Part Number	Description	List Price
CHASSIS PARTS - MECHANICAL		
43K610736	Bushing, line cord strain relief (use with 43K610737 retainer)....	.20
42B485548	Clip, IF transformer mtg.....doz	.35
42A75825	Clip, electrolytic mtg.....	.05
30K620856	Cord, line: with plug	1.00
2S7051	Nut, hex: Palnut; 3/8-32 x 9/16 (vol control mtg).....doz	.15
9A721182	Receptacle, appliance.....	.30
9A630708	Receptacle, clock.....	.15
43K610737	Retainer, line cord strain relief bushing (use with 43K610736 bushing).....	.20
9R119871	Socket, tube: miniature; 7-prong; with grounding strap; and center shield; wafer type.....	.15
9R119819	Socket, tube: miniature; 7-prong; with dummy lug; and center shield; wafer type.....	.15
CABINET PARTS		
16E630328	Cabinet, table model: plastic; walnut; less grille, pointer, clock overlay and crystal (53C6).	4.50
16K630329	Cabinet, table model: plastic; ivory; less grille, pointer, clock overlay and crystal (53C7).	5.85
16K630330	Cabinet, table model: plastic; green; less grille, pointer, clock overlay and crystal (53C8).	5.85
16K630331	Cabinet, table model: plastic; tan; less grille, pointer, clock overlay and crystal (53C9).....	5.85
61C630838	Crystal, plastic (clock face cover).....	1.15
13C630835	Grille, speaker: perforated metal; less medallion.....	1.35
36K630829	Knob, clock control: black.....	.20
36C630827	Knob, tuning.....	1.00
36K630828	Knob, volume.....	1.00
13K630096	Medallion (on speaker grille).....	.10
2S7074	Nut, speednut (dial pointer mtg) ..... per/c	.50
13C630834	Overlay, clock background: with numbers.....	1.00
28K630826	Plug, connector (connects clock to radio chassis).....	.10
52A630830	Pointer, radio dial: red	.05
13C630837	Trim, ornamental: on front of cabinet.....	.30

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

*Plus Federal Excise Tax At Current Rate

MODELS 62C1, 62C1A, 62C2, 62C2
62C3, 62C3A, Ch. HS-2

GENERAL INFORMATION

TYPE - AC table model superheterodyne with appliance outlet and self-contained electric clock for controlling automatically the operation of the radio and the outlet.

RECEIVER MODELS

Model	Color
62C1	Walnut
62C2	Ivory
62C3	Green

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT -

Type	Function
12BD6	RF Amplifier
12BE6	Converter
12BD6	IF Amplifier
12AT6	Det, AVC & AF Amp
35C5	Power Amplifier
35W4	Rectifier

POWER SUPPLY - Operates from 117 volts, 60 cycle, alternating current only. Power consumption 30 watts.

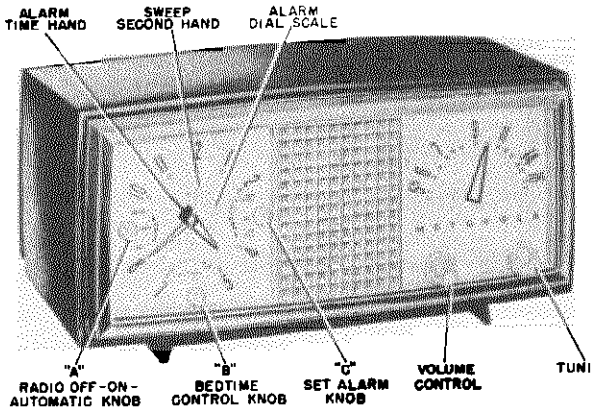


FIGURE 1. FRONT VIEW OF RECEIVER

APPLIANCE OUTLET - For use with 117 volt AC appl ances only, rated at 1100 watts less.

CLOCK - Telechron self-starting electric clock, w Motorola face and hands.

OPERATING INSTRUCTIONS

The locations and functions of the clock and radio controls are shown in Figure 1.

NORMAL RADIO OPERATION

Knob "A" on the clock turns the radio on or off. Select stations with the TUNING knob, and adjust volume with the VOLUME control.

A built-in ferrite magnetic iron core antenna eliminates the need for an outside antenna. When receiving a weak station, rotate the receiver slightly for best signal strength. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

CLOCK OPERATION

The clock will start as soon as the receiver is plugged into an electrical outlet. To set the hands to the correct time, rotate the TIME SET knob (on the rear of the radio) in a clockwise direction only.

ALARM OPERATION

To set the alarm, pull out knob "C" and rotate it in a counterclockwise direction to the desired time on the alarm dial scale. The alarm will ring for one hour, or until knob "C" is pushed in. The alarm function is completely independent of the other controls on the clock.

APPLIANCE OUTLET

To control an electrical appliance automatically, plug it into the receptacle on the back of the radio. It will then be turned on or off simultaneously with the radio.

CAUTION: Note that the rating of the outlet is 1100 watts or less.

If radio reception is not desired when operating the appliance, rotate the radio volume control to the minimum volume position.

AUTOMATIC RADIO OPERATION

The clock controls may be pre-set to turn the radio automatically at any time up to twelve hours in advance.

If an appliance is plugged into the receptacle on the b of the receiver, it will be turned on automatically, al with the radio.

Pull out knob "C", rotate it counterclockwise to the sired time on the alarm dial scale, and push the knob b in. Rotate knob "A" first to the "OFF" position and the the "AUTO" position. At the pre-set time, the radio come on and will continue to play until turned off manua The alarm will ring also if the knob "C" is left pulled The radio will come on first and, after an interval of a ten minutes, the alarm will ring.

BEDTIME CONTROL

The BEDTIME control will turn the radio and applia off after any pre-set interval of time up to one hour.

Turn knob "A" to the "OFF" position and rotate knob to any period of time between 0 and 60 minutes. The ra and appliance will be turned off automatically after the pr er time has elapsed, and they will remain off until tur on again manually.

AUTOMATIC AND BEDTIME OPERATIONS COMBINED

By combining the operations in the two sections abo the radio may be turned off automatically and on again au matically.

When setting the BEDTIME control, rotate knob "A the "AUTO" position instead of "OFF". IMPORTANT: I necessary to turn knob "A" first to the "OFF" position for proceeding to "AUTO", otherwise the radio may shut off.

CHASSIS HS-299

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.

2. Connect the low side of the signal generator to B-.

3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.

5. Use a small fibre screwdriver for aligning the IF and diode transformers.

6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.

7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv (RF section of gang)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. (RF section of gang)	1620 Kc	Fully open	5 (Osc trim)	Adjust for maximum.
3.	-	Radiation loop*	1400 Kc	Tune for max	6 (RF trim)	Adjust for maximum.
4.	-	Radiation loop*	1400 Kc	Tune for max	7 (Ant trim)	Adjust for maximum.

*Connect generator output across 5-inch diameter, 5 turn loop and couple inductively to receiver loop. Keep generator loop perpendicular to axis of and at least 12 inches from receiver iron core loop.

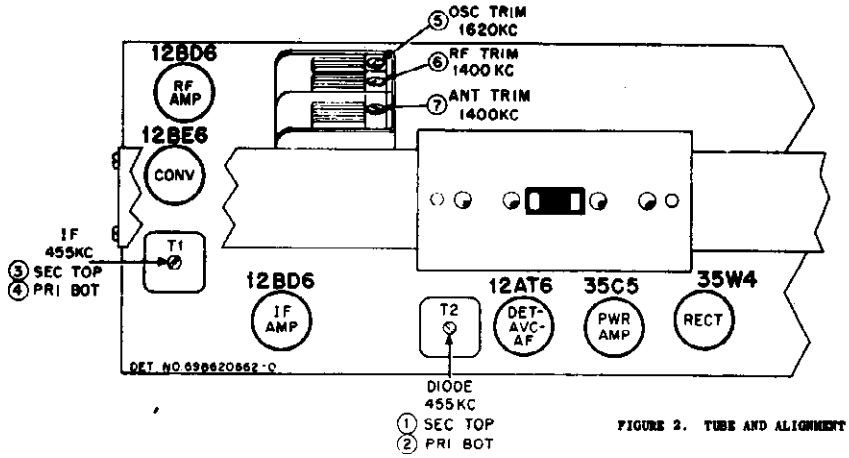


FIGURE 2. TUBE AND ALIGNMENT LOCATION

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver, an isolation transformer should be inserted between the power line and the chassis.

TO REMOVE CHASSIS FOR SERVICE

1. Remove the two screws from the bottom of the cabinet.

2. Remove the two screws from the back of the cabinet.

3. Pull the chassis and front cover from the cabinet.

4. Pull off radio and clock control knobs.

5. Insert a screwdriver into the loops on the ends of the front cover retainer springs, and pry the springs from their slots in the chassis.

6. Pull off the front cover.

TO REPLACE CLOCK DIAL BACKGROUND

1. Remove the clock from the chassis.

2. Carefully pull off the three hands.

3. Remove the alarm dial and dial background.

4. Install new background.

5. Turn the radio control shaft to "AUTO" position.

6. Slowly rotate the time set shaft clockwise until the switch contacts behind the radio control shaft close.

7. Reassemble the alarm dial and three hands. Set all the hands to indicate 12 o'clock. Set the figure "12" on the alarm dial to index with the small pointer on the hour hand.

8. Check the automatic operation to be sure the switch contacts close at the time indicated on the alarm dial.

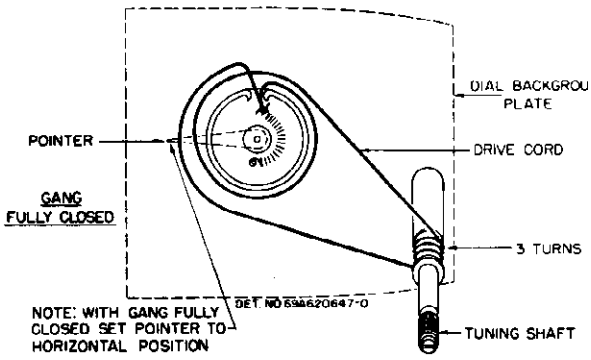
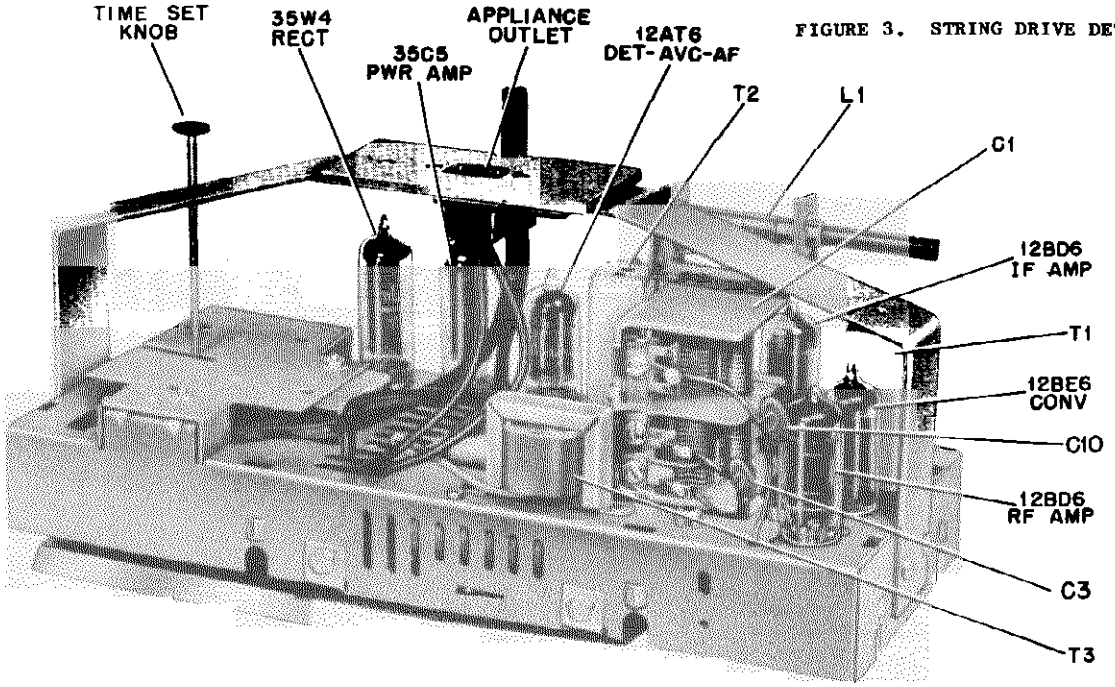


FIGURE 3. STRING DRIVE DETAIL



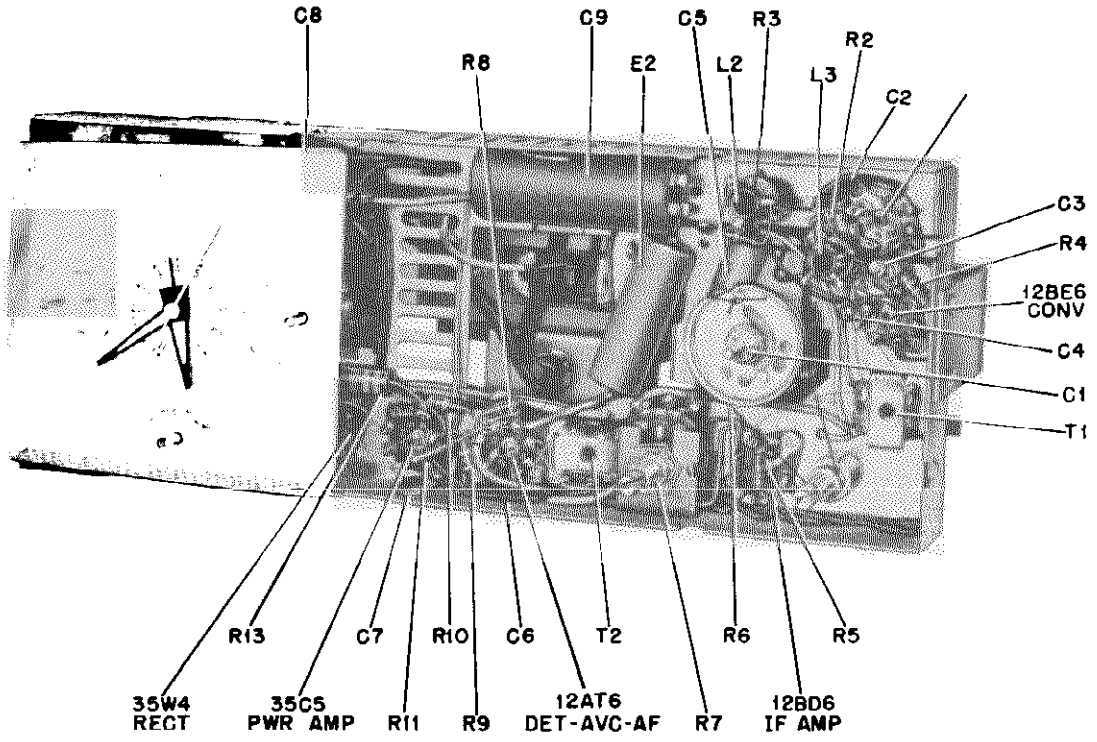


FIGURE 4. PARTS LOCATION

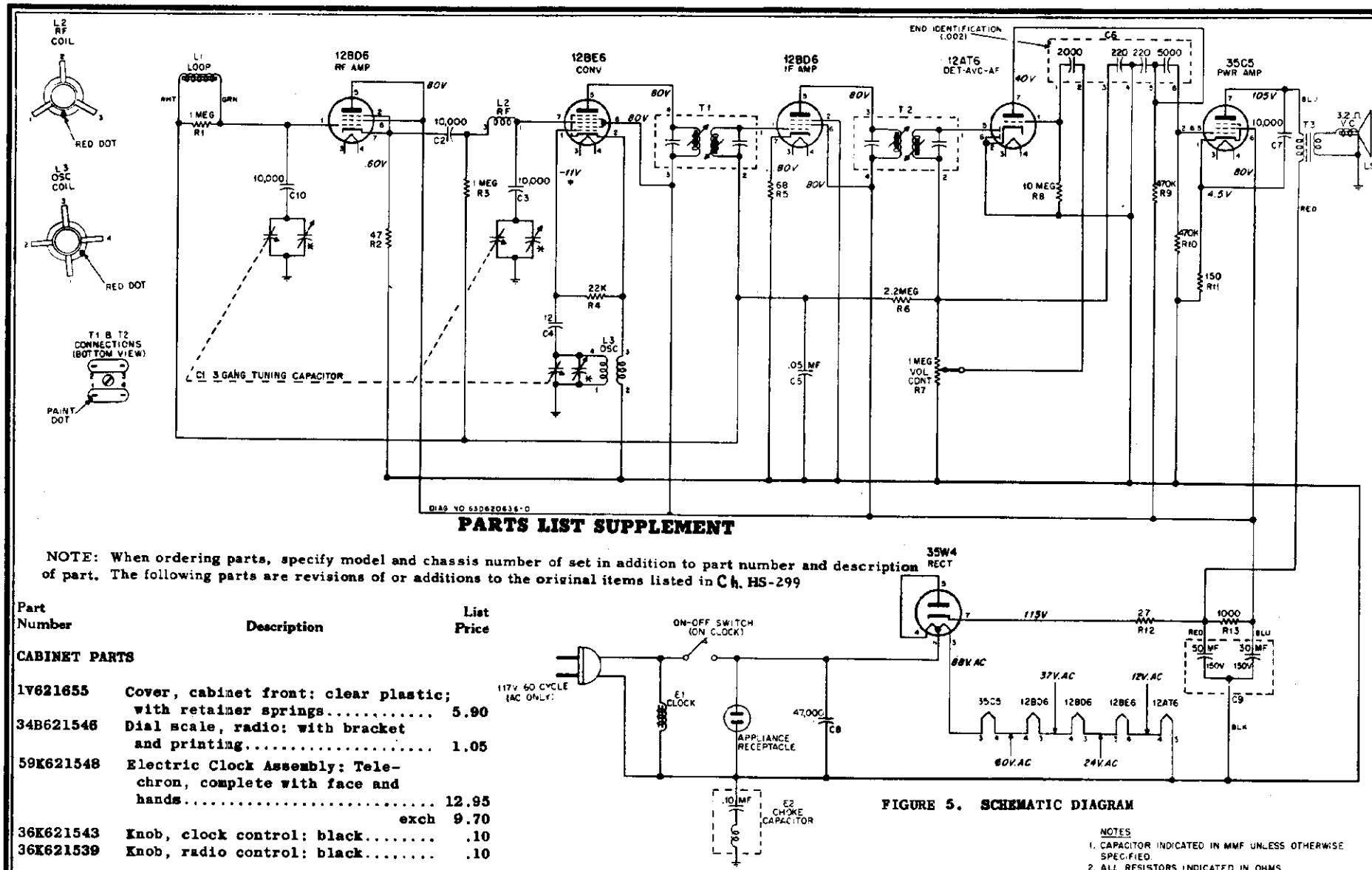


FIGURE 5. SCHEMATIC DIAGRAM

NOTES
1. CAPACITOR INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
2. ALL RESISTORS INDICATED IN OHMS.
3. K=ONE THOUSAND (1000) OHMS.
4. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
5. VOLTAGES TAKEN BETWEEN POINT INDICATED AND B-
6. VOLTAGE TOLERANCE ±10 %
7. INPUT VOLTAGE @ 117 V. AC
8. NO SIGNAL INPUT
9. * MEASUREMENT MADE WITH GANG FULLY OPEN.
10. * TRIMMERS ON GANG

PARTS LIST SUPPLEMENT

NOTE: When ordering parts, specify model and chassis number of set in addition to part number and description of part. The following parts are revisions of or additions to the original items listed in Ch. HS-299

Part Number	Description	List Price
CABINET PARTS		
1V621655	Cover, cabinet front: clear plastic; with retainer springs	5.90
34B621546	Dial scale, radio: with bracket and printing	1.05
59K621548	Electric Clock Assembly: Telechron, complete with face and hands	12.95
	exch	9.70
36K621543	Knob, clock control: black	.10
36K621539	Knob, radio control: black	.10

GENERAL INFORMATION

Models 62C1A, 62C2A, and 62C3A are the same as 62C1, 62C2, and 62C3, respectively, with the exception of the plastic front cover, the dial scale background, the knobs, and the electric clock, which are listed below. The remaining chassis parts and cabinet parts are the same as listed in Ch. HS-299

Refer to Chassis HS-299 for service instructions and alignment.

PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	List Price
CHASSIS PARTS-ELECTRICAL			
Capacitors			
C-1	19B610699	Variable: 3-gang; with pulley	3.80
C-2	21R482726	Ceramic, disc: 10,000 mmf 450V	.30
C-3	21R482726	Ceramic, disc: 10,000 mmf 450V	.30
C-4	21R119131	Ceramic: 12 mmf 500V	.30
C-5	8R9821	Paper: .05 mf 200V	.20
C-6	21B482847	Ceramic, multiple: 2000, 220, 220, 5000 mmf	.65
C-7	21R482726	Ceramic, disc: 10,000 mmf 450V	.30
C-8	8R490232	Molded paper: 47,000 mmf 400V	.30
C-9	23B600855	Electrolytic: 30-50 mf/150V.	1.60
C-10	21R482726	Ceramic, disc: 10,000 mmf 450V	.30
Clock			
E-1	59D610689	Electric Clock Assembly: Telechron; complete with face and hands	12.95
			exch 9.70
Choke-Capacitor			
E-2	8K620968	Choke and .10 mf paper capacitor	.65
Coils			
L-1	24K610726	Antenna loop: with core	.90*
L-2	24B610698	RF coil	.70
L-3	24A610695	Oscillator coil	.80
Speaker			
LS-1	50K610739	Speaker: 4" PM; 3.2 ohm VC; less screen & mtg brackets.	3.90*
			exch 2.75
Resistors			
		Note: All resistors are insulated carbon type unless otherwise specified.	
R-1	6R6046	1 meg 10% 1/2W.....doz	1.20
R-2	6R5550	47 10% 1/2W.....doz	1.20
R-3	6R6004	1 meg 20% 1/2W.....doz	1.20
R-4	6R6028	22,000 20% 1/2W.....doz	1.20
R-5	6R6007	68 20% 1/2W.....doz	1.20
R-6	6R3927	2.2 meg 20% 1/2W.....doz	1.20
R-7	18A610819	Volume control: 1 meg	.80
R-8	6R2109	10 meg 20% 1/2W.....doz	1.20
R-9	6R6032	470,000 20% 1/2W.....doz	1.20
R-10	6R6032	470,000 20% 1/2W.....doz	1.20
R-11	6R6373	150 10% 1/2W.....doz	1.20
R-12	6R5683	27 10% 1/2W.....doz	1.20
R-13	6R476004	1000 20% 2W	.25
Transformers			
T-1,2	24C485553	IF and Diode Transformer: 455 Kc: complete	1.45
T-3	25K610738	Output transformer	1.50

CHASSIS PARTS- MECHANICAL		
7A610711	Bracket, speaker mtg	.0
43K610736	Bushing, line cord strain relief (use with 43K610737 retainer)	.2
42B485548	Clip, IF trans mtg.....doz	.2
30K600980	Cord, line: with plug; 6 ft lg	1.0
5S7805	Eyelet, snap-in (loop insulator mtg).....doz	.1
5A484268	Grommet, speaker mtg: rubber...doz	.2
1X620223	Insulator, antenna loop: fibre; with lugs (loop mtg)	.1
35A610759	Insulator, appliance receptacle mtg: fibre.....doz	.2
14B610848	Insulator, clock: fibre (behind clock)	.1
2S7051	Nut, hex: Palnut; 3/8-32 x 9/16 (volume control mtg).....doz	.1
51B611046	Plate, dial background (radio dial): silver color	.1
52A610731	Pointer, radio dial: luminous	.0
9A601018	Receptacle, appliance	.1
43K610737	Retainer, line cord strain relief bushing (use with 43K610736 bushing)	.2
64A611059	Screen, speaker	.6
1V620998	Shaft, tuning: with pulley	.3
9A690129	Socket, tube: 7-prong; miniature	.1
41A14244	Spring, tension (gang drive cord).....doz	.5
4K692188	Washer, "C" (tuning shaft mtg).doz	.2
CABINET PARTS		
16E610742	Cabinet, table model: plastic; walnut (62C1)	5.7
16K610743	Cabinet, table model: plastic; ivory (62C2)	6.7
16K610744	Cabinet, table model: plastic; green (62C3)	6.7
1X611053	Cover, cabinet front: clear plastic; painted and lettered; complete with retainer springs	6.3
36K610818	Knob, clock control: gray	.1
36K610816	Knob, radio control: gray	.1
41A610758	Spring, retainer (cabinet front mtg).....doz	.3
CLOCK PARTS		
	Note: The following Motorola parts are for use with the basic Telechron clock movement.	
34K610691	Alarm dial: silver color	.
52K610692	Hand, hour: luminous	.
52K610693	Hand, minute: luminous	.
52K610694	Hand, second: gold color	.
36K601002	Knob, time set	.
59K610568	Motor, clock (rotor assembly only)	3.
34K610690	Plate, dial background: silver color	1.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

*Plus Federal Excise Tax At Current Rate

Frequency Range:

BATTERIES: 1 - 1½v Eveready #950, or 1050, or Burgess 2R or Ray-O-Vac 2LP or equivalent.
1 - 67½v Eveready #467, or Burgess XX45 or equivalent.

Model 489 is a 4 tube battery operated portable superheterodyne radio receiver with a built-in loop antenna. This antenna is contained in the cover of the receiver and to avoid impairment of reception it is advisable not to rest the cover against any metallic surface. Since all loop antennas are directional, reception may be improved by orienting the position of the set for best reception of the desired station.

An automatic OFF-ON switch turns the receiver ON when the cover is opened and OFF when the cover is closed. Since the useful life of the batteries is limited it is important to CLOSE the cover when the set is not in use. Battery power is consumed as long as the cover is open, although no sound is audible.

CAUTION: WHEN OPENING OR CLOSING THE COVER OR THE BOTTOM OF THE RECEIVER MOVE THE SMALL BUTTON OF THE CATCH IN THE DIRECTION OF THE ARROW. DO NOT SLAM THE COVER AS THIS MAY DAMAGE THE CATCH MECHANISM.

Controls:

There are two receiver controls. The left knob serves as a volume control but does not turn the receiver ON or OFF. The right knob is the TUNING control.

To exchange the batteries, keep the receiver cover closed. Turn the receiver face down and move the button which is on the short side, in the direction of the arrow. Opening the bottom of the receiver will permit access to the batteries. WHEN BATTERIES HAVE RUN DOWN ALWAYS REMOVE THEM FROM THE RECEIVER AS WORN OUT BATTERIES HAVE A TENDENCY TO SWELL AND SOMETIMES LEAK, CAUSING DAMAGE TO THE RECEIVER.

SERVICE AND ALIGNMENT INSTRUCTIONS

Equipment required: Modulated A-M, R-F signal generator, vacuum tube voltmeter or output meter, insulated screw driver, radiation loop (1 turn of about 6" or 8" of #12 or #14 wire connected across output of signal generator and placed parallel to receiver loop about 8" or 10" away), one .1/400v condenser.

With the receiver bottom open, connect output meter or vacuum tube voltmeter and signal generator as directed in the alignment procedure chart and keeping the output of the generator as low as possible, proceed exactly in the sequence shown in the chart.

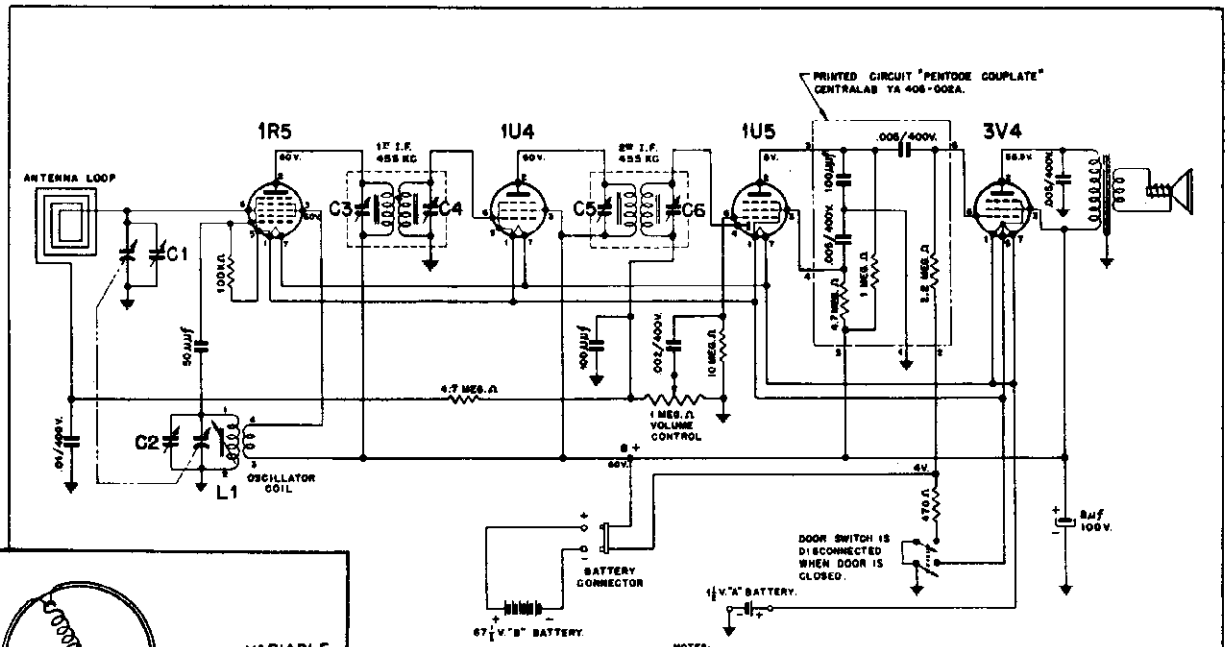
Before aligning close the variable condenser fully counterclockwise (plates fully closed) and check pointer position.

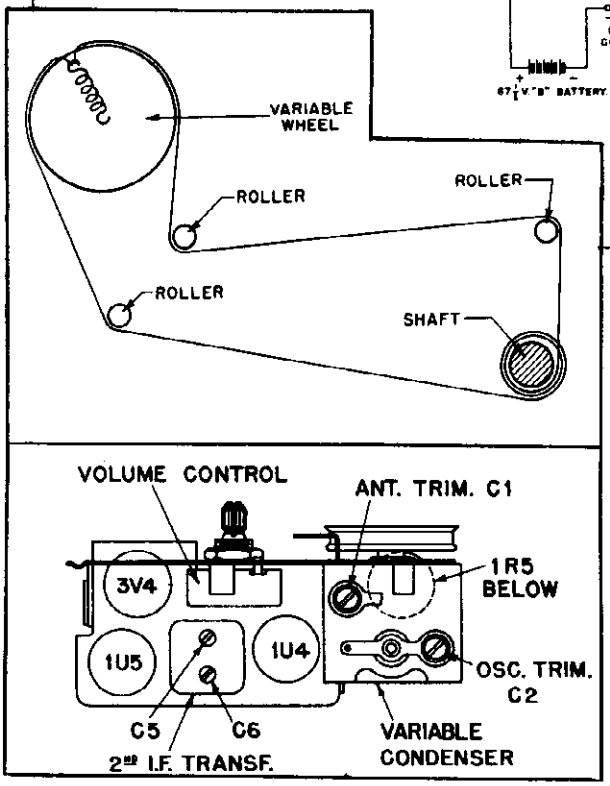
ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	SET POINTER TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	R. F. SECTION OF VARIABLE CONDENSER IN SERIES WITH A .1 MFD. 400 VOLT CONDENSER.	455 KC.	EXTREME RIGHT HAND POSITION (CONDENSER PLATES FULLY OPEN.)	C6, C5, C4, C3 AND REPEAT *IN SAME ORDER* (1st. AND 2nd. I.F. TRANFORMERS.)
2	*USE RADIATED SIGNAL*	1600 KC.	1600 KC. (160 ON DIAL)	C2 (OSCILLATOR TRIMMER)
3	(CONNECT BOTH SIDES OF SIGNAL GENERATOR TO RADIATION LOOP.)	1400 KC.	MAXIMUM SIGNAL (APPROX. 140 ON DIAL)	C1 (ANTENNA TRIMMER)
4		600 KC.	MAXIMUM SIGNAL (*APPROX. 60 ON DIAL*)	ADJUST L1 ROCK VARIABLE FOR MAXIMUM SIGNAL.
5	REPEAT STEPS 2, 3 & 4 AT LEAST TWICE TO INSURE MAXIMUM SENSITIVITY & PROPER DIAL TRACKING.			

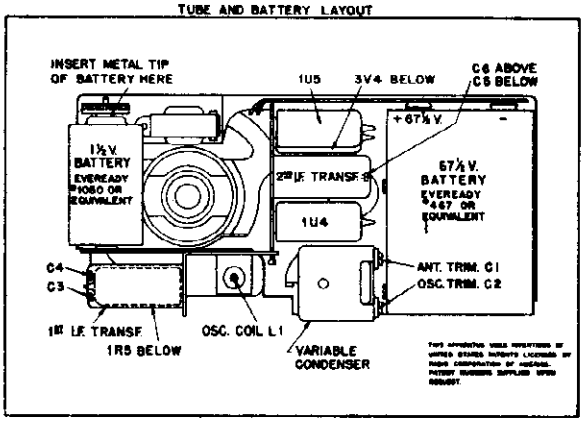
MODEL 489

CIRCUIT DIAGRAM





TUBE AND BATTERY LAYOUT



PARTS LIST

Part No.	Description
CL-2531	Coil—Oscillator Coil
CO-1323	Condenser—8 MFD 100 W.V. Electrolytic Condenser
CV-1291-1	Condenser—Variable Condenser (2 Section)
ES-1288	Escutcheon
KN-1309	Knob
LP-1316	Loop
MP-1290	Moulded Cover
MP-1292	Moulded Case
MP-1302	Plastic Handle
MP-1306	Loop Cover, Moulded
MS-1403	I.F. Mounting Clip
PC-2489	Pentode Couplate Network
PO-1310	Pointer
PP-1317	"B" Battery Snap Connector Assembly
PT-1313	1 Meg. Volume Control
SH-1284	Drive Shaft Assembly
SK-1283	Speaker—3½" P.M. Speaker (.68 oz. Alnico)
SP-1286	Spring—Pointer Drive Spring
SW-1280	Switch—Door Switch
TR-1279	Transformer—Output Transformer
TR-1314	Transformer—I.F. Transformer

Frequency Range Broadcast 540 k-c to 1610 k-c — Shortwave 4.75 m-c to 16.1 m-c

Power Requirement 105-125 Volts d-c or 50 to 60 cycles a-c

Power Consumption 30 watts

Model 9-435 is a 5 tube (four tubes plus rectifier) a-c or d-c operated 2 band superheterodyne receiver employing a built in loop antenna which will provide satisfactory reception under normal operating conditions. This type of antenna is directional and noise or interference from other stations can be minimized by rotating the receiver. If the receiver is used in locations where signal strength is very low, as in steel buildings, or in locations remote from broadcast stations, an outside antenna may be connected to a lead protruding through the back of the cabinet. For satisfactory reception on short wave, an outside antenna is essential. A ground connection is unnecessary.

On d-c operation, if no signal is heard after about one minute warm up period, reverse the line plug. If a slight hum is heard on a-c operation a similar reversal of the plug may reduce the hum.

CONTROLS

The receiver has three control knobs marked according to their function, reading from left to right as follows:

1. OFF-ON-VOLUME 2. BC-SW 3. TUNING

TUNING

To place this receiver in operation insert the line plug into a suitable electric outlet of 105-125 volts d-c or 50-60 cycles a-c. For operation on 220 volts d-c or 50-60 cycles a-c an adapter cord our part number LC530 must be inserted between the line plug and the electric outlet.

Then turn the OFF-ON knob clockwise until a click is heard. Allow about one half minute warm-up period for the tubes before the set is ready to function.

BROADCAST

For broadcast reception turn BC-SW knob counter-clockwise to the BC position. The Tuning knob should now be turned until the dial pointer is at the frequency of the desired station. Dial numbers are converted to kilocycles by adding one zero. For example, 70 on the dial is 700 kilocycles. With the volume control set to low volume level turn the Tuning knob until the desired station is received loudest. Now adjust volume control to the desired level and tone control to the desired tone. DO NOT USE TUNING KNOB TO ADJUST VOLUME BY TUNING OF STATION AS THIS WILL RESULT IN POOR TONE QUALITY.

NOTE: In case of dial light failure, replace the lamp (Mazda #47) as soon as possible to prevent damage to the 35Z5 tube.

SHORT WAVE

For short wave reception turn BC-SW knob clockwise to SW position and tune to the desired frequency in the same manner as described for broadcast reception. *Use the lower part of the dial scale calibrated in megacycles and meters. The tuning on the* short wave band should be very slow as the dial setting is very sensitive and stations may be "passed by" very easily.

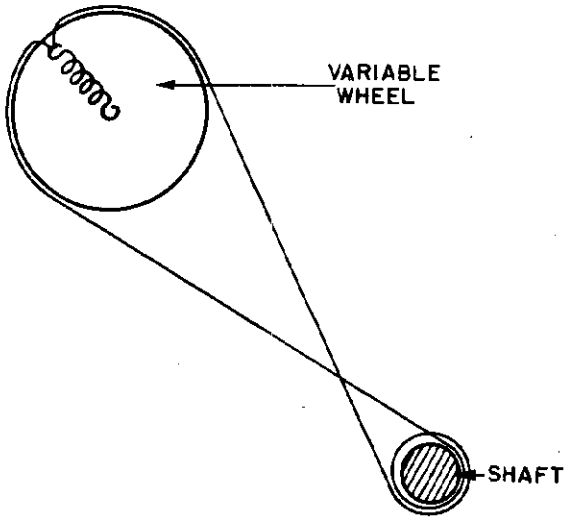
ALIGNMENT INSTRUCTIONS

Equipment required: Modulated r-f signal generator, output meter, insulated screw driver, two .1mfd. 400 V. Condensers, one 400 ohms resistor.

To align the receiver it is necessary to remove the chassis from the cabinet, check that the pointer is horizontal and coincides with the two horizontal reference lines on the dial. In this position the condenser should be completely closed. Turn volume control to maximum and connect the output meter across the voice coil.

Then connect the low side of the signal generator to the receiver chassis through a .1 mfd. condenser and keeping the output as low as possible proceed in the sequence as shown on the alignment chart.

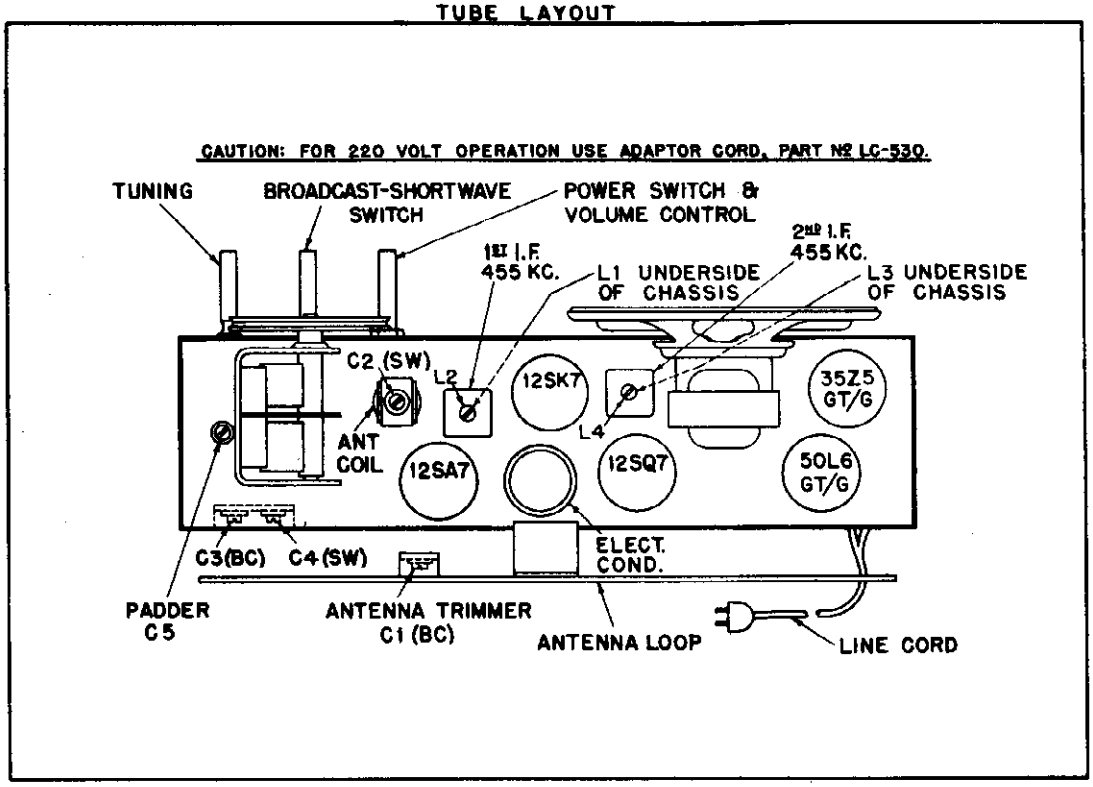
To insure alignment a radiated signal will be required during part of the alignment procedure. To radiate a signal connect a loop of about 6" to 8" diameter, (one turn of #14 or #12 wire) across the output of the signal generator and place this loop parallel to the loop of the receiver to be aligned, at a distance of about 8" or 10".



ALIGNMENT PROCEDURE CHART

STEP	SET BAND SWITCH ON	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO—	SET SIGNAL GENERATOR TO—	TURN RECEIVER DIAL TO—	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL FROM SIGNAL GENERATOR AS LOW AS POSSIBLE).
1	B.C.	R.F. SECTION OF VARIABLE CONDENSER OR PIN 4 OF THE 12SK7 TUBE IN SERIES WITH A .1MFD. 400 VOLT CONDENSER.	455 KC.	FULL CLOCKWISE POSITION (CONDENSER PLATES FULLY OPEN).	L4 AND L3 (2nd. I.F. TRANSFORMER)
2	B.C.	R.F. SECTION OF VARIABLE CONDENSER OR PIN 6 OF THE 12SA7 TUBE IN SERIES WITH A .1MFD. 400 VOLT CONDENSER.	455 KC.	FULL CLOCKWISE POSITION (CONDENSER PLATES FULLY OPEN).	L2 AND L1 (1st. I.F. TRANSFORMER)
3	B.C.	REPEAT STEPS 1 AND 2			
4	B.C.	USE RADIATED SIGNAL (CONNECT BOTH SIDES OF SIGNAL GENERATOR TO RADIATION LOOP).	1600 KC.	1600 KC. (160 ON DIAL)	C3 (OSCILLATOR TRIMMER)
5	B.C.		1400 KC.	MAXIMUM SIGNAL (APPROX. 140 ON DIAL)	C1 (ANTENNA TRIMMER)
6	B.C.		600 KC.	MAXIMUM SIGNAL (APPROX. 60 ON DIAL)	C5 (PADDER) ROCK VARIABLE FOR MAXIMUM SIGNAL
7	B.C.	REPEAT STEPS 4, 5, AND 6			
8	S.W.	ANTENNA WIRE ON LOOP IN SERIES WITH A 400 OHM RESISTOR.	15 MC.	15 MC. (APPROX. 15 ON DIAL)	C4 (OSCILLATOR TRIMMER) SECOND PEAK FROM TIGHT POSITION C2 (ANTENNA TRIMMER)
9	S.W.		5.5 MC.	RESONANCE (APPROX. 5.5 ON DIAL)	CHECK THAT POINTER (AT RESONANCE) COINCIDES WITH 5.5 MC. CALIBRATION POINT ON DIAL. IF NOT REPEAT STEP 8.

TUBE LAYOUT



Part No.	Description
BU-187	Bulb—#47 Mazda pilot light bulb
CA-327W	Cabinet—walnut bakelite cabinet
CA-327V	Cabinet—ivory bakelite cabinet
CL-933	Coil—broadcast and shortwave oscillator coil
CL-940	Coil—shortwave antenna coil
CO-1715	Condenser — 40/40/150 W.V. electrolytic condenser
CT-389	Condenser — 3-35 mmfd. dual trimmer condenser
CT-440	Condenser — 350-780 mmfd. padder condenser
CT-939	Condenser—3-35 mmfd. trimmer condenser
CV-772	Condenser—2 section ganged variable condenser
DL-934	Dial—dial scale
KN-1077	Knob—walnut knob marked "Off-On-Volume"
KN-1078	Knob—walnut knob marked "Tuning"
KN-1085	Knob—walnut knob marked "BC-SW"
KN-1103	Knob—ivory knob marked "Off-On-Volume"
KN-1104	Knob—ivory knob marked "Tuning"
KN-1105	Knob—ivory knob marked "BC-SW"
LP-937	Loop—loop antenna
PO-259W	Pointer—moulded pointer (walnut)
PO-259V	Pointer—molded pointer (ivory)
PT-102	Control—½ megohm volume control with off-on switch
RCM20A101M	Condenser—100 mmfd. ±20% mica condenser
RCM20A221M	Condenser—220 mmfd. ±20% mica condenser
RCM20A331M	Condenser—330 mmfd. ±20% mica condenser

*When ordering be sure to specify with r-f choke

Part No.	Description
RCM20A470M	Condenser—47 mmfd. ±20% mica condens
RCM30B402J	Condenser—4000 mmfd. ±5% mica conde ser
RCP10W4104L	Condenser—.1/400 W.V. tubular paper co denser*
RCP10W4203A	Condenser—.02/400 W.V. tubular paper co denser
RCP10W4503A	Condenser—.05/400 W.V. tubular paper co denser
RCP10W6103A	Condenser—.01/600 W.V. tubular paper co denser
RCP10W6502A	Condenser—.005/600 W.V. tubular pap condenser
REB-105M	Resistor—1 megohm ±20% ½ watt resistor
REB-106M	Resistor—10 megohms ±20% ½ watt resist
REB-151K	Resistor—150 ohms ±10% ½ watt resistor
REB-223M	Resistor—22,000 ohms ±20% ½ watt resist
REB-224M	Resistor—220,000 ohms ±20% ½ watt sistor
REB-225M	Resistor—2.2 megohms ±20% ½ watt sistor
RE-473M	Resistor—47,000 ohms ±20% ½ watt resist
REB-474M	Resistor—470,000 ohms ±20% ½ watt sistor
REC-221K	Resistor—220 ohms ±10% 1 watt resistor
RED-102M	Resistor—1000 ohms ±20% 2 watt resistor
SK-838-1	Speaker—5" p.m. speaker
SP-191	Spring—drive shaft retaining spring
SP-295	Spring—dial drive spring
ST-255-1	Back—cardboard back
SW-839	Switch—4 P.D.T. band switch
TR-1644	Transformer—455 k-c I.F. transformer

MODELS 9-435W, 9-435V