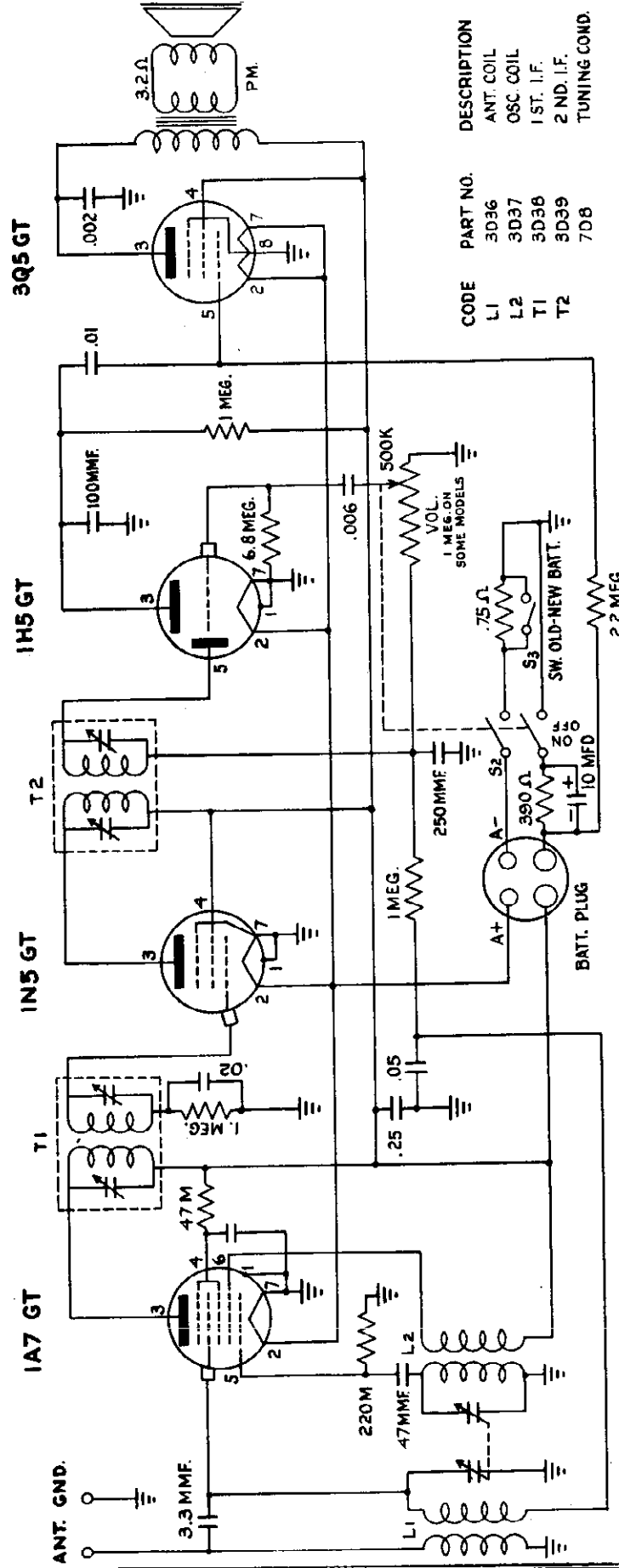


CODE - PART NO. DESCRIPTION

L1	3D12	SW. ANT. COIL
L2	3D9	BC. ANT. COIL
L3	3D11	SW. OSC. COIL
L4	3D8	BC. OSC. COIL
T1	3D20	1ST. I.F. TRANS.
T2	3D21	2ND. I.F. TRANS.
S1	11D2	BAND SWITCH

I.F. = 455 KC.

MODEL 505



CODE	PART NO.	DESCRIPTION
L1	3D36	ANT. COIL
L2	3D37	OSC. COIL
T1	3D38	1ST. I.F.
T2	3D39	2 ND. I.F.
	708	TUNING COND.

Model E-520 is a three band superheterodyne receiver, having one broadcast range and two short wave ranges. This receiver is designed to operate at 105-125 volts, 50-60 cycles AC or DC unless otherwise specified.

B.C. BAND.....	1680-525 K.C.	.....178-570 METERS
S.W. 2 BAND.....	8.0-2.5 M.C.	.....37.5-120 "
S.W. 1 BAND.....	24.2-7.5 M.C.	.....12.4-40 "

INSTALLATION: Make certain that all tubes are in place and pressed down in their sockets. A label showing the location of each tube will be found underneath the cabinet. A loop-tenna is incorporated which makes the use of an antenna unnecessary, in most localities, for broadcast reception. If it is found that additional pick-up is desired on the standard broadcast band, an antenna may be connected to the red lead extending from the rear of the chassis, and the black lead connected to an external ground. On short wave reception an external antenna and ground should be used.

VOLUME CONTROL AND POWER SWITCH: The second knob from the left is the power switch and volume control. When the control is in the extreme counterclockwise position, the power is "off". From this position, a slight clockwise rotation will turn the power "on", and by further rotation in this direction, volume may be increased to any degree until the full output of the receiver is obtained.

TUNING CONTROL: The knob on the right is the tuning control knob which operates the pointer and tuning condenser through a reduction drive to insure ease and accuracy in the selection of stations.

WAVE BAND SWITCH: The second knob from the right of the receiver is the wave band switch. This switch has three positions. When in the extreme counter-clockwise position, Standard Broadcast stations may be tuned in. When the switch is in the extreme clockwise position, Short Wave Band #1 may be tuned in. The intermediate position is for tuning in Short Wave Band #2.

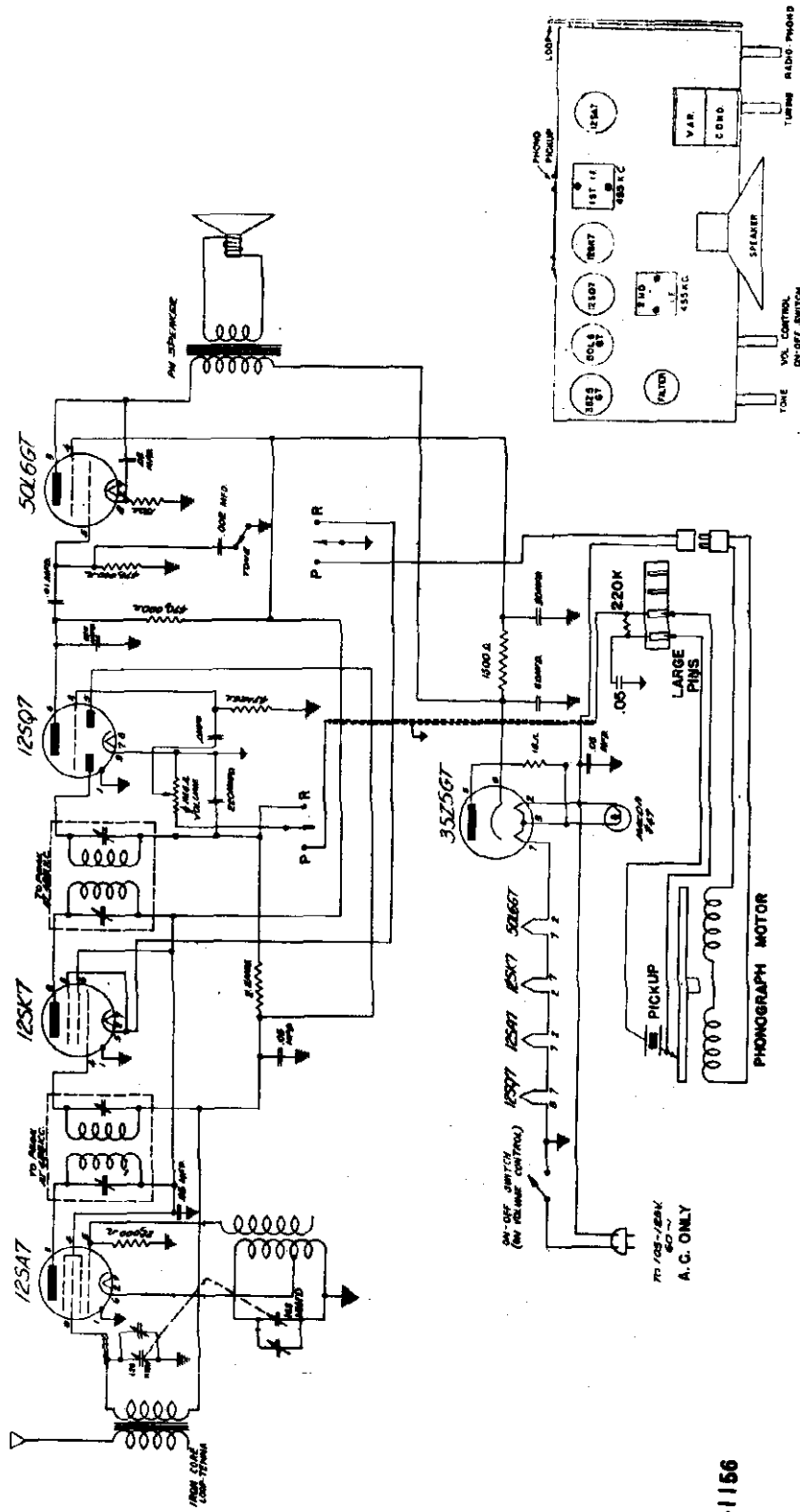
TONE CONTROL SWITCH: The extreme left knob is the tone control which allows the selection of two degrees of tone response.

To calibrate receiver, connect the output of signal generator in series with a 200 MMFD fixed condenser to the flexible antenna lead attached to the loop. Connect the low side of generator through a 0.1 MFD condenser to receiver chassis. The wave band switch should be in broadcast position. Adjust the generator to 455 K.C. and adjust both I.F. transformers (both top and bottom) for maximum signal. Open the variable condenser for minimum capacity. Turn the wave band switch to short wave #1 position. Set generator at 24.2 M.C. Peak the short wave #1 oscillator trimmer screw (C5) for maximum signal. Next set generator at 23 M.C. Tune in this signal. Adjust short wave #1 R.F. trimmer screw (C2) for maximum turn band switch to short wave #2 position. Rotate drive shaft until variable condenser is all the way open. Adjust generator to 8 M.C. Adjust the short wave #2 oscillator trimmer screw (C4) until maximum signal is heard. Next set generator at 7 M.C. Tune in this signal and adjust short wave #2 R.F. trimmer screw (C1) for maximum signal strength. The low frequency end of the dial is automatically adjusted by a fixed padder condenser. Next turn band switch to broadcast position. Adjust generator to 1500 K. C. and tune in this signal. Adjust the broadcast oscillator trimmer screw (C3) for maximum signal. To adjust the low end of the dial, set the generator and receiver at 600 K.C. Peak the broadcast padder (C7) for maximum output. The variable condenser should be rocked slightly during the operation. Keep the signal generator output as low as possible when making all these adjustments. It is extremely necessary in making the short wave adjustments, that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental.

REPLACEMENT PARTS

- LOOP ANTENNA
- 1093A B.C. OSC COIL
- 1094-1 S.W.1 ANT COIL
- 1095-1 S.W.1 OSC COIL
- 1094-2 S.W.2 ANT COIL
- 1095-2 S.W.2 OSC COIL
- 1091A-1 2ND I.F. COIL
- 1091A-4 1ST I.F. COIL
- 2014-4 VARIABLE CONDENSER
- 2049-2 ELECTROLYTIC CONDENSER
- CAN
- 6022A-2 DIAL SCALE
- 8001-7 PILOT LAMP ASSEMBLY
- 9123-3 DRIVE SHAFT
- 7017-2 P.M. SPEAKER WITH OUTPUT TRANS.
- 8017-B-4 WAVE BAND SWITCH
- 2050 PADDER CONDENSER (BROADCAST)
- 8043-2 TONE CONTROL SWITCH
- 3013-4 VOL CONTROL & "ON-OFF" SWITCH
- 4093-C CABINET
- 4132-1 KNOB

TUBES: 12BA6 . 12BE6 - 12AT6 - 35W4 - 50B5



- REPLACEMENT PARTS**
- 1137 ANT. LOOP
 - 1028-2 OSCILLATOR COIL
 - 1136 1ST I.F. COIL
 - 1136 2ND DETECTOR COIL
 - 2000A PAPER CONDENSER
 - 2012B CERAMIC CONDENSER
 - 2005-8 COMB. ELECTROLYTIC
 - 2003C VAR. CONDENSER
 - 7001-1 SPEAKER
 - 8001-2 PILOT LAMP SOCKET
 - AUTOMATIC RECORD CHANGER
 - 9032-2 SHAFT
 - 9816C BUSHING
 - 9069-3 DRIVE SPRING
 - DIAL CORD
 - #47 PILOT LAMP
 - 4132-3 KNOB

- TUBES**
- 1 125A7
 - 1 125K7
 - 1 125Q7
 - 1 50L6GT
 - 1 35Z5GT

- REPLACEMENT PARTS**
- 3029 1/2 W. RESISTOR
 - 3004 2 W. RESISTOR
 - 3002-2 VOL. CONTR. AND SWITCH
 - 8003-1 TONE CONTROL SWITCH
 - 8004-1 PHONO. SWITCH
 - 5000 LINE CORD
 - 6007 DIAL SCALE

Range: 535-1720 Kilocycles
 A. C. Volts Cycles Watts
 105-125 60 45

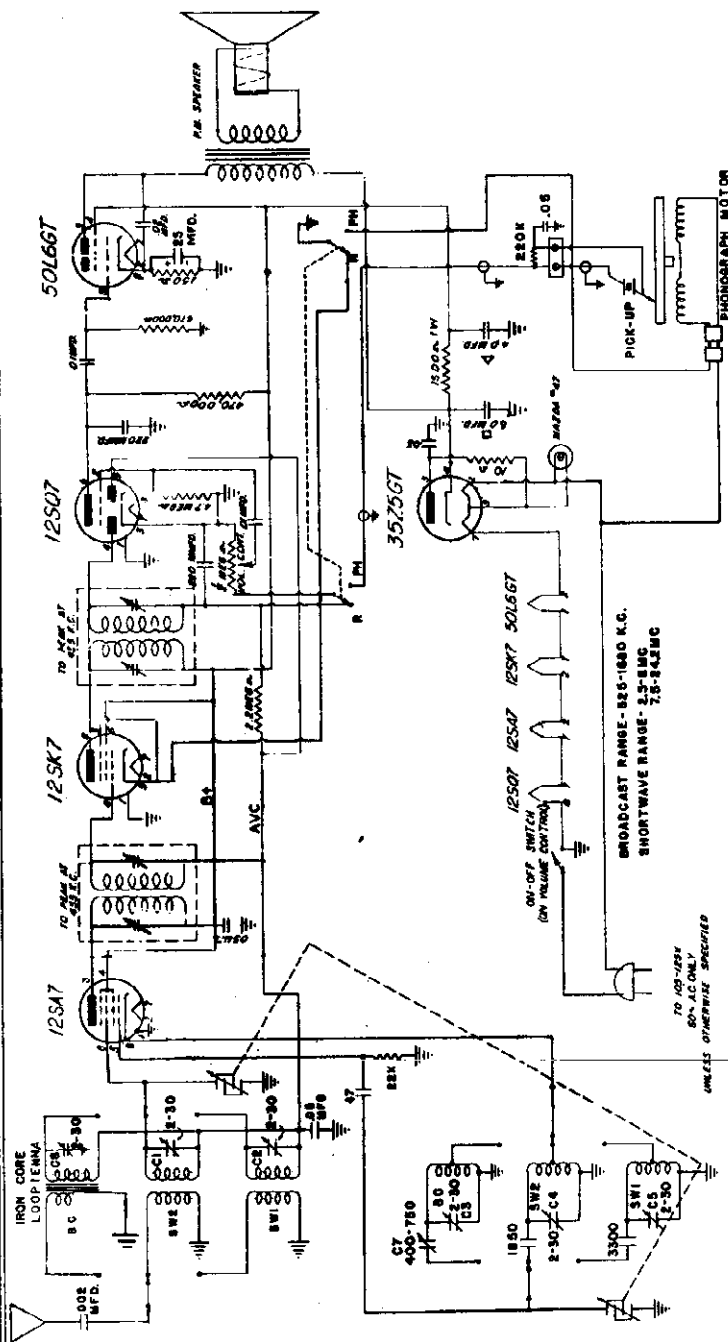
F-1156

MODEL E-522S

REPLACEMENT PARTS

- 1136 1ST I.F. COIL
- 2014-4 VARIABLE CONDENSER
- 2049-2 ELECTROLYTIC CONDENSER CAN
- 6022A-4 DIAL SCALE
- 8001-7 PILOT LAMP ASSEMBLY
- 9032-2 DRIVE SHAFT
- 1137 LOOP ANTENNA
- 1093A B.C. OSC COIL
- 1094-1 S.W. 1 ANT COIL
- 1095-1 S.W. 1 OSC COIL
- 1094-2 S.W. 2 ANT COIL
- 1095-2 S.W. 2 OSC COIL
- 1136 2ND I.F. COIL
- 7017-3 P.A. SPEAKER WITH OUTPUT TRANS.
- 8017-C-4 WAVE BAND SWITCH
- 2050 PADDER CONDENSER (BROADCAST)
- 8004-1 PHONO. SWITCH
- 3002-2 VOL. CONTR. AND SWITCH
- #47 PILOT LAMP
- 4132 KNOB

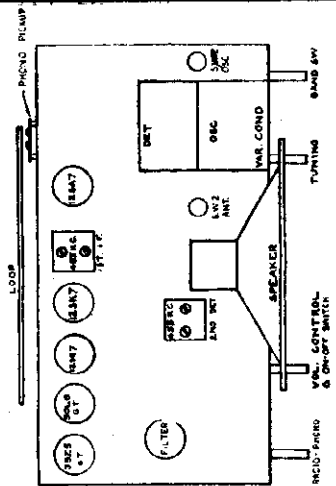
TUBES: 1 12SA7 - 1 12SK7 - 1 12SQ7 - 1 50L6GT - 1 35Z5GT

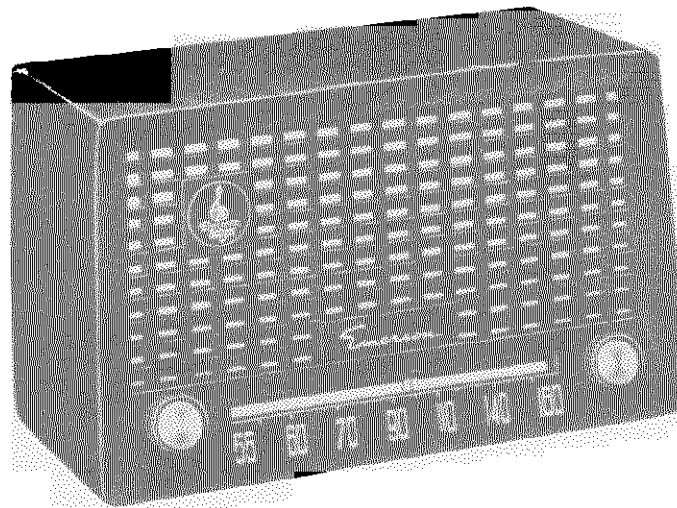


DE WALD RADIO INSTRUCTION SHEET

F-1160 5/51

To calibrate receiver, connect the output of signal generator in series with a 200 MMFD fixed condenser to the flexible antenna lead attached to the loop. Connect the low side of generator through a 0.1 MFD condenser to receiver chassis. The wave band switch should be in broadcast position. Adjust the generator to 455 K.C. and adjust both I.F. transformers for maximum signal. Open the variable condenser for minimum capacity. Turn the wave band switch to short wave #1 position. Set generator at 24.2 M.C. Peak the short wave #1 oscillator trimmer screw (C5) for maximum signal. Next set generator at 23 M.C. Tune in this signal. Adjust short wave #1 R.F. trimmer screw (C2) for maximum signal. The low frequency end of the dial is automatically adjusted by a fixed padder condenser. Next turn band switch to short wave #2 position. Rotate drive shaft until variable condenser is all the way open. Adjust generator to 8 M.C. Adjust the short wave #2 oscillator trimmer screw (C4) until maximum signal is heard. Next set generator at 7 M.C. Tune in this signal and adjust short wave #2 R.F. trimmer screw (C1) for maximum signal strength. The low frequency end of the dial is automatically adjusted by a fixed padder condenser. Next turn band switch to broadcast position. Adjust generator to 1500 K.C. and tune in this signal. Adjust the broadcast oscillator trimmer screw (C3) and the R.F. trimmer screw (C8) for maximum signal. To adjust the low end of the dial, set the generator and receiver at 600 K.C. Peak the broadcast padder (C7) for maximum output. The variable condenser should be rocked slightly during the operation. Keep the signal generator output as low as possible when making all these adjustments. It is extremely necessary in making the short wave adjustments, that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental.



MODEL 653B,
Ch. 120136-BMODEL 653B
Chassis 120136-B

DESCRIPTION

TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

- V-1-12SA7—pentagrid oscillator-modulator
- V-2-12SK7—first i-f amplifier
- V-3-12SQ7—diode detector, a-f amplifier, a.v.c.
- V-4-50L6GT—beam power output
- V-5-35Z5GT—half-wave rectifier

POWER SUPPLY: A.C. or D.C.

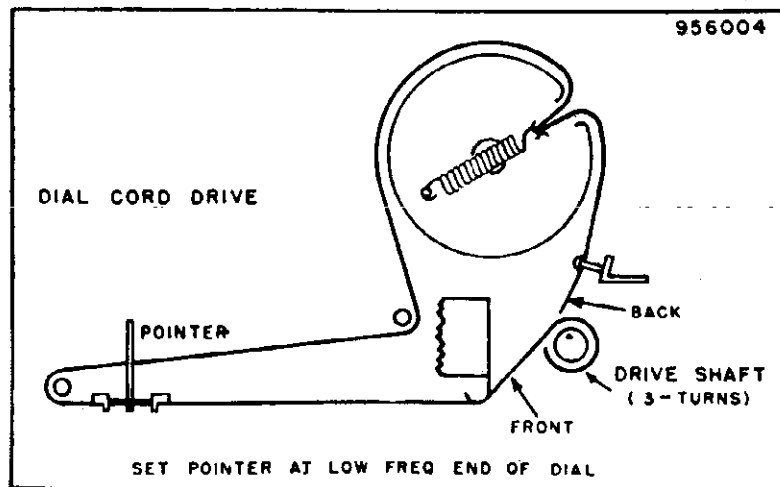
VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. Model 653B has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.



MODEL 653B,
Ch. 120136-B

ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to stator of rear section of tuning condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximum output.

VOLTAGE READINGS FOR CHASSIS 120136-B

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
V-1	12SA7	-.3 DC	24 AC	80 DC	80 DC	-6 DC	0	12 AC	-7 DC
V-2	12SK7	-.3 DC	36 AC	0	-1 DC	0	80 DC	24 AC	80 DC
V-3	12SQ7	-.3 DC	-7 DC	0	-7 DC	-5 DC	50 DC	0	12 AC
V-4	50L6GT	0	80 AC	110 DC	80 DC	0	0	36 AC	5 DC
V-5	35Z5GT	0	117 AC	110 AC	0	110 AC	0	80 AC	110 DC

RESISTANCE READINGS FOR CHASSIS 120136-B

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
V-1	12SA7	Inf.	28	500,000	500,000	24,000	.5	14	4 meg.
V-2	12SK7	Inf.	45	0	4 meg.	0	500,000	28	500,000
V-3	12SQ7	Inf.	10 meg.	0	4 meg.	500,000	1 meg.	0	14
V-4	50L6GT	N.C.	95	500,000	500,000	500,000	0	44	150
V-5	35Z5GT	N.C.	130	120	N.C.	140	N.C.	95	500,000

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltage measured at 1,000 ohms per volt.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

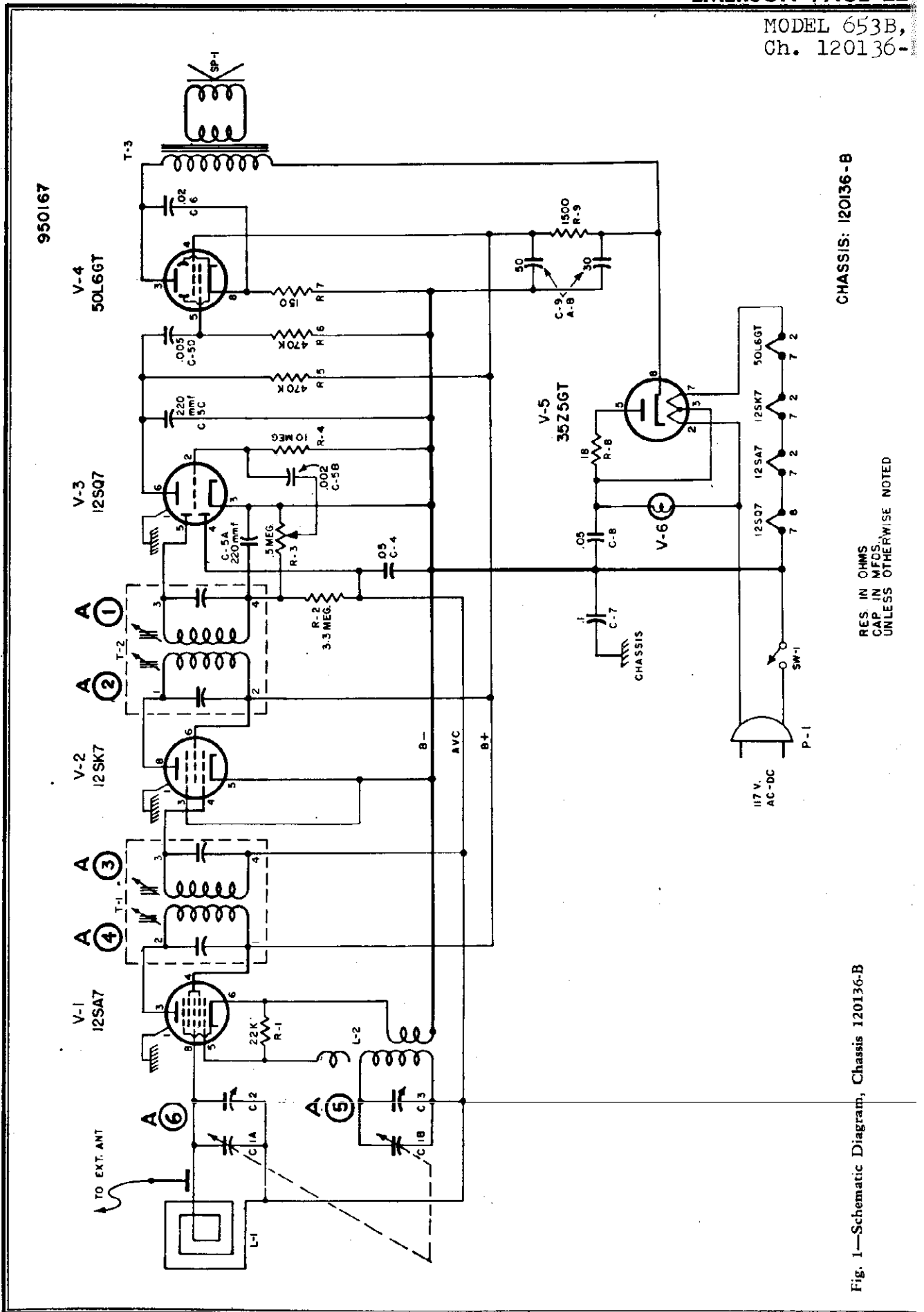


Fig. 1—Schematic Diagram, Chassis 120136-B

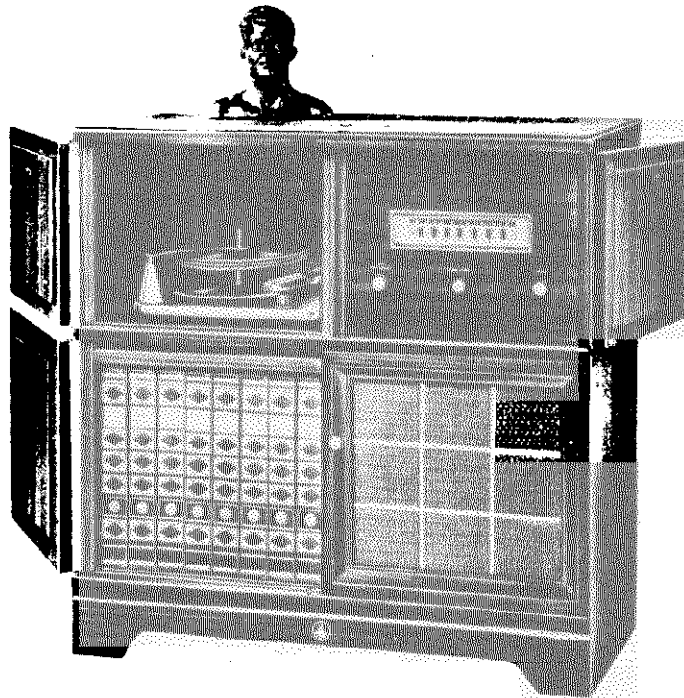
MODEL 653B,
Ch. 120136-B

CHASSIS PARTS LIST (Chassis 120136-B)

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
C-1A	900071	Variable Capacitor—R.F. Section	R-4	351450	10 megohm $\frac{1}{2} W \pm 20\%$
C-1B		Variable Capacitor—Osc. Section	R-5	351130	470,000 ohm $\frac{1}{2} W \pm 20\%$
C-2	Pt. of C-1A	Trimmer—R.F. Section	R-6	351130	470,000 ohm $\frac{1}{2} W \pm 20\%$
C-3	Pt. of C-1B	Trimmer—Osc. Section	R-7	340292	150 ohm $\frac{1}{2} W \pm 10\%$
C-4	920539	.05 mf. 400V	R-8	340072	18 ohm $\frac{1}{2} W \pm 10\%$
C-5A	923023	220 mmf. } Multiple Condenser	R-9	380532	1,500 ohm $1 W \pm 20\%$
C-5B		.002 mf. }	SP-1	180045	Speaker—PM—5"
C-5C		220 mmf. }	SW-1	Pt. of R-3	On-Off Switch
C-5D		.005 mf. }	T-1	720525	1st I.F. Transformer
C-6	920540	.02 mf. 400V	T-2	720021	2nd I.F. Transformer
C-7	920040	.1 mf. 200V	T-3	734057	Output Transformer
C-8	920539	.05 mf. 400V	V-1	800000	Vacuum Tube—12SA7
C-9A	925000	50 mf. Electrolytic } 150V	V-2	800020	Vacuum Tube—12SK7
C-9B		30 mf. Electrolytic } 150V	V-2	800030	Vacuum Tube—12SK7GT
L-1	700051	Loop Antenna & Back	V-3	800040	Vacuum Tube—12SQ7
L-2	716026-2	Oscillator Coil	V-3	800050	Vacuum Tube—12SQ7GT
P-1	583032	Line Cord & Plug	V-4	800070	Vacuum Tube—50L6GT
R-1	Pt. of L-2	22,000 ohm $\frac{1}{2} W \pm 10\%$	V-5	800090	Vacuum Tube—35Z5GT
R-2	351330	3.3 megohm $\frac{1}{2} W \pm 20\%$	V-6	807000	Pilot Light—.15 amp.
R-3	390145	500,000 ohm Volume Control			

CABINET PARTS LIST (Model 653B)

PART NO.	DESCRIPTION
140345	Cabinet—Bakelite—Walnut
140377	Cabinet—Urea—Ivory
460162S	Knob
470608	Baffle & Grille Cloth
583032	Line Cord
531323	Drive Pulley
180045	Speaker
530002	Drive Cord (30" approx.)
410904	Dial Back Plate
525022-2	Pointer
700051	Loop Antenna & Back

MODEL 670B
Ch. 120139Model—670B
Chassis—120139-B

DESCRIPTION

TYPE: Single band (AM) superhétérodyne
 FREQUENCY RANGE: 540-1620 KC.

TYPES OF TUBES:

V-1-6BJ6 converter
 V-2-6BJ6 oscillator
 V-3-6BJ6 1st i.f. amplifier
 V-4-6BJ6 2nd i.f. amplifier
 V-5-12AT6 Detector, a.v.c., a-f amplifier
 V-6-50C5 Power output
 V-7-35W4 Rectifier

POWER SUPPLY: A.c. or d.c.

VOLTAGE RATING: 115 volts

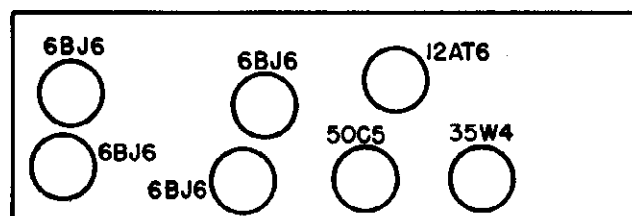
POWER CONSUMPTION: 30 watts

CURRENT DRAIN: 0.26 amp. at 117 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The receiver has a self-contained antenna, and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcast source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

FRONT



TUBE LOCATIONS

955323

MODEL 670B,
Ch. 120139-B

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltage readings are in d.c. volts and resistance readings in ohms unless otherwise specified.
2. A.C. and D.C. measurements are taken with a V.T.V.M.
3. Measured values are from socket pin to common negative (B—).
4. Line voltage maintained at 115V A.C. for voltage readings.
5. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum with no signal applied, for voltage measurements.
7. Measurements taken with radio-phonograph switch in radio position.

VOLTAGE READINGS FOR CHASSIS 120139-B

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	6BJ6	—1 D.C.	1 D.C.	18 A.C.	12 A.C.	90 D.C.	35 D.C.	0
V-2	6BJ6	—7.2 D.C.	0	24 A.C.	18 A.C.	90 D.C.	90 D.C.	0
V-3	6BJ6	0	1.4 D.C.	30 A.C.	36 A.C.	70 D.C.	90 D.C.	0
V-4	6BJ6	—1 D.C.	.75 D.C.	30 A.C.	24 A.C.	90 D.C.	90 D.C.	0
V-5	12AT6	—8 D.C.	0	0	12 A.C.	0	—3 D.C.	45 D.C.
V-6	50C5	5.8 D.C.	0	36 A.C.	80 A.C.	0	90 D.C.	105 D.C.
V-7	35W4	115 A.C.	110 D.C.	80 A.C.	115 A.C.	112 A.C.	110 A.C.	120 D.C.

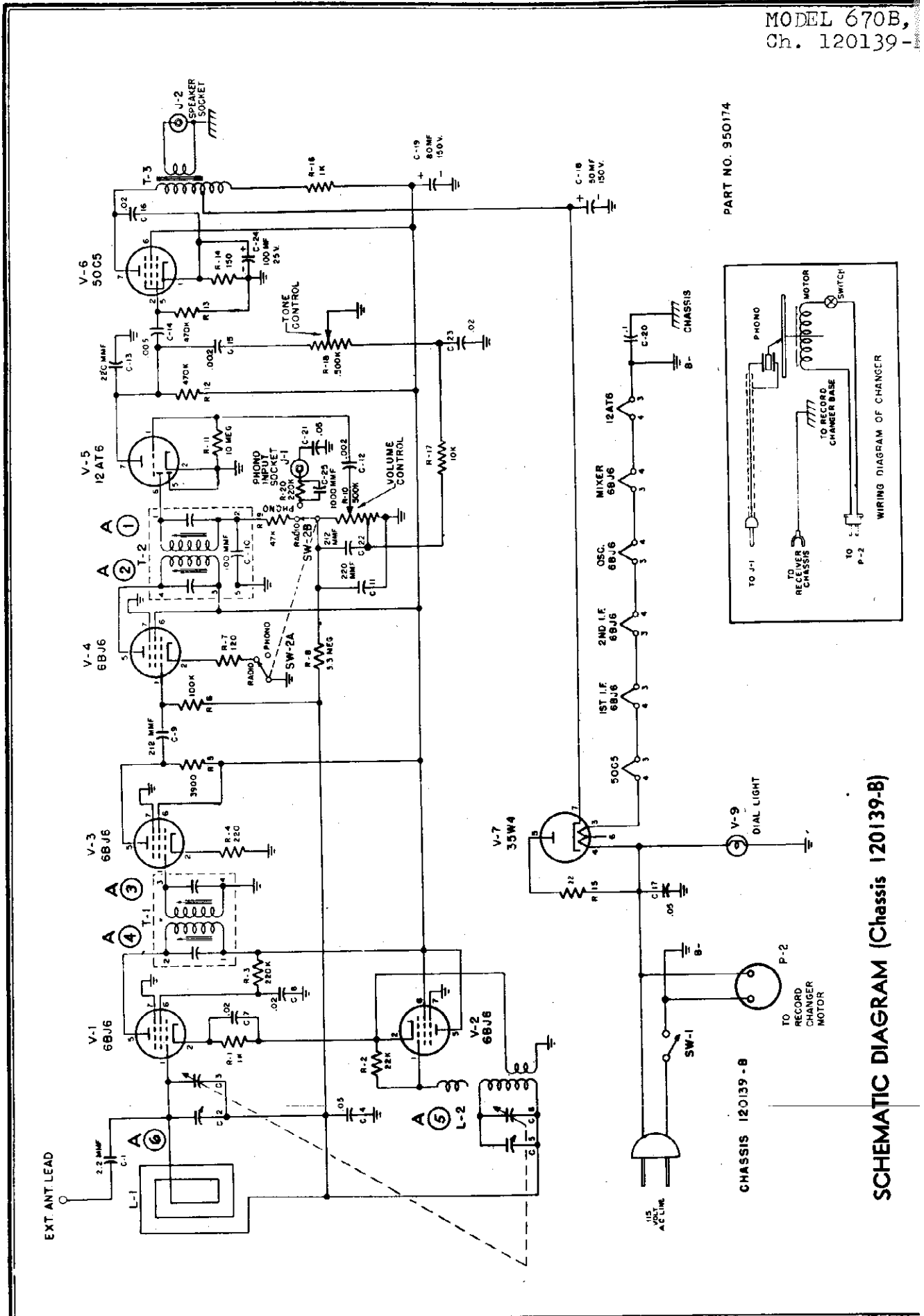
RESISTANCE READINGS FOR CHASSIS 120139-B

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	6BJ6	4.2 meg.	1000	22	16	500,000	1 meg.	0
V-2	6BJ6	22,000	1	30	22	500,000	500,000	0
V-3	6BJ6	20	220	38	46	500,000	500,000	0
V-4	6BJ6	4.3 meg.	120	38	30	500,000	500,000	0
V-5	12AT6	10 meg.	0	0	16	0	500,000	1 meg.
V-6	50C5	150	500,000	46	100	500,000	500,000	500,000
V-7	35W4	135	500,000	100	135	155	130	500,000

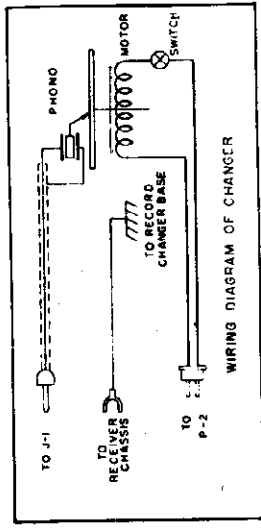
ALIGNMENT PROCEDURE

1. To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate.
2. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and B minus bus.
3. Volume control should be at maximum position; output of signal generator should be not higher than necessary to obtain an output reading.
4. Use an insulated alignment screwdriver for adjusting.

STEPS	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 1 (grid) of 6BJ6 (V1). Low side to B minus Bus.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2 (2nd i-f trans. T2) A3, A4 (1st i-f trans. T1)	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to B minus Bus.	1620 kc	Variable condenser fully open.	Across voice coil.	A5 (Trimmer cond. C5).	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to B minus Bus.	1400 kc	Tune for maximum output.	Across voice coil.	A6 (Trimmer cond. C2).	Adjust for maximum output.



PART NO. 950174



SCHEMATIC DIAGRAM (Chassis 120139-B)

CHASSIS 120139 - B

115 AC LINE

TO RECORD CHANGER MOTOR

DIAL LIGHT

12AT6 MIXER

6B16 OSC.

6B16 2ND I.F.

6B16 1ST I.F.

50C5

12AT6

CHASSIS

TO RECORD CHANGER

TO J-1

TO RECORD CHANGER MOTOR

TO RECORD CHANGER MOTOR

TO RECORD CHANGER MOTOR

TO RECORD CHANGER MOTOR

TO RECORD CHANGER MOTOR

TO RECORD CHANGER MOTOR

TO RECORD CHANGER MOTOR

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MODEL 670B,
Ch. 120139-B

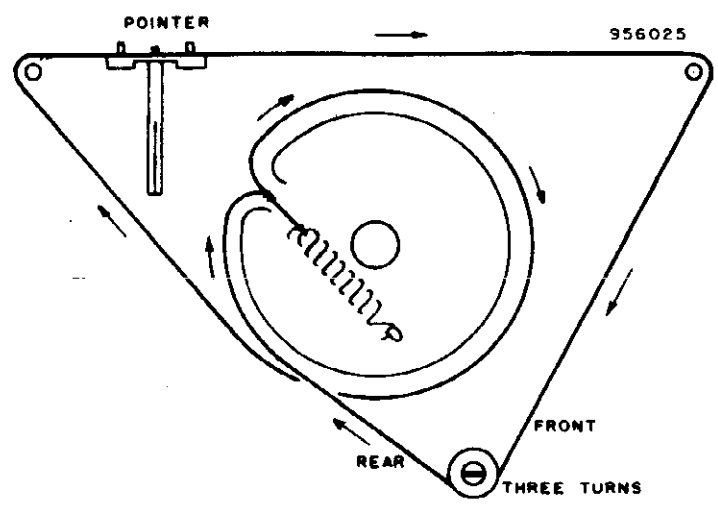
CHASSIS PARTS LIST (Chassis 120139-B)

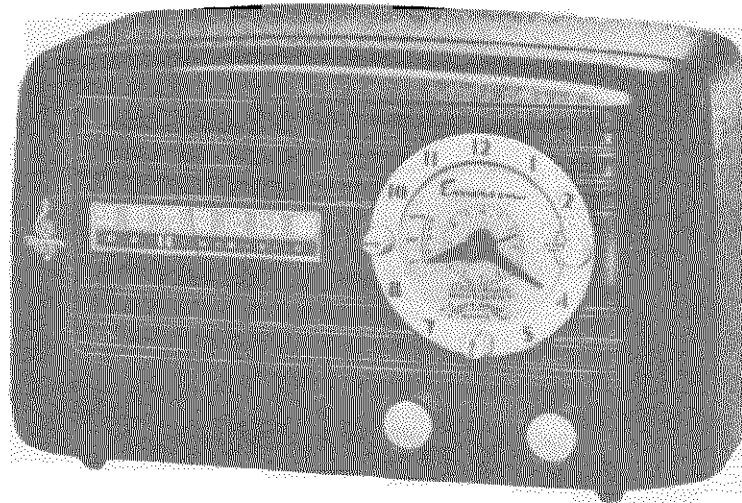
Symbol	Part No.	Description	Symbol	Part No.	Description
C-1	Pt. of L-1	2.2 mmf.	R-5	340632	3,900 ohm carbon 1/2W ±10%
C-2	Pt. of 900079	Trimmer — r.f.	R-6	350970	100,000 ohm carbon 1/2W ±20%
C-3	Pt. of 900079	Variable capacitor — r.f. section	R-7	340272	120 ohm carbon 1/2W ±10%
C-4	920030	.05 mf paper 400v	R-8	351330	3.3 megohm carbon 1/2W ±20%
C-5	Pt. of 900079	Trimmer — osc.	R-9	340890	47,000 ohm carbon 1/2W ±10%
C-6	Pt. of 900079	Variable capacitor — osc. section	R-10	390178	500,000 ohm volume control
C-7	920020	.02 mf paper 400v	R-11	351450	10 megohm carbon 1/2W ±20%
C-8	920020	.02 mf paper 400v	R-12	351130	470,000 ohm carbon 1/2W ±20%
C-9	928104	212 mmf ceramic	R-13	351130	470,000 ohm carbon 1/2W ±20%
C-10	Pt. of T-2	100 mmf	R-14	340292	150 ohm carbon 1/2W ±10%
C-11	Pt. of 470310	220 mmf	R-15	370092	22 ohm carbon 1W ±10%
C-12	Pt. of 470310	.002 mf	R-16	370490	1,000 ohm carbon 1W ±10%
C-13	Pt. of 470310	220 mmf	R-17	340732	10,000 ohm carbon 1/2W ±10%
C-14	Pt. of 470310	.005 mf	R-18	Pt. of 390178	500,000 ohm tone control
C-15	920545	.002 mf paper 400v	R-20	341050	220,000 ohm carbon 1/2W ±
C-16	920020	.02 mf paper 400v	J-1	Pt. of 508002	Phono input socket
C-17	922101	.05 mf molded 400v	J-2	Pt. of 508002	Speaker socket
C-18	Pt. of 925195	50 mf electrolytic 150v	SW-1	Pt. of 390178	On-off switch
C-19	Pt. of 925195	80 mf electrolytic 150v	SW-2A, B	510077	Phono-radio switch
C-20	920040	.1 mf paper 200v	T-1	720033	1st i.f. transformer
C-21	920030	.05 mf paper 400v	T-2	720125	2nd i.f. transformer
C-22	928104	212 mmf ceramic	T-3	734063	Output transformer
C-23	920020	.02 mf paper 400v	P-2	585067	Phono motor plug and cable assy.
C-24	Pt. of 925195	100 mf electrolytic 25v	V-1	800023	Vacuum tube - 6BJ6
C-25	928003	1000 mmf ceramic	V-2	800023	Vacuum tube - 6BJ6
L-1	700054	Loop antenna	V-3	800023	Vacuum tube - 6BJ6
L-2	716063	Oscillator — coil	V-4	800023	Vacuum tube - 6BJ6
R-1	340492	1,000 ohm carbon 1/2W ±10%	V-5	800523	Vacuum tube - 12AT6
R-2	Pt. of L-2	22,000 ohm	V-6	800032	Vacuum tube - 50C5
R-3	341050	220,000 ohm carbon 1/2W ±10%	V-7	800526	Vacuum tube - 35W4
R-4	340332	220 ohm carbon 1/2W ±10%	V-9	807003	Pilot light dial

Prices subject to change without notice.

CABINET PARTS LIST (Model 670B)

Part No.	Description	Part No.	Description
140397	Cabinet	587011	Spring Insert (Knobs)
411115	Metal Grille	585067	Motor Plug and Cable Assembly
520064	Escutcheon	508002	Phono and Speaker Socket
520142	Glass Dial	510077	Phono-Radio Switch
180077	Speaker (12")	280162	Drive Shaft
305040	Speaker Plug	411022	Dial Support Bracket
819060	G.I. 3-Speed Changer	411064	Dial Back Plate
560151	45 R.P.M. Adaptor	530002	Drive Cord (50")
450068S	Knob — Tuning and Phono	700054	Loop Antenna
450089	Knob — Tone	411024	Loop Bracket
450099S	Knob — Volume	525056	Dial Pointer



MODEL 671D,
Ch. 120137-DMODEL: 671D
CHASSIS: 120137-D

DESCRIPTION

TYPE: Single-band superheterodyne, with clock-timer and appliance outlet.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

- V-1—12BE6, oscillator mixer
- V-2—12BA6, first i-f amplifier
- V-3—12AT6, detector, a-f amplifier
- V-4—50C5, A. F. output
- V-5—35W4, rectifier

POWER SUPPLY: A.C. 60 cycles only

VOLTAGE RATING: 115 volts.

POWER CONSUMPTION: 32 watts.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. This model has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear. Use no ground connection.
3. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
4. Appliance outlet and radio on-off switch located in back of chassis. For information on clock applications see instructions supplied with set.

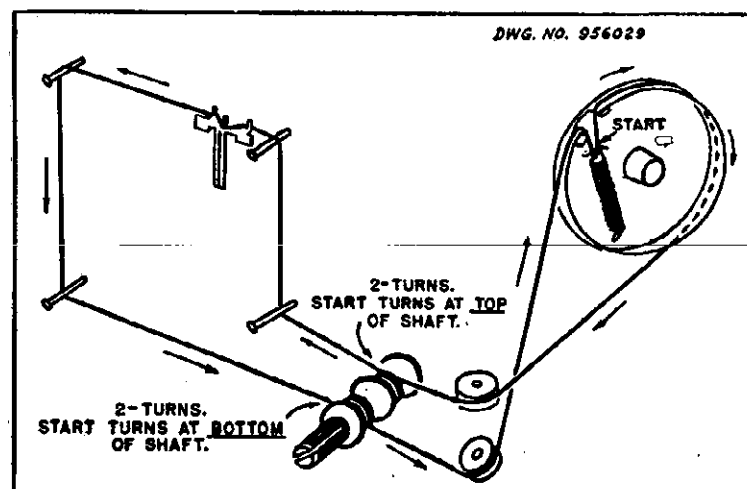


Fig. 2—Dial Cord Stringing, Model 671D

MODEL 671D,
Ch. 120137-D

ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.001 mfd.	High side to stator of rear section of tuning condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximum output.

VOLTAGE READING FOR CHASSIS 120137-D

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	12BE6	-6.3 DC	0	24 AC	12 AC	90 DC	90 DC	-8 DC
V-2	12BA6	-8 DC	0	24 AC	36 AC	90 DC	90 DC	1 DC
V-3	12AT6	-9 DC	0	0	12 AC	-7 DC	-8 DC	38 DC
V-4	50C5	5.5 DC	0	80 AC	36 AC	0	90 DC	110 DC
V-5	35W4	0	0	80 AC	117 AC	115 AC	110 AC	120 DC

RESISTANCE READING FOR CHASSIS 120137-D

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	12BE6	2,400	0.4	26	14	300,000	300,000	4 meg.
V-2	12BA6	4 meg.	0	26	38	300,000	300,000	120
V-3	12AT6	10 meg.	0	0	14	500,000	4 meg.	800,000
V-4	50C5	150	470,000	90	38	470,000	300,000	350,000
V-5	35W4	N.C.	N.C.	90	125	150	120	350,000

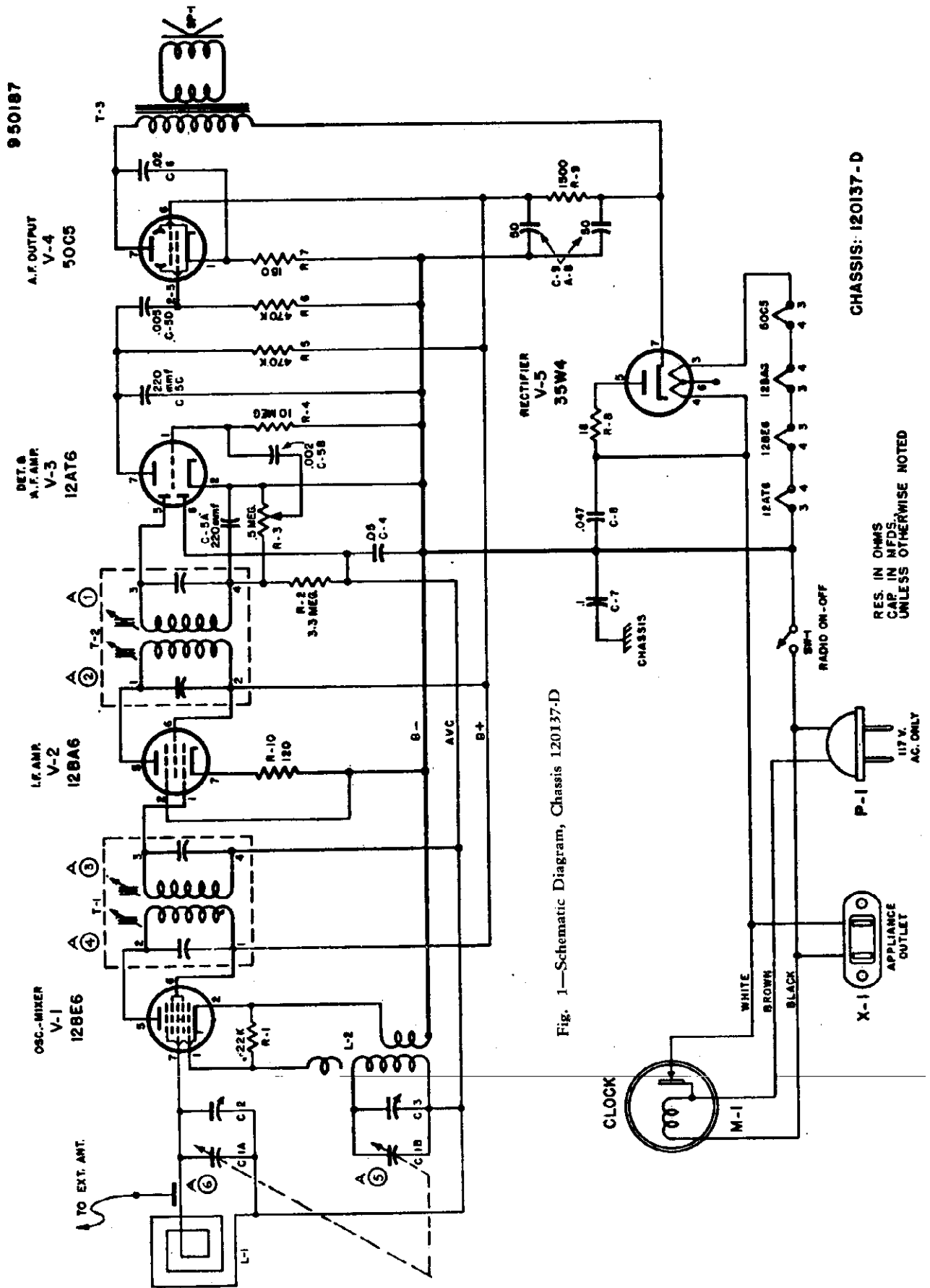
VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltage measured at 1,000 ohms per volt.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts, 60 cycles for voltage readings.
5. Normal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

NOTE: The radio and clock mechanism of MODEL 671D are covered by the Emerson warranty. If it should be necessary to have the clock mechanism repaired after the warranty has expired, it should be sent to the nearest authorized Telechron service station.

TO REMOVE THE CLOCK MECHANISM FROM THE CABINET THE FOLLOWING STEPS SHOULD BE TAKEN:

1. Remove radio chassis from cabinet.
2. Unsolder 3-wires at terminal strip coming from clock.
3. Remove three nuts located on back of clock and remove clock cover.
4. Carefully remove clock from front of cabinet.



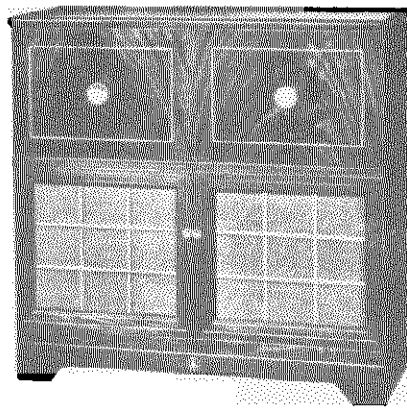
MODEL 671D,
Ch. 120137-D

CHASSIS PARTS LIST (Chassis 120137-D)

Item	Part No.	Description	Item	Part No.	Description
C1A	900082	Variable Capacitor - r.f. Section	R5	351132	470,000 ohm. Carbon $\frac{1}{2}W \pm 20\%$
C1B		Variable Capacitor - osc. Section	R6	351132	470,000 ohm. Carbon $\frac{1}{2}W \pm 20\%$
C2	Pt. of C1A	Trimmer - r.f. Section	R7	340292	150 ohm. Carbon $\frac{1}{2}W \pm 10\%$
C3	Pt. of C1B	Trimmer - osc. Section	R8	340072	18 ohm. Carbon $\frac{1}{2}W \pm 10\%$
C4	923554	.05 mf. Paper	R9	380532	1,500 ohm. Carbon $1W \pm 20\%$
C5A		220 mmf.	R10	340272	120 ohm. Carbon $\frac{1}{2}W \pm 10\%$
C5B	470310	.002 mf. Multiple Condenser	SP1	180079	Speaker — PM — 5"
C5C		220 mmf.	SW1	510083	On—Off Switch—Radio
C5D		.005 mf.	T1	720033	1st I.F. Transformer
C6	923524	.02 mf. Paper		or	
C7	923315	.1 mf. Paper	T1	720124	1st I.F. Transformer
C8	922101	.047 mf. Paper Molded	T2	720033	2nd I.F. Transformer
C9A	925201	50 mf. Electrolytic		or	
C9B		50 mf. Electrolytic	T2	720124	2nd I.F. Transformer
L1	700061	Loop Antenna & Back	T3	734065	Output Transformer
L2	716064	Oscillator Coil	V1	800525	Vacuum Tube—12BE6
M1	470668	Clock Movement	V2	800524	Vacuum Tube—12BA6
P1	583035	Line Cord & Plug	V3	800523	Vacuum Tube—12AT6
R1	Pt. of L2	22,000 ohm. Carbon	V4	800032	Vacuum Tube—50C5
R2	351332	3.3 megohm. Carbon	V5	800526	Vacuum Tube—35W4
R3	390177	500,000 ohm. Volume Control	X1	500029	Appliance Outlet
R4	351452	10 megohm. Carbon			

CABINET PARTS LIST (Model 671D)

MODEL 671D	DESCRIPTION
140387	Cabinet (Bakelite—Walnut)
140407	Cabinet (Urea—Ivory)
470668	Clock Movement
411108	Housing—Clock
520141	Crystal—(For Radio Dial)
460162S	Knob—Radio
960170	Knob—Clock (With Indicator)
960171	Knob—Clock (Without Indicator)
960172	Knob—Clock (For Setting Hands)
960173	Crystal (For Clock Face)



MODEL 679B
CHASSIS 120116-B

DESCRIPTION

TYPE: Amplitude modulation (AM) and frequency modulation (FM) superheterodyne.

FREQUENCY RANGE:

Broadcast band (AM)—540-1620 kilocycles
Frequency modulation band (FM)—88-108 megacycles

TYPE OF TUBES:

- 1—6BJ6 FM r-f amplifier
- 1—12AT7 FM converter
- 1—12BE6 AM converter
- 1—6BJ6 FM and AM i-f amplifier
- 1—6BJ6 2nd i-f FM amplifier
- 1—6BH6 FM limiter
- 1—19T8 FM discriminator, AM det., AVC and audio ampl.
- 1—50L6 power output
- 1—Selenium rectifier

POWER SUPPLY: 60 cycles

VOLTAGE RATING: 115v. a.c.

POWER CONSUMPTION: 75 watts

CURRENT DRAIN: 0.70 amps. at 115 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the R-F section of the circuit, the receiver should be carefully realigned.
2. A self-contained loop antenna is provided for broadcast band reception. For permanent home installation, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. Connect the outdoor antenna to the terminal strip marked (A.M.—"A") located at the back of the cabinet.
3. An internal power line antenna is provided for F.M. operation in relatively strong signal areas. For improved reception in weak signal areas, connect an external dipole antenna to the terminal strip on the back of the cabinet. Disconnect the link from screw (F.M.—"A") and connect the dipole to terminals marked (F.M.—"A" and "G").

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltage readings are in d.c. volts and resistance reading in ohms, unless otherwise specified.
2. D.c. voltage measurements are made at 20,000 ohms-per-volt and a.c. voltages are measured at 1000 ohms-per-volt.
3. Line voltage maintained at 115 volts a.c. for voltage readings.
4. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in readings.
5. Volume control at maximum, with no signal applied and bandswitch in broadcast position (unless otherwise noted), for voltage measurements.

VOLTAGE READINGS (CHASSIS 120116-B)

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1	6BJ6	0	.6 V.*	35 V.AC	41 V.AC	78 V.*	78 V.*	0	—	—
V-2	12AT7	86 V.*	-2.8 V.*	0	53 V.AC	41 V.AC	80 V.*	0	1.7 V.*	N.C.
V-3	6BJ6	-4 V	.8 V.	35 V.AC	30 V.AC	100 V.	100 V.	0	—	—
V-4	12BE6	-7.6 V	0	53 V.AC	64 V.AC	100 V.	100 V.	-.4 V	—	—
V-5	6BJ6	0	.7 V.*	30 V.AC	24 V.AC	86 V.*	86 V.*	0	—	—
V-6	6BH6	-.3 V.	0	24 V.AC	18 V.AC	50 V.*	50 V.*	0	—	—
V-7	19T8	-.5 V.*	-.6 V.*	-.1 V.*	0	18 V.AC	-.5 V.	0	-.5 V.	40 V.
V-8	50L6	N.C.	115V.AC	110 V.	105 V.	0	N.C.	64 V.AC	7.2 V.	—

N.C. Denotes "No Connection."

*Bandswitch in F.M. Position Only.

RESISTANCE READINGS (CHASSIS 120116-B)

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1	6BJ6	0	68	42	50	200 K.*	200 K.*	0	—	—
V-2	12AT7	200 K.*	10 K.	0	62	50	200 K.	0	2200	N.C.
V-3	6BJ6	3.2 meg.	82	42	35	200 K.*	200 K.*	0	—	—
V-4	12BE6	22 K.	.5	62	75	200 K.	200 K.	2.7 meg.	—	—
V-5	6BJ6	.6	82	35	28	200 K.*	200 K.*	0	—	—
V-6	6BH6	100 K.	0	28	20	200 K.*	200 K.*	0	—	—
V-7	19T8	100 K.	100 K.	175 K.*	0	20	500 K.	0	4.7 meg.	500 K.
V-8	50L6	N.C.	130	200 K.	200 K.	470 K.	N.C.	75	150	—

N.C. Denotes "No Connection."

*Bandswitch in F.M. Position Only.

MODEL 679B,
Ch. 120116-B

ALIGNMENT INSTRUCTIONS

1. To position pointer, turn variable condenser fully closed and set pointer to reference mark on dial backplate at the low frequency end of the dial.
2. Volume control should be set at maximum position. The output of the signal generator should be no higher than necessary to obtain an output reading. Attenuate the signal input as alignment proceeds. Use an insulated alignment tool for all adjustments.
3. Use isolation transformer if available; otherwise connect a .1 mfd. condenser in series with low side of signal generator to chassis.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 mfd.	High side to Pin 7 (grid) of 12BE6. Low side to chassis.	455 KC.	Broadcast	Tuning condenser fully open.	Across voice coil.	A1, A2, (Trans. T4), A3, A4, (Trans. T2).	Adjust for maximum output. Reduce dummy antenna to .001 mfd. if isolation trans. is not used.
2		Loop	1620 KC.	Broadcast	Tuning condenser fully open.	Across voice coil.	A5, (Trimmer cond. C6).	Form loop of several turns of wire. Radiate signal into receiver loop. Adjust for maximum output.
3		Loop	1400 KC.	Broadcast	Tune for max. outpt.	Across voice coil.	A6, (Trimmer cond. C5).	Adjust for maximum output.

FM I-F and Disc. Alignment Using AM Signal Generator and VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 2nd i-f (V5). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A7, (Trans. T5).	Adjust for maximum output.
2	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 1st i-f (V3). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A8, A9, (Trans. T3).	Adjust for maximum output.
3	.01 mfd.	High side to Pin 7 of 12AT7 conv. (V2). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A10, A11, (Trans. T1).	Adjust for maximum output.
4	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 2nd i-f (V5). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "B". Common to chassis.	A12, (Trans. T6).	Adjust for maximum output.
5	.01 mfd.	"	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "C". Common to chassis.	A13, (Trans. T6).	Adjust for zero output. Continue with FM r-f alignment.

FM I-F AND DISC. ALIGNMENT USING SWEEP SIGNAL GENERATOR AND OSCILLOSCOPE. Use frequency modulated signal, with 60 cycle modulation and 450 kc. sweep. Use 120 cycle sawtooth sweep voltage in oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	CONNECT OSCILLOSCOPE	ADJUST	REMARKS
1	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 1st i-f (V3). Low side to chassis.	10.7 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Vertical input to Point "A". Ground to chassis.	A7, A8, A9, (Trans. T5 and T3).	Adjust for maximum output (height) and symmetry as per i-f alignment curve shown (page 3).
2	.01 mfd.	High side to Pin 7 of 12AT7 of conv. (V2). Low side to chassis.	10.7 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Vertical input to Point "A". Ground to chassis.	A10, A11, (Trans. T1)	Adjust for maximum output (height) and symmetry as per i-f alignment curve shown (page 3).
3	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 2nd i-f (V5). Low side to chassis.	10.7 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Vertical input to Point "C". Ground to chassis.	A12, A13, (Trans. T6).	Alternately adjust A12 for maximum amplitude and A13 for maximum straightness of cross-over lines, with cross-over occurring at center of pattern as per discriminator alignment curve (page 3). Continue with FM r-f alignment.

FM R-F ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	300 ohm resistor in series with gen. lead.	High side to FM ant. term. Low side to chassis.	109.0 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open	Connect d.c. probe to point "A". Common to chassis	A14 (Iron Core)	Adjust for maximum output.
2	"	"	106.0 mc.	Frequency modulation	Tune for maximum output.	"	A15 (Iron Core)	Adjust for maximum output.

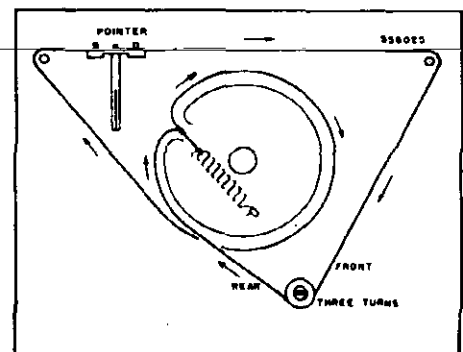
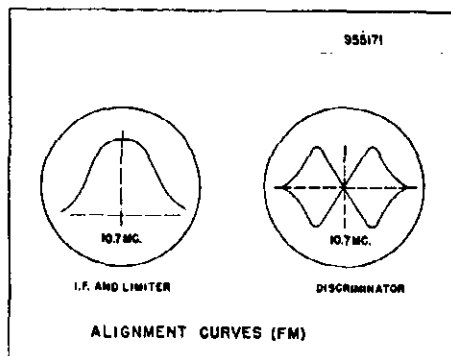
CHASSIS PARTS LIST (CHASSIS 120116-B)

Symbol	Part No.	DESCRIPTION	Symbol	Part No.	DESCRIPTION
C1	928006	1,500 MMF	R10	340332	220 Ohms $\frac{1}{2}W \pm 10\%$
C2	928006	1,500 MMF	R11	340970	100,000 Ohms $\frac{1}{2}W \pm 10\%$
C3	928053	.001 MF	R12	340770	15,000 Ohms $\frac{1}{2}W \pm 10\%$
C4	928027	.01 MF	R13	340970	100,000 Ohms $\frac{1}{2}W \pm 10\%$
C5	915029	.5 MMF	R14	340970	100,000 Ohms $\frac{1}{2}W \pm 10\%$
C6	928053	.001 MF	R15	340930	68,000 Ohms $\frac{1}{2}W \pm 10\%$
C7	928102	50 MMF	R16	Pt. of L5)	22,000 Ohms
C8	928027	.01 MF	R17	351290	2.2 Megohms $\frac{1}{2}W \pm 20\%$
C9	928027	.01 MF	R18	340332	220 Ohms $\frac{1}{2}W \pm 10\%$
C10	928027	.01 MF	R19	340890	47,000 Ohms $\frac{1}{2}W \pm 10\%$
C11	928055	.01 MF	R20	341210	1 Megohm $\frac{1}{2}W \pm 10\%$
C12	928109	.01 MF	R21	351370	4.7 Meg. $\frac{1}{2}W \pm 20\%$
C13	928110	25 MMF	R22	390153	1.0 Meg. Vol. Control
C14	928027	.01 MF	R23	Pt. of R-22)	400,000 Ohms Tone Control
C15	928006	1,500 MMF	R24	340810	22,000 Ohms $\frac{1}{2}W \pm 10\%$
C16	928013	100 MMF	R25	351130	470,000 Ohms $\frac{1}{2}W \pm 20\%$
C17	928059	300 MMF	R26	351130	470,000 Ohms $\frac{1}{2}W \pm 20\%$
C18	Part of Loop	2.2 MMF	R27	340292	150 Ohms $\frac{1}{2}W \pm 10\%$
C19	920060	.05 MF	R28	394042	1000 Ohms $3W \pm 10\%$
C20)			R29	394027	22 Ohms $2W \pm 10\%$
C21)	Pt of T6	100 MMF	R30	340810	22,000 Ohms $\frac{1}{2}W \pm 10\%$
C22	920180	.005 MF	L1	713026	FM Ant. Coil
C23	928013	100 MMF	L2	713027	FM R.F. Coil
C24	920090	.01 MF	L3	716059	FM Osc. Coil
C25	920545	.002 MF	L4	700054	AM Loop Ant.
C26	920090	.01 MF	L5	716058	AM Osc. Coil
C27	928104	212 MMF	L6	705002	Filament Choke
C28	920020	.02 MF	L7	705002	Filament Choke
C29	925191	80 MF	J1,J2	508002	Dual Jack (Phono-Speaker)
C30	925191	50 MF	P1	585081	Female Con. Cable (Phono. Motor)
C31	928013	100 MMF	P2	505014	Interlock Plug
C32	920030	.05 MF	SW1	(Pt. of R22)	On-Off Switch
C33	928006	1,500 MMF	SW3	510078	Band Switch
C34	928006	1,500 MMF	T1	720126	1st. FM I.F. Transformer
C35	928006	1,500 MMF	T2	720067	2nd. FM I.F. Transformer
C36	900081	AM Var. Cond. & FM Tuning Ass.	T3	720077	3rd FM I.F.
C37	(Pt. of C36)	AM RF Trimmer	T4	708062	FM Discriminator Transformer
C38	(Pt. of C36)	AM OSC. Trimmer	T5	720075	1st. AM I.F. Transformer
C39	(Pt. of T4)		T6	720076	2nd AM I.F. Transformer
C40	920030	.05 MF	T7	734064	Output Transformer
C41	920030	.05 MF	V1	800023	6BJ6, FM RF Amplifier
R1	340212	68 Ohms	V2	800047	12AT7, FM Osc.-Mixer
R2	340332	220 Ohms	V3	800023	6BJ6, FM AM 1st I.F. Amplifier
R3	340572	2,200 Ohms	V4	800525	12BE6, AM Osc.-Mixer
R4	340732	10,000 Ohms	V5	800023	6BJ6, FM 2nd I.F. Amplifier
R5	340332	220 Ohms	V6	800054	6BH6, FM Limiter
R6	340212	68 Ohms	V7	800029	19T8, FM Discriminator, AM Det
R7	340232	82 Ohms	V8	800070	50L6, Power Output
R8	340492	1,000 Ohms	V9	817102	
R9	340232	82 Ohms	V10	817101	Selenium Rectifier, 100 MA.
				807003	Pilot Bulb, 110V., 10W. Cand. Base

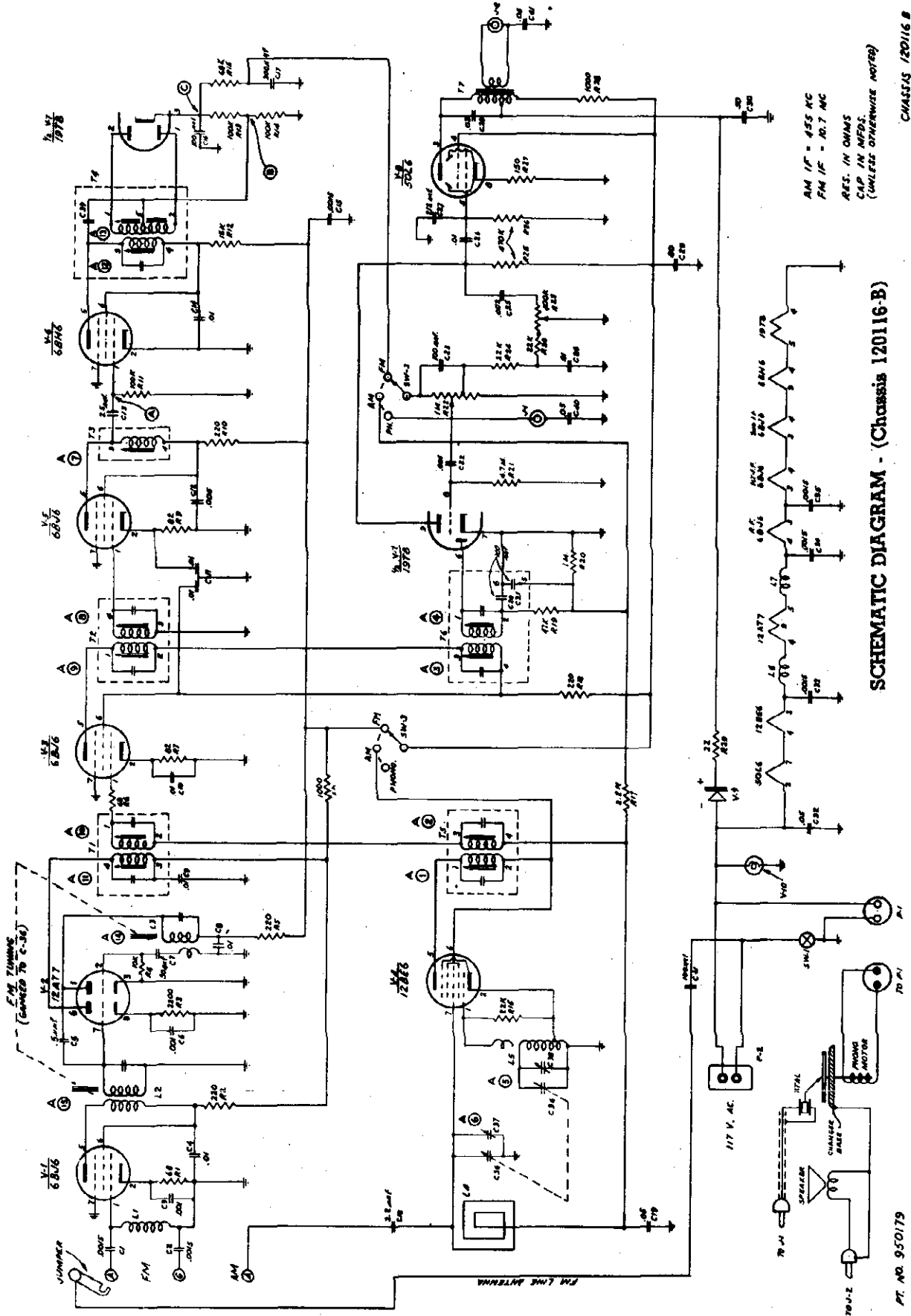
CABINET PARTS LIST (MODEL 679B)

Part No.	DESCRIPTION
140403	Cabinet
411115	Metal Grille
520064	Escutcheon
520144	Glass Dial
445032	Rubber Channel for Glass Dial
413559	Mounting Strip for Glass Dial
180077	Speaker—12"
505040	Speaker Plug
819060	G.I. 3-Speed Changer

Part No.	DESCRIPTION
560151	45 RPM Adaptor
560216	Masonite Bottom
560227	Masonite Back
583206	Line Cord
450088S	Knob—AM-FM-Phono.
450068S	Knob—Tuning
450089	Knob—Tone
450099S	Knob—Volume
587011	Spring Insert for Knobs



MODEL 679B,
Ch. 120116-B

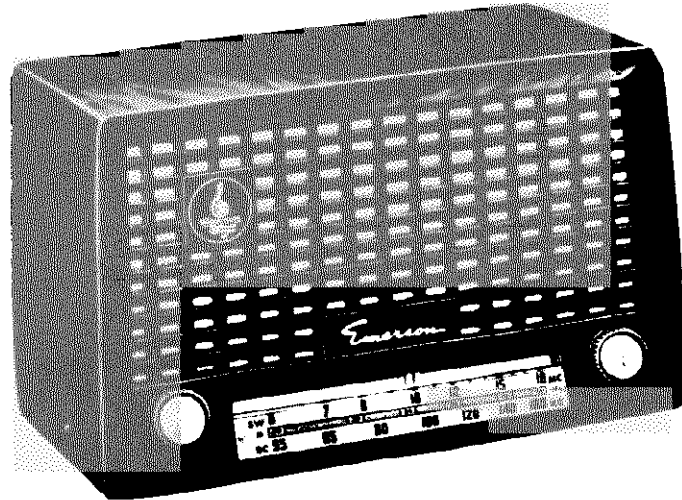


SCHEMATIC DIAGRAM - (Chassis 120116-B)

CHASSIS 120116 B

PT. NO. 950179

MODEL 691B,
Ch. 120145-E



MODEL 691B
Chassis 120145-B

DESCRIPTION

TYPE: Two-band superheterodyne.

FREQUENCY RANGE: Broadcast 540-1620 kc
Short Wave 6-18 mc.

TYPE OF TUBES:

- V-1-12BE6, oscillator mixer
- V-2-12BA6, first i-f amplifier
- V-3-12AT6, detector, a-f amplifier
- V-4-50C5, A. F. output
- V-5-35W4, rectifier

POWER SUPPLY: A.C. or D.C.

POWER CONSUMPTION: 30 watts.

CURRENT DRAIN: 0.26 amp. at 117 volts a.c.

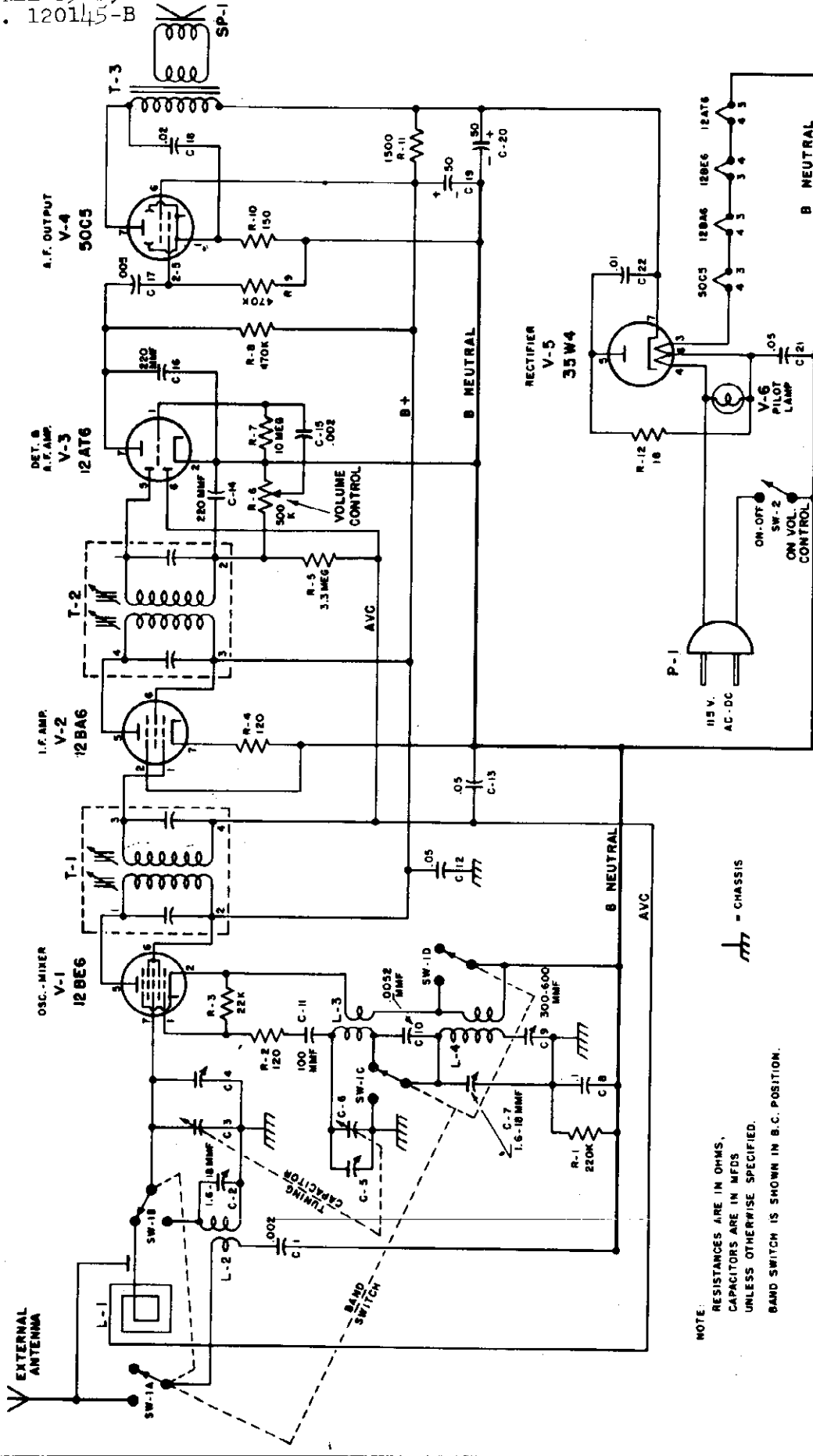
GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. Model 691B has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

CHASSIS PARTS LIST (Chassis 120145-B)

SYMBOL	PART NO.	DESCRIPTION			
C-1	912723	.002 MF Paper	600 V.	C-14	923023 220 mmf
C-2	Pt. of L-2	1.6-18 mmf Trimmer		C-15	Pt. of C-14 .002 mf
C-3	900083	Variable Capacitor - R.F. Sect.		C-16	Pt. of C-14 220 mmf
C-4	Pt. of C-3	Trimmer R.F. Sect.		C-17	Pt. of C-14 .005 mf
C-5	Pt. of C-3	Trimmer Osc. Sect.		C-18	921524 .02 mf Paper 400 V
C-6	Pt. of C-3	Variable Capacitor - Osc. Sect.		C-19	925206 50 mf Electrolytic 150 V
C-7	Pt. of L-2	1.6-18 mmf Trimmer		C-20	Pt. of C-19 50 mf Electrolytic 150 V
C-8	923515	.1 mf Paper	400 V	C-21	921554 .05 mf Paper 400 V
C-9	900210	300-600 mmf Padder		C-22	921514 .01 mf Paper 400 V
C-10	915031	.0052 mf Mica	±5%	L-1	700058 Loop Antenna & Back
C-11	928010	100 mmf Ceramic		L-2	710030 Antenna Coil - S.W.
C-12	921554	.05 mf Paper	400 V	L-3	716065 Oscillator Coil - S.W.
C-13	921554	.05 mf Paper	400 V	L-4	Pt. of L-3 Oscillator Coil - B.C.
				P-1	583032 Line Cord & Plug

MODEL 691B,
Ch. 120145-B



NOTE:
RESISTANCES ARE IN OHMS,
CAPACITORS ARE IN MFDs
UNLESS OTHERWISE SPECIFIED.
BAND SWITCH IS SHOWN IN B.C. POSITION.

CHASSIS NO. 120145-B

PART NO. 950186

Fig. 1—Schematic Diagram, Chassis 120145-B

SYM-BOL	PART NO.	DESCRIPTION		
R-1	341052	220,000 ohm	Carbon	½W ±10%
R-2	340272	120 ohm	Carbon	½W ±10%
R-3	350812	22,000 ohm	Carbon	½W ±20%
R-4	340272	120 ohm	Carbon	½W ±10%
R-5	351332	3.3 megohm	Carbon	½W ±20%
R-6	390145	500,000 ohm	Volume Control	
R-7	351452	10 megohm	Carbon	½W ±20%
R-8	351132	470,000 ohm	Carbon	½W ±20%
R-9	351132	470,000 ohm	Carbon	½W ±20%
R-10	340292	150 ohm	Carbon	½W ±10%
R-11	380532	1,500 ohm	Carbon	1W ±20%
R-12	340072	18 ohm	Carbon	½W ±10%
SP-1	180080	Speaker - with Output Transformer		
SP-1	180045	Speaker - less Output Transformer		
SW-1	510082	Band- Switch		
SW-2	Pt. of R-6	On-Off Switch		
T-1	720525	1st I.F. Transformer		
T-2	720055	2nd I.F. Transformer		
T-3	734067	Output Transformer (with Pt. No. 180045)		
V-1	800525	Vacuum Tube - 12BE6		
V-2	800524	Vacuum Tube - 12BA6		
V-3	800523	Vacuum Tube - 12AT6		
V-4	800032	Vacuum Tube - 50C5		
V-5	800526	Vacuum Tube - 35W4		
V-6	807000	Pilot Light		

CABINET PARTS LIST (Model 691B)

PART NO.	DESCRIPTION
140426	Cabinet—Bakelite—Walnut
140427	Cabinet—Urea—Ivory
4601628	Knob
460162	Knob—Band Switch
411164	Dial Plate—Calibrated
411182	Dial Back Plate
583032	Line Cord
180080	Speaker with Trans.
180045	Speaker less Trans. OR
530002	Drive Cord
525022-2	Pointer
700058	Loop Antenna & Back
470608	Baffle & Grille Cloth

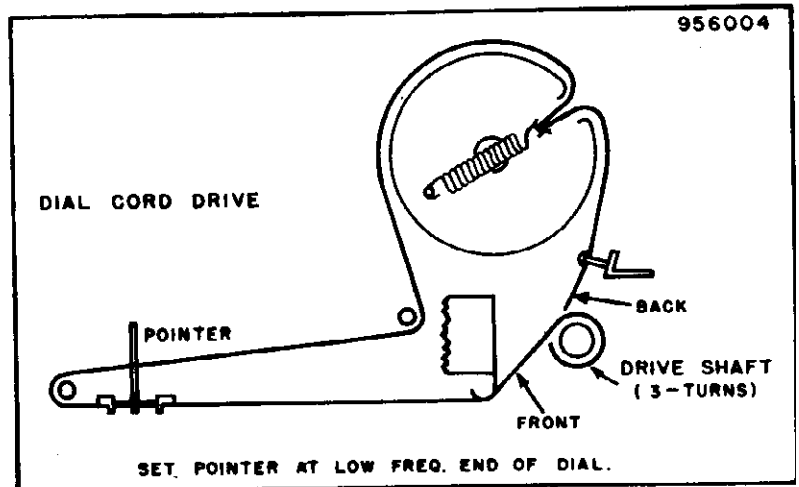


Fig. 2—Dial Cord String, Model 691

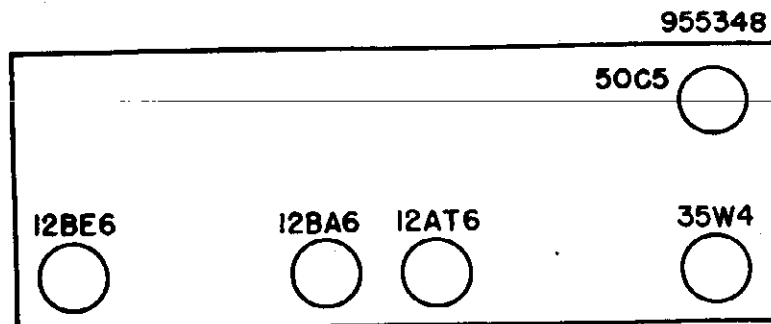


Fig. 3 Tube Location Diagram of Chassis 120145-B

MODEL 691B,
Ch. 120145-B

ALIGNMENT PROCEDURE

1. To set pointer, turn variable condenser fully closed and set pointer at mark near upper left end of dial backplate.
2. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and B neutral.
3. Volume control should be at maximum position; output of signal generator should be not higher than necessary to obtain an output reading.
4. Use an insulated alignment screwdriver for adjusting.

STEP	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS	SW-1
1	.1 MFD.	High side to pin #7 of V-1 (12BE6) Low side to B neutral.	455 KC 400 ~ Amplitude Modulation	Variable Condenser fully opened	Across Voice Coil	T-1, T-2 top and bottom	Adjust for maximum meter reading	Broadcast
2	400 ~	High side to external antenna lead. Low side to B neutral.	18.2 MC 400 ~ Amplitude Modulation	Variable Condenser fully opened (min. capacity)	"	C-5	Adjust for maximum meter reading	Short Wave
3	200 MMF.	High side to external antenna lead. Low side to B neutral.	1620 KC 400 ~ Amplitude Modulation	"	"	C-7	"	Broadcast
4	"	"	1420 KC 400 ~ Amplitude Modulation	Variable Condenser tuned to 1420 KC.	"	C-4	"	"
5	"	"	600 KC 400 ~ Amplitude Modulation	Variable Condenser tuned to 600 KC.	"	C-9	Rock variable slightly back & forth while adjusting C-9 for a true maximum indication. Check step #3 Repeat #4 & #5	"
6	400	Same as in Step #2	17.2 MC 400 ~ Amplitude Modulation	Variable Condenser tuned to 17.2 MC.	"	C-2	Adjust for max. signal while slightly rocking dial	Short Wave

VOLTAGE READINGS FOR CHASSIS 120145-B

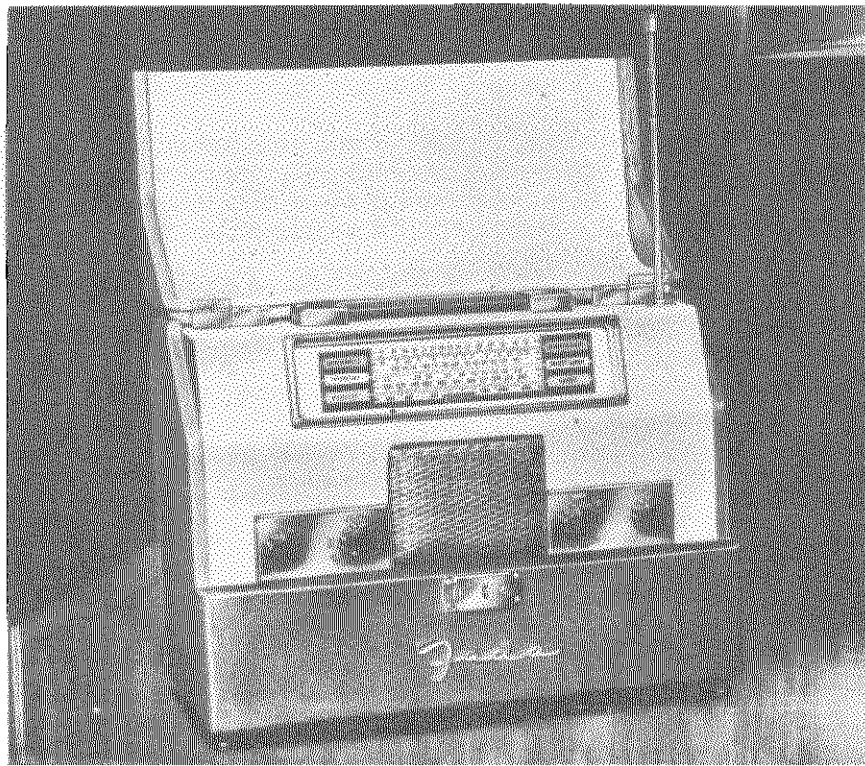
SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	12BE6	-7.2	0	24 AC	12 AC	86	86	-.4
V-2	12BA6	-.5	0	24 AC	34 AC	86	86	1
V-3	12AT6	-.4	0	0	12 AC	-.4	-.4	34
V-4	50C5	5.2	0	34 AC	82 AC	0	86	110
V-5	35W4	N.C.	N.C.	82 AC	115 AC	110 AC	112 AC	112

RESISTANCE READINGS FOR CHASSIS 120145-B

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	12BE6	22K	1.3	28	14	500K	500K	3.8 MEG
V-2	12BA6	3.8 MEG	0	28	42	500K	500K	120
V-3	12AT6	10 MEG	0	0	14	500K	500K	1 MEG
V-4	50C5	150	500K	42	95	500K	500K	500K
V-5	35W4	N.C.	N.C.	95	130	150	125	500K

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Line voltage maintained at 115 volts for voltage readings
2. D.C. and A.C. voltages measured with V.T.V.M.
3. Measured values are from socket pin to B neutral.
4. All measurements measured with band switch on broadcast
5. Volume control at maximum, no signal applied for voltage measurements.



Power Supply: 105-125 V. 40-60 cycles AC; Same voltage DC; and
 180-220 V. 40-60 cycles AC
 15 Watts Power Consumption at 117 volt line operation
 30 Watts Power Consumption at 220 volt line operation

Battery Operation: 9 V.A — 90 V.B
 (570-182 meters); 2.3-7.6 MC (130-39.5 meters);
 and 7.4-23.5 MC (40.5-12.8 meters)

Range: 530-1650 KC

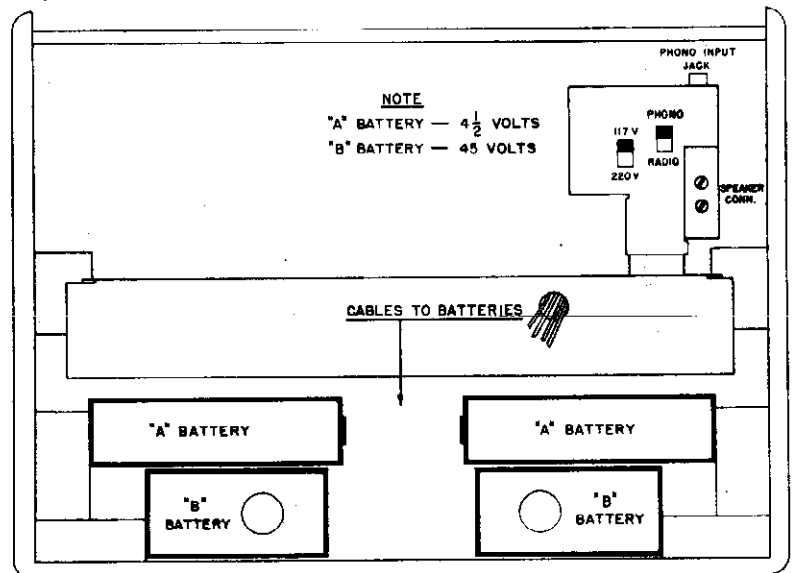
I.F. Circuits: 456 KC

Speaker: 5" P.M., 1.47 oz. Alnico V Magnet

Speaker Transformer: 10,000 ohms — 400 cycles

Speaker Voice Coil: 3.2 ohms

Tubes: 1U4 R.F. Amplifier
 1R5 Osc. Converter
 1U4 I.F. Amplifier
 1U5 Det. AVC. A.F.
 3V4 Power Output
 Selenium Rectifier



BATTERY LAYOUT P130

MODEL P-130

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on. Low range AC meter connected across voice coil to indicate output. Keep signal generator attenuated so as to maintain $\frac{1}{2}$ scale reading on output meter. Make certain that the dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

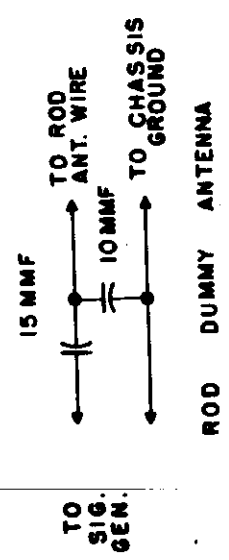
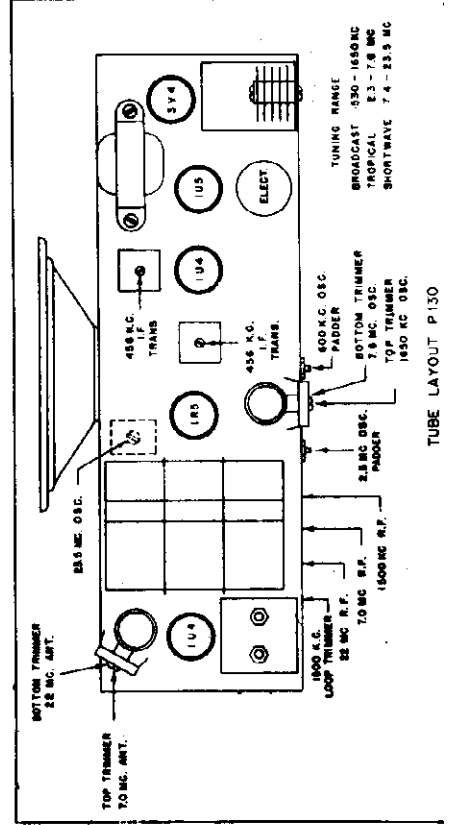
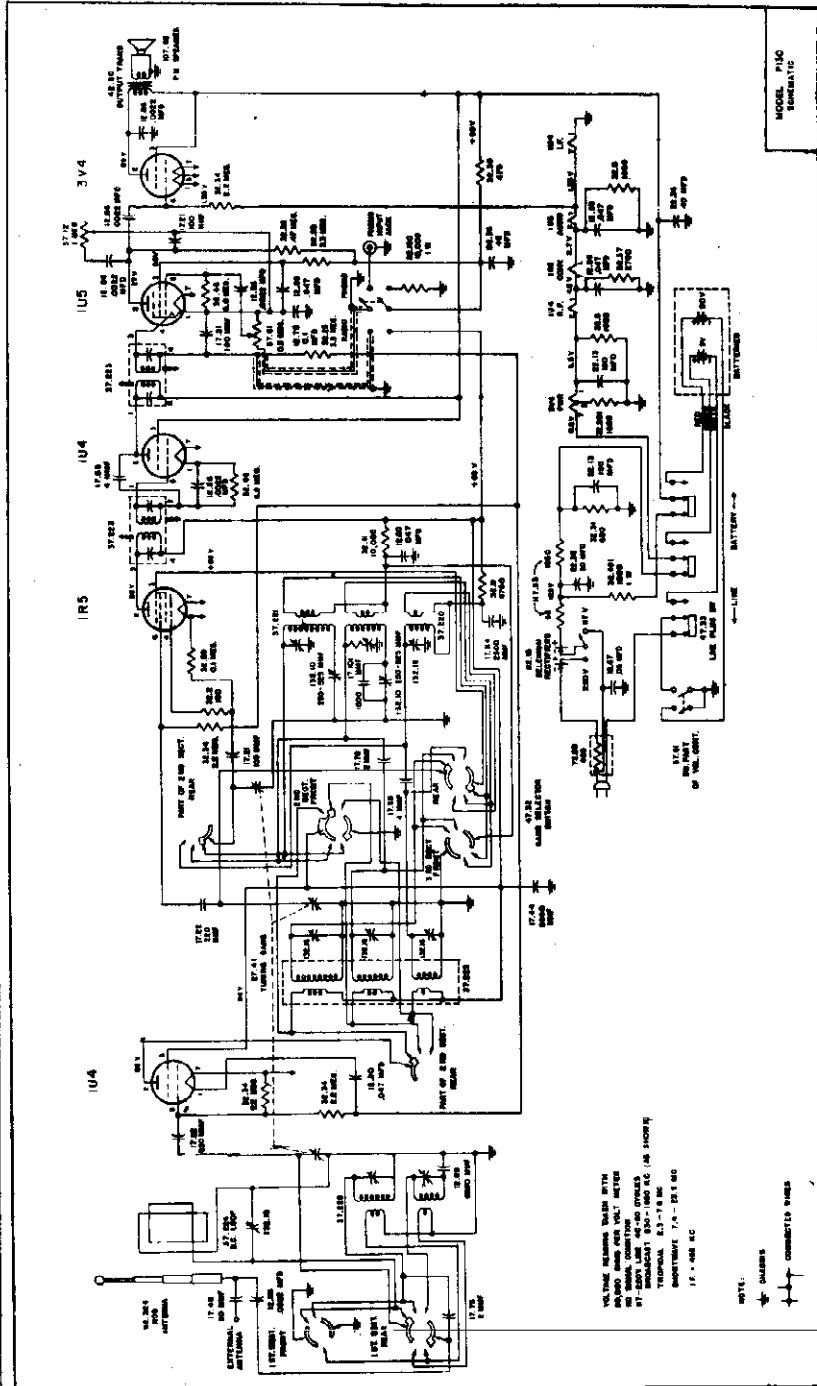
CAUTION:

The S.W. Oscillator Trimmers can be adjusted for maximum output at two positions, namely; above and below the signal frequency.

This receiver has been designed so that the oscillator frequency is always above the signal frequency.

Check the oscillator frequency carefully against the signal generator calibration and tune the R.F. Trimmers to the lower signal generator frequency.

Receiver Dial At:	Signal Generator	Dummy Antenna	Connect Signal Generator Across	Refer to Chassis Layout for Location of Trimmers
1 Fully open on Medium Wave Band	456 KC (658 Meters)	0.1 Mf	1500 K.C. R.F. Trimmer	Adjust I.F. coil cores for maximum output.
2 Fully open on Medium Wave Band	1650 KC (182 Meters)	0.1 Mf	Loop Wires	Adjust 1650 KC Oscillator trimmer for maximum output.
3 600 KC (500 Meters)	600 KC (500 Meters)		Loop Wires	Adjust 600 KC Oscillator Padder for Maximum output while rocking the variable condenser.
4 Repeat step 2				
5 1500 KC (200 Meters)	1500 KC (200 Meters)	0.1 Mf	Loop Wires	Adjust 1500 KC R.F. Trimmer for maximum output.
6 Fully open on S.W. II Band	7.6 MC (39.5 Meters)	Rod dummy antenna	Rod antenna input	Adjust 7.6 Mc oscillator trimmer for maximum output.
7 2.5 Mc (120 Meters)	2.5 Mc (120 Meters)	Rod dummy antenna	Rod antenna input	Adjust 2.5 Mc oscillator padder for maximum output while rocking the variable condenser.
8 Repeat step 6				
9 7.0 Mc (42.8 Meters)	7.0 Mc (42.8 Meters)	Rod dummy antenna	Rod antenna input	Adjust 7.0 Mc R.F. and antenna trimmers for maximum output.
10 Fully open S.W.I. on Band	23.5 (12.8 Meters)	Rod dummy antenna	Rod antenna input	Adjust 23.5 Mc oscillator trimmer for maximum output.
11 22.0 Mc (13.6 Meters)	22.0 Mc (13.6 Meters)	Rod dummy antenna	Rod antenna input	Adjust 22.0 Mc R.F. and antenna trimmers for maximum output.
12	Radiate a sufficient amount of signal to readjust the respective antenna trimmers for maximum output on 7 and 22 Megacycles. This is accomplished by connecting a one foot piece of wire between the rod antenna and the rod antenna wire attached to the chassis. Connect a two foot piece of wire to the signal generator "hot" terminal. Locate the signal generator approximately five feet away and extend the rod antenna. Adjust the respective trimmers for maximum output.			



MODEL P-130

PARTS LIST

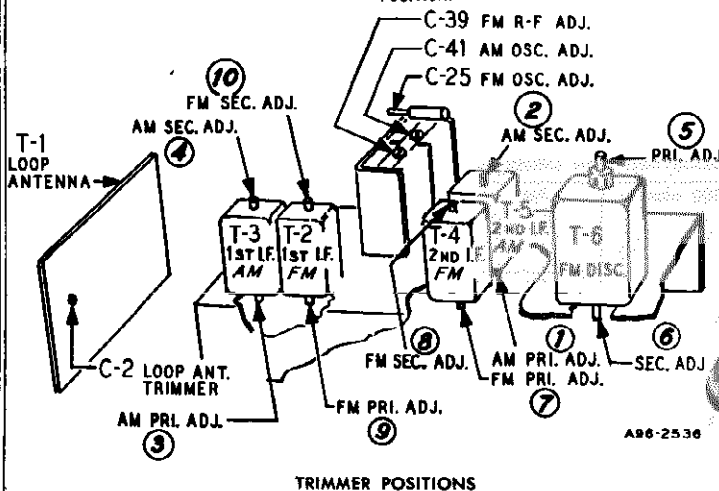
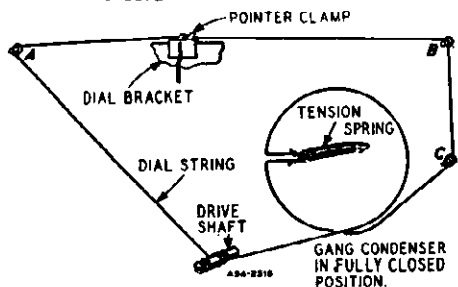
Part No.	Description
12.86	Molded Tubular Condenser .0022 Mf 400 V.
12.89	Molded Tubular Condenser .0068 Mf 400 V.
12.80	Molded Tubular Condenser .047 Mf 200 V.
12.67	Molded Tubular Condenser .047 Mf 400 V.
12.75	Molded Tubular Condenser .1 Mf 400 V.
17.78	Ceramic Condenser 2.0 Mmf
17.55	Ceramic Condenser 4.0 Mmf
17.49	Ceramic Condenser 50 Mmf \pm 10%
17.22	Ceramic Condenser 220 Mmf \pm 20%
17.21	Ceramic Condenser 100 Mmf \pm 20%
17.44	Ceramic Condenser 5000 Mmf + 100%, - 10%
17.101	Mica Condenser 1500 Mmf \pm 5%
17.114	Mica Condenser 2500 Mmf \pm 5%
22.13	Electrolytic Condenser 150 Mfd. 15 W.V.
22.36	Electrolytic Condenser 30-40-40 Mfd. 150 W.V.
27.41	3 Section Variable Condenser 441 Mmf.
37.224	Loop Antenna
37.223	I.F. Transformer
37.221	B.C. — Tropical Oscillator Coil
37.220	S.W. Oscillator Coil
37.225	R.F. Coil
37.228	S.W. Antenna Coil
47.33	Battery Electric Changeover Switch
47.35	Radio-Phono Switch
47.34	117 Volt — 220 Volt Line Switch
52.61	Volume Control
57.12	Tone Control
62.272	Whip Antenna Lock
72.88	Resistance Line Cord (117-220V. A.C. line operation only)
77.185	Dial Pointer
77.186	Dial Scale (Calibrated)
92.138	Phono Plug
92.377	Battery Retainer Block
92.324	Rod Antenna Assembly
92.380	Handle Cover
92.389	Phono Jack
97.311	Cabinet
42.50	Output Transformer
107.45	5" P.M. Speaker
112.24	Selenium Rectifier
112.22	Battery Harness Assembly
117.53	56 — 1850 ohm 10 W W.W. Resistor
132.10	Padder Condenser
132.15	Oscillator Trimmer
132.16	Trimmer Assembly
142.70	Tuning or Tone Knob
142.71	Volume Knob
142.72	Band Selector Knob

THE WESTMORELAND



DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.

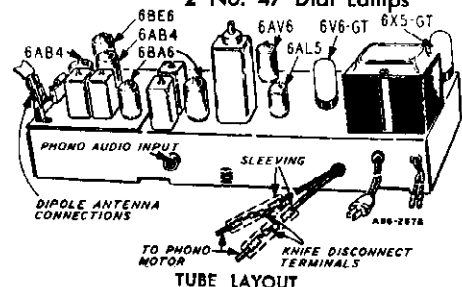


TRIMMER POSITIONS

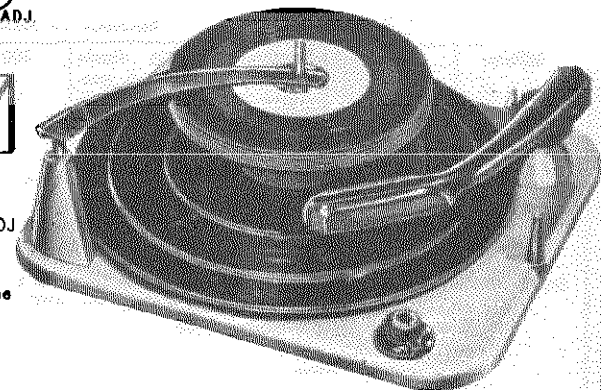
- MODELS 4-A-86 Rev., 4-A-95, The Westmoreland
- ### ELECTRICAL SPECIFICATIONS
- Power Supply 105-125 volts AC 60 cycles, 40 watts. 60 watts with record changer.
 - Frequency Ranges Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
 - Intermediate Frequency AM—455 KC
FM—10.7 MC
 - Selectivity AM—45 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 10" PM Dynamic
 - Voice Coil Impedance . . . 3.2 ohms 400 cycles

Tube and Dial Lamp Complement

- 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
- 1 6AB4 R-F Amplifier
- 1 6AB4 Mixer
- 2 No. 47 Dial Lamps



TUBE LAYOUT



VM No. 950 RECORD CHANGER

MODELS 4-A-86 Rev., 4-A-95, The Westmoreland

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				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
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 Der.	.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				BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA				
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.

MODELS 4-A-86 Rev., 4-A-95, The Westmoreland

REPLACEMENT PARTS LIST

MISCELLANEOUS

12A480	10" P.M. Speaker	.....
4X1082	Escutcheon	.....
10A759	Knob (Mahogany)	.....
10A765	Knob (White Oak)	.....
13X546	Line Cord & Plug Assembly	.....
2A393	Band Change Switch	.....
3A435	Molded Octal Tube Socket	.....
3A305	Phono Socket	.....
3A426	Tube Socket (1st 6BA6)	.....
3A427	Tube Socket (6BE6)	.....
3A439	Tube Socket (Miniature)	.....

CAPACITORS

C-1	14A209	Gang Condenser Assembly	.....
C-2	17A256	2-24 mmf	Trimmer.....
C-3	47X559	130 mmf	Ceramic.....
C-4			
C-5			
C-9			
C-10			
C-11	47X507	5000 mmf	Ceramic.....
C-17			
C-27			
C-43			
C-6		Part of T-2 (1st I-F Trans. FM)	
C-7		Part of T-3 (1st I-F Trans. AM)	
C-8		Part of T-5 (2nd I-F Trans. AM)	
C-12		Part of T-4 (2nd I-F Trans. FM)	
C-13			
C-14			
C-15			
C-16A	47X112	50-50 mmf	Dual Mica....
C-16B			
C-18		Part of T-6 (Discriminator Trans.)	
C-19	47X492	2700 mmf	Molded Mica..
C-20			
C-20	47X468	220 mmf	Ceramic.....
C-21	45X361	5 mf	100 V Dry Electrolytic
C-22			
C-22	47X557	2.2 mmf	Ceramic.....
C-42			
C-23	47X558	30 mmf	Ceramic.....
C-24	47X523	10 mmf	Ceramic.....
C-25	17A255	1-8 mmf	Trimmer.....
C-26			
C-44	866503	.05 mf	200 V Tubular.....
C-28A		20 mf	20 V
C-28B	45X360	40 mf	150 V Dry Electrolytic
C-28C		40 mf	200 V
C-29	H66102	.001 mf	800 V Tubular.....
C-30	47X470	330 mmf	Molded Mica..
C-31	47X508	500 mmf	Ceramic.....
C-32A			
C-32B	76X4	100 mmf	Dual Ceramic..
C-33			
C-36	B66103	.01 mf	200 V Tubular.....
C-34	D66502	.005 mf	400 V Tubular.....
C-37	D66104	.1 mf	400 V Tubular.....
C-38	D66203	.02 mf	400 V Tubular.....
C-39			
C-41		Part of C-1 (Gang Condenser)	
C-40	47X471	68 mmf	Ceramic.....

RESISTORS

		Ohms	Watts	
R-1	B85470	47	0.5	Carbon.....
R-2	B85562	5600	0.5	Carbon.....
R-4				
R-8	B84680	68	0.5	Carbon.....
R-5				
R-12	B84682	6800	0.5	Carbon.....
R-13				
R-6				
R-9	B85102	1000	0.5	Carbon.....
R-7				
R-25	B85473	47 K	0.5	Carbon.....
R-10	B85273	27 K	0.5	Carbon.....
R-11	43X233	3.6	0.5	Wirewound...
R-14				
R-16	B85104	100 K	0.5	Carbon.....
R-15	B85223	22 K	0.5	Carbon.....
R-17	B84221	220	0.5	Carbon.....
R-18				
R-24	B85474	470 K	0.5	Carbon.....
R-26				
R-20	B85153	15 K	0.5	Carbon.....
R-21	36X372	.5 meg.		Volume Control
R-23	40X310	.5 meg.		Tone Control
R-27	B85106	10 meg.	0.5	Carbon.....
R-28	D84821	820	2.0	Carbon.....
R-29	B85105	1 meg.	0.5	Carbon.....
R-30	B84271	270	0.5	Carbon.....
R-31	B84274	270 K	0.5	Carbon.....

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke	.....
L-2	9A2103	Parasitic Choke	.....
L-3	35A9	Insulated Choke	.....
L-4	35A8	Insulated Choke	.....
T-1	9A2146	"B" Range Loop Antenna	.....
T-2	9A2060	1st I-F Trans. (FM)	.....
T-3	9A2062	1st I-F Trans. (AM)	.....
T-4	9A2061	2nd I-F Trans. (FM)	.....
T-5	9A2063	2nd I-F Trans. (AM)	.....
T-6	9A2161	Discriminator Transformer	.....
T-7	9A2065	Oscillator Coil (AM)	.....
T-8	9A2067	Oscillator Coil (FM)	.....
T-9	51X134	Output Transformer	.....
T-10	9A2209	Dipole Antenna	.....
T-11	53X322	Power Transformer	.....
T-12	9A2066	Antenna Coil (FM)	.....

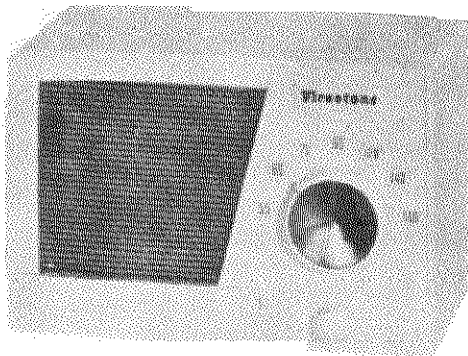
DIAL AND DRIVE ASSEMBLY

58X739	Dial Glass	.....
15X251	Pointer	.....
19X192	"C" Washer (Mtg. Drive Shaft)	.....
6X66	Rubber Grommet	.....
25X1616	Dial Bracket	.....
28X113	Drive Cord Tension Spring	.....
7A103	No. 47 Pilot Light	.....
7A199	Pilot Light Socket Assembly	.....
10X38	Drive Cord Assembly	.....
26X486	Drive Shaft	.....

VM No. 950 RECORD CHANGER PARTS

P-81	Crystal Cartridge with Unipoint Needle	.....
85-35	Unipoint Needle	.....
P-77	Crystal Cartridge with Needles	.....
85-18	Needle, Microgroove (Red)	.....
85-16	Needle, Regular	.....

MODELS 4-A-90
4-A-91



Cabinet Dimensions - 8-3/4"x4-7/16"x5-11/16"
 Weight - 4lbs.
 Power Supply - 110 to 120 Volt AC-DC
 Tuning Range - 540 to 1600 KC
 Intermediate Freq. - 455 KC
 Loud Speaker - 4 Inch P.M.
 Voice Coil Impedance - 3.2 Ohm at 400 Cycles

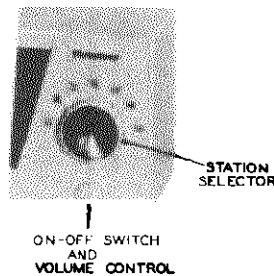
Power Output - Undistorted- 0.8 Watts
 Maximum - 1.3 Watts

Tube Complement- (Code No. 297-0-3212A)

- 12SA7 - Converter
- 12SK7 - I.F. Amplifier
- 12SQ7 - Diode-Audio
- 50L6GT - Output
- 35Z5GT - Rectifier

Tube Complement- (Code 297-0-3212)

- 12BE6 - Converter
- 12BA6 - I.F. Amplifier
- 12AV6 - Diode-Audio
- 50C5 - Output
- 35W4 - Rectifier



ON-OFF SWITCH AND VOLUME CONTROL

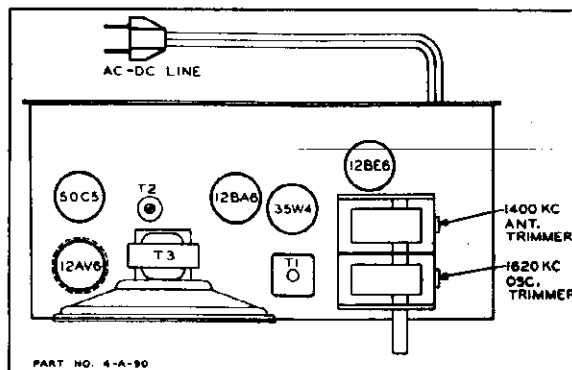
ALIGNMENT PROCEDURE

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

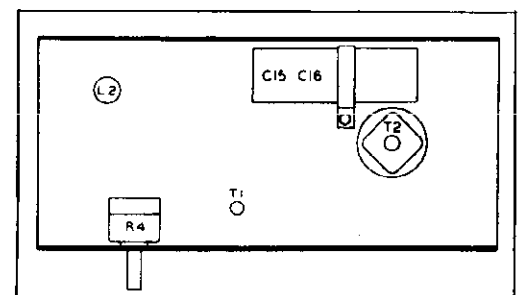
Before starting alignment:

- (A) Remove the chassis and loop antenna from the cabinet at the same time by removing the two screws on the rear apron of the chassis which fasten the chassis to the cabinet.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.

Steps	Set Receiver dial to:	TEST	OSCILLATOR	DUMMY ANTENNA	Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Attach output of test oscillator to:		
1	Any point where no interfering signal is received.	EXACTLY 455 KC	High side to grid of converter Tube. Low side to common negative.	1. MFD. CONDENSER.	Adjust 2nd I.F. (T2) and then each of the slugs of the 1st I.F. (T1) for maximum output.
2	Exactly 1620 KC	Exactly 1620 KC	DUMMY ANTENNA	2 turns of Hookup wire 6" in Dia. Place Approx. 4 foot from & parallel to loop.	Adjust 1620 KC oscillator trimmer for maximum output.
3	Approx. 1400 KC	Approx. 1400 KC	DUMMY ANTENNA		Adjust 1400 KC antenna trimmer for maximum output.

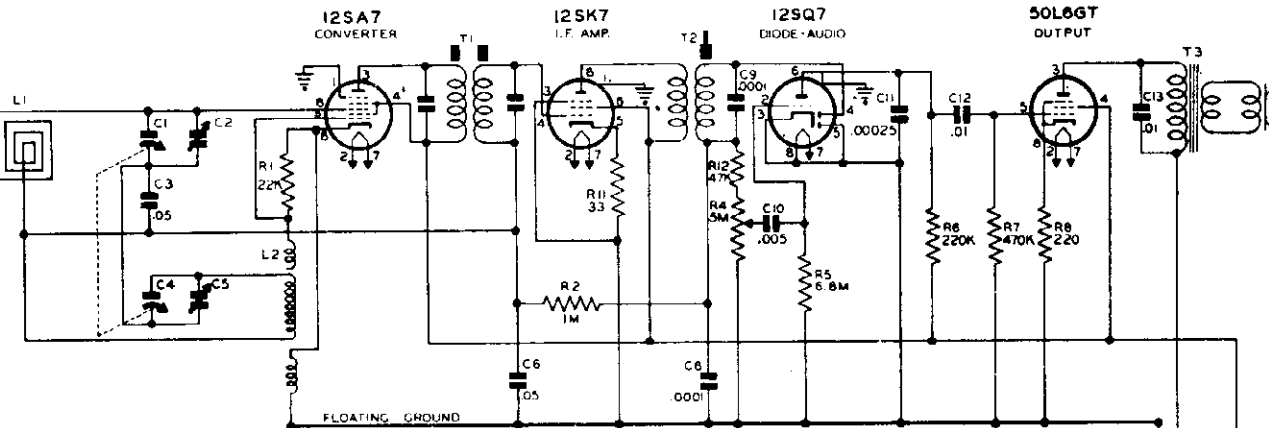


Top View of Chassis
Code No. 297-0-3212

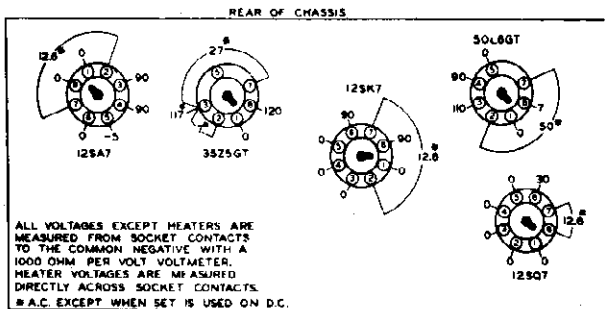


Bottom View of Chassis
Code No. 297-0-3212

MODELS 4-A-90,
4-A-91

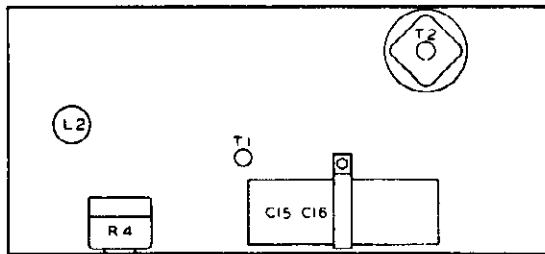


Code No. 297-0-3212A

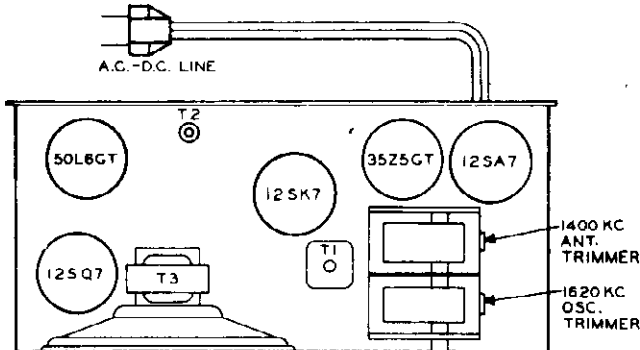


ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO THE COMMON NEGATIVE WITH A 1000 OHM PER VOLT VOLTMETER. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS. * A.C. EXCEPT WHEN SET IS USED ON D.C.

VOLTAGE TABLE (BOTTOM VIEW OF CHASSIS)



Bottom View of Chassis
Code No. 297-0-3212A



Top View of Chassis
Code No. 297-0-3212A

PART NO. 4-A-90A

PARTS LIST FOR CODE NO. 297-0-3212A

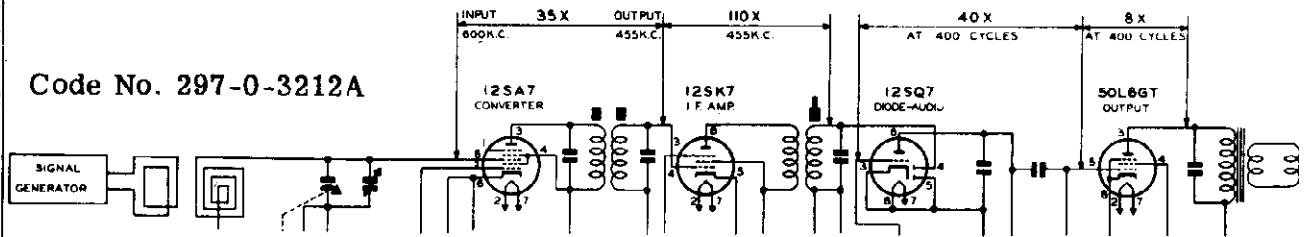
ILLUS. NO.	PART NUMBER	PART NAME	DESCRIPTION
	C3, C6, C7, N-1345	Condenser	Paper .05 MFD. 200V
	C8 N-8015	Condenser	Ceramic .0001 MFD. 500 V. 20%
	C9 N-7548	Condenser	Ceramic .0001 MFD. 500 V. 10%
	C10 N-4894	Condenser	Paper .005 MFD. 600 V.
	C11 N-6488	Condenser	Ceramic .00025 MFD. 500 V. 20%
	C12, C13 N-1344	Condenser	Paper .01 MFD. 400 V.
	C14 N-1346	Condenser	Paper .05 MFD. 400 V.
	C15) N-7889	Condenser	Electrolytic (50 MFD. 150V.)
	C16) N-7889	Condenser	Electrolytic (30 MFD. 150V.)
	R1 N-4025	Resistor	Carbon 22,000 Ohm 1/2W 20%
	R2 N-1282	Resistor	Carbon 1.0 Megohm 1/2W 20%
	R3, R6 N-4026	Resistor	Carbon 220,000 Ohm 1/2W 20%
	R4 N-7890	Volume Control	500,000 Ohm with Switch
	R5 N-4028	Resistor	Carbon 6.8 Megohm 1/2W 20%
	R6 N-4026	Resistor	Carbon 220,000 Ohm 1/2W 20%
	R7 N-4027	Resistor	Carbon 470,000 Ohm 1/2W 20%
	R8 N-4024	Resistor	Carbon 220 Ohm 1/2W 10%
	R9 N-4900	Resistor	Carbon 1,200 Ohm 1.0 W 10%
	R10 N-4068	Resistor	Carbon 33 Ohm 1.0 W 20%
	R11 N-4022	Resistor	Carbon, 33 Ohm 1/2W 20%
	**R12 N-4063	Resistor	Carbon 47,000 Ohm 1/2W 20%
	L1 N-8138	Coll.	Loop Antenna and Cabinet Back
	L2 N-7139	Coll.	Oscillator
	T1 N-7881	Coll.	1st I.F. Transformer
	T2 N-7542	Coll.	2nd I.F. Transformer
	T3 (Part of N-7824 Assembly)	Transformer, Output	Speaker and Output Transformer
	N-7824	Assembly	Speaker and Output Transformer
	N-7141	Condenser	Variable - 2 Gang
	N-8270	Assembly	Cabinet Front Panel
	#321	Cabinet	White, Plastic
	N-8191	Knob	Tuning, White
	N-8192	Knob	Volume, White
	#322	Cabinet	Walnut, Plastic
	N-8140	Knob	Tuning, Walnut
	N-8144	Knob	Volume, Walnut
	N-1090	Line Cord	6 Foot, Rubber

**R11 Resistor (47,000 Ohm 1/2 W. 20%) is included in R4 Volume Control in some receivers.

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

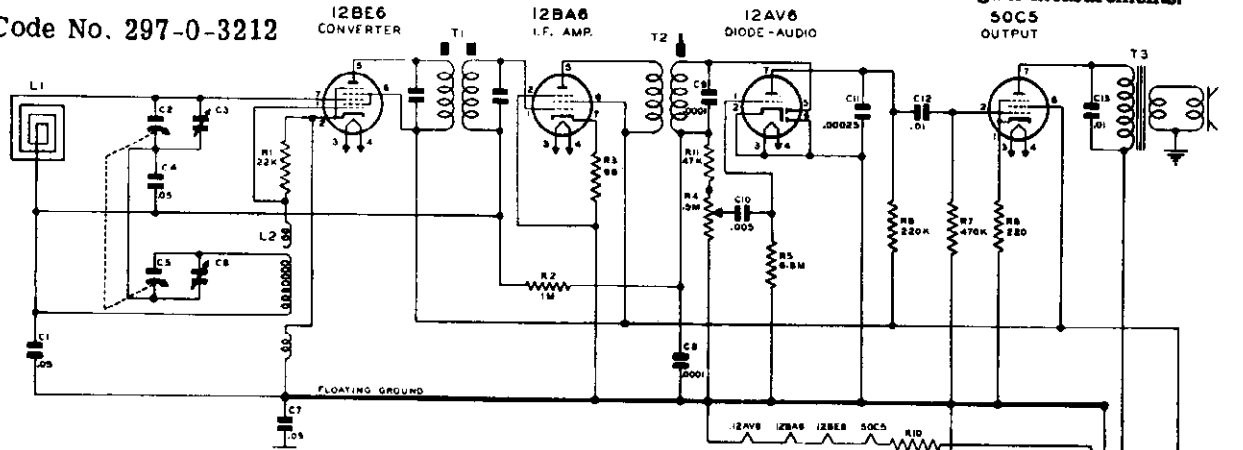
1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

Code No. 297-0-3212A



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

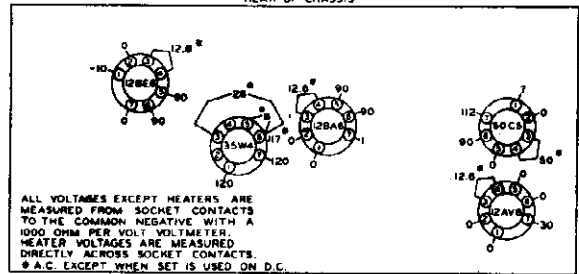
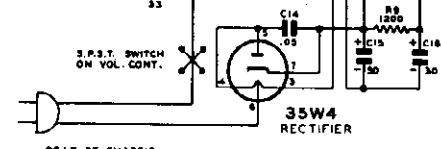
Code No. 297-0-3212



PARTS LIST FOR CODE NO. 297-0-3212

ILLUS. NO.	PART NUMBER	PART NAME	DESCRIPTION
C1, C4, C7	N-1345	Condenser	Paper .05 MFD. 200V
C8	N-8015	Condenser	Ceramic .0001 MFD. 500 V. 20%
C9	N-7549	Condenser	Ceramic .0001 MFD. 500 V. 10%
C10	N-4894	Condenser	Paper .005 MFD. 600 V.
C11	N-6488	Condenser	Ceramic .00025 MFD. 500 V. 20%
C12, C13	N-1344	Condenser	Paper .01 MFD. 400 V.
C14	N-1346	Condenser	Paper .05 MFD. 400 V.
C15	N-7889	Condenser	Electrolytic (50 MFD. 150V.)
C16	N-7889	Condenser	Electrolytic (30 MFD. 150V.)
R1	N-4025	Resistor	Carbon 22,000 Ohm 1/2W 20%
R2	N-1262	Resistor	Carbon 1.0 Megohm 1/2W 20%
R3	N-6485	Resistor	Carbon 68 Ohm 1/2W 10%
R4	N-7890	Volume Control	500,000 Ohm with Switch
R5	N-4028	Resistor	Carbon 6.8 Megohm 1/2W 20%
R6	N-4026	Resistor	Carbon 220,000 Ohm 1/2W 20%
R7	N-4027	Resistor	Carbon 470,000 Ohm 1/2W 20%
R8	N-4024	Resistor	Carbon 220 Ohm 1/2W 10%
R9	N-4900	Resistor	Carbon 1,200 Ohm 1.0 W 10%
R10	N-4068	Resistor	Carbon 33 Ohm 1.0 W 20%
*R11	N-4063	Resistor	Carbon 47,000 Ohm 1/2W 20%
L1	N-8138	Coll.	Loop Antenna and Cabinet Back Oscillator
L2	N-7139	Coll.	Oscillator
T1	N-7888	Coll.	1st I.F. Transformer
T2	N-7542	Coll.	2nd I.F. Transformer
T3	(Part of N-7824 Assembly) N-7824	Transformer, Output	Speaker and Output Transformer
	N-7141	Condenser	Variable - 2 Gang
	N-8270	Assembly	Cabinet Front Panel

PART NO. 297-0-3212



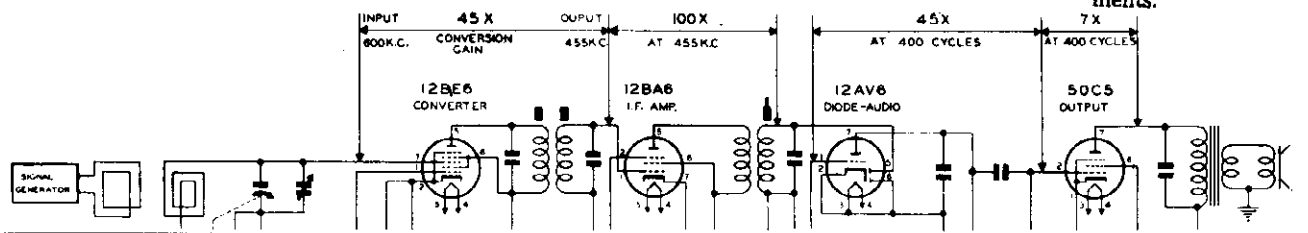
ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO THE COMMON NEGATIVE WITH A 1000 OHM PER VOLT VOLTMETER. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS. * A.C. EXCEPT WHEN SET IS USED ON D.C.

PART NO.	DESCRIPTION	VOLTAGE TABLE (BOTTOM VIEW OF CHASSIS)
#321	Cabinet	White, Plastic
N-8191	Knob	Tuning, White
N-8192	Knob	Volume, White
#322	Cabinet	Walnut, Plastic
N-8140	Knob	Tuning, Walnut
N-8144	Knob	Volume, Walnut
N-1090	Line Cord	6 Foot, Rubber

** R11 Resistor (47,000 Ohm 1/2 W. 20%) is included in R4 Volume Control in some receivers.

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it to maximum output at a desired frequency before making measurements.



MODELS 4-A-97,
4-A-98

SPECIFICATIONS		Power Supply
Frequency Range	Intermediate Frequency	105 to 125 volts A. C.
535 to 1620 KC	455 KC	60 cycle, 50 watts with record player operating.
	Power Output	
	1.1 watts max. .7 watts 10% distortion.	
Loud Speaker	Tube Complement	Record Player
5" PM dynamic Alnico magnet, voice coil impedance 3.2 ohms at 400 cycles.	1 - 12SA7 Mixer 1 - 12SK7 I. F. Amplifier 1 - 12SQ7 Det. & A. F.	3 Speed Automatic Changer (4-A-98) 3 Speed Manual Player (4-A-97)
	1 - 50L6 Power Amp. 1 - 35Z5 Rectifier 1 - No. 47 Dial Lamp	

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.

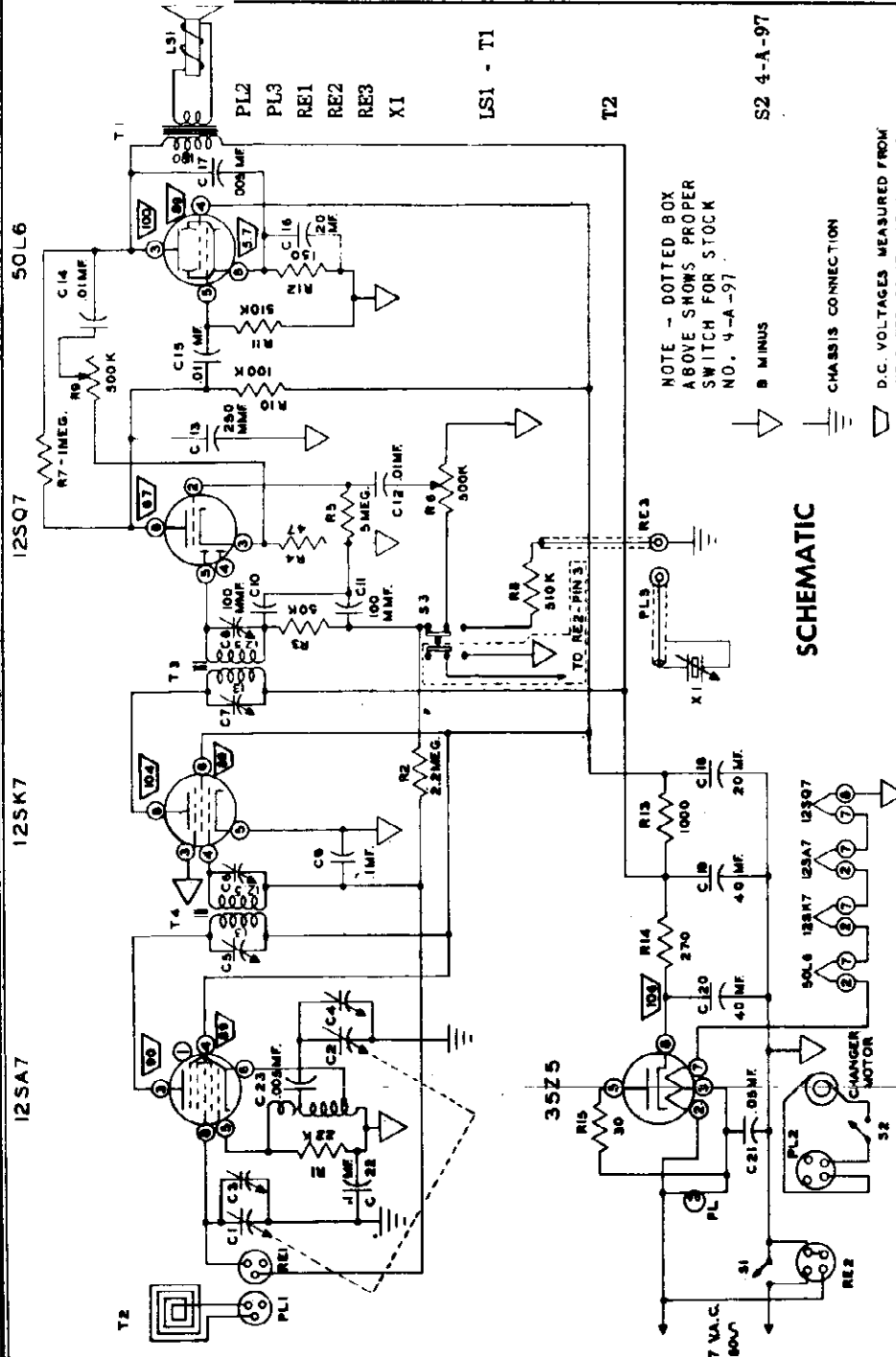
SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST MAXIMUM OUTPUT
LOOP	455 KC	Low End of Band	Across Voice Coil	C-8, C-7, C-6, C-5
LOOP	1620 KC	High End of Band		C-4
LOOP	1400 KC	1400 KC		C-3

RADIO REPLACEMENT PARTS

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	SCHEMATIC LOCATION	PART NO.	DESCRIPTION
RESISTORS					
R1	517	22,000 OHM ½ Watt	C14	825	.01 MF. Ceramic
R2	615	2.2 Meg OHM ½ Watt	C15		See Caprictors
R3		See Caprictors	C17	824	.005 MF. Ceramic
R4	520	47 OHM ½ Watt	C18, C19	1003	40-40-20 MFD/150 Volts
R5		See Caprictors	C20, C16		20 MFD/25 Volts
R6	401	500,000 OHM Vol. Control with Switch	C21	803A	.05 400 V. Tubular
R7	516	1 Meg OHM ½ Watt	CAPRISTORS		
R8, R11	502	510,000 OHM ½ Watt	R3, C10	811	100 MMF. 50,000 OHM 100 MMF
R10		See Caprictors	C11		Dual Shunt Connection
R12	505	150 OHM ½ Watt	R5, C12	813	.01 MF Meg OHM
R13	607	1000 OHM 1 Watt			Common Terminal Connection
R14	602	270 OHM 1 Watt	R10, C15	814	.01 MF 100,000 OHM
R15	534	30 OHM 1/2 Watt			Common Terminal Connection
CAPACITORS					
C1, C2	1004A	Tuning Gang and Trimmer Assembly	T1	1201	Output Transformer
C3, C4		Trimmer Condensors in I. F. Cans	T3, T4	1402	I.F. Transformers
C5, C6		.1 MFD. 200 V.	MISCELLANEOUS		
C7, C8		See Caprictors	S1	401	On-Off Switch on Volume Control
C9, C22	804	See Caprictors	R9	408	500,000 OHM Tone Control
C10, C11		See Caprictors	S2	407	Motor Switch on Changer Assembly
C12		See Caprictors	S3	1892	Radio-Phono Slide Switch
4-249 C13	817	250 MMF. Ceramic	PL1	307A	Loop Antenna Plug

MODELS 4-A-97,
4-A-98

- 307 Changer A. C. Plug
- 305 Pickup Plug
- 106A Loop Antenna Receptacle
- 106 Changer A.C. Receptacle
- 104 Pickup Receptacle
- 2534 Pickup Cartridge EV-334
- 2541 .0023 Needle
- Tone Arm Only
- 2607 5" Speaker and Output Transformer
- 210R Port. Carrying Case 4-A-98
- 2411 Knob
- 1512 Loop Antenna
- 1736A Dial Pointer
- 2307 Dial Bezel
- 2127C Front Panel 4-A-98
- 1722B Dial
- 1892A Radio-Phono Switch 4-A-97
- 2108A Port. Carrying Case 4-A-97
- 1896 Record Adaptor 4-A-97
- 1896A Record Adaptors 4-A-98
- 1888 Ventilating Bezel
- 2115 Motor Board for 4-A-97
- 2116C Back Board for 4-A-98
- 3302 Carton with Fillers for 4-A-97
- 3303B Carton with Fillers for 4-A-98
- 2134A Speaker Grill



NOTE - DOTTED BOX ABOVE SHOWS PROPER SWITCH FOR STOCK NO. 4-A-97

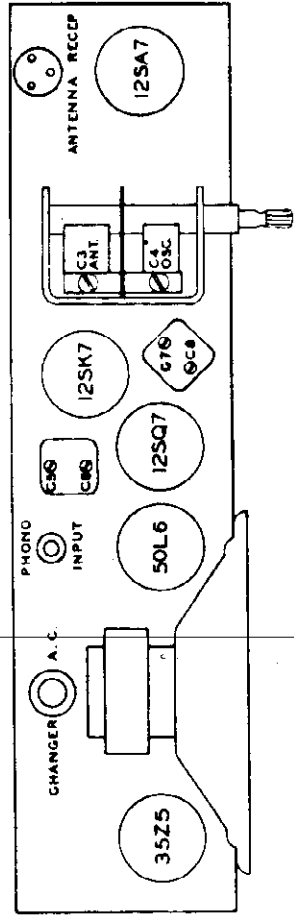
B MINUS

CHASSIS CONNECTION

D.C. VOLTAGES MEASURED FROM INDICATED POINTS TO B MINUS WITH V.T.V.M.

NUMBERS NEXT TO COIL WINDINGS INDICATE D.C. RESISTANCES OF WINDINGS.

LOCATION OF TUBES



MODEL 4-B-56
1949-50 Ford**DESCRIPTION**

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It features a novel two-piece construction and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone Top Cowl Aerial Stock No. 4-B-30. The unit is simple to install and requires no electrical adjustment after installation.

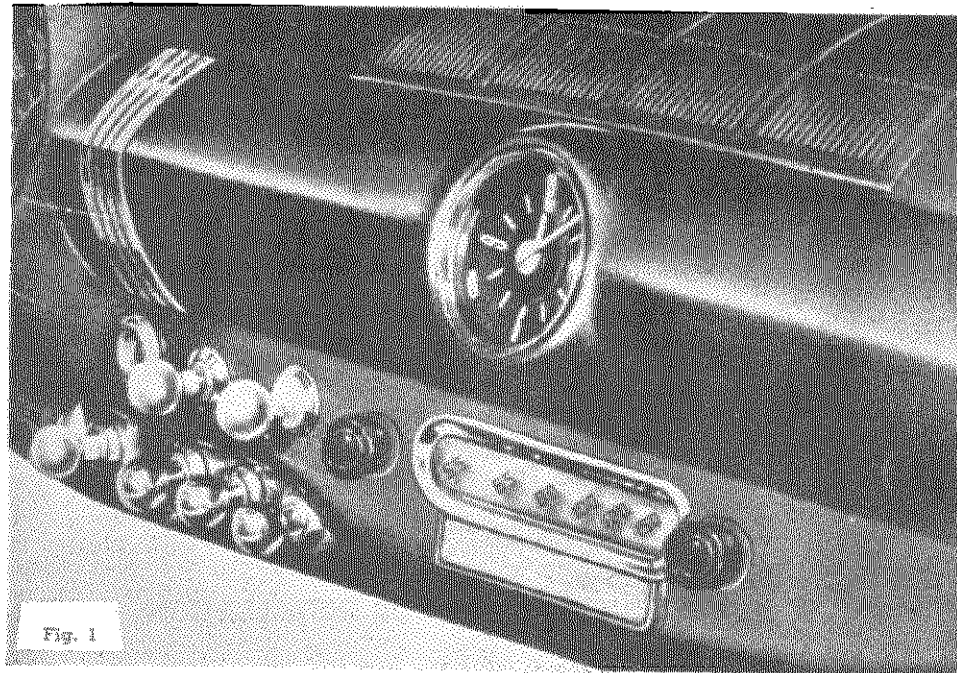


Fig. 1

OPERATION**VOLUME CONTROL KNOB**

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

1. Remove two speed nuts securing radio opening cover plate to instrument panel.
2. Remove cover plate.
3. Place speaker and power pack unit over four threaded stud bolts located on the underside of the instrument panel. (Position power pack unit so that power cable is located on the left hand side.) See Fig. 2.
4. Secure power pack into position with four 8-32 nuts and washers supplied in kit of mounting hardware. Note: It may be necessary to clean threads on studs before mounting.
5. Remove knobs, grommets, cup washers and hex mounting nuts from tuning unit. *Do not remove escutcheon.*
6. Place tuning unit behind instrument panel so that mounting bushings and shafts protrude through the front panel.
7. Attach tuning unit with a hex nut on each mounting bushing.
8. Replace cup washers, grommets and knobs over shafts.
9. Secure a supporting bracket (2 supplied in kit of hardware) to each side of the power pack unit by means of two No. 8 self tapping screws. Use end of supporting bracket with round hole. If more convenient, these brackets may be attached before power pack unit is positioned in place.
10. Swing supporting brackets so that slotted holes are in line with the holes on each side of the tuning unit.
11. Secure to tuning unit with two No. 8 self tapping screws.
12. Insert power cable plug into socket on rear of tuning unit.
13. Plug antenna cable into tuning unit.
14. Secure power cable under cable clamp and tighten clamp screw.

MODEL 4-B-56,
1949-50 Ford

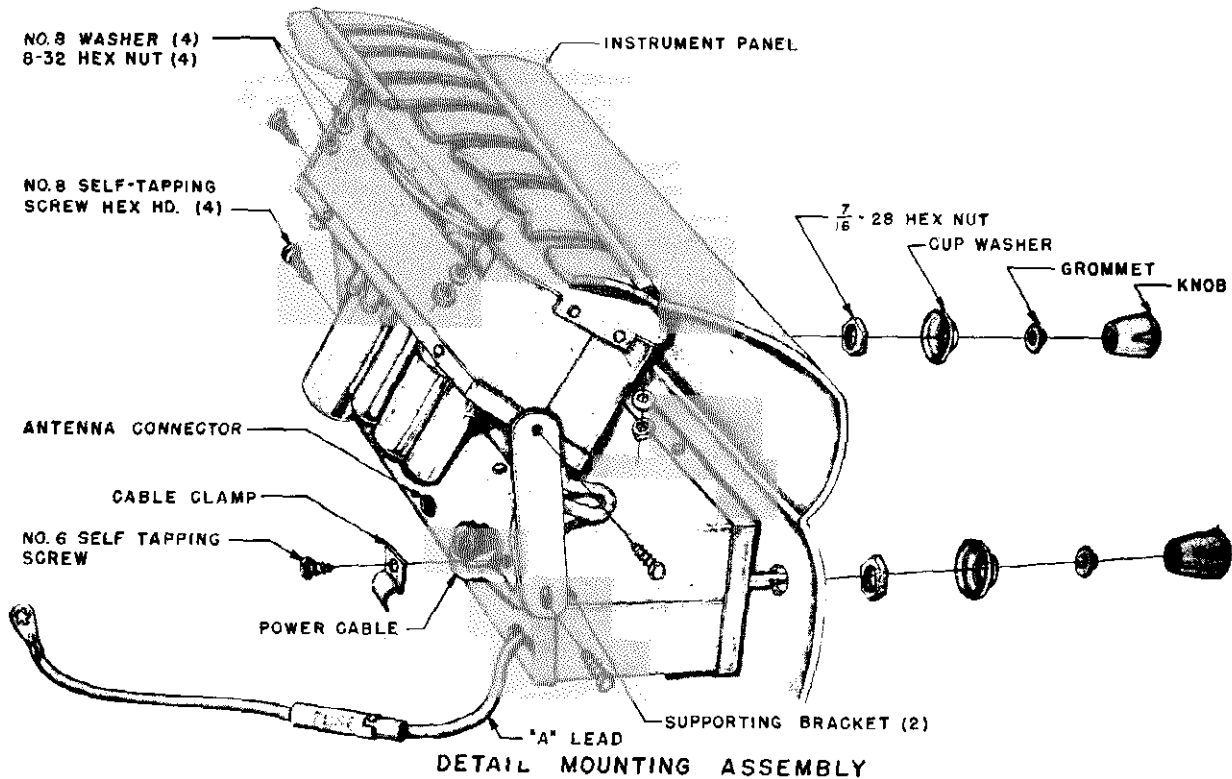


Fig. 2

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.

(See detail assembly drawing FIG. 2)

- 2 7/16-28 hex nuts
- 2 Cup washers
- 2 Grommets
- 2 Knobs
- 1 Cable clamp

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 Supporting brackets
- 4 No. 8 self-tapping screws
- 4 8-32 nuts
- 4 No. 8 washers

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser
- 1 Distributor suppressor

DISTRIBUTOR SUPPRESSOR

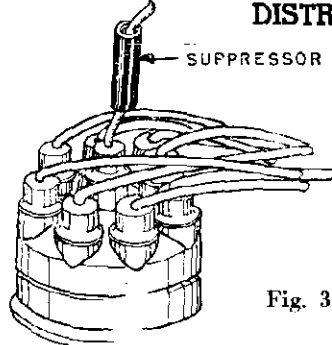


Fig. 3

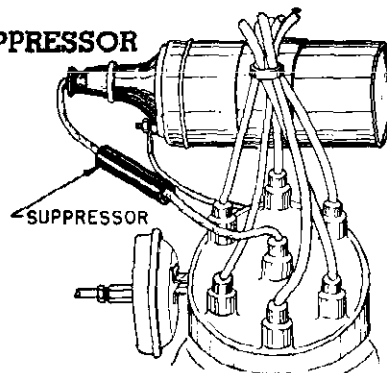


Fig. 4

Disconnect high tension wire that runs from the ignition coil to the center hole of the distributor head. Cut lead one and one-half inches back from metal tip end for 8 cylinder Ford or two and one-half inches back for 6 cylinder Ford. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor, back into distributor head.

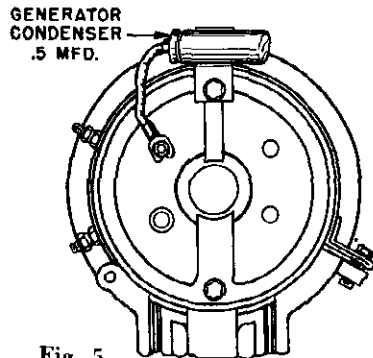


Fig. 5

GENERATOR CONDENSER

Loosen the top assembly bolt from the rear end plate of the generator. **DO NOT REMOVE.** Mount .5 MFD generator condenser under this bolt. Tighten bolt and connect condenser lead to the armature terminal of the generator.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

ELECTRICAL SPECIFICATIONS

Power Supply.....	6.3 Volts DC	This receiver contains the following: 1-6BA6—RF Amplifier 1-6BE6—Converter 1-6BA6 I. F. Amplifier 1-6AT6—Detector—AVC—1st Audio 1-6AQ5—Power Output 1-6X4—Rectifier
Current.....	5.5 Amp. average	
Frequency Range.....	538-1600 KC	
Speaker.....	5¼" PM	
Power Output.....	2 watts, undistorted 3 watts, maximum	
Sensitivity.....	2-3 microvolts average for 1 watt output	
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC	

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 7 and 7A).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

MODEL 4-B-56,
1949-50 Ford

DIAL CORD DRIVE

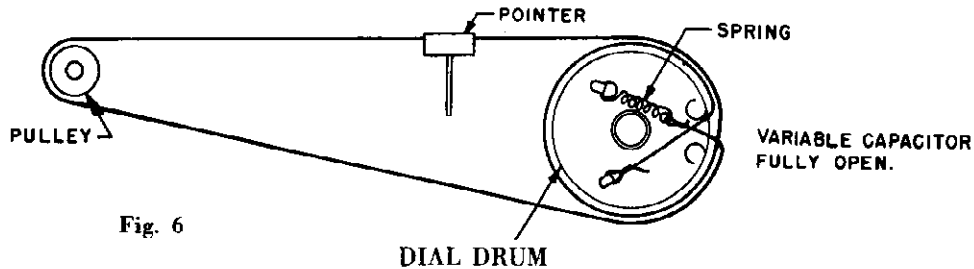


Fig. 6

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
No signal applied to antenna.
Power input—6.3 volts.
Connect dummy antenna in series with output lead of signal generator.
Connect ground lead of signal generator to chassis.
Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:
Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
Non-metallic screwdriver.
Output meter. (1.8 volt for 1 watt output.)
Dummy antennas—.1 MFD., 100 MMFD.
For alignment points refer to Schematic Diagram.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connection	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						

BOTTOM VIEW OF CHASSIS

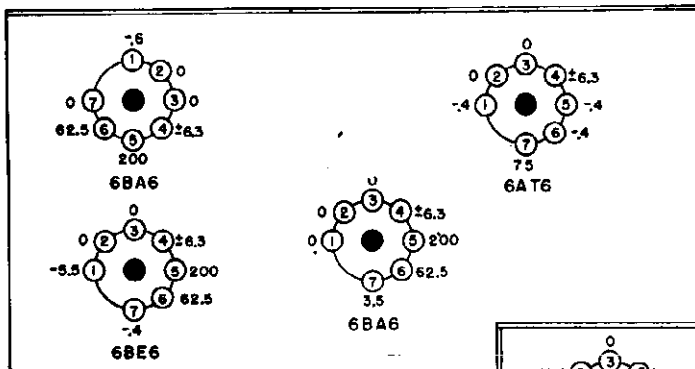


Fig. 7

FRONT OF CHASSIS

BOTTOM VIEW OF POWER PACK

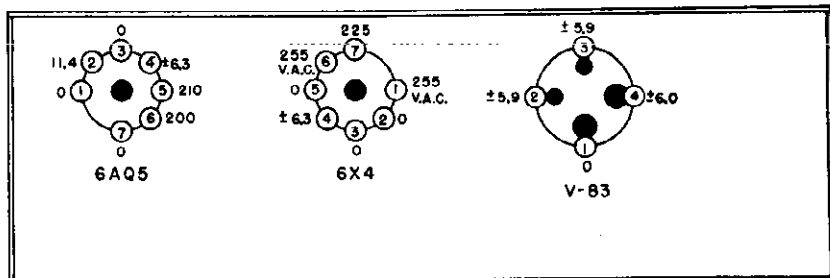


Fig. 7A

MODEL 4-B-56,
1949-50 Ford

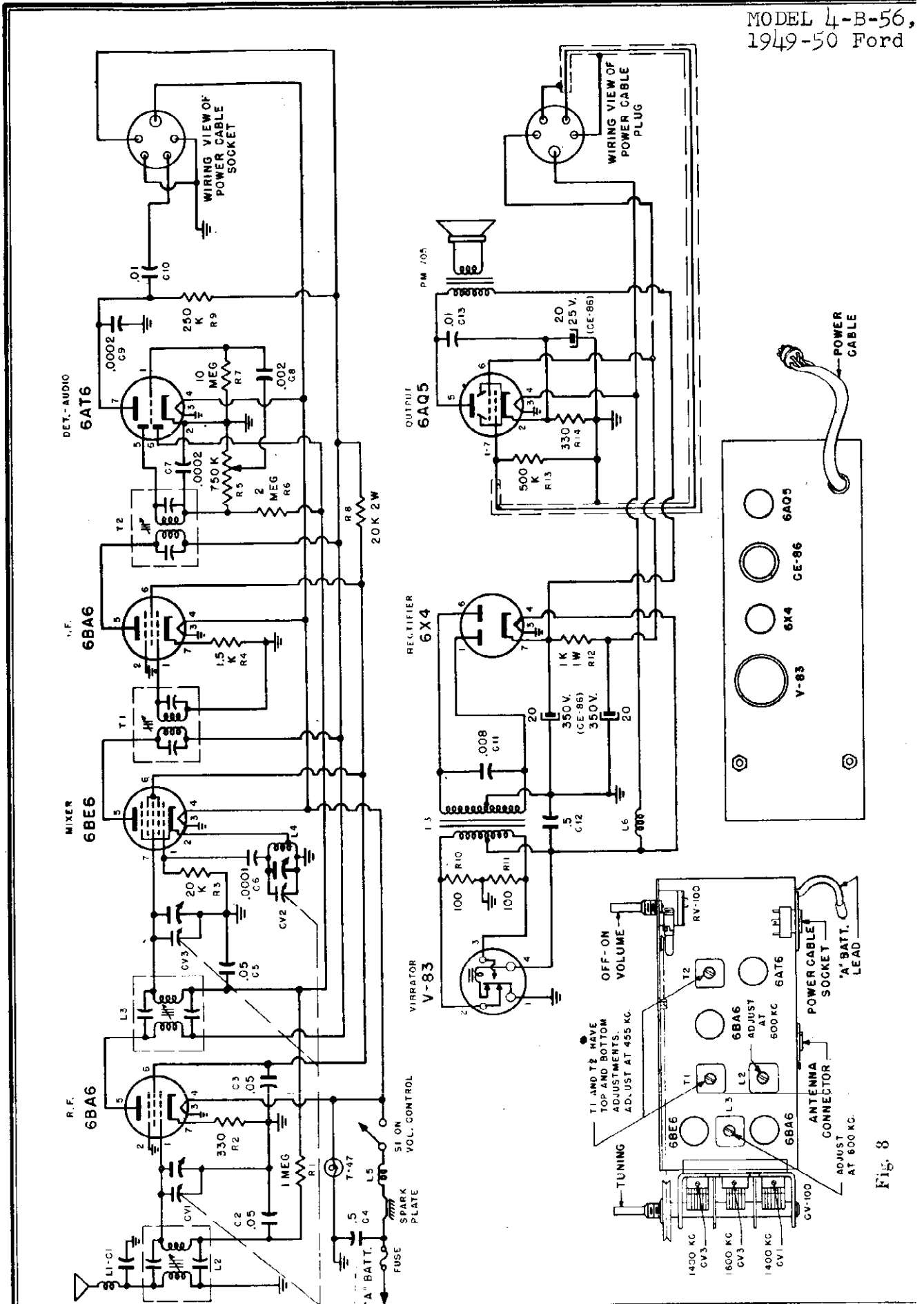


Fig. 8

MODEL 4-B-56,
1949-50 Ford

PARTS LIST

CONDENSERS

Schematic Diagram Reference	Part No	Description
C2, C3, C5	C207	.05 MFD 200 volt condenser
C4, C12	C209	.5 MFD 100 volt condenser
C6	CC200	100 MMFD ceramic condenser
C7, C9	CC201	200 MMFD ceramic condenser
C8	C203	.002 MFD 400 volt condenser
C10, C13	C206	.01 MFD 400 volt condenser
C11	C205	.008 MFD 1600 volt condenser
CE86	CE-86	20 MFD 350 volt electrolytic condenser
		20 MFD 350 volt electrolytic condenser
		20 MFD 25 volt electrolytic condenser
CV1-CV2-CV3	CV-100A	3 section variable

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2, R14	R303	330 ohm 1/2 watt 20% resistor
R3	R306	20K ohm 1/2 watt 20% resistor
R4	R314	1.5K ohm 1/2 watt 20% resistor
R5	RV-100	Volume control 3/4 megohm with switch
R6	R310	2 megohm 1/2 watt 20% resistor
R7	R311	10 megohm 1/2 watt 20% resistor
R8	R313	20K ohm 2 watt 20% resistor
R9	R307	250K ohm 1/2 watt 20% resistor
R10, R11	R301	100 ohm 1/2 watt 20% resistor
R12	R312	1K ohm 1 watt 20% resistor
R13	R308	500K ohm 1/2 watt 20% resistor

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	15053 or 57FB-3	Antenna coil
L3	15054 or 57FB-4	R.F. coil
L4	L201	R. F. oscillator coil
L5	L203	Choke "A" line
L6	L202	Choke, vibrator hash
T2	14977 or 1655-16	2nd IF transformer
T1	14977 or 1655-16	1st IF transformer
T3	TV-100 or 318V-2	Vibrator transformer
T4		Output transformer (Part of speaker not furnished separately)

MISCELLANEOUS

A300	"A" lead assembly
H301	Case, less covers for Power Supply Unit
H100	Case, complete with covers for R.F. tuning unit
H207	Clip, Anti-rattle
H208	Clip, coil mounting
H102	Cover, power supply unit mounting (with speaker louvres)
A201	Fuse 15 Amp.
504PC-300	Power Cable Assembly (complete with plug)
H212	Receptacle, Antenna cable
504-FC	Socket, power cable
PM-705	Speaker, 5 1/4" PM (includes output transformer)
V-83	Vibrator
H310	Knob
H311	Cup washer
H113	7/16-28 Hex nut
C100	.5 MFD generator condenser
R100	Distributor suppressor

DIAL PARTS

D100	Dial Scale Escutcheon, Plastic
PS100	Dial Pointer
T47	Pilot Light
H114	Pilot Light Socket
H203	Pulley, idler
H204	Spring, Dial drive String Tension
H115	String, dial drive

MODEL 4-B-60,
1951 Ford

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superheterodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone Top Cowl Aerial Stock No. 4-B-30. The unit is simple to install and requires no electrical adjustment after installation.

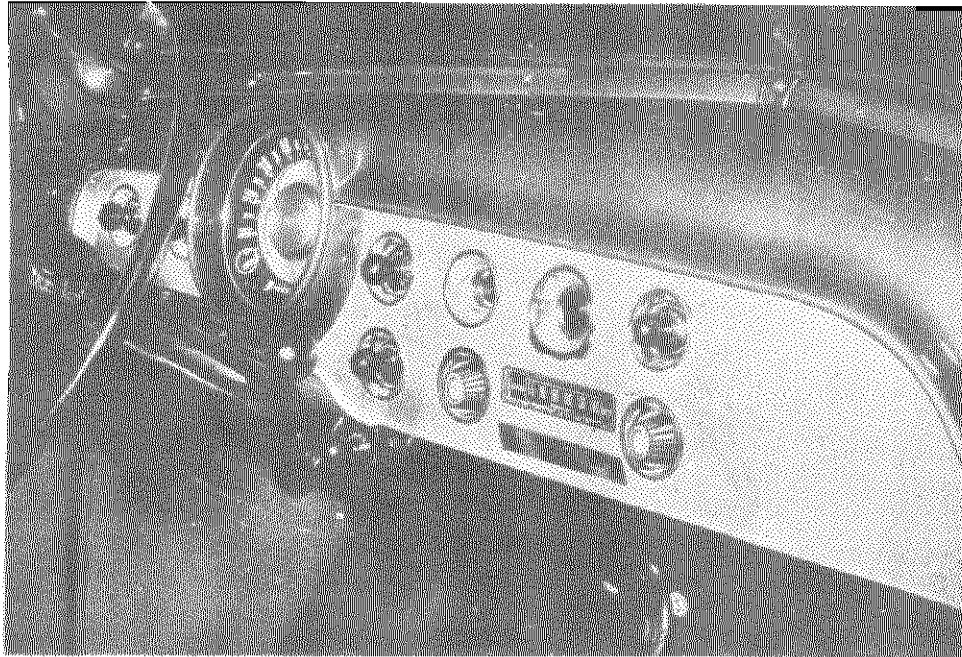


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

1. Remove the radio opening cover plate by removing the speed nuts at the rear of the instrument panel.
2. Remove and discard radio bezel cups on car by removing hex nuts securing bezel cups to instrument panel.
3. Remove knobs, hex nuts, and bezel cups from tuning unit.
4. Carefully position tuning unit behind instrument panel so the mounting bushings and shafts protrude through the front panel.
5. Place bezel cups over mounting bushings.
6. Attach tuning unit and bezel cups to instrument panel with a hex nut on each mounting bushing.
7. Replace knobs.
8. Position mounting bracket over mounting stud located behind instrument panel and secure with a 1/4" lockwasher and a 1/4 - 20 nut.
9. Secure mounting bracket to side of tuning unit with hex head No. 8 self tapping screw, as shown in Fig. 2
10. Place speaker and power pack unit over three threaded stud bolts behind the instrument panel. (Position power pack unit so that power cable is located near the tuning unit.) See Fig. 2.
11. Secure power pack into position with the wing nuts supplied in the kit of mounting hardware.

MODEL 4-B-60,
1951 Ford

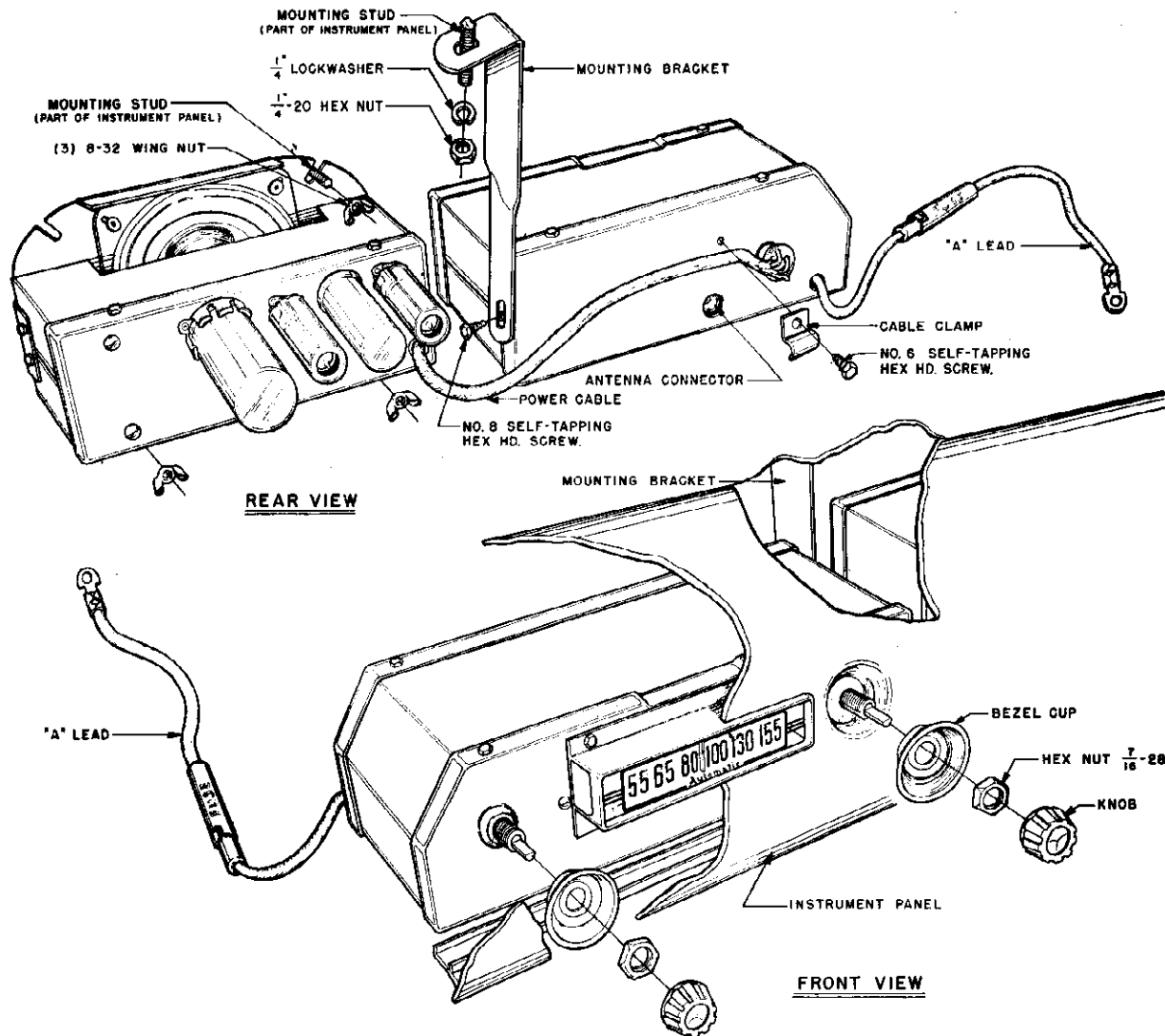


Fig. 2

DETAIL ASSEMBLY

INSTALLATION (Continued)

12. Insert power cable plug into socket on rear of tuning unit.
13. Secure power cable under cable clamp, and tighten clamp screw.
14. Plug antenna cable into tuning unit.
15. Connect "A" lead to terminal on ignition switch.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.

(See detail assembly drawing FIG. 2)

- 2 Bezel cups
- 2 7/16 — 28 hex nuts
- 2 Knobs
- 1 Cable clamp

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 1 Supporting bracket
- 1 No. 8 self-tapping screw
- 1 1/4" lockwasher
- 1 1/4 — 20 nut
- 3 No. 8 — 32 wing nuts

MOTOR NOISE ELIMINATION

MODEL 4-B-60,
1951 Ford

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser
- 1 Distributor suppressor

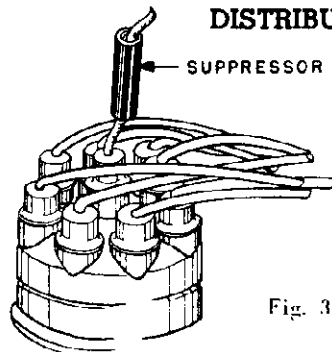


Fig. 3

DISTRIBUTOR 8 CYLINDER

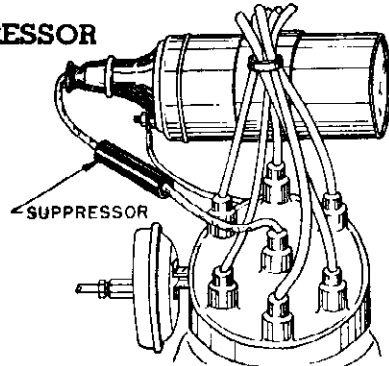


Fig. 4

DISTRIBUTOR-6 CYLINDER

Disconnect high tension wire that runs from the ignition coil to the center hole of the distributor head. Cut lead one and one-half inches back from metal tip end for 8 cylinder Ford or two and one-half inches back for 6 cylinder Ford. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor, back into distributor head.

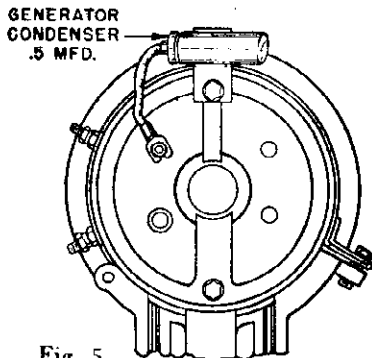


Fig. 5

GENERATOR CONDENSER

Loosen the top assembly bolt from the rear end plate of the generator. **DO NOT REMOVE.** Mount .5 MFD generator condenser under this bolt. Tighten bolt and connect condenser lead to the armature terminal of the generator.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA

ELECTRICAL SPECIFICATIONS

Power Supply.....	6.3 Volts DC
Current.....	5.5 Amp. average
Frequency Range.....	538-1600 KC
Speaker.....	5 1/4" PM
Power Output.....	2 watts, undistorted
	3 watts, maximum
Sensitivity.....	2-3 microvolts average for 1 watt output
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:

- 1—6BA6—RF Amplifier
- 1—6BE6—Converter
- 1—6BA6—I. F. Amplifier
- 1—6AT6—Detector—AVC—1st Audio
- 1—6AQ5—Power Output
- 1—6X4—Rectifier
- (6AV6 used in place of 6AT6 on some models)

MODEL 4-B-60,
1951 Ford
SERVICE NOTES

- Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart. (Fig. 7 and 7A).
- All voltages should be measured with an input voltage of 6.3 volts DC.
- To check for open-by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

DIAL CORD DRIVE

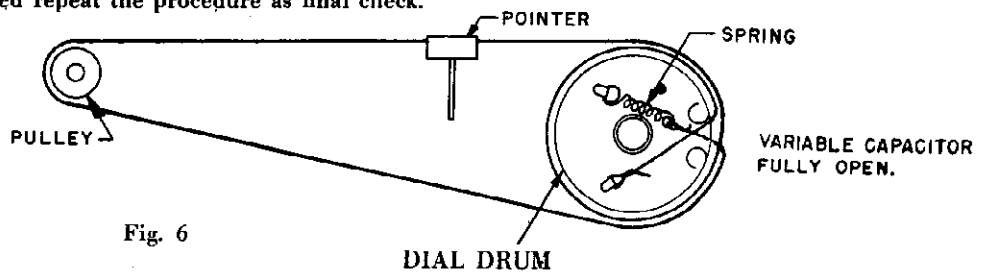


Fig. 6

REPLACEMENT PARTS LIST

SCHEMATIC DIAGRAM REF. NO.	PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
CONDENSERS				
C2, C3, C5	C207	.05 MFD 200 volt condenser	L6	L202 Choke, vibrator hash
C4, C12	C209	.5 MFD 100 volt condenser	T2	14977 or 1655-16 2nd IF transformer
C6	CC200	100 MMFD ceramic condenser	T1	14977 or 1655-16 1st IF transformer
C7, C9	CC201	200 MMFD ceramic condenser	T3	TV-100 or 318V-2 Vibrator transformer
C8	C203	.002 MFD 400 volt condenser	T4	Output transformer (Part of speaker not furnished separately)
C10, C13	C206	.01 MFD 400 volt condenser	DIAL PARTS	
C11	C205	.008 MFD 1600 volt condenser	D151	Dial Scale
CE-86	CE-86	20 MFD 350 volt electrolytic condenser	H151	Dial Scale Holder
		20 MFD 350 volt electrolytic condenser	PS151	Dial Pointer
		20 MFD 25 volt electrolytic condenser	T47	Pilot Light
CV1-CV2-CV3	CV-100A	3 section variable	H114	Pilot Light Socket
RESISTORS				
R1	R309	1 megohm 1/2 watt 20% resistor	H203	Pulley, idler
R2, R14	R303	330 ohm 1/2 watt 20% resistor	H204	Spring, Dial drive String Tension
R3	R306	20K ohm 1/2 watt 20% resistor	H115	String, dial drive
R4	R314	1.5K ohm 1/2 watt 20% resistor	MISCELLANEOUS	
R5	RV-100	Volume control 3/4 megohm with switch	A300	"A" lead assembly
R6	R310	2 megohm 1/2 watt 20% resistor	H152	Bezel Cup
R7	R311	10 megohm 1/2 watt 20% resistor	H153	Case, less covers for Power Supply Unit
R8	R313	20K ohm 2 watt 20% resistor	H154	Case, complete with covers for R.F. tuning unit
R9	R307	250K ohm 1/2 watt 20% resistor	H207	Clip, Anti-rattle
R10, R11	R301	100 ohm 1/2 watt 20% resistor	H208	Clip, coil mounting
R12	R312	1K ohm 1 watt 20% resistor	H102	Cover, power supply unit mounting (with speaker louvres)
R13	R308	500K ohm 1/2 watt 20% resistor	A201	Fuse 15 Amp.
COILS AND TRANSFORMERS				
L1-C1	L200	Motor noise elimination unit	H155	Knob
L2	15053 or 57FB-3	Antenna coil	H156	Mounting Bracket
L3	15054 or 57FB-4	R.F. coil	504PC-300	Power Cable Assembly (complete with plug)
L4	L201	R.F. oscillator coil	H212	Receptacle, Antenna cable
			504-FC	Socket, power cable
			PM-705	Speaker, 5 1/4" PM (includes output transformer)
			V-83	Vibrator
			H311	Cup washer
			H113	7/16-28 Hex nut
			C100	.5 MFD generator condenser

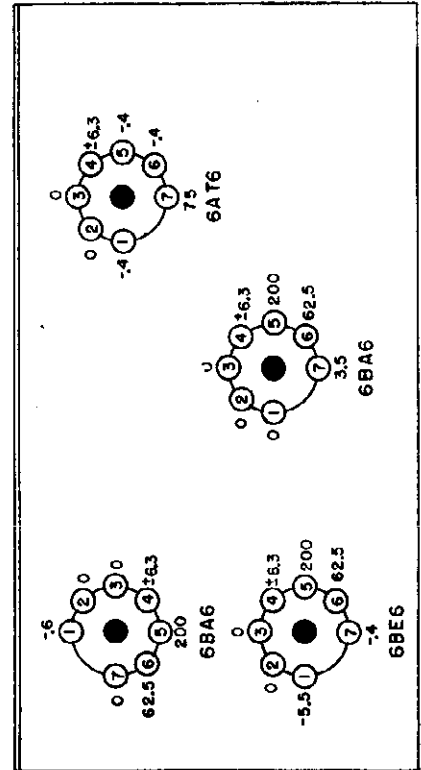
ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments. The following equipment is necessary for proper alignment:
 No signal applied to antenna. Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
 Power input—6.3 volts. Non-metallic screwdriver.
 Connect dummy antenna in series with output lead of signal generator. Output meter. (1.8 volt for 1 watt output.)
 Connect ground lead of signal generator to chassis. Dummy antennas—.1 MFD., 100 MMFD.
 Repeat alignment procedure as a final check. For alignment points refer to Schematic Diagram.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connection	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna

8) Repeat steps 4 and 5

BOTTOM VIEW OF CHASSIS



FRONT OF CHASSIS

BOTTOM VIEW OF POWER PACK

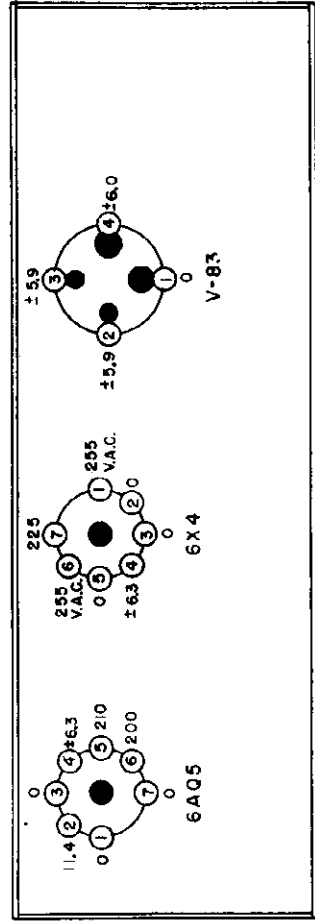
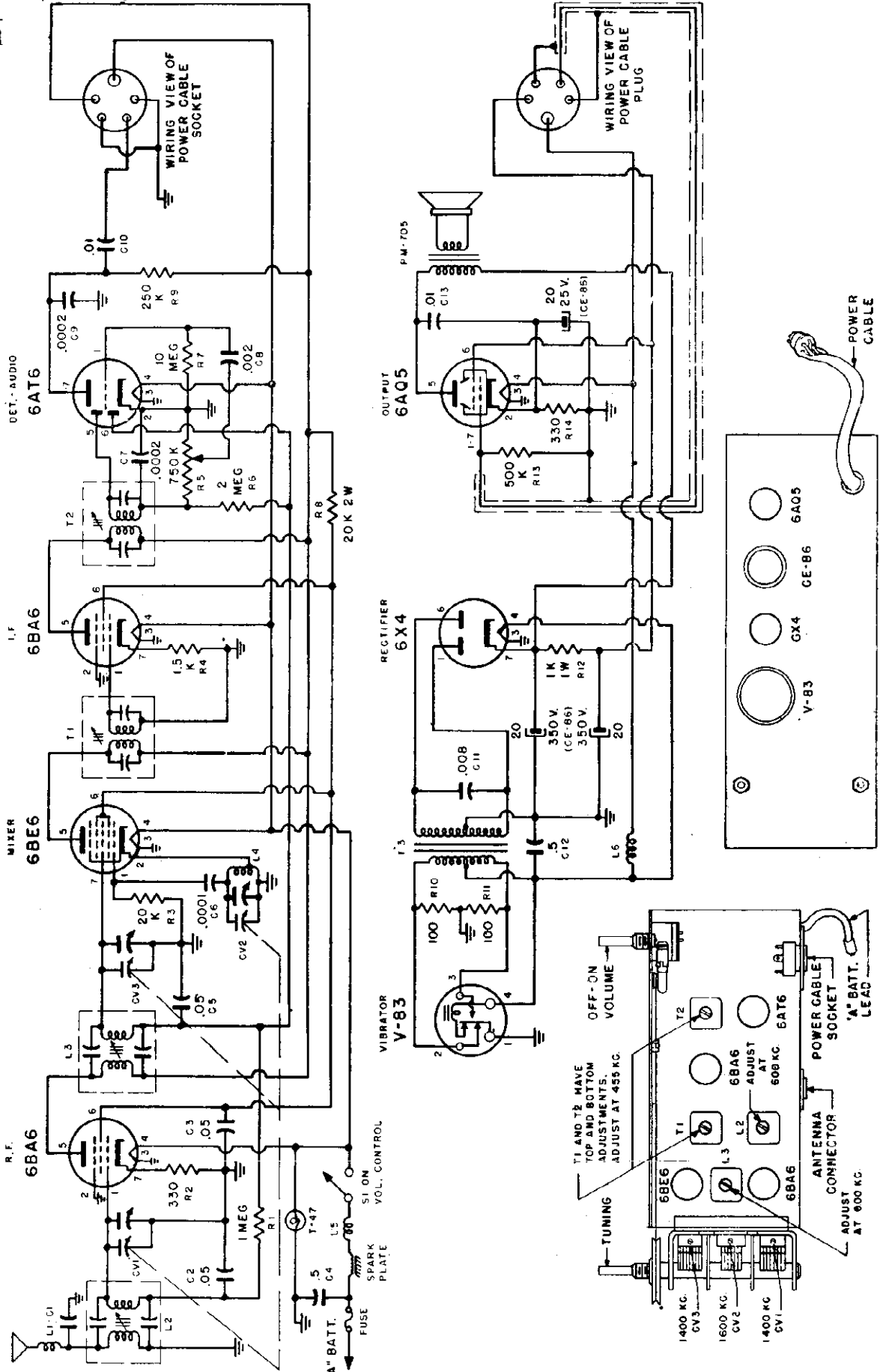


Fig. 7

SOCKET VOLTAGES

Fig. 7A

MODEL 4-B-60,
1951
Ford

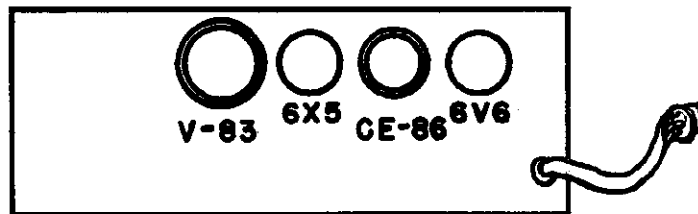
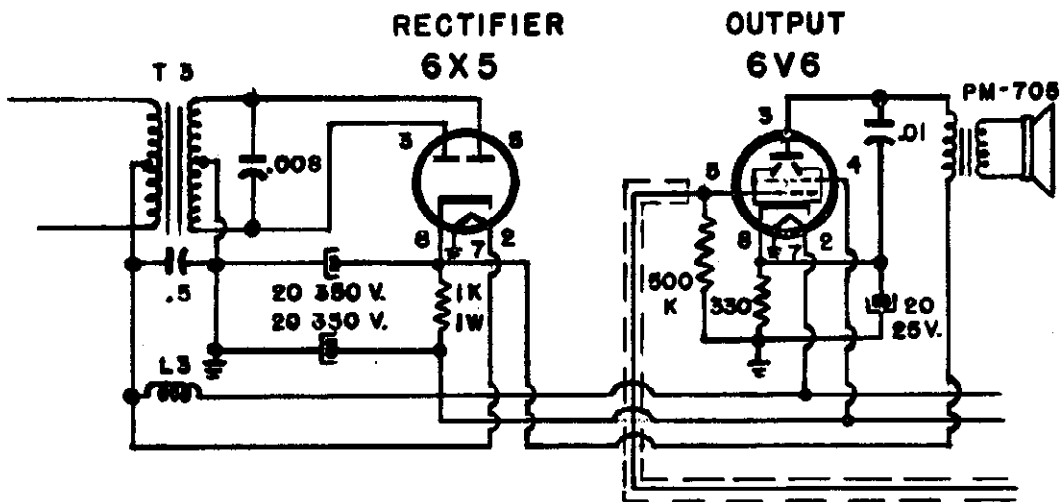


(NOTE: 6AV6 Tube used in place of 6AT6 on some models.)

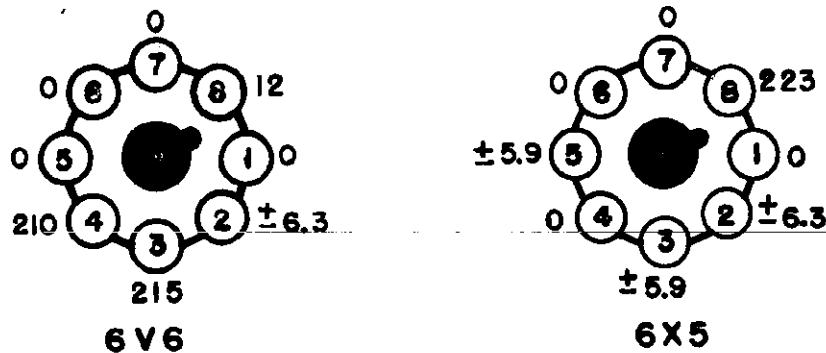
Fig. 8

MODEL 4-B-60.
1951 Ford

SUBSTITUTION OF 6X5 TUBE IN PLACE OF 6X4 AND 6V6 TUBE IN PLACE OF 6AQ5.



TUBE LOCATION CHART



SOCKET VOLTAGES CHART

MODEL 4-B-61,
1951 Chevrolet

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained P.M. speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone disappearing fender-well aerial stock No. 4-B-21. The unit is simple to install and requires no electrical adjustment after installation.

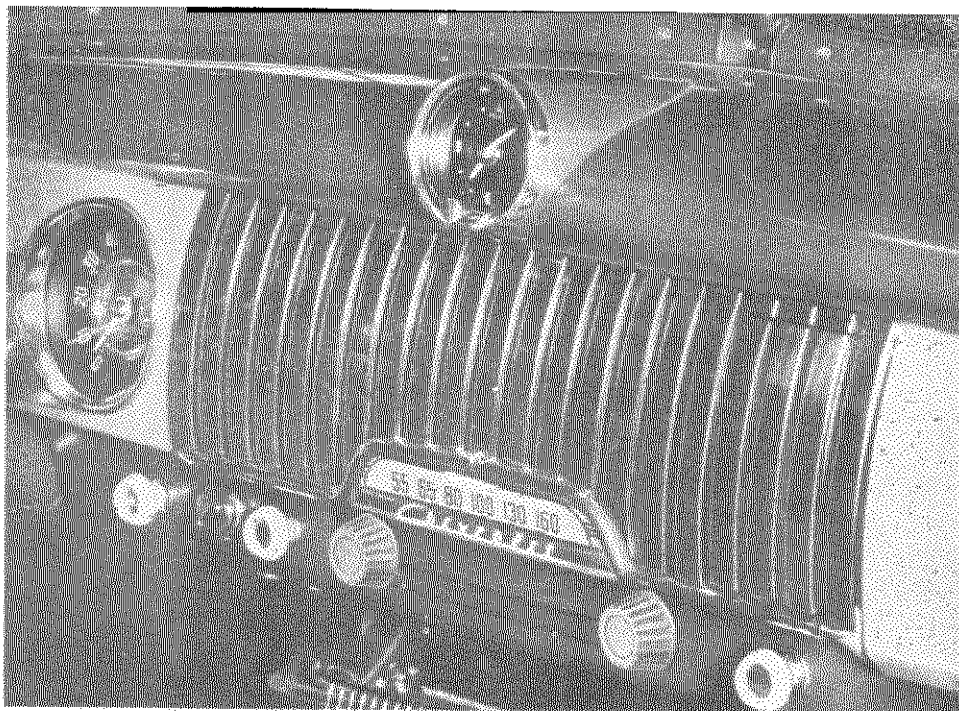


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

1. Remove two speed nuts securing dummy control cover plate. Discard dummy plate and speed nuts.
2. Remove 12-24 hex nuts securing dummy radio opening cover plate. Save hex nuts but discard dummy plate.
3. Referring to Fig. 2 (rear view), place mounting brackets over 12-24 stud bolts and attach with #12 lockwashers, contained in kit of mounting hardware, and 12-24 hex nuts previously removed.
4. Remove knobs, cup washers, hex nuts, washers and control cover plate from control shafts and mounting bushings.
5. Referring to Fig. 2 (front view), position the receiver behind the instrument panel so that the shafts and mounting bushings protrude through the instrument panel and the stud bolts on the sides of the receiver slide into the slotted ends of the mounting brackets.
6. Secure the mounting brackets to receiver with $\frac{1}{4}$ " lockwashers and $\frac{1}{4}$ -20 hex nuts.

MODEL 4-B-61,
1951 Chevrolet

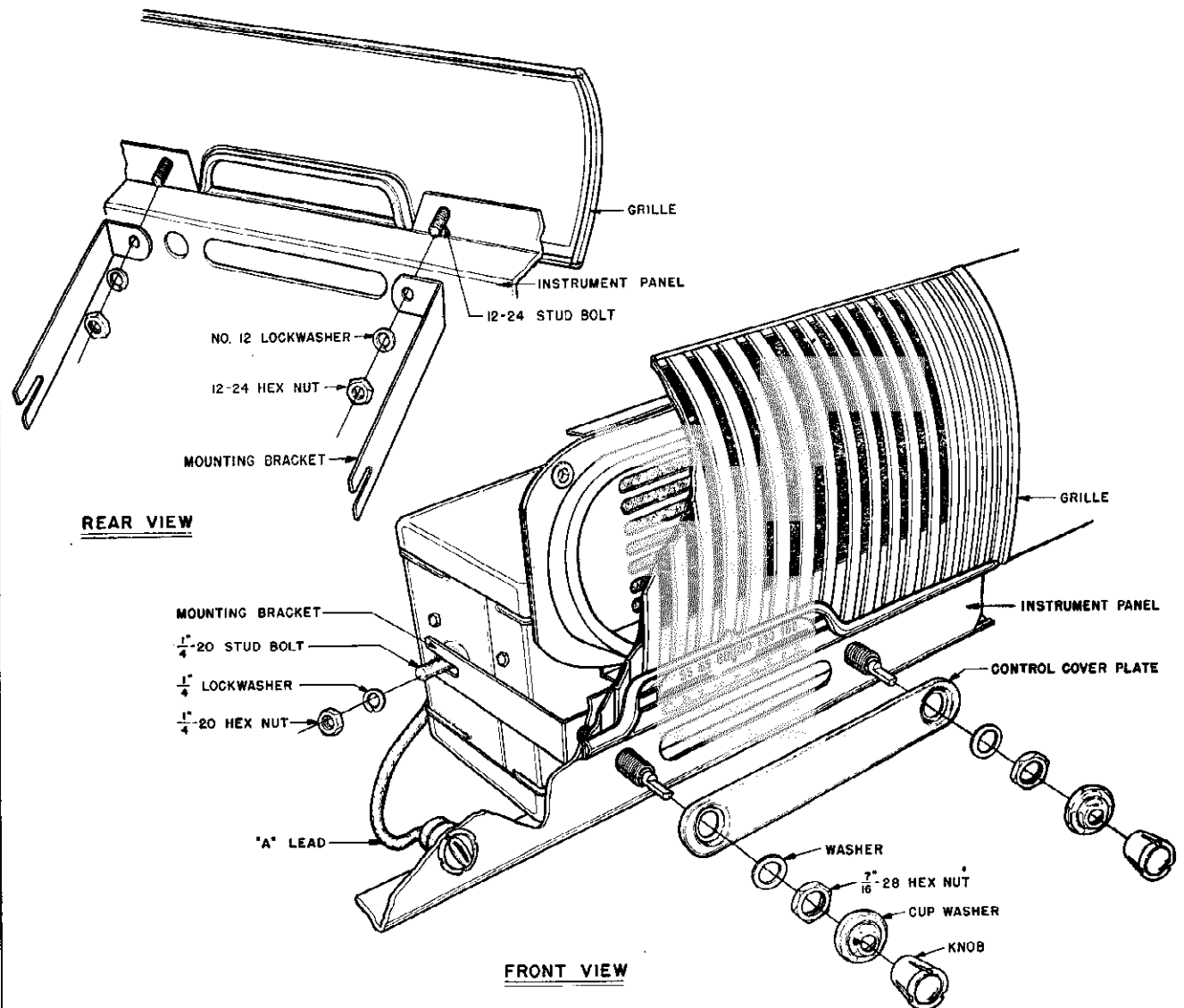


Fig. 2

DETAIL ASSEMBLY

INSTALLATION (Continued)

7. Place control cover plate over mounting bushings.
8. Replace washers and hex nuts on mounting bushings.
9. Replace cup washers and knobs on control shafts.
10. Connect the "A" lead to ignition switch.
11. Plug antenna cable into receptacle located on the back of the receiver.

ACCESSORIES FURNISHED FOR INSTALLATION

The following mounting hardware parts are shipped attached to the receiver. (See Detail Assembly drawing Fig. 2.)

2 Knobs	1 Control Cover Plate
2 Cup washers	2 1/4" Lockwashers
2 7/8-28 Hex nuts	2 1/4-20 Hex Nuts
2 Washers	

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 No. 12 Lockwashers
- 2 Mounting Brackets

MODEL 4-B-61, 1951 Chevrolet **MOTOR NOISE ELIMINATION**

SUPPRESSION KIT

- A suppression kit is shipped with this receiver. It contains the following parts:
- 1 Generator Condenser.
 - 1 Distributor Suppressor.

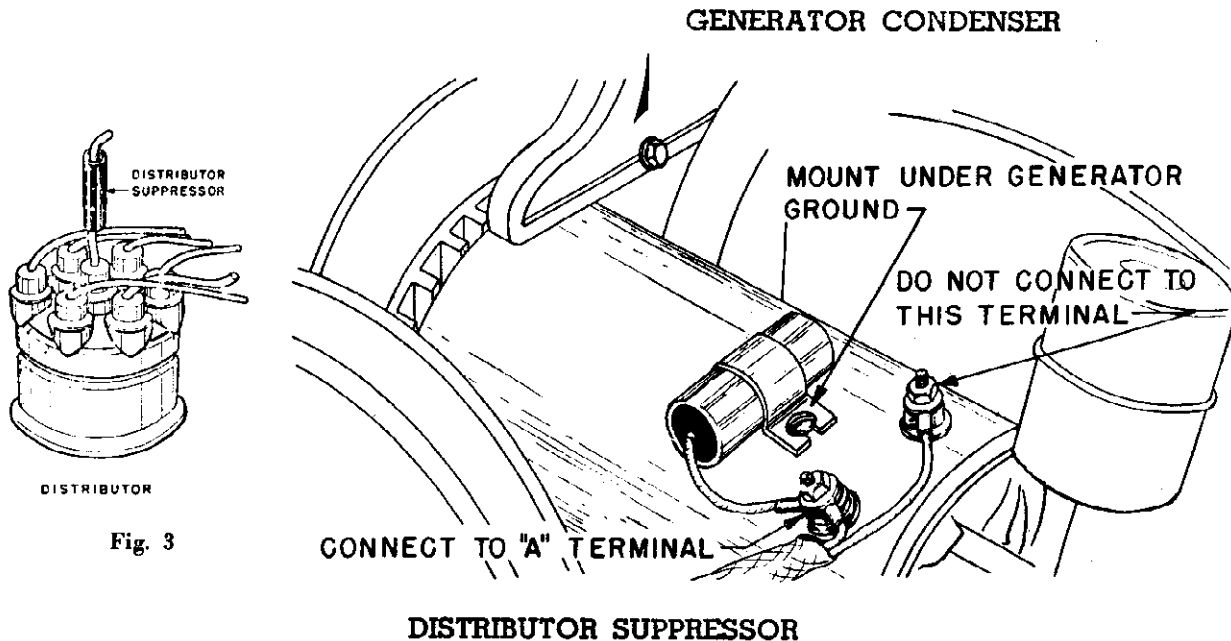


Fig. 3

Disconnect the center lead in the distributor head of the motor. Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA ELECTRICAL SPECIFICATIONS

Power Supply.....	6.3 Volts DC
Current.....	5.5 Amp. average
Frequency Range.....	538-1600 KC
Speaker.....	5 1/4" PM
Power Output.....	2 watts, undistorted
	3 watts, maximum
Sensitivity.....	2-3 microvolts average for 1 watt output
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC

- This receiver contains the following:
- 1—6BA6—RF Amplifier
 - 1—6BE6 Converter
 - 1—6BA6—I. F. Amplifier
 - 1—6AT6—Detector—AVC—1st Audio
 - 1—6AQ5—Power Output
 - 1—6X4—Rectifier
- (6AV6 used in place of 6AT6 on some models.)

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 4).
All voltages should be measured with an input voltage of 6.3 volts DC.
To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.
If realignment is necessary follow the instructions given under the heading "Alignment Procedure". After realignment has been completed repeat the procedure as final check.

INSTRUCTIONS FOR SERVICING RECEIVER COMPONENTS

The novel design of this receiver permits servicing all components without removing the chassis from the case. The top cover can be removed by removing the four (4) screws securing it to the case. This exposes all tube sockets, connections, resistors and condensers for observation and service.
Removing the bottom cover makes it possible to service tubes, vibrator, and volume control.

PARTS LIST

Schematic Diagram Reference	Part No.
C2, C3, C4	C207
C5	CC209
C6, C13, C14	CC201
C7	C203
C8, C9	C206
C10, C11	C209
C12	C205
CE-86	CE-86
CV-200	CV-200

CONDENSERS

Description	A351
.05 MFD 200 volt condenser	H352
100 MMFD ceramic condenser	H207
200 MMFD ceramic condenser	H208
.002 MFD 400 volt condenser	H209
.01 MFD 600 volt condenser	H354
.5 MFD 100 volt condenser	H355
.008 MFD 1600 volt condenser	H311
20 MFD 350 volt electrolytic condenser	A201
20 MFD 350 volt electrolytic condenser	H211
20 MFD 25 volt electrolytic condenser	H310
3 section variable tuning condenser	H212
	PM-250

MISCELLANEOUS

"A" lead assembly	A351
Bracket, mounting	H352
Case, (less covers)	H353
Clip, anti-rattle	H207
Clip, coil mounting	H208
Cover, bottom case	H209
Control Cover Plate	H354
Cover, top case	H355
Cup washers, shaft	H311
Fuse, 15 amp	A201
Grommet, rubber, gang mounting	H211
Knob	H310
Receptacle, antenna cable	H212
Speaker, 5/4" PM includes output transformer	PM-250
Vibrator	V-83 or V-94
1/2-28 Hex nut	H113
.5 MFD Generator condenser	C100
Distributor suppressor	R100

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor	
R2	R306	20K ohm 1/2 watt 20% resistor	
R3	R314	1.5K ohm 1/2 watt 20% resistor	
R4	R310	2 megohm 1/2 watt 20% resistor	
R5	R311	10 megohm 1/2 watt 20% resistor	
R6	R307	250K ohm 1/2 watt 20% resistor	
R7	R308	500K ohm 1/2 watt 20% resistor	
R8, R13	R303	330 ohm 1/2 watt 20% resistor	D351
R9	R313	20K ohm 2 watt 20% resistor	PS351
R10, R11	R301	100 ohm 1/2 watt 20% resistor	DS200
R12	R312	1K ohm 1 watt 20% resistor	H201
RV-200	RV-200	Volume control 3/4 megohm with switch	T51

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit	H204
L2	57FB-3	Antenna Coil	H205
L3	57FB-4	RF coil	
L4	L201	RF Oscillator coil	
L5	L202	Choke, vibrator hash	
L6	L203	Choke, "A" line	
T1	1655-16	1st IF transformer	
T2	1655-16	2nd IF transformer	
T3		Output transformer (Part of speaker not furnished separately)	
T4	TV-100 or TV-86A	Vibrator transformer	

DIAL PARTS

Dial Scale	D351
Dial Pointer	PS351
Drive shaft assembly	DS200
Grommet, rubber drive	H201
Pilot light	T51
Pilot light socket	H202
Pulley, idler	H203
Spring, Dial Drive String Tension	H204
String, Dial Drive	H205

MODEL 4-B-61,
1951 Chevrolet

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
 No signal applied to antenna.
 Power input—6.3 volts.
 Connect dummy antenna in series with output lead of signal generator.
 Connect ground lead of signal generator to chassis.
 Repeat alignment procedure as a final check.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connection	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						

The following equipment is necessary for proper alignment:
 Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%:
 Non-metallic screwdriver.
 Output meter. (1.8 volt for 1 watt output.)
 Dummy antennas—.1 MFD., 100 MMFD.
 For alignment points refer to Schematic Diagram.

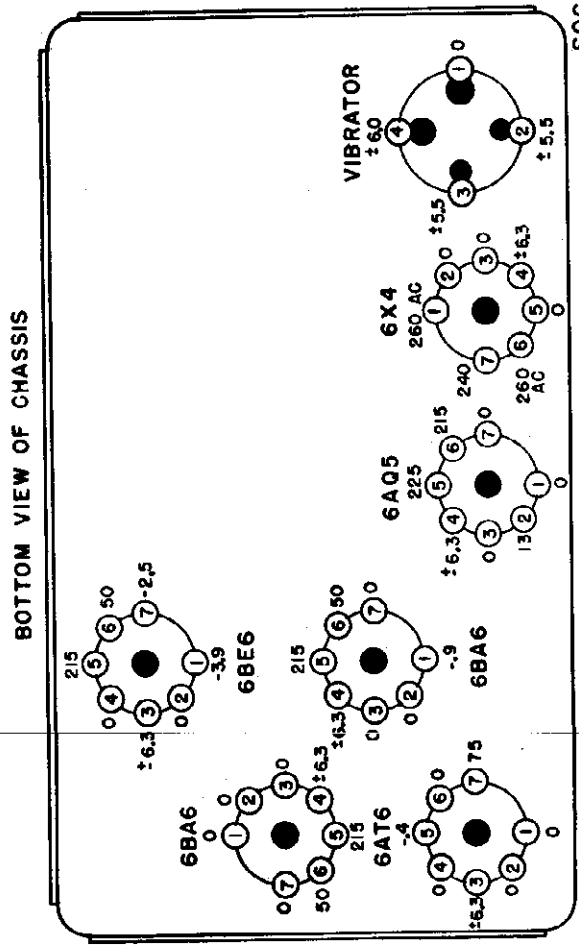


Fig. 4 FRONT OF CHASSIS SOCKET VOLTAGES

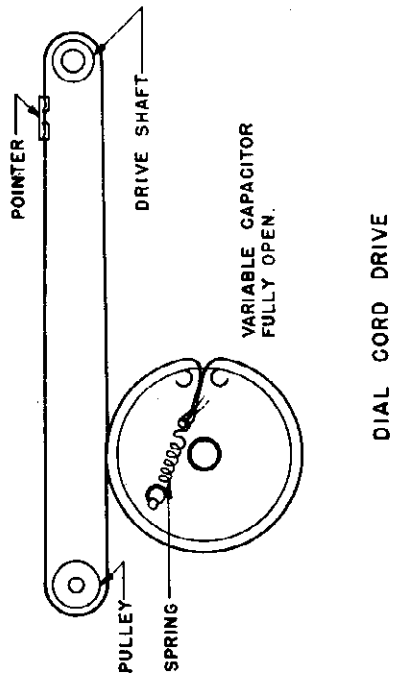
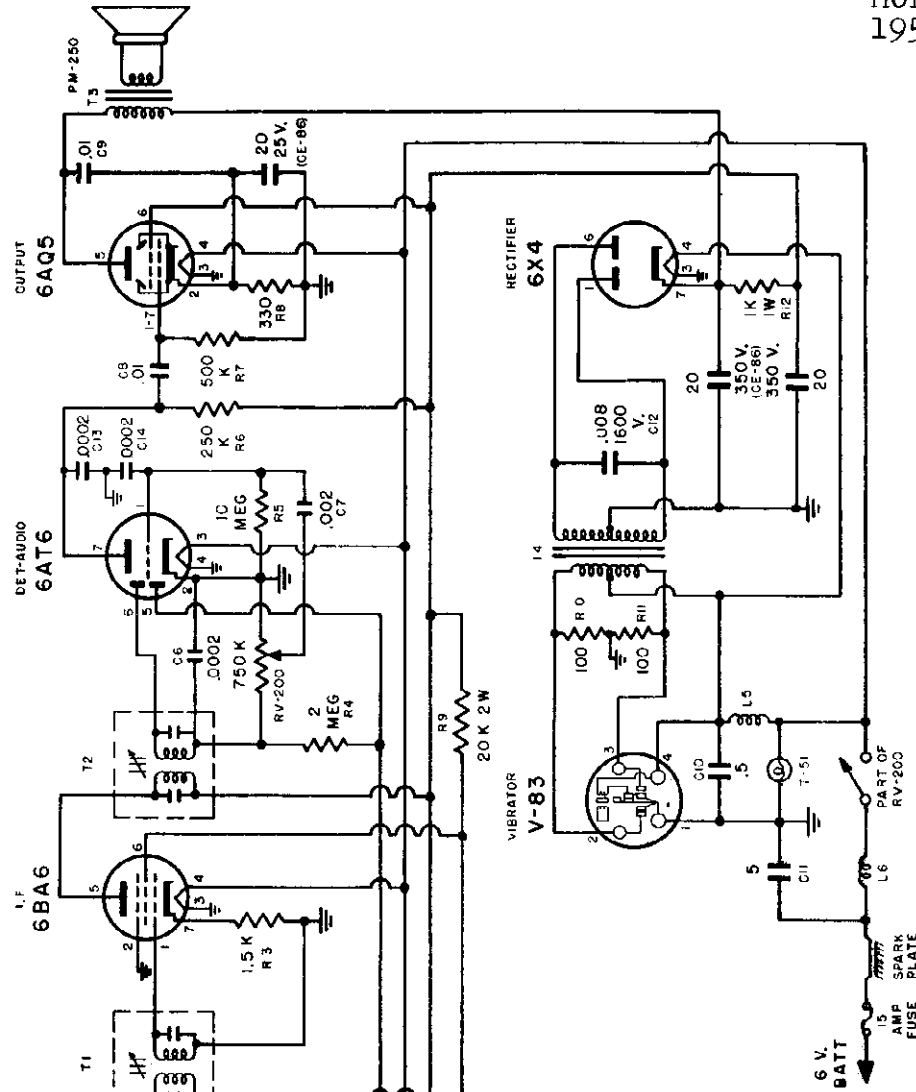


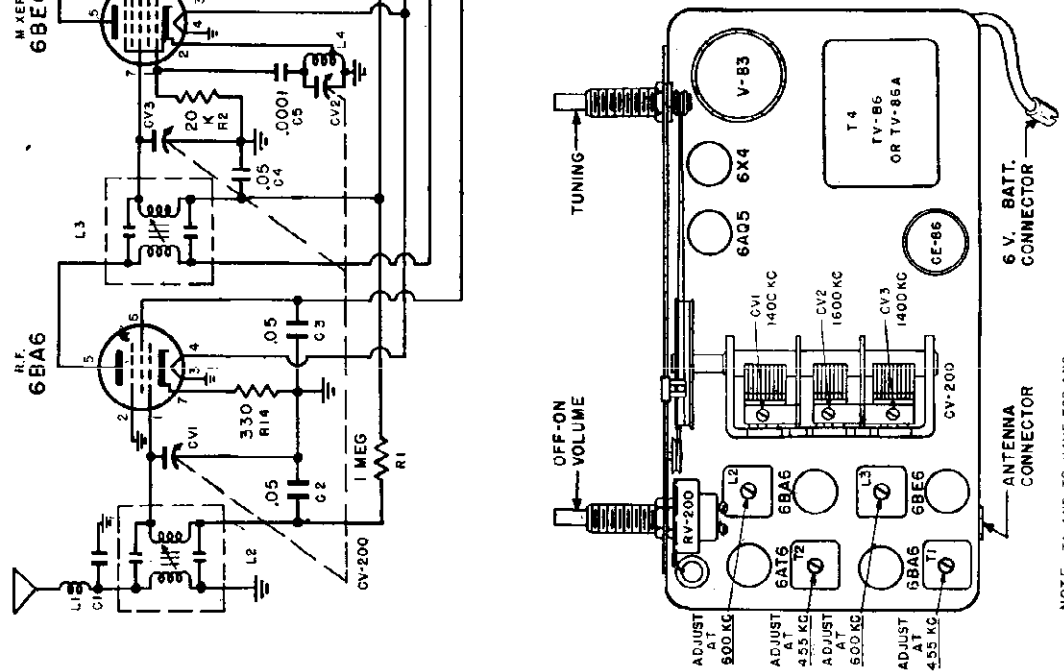
Fig. 5

MODEL 4-B-61,
1951 Chevrolet



Note: 6AV6 used in place of 6AT6 on some models.

Fig. 6



NOTE: T1 AND T2 HAVE TOP AND BOTTOM ADJUSTMENTS. ADJUST AT 455 KC.

MODEL 4-B-62,
1950-1951
Studebaker

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone Top Cowl Aerial Stock No. 4-B-30. The unit is simple to install and requires no electrical adjustment after installation.

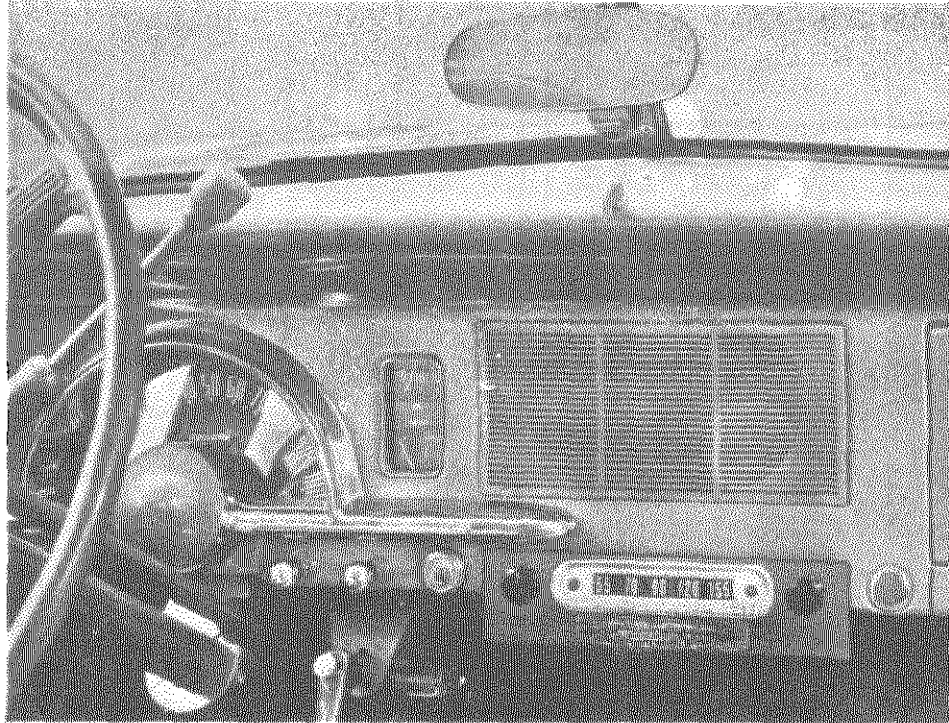


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION (See Fig. 2)

1. Attach rubber gasket baffle assembly to speaker grille on radio with 4 snap fasteners supplied in kit of mounting hardware.
2. Remove two screws securing radio opening cover plate to instrument panel.
3. Discard cover plate.
4. *Important:* Some car models have a cover over the speaker opening at the back of the instrument panel. Remove and discard this cover.
5. Lift hood of car and locate the two 5/16" holes which are in the Fire Wall just below the windshield wiper motor. Insert hook bolt through the right hand hole on the engine side.
6. Place a 1/4-20 hex nut approximately one inch up on threaded end of hook bolt.

MODEL 4-B-62,
1950-51,
Studebaker

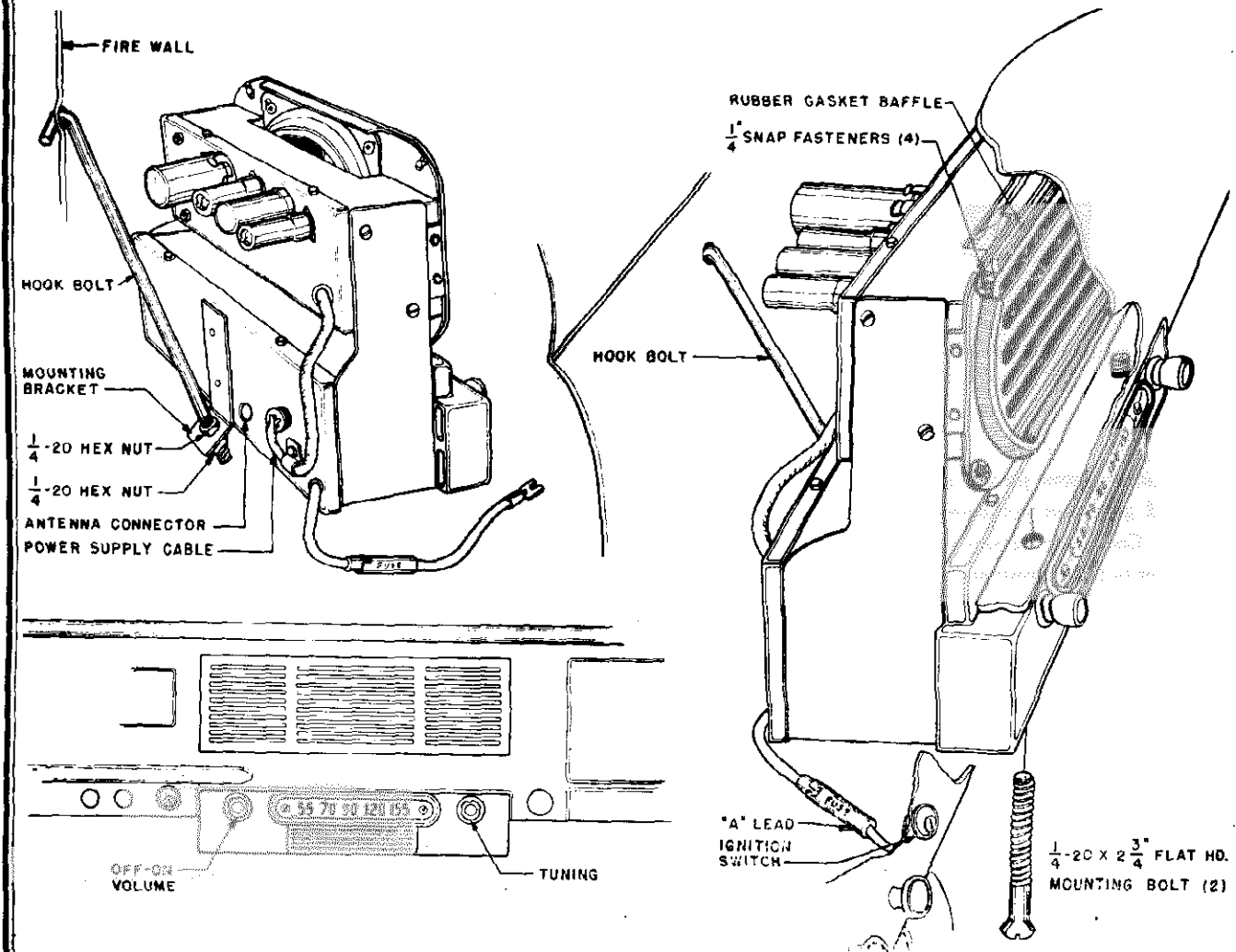


Fig. 2
**DETAIL MOUNTING ASSEMBLY
INSTALLATION (Continued)**

7. Position radio with attached rubber gasket baffle behind instrument panel and insert threaded end of hook bolt through hole on bracket attached to back of radio.
8. Screw $\frac{1}{4}$ -20 hex nut on hook bolt. Adjust position of the two $\frac{1}{4}$ -20 hex nuts so that the radio is mounted parallel to instrument panel. Tighten bottom hex nut.
9. Insert two $\frac{1}{4}$ -20 Flat head bolts supplied in mounting kit through bottom edge of radio and screw into edge of instrument panel.
10. Connect "A" lead to terminal on ignition switch.
11. Plug antenna cable into receiver.

MOUNTING PARTS KIT

ACCESSORIES FURNISHED FOR INSTALLATION

- 1 Rubber Gasket baffle assembly
- 4 $\frac{1}{4}$ " snap fasteners
- 1 Hook bolt
- 2 $\frac{1}{4}$ -20 hex nuts
- 2 $\frac{1}{4}$ -20 x $2\frac{3}{4}$ " flat head mounting bolts

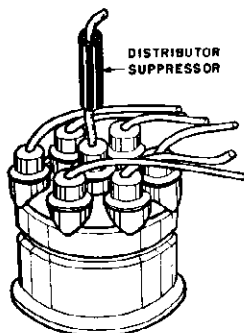
MODEL 4-B-62,
1950-1951
Studebaker

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor suppressor.



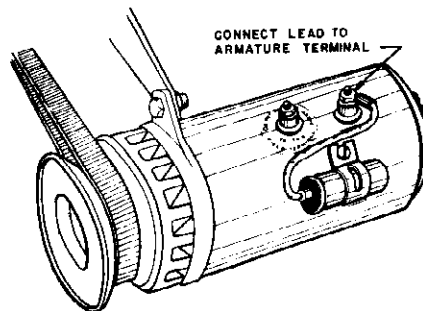
DISTRIBUTOR
Fig. 3

DISTRIBUTOR SUPPRESSOR

Disconnect the high tension wire that runs from the ignition coil to the center hole of the distributor cap. Cut lead one inch back from the metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into distributor cap. Plug lead with attached suppressor back into distributor cap.

GENERATOR CONDENSER

Loosen screw on top surface of generator near terminals. Insert slotted generator condenser bracket under screw head and tighten screw. Connect generator condenser lead to armature terminal. *Do not connect to field terminal.*



GENERATOR CONDENSER
Fig. 4

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

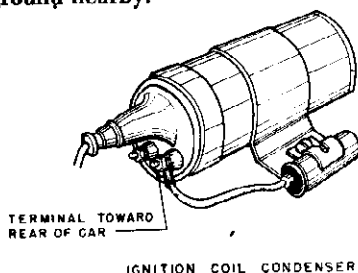


Fig. 5

IGNITION COIL CONDENSER

In some cases it may be necessary to connect a .5 MFD by-pass condenser from the rear terminal of the ignition coil to ground.

ELECTRICAL ACCESSORIES

It may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA

ELECTRICAL SPECIFICATIONS

Power Supply.....	6.3 Volts DC
Current.....	5.5 Amp. average
Frequency Range.....	538-1600 KC
Speaker.....	5 1/4" PM
Power Output.....	2 watts, undistorted
	3 watts, maximum
Sensitivity.....	2-3 microvolts average for 1 watt output
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:

- 1- 6BA6—RF Amplifier
- 1- 6BE6—Converter
- 1- 6BA6—I. F. Amplifier
- 1- 6AT6—Detector—AVC—1st Audio
- 1- 6AQ5—Power Output
- 1- 6X4—Rectifier
- (6AV6 used in place of 6AT6 on some models)

MODEL 4-B-62
1950-1951
Studebaker

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 7 and 7A).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

DIAL CORD DRIVE

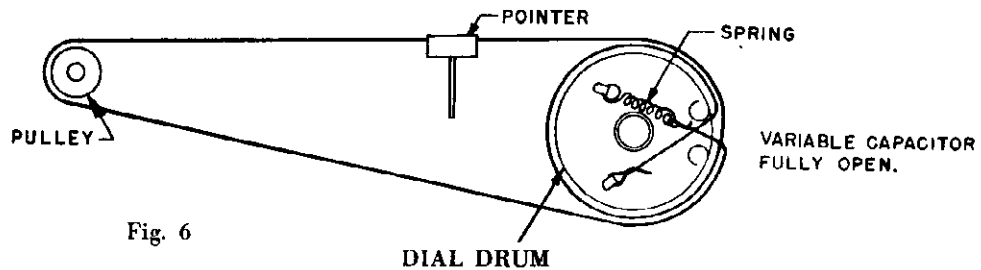


Fig. 6

PARTS LIST
CONDENSERS

Schematic Diagram Reference	Part No.	Description
C2, C3, C5	C207	.05 MFD 200 volt condenser
C4, C12	C209	.5 MFD 100 volt condenser
C6	CC200	100 MMFD ceramic condenser
C7, C9	CC201	200 MMFD ceramic condenser
C8	C203	.002 MFD 400 volt condenser
C10, C13	C206	.01 MFD 400 volt condenser
C11	C205	.008 MFD 1600 volt condenser
CE86	CE-86	20 MFD 350 volt electrolytic condenser
		20 MFD 350 volt electrolytic condenser
		20 MFD 25 volt electrolytic condenser
CV1-CV2-CV3	CV-400	3 section variable

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2, R14	R303	330 ohm 1/2 watt 20% resistor
R3	R306	20K ohm 1/2 watt 20% resistor
R4	R314	1.5 K ohm 1/2 watt 20% resistor
R5	RV-570	Volume control 3/4 megohm with switch
R6	R310	2 megohm 1/2 watt 20% resistor
R7	R311	10 megohm 1/2 watt 20% resistor
R8	R313	20K ohm 2 watt 20% resistor
R9	R307	250K ohm 1/2 watt 20% resistor
R10, R11	R301	100 ohm 1/2 watt 20% resistor
R12	R312	1K ohm 1 watt 20% resistor
R13	R308	500K ohm 1/2 watt 20% resistor

MISCELLANEOUS

A300	"A" lead assembly
H521	Case, less covers for Power Supply Unit
H520	Case, complete with covers for R.F. tuning unit
H207	Clip, Anti-rattle
H208	Clip, coil mounting
H102	Cover, power supply unit mounting (with speaker louvres)
H522	Cover, RF tuning unit, front (complete with plastic escutcheon)
A201	Fuse 15 Amp.
H524	Hook bolt
504PC-300	Power Cable Assembly (complete with plug)
H212	Receptacle, Antenna cable
504-FC	Socket, power cable
PM-705	Speaker, 5 1/4" PM (includes output transformer)
V-83	Vibrator
H310	Knob
H311	Cup washer
C100	.5 MFD generator condenser
R100	Distributor suppressor

DIAL PARTS

H523	Dial Scale Escutcheon, Plastic
PS100	Dial Pointer
T47	Pilot Light
H114	Pilot Light Socket
H203	Pulley, idler
H204	Spring, Dial drive String Tension
H115	String, dial drive

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	15053 or 57FB-3	Antenna coil
L3	15054 or 57FB-4	R.F. coil
L4	L201	R.F. oscillator coil
L5	L203	Choke "A" line
L6	L202	Choke, vibrator hash
T2	14977 or 1655-16	2nd IF transformer
T1	14977 or 1655-16	1st IF transformer
T3	TV-100 or 318V-2	Vibrator transformer
T4		Output transformer (Part of speaker not furnished separately)

MODEL 4-B-62,
1950-1951
Studebaker

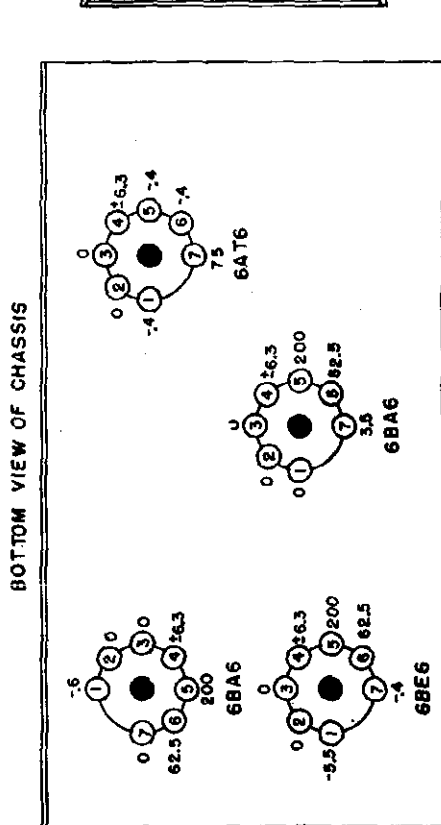
ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
 No signal applied to antenna.
 Power input—6.3 volts.
 Connect dummy antenna in series with output lead of signal generator.
 Connect ground lead of signal generator to chassis.
 Repeat alignment procedure as a final check.

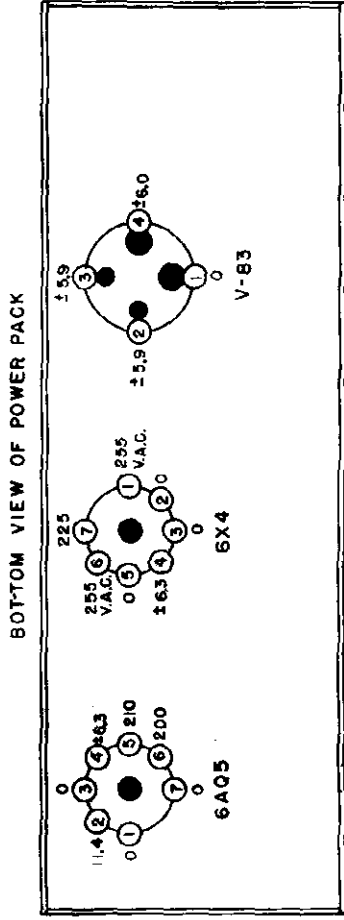
The following equipment is necessary for proper alignment:
 *Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
 Non-metallic screwdriver.
 Output meter. (1.8 volt for 1 watt output.)
 Dummy antennas—1 MFD., 100 MMFD.
 For alignment points refer to Schematic Diagram.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connection	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & Bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna

8) Repeat steps 4 and 5



FRONT OF CHASSIS



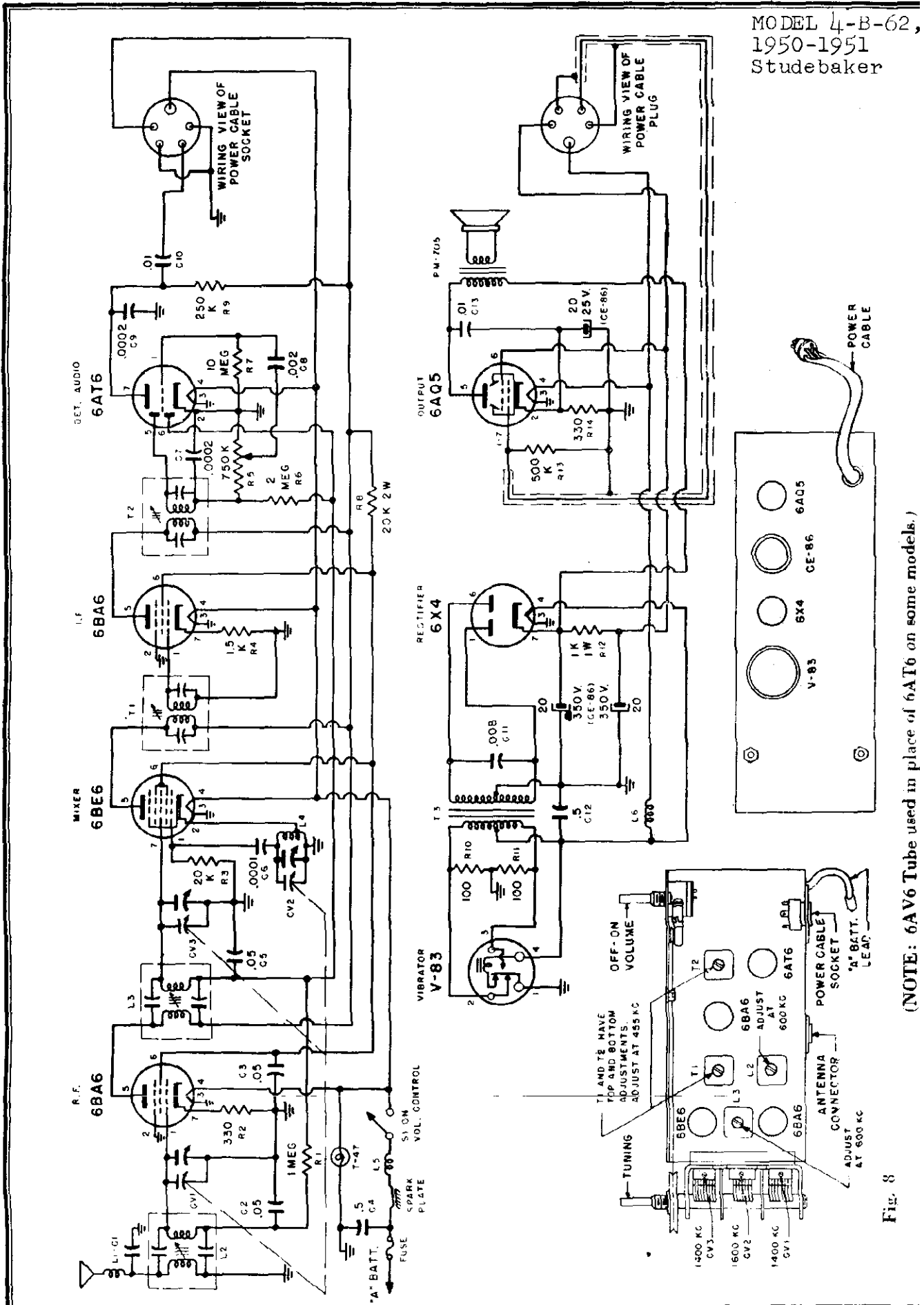
BOTTOM VIEW OF POWER PACK

Fig. 7

SOCKET VOLTAGES

Fig. 7A

MODEL 4-B-62,
1950-1951
Studebaker

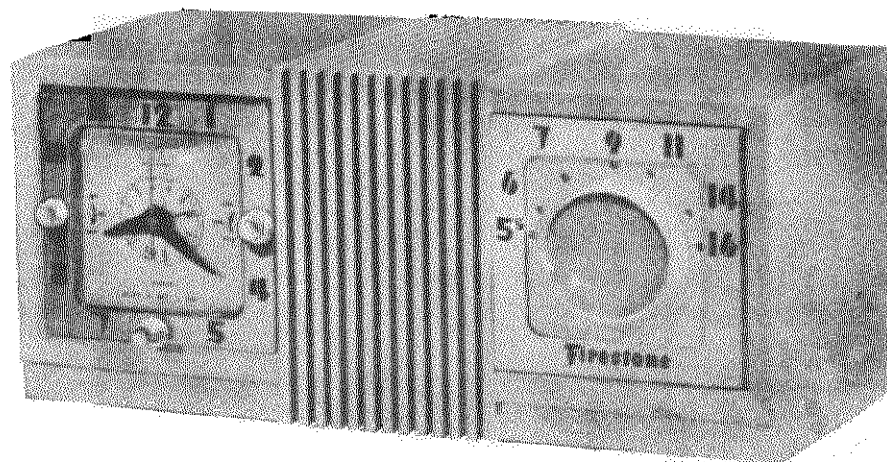


(NOTE: 6AV6 Tube used in place of 6AT6 on some models.)

Fig. 8

PAGE 22-38 FIRESTONE

MODEL 4-A-92,
The New Slumbertone



SPECIFICATIONS

Cabinet Dimensions	- 11-1/8" x 5-1/16" x 5-1/8"	Power Output -
Weight	- 6-1/4 Lbs.	Undistorted - 0.8 Watt
Power Supply	- 110 to 120 Volt 60 Cycle AC only.	Maximum - 1.3 Watts
Tuning Range	- 540 to 1600 KC	Tube Complement -
Intermediate Freq.	- 455 KC	12SA7 --Converter
Loud Speaker	- 3-1/2" P.M.	12SK7 - I.F. Amplifier
Voice Coil Impedance	- 3.2 Ohm at 400 Cycles	12SQ7 - Diode-Audio
		50L6GT - Output
		35Z5GT - Rectifier

ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right and make the adjustments 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 removing the two screws on the rear apron of the chassis which fasten the chassis to the cabinet.

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

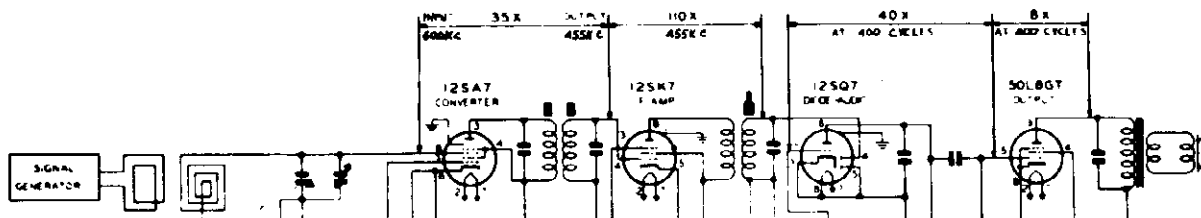
Steps	Set Receiver dial to:	TEST	OSCILLATOR	DUMMY ANTENNA	Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Attach output of test oscillator to:		
1	Any point where no interfering signal is received.	EXACTLY 455 KC	High side to grid of converter Tube. Low side to common negative.	1. MFD CONDENSER	Adjust 2nd I.F. (T2) and then each of the slugs of the 1st I.F. (T1) for maximum output.
2	Exactly 1620 KC	Exactly 1620 KC	DUMMY ANTENNA	2 turns of Hookup Wire 6" in Diam. (Place approx. one foot from & parallel to loop.)	Adjust 1620 KC oscillator trimmer for maximum output.
3	Approx. 1400 KC	Approx. 1400 KC	DUMMY ANTENNA		Adjust 1400 KC antenna trimmer for maximum output.

PAGE 22-40 FIRESTONE

MODEL 4-A-92, The
New Slumbertone

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R. F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R. F. Amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel type instrument" carefully tune it for maximum output at desired frequency before making measurements.



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

ORDERING PARTS

Order parts from your nearest Firestone Tire and Auto Supply Warehouse. When ordering parts, it is important that the correct code number and stock number, be given with the correct part name and part number as shown in the parts list. You will find the stock number and code number marked on the radio. The stock and code number also appears on the front cover of this booklet.

IMPORTANT:-

This receiver is equipped with a special heavy duty power cord because of the added wattage rating of the appliance outlet.

When replacing power cord be sure to use one of adequate rating.

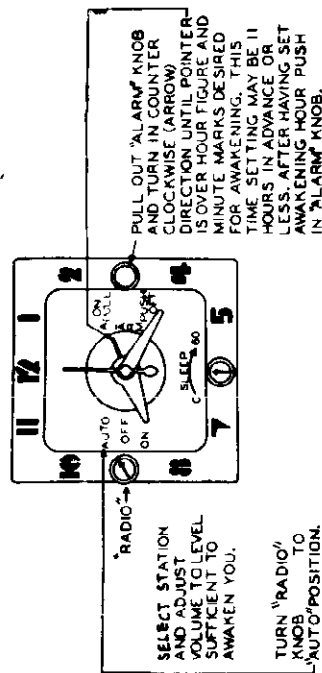
RETURNING DEFECTIVE PARTS

All parts on adjustments must be returned to your District Office Service Department with claim form completely filled out. This radio is so constructed that it can be repaired locally by an experienced repairman.

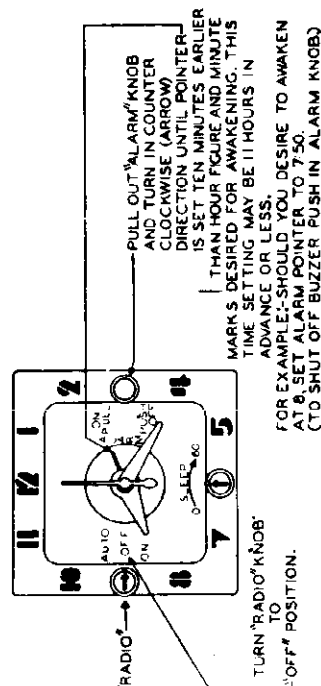
INSTRUCTIONS FOR USE OF CLOCK WITH RADIO OR EXTERNAL APPLIANCE

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

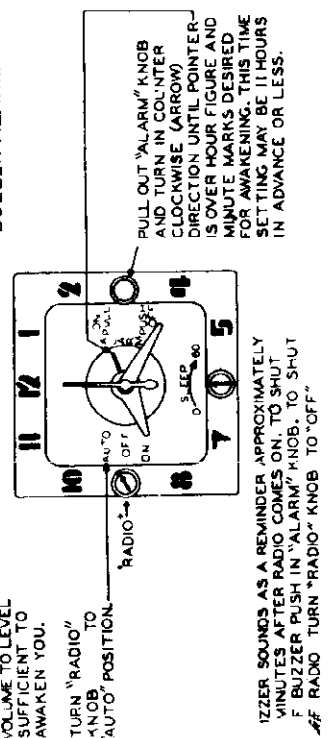
(1) TO AWAKEN TO MUSIC



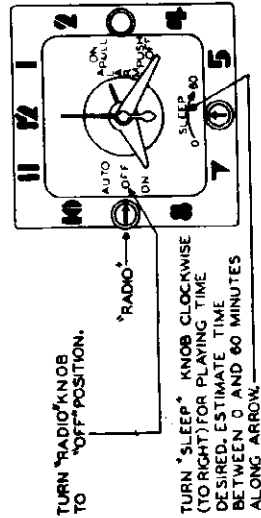
(2) TO AWAKEN TO BUZZER ALARM



(3) TO AWAKEN TO MUSIC AND BUZZER ALARM



(4) TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING



To use this feature, simply plug in the appliance, turn the AUTO-OFF-ON SWITCH KNOB to the "OFF" position rotate the "Sleep" knob in a clockwise direction for the length of time required.

Precise time setting with this "Sleep" control will require practice.

- (5) TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING AND AWAKEN TO MUSIC. Set controls as in Illustration 1 and set "Sleep" knob as in Illustration 4.
 - (6) TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING AND AWAKEN TO BUZZER ALARM. Set controls as in Illustration 2 and set "Sleep" knob as in Illustration 4.
 - (7) TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING, AWAKEN TO MUSIC AND BUZZER ALARM. Set controls as in Illustration 3 and set "Sleep" knob as in Illustration 4.
 - (8) TO AUTOMATICALLY TURN ON RADIO AND EXTERNAL ELECTRICAL APPLIANCE. Insert plug of appliance into the electrical outlet provided at rear of receiver and set clock controls as in Illustration 1.
- This feature may be used with any electrical appliance which operates on a 110-120 volt, 60 cycle power supply and which DOES NOT EXCEED THE WATTAGE RATING FOR THE OUTLET SHOWN ON THE CABINET BACK.
- Current is available at this outlet whenever the radio is turned on.
- (9) TO TURN RADIO AND APPLIANCE OFF AUTOMATICALLY. The controls may be set to turn off the radio and appliance at any time up to 60 minutes after

MODEL 4-A-92, The
New Slumbertone

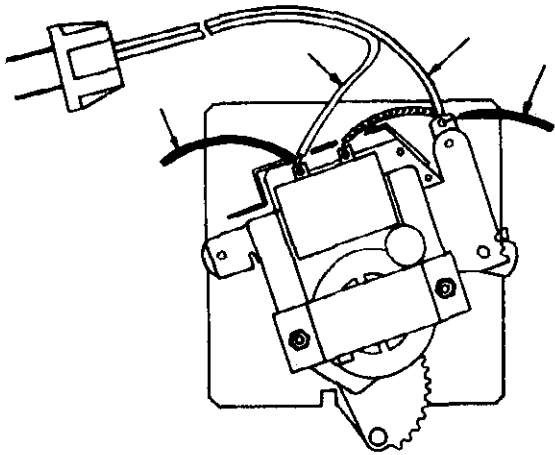


FIGURE "A"

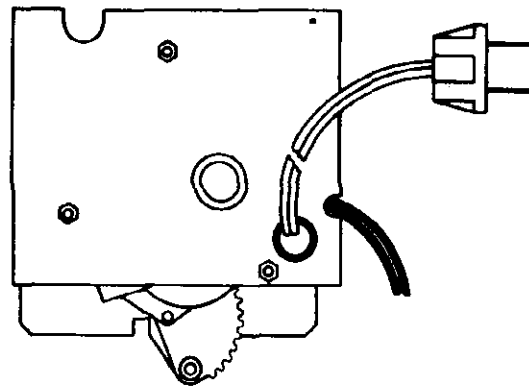


FIGURE "B"

REMOVAL OF CLOCK FROM CABINET

The clock movement may be removed from the cabinet by following the procedure listed below:

1. Remove plug of power cord from wall outlet.
2. Remove tuning and volume control knobs.
3. Remove two chassis retaining screws at rear of receiver, and slide chassis from cabinet to permit access to rear of clock.
4. Remove 3 nuts holding clock retaining bracket illustrated in figure "B" above.
5. After shield is removed, unsolder the power cord and the two wires leading from the clock to the chassis. (These wires are indicated by arrows in figure "A" above.
6. Rotate "Sleep" knob to the 60 minute position and remove clock by sliding straight forward.

SHIPPING OF CLOCK FOR REPAIR

When it is necessary to ship the clock to a Telechon Service Station for repair make certain that it is suitably packed to withstand transportation. Particular care must be given to the glass crystal so that it is not subject to strain during shipment.