RCA VICTOR SERVICE DATA

VOLUME VIII 1952

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RADIO RECEIVERS PHONOGRAPHS TELEVISIÓN

RADIOCORPORATIONOFAMERICARCA Victor DivisionHarrison, N. J., U. S. A.

rcaVictor SERVICE DATA



TELEVISION RECEIVERS RADIO RECEIVERS • PHONOGRAPHS

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First Edition-First Printing Printed in U. S. A.

PREPARED BY RCA SERVICE CO., INC. FOR RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION HARRISON, N. J., U. S. A.

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RC-333C	RC-400A96X-11 to 96X-14	Prod.) PC 459E 45X-13 (2nd Prod.)
RC-335911K	RC-401	RC-459F
RC-335A98K	RC-403A9TX-23	Prod.)
RC-335B99K	RC-404AU-8	RC-459H
RC-335D U-126, U-128	RC-4059TX-31	RC-4595
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RC-335F910KG	RC-405C40X-30	RC-459L45X
RC-335K U-129	RC-405D40X-31	RC-459M
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RC-348HU-123 (1 band)	RC-418BU-10	RC-482BU-9
RC-348JU-121 RC-348L U-127F	RC-421U-123 (2 bands)	RC-482C
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RC-501A	,K-130 Tuner Unit
RC-502	.7Q4X
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BC-507A	Q25
RC-507B	QK23
RC-507C	.QU2C
RC-507D	.QU2M
RC-507H	
RC-507J	.Q26
RC-507K	.Q27
RC-507L	.QU52C
RC-507N	QU52M Q121 (PM)
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RC-509A	.16T3
RC-509B	.1612 16K
RC-509F	16T4 (2nd Prod.)
RC-509H	.16T3 (2nd Prod.)
RC-509J	.16T2 (2nd Prod.)
RC-511	.18T
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RC-513	.110K, 110K2
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RC-517	. V-100
RC-517F	Radiola R-560P
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	RC-601	Q122 (EM)
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	RC-616A	8V91
	RC-616B	8TV321 Radio Section
	RC-616C	.8TV323 Radio Section
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	10-0101X	Radio Section
	RC-616N	9TW333 Radio Section
	RC-617A	
	RC-618A	8V90 2nd Prod.
	RC-618B	9W101, 9W103
	RC-618D	9W105
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RC-1022 RC-1022A	Prod.) 34X (2nd Prod.) 12X (2nd Prod.), 35X (2nd Prod.), Badiala
RC-1023 RC-1023A RC-1023B	522 (2nd Prod.) 56X5, Radiola 615 56X11 56X10, Radiola 61-10.
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BC 1046 66¥12		2nd Prod.		9789
RC-1046 66X11	BC-1065E	8X541, 8X544, 8X545		7T143, 9T147
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BC 1053B 5Q1 2nd Prod	BC-1069A	.8B42	BC-1102B	1881
(234 v)	BC-1069B	.8B43	BC 1102C	1001
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RC-1055H Q853 (117 v234 v.)	RC-1079B	.9X561	PC-1111	2-5-10
RC-1055J Q853 (85-260 v.)	RC-1079C	.9X562	BC-1111A	21-T-197D F
RC-1055K Q853 (117 v. 25 cy.)	RC-1079D	.9W51	BC-1111B	21-T-244
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RC-10618X681, 8X682	RC-1085B	2-X-621	50.000	2-R-52, 2-R-52A
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AUDIO AMP. AND POWER UNITS

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RS-77	R-98		Unit	RS-112	QU8 Power Unit
RS-79B	CV-9 Electrifier	RS-89BU	-42 Power Unit	RS-112A	QU7 Power Unit
RS-83-2	PSU-8B	RS-91A0	-50	RS-114A RS-115	OB1 OB11 OB12
RS-83-3	PSU-8C	RS-91BR	-60		QB13, 6V. Power
RS-83A-1	PSU-10A	RS-92N	1-70 Power Unit		Unit
RS-83A-3	PSU-10D	RS-95	V-111 Electrifier	RS-115B	QB9 Power Unit
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RS-83E	TRK-9, TRK-12,	RS-102AU	44 Power Unit		711V1, 711V2, 711V3
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RS-84	R-91	RS-102DU	-45 Power Unit	PS.123A	er Supply
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KO DA	
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КС-3СТ	RK-5 (50 cy.) TV
КС.4 Т	DRASSIS
KC 4 A	BK 0 TV Tuner
K0-4A	RK-9 IV luner
КС-4ВТ	RK-12 (50 cy.) TV
KC-4C	RK-9 (50 cv) TV
	Tuner
KC-4FT	RK-120 TV Tuner
КС-4НТ	RK-90 TV Tuner
КС-4.1 Т	RK-120 (50 ov) TV
	Tuner
KCS-20A6	30TS
KCS-20B6	30TCS
KCS-20C 6	30TS (50 cv)
KCS 20D	20TCS (50 av)
KC6 201	501CS (50 CY.)
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KCS-2162	21 TS
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K00.044	Chassis
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KCS-24C8	PCS41, 9PC41
	R-F/I-F Chassis
KCS-24D9	PC41 R-F/I-F
KCS-254 6	Unassis
KOG DEC	
NU3-250	Chassie
KORDED 0	
KCS-25D8	IV41 IV Chassis
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KCS-20A-272	11CS (50 cy.)
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TELEVISION CHASSIS

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	2T208, 21T217,
	21 T 218, 21 T 227,
KCS 72D 1	211228, 211229
KCS-72D-2	21 7 242
KCS-74	17T250DE. 17T261DE
KCS-79	U-2
KCS-79A	U-2A

KK-7	
KK-7A	Unit
KK-7D	TRK-12 (50-cy.) TV Power Unit
KK-7E	TRK-9 (50 cy.) TV Power Unit
KK-7F	Unit
KK-7J.	Unit
КК-7Н	TRK-120 (50 cy.) TV Power Unit

KRS-20	648PTK, 648PV
	Horiz. Defl. Chassis
KRS-20A	741PCS, 8PCS41
	Horiz. Defl. Chassis
KRS-20B	8PCS41, 9PC41
	Horiz. Defl. Chassis
KRS-21	648PTK, 648PV TV
	Power Supply
KRS-21A	741PCS, 8PCS41,
	9PC41, TV Power
	Supply

SALES NAME vs. MODEL NUMBER

Ainsworth 17-T-261DE	Forbes 2-X F-91	Penfield 21-T-244
Albury	Gladwin 1-X-591	Personal
Ashley A-91	Glenside 17-T-151	2-C-511, 2-R-51
Ashton 17-T-211	Globetrotter 66BX 8BX6 BX-6.	Prentiss 8-X-541
Bancroft 21-T-174DE	PIX-600, 2-BX-63	Preston
Belgrove 21-T-229	Graveon X-551	Provincial6-T-76, 7-T-125, 9-T-128
Bentley	Hedlow 17-T-201	Randolph
Benton 21-T-175DE	Hautey 17 T 100	Regency
Blaine 1-X-51	Hampton	Reveler BX-57
Brandon 21-T-228	Hartford	Rockingham 21-T-178, 21-T-178DE
Brantley 45-W-10	Haywood 17-1-111B	Rutland
Brett 17-T-250DE	Highland	Sedgwick
Bristol 17-T-153	HillsboroughA-101	Selfridge 21-T-159, 21-T-159DE
Brookfield 21-T-217	Hillsdale	Shelby 2-T-51
Calhoun 17-T-173	Kendall	Shelley 17-T-200
Carlisle A-108	Kent	Somervell 2-T-81 4-T-141
Clarendon 21-T-179, 21-T-179DE	Kentwood	Suffolk 21-T-176
Colby 17-T-150	Kerby	Sundarland 21-T-197DE
Covington 17-T-172	Lambert	Sunderland 2 R 400
Crafton 17-T-163	Lansford	
Crandall 21-T-207, 21-T-207G	Lindale	
Crestwood 612V1, 8V151	Lindsay	Terrel A-02
Cumberland 2-T-60	Livingston	Torrance 9-X-5/1
Donley	Meredith	Townley
Fairfax 6-T-84	Modern	Westland
Fairfield 6-T-71, 6-T-72, 7-T-122	Newport	Whitfield 17-T-154
Farmington 21-T-166DE	Northampton 9-T-79	Winston
Fenwick 2-S-10	Oakland	York

MODEL vs. RECORD CHANGER (1943 to 1952 incl.)

Model	Record Changer	Л
A55 BP	168 & 960282-1	6
A78 BP	168 & 960282-1	Ŭ
A_92 DD	168 on PP 190-2	
A-04	060292 4 an E	c
	2 960282-4 OF -5	o
A-91	168 OF RP 190-2	
č	£ 960284-1 or -2	6
A-101 RP 190-2 &	£ 960282-4 or -5	
0	r 960284-1 or -2	-7
A-106	168 & 960285-1	-7
A-108 RP	168 or RP 190-2	
8	960284-1 or -2	8
QFY4	BP 190-5	8
QEV5	BP 190-5	Ř
OEVE	BB 100 5	ŏ
OIV.	DD 169	0
QJ 1		0
GLT3.		0
QU61		8
QU62		8
QU68		9
S1000	168 & 960285-1	9
TA128	168 & 960282-1	9
TA129	168 & 960282-1	9
TA169	168 & 960285-1	9
2-ES-3		9
2-ES-31	930409-5	9
2-ES-31 F	930409-5	9
2-FS-31Q	930409-6	ģ
2-FS-38	930409-5	q
2 EG 20E	930409-5	9
2-E3-36E	020409-5	0
2-E5-38G	930409-6	3
2-J3-1		
2-JS-1E	930409-5	9
2-J 5-1Q		9
2-S-7	930409-5, -10	9
2-S-10		- 9
2T81	168 or RP 190-2	9
	& 960282-4 or -5	9
2-US-7 93	30409-5, -10, -11	9
4QV8C RP	168 & 960282-2	9
4T141	BP 190-2	c
	960282-4 or -5	q
60113	BP 178-3	ă
COU2V	DD 169	0
COV2	DD 179 2	3
DGV3		5

34.1.7	D I Cl
Nioaei	Recora Changer
6T84	RP 168 or RP 190-2
	& 960282-4 or -5
	or 960284-1 or -2
CTOC	DD 169 DD 100 2
0100	RF 106 0F RF 190-2
	& 960284-4 or -5
6Т87	RP 168 or RP 190-2
	& 960284-1 or -2
7QV5	
7T143	BP 190-2
	& 960284-1 or -2
9T1/41	DD 177A
01 141	DD 170
81V321	· · · · · · · · · · · · · · · · · · ·
8 I V323	
8V7	RP 178
8V90	
8V91	RP 178
8V/112	BP 178
9\/151	DD 1778
0FV2	DD 160
5ET3	DD 100
9EY31	
9EY32	
9EY35	
9EY35U	
9EY36	
9EY36U	BP 168
9JY	BP 168
9QV5	BP 168 & 960282-2
0790	PB 169 on PB 190-2
5165	R 100 0F NF 150-2
	& 960284-1 OF -2
9114(
	& 960284-1 or -2
9TW309	
9TW333	
9TW390	RP 168 & RP 177B
9W51	BP 168
9W/78	BP 168 & BP 178
9\4/101	DD 160
014/102	DD 100
0W/102	DD 100
9 W 103	RP 168
9W105	RP 168 & RP 178
9W106	
9¥7	
9Y51	
97510	BP 190-1

	_ ,
Model	Record Changer
9Y511	
15-E, 15-E-1	RP 190A-1 &
	Manual turntable
21T197DE	
21T242	
21T244	
35QU	
45-EY	
45-EY-1	
45-EY-2	
45-EY-3	RP 190-1 or RP 190-3
45-EY-4	
45-EY-15	RP 168
45-EY-26	RP 190A-2
45-J	
45-J-2	
45-J-3	
45-W-9	
45-W-10	
55U, 55AU	
58V, 58AV	
59V1, 59AV1	
Rad. 62-1	
65U, 65AU	
65U-1	
67V1, 67AV1	
Rad. 75ZU	
77U	
77V1	
77V2	
610V1	.960001-5 or -6 or RP 177
610V2	.960001-5 or -6 or RP 177
612V1	RP 176A or RP 176B
612V3	RP 176 or RP 176A
612V4	RP 176 or RP 176A
641TV	
648PV	
710V2	
730TV1	
730TV2	RP 177 or RP 177A
711V1	
711V2	
711V3	

NOTES ON 17T150, 17T151, 17T153, 17T154, 17T155, 17T160, 17T162, 17T163, 17T172, 17T172K, 17T173, 17T173K, 17T174K, 21T159, 21T165, 21T176, 21T177, 21T178 AND 21T179 TELEVISION RECEIVERS

SEPARATION OF SOUND AND PICTURE IN WEAK SIG-NAL AREAS—Normally the picture carrier falls at 50% on the slope of the overall response curve as shown below. When receiving signals of less than 50 microvolts, on intercarrier receivers, it is common practice to adjust the fine tuning control so as to move the picture carrier up the slope to improve the signal to noise ratio. The actual amount which the carrier is moved depends upon the signal strength. On extremely weak signals, the picture carrier may be moved as high as 80% to 90% on the slope of the curve. This may represent a change of as much as .75 megacycles of all frequencies being passed through the pix i-f amplifier. Under such conditions the sound may become weak and noisy even on intercarrier receivers. The reason for this is shown in figure 1 below.



Figure 1-Details of Overall Response Curves

When the picture carrier is rolled up the slope and lowered in frequency by .75 mc., the sound carrier is also lowered in frequency by .75 mc. to become 40.50 mc. As can be seen by the enlarged section of the response curve, the sound carrier begins to fall into the adjacent channel picture trap with a consequent reduction of sound output. Receiver designs which do not incorporate an adjacent channel picture trap may avoid this difficulty at the expense of adjacent channel picture rejection.

It is possible to overcome the above described difficulty in many cases by a simple adjustment which can be made in the field without the aid of test equipment. When the picture carrier is rolled up the slope by .75 mc., the adjacent channel picture carrier is lowered in frequency to 39.00 mc. and no longer falls into the adjacent channel picture trap. If the trap is returned to 39.00 mc. it will permit the response at 40.50 mc. to rise somewhat and produce stronger sound and will produce greater adjacent channel picture rejection under the actual operating condition. If a strong signal is available on another channel and the fine tuning is adjusted to roll the picture carrier down the slope to the normal 50% point, the adjacent channel picture trap will appear mistuned. However, it is not likely that adjacent channel picture interference will be experienced on strong signals.

In addition to the above adjustment, T107, normally peaked at 41.8 mc., may be lowered in frequency to provide improved sound gain. Care should be taken in making this adjustment not to lower its frequency any more than necessary as it reduces adjacent channel picture rejection somewhat and might cause difficulty from sound in the picture if a strong signal is available on another channel.

The above adjustments may be made without removing the chassis from the cabinet. First, tune in the desired channel and adjust the fine tuning control for best picture. Then, since the adjacent channel picture trap is under the kinescope, disconnect the high voltage lead at the chassis to prevent getting a shock. Turn the T104 top core clockwise, approximately 1/2 turn if it is a threaded core type or approximately 1/2 turn clockwise if it employs a brass stud extending from the transformer shield. Restore the kinescope high voltage connection. Then, from the top of the chassis, adjust T107 clockwise 1/2 turn or less.

If adjacent channel picture interference is a severe problem, it may be necessary to remove the chassis from the cabinet and adjust T104 top core while observing the picture for minimum interference. R-F AND I-F BIAS RATIOS—In medium field strength areas an occasional receiver may show some snow on signals in the 300 to 1000 microvolt signal range due to an improper ratio of r-f and i-f bias. If the r-f bias is high with respect to the i-f bias, the picture becomes snowy. If the i-f bias is too high with respect to r-f bias, the receiver may overload on strong signals.

To determine whether or not the biases are of the correct ratio, tune in a signal and measure the r-f bias, the i-f bias and the AGC amplifier plate voltage with a "VoltOhmyst". The signal must be steady during these measurements. Plot these points on the accompanying graph. The values should fall within the range of the dotted lines.



According to the graph, when the AGC amplifier plate measures -45 volts, the i-f bias should be -8.2 volts. If the i-f bias actually measured -10 volts, it indicates that Rl43 or Rl45 is too low in value and/or Rl44 or Rl50 is too high. If, however, the i-f bias actually measured -6 volts it indicates Rl43 or Rl45 is too high in value and/or Rl44 or Rl50 is too low. The resistors originally employed in production were 10% tolerance units. However, if Rl43 and Rl45 are at one limit of their tolerance and Rl44 and Rl50 are at the other limit of their tolerance, a considerable error in i-f bias is produced.

Similarly at -45 volts AGC amplifier plate voltage the r-f bias should measure -6.8 volts. If the i-f bias should measure say -12 volts, it indicates that R128 or R129 is too low or R127 is too high or the R145 volt bus is too low. If the bias is too low, obviously the converse is true.

In several instances, r-f or i-f bias difficulties have been traced to leaky electrolytic capacitors C124 or C138. In two known instances, one of these two capacitors was connected into the circuit in reversed polarity due to a reversal of the polarity markings on the capacitor.

The above AGC bias circuit description is for the 17T153 series receivers. The 21T176 receivers are similar except for slight differences which cause the biases to occur at slightly different AGC plate voltages.

AGC THRESHOLD CONTROL ADJUSTMENT—The AGC control is adjusted at the factory to provide maximum possible gain without clipping sync for all signals above the receiver threshold up to 25000 microvolts. The adjustment of this control should not be touched in the field unless it is definitely known to be incorrect. If the control is misadjusted so as to increase the receiver gain, it may overload when a strong signal is received or when a weak signal temporarily increases in strength due to unusual propagation conditions. On the other hand, if the receiver gain is lowered by the AGC control, the sync noise immunity is reduced.

In order to reduce the prominence of snow on weak signals it is important that the picture control not be operated at its maximum clockwise position. Such an adjustment will provide a higher contrast picture but at the same time may produce an apparent poorer signal to noise ratio due to the fact that an excessive amount of signal on the kinescope grid causes the snow to bloom or defocus thus causing the flake particle to become larger and more prominent than normal. At the same time it is equally important that the receiver be focused to obtain the appearance of the least amount of

NOTES ON 17T150, 17T151, 17T153, 17T154, 17T155, 17T160, 17T162, 17T163, 17T172, 17T172K, 17T173, 17T173K, 17T174, 17T174K, 21T159, 21T165, 21T176, 21T177, 21T178 AND 21T179 TELEVISION RECEIVERS

snow in the picture. To do this, focus the receiver by the method directed in the Service Data. As a final adjustment, adjust the focus control for the appearance of minimum snow in the picture.

Only under two conditions can it be consideted permissible to adjust the AGC control. In an area where the signal is so weak that the snow practically obscures the picture after having taken all the above precautions, then the AGC control may be adjusted to give the best signal to noise ratio. It should be recognized however, that trouble from loss of sync noise immunity might be experienced.

The other condition which would justify adjustment of the AGC control is where a signal of over 25,000 microvolts is received. Under this condition the AGC control should be adjusted until the receiver no longer overloads.

NOTES ON GERMANIUM CRYSTAL DETECTOR CR101— Several different types and makes of crystals are used, such as IN60, IN64 and CK706. These crystals have slightly different characteristics and may not be directly interchangéable. In production, these differences are taken care of by varying the value of R154 which is located in T109. This resistor is normally 10K. However, to take care of different crystals, this resistor may vary from 5600 ohms to 10K ohms.

If the crystal is to be replaced, it should be replaced by one of the same make and type. However, if desired, the entire Tl09 transformer and matching resistor may be installed. In any event, if Tl09 or CRl01 is replaced, the over-all response should be checked.

If a crystal is replaced, care should be taken to get it connected in the proper polarity. Since germanium crystals are marked differently than selenium rectifiers, confusion may result. Selenium rectifiers are marked + and - to show the polarity of the d-c output voltage. Germanium crystals are marked to show the polarity of voltage that must be applied to obtain maximum current flow. The cathode end of a germanium crystal may be coded with green paint or marked -. The anode end may not be coded or may be coded +. In schematic symbols, the anode is shown as an arrow (\blacktriangleleft) and the cathode as a flat bar. In T109, the anode (+) end is connected to terminal A and the cathode (-) end to terminal D. Care should also be taken not to overheat the crystal with the soldering iron as damage to the crystal may result.

As a protection against damage to the crystal detector, a 220 ohm, $\frac{1}{2}$ watt resistor has been added in series with the screen of V110, the 6AG7 video amplifier. This resistor is designated as R174 in both 17 and 21 inch receivers and is carried under stock number 503122. It is shown in the latest editions of the receiver Service Data.

T104 FREQUENCY CHANGE—In late production receivers, the adjacent channel picture trap in T104 has been tuned to 39.25 mc, rather than 39.75 mc. This results in slightly more sound sensitivity when operating the receiver in fringe areas. It also provides slightly higher adjacent channel picture rejection when the fine tuning is adjusted so as to roll the picture carrier up on the slope of the i-f response as is done in receiving weak signals. This change, suggested as a field adjustment, was covered more fully in RPT Tip, Volume II, Issue 9, dated November 19, 1951.

KRK11 OSCILLATOR INJECTION VOLTAGE—If low oscillator injection voltage is encountered in KRK11 r-f unit, it may be necessary to select a 6X8 tube which will give proper injection when the r-f unit is properly aligned. Recent changes in the circuit and parts makes it easier to obtain sufficient injection with average 6X8 tubes. R-F units in which these changes are made are marked M1. The parts list of the 17 inch receiver Service Data lists parts for early and late production units.

FUSE CHANGE—Early production receivers employed a 0.25 ampere fuse. This was later changed to a 0.20 ampere slow blow type. The latest production receivers have reverted to the regular type 0.25 ampere fuse, stock number 73600. If a fuse requires replacement, it is recommended that the regular type be employed.

LEAD DRESS IN KRK11—In several early production units, difficulty has been reported due to the shield of the cable from Tl shorting against C28. When working on one of these units, take care not to disturb the dress of this cable so as to make this short more likely to happen in service. It may also be a worthwhile precaution to wrap the shield of the cable with several turns of tape at the point where it passes C28. In late production units, this lead has been dressed so that a short cannot occur.

VERTICAL SYNC AND HOLD IN 17T153 SERIES—In a few cases it has been found that C172 has changed value with time and temperature requiring resetting the vertical hold control during initial warm-up and causing the control to be operated at the extreme clockwise position. If such a condition is encountered, replace C172 with another capacitor which will permit normal operation of the control.

Several cases have been reported from the field that R191 was connected to the cathode side of R266 instead of the junction of R265 and R266. This results in 70 to 80 volts on the cathode pin 6 of V113 instead of the normal 100 volts, causing unstable vertical sync.

KCS68 VERTICAL SYNC INSTABILITY DUE TO REFLEC-TIONS—In some cases, reflections may cause vertical sync to be unstable. The following changes to KCS68 chassis are suggested as a possible cure for this condition at a slight detrement of sync noise immunity on weak signals.

1. Change R185 to 1.0 meg, $\pm\,10\%,~1\!\!/_2$ watt, Stock No. 503510.

2. Change R186 to 3.9 meg, $\pm\,10\%,~1/_{2}$ watt, Stock No. 503539.

3. Change R189 to 22K, ±10%, ½ watt, Stock No. 503322.

4. Change C160 to .056 mfd, 400 volts, Stock No. 73791.

5. Add a 100 mmf capacitor, Stock No. 39628 from pin 4 of V113 to ground.

The above changes apply only to KCS68 and are not applicable to KCS66 series chassis.

SOCKET CONNECTIONS TO 1B3GT RECTIFIER (KCS66 SERIES)—In some KCS66 series chassis, the 1B3GT socket, terminal 5 has been used as a tie point. It has been found that some brands of tubes have an internal connection in the tube between pins 5 and 7. Such tubes will not operate in KCS66 series chassis which are wired as noted above.

When replacing the 1B3GT tube in the field, the serviceman may employ one of the three following methods to avoid difficulty.

l. Use a tube which does not employ a connection between pins 5 and 7. RCA tubes do not have this connection.

2. Rewire the 1B3GT tube socket so that terminal 4 is employed as the tie point instead of terminal 5.

3. If the tube has a connection between pins 5 and 7, clip pin 5 off of the tube base.

DEFLECTION TROUBLE SYMPTOMS IN 21-INCH RE-CEIVERS—Fold over or white bar in center of raster. This trouble may be caused by low screen voltage on the 6CD6 tube due to R253 or R235 being open.

Low brilliance, change in pix size and linearity, etc. This may be caused by a defective L106.

Poor interlace—To prevent coupling between the vertical and horizontal sweep circuits, thus causing poor interlace, dress the red lead from the yoke socket to the HV transformer under the lance on the side of the high voltage cage. To prevent parasitic oscillations in the horizontal sweep circuit, Cl85 should be connected from pin 2 of V116 to ground instead of from the nearby terminal board to ground.

17CP4, 21AP4 AND 17QP4 KINESCOPES—If certain kinescope "electron gun" parts become magnetized, "poor focus" may result. To demagnetize these tubes, connect a 630TS receiver EM focus coil to 110 volts a-c and pass the coil slowly over the kinescope neck, past the "gun" and slowly withdraw.

R-F TUNERS

The attached information lists the differences between the various types of KRK2, KRK5, KRK7 and KRK8 series r-f tuners. This information should be helpful in adapting one type of unit to another in event the correct type is not available.

KRK2 SERIES TUNERS

Receiver Model	R-F Unit	Detent Stock No.	Converter Transformer Tap	Conv. Trans. Cap.
621TS	KRK2	71463 (Short)	3rd or 4th Turn Down	62 mmf.
630TS	KRK2	71463 (Short)	4th Turn Down	68 mmf.
630TCS	KRK2	71463 (Short)	4th Turn Down	68 mmf.
641TV	KRK2	71463 (Short)	4th Turn Down	68 mmf.
648PTK	KRK2A	71463 (Short)	4th Turn Down	68 mmf.
648PV	KRK2A	71463 (Short)	4th Turn Down	68 mmf.
721TS	KRK2B-1	72743 (Long)	3rd Turn Down	62 mmf.
721TCS	KRK2B-1	72743 (Long)	3rd Turn Down	62 mmf.
730TV1 & 2	KRK2B-1	72743 (Long)	3rd Turn Down	62 mmf.
741PCS	KRK2A	71463 (Short)	4th Turn Down	68 mmf.
8TS30	KRK2	72743 (Long)	4th Turn Down	68 mmf.
8PCS41	KRK2A	71463 (Short)	4th Turn Down	68 mmf.
8TV41	KRK2	71463 (Short)	4th Turn Down	68 mmf.
9PC41	KRK2A	71463 (Short)	4th Turn Down	68 mmf.

NOTE #1—Converter transformers using 62 mmf. capacitors are aligned on the primary side to 22.8 mcs. and are recognized by a painted dot on top. All others are aligned to 21.8 mcs.

NOTE #2—There is no difference between the KRK2 and the KRK2A, except that "2A" unit is used in the projection receivers.

- NOTE #3—Using the 621TS (KRK2) r-f unit in the 630TS or 8TS30 without the modification indicated may result in i-f oscillation. Using the 630TS (KRK2) r-f unit in the 621TS without modification indicated may result in insufficient sound.
- NOTE #4—The KRK2 unit can be changed to a KRK2B-1 by changing the detent, tap on converter transformer, and converter shunt capacitor as listed above. All other parts are identical.

KRK5 AND KRK7 SERIES TUNERS

Receiver Model	R-F Unit	Front Plate	Chan. Sel. Shaft	Actuating Shaft	Shaft Length
8T241	KRK5	73436	73437	73439	Short
8TV321-3	KRK5	73436	73437	73439	Short
8T270	KRK5A	74166	74168	74167	Long
8TK320	KRK5A	74166	74168	74167	Long
8TR29)	KRK5	73436	73437	73439	Short
8TK29 🖇					
9T240	KRK5	73436	73437	74439	Short
9TC240	KRK5 A	74166	74168	74167	Long
9TC245-47-49	KRK5	73436	73437	73439	Short
07246	VDV7			(74574	
51240	KRK I	14512	74573	74577	-
97256	VDV7	74570		(74574	
51250	KRK /	14512	74573	74577	
97270	VDVCS	74166	8.100		
9TC272.5 ∫	KUKON	14100	74168	74167	Long
9TW 309	KRKS	73436	73437	73439	Short
9TW 333	KRK5	73436	73437	73439	Short
9TW390	KRK5A	74166	74168	74167	Long
T 100	VDV7	5 4550		(74574	,
1100	KRK7	14512	74573	74577	-
T120	KRK5	73436	73437	73439	Short
T121	KRK5	73436	73437	73439	Short
TC124-5-7	KRK5	73436	73437	73439	Short
TA128	KRK5	73436	73437	73439	Short
TA129	KRK5	73436	73437	73439	Short
T164	WDWCD		_		0.0011
TC165-6-7-8 🖇	KRKSB	73436	73437	73439	Short
TA169	KRK5B	73436	73437	73439	Short
S1000	KRKSA	74166	74168	74167	Long
6 T7 2	KRK5B	73436	73437	73439	Short
				-0.00	OHOIL

NOTE #1—KRKS units may be converted to KRKSA by the replacement of the front plate, fine tuning shaft, and channel selector shaft. (Parts No. 73436, 73437 and 73439 are replaced by Parts No. 74166, 74167 and 74168.) NOTE #2—KRK5, KRK5A and KRK5B* units may be converted to KRK7 by discarding the following parts: Stock Number

lock	Number	Description
	73465	Belt, fine tuning
	73441	Cam, fine tuning
	73634	Nut, speed nut
	73436	Front Plate and Bushing
	73464	Pulley, fine tuning
	14343	Retainer for chan, sel, shaft
	73437	Shaft, channel sel.
	73438	Shaft, fine tuning
	73439	Shaft, actuating
	73454	Shield for belt
	73456	Spring, belt tension
	74166	Front Plate and Bushing
	74167	Shaft, actuating
	74168	Shaft, channel selector
nd -	oplace with the fill of	B .

and replace with the following Parts:

Stock Number	Description
74572	Front Plate and Bushing
74574	Shaft—Fine tuning and
74577	Cam Assembly Spring Washer

*The KRK5B unit is the same as the KRK5, except the inside front corner of the tuner shield is cut off diagonally. **These parts used with KRK5A only.

KRK8 SERIES TUNERS

n .	-				
Model	H-F Unit	Chan. Sel. Shaft	Fine Tuning Shaft & Cam	Insulating Washer	Front
2T51-60	KRK8	75159	75160	73466 (Round)	
2T81	KRK8	75159	75160	73466 (Round)	
4T101	KRK8C	76133	76134	73466 (Round)	76754
4T141	KRK8C	76133	76134	73466 (Bound)	76754
6T53-54-64-					10104
65-71-74-75-76	KRK8B	75159	75160	75607 (Hez)	76135
6T84-86-87	KRK8B	75159	75160	76507 (Hez)	76135
7T103-103B-					
112-112B-122-	КТК8 В	75159	75160	75607 (Her)	76135
122B-123-123B- 124-125B-132				(10100
7T143	KRKOR	75150	76160	75007 (Tr)	-
9157-77-79	VTVOD	75159	75160	75607 (Hex)	76153
0780	VDVOD	75159	75160	75607 (Hex)	76135
OTLOE 106 100	KAKOD	75159	75160	75607 (Hex)	76135
91105-126-128	KHK8B	75159	75160	75607 (Hez)	76135
91147	KRK8B	75159	75160	75607 (Hex)	76135
16T152	KRK8B	75159	75160	75607 (Hex)	76135
17T200-201-					
11-20	KRK8D	76519	76134	75607 (Hex)	76518
21T208-17-	TOTOD		_		
18-21-28-29	KHK8D	76519	76134	75607 (Her)	76518

NOTE # 1—Any KRK8 series r-f tuner can be changed from a KRK8 to a KRK8B or 8C, or vice-versa, by installing the proper parts as listed above for each unit. All other parts are identical.

NOTE #2—Front plate No. 76135 is for the KRK11 tuner, but can be used on the KRK8B tuner.

NOTE #3—The KRK8D r-f unit differs from the other units both mechanically and electrically. A KRK8D unit can be mechanically converted so as to be used in place of a KRK8, 8B or 8C provided that Rl3 is shorted out. However, the KRK8D has a wide range fine tuning control which might cause the fine tuning adjustment to be critical on non intercarrier receivers. In general, electrical conversions are not recommended due to the nature and amount of work involved.

OSCILLATOR SWITCH WAFERS

Some switches have a wax treated wafer. Heat, due to soldering operations, melts the wax and loosens the switch terminal on which the inductances are mounted. Operation of the switch causes variations in inductance during switching operations. Tuning will vary, depending on the direction of approach of the channel selector switch. This is the result of compression and expansion of the coils mounted on the loose switch contacts. Therefore, when repairing r-f units, take care not to overheat the oscillator switch wafer. If the wafer is thus damaged, replacement of the wafer is the most practical solution.

R-F UNIT OSCILLATOR TRACKING

The frequency of the r-f unit oscillator is a function of the circuit inductance and capacity, and since the steps of inductance are fairly well fixed on Channels 7 to 12, inclusive, the only sizeable variables that are available are (1) the capacity and (2) Channel 13 inductance.



Figure 3-Simplified Schematic of R-F Oscillator.

On KRK2, "C" consists of stray capacity, fine tuning capacity and (in some units only a "gimmic", a piece of, insulated wire about 1/4 inch long) between the plate pins on the tube socket.

On KRK5, KRK7 and new KRK8, "C" is composed of stray capacity and a real adjustable capacitor.

On KRK2, "C" becomes less with a counter-clockwise rotation of the fine tuning control.

On KRK5, KRK7 and KRK8, a clockwise rotation of the fine tuning control gives less capacity.

To properly track an r-f unit oscillator on the high channels, the following process may prove helpful:

- 1. Make sure that the adjustment screws for Channels 7 to 12, inclusive, are spaced about 1/32 of an inch (11/2 turns from full in position) away from the rivets holding the inductance strap.
- 2. Tune for correct Channel 13 oscillator frequency by using the readily available adjustments for the purpose (a capacity trimmer on the KRK8 and an inductance slug on the KRK5.)
- 3. Without moving the fine tuning control, turn the detent to Channel 7 position and note the oscillator frequency.
- 4. If the noted frequency is higher than it should be, the Channel 13 capacity should be increased and the Channel 13 inductance should be decreased. Go back to Channel 13 and make the necessary changes to give both the correct frequency and an approximation of tracking correction. See Chart below.
- 5. If, on the other hand, the Channel 7 oscillator frequency is lower than it should be, the Channel 13 capacity should be decreased and the inductance increased. See Chart below.

KRK2

To Increase Channel 13 Capacity	To Decrease Channel 13 Capacity					
1. Pick oscillator tube to give lower frequency.	1. Pick oscillator tube to give higher frequency.					
 Add a "gimmic" between oscil- lator tube socket plate pins or move the existing "gimmic" closer. (Use a production sample for reference—some units al- ready have a "gimmic".) 	 Move "gimmic" away from plate pins. 					
 Check cross feed capacitors for correctness of value. 	 Check cross feed capacitors for value. 					
To Increase Channel 13 Inductance	To Decrease Channel 13 Inductance					
The Channel 13 slugs are brass and normally inserted through the coil. If the slug screws stick out about $\frac{3}{26}$ of an inch, they are in their minimum inductance position and any tuning, either in or out, gives a change toward the maximum inductance position.						

 Move Channel 13 slug in if the stud protrudes ¾ of an inch, or less. Move out if they protrude more than ¾ of an inch.
 Move Channel 13 slug out if the stud protrudes ¾ of an inch, or less. Move in if they protrude more than ¾ of an inch.

VDVE	AND	KDK7
nRho	AND	nRNI

To Increase Channel 13 Inductance	To Decrease Channel 13 Inductance
1. Screw brass slug out of Ll and L2.	1. Screw brass slug into Ll and L2.
These slugs are available from the are normally cemented lightly.	e bottom of the r-f unit chassis and

To Increase Channel 13 Inductance	To Decrease Channel 13 Inductance
1. Screw brass slug out of coil.	1. Screw brass slug into coil.
This slug is available from front of	unit only.

On the KRK5, KRK7 and KRK8, the Channel 13 capacity adjustment is fairly obvious. Screwing the stud out gives less capacity; in, gives more capacity.

After the proper adjustments have been made to give oscillator tracking within 1.0 mc. or so from 13 to 7, each channel can be individually aligned by using the available screw trimmers.

For field use in areas having two or more high channel stations, a slightly different approach may be taken:

- 1. If the highest high channel is aligned with the fine tuning centered and the lowest high channel calls for a clockwise rotation of the fine tuning control, Step 4 applies for KRK2 and Step 5 for all other units.
- If the highest high channel is aligned with the fine tuning centered and the lowest high channel calls for a counterclockwise rotation of the fine tuning, Step 5 applies for KRK2 and Step 4 for other units.

Step 4 means an increase of Channel 13 capacity and a decrease of inductance.

Step 5 means a decrease of Channel 13 capacity and an increase of inductance.

USE OF WR39A & WR39B TELEVISION CALIBRATORS

In some instances it may be difficult to hear the heterodyne beat between the variable oscillator and the crystal standard in subject instruments, particularly at the high frequencies.

If the audio system of the receiver under test is in good condition, it is suggested that an audio lead can be run from the head phone jack of the calibrator to the "high" side of the volume control of the television receiver, thus utilizing the additional audio amplification available in the television chassis.

CORRECTING PIX I-F RESPONSE OF RECEIVERS USING KRK5, KRK7 or KRK8 R-F UNITS

Curve "A" below illustrates a normal pix i-f response. Curves "B" and "C" below, illustrate results that are obtained in some cases due to abnormal conditions in the i-f system.

"Correcting" Curve "B", by using the adjusting slugs, usually results in placing the pix carrier minus .75 mc. point at the top of the curve which, again, is not the proper alignment. "Correcting" Curve "C", usually results in very much reduced gain and an excessive amount of adjacent channel response.

To correct Curve "B" with the minimum amount of bad effects, the turns of the second pix I-F trap (T-102) should be moved away from the primary of the same transformer. Moving the whole trap coil about two or three nicks up the coil form is usually sufficient.

To correct Curve "C", the following must be checked:

- 1. Make sure that the cathode sound trap is not shorting.
- 2. Check the sound I-F alignment.
- Check sweep and scope response by removing "blanking" on the sweep and checking for response overlap. (A defective scope cable or input can cause overshoot on this side of the response curve.)
- 4. If none of the above results in a satisfactory curve, then the sound take-off trap coil (T-103) should be moved up and away from T-103 primary. One notch on the coil form is usually sufficient.



HIGH PASS FILTER FOR REJECTION OF INTERFERING SIGNALS BELOW 50 MC.

If interference is experienced due to the presence of strong signals below 50 mc. it can usually be eliminated by the use of a high pass filter. To be effective, the filter must be installed at the r-f units with as short leads as possible and the case of the filter connected to the r-f unit chassis.

Figure 5 shows the method of attaching the antenna input connectors to the filter so that it can be "plugged" directly into the antenna matching units employed with KRK5, KRK7 and KRK8 r-f tuners.

Figure 6 shows the method of mounting the filter on receivers employing KRK2 r-f units.



Figure 5-Filter for KRK5, KRK7 and KRK8 R-F Units



Figure 6-Filter for KRK2 R-F Units

ADJUSTMENT OF THE AGC CONTROL ON 17T200 AND 21T208 SERIES RECEIVERS

In setting the AGC control on these and other RCA receivers, care must be taken that the receiver is generating the maximum AGC voltage which will be required for that particular location of the receiver.

If the AGC control is adjusted on a weak signal, the receiver may overload, bend on sync etc. when a stronger signal is received.

One source of difficulty not likely to be suspected is the position of the fine tuning control. If the AGC control is adjusted with the fine tuning set so that the picture carrier is low on the slope of the i-f response curve, then the receiver may overload, bend on sync, etc. when the picture carrier is moved up the slope with the fine tuning control. The obvious cure is to set fine tuning so that the picture carrier is well up the slope (fine tuning ccw on KRK8) when making final adjustment of the AGC control.

HIGH VOLTAGE ARCS AT KINESCOPES

During days of humid weather, difficulty may be experienced with arcing across the bell of metal cone picture tubes due to a collection of dust and moisture around this area. In the past, many remedies have been suggested, all of

which have been helpful for a short period of time. The best field remedy found to date has been an application of "Car-Plate", mfd. by S. C. Johnson & Son, Racine, Wis.

The following procedure should be employed:

- Remove the entire coating on glass bell, using methanol or acetone.
- 2. Wash the glass bell thoroughly with a good detergent.
- 3. Dry the glass bell thoroughly.
- Apply a good coating of Johnson's "Car-Plate". Allow to dry, then wipe off the white residue. Brush application is satisfactory.

FIXED COMPOSITION RESISTOR STOCK NO. CODE

The RCA six digit stock number for fixed composition resistors.

The first digit will always be 5.

The second digit is to indicate the wattage. $O = \frac{1}{2}$ watt, l = 1 watt, 2 = 2 watt.

The third digit is to indicate the resistor tolerance. 2=5%, 3=10%, 4=20%.

The fourth digit is for the number of zeros following the significant figures of the resistor value.

The fifth and sixth digits are for the significant figures of the resistor value.

Example 503268 is the stock number of a $\frac{1}{2}$ watt, fixed composition resistor, 6800 ohms $\pm 10\%$. A few resistors are still being listed in the Service Data

A few resistors are still being listed in the Service Data under four or five digit stock numbers. This is because there are still some of these resistors in stock packaged under the old stock numbers. However, as these are depleted, the new stock will be carried under the six digit stock number system.

Wire wound or other special resistors will continue to carry four or five digit stock numbers.

TELEVISION RECEIVER MODELS AND CHASSIS

			D 1	V	DE	Speaker	Television	Audio
Receiver Models	Television Chassis	Radio Chassis	Record Changer	scope	R-F Tuner	Size	Power Supply	Amplifier
TT5 (PRE WAR)	KC-3 or KC-3B†	RC429 & RS89A		5BP4 5BP4	5 channels 5 channels	None 12'' EM		
TRKO (PRE WAR)	KC-4A or KC-4Ct	RC427A & RS83E		9AP4	5 channels	12'' EM	KK-7A or KK-7E†	
TRK9 (PRE WAR)	KC-4H	RC427G & RS83E		9AP4	5 channels	12" EM	KK-7H	
TRK12 (PRE WAR)	KC-4 or KC-4B†	RC427 & RS83E		12AP4	5 channels	12" EM	KK-7 or KK-7DT	1
TRK120 (PRE WAR)	KC-4F or KC-4J†	RC427F & RS83E		IZAP4	5 channels	12 EM	KK-IF OF KK-IJ	
621TS	KCS21			7DP4	KRK2	4 x6 LM	-	
630TS	KCS20A or			10BP4	KRK2	5'' EM		
	KCS20C-2			10BP4	KBK2	12'' EM		
630TCS	KCS20D-2†					10// 734		DC1228
641TV	KCS25A-1 or KCS25C-2†	RK117A	960001 (78 RPM)	10BP4	KRK2	12" EM		DO100 A
648PTK	KCS24-1*	RK121A		5TP4	KRK2A	12'' EM	KRS21	RS123A
	KRS20-1**							
	KRKI-1***		DDIEC	CTD4	VDVOA	12" FM	KRS21A-1	BS123B
648PV	KCS24A-1*	RK121A	(70 PDM)	51P4	KNKZA		KIIOZIN-I	noizos
	KRS20-1**		(18 RPM)					
	KRKIA			IOBDA	KRK2B-1	4"x6" EM		
721TS	KCS26-1 or			10014	KNK2D-1	- XO LIM		
	KC520-21			10BP4	KRK2B-1	12" EM		
721TCS	KCS26A-1 or KCS26A-2t			1001 4	KIII ZD-1			
720711	KCS27-1 or	BC610A	RP177	10BP4	KRK2B-1	12" PM		
730TV2	KCS27-2†	RC610B	RP177	10BP4	KRK2B-1	12" PM		-
741005	KCS24B-1*			5TP4	KRK2A	12'' EM	KRS21A-1	RS123C
141105	KRS20A-1**							
	KRK1A-1***			CTTD 4	VDVOA	12// FM	KBS21A 1	BS123C
8PCS41	KCS24B-1*			51P4	KNKZA	12 6141	KIIOZIA-I	nondoo
	KRSZUA-1**							Davag
ODCS41B	KCS24C-1*	4		5TP4	KRK2A	12'' EM	KRS21A-1	RS123C
orcoub	KRS20B-1**	1				l .		
	KRK4***			STP4	KBK2A	12" EM	KRS21A-1	RS123C
8PCS41C	KCS24C-1*				In the second			
	KRK1A-1***							
07020	KCS20L1 or			10BP4	KRK2	5''x7'' PM		
81530	KCS20K-2†							-
PTV/1	KCS25D-1 or	RK117A	RP177A	10BP4	KRK2	12'' EM		RS123A
01741	KCS25E-2†		(78 RPM)					
8T241, 8T243, 8T244	KCS28			10BP4	KRK5	5"x7" PM		
87270	KCS29			16AP4	KRKSA	8" PM		
8TC270, 8TC271	KCS29A	· · · · ·		16AP4	KRK5A	8 PM		
8TR29	KCS32 or 32B	RK135 or 135A		10BP4	KRK5	5'x7' PM		
8TK29	KCS32A or 32C	RK135 or 135A	<u> </u>	10DF4	KIKS	12 TM		
8TK320	KCS33A-1	RK135A-1		IGAP4	KRKSA	12 FM		
8TV321	KCS30-1	RC616C or K	RP178	10BP4	KKK5	12 PM		
8TV323	KCS30-1	RC616B or J	RP178	TUDIA	KAKS	12 TM	L VDCOIA I	RS123A
9PC41(a)	KCS24C-1*	× .		51P4	KRKZA	12 EM	F 102IA-I	1012011
	KRS20B-1**	1			1			
OPC41(b) OPC41(c)	KCS24D*			5TP4	KRK2A	12'' EM	KRS21A-1	RS123A
9PC41(b), 9PC41(c)	KRS20B-1**							
	KRK4***							
9T240	KCS28			10BP4	KRK5	5"x7" PM	1	
9T240K	KCS28A			10BP4	KRKSA	12" PM	1	
9TC240	KCS28B			1001	VPVE	12" PM		
9TC245, 9TC247, 9TC24	9 KCS34B			1ZLF4	I KARS	12. 1 14		
1	or KCS34 in					1		
	some 247 a 245			10BP4	4 KRK7	5"x7" PM	1	
9T246	KCS28C or			10BP4	4 KRK7	5"x7" EN	1	
97256	KCS38C			10BP4	4 KRK7	5"x7" EN	1	
91230	KCS29			16AP	4 KRK5A	8" PM		
9TC272, 9TC275	KCS29C			16AP	4 KRK5A	12" PM		
9TW309	KCS41-1	RK135C	RP178 (78 RPM)	12LP	4 KRK5	12" PM		
			RP108A-1(45RPM	1000	AVDVE	12" DM		
9TW333	KCS30-1	RC616N	RP178 (78 KPM) RP168A-1(45RPM		4 NUVO	12 114		
	WORDI I	PC617A	RP177R (78 RPM)	16AP	4 KRK5A	12" PM		
9TW390	KC531-1	IICOITA .	RP168A-1(45RPM)				

†50 Cycle Chassis

**Deflection & HV Chassis

***Optical Barrel

TELEVISION RECEIVER MODELS AND CHASSIS

Receiver Models	Television Chassis	Radio	Record	Kine-	R-F	Speaker	Television	Audio
T100	KCS38		Cirdinger	10PD4	Tuner	Size	Power Supply	Amplifier
T120 T121	KCS34C			IUBP4	KRK7	5"x7" EM		
TC124 TC125 TC127	KCS34B			IZLP4	KRK5	5"x7" PM		
TA128	KCS42A	RK135D	960282 (33/78)	12LP4 12LP4	KRK5 KRK5	12" PM 12" PM		-
TA129	KCS41A-1	RK135D	960282 (33/78) BP168C (45 RPM)	12LP4	KRK5	12'' PM		
T164 TC165, 166, 167, 168	KCS40 KCS40A		111100C (45 NFM)	16GP4	KRK5B	8'' PM		
TA169	KCS43	RK135D	960285 (33/78) BP168C (45 BPM)	16GP4	KRK5B	12 PM 12" PM		
S1000	KCS31-1	RC617B	960285 (33/78) RP168C (45 RPM)	16AP4	KRK5A	12'' PM		
2T51 2T60	KCS45 KCS45A			12LP4 12LP4	KRK8 KRK8	5′′×7′′ EM 12′′ PM		
2T81	KCS46	RC1090	960282 (33/78) RP168 (45 RPM)	12LP4	KRK8	12'' PM		
4T101	KCS61			14EP4	KBK8C	5"x7" PM		_
4T141	KCS62	RC1090	960282 (33/78) BP190-2 (45 RPM)	14EP4	KRK8C	12" PM		_
6T72	KCS40B		(10 11 1)	16GP4	KRK5B	12'' PM		_
6T53, 6T54 6T64, 65, 71, 74, 75, 76	KCS47 or 47T KCS47A or 47AT			16GP4	KRK8B	8" PM 12" PM		
6T84	KCS48 or 48T	RC1090	960282 or 284	16GP4	KRK8B	12" PM		
6T86, 6T87	KCS48 or 48T	RC1092	960282 or 284 RP168 or 190	l6GP4	KRK8B	12′′ PM		
7T103, 7T104 7T103B, 7T104B 7T112, 122, 123, 124 7T112B, 122B, 123B, 125B 7T112B, 122B, 123B 7T111B 7T111B 7T132	KCS47B KCS47F KCS47C or GF KCS47GF-2 KCS47GF-2 KCS47D		RP190	17CP4 17GP4 17GP4 17GP4 17GP4 17GP4 17GP4	KRK8B KRK8B KRK8B KRK8B KRK8B KRK8B	8" PM 8" PM 12" PM 12" PM 12" PM 8" PM 12" PM		
7T143	KCS48A	RC1092	960284 (33/78) RP190 (45 RPM)	17CP4	KRK8B	12 PM		
9T57 9T77, 9T79	KCS49 or 49T KCS49A or 49AT			19AP4A 19AP4A	KRK8B KRK8B	8" PM 12" PM		
9T89	KCS60 or 60T	RC1092	960284 (33/78) RP168 or 190	19AP4A	KRK8B	12'' PM		
9T105 9T126, 9T128	KCS49B, 49BF or 49BF-2 KCS49C, 49CF			19AP4A 19AP4A	KRK8B KRK8B	8′′ PM 12′′ PM		
9T147	or 49CF-2 KCS60A	RC1092	960284 (33/78)	19AP4A	KRK8B	12'' PM		_
167152	VOC 47E		RP190 (45 RPM)					
177150	KCS66C			16GP4	KRK8B	8" PM		
17T151, 17T163	KCS66C			17QP4 17QP4	KRK11 KRK11	4"x6" PM 8" PM		
17T153, 154, 155, 160 17T162, 17T174 17T172, 17T173 17T172K, 17T173K 17T172K, 17T173K	KCS66 KCS66A KCS66A KCS66D KCS66D			17GP4 17GP4 17GP4 17CP4 17CP4	KRK11 KRK11 KRK11 KRK11 KRK11	8" PM 8" PM 12" PM 12" PM 8" PM		
17T200, 17T201, 17T202 17T211, 17T220	KCS72 KCS72			17QP4 170P4	KRK8D	5" PM 8" PM		
17T250DE 17T261DE	KCS74 KCS74			17QP4	KRK11A	8" PM 12" PM		
21T159 21T159DE 21T165 21T166DE 21T176, 177, 178, 179 21T174DE, 178DE, 179DE	KCS68E KCS68F KCS68E KCS68F KCS68C KCS68C			21AP4 21AP4 21AP4 21AP4 21AP4 21AP4 21AP4 21AP4	KRK11 KRK11A KRK11A KRK11A KRK11A KRK11A	8" PM 8" PM 12" PM 12" PM 12" PM 12" PM 12" PM		
21T197DE	KCS68H	RCIIIIA	930409	2łAP4	KRK11A	12" PM		RS141A
2 1T207, 2 1T207G 21T208, 21T217, 21T229 21T218, 21T227, 21T228	KCS72A KCS72A KCS72A			21AP4 21AP4 21AP4	KRK8D KRK8D KRK8D	5" PM 8" PM 12" PM		
21T242 21T244	KCS72D-1 KCS72D-2	RC1117B-1 RC1111B	930409 930409	21AP4 21AP4	KRK8D KRK8D	12'' PM 12'' PM		RS141C

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SAPPHIRE

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RED

Fig. 103

THREADED

APPHIRE

Fig. 107

Fig. 109

Fig. 111



SHAFT

VISCOLOID

2

Fig. 104 -----

SHAFT OULDER

SAP SAP Fig. 106 2.0 1160 #









Fig. 112 -----

MODEL	vs. PICKUP	' I	Model	Record Changer	Cartridge Stock No.	Model	Record Changer	Cartridge Stock No.	Model	Re- Chc	cord Ca inger Stc	rtridge ock No.
Onici Kii	Record Cr	netridae	UY-124	DD 1000	31156	9-EY-35	RP-168	74067	711-V-3	96000)1-5	39851
Model	Changer St	ock No.	U-125 U-126	RP-132C	31156	9-JY	RP-168 RP-168	74067	720 111 2	RF	-177Å	72551
A -55	RP-168 960282-1	* 74625 † 75044	U-127£ * U-128	RP-132	31050	9-JYM	RP-168	74067	130-10-2	RF	-177A	72551
A -78	RP-168	74625	U -129	RP-132F	31156	9-QV-5	RP-168	* S-5578	= 45 r.p.r = 78/33 r.	1. p.m.		
Å -82	RP-168 RP-190-2 960282-4	74625 75575	U-130 U-132 U-134 V-100	RP-132C RP-132B RP-132B	31156 32632 32632 33122	9- T -89	RP-168 RP-190-2 960284-1	* 74625 * 75575	t=78 r.p.n PICKUP	CAR	FRIDGI	ES
A -91	RP-168 RP-190-2 960284-1	74625 75575	V-101 V-102 V-105		33122 33905 33122	9-T-147	or-2 RP-190-2 960284-1 or-2	* 75575 † 75475	WITH N Stoc 14	EEDL. k No. 820	E SCRE Fig. No	- W
A -101	or -2 RP-190-2 960282-4 or -5 or []	75475 75575 75475	V-135 V-140	RP-162 RP-162	38610 38610	9-TW-309 9-TW-333	RP-168 RP-178 RP-168 RP-177	* 74625 ‡ 72551 * 74067 ‡ 72551	30 31 31 32	708- 050 156 632-	· 2 3 4 4	
A -106	960284-1 or -2 RP-168 *	74625	V-175 V-200 V-201	RP-152 RP-152A RP-152A RP-152A	38610 35171 35171	9- TW -390	RP-168 RP-177	* 74067 ‡ 72551	33 33 33	122 * 21 7* 905 *	5 6 7	
A -108	960285-1 † RP-168 *	75044 74625	V-205	RP-152D	37150	9-W-78	RP-168	* 74625	34	307	8 9	
Q-50	RP-190-2 * 960284-1 or -2 †	75575	V-209 V-210 V-215	RP-158 RP-158 RP-160	38610 38610 (38453)39550	9-W-101 9-W-102	RP-178 RP-168 RP-168	12551 74067 74067	34 35 37	710 171▲ 158	10 7 11	
QEY-3 QEY-4	RP-168 RP-190-5	74984 76297	V-219 V-221	RP-160 RP-160	/38453 39550 /38453	9-W-103 9-W-105	RP-168 RP-168 .RP-178	74067 * 74067 ‡ 72551	39 71 ≜Discontin	586 * 173	12 15	
QJY QJY	RP-190-5 RP-168	74984	V-225	RP-151 To	39550 p 38453	9-W-106	RP-168 RP-178	* 74625 1 72551	30708→use	14820		
QU-2C QU-3C	RP-190-5	76297 33905 33905	V-300 V-301	RP-151 Bo RP-152J RP-153	ott. 38598 37158 33905	9- Y-7 9- Y-5 1	RP-168 RP-168	74067 74625	33122→use 33217→use 33905→use	9890 9890 37158		
QU-5C QU-51C QU-52C	RP-145E RP-145E RP-152S	33905 35171 35171	V-302 V-405	RP-153 RP-152J	33905	9- Y -510 9- Y -511	RP-190-1 or-4 RP-168	75476 76318 74625	35171→use 39686→use	37158 9890		
QU-61	960001-4	33122 39851	VA-15 VA-20	RP-152	31050	11-QU 12-QU	RP-132A RP-132A	31156 31156	REPLAC	5 WIT	H ESTYL	JUS
OU-62 OU-68 OU-72	960001-4 960001-4	39851 39851 39851	VA-22 VA-22 VA-22A	RP-139D RP-145C	31156 33905	45-EY	RP-168	74067	Pickur Stock	Fig.	Stock	us Fig.
QU-72A R-56		39851 39686	VA-24	RP-145C	33905	45-EY-1 45-EY-2	RP-168 RP-190-1	/75476	9890 1	6-ZN	39863	101
R-60		33122	VHR-207	RP-155 RP-161	37158	45-EY-3	RP-190-1	75476	38453* 1 38598 1	7-AL 8	38449* 38449*	102
R-89 R-91		31050 31050		RF-101	08150	45-EY-15	or-3 RP-168	76318	39851 1 39851 1	3 9-ZN	39564 39863	103
R-93B R-93C R-93F	· · · · · · · · · · · · · · · · · · ·	31050 31050 33122	VHR-307 VHR-407 2-S7-ED 2-T-81	RP-155 RP-155 RP-168	37158 37158 73839 * 74625	45-J 45-J-2	RP-168 RP-190-1	74067 ∫75476 76218	39550 1 39919 1 70332▲ 1	7-ZN 7-AL 9-AL	38449▲ 38449▲ 38449▲	102 102 102
R-94B R-98 R-100		31050 31156 33122		RP-190-2 960282-4 or-5	* 75575 † 75475	45-J-2 45-J-3 45-W-9	RP-190-6 RP-193 RP-190-2	74067 76257 75575	70338 1 70339 1	4-AL 4-AL	72345 70915	101 102
R-103S	* • * • * * • •	33122	4-QV-8C	RP-168 960282-2	* S-5578 † S-5652	45 W 10	PP . 190. 2	75575	73839 2))	73840	104
R-566P S-1000	RP-162 RP-168 * 960285-1 †	33122 38610 74625 75044	4-T-141	RP-190-2 960282-4	* 75575	55-U, 55-AU 58-V, 58-AV	960015 960001-1	71173 70338 39851	74625 2 74984 2	i 2	74818 74985	106 107
TA-128 TA-129	RP-168 * 960282-1 † RP-168 *	74625 75044 74625	6-J 6-JM 6-OU	or-5	† 75475 70338 70338 33122	59-V-1 59 -AV- 1	960001-2 960001-2	70332 70332	75044 2 75475 2	3 4	75045 75046 75496	108 108 109
ግል 169	960282-1 †	75044	6-QU-3	RP-178-3	72551	62-1 63- E	960260-2	70338 70338	75575 2	5	75770	109
U-8 U-9	960285-1 †	75044 33122 33122	6-QU-3Y 6-QV-3 6-T-84	RP-168 RP-178-3 RP-168	74984 72551 * 74625	63-EM 65-U 65-AU	960260-2 960260-2	70338 70338 70338	75976 1 76257 {2 2	5-ZN 7	39863▲ 76374 76323 €	101 111 112
U-10 U-12		33122 33905		RP-190-2 960282-4	* 75575	65-AU-1	960260-2	70338	76297■ 2 76318▲ 2	B 1	74985	107
U-20 U-25 U-26	RP-132M RP-132M	33905 31156 31156	6- T -86	or-5 RP-168 RP-190-2 960284-1	† 75475 * 74625 * 75575	66-ED 66-E-1 67-V-1	960260-1	70332 70332 70338	S-5652 2	3	75045 75046 0	108 108
U-40 U-42	RP-132M RP-139A RP-145	35171	6 -T -87	or-2 RP-168 RP-190-2	† 75475 * 74625 * 75575	67-AV-1 75-ZU	960260-1 RP-178 or	70338 72551	PICKUPS	S WIT	H FIXE	ED
U-43 U-44 U-45	RP-145 RP-145 RP-139A	35171 35171 35171		950284-1 or-2	† 75475	77-V 77-V-1	RP-178 960260-1	72551 70338	St	ock No.	Fig. No.	
Ū-46	RP-140	33905	7-QV-5 7-T-132	960001-4 RP-190-2	39851 75575	77-V-2	960260-1	70338	S-5 754	578 - 764	29 30	
U-50 U-104 U-106	RP-129B	33217 31050	7-T-143	RP-190-2 960284-1 or-2	* 75575 † 75475	610-V-1	960001-5or- or RP-177 960001-5 or-	6 39851 7 72551 6 39851	ZN = Zinc c AL = Alumi Ceramic t	ise, num cas vpe pick	se	
U -107	(9820) RP-129A	14820	8-QU-5C 8-TV-41	RP-177A	34307 72551	612-V-1	or RP-177 RP-176A or	7 72551	ADiscontinu 38449→use	red : 70915		
U -108	(9820) RP-129 (9820)	14820 14820	8. TV . 321	RP.179	72551	612-V-3	RP-176B RP-176 or	70339	38453→use 39851→use	39919 75976		
U -109	RP-129 (9820)	14820	8-TV-323 8-V-7	RP-178 RP-178	72551	612-V-4	RP-176B RP-176 or	70339	39863→use 70332→use	73345 75976		
U-111 U-112		31050 31050	8-V-90 8-V-91	RP-178 RP-178	72551		RP-176B	70339	74984→use 75476→use	76297 74067		
U-119		31050	8-V 112	PP. 179	72661	641- TV	960001-1	20851	76318→use	74067 .—RED		
U-121 U-122E	11010-11-	31050	8-V-151 9-EY-3	RP-177B RP-168	70339	648-PV 710-V-2	RP-176 RP-177 or	70339	 78 r.p.m For picku 	-PLAIN	red 98837(J-1
UY-122E U-123 U-124	RP-139B	31156 31156 31156	9-EYM-3 9-EY-31 9-EY-32	RP-168 RP-168 RP-168	74067 74625 74625	711-V-1 711-V-2	RP-177A 960001-5 960001-5	72551 39851 39851	[®] For picku S-5652 and only thru R	S-5578 CA Inte	ed 988370 are avai rnationa)-2 ilable 1 Div.





2	B	400	SERIES
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2 B 400	2 B 401	2 B 402
Grey	Black	Ivory
2 B 403	2 B 404	2 B 405
Green	Tan	Red



Battery Operated Personal Receiver

2B400 Series

Chassis No. RC-1114

SERVICE DATA

-1952 No. 5-

PREPARED BY RCA SERVICE CO., INC.

FOR

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION

CAMDEN, N. J., U. S. A.

Specifications

Tuni	ng Ra	nge		0-1600	kc
Inter	media	te Fr	equency	455	kc
Tube	Com	pleme	ent:		
1.	RCA	1R5		Convei	ter
2.	RCA	1U4		Ampli	lier
3.	RCA	1U5		p. A.V	.C.
4.	RCA	3V4		Out	put
Loud	lspeak	er			
0:			0//	0// D	

Size and type			2″ x	: 3″	P.M.
Voice coil impedance		ohms a	t 100	0 c1	ycles
Weight (with batteries)	••••••	apj	prox.	3¾	lbs.



Controls

Batteries Required: Type of Battery	Current Drain			
	Normal Pos.	Saver Pos.		
"A"-1.5 volt (two) RCA VS 236	0.25 amp.	0.20 amp.		
"B"-67.5 volts RCA VS 216	8.45 ma.	5.45 ma.		

Battery life is approximately 100 hrs. intermittent service with battery-saver switch in "Normal" position. With switch in "Saver" position, battery life is increased approximately 30%.

Power Output:

Undistorte	d					07	5 wati	ł
Maximum						D.1	0 wati	ł
Dimensions	(over-all)	approx.	81⁄8″	x	5 1/8"	x	211/16"	

Case Back

To remove—insert small coin in the slot at top rear of case and pry open.

To replace—insert bottom edge into case and snap top edge in place.

C[#]·On Indicator

A window in the case (just below edge of volume control knob) indicates whether set is turned ON or OFF. "ON" appears in window when set is turned ON and disappears when set is turned OFF.

Battery-Life Saver Switch

Maximum power is obtained when the slider button is pushed toward left (outer edge of case). Extra battery life with slight effect on performance is obtained with the slider button pushed to the right (toward center of case).

Battery Life

The life of the "A" and "B" batteries is approximately equal. For best performance all batteries should be replaced at the same time.

Output Meter.—Connect meter to voice coil terminals. Turn volume control to maximum position.

Test-Oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

Note:—The ant. coil is supplied pre-adjusted and cemented to rod. This makes further adjustment unnecessary. However when replacing ant. assembly make certain that the coil end of the rod is fully entered in its rubber mounting grommet but does not extend through the grommet more than is required to permit the opposite end to fit inside the case.

Replacement of Component Parts

- I. To Remove Back Cover
 - a. Depress top of case midway between the handle supports, until the top end of the back separates from the main case.
 - b. Pull the back cover back and up, thereby unhooking the retaining lugs in the bottom of the main case.

II. To Replace Batteries

- a. Remove back cover.
- b. Remove both "A" and "B" batteries. The "B" battery snap fasteners can best be removed by insetting a screwdriver under the snap fastener strip and prying upward.
- c. The "A" batteries can easily be removed by pulling up on the spring wire clips.
 - Note: The "A" and "B" batteries have approximately equal life and therefore it is advisable to replace all batteries at one time.

III. To Remove Chassis

- a. Remove dial knob by grasping with finger tips at two sides and pulling.
- b. Remove back cover.
- c. Remove batteries.
- d. Remove "A+" contacts by squeezing against case and sliding out of slots in case.
- e. Remove the four screws "A."
- f. Grasp the assembly by the speaker and pull the bottom end down and outward to clear the volume control knob.

IV. To Replace Chassis

- a. Observe the position of the battery save button extension in relation to the "battery-save" switch. This extension mut engage with the center of the battery save switch.
- b. Replace in reverse order to that given for chassis removal.

V. To Remove Handle

- a. Spread the square spring wire clips by pulling on one side of a clip.
- b. Allow the clip to return to its original shape but resting on the outside of the case.
- c. Pull the other side of the clip out of the case.

VI. To Replace Battery Save Switch Button

- a. Remove chassis.
- b. Spread the open end of the spring clip retainer no more than necessary to permit removal of clip.
- c. Slide the clip clear of the slider button.
- d. Turn slider button one-quarter turn and pull out of case.
- e. Replace button in reverse order—do not use excessive force in replacing spring clip.

Steps	Connect high side of test osc. to—	Tune test- osc. to—	Turn radio dial to—	Adjust the following for max. output—	
1			Quiet point	Trimmers of 2nd I-F trans	
2	High side of ant. coil (terminal lug on coil which is connected to Pin #6 of 1R5 tube)	455 kc	near 1600 kc	Trimmers of 1st I-F trans.	
3		Repeat steps 1 and 2			
4		1400 kc	l4 Rock gang	Cl-lT (osc.)	
5	Short wire placed near ant. coil for radiated signal	600 kc	60 Rock gang	L2 (osc.)	
6		Re	epeat steps 4 a	and 5	



Tube and Trimmer Locations

IST. I.F. TRANS. 455 KC

SWITCH

2

2



Schematic Diagram

In some chassis the on-off switch terminals are not in the order shown in the wiring diagram. USE CONTINUITY CHECK when connecting replacement control.

3



Connection Diagram

CRITICAL LEAD DRESS

- 1. Position Ferrite antenna rod as described above.
- 2. Dress all bus wires, pigtail leads and non-insulated components away from chassis base and away from each other.
- 3. Dress neutralizing capacitor C5 against front of chassis and with clearance under volume control knob. Utilize shielding effect of oscillator coil mounting bracket.
- 4. Dress all I-F transformer leads down to base.

A

Replacement Parts

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES		77163	Back—Case back—RED—for Model 2B405
	RC 1114		76859	Button—Battery saver switch slider button—GREY—for
76847	Antenna—Ferrite rod antenna (L1)	1	77164	Model 2B400
76846	Capacitor—Variable tuning capacitor (C1-1, C1-2)		//104	spring clip for Model 2B401
57090	Capacitor-Ceramic, 3 mmf. (C5)		77165	Button-Battery saver switch slider button-IVORY-and
75784	Capacitor—Ceramic, 56 mmf. (C2, C7)			spring clip for Model 2B402
73960	Capacitor—Ceramic, 82 mmi. (C5, C10)		77166	Button-Battery saver switch slider button-GREEN-and
73964	Capacitor-Electrolytic, 10 mfd., 70 volts (C15)		77167	Button-Battery saver switch slider button-TAN-and
72792	Capacitor-Tubular, paper, .001 mfd., 200 volts (C12)			spring clip for Model 2B404
73750	Capacitor—Tubular, paper, .002 mfd., 200 volts (C11, C14)	ł	77168	Button—Battery saver switch slider button—RED—and
71928	Capacitor—Tubular, paper, .003 mia., 200 volts (C6)		76939	spring slip for Model 28405
73558	Capacitor—Tubular, paper, .047 mfd., 200 volts (C8)		10000	back for Model 2B400
76852	Clip-"A" battery mounting clip (formed spring wire)		77154	Case—Case assembly—BLACK—less handle, links and
	(2 required)			back for Model 2B401
75774	Colp— C clip and screw to mount output transformer		//155	back for Model 28402
/3//4	L3)		77156	Case—Case assembly—GREEN—less handle, links and
76854	Contact—"A" battery contact (2 required)			back for Model 2B403
75773	Control—Volume control and power switch (R6, S1)		77157	Case—Case assembly—TAN—less handle, links and back
37396	Grommet-Rubber grommet for antenna rod (2 required)		77158	Case—Case assembly—RED—less handle, links and back
76851	Knob-Volume control and power switch knob-less set			for Model 2B405
	SCIEW		76860	Clip—Retaining spring clip for battery saver switch slider
76855	Lead—"B" battery lead complete with connector		76842	Digl-Polystyrene digl scale-GREY-for Model 2B400
503139	All		77169	Dial—Polystyrene dial scale—BLACK—for Model 2B401
504210	$1000 \text{ ohms}, \pm 20\%, \frac{1}{2} \text{ watt (R12)}$		77170	Dial—Polystyresse dial scale—IVORY—for Model 2B402
503315	15,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R2)		77171	Dial-Polystyrene dial scale-GREEN-for Model 28403
504347	47.000 ohms. ±20%, 1/2 watt (R5)		77173	Dial-Polystyrene dial scale-RED for Model 2B405
504410	$100,000 \text{ ohms}, \pm 20\%, \frac{1}{2} \text{ watt (R1)}$		75844	Emblem—"RCA Victor" emblem
504533	$3.3 \text{ megohm}, \pm 20\%, \frac{1}{2} \text{ watt (R4, R10)}$		73843	Grille-Metal grille-perforated-GREY-for Model 2B400
504547	4.7 megohm, ±20%, 1/2 watt (R3, R7)		//1/3	and 28402
504610	10 megohm, ±20%, ½ watt (R8)		77180	Grille—Metal grille—perforated—GREEN—for Model 2B403
70527	Screw—#6-32, x 3/16" socket head set screw for volume		77181	Grille—Metal grille—perforated—TAN—for Model 2B404
75780	Socket-Tube socket, 7 pin, miniature, saddle mounted	1	73839	Handle—Carrying handle—BLACK—for Models 2B400 and
76848	Switch-Battery saver switch (S2)			2B401
76849	Transformer—First I.F. transformer (T1)		77183	Handle-Carrying handle-BEIGE-for Model 2B402
76850	Transformer—Second I.F. transformer (T2)		77184	Handle—Carrying handle—GREEN—for Model 2B403
	Tansionnet—Output itansionnet (15)		77186	Handle—Carrying handle—RED—for Model 2B405
	SPEAKER ASSEMBLY		76856	Knob-Tuning control knob-GREY-for Model 2B400
1	92523-W		77174	Knob-Tuning control knob-BLACK-for Model 2B401
76373	Speaker-2" x 3" P.M. speaker complete with cone and		77176	Knob—Tuning control knob—GREEN—for Model 2B402
	voice coil		77177	Knob-Tuning control knob-TAN-for Model 2B404
76941	MISCELLANEOUS		77178	Knob-Tuning control knob-RED-for Model 2B405
77159	Back-Case back-GREI-for Model 28400		73858	Link—Carrying handle link (2 reg'd) Bing—Begring ring for tuning knob
77160	Back—Case back—IVORY—for Model 2B402		70857	Screw—#4-40 x 5/30" cross recessed binder head machine
77161	Back—Case back—GREEN—for Model 2B403			screw for mounting chassis (4 req'd)
77162	Back—Case back—TAN—for Model 2B404		74734	Spring—Spring clip for tuning control knob

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

Incorrect Tube Location Label:

A tew receivers were shipped with an incorrect tube location label in which the designation of 3V4 and 1U5 tubes were transposed. These may be readily identified by the label color. The incorrect label is BLUE, the correct label is YELLOW. The correct tube locations are illustrated below.



"A" Battery Lead:

A rubber band is used for the purpose of holding the "A" battery lead in a position where it will not be accidentally torn loose when replacing the battery. When servicing one of these receivers, make sure that this rubber band is around the i-f transformer shield can and holding the "A" battery lead against the chassis.

Correct Tonal Response:

For correct tonal response it is necessary that the holes in the case, where the metal grille is attached, be closed. This is done at the factory by covering the tabs, on the inside of the case, with tape. Absence of this tape will adversely affect the tonal response of these receivers.







PREPARED BY RCA SERVICE CO., INC.

FOR

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION

CAMDEN, N. J., U. S. A.

Specifications

Power Supply Rating Power Line Operation OL Tube Complement (1) RCA 1T4 (2) RCA 1R5 (3) RCA 1T4 I.F.-Amplifier Det. — AVC — 1st A.F. (4) BCA 1U5

To Remove Hinges

(5) RCA 3V4

Remove back from cabinet as described at right. Spread the hinge apart to remove it from the cabinet back.

A selenium rectifier is used.

Output



Removal of Cabinet Back

Weight (Approx.) Without battery4	lb. 10 oz.	With battery	7 lb. 12 oz.
Power Output Undistorted Maximum			0.170 watt 0.320 watt
Loudspeaker Voice Coil impedance Cabinet Dimensions Height 8 in.	ce s Width12	3.2 ohms ¹ / ₂ in. Dep	4 in. P.M. at 400 cycles oth5% in.

To Remove Chassis:

- 1. Pull out battery and disconnect battery plug.
- 2. Unsolder the two loop antenna leads.
- 3. Remove the two large screws (under handle) in the top of the case.

To Remove Cabinet Back

With the back fully open, grip the cabinet as illustrated. Insert a screwdriver under one hinge and pry the center of the hinge out of the opening in the cabinet while maintaining pressure on the back with the fingers and on the cabinet with the thumb. Repeat this procedure with the other hinge. Pull the back straight to the rear using both hands.



Rear View With Back Removed

2 BX 63

6

Alignment Procedure

Output Meter Alignment — If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

•Test Oscillator — For all alignment operations, connect the low side of the test oscillator to the receiver chassis and keep the oscillator output as low as possible to avoid AVC action.

Battery operation of the receiver is preferable during alignment; on AC operation an isolation transformer (117v./117v.) may be necessary for the receiver if the test oscillator is also AC operated.

Dial Pointer Position — With the tuning condenser fully meshed the center of the dial pointer should be in line with the score mark on the chassis.

Step	Connect High Side of Sig. Gen. to —	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output			
1	Disconnect loop plate.	remove	chassis-	-remove bottom			
2	Pin #6 of 1T4 I.F. Amplifier thru .005 mf.	455 kc	Quiet point near 1600 kc	2nd I.F. Trans. T2 Top & Bottom			
3	Pin #6 of 1R5 Converter thru .005 mf.			lst I.F. Trans. Tl Top & Bottom			
4	Replace bottom cover and install chassis in cabinet. Re-connect loop.						
5		1620 kc	min. cap.	1600 kc osc. trimmer C1-3T			
6		1400 kc	1400 kc Signal	1400 kc r.f. & ant. trimmers*			
7	Short wire placed near	Connect parallel	a 22,000 with r.f. t	ohm resistor in uning cond. C1-2			
8	loop for	600 kc	600 kc Signal	L4 osc. core* while rocking gang			
9	radiated signal	Remove from r.f.	the 22,0 tuning c	00 ohm resistor ond. C1-2.			
10		600 kc	600 kc Signal	L3 r.f. core			
11	Repeat Steps	5, 6, 7, 8,	9 and 10).			

* The position of the battery affects loop inductance. The battery should be in place during steps 5 to 11.

Critical Lead Dress

- 1. Dress all filament leads next to chassis.
- 2. Use short pigtail leads on components to V1, Pin 6.
- 3. Dress gang leads direct to avoid excess lead length.
- 4. Dress loop leads away from gang tuning drum.
- 5. Dress capacitors C3, C4, C6 for RF shielding.
- 6. Use short pigtail lead on C21 to V3-2 and dress away from Pin 6.
- 7. Dress capacitors C13 and C17 direct and down to base.

CAUTION .--

Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.

Dial-Indicator and Drive Mechanism





Tube and Trimmer Locations



Schematic Diagram-Chassis No. RC-1115

3

2 BX 63

7
Replacement Parts

CHASSIS ASSEMBLIES RC-1115 RC-111513233 RC-11153320 Status3420 StatusNew dtR2 RC-111577054CapacitorVariable tuning capacitor complete with drive drumCCIA, CIE (1500 ohms, $\pm 20\%, 4^{\circ}$ wortR1077153CapacitorCeramic, 4 m.f. CapacitorCeramic, 82 m.f. (160 ohms, $\pm 20\%, 14^{\circ}$ wortR1077154CapacitorCeramic, 82 m.f. (160 ohms, $\pm 20\%, 4^{\circ}$ wortR1677154CapacitorCeramic, 82 m.f. (150 ohms, $\pm 20\%, 4^{\circ}$ wortR1677154CapacitorCeramic, 82 m.f. (150 ohms, $\pm 20\%, 4^{\circ}$ wortR1677155CapacitorLickal, 80 m.f. (150 ohms, $\pm 20\%, 4^{\circ}$ wortR1677156Capacitor	STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
7754Capacitor-Variable tuning capacitor complete with drive drumClA CIB CIC (10000 ohms, $\pm 20\%$, $\%$ wartRio (10000 ohms, $\pm 20\%$, $\%$ wartRio 		CHASSIS ASSEMBLIES RC-1115	513233 504315 503327	3300 ohms, ±10%, 1 watt R22 15,000 ohms, ±20%, ½ watt R20 27,000 ohms, ±10%, ½ watt R14
73133 Capacitor-Ceramic, 4 mmin. C21 30342 220,000 onms, ±10%, 4 watt All 73144 Capacitor-Mice, 56 mmin. C7 503518 1 megohm, ±10%, 4 watt R1 51415 Capacitor-Mice, 180 mmin. C2 503518 1 megohm, ±10%, 4 watt R2 51415 Capacitor-Tubuic, comprising 1 sectors 504547 47 megohm, ±10%, 4 watt R1 5153 Capacitor-Tubuic, comprising 1 sectors 504547 47 megohm, ±10%, 4 watt R1 7355 Capacitor-Tubuic, paper, 0022 mid, 600 voits C1 70352 535 64 megohm, ±10%, 4 watt R1 73755 Capacitor-Tubuic, paper, 0033 mid, 600 voits C1 70352 536 68 megohm, ±10%, 4 watt R1 73765 Capacitor-Tubuic, paper, 0021 mid, 400 voits C1 70353 537 704 704 704 704 705 537 704	77054	Capacitor—Variable tuning capacitor complete with drive drum	504368 504410	68,000 ohms, ±20%, ½ watt
71514 Capacitor-Carcamic, 82 mmi. C2, C12 503516 1.8 megohm, ±10%, ½ watt R2 51416 Capacitor-Electolytic comprising 1 section of 51 mid., 150 volts, 13 section of 40 mid., 150 volts, 13 mid., 25 volts, 14 section of 40 mid., 150 volts, 150 mid., 25 volts, 14 section of 40 mid., 150 volts, 150 secter-Tubular, paper, 0022 mid., 600 volts C17 50356 5.6 megohm, ±10%, ½ watt R1 73555 Capacitor-Tubular, paper, 0022 mid., 600 volts C17 7317 Socket-Tubue socket, 7 pin, innitatre 73786 Capacitor-Tubular, paper, 01 mid., 400 volts C17 7318 Spring-Drive cord pring 73556 Capacitor-Tubular, paper, 0.22 mid., 400 volts C17 7368 Spring-Drive cord pring 73557 Capacitor-Tubular, paper, 0.21 mid., 400 volts C17 7368 Spring-Drive cord pring 73558 Capacitor-Tubular, paper, 0.47 mid., 400 volts C3, C5 C3 C4, C5, C3, C10 73550 Capacitor-Tubular, paper, 0.47 mid., 400 volts C4, C5, C3, C10 7326 7350 Capacitor-Tubular, paper, 0.47 mid., 400 volts C4, C5, C3, C10 7351 Capacitor-Tubular, paper, 0.47 mid., 400 volts C4, C5, C3, C10 7350 Capacitor-Tubular, paper, 0.67 mid., 400 volts C4, C5, C3, C10 </td <td>73153 39622</td> <td>Capacitor—Ceramic, 4 mmf</td> <td>503422 504510</td> <td>220,000 ohms, $\pm 10\%$, 42 watt</td>	73153 39622	Capacitor—Ceramic, 4 mmf	503422 504510	220,000 ohms, $\pm 10\%$, 42 watt
11110 Capacitor—Bick 100 mmin. C13 17655 Capacitor—Diction of 160 mmin. 50356 17655 Capacitor—Diction of 160 mmin. 50356 17655 Capacitor—Diction of 160 mmin. 50356 17655 Capacitor—Tubular, paper, 0.022 md6, 600 volts. C14 17355 Capacitor—Tubular, paper, 0.022 md6, 800 volts. C14 17355 Capacitor—Tubular, paper, 0.022 md6, 800 volts. C14 173552 Capacitor—Tubular, paper, 0.022 md6, 800 volts. C14 173552 Capacitor—Tubular, paper, 0.022 md6, 800 volts. C14 173552 Capacitor—Tubular, paper, 0.022 md4, 400 volts. C14 173553 Capacitor—Tubular, paper, 0.022 md4, 400 volts. C14 173553 Capacitor—Tubular, paper, 0.027 md, 400 volts. C14 17353 Capacitor—Tubular, paper, 0.027 md, 400 volts. C14 17353 Capacitor—Tubular, paper, 0.027 md, 400 volts. C14 17354 Capacitor—Tubular, paper, 0.027 md, 400 volts. C14 17355 Capacitor—Tubular, paper, 0.027 md, 400 volts. C14 17314 Calae-Stomatic mail connector or output Transformere—Catput masformere T23	71514	Capacitor—Ceramic, 82 mmf	503518 503533	1.8 megohm, ±10%, ½ watt
mid., Lib voits, 1 section of 40 mid., 25 voits and 1 section 2 section of 1 section 2 section and 1 section 2 sectin 2 sectin 2 section 2 section 2 section 2 section 2 s	76659	Capacitor—Electrolytic comprising 1 section of 50	504547	4.7 megohm, ±20%, ½ watt
7395 Capacitor-Tubular, paper, 0.033 mid., 600 voltsC17 7366 7367 Sceket-Tube scoket, 7 pin, miniture 73755 Capacitor-Tubular, paper, 0.033 mid., 600 voltsC19 7368 Switch-''Line-Battery'' switch S1 7356 Capacitor-Tubular, paper, 0.033 mid., 600 voltsC19 7317 Sceket-Tube-Battery'' switch S1 7356 Capacitor-Tubular, paper, 0.02 mid., 400 volts C13, C16 Transformer-Tist I.F. transformer complete with adjustable cores. T 73553 Capacitor-Tubular, paper, 0.47 mid., 400 volts C3, C6 Transformer-Output transformer T 73571 Capacitor-Tubular, paper, 0.47 mid., 400 volts C3 T Transformer-Output transformer T2 73525 Capacitor-Tubular, paper, 0.47 mid., 400 volts C20 Speaker-4" P.M. speaker complete with ob shaft 73551 Capacitor-Tubular, paper, 0.47 mid., 400 volts C11 T Speaker-4" P.M. speaker complete with cone and voice coil (3.2 chms) 7352 Cadacitor-S contact male connector or output transformer leads C11 T T 7354 Connector-Single contact male connector for output transformer leads C11 T T 7364 Connector-Single contact male connector for output		mfd., 150 volts, 1 section of 40 mfd., 150 volts, 1 section of 160 mfd., 25 volts and 1 section of 40 mfd., 25 volts	503556 503568 504610	3.5 megohm, ±10%, ½ watt R/ 6.8 megohm, ±10%, ½ watt R1 10 megohm, ±20%, ½ watt R12
73795 Capacitor—Tubular, poper, .0033 mid., 600 voltsC13 7636 Spring—Drive cord spring 73756 Capacitor—Tubular, poper, .01 mid., 400 voltsC14 71039 Sitth—"Line-Battery" switch	73595	Capacitor—Tubular, paper, .0022 mfd., 600 volts C17	73117	Socket—Tube socket, 7 pin, miniature
7356 Capacitor-Tubular, paper, 0.039 mid., 600 volts Capacitor-Tubular, paper, 0.21 mid., 400 volts C13 7109 Switch-"Line-Battery" switch	73795	Capacitor—Tubular, paper, .0033 mfd., 600 voltsC8	76368	Spring—Drive cord spring
7351 Capacitor—Iubular, paper, 01 mid., 400 volts C13, C16 7355 Capacitor—Tubular, paper, 022 mid., 400 volts. C13, C16 73553 Capacitor—Tubular, paper, 047 mid., 400 volts C4, C5, C9, C10 73553 Capacitor—Tubular, paper, 047 mid., 400 volts C3, C6 73573 Capacitor—Tubular, mouled paper, 047 mid., 400 C3, C6 73573 Capacitor—Tubular, mouled paper, 047 mid., 400 C3, C6 73574 Capacitor—Tubular, mouled paper, 047 mid., 400 C3, C6 73575 Capacitor—Tubular, mouled paper, 047 mid., 400 C3, C6 73574 Capacitor—Tubular, paper, 041 mid., 400 C3, C6 73575 Capacitor—Tubular, paper, 041 mid., 400 C3, C6 73574 Capacitor—Tubular, paper, 041 mid., 400 C20 73575 Capacitor—Tubular, paper, 041 mid., 400 C20 73575 Capacitor—Tubular, paper, 041 mid., 400 C20 73116 Capacitor—Tubular, paper, 041 mid., 400 C20 73117 Capacitor—Tubular, paper, 041 mid., 400 C20 73116 Coil—Scillar Coil complete with adjustable cores C21 73117 Coil—Coil complete with adjustable core 12, L3 Timesf	73796	Capacitor—Tubular, paper, .0039 mtd., 600 voltsC19	71039	Switch—"Line-Battery" switch
73552 Capacitor—lubular, paper, .027 mid., 400 volts 75487 Transformer—Second I.F. transformer complete with adjustable cores 73553 Capacitor—Tubular, paper, .047 mid., 400 volts 33726 73553 Capacitor—Tubular, moulded paper, .047 mid., 400 23726 73553 Capacitor—Tubular, moulded paper, .047 mid., 400 23726 73553 Capacitor—Tubular, paper, .047 mid., 400 201 73553 Capacitor — Soluci male connector or output transformer Leads (2 req'd) 77058 73647 Connector—Soingle contact male connector or output transformer leads 77065	73561	Capacitor-lubular, paper, 101 mia., 400 volts C13, C16	73129	Transformer—First I.F. transformer complete with ad- justable coresTl
Capacitor—Tubular, paper, 047 mid, 400 volts 71047 Transformer—Output transformer 713 73553 Capacitor—Tubular, paper, 047 mid, 400 volts C3, C6 Size Washer—"C" washer for tuning knob shaft 73553 Capacitor—Tubular, moulded paper, 047 mid, 400 C20 SPEAKER ASSEMBLIES 73553 Capacitor—Tubular, paper, oil impregnated, 0.1 mid., 400 volts C20 SPEAKER ASSEMBLIES 73553 Chip—Mounting clip for LF, transformer C11 77055 Speaker—4" P.M. speaker complete with cone and voice coil (3.2 ohms) 731047 Connector—Scingle contact pin connector or output transformer leads 77056 Antenna—Anthenal loop assembled to polysiyrene frame and support L1 7488 Connector—Single contact male connector for output transformer leads 77065 Case—Case front—leads handle, handle support, caps, links and chasis mounting screw 77051 Toile—Metal giscle complete with (3) pulleys 77065 Care-Case front—lead scale complete with (3) pulleys 7488 Gronmet—Rubber grommet for mounting variable capacitor on thirer, Statin selector pointer 77056 Gronmet—Rubber grommet for mounting variable capacitor 70052 Grad—Tabular, pager, 20, 1 watt 77056 Gronmet—Rubber grommet for mounting loop assembly frome 70052 <td< td=""><td>73552</td><td>Capacitor—Tubular, paper, .022 mfa., 400 volts</td><td>75487</td><td>Transformer—Second I.F. transformer complete with adjustable cores</td></td<>	73552	Capacitor—Tubular, paper, .022 mfa., 400 volts	75487	Transformer—Second I.F. transformer complete with adjustable cores
75071 Capacitor—Tubular, moulded paper, .047 mid., 400 volts .220 SPEAKER ASSEMBLIES 73551 Capacitor—Tubular, paper, oil impregnated, 0.1 mid., 400 volts .220 SPEAKER ASSEMBLIES 73935 Clip—Mounting clip for I.F. transformer C11 .7055 Speaker—4" P.M. speaker complete with cone and voice coil (3.2 ohms) 7492 Coil—RF coil complete with adjustable core .12, 1.3 .7055 Speaker—4" P.M. speaker complete with cone and voice coil (3.2 ohms) 71041 Connector—Single contact pin connector or output transformer leads .7066 Antenna—Antenna loop assembled to polystyrene — complete with strikes 72652 Conteol—Volume control and power switchR9, S2 .7061 Cap—Carrying handle cap and chassis support 70222 Cord—250° Drive Cord Reel (approx. 50" required) .7064 Emblem—"RCA Victor" emblem 70222 Cord—Power cord and plug .7064 Emblem—"RCA Victor" emblem 70223 Gronmet—Rubber grommet for mounting variable corpacitor .7064 Emblem—"RCA Victor" emblem 7055 Pinte—Station selector pointer .7062 Hing—Carrying handle .7063 7056 Resistor—Wire wound, 2550 ohms, 7 wattsP1 .7052 Forele-LMedd grille .7054 70503	73553	Capacitor—Tubular, paper, .047 mfd., 400 volts	71047 33726	Transformer—Output transformer
73551 Capacitor—Tubular, apper, oil impregnated, 0.1 mfd., 400 volts 971495.7W RL108B10 73935 Clip—Mounting clip for I.F. transformer 7114 73114 Coil—Oscillator coil complete with adjustable core L4, L5 77055 74992 Coil—RF coil complete with adjustable core .L2, L3 7066 71041 Connector—Single contact male connector or output transformer leads 77068 74285 Control—Volume control and power switch Res. 74285 Control—Volume control and power switch Res. 77051 Dial—Metal dial scale complete with (3) pulleys 77066 77052 Gronmet—Rubber grommet for mounting variable corgacitor 77057 77053 Pointer—Station selector pointer 77058 77054 Resistor—Fixed, composition:— Resistor—Fixed, composition:— 74031 Resistor—Fixed, composition:— 77058 750321 1300 ohms, ±10%, ½ watt Rei 750321 1300 ohms, ±10%, ½ watt Res <tr< td=""><td>75071</td><td>Capacitor—Tubular, moulded paper, .047 mfd., 400</td><td></td><td>SPFAKER ASSEMBLIES</td></tr<>	75071	Capacitor—Tubular, moulded paper, .047 mfd., 400		SPFAKER ASSEMBLIES
73935Clip—Mounting clip for 1.F. transformer73114Coil—Cscillator coil complete with adjustable coreL4, L574992Coil—RF coil complete with adjustable core . L2, L37705571041Connector—S contact male connector or battery cable7706672765Connector—Single contact pin connector or output transformer leads (2 req'd)7706874285Control—Volume control and power switch R9, S27706572953Cord—250° Drive Cord Reel (approx. 50° required)7706670022Cord—Power cord and plug7705670253Dial—Metal dial scale complete with (3) pulleys7706670264Grommet—Rubber grommet for mounting variable capacitor7706670265Pulley—Drive cord pulley7706670260Pulley—Drive cord pulley70313Sotms, ±20%, 1½ watt70321Is00 ohms, ±10%, ½ watt70321Is00 ohms, ±10%, ½ watt70322Is00 ohms, ±10%, ½ watt70342Is00 ohms, ±10%, ½ watt70343Is00 ohms, ±10%, ½ watt70342Is00 ohms, ±10%, ½ watt70322Is00 ohms, ±10%, ½ watt70323Is00 ohms, ±10%, ½ watt70324Is00 ohms, ±10%, ½ watt70324Is00 ohms, ±10%, ½ watt70334Is00 ohms, ±10%, ½ watt70334Is00 ohms, ±1	73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts		971495-7W RL-108B10
73114 Coil—Oscillator coil complete with adjustable core 14, L5 voice coil (3.2 ohms) 74992 Coil—RF coil complete with adjustable core 122, L3 voice coil (3.2 ohms) 71041 Connector—Single contact male connector or output transformer leads 77060 75474 Connector—Single contact male connector for output transformer leads 77060 7022 Cord—250' Drive Cord Reel (approx 50' required) 77061 7022 Cord—Power cord and plug 77064 77051 Dial—Metal dial scale complete with (3) pulleys 77065 77052 Grommet—Rubber grommet for mounting variable capacitor 77063 72828 Grommet—Rubber grommet for mounting variable capacitor 77064 7284 Grommet—Rubber grommet for mounting variable capacitor 77065 72828 Pointer—Station selector pointer 77065 72829 Pointer—Sted, composition:— 77064 74319 Resistor—Fixed, composition:— 77053 74920 Fulley—Drive cord pulley 77055 74322 Rectifier—Sted, composition:— 77054 74323 Resistor—Fixed, composition:— 77054 74323 Solonms, ±20%, ½ watt Rift	73935	Clip—Mounting clip for I.F. transformer	77055	Speaker-4" P.M. speaker complete with cone and
74992Coil—RF coil complete with adjustable coreL2, L3MISCELLANEOUS71041Connector—Single contact male connector or battery cable transformer leads (2 req'd)77068Antenna—Antenna loop assembled to polystyrene frame and support75474Connector—Single contact male connector or output transformer leads77061Back—Cabinet back—polystyrene—complete with strikes74285Control—Volume control and power switchR9, S277061Cag—Carrying handle cap and chassis support70222Cord—250' Drive Cord Reel (approx. 50" required)77064Emblem—"RCA Victor" emblem77051Dial—Metal dial scale complete with (3) pulleys77056Groumet—Rubber grommet for mounting loop assembly72283Grommet—Rubber grommet for mounting variable capacitor77064Emblem—"RCA Victor" emblem72602Pulley—Drive cord pulley77065Groumet—Rubber grommet for mounting loop assembly77053Pointer—Station selector pointer77064Link—Carrying handle74328Resistor—Wire wound, 2650 ohms, 7 wattsR19 Resistor—Fixed, composition:—77051Sirew—#6 x ¼" cross recessed self-tapping round head screw for mounting loop7403131500 ohms, ±10%, ½ watt	73114	Coil—Oscillator coil complete with adjustable core L4, L5		voice coil (3.2 ohms)
71041 Connector—5 contact male connector or battery cable 77068 Antenna—Antenna loop assembled to polystyrene 72776 Connector—Single contact pin connector or output transformer leads (2 req'd) 77068 Antenna—Antenna loop assembled to polystyrene 75474 Connector—Single contact male connector for output transformer leads 77068 Antenna—Antenna loop assembled to polystyrene 11 75474 Connector—Single contact male connector for output transformer leads 77060 77060 77060 74285 Control—Volume control and power switch … R9, S2 77061 77065 Cap—Carrying handle cap and chassis support, caps, links and chassis mounting screw 70022 Cord—Power cord and plug 77064 Emblem—"RCA Victor" emblem 77051 Dial—Metal dial scale complete with (3) pulleys 77057 Eyelet—Metal eyelet for mounting loop assembly 74838 Grommet—Rubber grommet for mounting variable capacitor 77063 Grille—Metal grille 77064 7864 Pinte—Bakelite mounting plate for electrolytic 74796 Handle—Catrying handle link 77053 7865 Pointer—Station selector pointer 77058 Resistor—Fixed, composition:— 77058 Screw—#6 x ½2" cross recessed self-tapping round head screw for mounting loop <t< td=""><td>74992</td><td>Coil—RF coil complete with adjustable coreL2, L3</td><td></td><td>MISCELLANEOUS</td></t<>	74992	Coil—RF coil complete with adjustable coreL2, L3		MISCELLANEOUS
transformer leads(2 req'd)77050Back — Cabinet back — polystyrene — complete with strikes75474Connector—Single contact male connector for output transformer leads77060Back — Cabinet back — polystyrene — complete with strikes74285Control—Volume control and power switch … R9, S2 7295377061Cap—Carrying handle cap and chassis support70022Cord—250' Drive Cord Reel (approx. 50" required)77065Case—Case front—less handle, handle support, caps, links and chassis mounting screw70022Cord—Power cord and plug77064Emblem—"RCA Victor" emblem77051Dial—Metal dial scale complete with (3) pulleys77057Eyelet—Metal gyelet for mounting loop assembly74838Grommet—Rubber grommet for mounting variable capacitor77066Grille—Metal gyille72639Pointer—Station selector pointer77063Handle—Carrying handle74839Pesistor—Fixed, composition:—77064Knob—Control knob74319Resistor—Fixed, composition:—77058Screw—#8-32 x 7/16" cross recessed self-tapping round head screw for mounting loop743211500 ohms, $\pm 20\%$, $\frac{1}{2}$ wattR1774734742311800 ohms, $\pm 10\%$, $\frac{1}{2}$ wattR1774232ReliferSign—Spring clip for knobs50321211800 ohms, $\pm 10\%$, $\frac{1}{2}$ wattR6723222700 ohms, $\pm 10\%$, $\frac{1}{2}$ wattR673324R10%, $\frac{1}{2}$ wattR6732477058732411800 ohms, $\pm 10\%$, $\frac{1}{2}$ watt732421800 ohms, $\pm $	71041 72776	Connector—5 contact male connector or battery cable Connector—Single contact pin connector or output	77068	Antenna—Antenna loop assembled to polystyrene frame and supportLl
transformer leads77061Cap—Carrying handle cap and chassis support74285Control—Volume control and power switchR9, S277065Cae—Case front—less handle, handle support, caps, links and chassis mounting screw70022Cord—Power cord and plug77064Emblem—''RCA Victor'' emblem77051Dial—Metal dial scale complete with (3) pulleys77057Fyelet—Metal eyelet for mounting loop assembly77053Grommet—Rubber grommet for mounting variable capacitor77066Grommet—Rubber grommet for mounting loop assembly77053Pointer—Station selector pointer77062Hinge—Cabinet hinge (2 req'd)74319Resistor—Fixed, composition:—77053Nut—Speed nut for fastening "RCA Victor" emblem743131000 ohms, ±20%, 1 wattR21770585032181800 ohms, ±10%, ½ wattR6, R1877467Yara5032272700 ohms, ±10%, ½ wattR6, R1877467Window—Clear vinylite dial window	75474	transformer leads (2 req'd) Connector—Single contact male connector for output	77060	Back — Cabinet back — polystyrene — complete with strikes
 74285 Control—Volume control and power switch M9, S2 77053 Cord—250' Drive Cord Reel (approx. 50" required) 70022 Cord—Power cord and plug 77051 Dial—Metal dial scale complete with (3) pulleys 77057 Dial—Metal dial scale complete with (3) pulleys 77058 Grommet—Rubber grommet for mounting variable capacitor 77053 Pointer—Station selector pointer 77053 Pointer—Station selector pointer 77054 Pulley—Drive cord pulley 77055 Pulley—Drive cord pulley 77056 Pulley—Drive cord pulley 77057 Pointer—Fixed, composition:— 77058 Sistor—Fixed, composition:— 78439 Sourds, ±20%, ½ watt 7854 Resistor—Fixed, composition:— 7854 Resistor—Fixed, composition:— 7854 Red Sistor—Fixed, composition:— 7854 Red Sistor—Fixed, composition:— 7855 Resistor—Fixed, composition:— 7854 Red Sistor—Fixed, composition:— 7854 Red Sistor—Fixed, composition:— 7855 Resistor—Fixed, composition:— 7854 Red Sistor—Fixed, composition:— 7855 Resistor—Fixed, composition:— 7856 R18 77467 Source for mounting loop 7857 State and chassis mounting loop 7858 Resistor—Fixed, composition:— 7957 Size and chassis recessed pan head machine screw for mounting loop 7957 Size and chassis recessed pan head machine screw for mounting loop 7958 Screw—#8-32 x 7/16" cross recessed pan head machine screw for mounting loop 7958 Screw—F8-32 x 7/16" cross recessed pan head machine screw for mounting loop 7958 Screw—F8-32 x 7/16" cross recessed pan head machine screw for mounting loop 7959 Screw—F8-32 x 7/16" cross recessed pan head machine screw for mounting loop 7959 Screw—F8-32 x 7/16" cross recessed pan head machine screw for mounting loop 7959 Screw—F8-32 x 7/16" cross recessed pan head machine screw for mounting loop 7950 Screw—F8-32 x 7/16" cross recessed p	B4005	transformer leads	77061	Cap—Carrying handle cap and chassis support
70022Cord—Power cord and plug77064Emblem—"RCA Victor" emblem77051Dial—Metal dial scale complete with (3) pulleys77057Eyelet—Metal eyelet for mounting loop assembly74838Grommet—Power cord strain relief (1 set)77066Grille—Metal grille72283Grommet—Rubber grommet for mounting variable capacitor77066Grommet—Rubber grommet for mounting loop assembly74849Plate—Bakelite mounting plate for electrolytic77061Handle—Carrying handle7864Pulley—Drive cord pulley77063Hinge—Cabinet hinge (2 req'd)78722Rectifier—Selenium rectifier77062Link—Carrying handle link74319Resistor—Wire wound, 2650 ohms, 7 wattsR1976671Screw—#6 x ½" cross recessed self-tapping round head screw for mounting loop51403333 ohms, ±20%, 1 wattR41R4174734Spring—Spring clip for knobs5032151500 ohms, ±10%, ½ wattR65, R1877467Washer—Knob washer—felt5032272700 ohms, ±10%, ½ wattR65, R1877067Window—Clear vinylite dial window	74285	Control—Volume control and power switch R9, S2 Cord—250' Drive Cord Reel (approx. 50'' required)	77065	Case—Case front—less handle, handle support, caps, links and chassis mounting screw
 77051 Dial—Metal dial scale complete with (3) pulleys 77057 Eyelet—Metal eyelet for mounting loop assembly 77058 Grommet—Power cord strain relief (1 set) 72283 Grommet—Rubber grommet for mounting variable capacitor 77056 Grommet—Rubber grommet for mounting variable capacitor 77057 Pointer—Station selector pointer 77058 Pointer—Station selector pointer 77059 Pulley—Drive cord pulley 77050 Pulley—Drive cord pulley 77051 Resistor—Fixed, composition:— 77058 Screw—#6 x ½" cross recessed self-tapping round head screw for mounting loop 77058 Screw—#8-32 x 7/16" cross recessed pan head machine screw for mounting loop 77050 Straw_#8-32 x 7/16" cross recessed pan head machine screw for mounting loop 77050 Straw_10%, ½ watt 77050 Straw_10%, ½ watt 77050 Straw_10%, ½ watt 77050 Straw_10%, ½ watt 77050 Straw_7467 77057 Window—Clear vinylite dial window 	70022	Cord—Power cord and plug	77064	Emblem—"RCA Victor" emblem
74838Grommet—Power cord strain relief (1 set)77056Grille—Metal grille72283Grommet—Rubber grommet for mounting variable capacitor77056Grommet—Rubber grommet for mounting loop assembly18469Plate—Bakelite mounting plate for electrolytic74790Hamdle—Cabinet hinge (2 req'd)77053Pointer—Station selector pointer77052Knob—Control knob72602Pulley—Drive cord pulley77052Link—Carrying handle link74322Rectifier—Selenium rectifier77013Nut—Speed nut for fastening "RCA Victor" emblem74319Resistor—Fixed, composition:—77058Screw—#6 x ½" cross recessed self-tapping round head screw for mounting loop51403333 ohms, ±20%, 1 wattR2177058Screw—#8-32 x 7/16" cross recessed pan head machine screw for mounting loop5032151500 ohms, ±10%, ½ wattR1774734Spring—Spring clip for knobs5032272700 ohms, ±10%, ½ wattR6, R1877067Window—Clear vinylite dial window	77051	Dial—Metal dial scale complete with (3) pulleys	77057	Eyelet—Metal eyelet for mounting loop assembly
7223Grommet—Aubber grommet for mounting variable capacitor77053Grommet—Aubber grommet for mounting loop assembly 7706318469Plate—Bakelite mounting plate for electrolytic77063Handle—Carrying handle77053Pointer—Station selector pointer774790Hinge—Cabinet hinge (2 req'd)7202Pulley—Drive cord pulley77062Link—Carrying handle link74319Resistor—Wire wound, 2650 ohms, 7 wattsR1976671Screw—#6 x ½" cross recessed self-tapping round head screw for mounting loop51403333 ohms, ±20%, 1 wattR2177058Screw—#8-32 x 7/16" cross recessed pan head machine screw for mounting loop5032151500 ohms, ±10%, ½ wattR1774734Spring—Spring clip for knobs5032272700 ohms, ±10%, ½ wattR6, R1877067Window—Clear vinylite dial window	74838	Grommet—Power cord strain relief (1 set)	77066	Grille—Metal grille
18469Plate—Bakelite mounting plate for electrolytic74790Hinge—Cabinet hinge (2 req'd)77053Pointer—Station selector pointer77248Knob—Control knob72602Pulley—Drive cord pulley77062Link—Carrying handle link74322Rectifier—Selenium rectifier77013Nut—Speed nut for fastening "RCA Victor" emblem74319Resistor—Wire wound, 2650 ohms, 7 wattsR1976671Screw—#6 x ½" cross recessed self-tapping round head screw for mounting loop51403333 ohms, ±20%, 1 wattR2177058Screw—#8-32 x 7/16" cross recessed pan head machine screw for mounting loop5042101000 ohms, ±10%, ½ wattR1774734Spring—Spring clip for knobs5032181800 ohms, ±10%, ½ wattR6, R1877467Washer—Knob washer—felt5032272700 ohms, ±10%, ½ wattR377067Window—Clear vinylite dial window	12203	capacitor	77063	Handle-Carrying handle
77053Pointer—Station selector pointer77248Knob—Control knob72502Pulley—Drive cord pulley77062Link—Carrying handle link74322Rectifier—Selenium rectifier77013Nut—Speed nut for fastening "RCA Victor" emblem74319Resistor—Wire wound, 2650 ohms, 7 wattsR1976671Screw—#6 x ½" cross recessed self-tapping round head screw for mounting loop51403333 ohms, ±20%, 1 wattR2177058Screw—#8-32 x 7/16" cross recessed pan head machine screw for mounting loop5042101000 ohms, ±10%, ½ wattR1774734Spring—Spring clip for knobs5032181800 ohms, ±10%, ½ wattR6, R1877467Washer—Knob washer—felt5032272700 ohms, ±10%, ½ wattR377067Window—Clear vinylite dial window	18469	Plate—Bakelite mounting plate for electrolytic	74790	Hinge—Cabinet hinge (2 req'd)
72002Pulley—Drive cord pulley77062Link—Carrying handle link74322Rectifier—Selenium rectifier77013Nut—Speed nut for fastening "RCA Victor" emblem74319Resistor—Wire wound, 2650 ohms, 7 wattsR1976671Screw—#6 x ½" cross recessed self-tapping round head screw for mounting loop51403333 ohms, ±20%, 1 wattR2177058Screw—#8-32 x 7/16" cross recessed pan head machine screw for mounting loop5042101000 ohms, ±20%, ½ wattR1774734Spring—Spring clip for knobs5032151500 ohms, ±10%, ½ wattR6, R1877467Washer—Knob washer—felt5032272700 ohms, ±10%, ½ wattR377067Window—Clear vinylite dial window	77053	Pointer—Station selector pointer	77248	Knob—Control knob
74322 Rectiner—setentum rectiner 77013 Nut—Speed nut for fastening "RCA Victor" emblem 74319 Resistor—Wire wound, 2650 ohms, 7 watts R19 76671 Screw—#6 x ½" cross recessed self-tapping round head screw for mounting loop 514033 33 ohms, ±20%, 1 watt R21 77058 Screw—#8-32 x 7/16" cross recessed pan head machine screw for mounting loop 504210 1000 ohms, ±20%, ½ watt R4 74734 Spring—Spring clip for knobs 503215 1500 ohms, ±10%, ½ watt R6, R18 77467 Washer—Knob washer—felt 503227 2700 ohms, ±10%, ½ watt R3 77067 Window—Clear vinylite dial window	72502	Pulley—Drive cord pulley	77062	Link—Carrying handle link
Nation All state	74322	Resistor-Wire wound 2650 ohme 7 worthe P10	77013	Nut—Speed nut for fastening "RCA Victor" emblem
514033 33 ohms, ±20%, 1 watt R21 77058 Screw—#8-32 x 7/16" cross recessed pan head machine screw for mounting loop 504210 1000 ohms, ±20%, ½ watt R4 74734 Spring—Spring clip for knobs 503215 1500 ohms, ±10%, ½ watt R17 74734 Spring—Spring clip for knobs 503218 1800 ohms, ±10%, ½ watt R6, R18 77467 Washer—Knob washer—felt 503227 2700 ohms, ±10%, ½ watt R3 77067 Window—Clear vinylite dial window	/4019	Resistor—Fixed, composition:	/66/1	bcrew—#b x ½" cross recessed self-tapping round head screw for mounting loop
503215 1500 ohms, ±10%, ½ watt R17 74734 Spring—Spring clip for knobs 503218 1800 ohms, ±10%, ½ watt R6, R18 77467 Washer—Knob washer—felt 503227 2700 ohms, ±10%, ½ watt R3 77067 Window—Clear vinylite dial window	514033	$33 \text{ ohms, } \pm 20\%, 1 \text{ watt}$ R21	77058	Screw—#8-32 x 7/16" cross recessed pan head machine
503218 1800 ohms, ±10%, ½ watt R6, R18 77467 Washer—Knob washer—felt 503227 2700 ohms, ±10%, ½ watt R3 77067 Window—Clear vinylite dial window	503215	$1500 \text{ ohms}, \pm 10\% \frac{1}{2} \text{ watt}$	74734	Spring—Spring clip for knobe
503227 2700 ohms, ±10%, ½ watt	503218	1800 ohms, ±10%, ½ watt	77467	Washer—Knob washer—felt
	503227	2700 ohms, ±10%, ½ watt	77067	Window-Clear vinylite dial window

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

3 in DM

Q





2 C 511	2 C 512	2 C 513	2C514
Black & Gray	Ivory	Red	Two Tone Gray

A-C Operated Clock Radio Receiver

RCA VICTOR

2-C-511 SERIES

Chassis No. RC-1118

SERVICE DATA

— 1952 No. 12 —

PREPARED BY RCA SERVICE CO., INC.

FOR

RADIO CORPORATION OF AMERICA

CAMDEN, N. J., U. S. A.

SPECIFICATIONS

Loudspeaker:

Size and typ

Tuning Range				
Tube Complement:				
(1) RCA 12BE6 Converter				
(2) RCA 6BJ6				
(3) RCA 12AV6				
(4) RCA 6AK6 Output				
RCA Stock No. 77292 Rectifier				
Power Supply Rating:				
115 volts a.c., 60 cycles				
CAUTION: DO NOT OPERATE ON D.C.				

Voice Coil impedance	ns at 400 c	ycles
Power Output: Undistorted Maximum	0.19	watt watt
Funing Drive Ratio	l (Direct I	Drive
Weight		/ ₂ lbs
Dimensions (overall): Height6" Width81/2" I	Depth4	1/2 ''

OPERATING INSTRUCTIONS

This instrument contains a timer-type electric clock mechanism which may be used to automatically actuate the self-contained a.c. radio. The radio may also be operated independently of the clock mechanism.



Clock Radio Controls

CLOCK—1. Plug instrument into 115 v. a.c. outlet. The clock will start to operate immediately. Set the correct time by turning clockwise, the "TIME" knob located at the center of the instrument back. To set the alarm, turn the "ALARM" knob clockwise until the desired time is indicated by the alarm pointer extension on the hour hand. Pull knob out for alarm buzzer operation. To turn off buzzer, push knob in.

RADIO—1. To obtain radio operation independently of the clock, push the slide switch lever at the top of the cabinet to the left "ON" position. Adjust volume and tuning control knobs as required after approximately 30 second warm-up. To increase volume turn knob clockwise as viewed from volume control side panel. Push slide switch lever to the center "OFF" position when finished listening.

2. To automatically actuate the radio by the clock mechanism, make initial volume and station settings as described in section 1 above. Set the "ALARM" knob to the time desired. Push slide switch lever to the right "AUTO" position. If the alarm buzzer knob is pulled out, the alarm will sound approximately ten minutes after the radio starts operating. Push alarm knob in to turn off alarm. The radio will turn itself off after a period of approximately one hour if the slide switch remains in the "AUTO" position after start of playing.

CAUTION—Keep slide switch "ON-OFF-AUTO" lever in "OFF" position when instrument is not in use. Locate instrument so that "TIME" and "ALARM" knobs have free movement.

2-C-511 Series

ALIGNMENT PROCEDURE

Output Meter Alignment—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

Test-Oscillator—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid AVC action.

On a.c operation an isolation transformer (115 v./115 v.) may be necessary for the receiver if the test oscillator is also a.c. operated.

Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	6BJ6 I-F grid through .01 mfd. capacitor		Quiet- point	T2 (top and bottom) 2nd I-F trans.
2	Stator of C1-A through .01 mfd.	455 kc	end of dial	Tl (top and bottom) lst I-F trans.
3		1620 kc	Min. cap.	osc. trimmer C1B-T
4	Short wire placed near	1400 kc	1400 kc signal	ant. trimmer CIA-T
5	loop to radiate signal	600 kc	600 kc (rock)	(osc. coil) Slug L3
6		Rep	4, and 5	

ALIGNMENT TABULATION

RADIO CHASSIS AND CLOCK SERVICE

TOOL REQUIREMENTS—A small #1 size cross-head screwdriver is required for disassembly of the radio into its major cabinet and chassis components.

TUBE SERVICE—Disassembly—To make tubes accessible for testing, remove the volume and tuning control knobs by pulling off. Unscrew counterclockwise the alarm and time knobs from their shafts. Invert the cabinet and remove only the two cross-head screws along the back underside of the cabinet. Place the cabinet in its normal position. Using only firm hand pressure, press down alternately at front right and left sides of the cabinet top, midway between the "ON-OFF-AUTO" slide switch lever and the cabinet sides, forcing down and backward, to disengage the molded-in plastic catches. Then lift off the cabinet rear cover.

Assembly—To reassemble, proceed in the reverse order, sliding the cabinet rear cover into its track on the cabinet base. Lift the front corners up slightly to clear the two molded-in pads at each front corner of the cabinet base. Then press down and snap-in the upper front edge of the cabinet rear cover under the top rim of the cabinet base. Make sure the slide switch and switch lever are in corresponding center "OFF" positions. Reassemble clock and radio knobs, and the two screws securing the cabinet rear cover.

RADIO CHASSIS SERVICE—Disassembly—To service chassis, open case as described above. In addition, remove the single cross-head screw remaining at the front underside of the cabinet and also the two cross-head screws located on the chassis near the tuning gang and the volume control. Lift out the chassis and remove the four self-tapping cross-head screws holding the bottom cover to the chassis. Lift off the bottom cover.

Assembly—Reassemble in the reverse order. Secure the bottom cover to the chassis with the four self-tapping screws. Next, insert the single self-tapping screw holding the chassis to the bottom of the cabinet base. Center the chassis mounting holes so that they line up with the holes in the cabinet and replace the two cross-head machine screws. Tighten just sufficiently to hold the chassis firmly. Do not turn the screws to the possible limit of travel unless this is necessary to hold the chassis firmly. The average receiver may have a $\frac{1}{21}$ clearance between the chassis

metal panel and molded plastic boss. If any of the four foam rubber cushions on the bottom cover register in the clock face after assembly, push the excess length under the "Z" tabs of the bottom cover.

CLOCK SERVICE—Disassembly—To service clock, remove chassis and bottom cover as described above. In addition, remove the three screws holding the speaker to the speaker mounting bracket. Remove the two hex nuts holding the clock to the chassis pan recess. Lift the clock out. Unsolder the clock leads at the clock terminals.

Assembly—Proceed in the reverse order. Solder clock leads, and secure clock to chassis pan with two hex head nuts. Reassemble speaker to speaker mounting bracket.

CRITICAL LEAD DRESS

- Filament leads should be dressed away from secondary output lead, terminal #1, of 2nd I.F. Transformer and secondary output lead, terminal #1, of 1st I.F. transformer.
- 2. Connect the outside foil of capacitors as shown on schematic.
- Dress electrolytic capacitor leads and filament transformer leads away from selenium rectifier.
- Plate and grid leads of 12BE6 and 6BJ6 tubes should be kept as short and direct as possible.



Tube and Trimmer Locations



2-C-511 Series

11

12

REPLACEMENT PARTS

NO	DESCRIDTION	5	NO	DESCRIPTION
NO.	DESCRIPTION		NO.	
1	CHASSIS ASSEMBLIES		77414	Transformer_Output_transformerT3
			77416	Transformer—lst. I.F. transformer complete with
	RC 1118—Model 2C511 RC 1118A—Model 2C512		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	adjustable cores
1 77410	RC III8B-Model 2C513 RC III8C-Model 2C514		77417	Transformer—2nd. I.F. transformer complete with
//410	Antenna-Ferrite rod antenna complete with			adjustable cores
77408	Canacitor-Variable tuning canacitor CLA CLB		77420	Washer-Shoulder washer (nylon) for variable
77471	Capacitor—Ceramic 47 mmf			tuning capacitor mounting (3 req a)
75609	Capacitor—Ceramic, 47 mmf			SPEAKER ASSEMBLIES
75641	Capacitor—Ceramic, 390 mmf			971920-1
75198	Capacitor—Ceramic, 470 mmf		77428	Speaker—3" P.M. speaker complete with cone and
77427	Capacitor-Electrolytic comprising 1 section			
	of 50 mfd., 150 volts and 1 section of 30		77420	Back Polystyropo achinot back aray tan-for
-	mtd., 150 volts. CSA, CSB		//430	Model 2C511
77425	Capacitor-Tubular, paper, 0015 mtd., 200		77505	Back—Polystyrene cabinet back—ivory—for Model
77488	Canacitor—Tubular paper 0056 mfd 400			2C512
// 400	volts		77507	Back—Polystyrene cabinet back—red—for Model
77424	Capacitor—Tubular, paper, .01 mfd., 200 voltsC8		775.00	ZC513 Ruch Relations achieve hards are to Medal
77422	Capacitor—Tubular, paper, .047 mfd., 400 voltsC4		//509	2C514
75071	Capacitor—Tubular, moulded, .047 mfd., 400		77433	Button-Slide button for function switch less clip
77400	volts		77429	Case—Polystyrene case front—black—complete
77423	Capacitor—Tubular, paper, 0.1 mid., 400 volts			with window less back for Model 2C511
75010	Clip "C" alig for mounting output transformer		77504	Case — Polystyrene case front — Ivory — complete
73935	Clip—Mounting clip for LF transformer		77506	Case_Polystyrene case front_red_complete with
77411	Coil—Oscillator coil complete with adjustable		//500	window less back for Model 2C513
	core		77508	Case — Polystyrene case front — gray — complete
77409	Control—Volume control			with window less back for Model 2C514
70392	Cord—Power cord and plug		77434	Clip—Spring clip for function switch slide button
77404	Cover—Chassis bottom cover		77431	Dial Dial knob-jyory for Model 2C512
77419	Cushion—Foam rubber cushion for speaker rim or		77499	Dial—Dial knob—red—for Model 2C513
74838	Grommet—Power cord strain relief (1 set)		77500	Dial—Dial knob—gray—for Model 2C514
77418	Grommet—Rubber grommet for mounting ferrite		77432	Knob—Volume control knob—gray tan—for Model
1 110	rod antenna			2C511
77405	Insulator—Bakelite insulator for variable tuning		77501	Knob—Volume control knob—ivory—for Model
	capacitor		77502	Knob-Volume control knob-red-for Model
77406	Insulator—Ferrite rod antenna mounting insulator		//302	2C513
77407	-L.H.		77503	Knob-Volume control knob-gray-for Model
//40/	-B H.			2C514
77292	Rectifier—Selenium rectifier		77412	Knob-Timer knob
	Resistor—Fixed, composition:—		77437	Screw—#6 x %6 cross recessed truss head tapping
503022	22 ohms, $\pm 10\%$, $\frac{1}{2}$ watt		77436	Screw $\#6-32 \times \frac{3}{2}$ cross recessed truss head
503110	$100 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}$,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	machine screw for mounting chassis to case
503135	$1500 \text{ abma} \pm 10\%, \frac{1}{2} \text{ watt}$		77435	Screw-#6-32 x 36" cross recessed truss head
503333	$1300 \text{ ohms}, \pm 10\%, 2 \text{ watts}$			machine screw for fastening case assembly
503347	$47,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}$		/4/34	spring—spring clip for dial knob or volume control
503433	330,000 ohms, ±10%, ½ watt		77467	Washer—Knob Washer—felt
503482	. 820,000 ohms, ±10%, ½ watt			CLOCK ASSEMBLY
503533	$R_{13.3} \text{ megohm}, \pm 10\%, \frac{1}{2} \text{ watt}$		* * *	Clock—If clock mechanism repair becomes neces-
503547	4.7 megohm, $\pm 10\%$, $\frac{1}{2}$ watt			sary, remove the clock from the radio. The RCA
/5/80	mounted			Victor Distributor in your area will advise you
77415	Switch—Function switch			station for clock mechanisms. Repair facilities
77413	B Transformer—Filament transformer 117 volts A.C.			and replacement parts are available at these
	input			authorized service stations.

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



RCA VICTOR

20522

Ivory

20521 Maroon

20527 White A-C Operated Clock Radio Receiver

2-C-521 SERIES

Chassis Nos. RC-1120, RC-1120A, RC-1120B, RC-1120C, RC-1120D, RC-1120E

SERVICE DATA - 1952 No. 10 -

PREPARED BY RCA SERVICE CO., INC. FOR

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION

CAMDEN, N. J., U. S. A.

Specifications

Tuning Range
Intermediate Frequency
Tube Complement:
(1) RCA 12BE6
(2) RCA 12BA6 I.F. Amplifier
(3) RCA 12AV6
(4) RCA 50C5 Output
(5) RCA 35W4Rectifier
Power Supply Rating:
115 volts a.c., 60 cycles
CAUTION:-DO NOT OPERATE ON D.C.

This instrument can be used in any one of several ways. It may be used as a clock with alarm alone, radio, phonograph amplifier, or clock-controlled radio or appliance outlet. Instructions for the various uses follow:

Clock-Plug instrument into a.c. outlet. The clock will start to operate immediately. Set the correct time with the "TIME-SET" knob on the back panel of the instrument. To set the alarm, pull out the "ALARM" knob and turn counter alackuice with the de instrument. ter-clockwise until the desired time is indicated by the alarm pointer. Leave knob out for alarm buzzer operation. Push knob in to turn off buzzer.

Radio—1. Push "RADIO" slide switch lever to the right, as viewed from the back. Turn "RADIO" knob on clock from "OFF" to "ON" position. Adjust volume and tuning knobs as required after 30 second warm-up. Turn clock "RADIO" knob to "OFF" position when finished listening.

2. To have radio turn itself off after a period of up to 60 minutes, set "SLEEP" knob to desired playing time. Turn clock "RADIO" knob "OFF."

3. To have radio turn itself on, turn tuning and volume knobs to desired position, and then set the alarm as ex-plained above. Turn clock "RADIO" knob to "AUTO" position.

4. To have the radio turn itself off during any time within a 60 minute period and then turn itself on, after an off period of up to twelve hours, set the "SLEEP" and "ALARM"

Louaspeaker:
Size and type
Voice Coil Impeddrice
Power Output:
Undistorted 1.2 watts
Maximum
Tuning Drive Ratio
Weight
Cabinet Dimensions:
Height6 ¹ / ₈ " Width11 ³ / ₄ " Depth5 ¹ / ₂ "

Operating Instructions

knobs, and volume and tuning controls as explained pre-viously. Turn clock "RADIO" knob to "AUTO" position.

Appliances—1. To use appliance outlet, plug appliance into rear receptacle, and turn clock "RADIO" knob to "ON" position. If operation of the radio is not desired at the same time, push radio slide-switch lever on the back panel to the off position (lever pushed to the left).

2. To start appliance automatically, proceed as above, except that the "ALARM" knob should be set to the desired starting time, and the clock "RADIO" knob set to the "AUTO" position. To turn off appliance, turn clock "RADIO" knob to "OFF" position, or remove appliance plug if radio operation is desired.

3. To operate appliance for any time within a 60 minute period, have appliance plugged in, with clock "RADIO" knob turned to "OFF" position. Set "SLEEP" knob for desired operating period. Appliance will be turned off automatically at the end of this period.

Phonograph-1. Make sure radio slide switch is on (lever pushed to the right). Plug phonograph attachment audio plug into jack provided. Turn clock "RADIO" knob to "ON" position. If a spare a.c. receptacle is not available for the record changer, the appliance outlet may be used to provide power.

CAUTION:-Keep clock "RADIO" knob "OFF" when instrument is not in use.



Dial Cord Drive Chassis RC-1120, RC-1120A, B, C

RADIO CHASSIS AND CLOCK SERVICE

Tube Service—To make tubes accessible for testing, remove the hex head screw at the lower right hand corner and the hex head screw at the left side of the appliance outlet on the back panel. The loop antenna and antenna trimmer are located on this back panel.

Radio Chassis Service—Proceed as above, removing the volume and tuning control knobs by pulling off, and also removing the three hex head screws and washers on the underside of the cabinet. Do Not remove the clock from the cabinet unless this is necessary for service. Lift off the shield on the underside of the chassis.

Clock Service—Proceed as above. Remove the three clock control knobs from the front of the cabinet by pulling off, taking care not to damage the clock control shafts. Using a small screwdriver or a small pry tool, remove the five sheet metal clips holding the clock to the cabinet. The clips will be found embedded in the plastic. The seal between the plastic and the metal teeth on the clips should be broken by lifting the metal edges till the teeth clear the plastic. To prevent scratching the plastic dial faces of the radio and clock, place the instrument face down on a thick soft cloth. When removing the clock, take care not to damage the molded-in plastic rim for mounting the clock.

In remounting the clock, new sheet metal clips should be used. These should be heated until hot enough to soften the plastic slightly upon contact. Place the clock in its mounting rim and push the heated clips on tightly, using a pair of pliers or other holding tool.

Attachment of Record Player

The audio output cable of the record player should be terminated with a pin plug.

Plug the cable into the receptacle which is accessible from the back of the cabinet.

Insertion of the cable plug into the receptacle removes radio signal from the volume control. The record player cable must be removed from the receptacle to permit radio operation.





Dial Cord Drive - Chassis RC-1120D, E

Alignment Procedure

Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output	
1	12BA6 I-F grid through .1 mfd, capacitor		Quiet- point	T2 (top and bottom) 2nd I-F trans.	
2	Stator of Cl-B through .1 mfd.	455 kc.	end of dial	Tl (top and bottom) lst I-F trans.	
3		1620 kc	Min. cap.	osc. trimmer	
4	Short wire placed near	1400 kc	1400 kc signal	ant. trimmer	
*5	loop to radiate signal	600 kc	600 kc signal	osc. coil L1, L2 (rock gang)	
6		Repeat steps 3, 4, and 5.			

*Necessary only on receivers having RC-1120D; E chassis.

Test-Oscillator—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

On a.c. operation an isolation transformer (115 v./115 v.) may be necessary for the receiver if the test oscillator is also a.c. operated.







Chassis RC-1120B, C, D, E



REPLACEMENT PARTS

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLIES	77903	Transformer—Output transformer (RC-1120B,
	RC-1120, RC-1120B—Model 2-C-521 RC-1120A, RC-1120C—Models 2-C-522, 2-C-527	33726	Washer—"C" washer for tuning knob shaft
77357	Capacitor—Variable tuning capacitor		SPEAKER ASSEMBLIES
	complete with drive drum CIA, CIA-T, CIB		B12A512 RL108E7
76348 77116	Capacitor—Ceramic, 6 mmf. Capacitor—Ceramic, 47 mmf. Capacitor—Ceramic, 56 mmf.	77226	Speaker—4" P.M. speaker complete with cone and voice coil (3.2 ohms)
73520	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd., 150 volts C18A C18B		MISCELLANEOUS
73561 73554	Capacitor—Tubular, paper, .01 mfd., 400 voltsC15 Capacitor—Tubular, paper, .027 mfd., 400 voltsC10	77367	Antenna—Antenna loop complete with back cover —maroon—for Model 2C521 (RC-1120, RC-1120A) Includes C2
73553	400 volts	77904	Antenna—Antenna loop complete with back cover
73551 73935	Capacitor—Tubular, paper, 0.1 mfd., 400 volts. C16 Clip—Mounting clip for I.F. transformer	77368	—marcon—for Model 2C521 (RC-1120B, C, D, E) Antenna—Antenna loop complete with back cover —ivory—for Models 2C522, and 2C527 (RC-1120,
78586	Coil—Oscillator coil complete with	77005	RC-1120A) Includes C2
75482	adjustable core (L1, L2) RC-1120D, E only Connector—Phono input connector	77903	-ivory-for Models 2C522, 2C527 (RC-1120B, C, D, E)
77901	appliance outlet (RC-1120, RC-1120A, D, E) Connector—2 contact female connector for	77367	Back—Cabinet back—marcon—and antenna loop for Model 2C521 (RC-1120, RC-1120A),
77359	appliance outlet (RC-1120B, RC-1120C) Control—Volume control R8	77904	Back—Cabinet back complete with antenna loop—
72953	Cord—250' Drive Cord Reel (approx. 26" required)	77368	maroon—for Model 2C51 (RC-1120B, C, D, E) Back—Cabinet back—ivory—and antenna loop for
28451	Cora—Power cora and plug Cover—Insulating cover for electrolytic		Models 2C522 and 2C527 (RC-1120, RC-1120A),
77360	Grommet—Rubber grommet for mounting tuning capacitor	77905	Back—Cabinet back complete with antenna loop—
73693	Grommet—Power cord strain relief (1 set) Plate—Bakelite mounting plate for electrolytic		C, D, E)
77355	Plate—Dial back plate complete with pointed escutcheon (RC-1120, RC-1120Å)	X3304	Baffle—Baffle board and grille cloth for Model 2C521
77900	Plate,—Dial back plate (RC-1120B, RC-1120C) Pointer—Station selector pointer	X3305	2C522 and 2C527
77365	Printed Circuit PC1 (C9A, C9B, C9C, R4A, R4B) Pulley—Drive cord idler pulley	¥2463	Cabinet—Plastic cabinet—maroon—complete with crystals (2) for Model 2C521
510000	Resistor—Fixed, composition:—	Y 2464	Cabinet—Plastic cabinet—ivory—complete with crystals for Model 2C522
503110	$133 \text{ ohms}, \pm 10\%, 1 \text{ watt}$ 100 ohms, $\pm 10\%, \frac{1}{2}$ watt	¥2465	Cabinet—Plastic cabinet—white—complete with
503115	150 ohms, ±10%, ½ watt	77372	Clip—Spring clip for mounting timer assembly
503339	39,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt R1	77033	(5 req'd) Emblem—"RCA Victor" emblem
503347	$220,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}$	77369	Knob—Timer control knob—maroon—for Model
503533	3.3 megohm, ±10%, ½ watt	77370	Knob—Timer control knob—ivory—for Model 2C522
77358	Shaft—Tuning knob shaft (RC-1120, RC-1120A)	77371	Knob—Timer control knob—white—for Model 2C527
77909	Shaft—Tuning knob shaft (RC-1120B, C, D, E) Shield—Tube shield	11313	maroon—for Model 2C521
77115	Socket—Tube socket, 7 pin, miniature, moulded	77374	Knob—Tuning control or volume control knob— ivory—for Model 2C522
75780	saddle-mounted	77375	Knob—Tuning control or volume control knob— white—for Model 2C527
77206	for VI, V4, V5 (RC-1120D, E only)	77013	Nut—Speed nut to fasten "RCA Victor" emblem to cabinet
77261	for V2, V3 (RC-1120D, E only)	77491	Window—Polystyrene window for radio or timer dials
77902	Spring—Drive cord spring (RC-1120B, RC-1120A) Spring—Drive cord spring (RC-1120B, RC-1120C)		CLOCK ASSEMBLY
31418	Spring-Drive cord spring (RC-1120D, RC-1120E) Switch-Radio power switch		Clock—If clock mechanism repair becomes neces-
75486	Transformer—First I.F. transformer, complete with adjustable cores		sary, remove the clock from the radio. The RCA Victor Distributor in your area will advise you
75487	Transformer—Second I.F. transformer, complete with adjustable cores		of the address of the nearest authorized service station for clock mechanisms. Repair facilities
77362	Transformer—Output transformer (RC-1120, RC-1120A)		and replacement parts are available at these authorized service stations.

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



No	DESCRIPTION	No.	DESCRIPTION
No. 75980 73595 73920 73554 73554 73553 73554 73553 73554 73554 73553 736885 70392 73693 74838 72314 514033 503115 503215 503518 504547 70827 73117 75939 76886	DESCRIPTION AMPLIFIER ASSEMBLIES RS 142 Capacitor—Electrolytic comprising 1 section of 50 mfd., 150 volts and 1 section of 80 mfd., 150 volts Capacitor—Tubular, paper, .0022 mfd., 600 volts. C3 Capacitor—Tubular, paper, .0027 mfd., 600 volts. C4 Capacitor—Tubular, paper, .027 mfd., 400 volts. C4 Capacitor—Tubular, paper, .027 mfd., 400 volts. C5 Capacitor—Tubular, paper, .027 mfd., 400 volts. C6 Capacitor—Tubular, paper, .027 mfd., 400 volts. C6 Capacitor—Tubular, paper, .027 mfd., 400 volts. C5 Cantrol—Tone control R1 Cond—Power cord and plug Grommet—Output transformer leads strain relief (1 set) Resistor—Wire wound, 120 ohms, 5 watts R1 So ohms, ±10%, ½ watt R1 So ohms, ±10%, ½ watt R2 R2 Socket—Tube socket, 7 watt R1 Socket—Tube socket, 7 pin, miniature, wafer Socket—Tube socket, 7 pin, miniat	No. X1756 77139 76895 73634 76887 74734 74734 74734 74734 77128 76890 74273 74809 77126 76891 76555 76891 76555 76891 76555 76894 75945 76520 76894 77127 75902	DESCRIPTION Note: If stamping on speaker in instruments does not agree with above speaker number, order replacement parts by referring to model number of instrument, num- ber stamped on speaker and full description of part required. MISCELLANEOUS FOR MODEL 2ES3 Cloth—Grille cloth Knob—Centrol Knob. Foot—Rubber foot (4 required) Nut—Speed nut for No. 8 screw for speaker bracket mounting screws Screw—No. 10-32 x 1½" round head cross recessed machine screw complete with fibre washer and No. 10-32 hex nut for mounting changer (2 required) Spring—Spring clip for knobs MISCELLANEOUS FOR MODEL 2ES38 Button—Plug button and ventilating screen (3 required) Catch—Cabinet catch and lock (2 required) Decal—"Victorla" decal Emblem—"RCA Victor" emblem Escutcheon—Knob well escutcheon Fastene—No. 2 x 11/16" wood screw and stud for fasten- ing pickup arm hold-down strap Foot—Cabinet ido tand glide (8 required) Handle—Carrying handle only Hinge—Cabinet lid hinge (2 required) Nut—No. 10-32 spring nut for changer mounting stud Nut—No. 10-32 spring nut for changer mounting stud Nut—No. 10-32 spring nut for changer mounting stud Nut—No. 10-32 supension spring (coil)
75024	cone and voice coil (3.2 ohms) SPEAKER ASSEMBLIES FOR MODEL 2ES38 92586-4 W RL 105C4 Cone—Cone and voice coil (3.2 ohms) Specker Complete with cone	75902 14270 76892 76893	Spring—Cable suspension spring (coil) Spring—Retaining spring for knob Strap—Hold down strap for pickup arm Stud—No. 10-32 x 1%'' special stud for mounting changer (2 required)
74664	and voice coil (3.2 ohms)	77125	Support—Lid support

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

2 ES 3, 2 ES 38



AUDIO INPUT FROM RECORD CHANGER SPEAKER LEADS POWER & SWITCH RECORD CHANGER PASSED AUDIO INPUT SOLGGT OUTPUT AF.AMP TONE CONTROL VOLUME CONTROL

Amplifier Top View

CONTROLS

The record changer has a dual control on the motorboard and a stylus selector control on the pickup arm. The inner control (circular knob) is the OFF-ON-REJECT control. Turning this knob to the center position energizes the motor and starts the turntable, when turned to the right (clockwise) it starts the mechanism into complete automatic operation. The mechanism will shut off automatically after the last record has been played but can be shut off manually by turning this knob to the left (counter-clockwise).

The outer control (double ended lever) is the speed control. It has three positions; "33", "45", "78", to select the turntable speed desired.

The stylus control has two normal positions (right and left) and one shipping position (lever pointing up). When playing 33¹/₃ or 45 r.p.m. records the lever is turned so that "33-45" is visible on the TOP of the lever; likewise for 78 r.p.m. records "78" should be visible on the TOP.

The removable centerpost is for use with 45 r.p.m. records having the large centerhole. It must be placed over the center spindle with the "RCA" trademark monogram FACING to the FRONT. When not in use it is placed in a well at the front of the motorboard.

Schematic Diagram

CRITICAL LEAD DRESS

- 1. Dress R₃ down next to chassis.
- 2. Dress all leads away from R₉ and R₁₀.
- 3. Dress power cord and other A.C. leads down next to chassis.
- 4. Connect C_2 and C_4 with short leads.
- 5. Dress electrolytic capacitor leads away from audio input circuit.

FOR RECORD CHANGER SERVICE INFORMATION — REFER TO 930409 SERIES SERVICE DATA



Record Changer Controls





Automatic Record Player Model 2 ES 31

Chassis No. RS-142 Record Changer 930409-5

SERVICE DATA

PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

SPECIFICATIONS

Tube Complement

1.	RCA	12SQ7	. A.F.	Amplifier
2.	RCA	50L6-GT		Output
3.	RCA	35W4		Rectifier

Power Supply Rating

Loudspeaker

Power Output

Dimensions (overall)			
Height 10¾	" Width	13 1/8 ''	Depth	131/2"

Weight

Record Changer (930409-5)

Pickup (Stock No. 75475)...Crystal with replaceable styli.

REPLACEMENT PARTS

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
AMPLIFIER ASSEMBLIES RS 142 75980 Capacitor—Electrolytic comprising 1 section of 50 mtd., 150 volts and 1 section of 80 mtd., 150 volts 73595 Capacitor—Tubular, paper, .0022 mtd., 600 voltsC4 73920 Capacitor—Tubular, paper, .0024 mtd., 600 voltsC4 73595 Capacitor—Tubular, paper, .01 mtd., 400 voltsC2, C7 73554 Capacitor—Tubular, paper, .01 mtd., 400 voltsC6, C5 73553 Capacitor—Tubular, paper, .027 mtd., 400 voltsC6, C5 73554 Control—Tubular, paper, .047 mtd., 400 voltsC6, C5 73552 Control—Tone control R4 76885 Control—Volume control R1 70392 Card_Power cord and plug Gramet—Output transformer leads strain relief		73117 75939 76886	Socket—Tube socket, 7 pin, miniature, wafer for 35W4 tube Transformer—Output transformer
74838 72314 514033 503115 503215 503410 503427 503518 504547 70827		Y2400 X1756 76888 76787 77139 73634 76894 74734 76893	MISCELLANEOUS Cabinet—Plastic cabinet—maroon Cloth—Grille cloth Cover—Cabinet bottom cover less rubber feet Foot—Rubber foot (4 req'd) Knob—Control knob Nut—Speed nut for #8 screw for speaker bracket mount- ing screws Nut—#10-32 spring nut for changer mounting stud Spring—Spring clip for knobs Stud—#10-32 x 1 ³ / ₄ " special stud for mounting changer (2 req'd)





AUDIO INPUT FROM RECORD CHANGER TONE CONTROL VOLUME CONTROL

Amplifier Top View

CONTROLS

The record changer has a dual control on the motorboard and a stylus selector control on the pickup arm. The inner control (circular knob) is the OFF-ON-REJECT control. Turning this knob to the center position energizes the motor and starts the turntable, when turned to the right (clockwise) it starts the mechanism into complete automatic operation. The mechanism will shut off automatically after the last record has been played but can be shut off manually by turning this knob to the left (counter-clockwise).

The outer control (double ended lever) is the speed control. It has three positions; "33", "45", "78", to select the turntable speed desired.

The stylus control has two normal positions (right and left) and one shipping position (lever pointing up). When playing $33\frac{1}{3}$ or 45 r.p.m. records the lever is turned so that "33-45" is visible on the TOP of the lever; likewise for 78 r.p.m. records "78" should be visible on the TOP.

The removable centerpost is for use with 45 r:p.m. records having the large centerhole. It must be placed over the center spindle with the "RCA" trademark monogram FACING to the FRONT. When not in use it is placed in a well at the front of the motorboard.

Schematic Diagram

CRITICAL LEAD DRESS

- 1. Dress R₃ down next to chassis.
- 2. Dress all leads away from R_9 and R_{10} .
- 3. Dress power cord and other A.C. leads down next to chassis.
- 4. Connect C_2 and C_4 with short leads.
- 5. Dress electrolytic capacitor leads away from audio input circuit.



Record Changer Controls





SPECIFICATIONS

Record Changer (930409-5)

Turntable speed
Record capacity
or twelve 10 inch.
or ten 12 inch.
or ten 10 in. and 12 in. intermixed.
Pickup (Stock No. 75475)Crystal with replaceable styli.

Power Supply Rating

Dimensions (overall)

Height 8%" Width 131/2"

Depth 13¼"

FOR RECORD CHANGER SERVICE INFORMATION— REFER TO 930409 SERIES SERVICE DATA



Record Changer Attachment

RCA VICTOR

MODEL 2 JS 1 SERVICE DATA

- 1952 No. 2 -

PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA

CAMDEN, N. J., U. S. A.



Schematic Diagram

CONTROLS

The record changer has a dual control on the motorboard and a stylus selector control on the pickup arm. The inner control (circular knob) is the OFF-ON-REJECT control. Turning this knob to the center position energizes the motor and starts the turntable, when turned to the right (clockwise) it starts the mechanism into complete automatic operation. The mechanism will shut off automatically after the last record has been played but can be shut off manually by turning this knob to the left (counter-clockwise).

The outer control (double ended lever) is the speed control. It has three positions; "33", "45", "78", to select the turntable speed desired.

The stylus control has two normal positions (right and left) and one shipping position (lever pointing up). When playing 33¹/₃ or 45 r.p.m. records the lever is turned so that "33-45" is visible on the TOP of the lever; likewise for 78 r.p.m. records "78" should be visible on the TOP.

The removable centerpost is for use with 45 r.p.m. records having the large centerhole. It must be placed over the center spindle with the "RCA" trademark monogram FACING to the FRONT. When not in use it is placed in a well at the front of the motorboard.

REPLACEMENT PARTS

STOCK No.	DESCRIPTION
70392	Cord—Power cord and plug
77192	FootRubber foot (4 required)
31048	Plug—Pin plug for audio output cable

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.

Connecting Record Changer Attachment to Radio or Television Receivers

In general, the Record Changer Attachment must be used with receivers having at least two stages of high-gain audio amplification. The output of the Record Changer Attachment should be connected to the input of the first audio tube, and at the same time the output of the detector portion of the receiver should be shorted or opened, to prevent radio signals being heard while the Record Changer Attachment is in operation.

RCA Radios or Television Receivers with Phono Jack

Plug male connector on the end of the "Phono" lead into the female connector on the receiver chassis. If set is provided with a phono switch, push or turn the "Phono" switch to "Phono" position, and operate the Record Changer Attachment according to instructions. If no switch is provided, use minimum setting of receiver volume control which will give acceptable volume, and tune receiver off frequency from any very strong station. In some instances the radio volume control will have the effect of a tone control.

Radios Without Phono Jack

Methods of connecting the Record Changer Attachment to various types of audio systems are given in the accompanying text and illustrations. The data given requires that an RCA Type No. 240X1 (Formerly Stock No. 240) Radio-Phono switch be used for switching from radio to phonograph, as desired. For ease in connecting the "Phono" lead to the switch, the male plug on the end of the lead matches the phono jack on the switch.

Note:

If connected to a radio or television receiver as shown in Figures A or B, it will probably be necessary to add a volume control (1 to 2 megohm) to the Record Changer. Attachment, since most receivers do not have a volume control following the first audio tube.

Installation of Switch

Fasten the bracket to the cabinet in such a position that the switch may be easily reached. For wooden cabinets, a suggested place is the upper rear edge of the cabinet. If the radio has a plastic cabinet, the bracket may be fastened to the chassis by self-tapping screws or soldering. In the case of a.c.-d.c. sets, the bracket should not be fastened to the chassis. In such cases, a wooden block may be fastened to the chassis and the bracket screwed to the wooden block, care being exercised that there is no metallic path from the bracket to the chassis.



Connect the braided shield extension to the radio chassis by either soldering or placing the spade lug under a mounting screw.

On a.c.-d.c. sets it is necessary to isolate the cable shield from the chassis. This is best done by connecting the shield to the chassis through a .1 mf. 400-volt condenser. Care should be taken that the shield braiding and switch bracket do not come in contact with the chassis.

If the common-negative wiring in the a.c.-d.c. set is isolated from the set chassis, connect the cable shield, through a .1 mfd. capacitor, to the common-negative wiring, and not to the chassis.



For receivers in which the lst-audio tube has a top grid cap—see Fig. A:

- 1. Disconnect the grid lead from the first audio tube.
- 2. Connect the cap on the black lead to the clip on the grid lead, as shown above.
- Connect the clip on the black-brown lead to the grid cap at the top of the 1st-audio tube, bending the terminal if necessary to proper size for a metal tube cap.
- 4. Insert the plug on the end of the record player lead into the jack on the bracket.
- Secure or position the connection cable assembly so that the cap and clip terminals are well separated from each other and other metal parts.

For receivers in which the lst-audio tube is type 6SQ7, 6SR7, 12SO7 or 12SR7—see Fig. B:

- 1. Use adaptor plug RCA Stock No. 37798.
- 2. Remove the 1st-audio tube,
- 3. Solder the switch leads to the adaptor plug terminals black to bottom lug—black-brown to top lug.
- 4. Tape terminals to prevent short circuits when installed in set.
- 5. Insert the adaptor into the 1st-audio tube socket.
- 6. Insert the 1st-audio tube into the adaptor.
- 7. Insert the plug on the end of the record player lead into the jack on the bracket.



For other radio receivers in which the lst-audio tube does not have a grid cap; connection to volume control input—see Fig. C:

- 1. Unsolder the lead from the volume control lug indicated in Fig. C. It is usually necessary to remove the chassis from the cabinet to do this.
- Solder the black-brown lead (remove clip) to the lug or pin disconnected in Step 1.
- 3. Solder the black lead (remove plug) to the lead disconnected in Step 1. Tape the joint to prevent short circuits.
- 4. Insert the plug on the end of the record player lead into the jack on the bracket.

Radio-Phonograph Combinations

RCA Type 202-W-l Record Player Selector Switch may be used to select the output of two record changers for connection to one phono input jack. A choice of two types of input jacks and output cable plugs are provided.

Most radio-phonograph combinations use resistors and/or capacitors in their phono input circuit for tone compensation purposes. This may result in unsatisfactory reproduction from Model 2JS1 when connected to the phono jack of such instruments. In such cases it is suggested that Model 2JS1 be connected as indicated tor instruments not having a phono jack.

2 JS 1



Schematic Diagram

2-R-51, 2-R-52

Top View



CRITICAL LEAD DRESS

- Oscillator coil should be centered in space provided and have at least ¼ inch between winding and chassis.
- The filament wiring should be dressed down on chassis and away from audio leads and audio coupling condensers.
- 3. The I.F. plate and grid leads, including the 2nd I.F. diode lead should be as short as practical.

- The output plate by pass condenser should be dressed against the side of the chassis and away from the 1st audio grid condenser and the diode filter resistor.
- 5. Output transformer primary leads should be dressed away from the selenium rectifier.
- 6. The loop antenna should be accurately centered in its position on the fishpaper cover. The ends must not project beyond the fishpaper.

ALIGNMENT PROCEDURE

Test-Oscillator—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action.

On a.c. operation an isolation transformer (115 v./115 v.) may be necessary for the receiver if the test oscillator is also a.c. operated.

Output Meter—Connect meter across speaker voice coil. Turn volume control to maximum.

Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max.output
1	6BJ6 I-F grid through .01 mfd. capacitor		Quiet- point	T2 (top and bottom) 2nd I-F. trans.
2	Stator of ClA through .01 mfd.	433 KC	end of dial	T1 (top and bottom 1st I-F trans.
3	Short wire	1620 kc	Min. cap.	osc. trimmer C1B-T
4	placed near loop to	1400 kc	1400 kc signal	ant. trimmer CIA-T
5	radiate signal		Repeat step	s 3 and 4

REPLACEMENT PARTS

STOCK NO.	DESCRIPTION		STOCK NO.	DESCRIPTION		
	CHASSIS ASSEMBLIES		503547	4.7 megohm, ±10%, 1/2 watt		
	BC 1119		76723	Socket-Lamp socket		
			75780	Socket—Tube socket, 7 pin, miniature saddle-mounted		
77438	Antenna—Ferrite rod antenna complete with windingsLl		77441	Transformer—Filament transformer 117 volts AC		
77440	Capacitor—Variable tuning capacitor		77445	Transformer—Output transformer. T3		
77471	Capacitor—Ceramic, 4.7 mmf		77416	Transformer—1st I.F. transformer complete with adjustable		
75609	Capacitor-Ceramic, 47 mmf.			cores		
76347	Capacitor-Ceramic, 120 mmf.		77417	Transformer-2nd I.F. transformer complete with adjustable		
75611	Capacitor-Ceramic, 220 mmf.		87400	cores		
77443	Capacitor—Electrolytic comprising 1 section of 50 mtd., 150 volts and 1 section of 30 mtd., 150 volts	5	7/420	Washer-Shoulder washer (nylon) for mounting variable tuning capacitor		
77446	Capacitor—Tubular, paper, .0022 mfd., 400 volts					
77447	Capacitor-Tubular, paper, .0033 mfd., 400 volts	l l		SPEAKER ASSEMBLIES		
77424	Capacitor-Tubular, paper, .01 mtd., 200 volts		1	922258-7		
77448	Capacitor-Tubular, paper, .027 mtd., 200 volts		77451	Speaker-4" x 6" P.M. speaker complete with cone and voice		
77422	Capacitor-Tubular, paper, .047 mfd., 400 volts			coil (3.2 ohms)		
75071	Capacitor-Tubular, moulded paper, .047 mtd., 400 voltsC.	5				
77423	Capacitor-Tubular, paper, 0.1 mid., 400 volts	2		MISCELLANEOUS		
73935	Clip-Mounting clip for I.F. transformer		77457	Case—Polystyrene case—black & beige—complete with		
77450	Control—Oscillator control and power switch		//10/	speaker baffle and screen assemblies less bottom cover for Model 2851		
70392	Cord—Power cord and plug		77465	Case-Polystyrene case-tan & ivory-complete with speaker		
77439	Cover—Insulating cover for chassis	1		baffle and screen assemblies less bottom cover for Model		
74838	Grommet—Power cord strain reliet (1 set)			2R52		
77405	Insulator-Bakelite insulator for variable tuning capacitor		77456	Clip—Spring clip to mount station selector pointer		
77444	Nut—Speed nut for output transformer mounting screws		77458	Cover-Bottom cover-beige-for Model 2R51		
28452	Plate—Bakelite mounting plate for electrolytic		77466	Cover-Bottom cover-ivory-for Model 2R52		
77292	Rectifier—Selenium rectifier CR		77453	Dial—Dial knob—black & gold—for Model 2R51		
77571	Resistor-Wire wound, fuse type, 22 ohms, 0.4 ampsR	4	77464	Dial—Dial knob—tan & gold—for Model 2R52		
500110	Resistor—Fixed, composition:—	,	77452	Knob-Volume control and power switch knob-black & gold		
503110	$100 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ wdit}$	1		-tor Model 2R51		
503147	$4/0 \text{ onms}, \pm 10\%, \frac{1}{2} \text{ watt}$	2	77463	Knob-Volume control and power switch knob-tan & gold-		
502260	1300 ohms, ±10%, 2 walls.	2	11765	Ior Model 2R32		
503200	$22000 \text{ phase} \pm 10\%$ 1/2 watt	1	77455	Lamp-Pilot lamp-Mazad SI		
502247	$47,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}$	5	77453	Serow #9.22 x 3/2" gross record truss head machine retow		
502/22	330 000 ohms, ±10%, ½ watt	8	//4.54	for fastening bottom cover		
503493	820,000 ohms, ±10%, % watt	q	76783	Shield—Pilot Jamp shield		
503402	$3.3 \text{ megohm} \pm 10\% \text{ //}_{2} \text{ watt}$	4	74734	Spring—Spring clip for volume control knob or dial knob		
000000	0 0 megonin, 10 %, 72 went	1	11.01			
5	APPLY TO YOUR BCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS					



FOR RECORD CHANGER SERVICE INFORMA-TION—REFER TO 930409 SERIES SERVICE DATA.



RCA VICTOR Radio Phonograph Combination Model 2-S-7 Chassis No. RC-1117D

SERVICE DATA

PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

SPECIFICATIONS

Tuning Range				
Intermediate Frequency 455 kc.				
Tube Complement Converter 1. RCA 12BE6 Converter 2. RCA 12BA6 I.F. Amplifier 3. RCA 6AQ6 Detector—A.F. Amplifier 4. RCA 6AQ6 Phase Inverter 5. RCA 35C5 Push Pull Output 6. RCA 35C5 Push Pull Output A selenium rectifier Stock #76871 is used.				
Power Supply Rating				

	-	
115 volts A.C.,	60 cycles.	 45 watts

Dial Lamps (2) Mazda type 51, 6-8 volts, 0.2 amp.



Record Changer Controls

Louaspeaker		
Size and type		
Voice coil impedance	e	hms at 400 cycles
Power Output		
At 10% distortion		
Maximum		
Cabinet Dimensions		
Height 32¼"	Width 281/2"	Depth 191/8"
Tuning Drive Ratio		1/8 turns of knob)
Record Changer (93	0409-5, or -10)	
Turntable speed		3 ¹ /2, 45 or 78 r.p.m.
Record capacity	up to fourteen 7 i	nch RCA type
	or twelve 10 inch	
	or ten 12 inch	
	or ten 10 in. and	12 in. intermixed.
Pickup (Stock No. 75	475) Crystal with	replaceable styli.
Weight		66 lbs. net

RECORD CHANGER CONTROLS

The record changer has a dual control on the motorboard and a stylus selector control on the pickup arm. The inner control (circular knob) is the OFF-ON-REJECT control. Turning this knob to the center position energizes the motor and starts the turntable, when turned to the right (clockwise) it starts the mechanism into complete automatic operation. The mechanism will shut off automatically after the last record has been played but can be shut off manually by turning this knob to the left (counter-clockwise).

The outer control (double ended lever) is the speed control. It has three normal positions, "33", "45", "78" to select the turntable speed desired and a neutral position (midway between "45" and "78"). The control should be turned to this neutral position if the changer is not expected to be in use for an extended period of time. The stylus control has two normal positions (right and

The stylus control has two normal positions (right and left) and one shipping position (lever pointing up). When playing 33¹/₃ or 45 r.p.m. records the lever is turned so that "33-45" is visible on the TOP of the lever; likewise for 78 r.p.m. records "78" should be visible on the TOP.

The removable centerpost is for use with 45 r.p.m. records having the large centerhole. It must be placed over the center spindle with the "RCA" trademark monogram FAC-ING to the FRONT. When not in use it is placed in a well at the front of the motorboard.

To load or remove records, the record stabilizer is lifted and turned off-side. After loading it is turned to the center where it rests on top of the stack of records. 2-S-7



Radio Controls

Critical Lead Dress

- 1. Dress all leads away from R22.
- 2. Dress all filament leads down to chassis.
- 3. Dress output plate leads down to chassis.
- 4. Dress R12 close to chassis.



Alignment Procedure

Output Meter.—Connect meter across speaker voice coil. Turn volume control to maximum.

Test Oscillator.—Connect low side of test oscillator to common wiring in series with a .1 mf. capacitor. If the test oscillator is a.c. operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common wiring at the electrolytic capacitor. Keep the oscillator output low to prevent a-v-c action.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the fol- lowing for max. output	
1	I.F. grid, in series with .1 mfd.		Q	Quiet point	Pri. & Sec. 2nd I.F. transformer
2	Converter grid in series with .1 mfd.	455 kc	l,600 kc end of di a l	Pri. & Sec. 1st I.F. transformer	
NOTE.—ANTENNA LOOP MUST BE IN CABINET FOR THE FOLLOWING					
3	Short wire placed near loop for	1,620 kc	Extreme R. H. end (gang open)	C22 (osc.)	
4		1,400 kc	1,400 kc	C5 (cmt.)	
5	signal	600 kc	600 kc Signal	L3 (Rock Gang)	

Dial Pointer Adjustment.—Rotate tuning condenser fully counterclockwise (plates fully meshed). Adjust indicator pointer so that it is $3^1\%_6$ " from the left hand edge of the dial back plate.



Tube and Trimmer Locations



Schematic Diagram-Chassis RC-1117C

2-S-7

REPLACEMENT PARTS

STOCK No.	PART DESCRIPTION	STOCK No.	PART DESCRIPTION
	CHASSIS ASSEMBLIES RC1117D	74697 77115 51955	Socket—Dial lamp socket Socket—Tube socket, 7 pin, miniature, moulded Socket—Tube socket, 7 pin, miniature, moulded sad-
76876 76867 76872	Antenna—Antenna loop and back cover, Ll Capacitor—Variable tuning capacitor, ClA, ClB Capacitor—Adjustable trimmer, 2.5—30 mmf., C5, C22	76368 76873 77122	dle-mounted Spring—Drive cord spring Switch—Function switch less volume control, S1 Transformer—Output transformer, T3
77116	Capacitor—Fixed, ceramic, insulated, temp. coef.— -3300, 56 mmf., ±20%, 500 volts DC, C4	74918	Transformer—First I.F. transformer complete with adjustable cores, Tl
93603 76347	Capacitor—Fixed, ceramic, insulated, high K type— 56 mmf., ±10%, 500 volts, C9 120 mmf., ±20%, 500 volts, C13	73037	Transformer—Second I.F. transformer complete with adjustable cores, T2 Washer—"C" washer for tuning knob shaft
73013	Capacitor—Electrolytic: comprising 1 section of 80 mfd., 150 volts, 1 section of 30 mfd., 150 volts and 1 section of 10 mfd., 150 volts C178, C178		SPEAKER ASSEMBLIES 92586-4W BL10504 RMA-274
73851	Capacitor—Fixed, tubular, paper: .0018 mfd., 1600 volts, C8, C21	75024 74664	Cone—Cone and voice coil (3.2 ohms) Speaker—8″ P.M. speaker complete with cone and
73595 73795 73920	.0022 mtd., 600 volts, C7 .0033 mfd., 400 volts, C12 .0047 mfd., 400 volts, C10		voice coil (3.2 ohms) MISCELLANEOUS
73788 73561	.0056 mfd., 400 volts, C14 .01 mfd., 400 volts, C16, C19, C20	71892 70142	Catch—Bullet catch and strike Clamp—Dial clamp (1 set)
73552 73553 75071	.022 mtd., 400 volts, C1, C15 .047 mtd., 400 volts, C2, C3, C6 Capacitor—Fixed, tubular, moulded paper: .047 mtd.,	X3351 X3350	Cloth—Grille cloth for blonde manogany instruments Cloth—Grille cloth for mahogany or walnut instru- ments
73935	400 volts, C18 Clip—Mounting clip for I.F. transformer	30870	Connector—2 contact male connector for motor cable, P2 Connector 2 contact male connector for pickup
36422	core L2. L3 Connector—Phono input connector, J1	77898	cable, Pl Decal—Control function decal for blonde mahogany
77114 75 1 74	Connector—Single contact male connector for loop lead Connector—Single contact male connector for	77897	instruments Decal—Control function decal for mahogany or wal-
30868	speaker cable Connector—2 contact female connector for motor	74273 77889	Decal—'Victrola'' decal Dial—Glass dial scale
76874 72953	cable, P2 Control—Volume control, R11 Cord—250' Drive Cord Reel (approx. 54'' overall	74205 74838 77402	Escutcheon—Dial scale escutcheon less dial Grommet—Power cord strain relief (1 set) Handle—Pullout handle for record changer mech-
73690	req'd) Cord—Power cord and plug	74308	anism Hinge—Door hinge (1 set) Kash Function switch knoh-beige—for blande ma-
72283	Grommet—Rubber grommet for mounting variable capacitor	77891	hogany instruments (outer) Knob—Function switch knob—maroon—for mahog-
11765 28452 77926	Lamp—Dial lamp—Mazda 51 Plate—Bakelite mounting plate for electrolytic Plate—Dial back plate complete less dial	77382	Any or walnut instruments (outer) Knob—Tuning control knob—beige—for blonde ma- hogany instruments (inner)
77378 76871	Pointer—Station selector pointer Rectifier—Selenium rectifier, SRI	77386	Knob—Tuning control knob—beige—for blonde ma- hogany instruments (outer)
77379	tive temperature coefficient, R23 Resistor—Wire wound, 66 ohms, 5 watts, R22	77385	any or walaut instruments (inner) Knob—Tuning control knob—maroon—for mahog-
503082	Resistors—Fixed, composition: 82 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R19 270 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R5	75464	any or walnut instruments (outer) Knob—Volume control knob—beige for blonde ma- bogany instruments (inner)
513212 503218	1200 ohms, ±10%, 1 watt, R21 1800 ohms, ±10%, ½ watt, R20	74963	Knob—Volume control knob—maroon—for mahog- any or walnut instruments (inner)
503312 503339 503347	12,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R17 39,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R2 47,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt R4	77894	blonde mahogany instruments Pan—Record changer mounting pan—beige—for Pan—Record changer mounting pan—plum—for
503356 503412	56,000 ohms, ±10%, ½ watt, R10 120,000 ohms, ±10%, ½ watt, R7	7642	mahogany or walnut instruments Pin—Slide mechanism stop pin Bull Deer mult
503422 503433 503439	220,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R1, R13, R14 330,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R3 390,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R8	74113	3 Screw—#8-32 x 1" trimit head screw for door pull Slide—Mounting pan slide mechanism
503447 503515 503522	470,000 ohms, ±10%, ½ watt, R16, R18 1.5 megohm, ±10%, ½ watt, R9 3.3 megohm, ±10%, ½ watt	76422	2 Spring—Retaining spring for slide mechanism stop pin 3 Spring—Retaining spring for knobs 74963 and 75464
503610	10 megohin, $\pm 10\%$, $\frac{1}{2}$ wait, R12, R15 Shaft—Tuning knob shaft	7683	7 Spring—Retaining spring for knobs 75945, 77382, 77385, 77386, 77891, 77892
76870	Shield—Tube shield	/293	

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

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FOR RECORD CHANGER SERVICE INFOR-MATION-REFER TO 930409 SERIES SER-VICE DATA.



AM-FM Radio-Phonograph Combination

Model 2-S-10

Radio Chassis RC1111 Audio Amplifier RS141 Record Changer 930409-5, or -10

SERVICE DATA – 1952 No. 14 –

PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

Specifications

Tuning Range

Standard Broadcast (AM)	
Frequency Modulation (FM)	
Intermediate Frequency (AM)	
Intermediate Frequency (FM)	

Tube Complement

Tube Used	Function
Radio Chass	sis RC1111
(1) RCA 6CB6.	
(2) RCA 6J6	
(3) RCA 6BA6	I-F Amplifier
(4) RCA 6AU6	F-M Driver
(5) RCA 6AL5	Ratio Detector
(6) RCA 6AV6	AM DetAVC-A-F Amplifier
Audio Chas	sis RS141
(1) RCA 6C4.	Phase Inverter
(2) RCA 6V6GT	
(3) RCA 6V6GT	Audio Output
(4) RCA 5Y3GT	Rectifier
Lamps	
Dial (2) Jewel (1)	#51, 6-8 volts, 0.2 amp. #51, 6-8 volts, 0.2 amp.

General Description

This instrument is a Victrola combination having nine tubes, plus one rectifier. It has a modern style cabinet in either walnut, mahogany, or limed oak finish. The entire receiver (with the exception of the power supply and speaker) is built as a unit with the automatic record changer for "pull-out" operation. The three speed record changer is nested over the radio chassis on a plastic case. Record storage space is provided for both large and small diameter records.

For standard broadcast reception, a loop antenna is mounted on the roll-out unit back. A folded dipole is mounted inside the cabinet for use on the FM band. Provision is made for connecting an external antenna for either the broadcast or FM bands.

By rotating the function switch, the 2S10 can be operated as:

1. Phonograph sound channel for the three speed record changer.

Power Supply Rating......115 volts, 60 cycles, 100 watts

Audio Power Output Rating Radio
Loudspeaker (92569-12W)
Size and Type
Tuning Drive Ratio
Net Weight
Dimensions (overall)
Height35½ in. Width35 in. Depth23 in.
Record Changer (930409-5, or -10)
Turntable Speed
Record Capacity Up to fourteen 7 inch RCA type
or twelve 10 inch
or ten 12 inch
or ten 10 inch and 12 inch intermixed
Pickup (Stock No. 75475) Crystal with replaceable styli

2. Standard broadcast "A" band receiver (540-1600 kc).

3. Broadcast "FM" band receiver (88-108 mc).

The function switch controls the internal connections for:

- A. RF-IF stage AVC voltages from AM or FM detector.
- B. Audio amplifier input from any one of three channels.
- C. B+ voltage application to RF-IF circuits.
- D. Audio output tube bias voltage. In phonograph operation, R2 is disconnected from R107, increasing available power output for phonograph operation.
- E. Selection of tuned circuits for AM or FM operation.

A horizontal tilted slide rule type dial is located along the top front face of the plastic roll-out case. The dial is edge-lighted at both ends by dial lamps. An amber jewel lamp, visible at the bottom front, glows whenever the set is in operation.





Alignment Procedure

CORRECT ALIGNMENT OF THE AM R.F. STAGES REQUIRES THAT THE FM R.F. STAGES BE ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment Con-nections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil

ment indicator, either to measure audio output or to measure The RCA VoltOhmyst can also be used as an AM align-

a-v-c voltage. When audio output is being measured the volume control should be turned to maximum. Adjust tone controls for maximum highs and lows during alignment.

Signal Generator.

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action

RANGE SWITCH IN AM DOSITION **AM** Alignment (

3

	TONUT	TTOTTAN	COJ INTE N	NOTTO
Steps	Connect high side of sig. gen. to-	Sig. gen. output	Turn radio dial to	Adjust for peak output
1	Pin No. 1 of V3 in series with .01 mfd.	455 kc.	Quiet point	T4 bottom† core (sec.). T4 top core (pri.).
5	To stator of C1-E	(mod.)	freq. end	T2 top† core (sec.). T2 bottom core (pri.).
\odot	PERFORM	FM ALIGNM	ENT BEFORE I	PROCEEDING
ю		1620 kc. (mod.)	1620 kc.	ClB-T (osc.).
4	Short wire	1400 kc. (mod.)	1400 kc.	CID-T (ant.). CIE-T (rf.).
ß	placed near loop for radiated signal	600 kc. (mod.)	600 kc,	L5 (osc.) with 10,000 ohm resistor from RF stator to gnd. (rocking gang)
9				L7 (RF) with the 10,000 ohms removed.

Repeat steps 4, 5 and 6 until no improvement in sensitivity is obtained.

L

FM Alignment

FUNCTION SWITCH IN FM POSITION-VOLUME CONTROL MAXIMUM

6

eps	Connect high side of sig. gen. to	Sig. gen. output	Turn radio dial to—	Adjust for max. output
П	Connect the d.c. 2 mfd. capacitor gen. output to pre	probe of a Volt C39 and the cc ovide approx	Ohmyst to th ommon lead -4 v. indicat	e negative lead of the to chassis. Adjust sig. ion during alignment.
N	Pin #1 of 6AU6	10.7 mc AM		Top of driver trans. T5 for max. d-c voltage
~	with .01 mf.	modulated]	†Bottom of driver trans. T5 for min. audio output
	Repeat steps 2 an	ld 3		
	Thru 470 ohme to C1-F. Con- nect gnd. end of cable close to V2 cathcde ground on r-f shelf	10.7 mc	88 B	*Top (sec.) & bottom (pri.) cores of T3 *Top (sec.) & bottom (pri.) cores of T1
-		90 mc	90 mc	L8 (osc.)
	To FM antenna terminals thru 120 ohms in each side of line	106 mc	106 mc Signal	Cl-F trimmer (ant.) and Cl-C trimmer (r. f.)
	s	90 mc	90 mc Signal	L1 (ant.) and L2 (r.f.)
	Repeat steps 6, 7	and 8		
	Connect a sweep	generator to	the antenna	terminals thru 120

†Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

R33 and C35 to check response and linearity of FM band. Peak

to peak separation should not be less than 180 kc.

of the same trans. is being peaked. Then the grid winding is loaded with the 680 ohm resistor while the plate winding is being peaked. When windings are loaded, it is necessary to increase the 10.7~mc input to maintain the -4*Use a 680 ohm resistor to load the plate winding while the grid winding volts indication.

L8, L1 and L2 are adjustable by increasing or decreasing the spacing

between turns. Oscillator signal tracks above signal frequency. The proper adjustment of the LF. cores can be determined by starting the core all the way out. The first peak obtained is the correct one.

Tube Socket Voltages

Phono	1111	1111	1111	11 EI	11	104 -0.8	120 - 13 - 19	298 292 0 - 21	307
FM	180 62 6.0 .4 4.0	- 1.3 - 1.3 - 1.2	210 115 0.7	216 150 1.5	11	-0.7	1 1 1 1 1 1 1 1 1 1	300 224 - 17	305
AM	215 74 -0.4	-2.0	210 126 0.9	216 150 1.5 0	11	88 -0.7	87.5 - 11 - 16	300 224 0 -17	305
Pin No.	- 1902	0 ~ 210	1 7 6 5	1 7 6 2	11	7 1	6 7 5	₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩	8
Tube Element	Plate Screen Cathode Grid	Plate Grid Plate Grid	Plate Screen Cathode Grid	Plate Screen Cathode Grid	11	Plate Grid	Plate Cathode Grid	Plate Screen Cathode Grid	Fil.
Tube Type and Function	V1 6CB6 R-F Amp.	V2 6J6 Osc. and Mixer	V3 6BA6 I-F Amp.	V4 6AU6 Driver	VS 6ALS Ratio Det.	V6 6AV6 Audio Amp.	6C4 Phase Inverter	6V6GT Audio Output	5¥3GT Rectifier

sted line voltage. Tuning condenser closed-no signal input.

Critical Lead Dress

- The 1st F.M. I.F. plate lead should be dressed away from i c'i
- the R.F. plate. Dress the 1st A.M. I.F. plate lead to S-2 wafer away from the A.M. R.F. coil.
- The ground strap between the R.F. Shelf and the main chassis should be well soldered and kept as short as practicable but yet allow some flexibility for the R.F. Shelf. Dress A.C. power switch wires away from all audio *.* 4.
- Dress C-26 down toward base between terminal board and components. side apron. ഗ
 - Shelf R.F. C-18 bypass should ground as close to the ground strap as practicable. ю.
 - Dress C.25 away from arm of volume control. All leads, from the R.F. shelf, leaving through the shields Μ
- must be kept as short as possible so as to minimize F.M Dress A.C. leads in the RS141 chassis away from oscillator radiation. <u>ю</u>
- input leads and components. Dress all leads away from R1 in the RS141 chassis. All leads for F.M. should be kept short especially on the R.F. shelf. àudio
 - 11.

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Simplified Schematic Diagram-"FM" Position



Simplified Schematic Diagram - "AM" Position

45 RPM CENTERPOST CENTER SPINDLE 3 PICK UP ONOGRAN ò STABILIZER FOR 33 1/3 OR 45 RPM RECORDS OFFON REJECT (45) STYLUS CONTROL FOR RECORDS WELL FOR CENTERPOST SPEED

Controis

Record Changer Controls

The record changer has a dual control on the motorboard and a stylus selector control on the pickup arm. The inner control (circular knob) is the OFF-ON-REJECT control. Turning this knob to the center position energizes the motor and starts the turntable, when turned to the right (clockwise) it starts the mechanism into complete automatic operation. The mechanism will shut off automatically after the last record has been played but can be shut off manually by turning this knob to the left (counter-clockwise).

The outer control (double ended lever) is the speed control. It has three normal positions, "33", "45", "78" to select the turntable speed desired and a neutral position (midway between "45" and "78"). The control should be turned to this neutral position if the changer is not expected to be in use for an extended period of time.

The stylus control has two normal positions (right and left) and one shipping position (lever pointing up). When playing 331/3 or 45 r.p.m. records the lever is turned so that "33-45" is visible on the TOP of the lever; likewise for 78 r.p.m. records "78" should be visible on the TOP.

The removable centerpost is for use with 45 r.p.m. records

Radio

Operating Instructions

RADIO-Turn extreme right hand FUNCTION knob to "AM" or "FM" radio position as desired. Turn OFF-VOLUME Knob "ON" and advance to mid-position for medium volume. Allow approximately 20 seconds for tube warm-up. With TUNING knob, select desired station indicated by dial pointer. Set tone controls for most pleasing reception. Turn BASS control counter-clockwise and TREBLE control clockwise for full tone. Adjust volume level as desired.

PHONOGRAPH-Turn extreme right hand FUNCTION knob to "PH" position. Turn OFF-VOLUME knob "ON" and advance to mid-position for medium volume. Set tone controls as indicated above for best tone. Refer to RECORD CHANGER section for operational information.



Radio Controls

having the large centerhole. It must be placed over the center spindle with the ''RCA'' trademark monogram FACING to the FRONT. When not in use it is placed in a well at the front of the motorboard.

To load or remove records, the record stabilizer is lifted and turned off-side. After loading it is turned to the center where it rests on top of the stack of records.

Record Changer Adjustments

Landing Adjustment

Only one landing adjustment is necessary. The landing position of the stylus is adjusted by means of the eccentric stud (20A), mounted on the pickup arm support bracket. When adjusted for correct landing on one side of record, the landing position for other sizes of records is automatically corrected.

Pickup Arm Height Adjustment

The pickup arm height during cycle is adjusted by means of the hex head screw (17), located in the pickup arm.

Turn control knob to "REJ" and rotate turntable by hand until arm has risen to its maximum height. Adjust screw so that stylus is 13%" above turntable.

Stylus Force Adjustment

Stylus force should be 7½ to 9½ grams. Loosen screw (14), and move slide until the correct force is obtained.



Tripping

The tripping method used in this mechanism is a velocity method. Velocity tripping is effective between 43/4'' and 31/4''diameters, when the stylus moves inward 1/8" or more per revolution of the turntable. No adjustment is required.

Roll-Out Mechanism

Record Changer Mounting

The record-changer is mounted in a roll-out carriage. The changer mechanism is mounted on springs and should be free floating.

Roll-out Carriage Removal

Roll-out carriage has two stop pins, (one at the back end of each slide) held in place by retaining spring. To remove roll-out carriage, it is first necessary to pull the retaining springs out of the slides with a pair of long nose pliers, the stop pins are then easily removed. The roll-out carriage may then be removed from the front of the cabinet after disconnecting its connecting cables.

Roll-out Carriage Travel

The roll-out carriage has a normal movement limitation of approximately 10 inches. If it does not have this amount of movement, it may be due to an obstruction or from slippage or creeping of the balls of the slide mechanism. Travel restriction due to slippage or creeping of balls in the slide mechanism can be corrected by exerting slightly greater pull until the normal travel limitation is reached. The carriage should then operate to its full travel with normal pull.

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RC1111 Chassis-Tube and Trimmer Locations

Dial Cord Drive

Replacement Parts

STOCK NO.	PART DESCRIPTION	STOCK NO.	PART DESCRIPTION
	CHASSIS ASSEMBLIES RC 1111	77315 77305	Coil-Oscillator coil-FM (L8) Coil-R.F. coil-AM-complete with adjustable
77308	Capacitor—Variable tuning capacitor (C1-A, C1-B, C1-C, C1-D, C1-E, C1-F)	77314 75543	Coil-R.F. coil-FM (L2) Connector-2 contact female connector for phono
77352	Capacitor-Ceramic, 5 mmi. (C12, C41) Capacitor-Ceramic, 6.8 mmf. (C16) Capacitor-Ceramic, 15 mmf. (C14)	74879	Connector –2 contact female connector for an- tenna leads
76348	Capacitor-Ceramic, 47 mmf. (C10) Capacitor-Ceramic, 68 mmf. (C15, C17)	75062	Connector—9 contact male connector for power input (J1)
39396 75614	Capacitor—Ceramic, 100 mmf. (C5) Capacitor—Ceramic, 150 mmf. (C13, C28, C31)	35787	Connector—Single contact female connector for audio cable (J2)
75611 39640	Capacitor—Ceramic, 220 mmf. (C3) Capacitor—Mica, 330 mmf. (C36, C37)	33742	Connector-Single contact female connector for phono cable (J3)
39644 73473	Capacitor—Mica, 470 mmf. (C6) Capacitor—Ceramic, 4700 mmf. (C2, C4, C7, C9,	75562 75561	Control-Tone control-H.F. (R29) Control-Tone control-L.H. (R16)
72747	$C_{11}, C_{18}, C_{20}, C_{23}, C_{24}, C_{27}, C_{32}, C_{34}, C_{35}, C_{40}$	72052	S2) Cord 250' Drive Cord Real (approx 57" everall
77468	Capacitor-Tubular, paper, .0018 mfd., 600 volts (C8)	75564	reg'd) Coupling-Spring coupling for function switch
73795	Capacitor—Tubular, paper, .0038 mfd., 600 volts (C25)	74839	extension shaft Fastener—Push fastener to fasten RF shelf (4 req'd)
73920	Capacitor—Tubular, paper, .0047 mfd., 600 volts (C30)	16058	Grommet—Rubber grommet for mounting RF shelf (4 req'd)
72490	Capacitor-Tubular, paper, .005 mfd., 200 volts (C33, C38)	75548	Grommet-Rubber grommet for mounting slides (4 reg(d)
73561	(C29) Capacitor-Tubular, paper, .01 mtd., 400 volts (C29) Capacitor-Tubular, paper, .015 mtd. 600 volts	77311	Lamp-Dial lamp-Mazda 51 Latch-Bottom cover latch
77469	(C22) (C22) Capacitor—Tubular paper 018 mfd 200 volts	76421	Pin-Slide mechanism stop pin Pulley-Drive cord pulley
73562	(C21) Capacitor—Tubular, paper, .022 mfd., 400 volts	35641	Pulley—Drive cord pulley—1¾″ dia. Resistor—Fixed, composition:—
73558	(C26) Capacitor—Tubular, paper, .047 mfd., 200 volts	503039 503068	39 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3) 68 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R21)
73935	(C19) Clip—Mounting clip for I.F. transformer for 75558	503110 503112	100 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R14, R34) 120 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R30)
77313	Coil—Antenna coil—FM (L1)	503168	$590 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R12)}$ 680 ohms, $\pm 10\%, \frac{1}{2} \text{ watt (R6, R25, R32)}$
75569	Coil-Oscillator coil-AM-complete with adjust- able core (L3, L4, L5)	502212 502233	1200 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R36) 3300 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R35)

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Replacement Parts (Continued)

STOCK NO.	PART DESCRIPTION	STOCK NO.	PART DESCRIPTION
503282 503315 503318	8200 ohms, ±10%, ½ watt (B5) 15,000 ohms, ±10%, ½ watt (R33) 18,000 ohms, ±10%, ½ watt (R13, R17)	73690 74838 72776	Cord—Power cord and plug Grommet—Power cord strain relief (1 set) Pin—Contact pin for speaker lead (2 reg'd)
503322 503327	22,000 ohms, ±10%, ½ watt (R22, R31) 27,000 ohms, ±10%, ½ watt (R9, R18)	73637	Resistor—Wire wound, 2200 ohms, 5 watts (R101) Resistor—Fixed, composition:—
503339 503356	39,000 ohms, ±10%, ½ watt (R37) 56,000 ohms, ±10%, ½ watt (R26)	503110 522127	100 ohms, ±10%, ½ watt (R108) 270 ohms, ±5%, 2 watts (R107)
503412 503415	120,000 ohms, ±10%, ½ watt (R11, R15) 150,000 ohms, ±10%, ½ watt (R4, R24)	502233 503368	3300 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R102) 68 000 ohms, $\pm 10\%$ $\frac{1}{6}$ watt (R105)
503422 503427	220,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R23) 270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R28)	503382	82,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R103) 470,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R104, R106)
503447	$470,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R38)$	31364	Socket-Pilot lamp socket
503515	1.5 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R10) 2.2 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R10)	73117	Socket-Tube socket, 7 pin, miniature, wafer
503610	10 megohm, $\pm 10\%$, $1/2$ watt (R20)	75566	Transformer-Power transformer, 117 volt, 60
77303	Shaft-Extension shaft for function switch		cycle (TIUI)
73584	Sheld-Tube shield for V1, V6		SPEAKER ASSEMBLIES
75192	Shield—Tube shield for V2 Slide—Slide mechanism (2 req'd)		82509-12W RMA-274
31364 74179	Socket—Dial lamp socket Socket—Tube socket, 7 contact, miniature, wafer	75682	Cone-Cone and voice coil (3.2 ohms)
73117	for V1, V3, V4, V5 Socket—Tube socket, 7 contact, miniature, wafer	76093	Speaker-12" P.M. speaker complete with cone and voice coil (3.2 ohms)
77306	Socket—Tube socket, 7 pin, moulded, saddle- mounted for V2		does not agree with above speaker number, order replacement parts by referring to model number
77312 76332	Spring—Actuating spring for bottom cover latch Spring—Drive cord spring		of instrument, number stamped on speaker and full description of part required.
75563	Spring—Retaining spring for function switch ex- tension shaft		MISCELLANEOUS
77304	stop pin Support-Polystyrene support for FM oscillator	77332	Antenna—Antenna loop—less cable Antenna—F.M. antenna
77307	coil complete with mounting bracket Switch-Function switch (S1)	77327	Back—Back—light brown—for chassis and changer rollout assembly for blonde mahogany instru-
75559	Transformer—1st. I.F. transformer—FM—complete with adjustable cores (T1)	77326	ments Back—Back—maroon—for chassis and changer
75558	Transformer-1st. 1.F. transformer-AM-complete with adjustable cores (T2)	77007	rollout assembly for mahogany or walnut instruments
76528	plete with adjustable cores (T4)	77325	Back—Cabinet back Board—Antenna terminal board
10000	plete with adjustable cores (T3)	71599 72437	Bracket—Pilot lamp bracket Cable—Shielded pickup cable complete with pin
22726	with adjustable core (T5)	13103	plug Cap—Pilot lamp cap (Jewel)
33120	drive cord pulley	X3222	Catch—Bullet catch and strike for cabinet doors Cloth—Grille cloth for blonde mahogany instru- ments
77319	ROLLOUT MECHANISM ASSEMBLIES Bracket—Dial lamp.socket bracket—I. H	X3130	Cloth—Grille cloth for mahogany or walnut instruments
77318 77320	Bracket—Dial lamp socket bracket—R.H. Dial—Polystyrene dial scale	30870	Connector-2 contact male connector for record changer power cable
77321 77317	Escutcheon—Dial scale escutcheon less dial Frame—Plastic mounting frame—light brown—for	74882	Connector—2 contact male connector for antenna loop cable
	chassis and record changer for blonde ma- hogany instruments	74752	Connector—2 contact male connector for antenna lead
77316	Frame—Plastic mounting frame—maroon—for chas- sis and record changer for mahogany or walnut	71984 74273	Decal—''RCA Victor'' decal Decal—''Victrola'' decal
77322	instruments Pointer—Station selector pointer	37396 74308	Grommet-Rubber grommet for speaker mounting Hinge-Cabinet door hinge (1 set)
	AMPLIFIER ASSEMBLIES	77331 77328	Knob-Function switch knob-maroon Knob-Function switch knob-tan Knob-Tuning control, tone control or volume con-
77324	Capacitor—Electrolytic comprising 1 section of 30	77329	trol and power switch knob—maroon Knob—Tuning control, tone control or volume con-
	mfd., 450 volts, 1 section of 30 mfd., 350 volts and 1 section of 40 mfd., 25 volts (C101A,	11765	trol and power switch knob—tan Lamp—Pilot lamp—Mazda 51
75643	CIOIB, CIOIC) Capacitor—Tubular, paper, oil impregnated, .001	73634 77335	Nut—Speed nut for speaker mounting screws Plate—Back plate for lower door pull (2 req'd)
73789	mtd., 1000 volts (C103, C104) Capacitor-Tubular, paper, .0068 mfd., 400 volts	77334 77333	Pull-Cabinet door pull-lower (2 req'd) Pull-Cabinet door pull-upper-(4 req'd)
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts	75623	Screw-#8-32 x %" trimit head screw tor upper door pull
72583	Cable—Shielded audio cable complete with pin	74113	Screw-#8-32 x 1" trimit head screw for lower door pull
75064	Connector –9 contact female connector for power input cable (P101)	75902 72936	Spring—Spring clip for knobs Spring—Suspension spring for main cable Stop—Cabinet door stop
			F

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



FOR RECORD CHANGER SERVICE INFORMA-TION—REFER TO 930409 SERIES SERVICE DATA.

RCA VICTOR

Radio Phonograph Combination

Model 2US7

Chassis No. RC-1117A, RC-1117C

SERVICE DATA

PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

SPECIFICATIONS

Tuning Range	 540 - 1600 kc.
Intermediate Frequency	 455 kc.

Tube Complement

1.	RCA	12BE6 .	 		Converter
2.	RCA	12BA6	 		I.F. Amplifier
3.	RCA	6AQ6 .	 	Detect	or-A.F. Amplifier
4.	RCA	6AQ6 .	 		Phase Inverter
5.	RCA	35C5	 		
6.	RCA	35C5	 	{	rush rull Output

A selenium rectifier Stock #76871 is used.

Power Supply Rating

Dial Lamps (2) Mazda type 51, 6-8 volts, 0.2 amp.



Record Changer Controls

Loudspeaker		
Size and type Voice coil impe	dance	
Power Output		
Undistorted Maximum		
Cabinet Dimensi	ons	
Height 10"	Width 1634"	Depth 20¾"
Tuning Drive Ra	tio 14¼:1 (7 ¹	/s turns of knob)
Record Changer	(930409-5, -10 or -)	11)
Turntable speed		з, 45 оѓ 78 г.р.т.
Record capacity	up to fourteen 7 in	nch RCA type
	or twelve 10 inch	
	or ten 12 inch	12 in intermixed
Pickup (Stock No	o. 75475) Crystal with	replaceable styli.
Weight		26 lbg not

RECORD CHANGER CONTROLS

The record changer has a dual control on the motorboard and a stylus selector control on the pickup arm. The inner control (circular knob) is the OFF-ON-REJECT control. Turning this knob to the center position energizes the motor and starts the turntable, when turned to the right (clockwise) it starts the mechanism into complete automatic operation. The mechanism will shut off automatically after the last record has been played but can be shut off manually by turning this knob to the left (counter-clockwise).

The outer control (double ended lever) is the speed control. It has three normal positions, "33", "45", "78" to select the turntable speed desired and a neutral position (midway between "45" and "78"). The control should be turned to this neutral position if the changer is not expected to be in use for an extended period of time. The stylus control has two normal positions (right and

The stylus control has two normal positions (right and left) and one shipping position (lever pointing up). When playing 33¹/₃ or 45 r.p.m. records the lever is turned so that "33-45" is visible on the TOP of the lever; likewise for 78 r.p.m. records "78" should be visible on the TOP.

The removable centerpost is for use with 45 r.p.m. records having the large centerhole. It must be placed over the center spindle with the "RCA" trademark monogram FAC-ING to the FRONT. When not in use it is placed in a well at the front of the motorboard.

To load or remove records, the record stabilizer is lifted and turned off-side. After loading it is turned to the center where it rests on top of the stack of records.



Service Hints

All tubes, except the 12BE6, are accessible for testing by lifting up one side of the cabinet and removing the tubes from the rear chassis apron. To service the 12BE6 tube and the pilot lights, remove the four wood screws holding the sloping panel at the front of the record changer compartment. This panel also holds the loop antenna.

To remove the radio chassis for service, first remove the push-on type knobs. Secure the record changer pickup arm to the center post and rest the cabinet on its side. Remove loop antenna connections, and pickup arm audio plug. Hook-on connectors are used to connect a.c. power from the radio chassis to the phono motor. These connectors are covered by taped-over black insulating sleeves located in one corner of the cabinet. Push back sleeves and unhook. Remove the four flat-head wood screws holding the chassis mounting board to the bottom of the cabinet. Slide chassis out of cabinet, then remove the three ¹/₄ inch hex head self-tapping screws holding the chassis to the panel.



Dial Cord Layout

Alignment Procedure

Output Meter.—Connect meter across speaker voice coil. Turn volume control to maximum.

Test Oscillator.—Connect low side of test oscillator to common wiring in series with a .1 mf. capacitor. If the test oscillator is a.c. operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common wiring at the electrolytic capacitor. Keep the oscillator output low fo prevent a-v-c action.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the fol- lowing for max. output		
1	I.F. grid, in series with .1 mfd.	455.1	Quiet point	Pri. & Sec. 2nd I.F. transformer		
2	Converter grid in series with .1 mfd.	455 kc	end of dial	Pri. & Sec. 1st I.F. transformer		
NOTE.—ANTENNA LOOP AND RECORD CHANGER MUST BE IN CABINET FOR THE FOLLOWING						
3	Short wire	1,620 kc	Extreme R. H. end (gang open)	ClB-T (osc.)		
4	placea near					
	loop tor	1,400 kc	1,400 kc	C5 (ant.)		
5	loop for radiated signal	1,400 kc	1,400 kc 600 kc Signal	C5 (ant.) L3 (Rock Gang)		

Critical Lead Dress

- Dress C15 (.022 mfd. at grid of phase inverter) over tube socket away from filament leads.
- 2. Keep all filament leads close to chassis.
- Keep leads of R26 (270 ohms at I-F amplifier cathode) short as possible.
- Connect outside foil of all capacitors as indicated in schematic diagram.
- 5. Dress output plate bypasses, C19 and C20, as near chassis as possible.

Dial Pointer Adjustment.—Rotate tuning condenser fully counterclockwise (plates fully meshed). Adjust indicator pointer so that it is $3^{15}\%_{16}$ " from the left hand edge of the dial back plate.



Tube and Trimmer Locations



REPLACEMENT PARTS T

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STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES	503356	56,000 ohms, ±10%, ½ watt, R10
R0008	RCIII7A, RCIII7C	503412	120,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R7
76867	drive drum. CIA, CIB	504422	$220,000 \text{ ohms}, \pm 20\%, \frac{1}{2} \text{ watt, RI, RI3, RI4}$
93603	Capacitor—Ceramic, 56 mmf., C9	503439	$390,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt, R8}$
77116	Capacitor—Ceramic, 56 mmf., C4	503447	470,000 ohms, ±10%, ½ watt, R16
76347	Capacitor—Ceramic, 120 mmf., C13	504447	470,000 ohms, ±20%, ½ watt, R18
76872	Capacitor—Adjustable trimmer, 2.5—30 mmf., C5	503515	1.5 megohm, $\pm 10\%$, $\frac{1}{2}$ watt, R9
73013	Capacitor—Electrolytic comprising 1 section of 80	504533	3.3 megohm, \pm 20%, $\frac{1}{2}$ watt, R5
	and 1 section of 10 mfd., 150 volts, C17A, C17B,	504610	10 megohm, ±20%, ½ watt, R12, R15
	C17C	76869	Shaft—Tuning knob shaft
73851	Capacitor—Tubular, paper, .0018 mfd., 1600 volts,	74607	Shield—lube shield for VI, VZ, V3
72505	Canasitan Tubular paper 0022 mtd 600 volts C7	51955	Socket_Tube socket 7 pin minigture moulded
73795	Capacitor—Tubular paper 0033 mfd 400 volts	51555	saddle-mounted
/3/33	Cl2	77115	Socket—Tube socket, 7 pin, miniature, moulded
73920	Capacitor—Tubular, paper, .0047 mfd., 600 volts,	76368	Spring—Drive cord spring
	C10	76873	Switch—Function switch less volume control, S1
73788	Capacitor—Tubular, paper, .0056 mtd., 400 volts, Cl4	77113	Terminal—Phono lead assembly terminal (knife) disconnect type)
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts, C16, C19, C20	74918	Transformer—First I.F. transformer complete with adjustable cores, Tl
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts, C11, C15	73037	Transformer—Second I.F. transformer complete with adjustable cores, T2
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts, C2, C3, C6	77122 33726	Transformer—Output transformer, T3 Washer—``C'' washer for tuning knob shaft (2 reg'd)
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts, C18		SPEAKER ASSEMBLIES
76866	Coil—Oscillator coil without adjustable core L2, L3	76875	Speaker—5" x 7" P.M. speaker complete with cone and voice coil (3.2 ohms)
78586	Coil—Oscillator coil with adjustable core L2, L3		MISCELLANEOUS
74192	Connector—3 contact male connector for shielded pickup cable, Pl	76876	Back—Cabinet back and antenna loop assembly (L1)
77114	Connector—Single contact male connector for loop lead	77350	Cable—Cable and Capacitor assembly (includes C21) (For RC1117A only)
76874	Control—Volume control, R11	74273	Decal-Victrola decal
72953	Cord—250' Drive Cord Reel (approx. 54'' required)	708//	Dial-Polystyrene dial scale
70392	Cord—Power cord and plug	74225	Emblem RCA Vicior emblem
74838	Grommet—Power cord strain relief (1 set)	76878	Escutcheon—Function switch escutcheon
12203	ing capacitor (3 reg'd)	76879	Escutcheon—Tuning control escutcheon
11765	Lamp—Dial lamp—Mazda 51	76895	Foot-Rubber foot (4 req'd)
28452	Plate-Bakelite mounting plate for electrolytic	72692	Hinge—Cabinet lid hinge
76865	Plate—Dial back plate complete with three (3)	76882	Knob—Function switch knob—light gray
70000	pulleys less dial	76881	Knob—Tuning control knob—(inner) light gray
76971	Pointer-Station selector pointer	76883	Knob—Tuning control knob (outer)—light gray
73038	Besistor-Wire wound 66 ohms 5 watts R22	71005	Nut Speed put to fraten dial capitabeen
73072	Resistor—Normal value, 95 ohms, @ 38°C with neartive temperature coefficient R23	72765	Nut—Speed nut to fasten function switch or tuning
	Resistor—Fixed, composition:	76894	Nut-#10-32 spring nut for mounting stud
503082	82 ohms, ±10%, ½ watt, R19	30330	Spring—Retaining spring for volume control knob
503127	270 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R6	14270	Spring—Retaining spring for tuning control or func-
513212	1200 ohms, = 10%, 1 watt, K21		tion switch knobs
503218	$12000 \text{ onms} \pm 10\%$, $72 \text{ wall, } R20$	1 19883	Stud=#10-32 x 1%" special stud to mount changer in cabinet (2 rea'd)
503339	$39.000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt. R2}$	71824	Stud—Stud and screw (1 set) for cabinet lid hinge
503347	47,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt, R4	77221	Support—Lid Support

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

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Model 2X61 Maroon M

Model 2X62 Ivory

RCA	VICTOR
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AC-DC Radio Receiver

Models 2X61, 2X62 Chassis No. RC-1080C RC-1080D SERVICE DATA - 1952 No. 9 --

PREPARED BY RCA SERVICE CO., INC. FOR

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

SPECIFICATIONS

Tuning Range	Dial L
Intermediate Frequency	Louds
Tube Complement	Voic
(1) RCA 12SK7 R.F. Amplifier (2) RCA 12SA7 Converter (3) RCA 12SK7 I.F. Amplifier (4) RCA 12SQ7 DetA.V.CA.F. Amp. (5) RCA 35L6GT Output (6) RCA 35Z5GT Rectifier	Power Undi Max Tuning Weigh
Power Supply Rating 115 volts d. c. or 50 to 60 cycles a. c	Cabin Heig

Dial Lamp
Size and type
Power Output Undistorted
Funing Drive Ratio
Weight
Cabinet Dimensions Height8% Width11¾ Depth7½

REPLACEMENT PARTS

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
No. 77143 77144 77143 77144 77143 77144 77145 39042 71924 73501 73473 74662 73595 73595 73593 73551 735787 75474 38410 72953 73693 73693 77142 72602 514033	CHASSIS ASSEMBLIES RC 1080C—Model 2X61 RC 1080D—Model 2X62 Antenna—Antenna loop and back cover assembly— maroon—for Model 2X61 Antenna—Antenna loop and back cover assembly— ivory—for Model 2X62 Back—Cabinet back cover and antenna loop assembly —maroon—for Model 2X61 Capacitor—Variable tuning capacitor complete with drive drum, Cl, C2, C3, C4, C5, C6 Capacitor—Ceramic, 47 mmi., C8 Capacitor—Ceramic, 150 mmi., C12, C13 Capacitor—Ceramic, 56 mmi., C20 Capacitor—Ceramic, 70 mmi., C20 Capacitor—Ceramic, 70 mmi., C20 Capacitor—Tubular, paper, .0022 mid., 600 volts, C14 Capacitor—Tubular, paper, .0022 mid., 600 volts, C14 Capacitor—Tubular, paper, .0022 mid., 600 volts, C16 Capacitor—Tubular, paper, .015 mid., 400 volts, C17, C18 Capacitor—Tubular, paper, 0.1 mid., 400 volts, C17, C18 Capacitor—Tubular, paper, 0.2 mid., 400 volts, C21 Clip—Mounting clip for 1.F. transformer Coin—Cscillator coil complete with adjustable cores, L3, L4 Coin—R.F. coil complete with adjustable cores, L1, L2 Connector—Phower cord and plug Grommet—Power cord and plug Grommet—Power cord strain relief (1 set) Grommet—Rubber grommet for mounting tuning capa- citor—Station selector pointer Puiley—Drive cord pulley Resistor—Fixed, composition:— Based and selector pointer Puiley—Drive cord pulley	x40. 503112 503118 503127 513212 503312 503322 503356 503447 503547 74691 74697 74691 74693 76368 33634 73036 73037 73976 35969 76391 Y2445 Y2445 Y2445 7146 72643 71116 74301 30900	120 ohms, ±10%, ½ watt, R4, R11 180 ohms, ±10%, ½ watt, R1 120 ohms, ±10%, ½ watt, R2 12,000 ohms, ±10%, ½ watt, R3 56,000 ohms, ±10%, ½ watt, R1 22,000 ohms, ±10%, ½ watt, R1 22,000 ohms, ±10%, ½ watt, R1 22 megohm, ±10%, ½ watt, R1 2.2 megohm, ±10%, ½ watt, R1 2.4 megohm, ±10%, ½ watt, R1 56,000 ohms, ±10%, ½ watt, R1 2.5 megohm, ±10%, ½ watt, R1 50 kott-Tuning knob shaft Socket-Dial lamp socket Spring-Drive cord spring Switch-"Radio-Phono" switch, S2 Transformer-First I.F. transformer complete with adjustable cores, T1 Transformer-Output transformer, T3 Washer-"C" washer for tuning knob shaft SPEAKER ASSEMBLIES 971495-3 Speaker-4" P.M. speaker complete with cone and voice coil (3.2 ohms) MISCELLANEOUS Cabinet-Plastic cabinet-maroon-complete with dial escutcheon for Model 2X61 Cabinet-Plastic cabinet-maroon-for Model 2X61 Cabinet-Plastic cabinet ivory - complete with dial escutcheon pi al amp-Mazad 1490

† Stock No. 72953 is a reel containing 250 feet of cord.

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

NOTE.—If reception is not obtained on d. c. operation, reverse plug in outlet receptacle. On a. c. operation this may reduce hum.

The position of the speaker is adjustable; the correct position is indicated on the illustration "Tube and Trimmer Locations."

ALIGNMENT PROCEDURE

Cathode Ray Alignment is the preferable method. Connections for the oscilloscope are shown on the schematic diagram.

Output Meter Alignment.—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

Test Oscillator.—Connect low side of fest oscillator to common wiring in series with α .l mf. capacitor. If the test oscillator is α .c. operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common wiring at the electrolytic capacitor. Keep the oscillator output low to prevent α -v-c action.

Step	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output							
1	Pin No. 4 of 12SK7 (V3 I.F.)	455 kc	Quiet point	Top and bottom cores of T2							
2	Pin No. 8 of 12SA7 (V2 conv.)		near 600 kc	Top and bottom cores of Tl							
3		1620 kc	Gang open	C6 Osc.							
4		1400 kc	1400 kc 1400 kc C signal C								
E	"External Antenna"	Shunt C5 with 22,000 ohm resistor									
J	100 mmf. capacitor	600 kc	600 kc	L4 Osc. (Rock gang)							
6		Remove	22,000 ohm re	sistor from C5							
		600 kc	600 kc	L2 R.F.							
7		Repeat steps 4, 5 and 6									

The position of the loop antenna in relation to the chassis affects adjustment of C4. The correct position is indicated on the illustration "Tube and Trimmer Locations."



Dial Indicator and Drive Mechanism



Tube and Trimmer Locations



Schematic Diagram





AC-DC Radio Receiver

MODEL 2-X-621

Chassis No. RC-1085B

SERVICE DATA

- 1952 No. 11-

PREPARED BY RCA SERVICE CO., INC. FOR

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

Specifications

Tuning Ranges

Standard Bro Short Wave (oadcast ("A (" C " Band).	 B:	a 13	1d)	• •			 ļ		5.	8)- -1	160)()) 1	ko 110
Intermediate	Frequency					i.	•	,			• •			4	55	ko
m.1 01.																

Tube Complement

(1)	RCA	12BA6 R. F. Amplifier
(2)	RCA	12BE6 Converter
(3)	RCA	12BA6I. F. Amplifier
(4)	RCA	12SQ7 Det A.F A.V.C.
(5)	RCA	35L6GTOutput
(6)	RCA	35Z5Rectifier
Dial	Lamp	2 Type 1490, 3.2 volts, 0.15 amp.

Power Supply Rating

Operating Instructions

Radio-Turn power on with POWER-VOLUME control and set about half-way for volume. Set the FUNC-TION Control for the type of program desired and allow 30 to 40 second warm-up period when the dial will be fully illuminated.

Tune in desired station with TUNING Control making slow and careful setting in conjunction with volume control for Short Wave reception. Make final setting of VOLUME control to suit requirements.



Loop Antenna Leads

Loudspeaker

Type	971495-9W	 						,							•				, ²	4	ir	L	P	. N	1.	
VC	Impedance								1	3	2	0	h	11	n	s	-	a t	2	1(0	c	v	·le	s	

Power Output

Indistorted	0.85 watts
Maximum	1.2 watts
Weight	8 lbs.

Cabinet Dimensions

Width ... 113/4 in. Height ... 85% in. Depth...71/2 in.

NOTE: If reception is not obtained on DC, reverse plug in outlet receptacle. This may also reduce hum on AC operation.

Phonograph Operation-Plug in record changer attachment to phono socket on lower chassis apron. Set FUNC-TION switch to "PH" (phono) position. Adjust VOL-UME control for listening requirements.


44 2-X-621



Tube and Trimmer Locations



Dial Indicator and Drive Mechanism

ALIGNMENT PROCEDURE

Steps	Connect the High Side of The Test Osc. to—	Tune Test Osc. to	Range Switch to-	Turn Radio Dial to—	Adjust for maximum output	
1	Pin No. 1 of 12BA6 I.F. amp. tube in series with 0.1 mfd.		"A"	Quiet Point near 1600 kc.	Top and bottom T2 2nd I.F. Trans.	
2	Pin No. 7 of 12BE6 Converter tube in series with 0.1 mfd.	455 kc.			*Top and bottom T1 1st I.F. Trans.	
3	Pin No. 1 of 12BA6 R.F. tube in series with 0.1 mfd.				L2 wave trap for minimum output.	
4		1620 kc.	"A"	1620 kc. (Cap. min.)	C-13 "A" Osc.	
5	(Radiated signal) short piece of wire placed near ant.	1400 kc.		1400 kc.	C-2 "A" ant.	
6		600 kc.		600 kc.	L6 "A" Osc. Rocking gang.	
7	Repeat steps 4, 5 and 6.					
8	Center terminal on loop antenna	18.2 mc.		18.2 mc. (Min. cap.)	**C-12 "C" Osc.	
9	Term. board through 47 mfd. Low side to loop primary terminal	15.2 mc.	"C"	15.2 mc.	***†C-3 "C" Ant.	
10		6.1 mc.		6.1 mc.	++L-5 "C" Osc. L-1 "C" Ant.	
11	Re	peat steps 8, 9, and	10 as necessary.			

*Use 18K resistor across primary when aligning secondary, across secondary when aligning primary.

**Two peaks should be found, use one having lowest capacity.

***Two peaks should be found, use one having highest capacity. Note: Check for image frequences.

 \dagger Radio dial tuned to 15.2 mc. as in step 9, tune test osc. to 16.11 mc. where a weaker signal should be heard.

 $\dagger\dagger Radio$ dial tuned to 6.1 mc. as in step 10, tune test osc. to 7.01 mc. where a weaker signal should be heard.

Test Oscillator—Connect low side of test oscillator to common wiring in series with a .1 mf. capacitor. If the test oscillator is a. c. operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common wiring at the electrolytic capacitor. Keep the oscillator output low to prevent a-v-c action.

Output Meter Alignment—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.



Dial Scale Actual Size

CRITICAL LEAD DRESS

- Dress all heater leads and pilot light leads down to chassis and away from all audio grid and plate wiring. Dress all exposed leads away from each other and away from chassis to prevent short circuits. Leads to loop antenna are long and draped to permit Ι.
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- tube servicing by lowering loop back. They should be evenly spaced to maintain low capacity and dressed to prevent touching gang plates. All R.F. leads to coils should be short and direct. Dress other leads and components away from coils.

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Schematic Diagram-Chassis RC1085B

Replacement Parts

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLIES	514033	Resistor—Fixed, composition:— 33 ohms, ±20%, 1 watt
	NO-1000D	503082	$82 \text{ onms}, \pm 10\%, \frac{1}{2} \text{ watt}$
77217	Antenna—Antenna loop and back cover—marcon	503112	$120 \text{ ohms}, \pm 10\%, 72 \text{ wdt}$
77217	Back—Cabinet back cover and antenna loop assembly	503127	$270 \text{ ohms} \pm 10\%$ $\frac{1}{2} \text{ watt}$
	-maroon	503127	$560 \text{ ohms} \pm 10\% \frac{1}{2} \text{ watt}$
71042	Button—Plug button for trimmer adjustment hole	503210	$1000 \text{ ohms} \pm 10\%$ $\frac{1}{2}$ watt B2 B17
77216	Capacitor-Variable tuning capacitor complete with	513212	$1200 \text{ ohms} \pm 10\%$] watt R13
	drive drum	503333	$33,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}$
74924	Capacitor—Mica trimmer, dual 3-35 mmtC3, C12	503356	$56,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}$
74923	Capacitor—Mica trimmer, 4-70 mmf.	503410	$100.000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}$ R21
71924	Capacitor—Ceramic, 56 mmi.	503422	220,000 ohms, ±10%, ½ watt
/3501	Capacitor—Ceramic, 150 mmi.	503447	470,000 ohms, ±10%, ½ watt
30031	Capacitor—Mica, 620 mmi.	504522	2.2 megohm, ±20%, ½ watt
39003	Capacitor—Mica, 3000 mini.	504547	4.7 megohm, ±20%, ½ watt
70210	Capacitor Electrolytic comprising L section of 30 mfd	74922	Shaft—Tuning knob shaft
/2312	150 volts and 1 soction of 80 mfd 150 volts	74697	Socket—Dial lamp socket
	Cl7A, Cl7B	73117	Socket—Tube socket, 7 pin, miniature for V1, V2, V3
73595	Capacitor—Tubular, paper, .0022 mfd., 600 voltsC15	54414	Socket—Tube socket, octal, saddle-mounted for V4, V5,
73561	Capacitor—Tubular, paper, .01 mfd., 400 voltsC22		V6
73797	Capacitor—Tubular, paper, .015 mfd., 600 voltsC16	76368	Spring—Drive cord spring
73562	Capacitor—Tubular, paper, .022 mfd., 400 voltsC20	74921	Switch—Selector switch
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts C7, C8, C19	74918	justable cores
73551	Capacitor—Tubular, paper, 0.1 mfd., 400 voltsC18	73037	Transformer—Second I.F. transformer complete with
73794	Capacitor—Tubular, paper, 0.22 mfd., 400 voltsC24	72076	Transformer Output transformer T3
73935	Clip—Mounting clip for I.F. transformer	35969	Washer_"C" washer for tuning knob shaft
74927	Coil—Antenna coil—''C'' band	33303	wusher - C wusher for furning knob shuft
74925	Coil—Oscillator coil—``A`` band—complete with adjust- able coreL6		SPEAKER ASSEMBLIES
74926	Coil—Oscillator coil—"C" band—complete with adjust-		571-50-511
74020	$ \begin{array}{c} \alpha \text{ ble core} \\ C \text{il } \text{ Deriv} \text{ il } (10 \text{ mult}) \\ \end{array} $	77218	Speaker—4" P.M. speaker complete with cone and
74930	Coil—Pecking coil (12 mun.)		Voice con (3.2 onnis)
74928	Coil—Series wavetrap coil (455 KC) complete with ad-		MISCELLANEOUS
35707	Connector_Phone input connector II	Y2447	Cabinet—Plastic cabinet—maroon—complete with dial
33/0/	Connector—Finale contact male connector for output	77000	escutcheon
/ 34/4	transformer leads (2 reg'd.)	77220	Dial-Polystyrene dial scale
38410	Control-Volume control and power switch	75761	Grommet Bubber grommet for mounting speaker (A
72953	Cord—250' Drive Cord Reel (approx. 50'' req'd.)	73701	reg'd.)
70392	Cord-Power cord and plug	77219	Knob-Selector switch knob-maroon
74838	Grommet—Power cord strain relief (1 set)	74931	Knob—Tuning control or volume control and power
33139	Grommet—Rubber grommet for chassis base		switch knob-maroon
16058	Grommet—Rubber grommet for mounting tuning ca-	71116	Lamp—Dial lamp—Mazda 1490
	pacitor	74301	Screw—#8 x 3/8" cross recessed binder head screw for
70980	Lead—Antenna lead—"C" band	20000	mounting dial
77142	Pointer—Station selector pointer	20200	ppring—netaining spring for knobs

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS





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Model 2-XF-91 "Forbes" Maroon **AM-FM Radio Receiver**

MODEL 2-XF-91

Chassis No. RC1121

SERVICE DATA

— 1952 No. 16 —

PREPARED BY RCA SERVICE CO., INC. FOR RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION

CAMDEN, N. J., U. S. A.

SPECIFICATIONS

POWER SUPPLY RATING

TUNING RANGE

Standard Broadcast (AM)	540-1600 kc
Frequency Modulation (FM)	
Intermediate Frequency (AM)	
Intermediate Frequency (FM)	10.7 mc

TUBE COMPLEMENT

(1)	RCA	6BJ6R.F. Amplifier
(2)	RCA	19X8 Mixer-Oscillator
(3)	RCA	12BA6I.F: Amplifier
(4)	RCA	12AU6FM I.F. Amplifier
(5)	RCA	12AU6FM I.F. Amplifier
(6)	RCA	12AL5F.M. Detector
(7)	RCA	12AV6 AM DetAVC-Audio
(8)	RCA	35C5 Audio Output
	RCA	Stock No. 77519Selenium Rectifier

CIRCUIT DESCRIPTION

This instrument, an AM-FM table radio, has eight tubes, plus selenium rectifier. Individual dials are provided for AM and FM bands. RF circuits, contained on a two tube sub-chassis, include RF amplification for both bands and a combination mixeroscillator circuit. The input circuit to the FM RF stage is broadbanded, and is tuned to the approximate FM band center at 100 mc. The mixer is pentode connected for AM operation; triode connected for FM operation. AM IF circuits use an IF amplifier and conventional diode detector with AVC. FM IF circuits include three IF amplifier stages and a discriminator detector. The two tube audio amplifier has an adjustable tone control circuit with combination bass and treble compensation. A hum-bucking circuit uses the tapped-winding output transformer. An inbuilt AM loop antenna, and line cord FM antenna, allow reception without the use of external antennas. A phono jack at the instrument rear permits the use of a record player attachment.



Radio Controls

AUDIO POWER OUTPUT
Undistorted
Maximum
TUNING DRIVE RATIO
NET WEIGHT
DIMENSIONS (Overall)
Height

OPERATING INSTRUCTIONS

RADIO — Turn OFF-VOLUME control about half-way in a clockwise direction to turn receiver ON and provide for medium VOLUME. Allow a short warm-up period. Set FUNCTION control at desired service — AM or FM. Rotate TUNING control to move the pointers to the desired AM or FM frequency. Do not touch the pointers themselves. Adjust VOLUME and TONE controls as desired.

PHONOGRAPH — Connect attachment to PHONO jack at instrument rear. Switch the FUNCTION control to "PH" position. Turn on receiver and adjust VOLUME and TONE controls as desired





Tube and Trimmer Locations

ALIGNMENT PROCEDURE

ALIGNMENT INDICATORS:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate maximum audio output during AM alignment. Connect the output meter across the speaker voice coil. The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio dutput or to measure AVC voltage. When audio output is being measured, the volume control should be turned to maximum. Adjust tone control to mid-position.

SIGNAL GENERATOR:

For all alignment operations, connect the low side of the signal generator to the receiver chassis. If output measurement is used for AM alignment, the output of the signal generator should be kept as low as possible to avoid AVC action.

If an FM sweep generator is used for FM alignment, adjust for 10.7 mc, 0.4 mc sweep. Connect oscilloscope across C26, adjusting discriminator T6 top core for 10.7 mc crossover, and T6 bottom core for balanced peaks. Peak separation should be approximately 330 kc. When aligning the other FM tuned circuits, connect oscilloscope lead through a 220K resistor to pin 1 of V5. Follow alignment table sequence, adjusting for maximum gain and symmetrical curves.

Tube Socket Voltages

Tube Type	Tube	Pin			
Function	Element	No.	AM	FM	Phono
V1 6BJ6	Plate Screen	5	94	92	92
R.F. Amp.	Cathode Grid	2 1	0.7 -0.5	0.9	0.5 -0.6
V2 19X8	Plate	9	75	80	80
Mixer	Cathode Grid	6 7	0 -1.6	0 -2.3	0 -2.3
Osc.	Plate Grid	3 2	85 3.3	85.6 -3	74 -0.3
V3 12BA6	Plate Screen	5	94 94	92	90
I.F. Amp.	Cathode Grid	7 1	0.8 0.4	0.9	0.8 -0.2
V4 12AU6	Plate	5	95	93.5	92
2nd I.F.	Cathode	7	0.8	0.8	0.8
Amp. (F.M.)	Grid	1	0	0	0
3rd LF	Screen	5 6	74 74	73	72 72
Amp. (F.M.)	Cathode Grid	7 1	0.3	0.3 ·	0.4
V6 12AL5	Plate	2		****	
F.M. Det.	Cathode Plate Cathode	5 7 1	_		=
V7 12AV6 A M Det	Plate	7	58	57	57
Audio Amp.	Plate (Diode)	5	-0.8 -0.5	-0.8 -0.3	-0.8 -0.3
V8 35C5 Audio	Plate Screen	7	130	130	130
Output	Cathode Grid	1 2-5	5.1	5.0	5.0



Dial and Drive Cord Drive

AM Alignment FUNCTION SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 1 of V3 in series with .01 mfd.	455 kc.	Quiet point	T4 bottom core (sec.) T4 top core (pri.)
2	Tap lug 4 on AM RF coil	(mod.)	freq. end	T2 bottom core (sec.) T2 top core (pri.)
3		1620 kc. (mod.)	1620 kc.	C1A-T (osc.)
4	Short wire	1400 kc. (mod.)	1400 kc.	C37 (ant.) C1C-T (rf.)
5	placed near loop for radiated signal	600 kc. (mod.)	600 kc.	L6 (osc.) with 10,000 ohm resistor from C1C RF stator to gnd. (rocking gang)
6				L4 (RF) with the 10,000 ohms removed
7	Repeat steps 4, 5 and 6 until maximum gain is obtained			

FM Alignment FUNCTION SWITCH IN FM POSITION—VOLUME CONTROL MINIMUM—TONE CONTROL CENTER

			++	
Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Pin No. 1 of V5-12AU6			T6 top core for zero d.c. (across C26) T6 bottom core for maximum d.c. (junction of R24 and R25)
2	Pin No. 1 of V4-12AU6	Quiet point at 10.7 mc. low +T5 top con		†T5 top core
3	Pin No. 1 of V3-12BA6		end	T3 top core †*T3 bottom core
4	C1D Stator			Tl top core †*Tl bottom core
5		90 mc.	90 mc.	†FM osc. L8
6		106 mc.	106 mc.	†FM R.F. C1D-T
7	r M Ant. terminals thru 270	90 mc.	90 mc.	†FM R.F. L2
8	ohm resistor	Repeat s	steps 6 and 7 until maximum gain is obtained	
9		100 mc.	100 mc.	†FM Ant. coil L5

*If necessary for accurate peaking, the winding in the same transformer not being peaked should be loaded with a 680 ohm resistor. †Connect VoltOhmyst to pin 1 of V5 through a 220K isolating resistor with 1/4 inch maximum exposed lead at grid terminal end. Output adjusted for 1 volt d.c. Dress VoltOhmyst lead away from input circuits.

Oscillator frequency is above signal frequency on both AM and FM

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Rectifier output should be approximately 139 volts, 70 ma.

Schematic Circuit Diagram-Chassis No. RC1121



3

CRITICAL LEAD DRESS

- Dress C28 down on chassis and against terminal board. Run filament lead between V5 and V6 on side of V6 socket œ.
- opposite C28. All ceramic button 4700 uuf condensers should have leads .

All FM IF Transformer grid and plate leads should be short and direct as possible and kept low, near chassis. C26 leads should be kept as short as possible. C32 leads should be kept as short as possible. T82 and R25 leads should be kept as short as possible on T6 terminol 6 side. C27 should ground in hole near terminal 5 of V6 with short

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i.

AM oscillator coil should not be tilted over toward function switch when wrapping short bus leads to switch.
 Keep leads V5 pin 5, to T6 term 1, as short as possible and

leads.

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low near chassis

- as short as possible. Green lead from AM oscillator stator gang terminal to AM oscillator coil should be dressed against front of shield box ю.
 - away and up above filament choke. RF plate choke L1, should be dressed at least $y_{6''}$ from AM R.F. coil L4 and at least $y_{6''}$ from shield. Ξ.
- Mixer grid condenser C7 should be dressed away from FM oscillator gang stator terminal and away from leads con-12.
- 18. 17. necting to terminals 8 and 9 of V2 socket.
- Filament chokes L10 and L11 should be raised a minimum of $1/16^{\prime\prime}$ above chassis. 13.
- end Use varnished tubing only on choke and coupling cond. Condenser C2 should have lead on antenna terminal leads coming through shield partition slot. 14. 15.
 - not more than 3/16" long to prevent possible contact of lead or body to "Hot" chassis. 16.
 - Condensers C3 and C35 should use varnished tubing, not
- vinyl, to prevent breakthrough crossing chassis edge. Oscillator grid condenser C17 should have short leads and be dressed away from filament choke L10.
- Leads from loop terminal to chassis terminal board should have a minimum of three twists.

2-XF-91

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Simplified Schematic—"AM" Position



2-XF-91

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2-XF-91

REPLACEMENT PARTS

STOCK No.	PART DESCRIPTION	STOCK No.	PART DESCRIPTION
	CHASSIS ASSEMBLIES RC1121	77519 76346	Rectifier—Selenium rectifier, 100 MA (CR1) Resistor—Wire wound, 1200 ohms, 4 watts (R13)
77520	Bushing—Laminated bushing (5/8" long with shoul-	503022	Resistor—Fixed, composition: 22 ohms, ±10%, ½ watt (R27)
	der) for station selector pointer pulley and shall assembly.	503068	$68 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R16, R30)$
77522	Capacitor—Variable tuning capacitor (C1A, C1B,	503112	$120 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ wdtt} (R19, R21)$ 150 ohms, $\pm 10\%, \frac{1}{2} \text{ wdtt} (R12)$
70007	CIC, CID, CIE, CIA-T, CIC-T, CID-T)	503122	220 ohms, ±10%, ½ watt (R1, R17, R20)
/099/	+1 mmf., 500 yolts D.C. Temp. coef. = 0 (C2)	503227	2700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R4)
77530	Capacitor—Fixed, ceramic, non-insulated, 7 mmf.,	503282	$10.000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R31)$
22200	\pm .5 mmf., 500 volts D.C. Temp. coef. \equiv 80 (C15)	503318	18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3)
33380	$\pm 5\%$, 500 volts D.C. Temp. coef. = 0 (C6)	503347	$47,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R18)}$
77531	Capacitor-Fixed, ceramic, non-insulated, 47 mmf.,	503410	$100,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R15, R22, R26)$
77532	$\pm 10\%$, 500 volts D.C. Temp. coet. $\equiv 0$ (C17) Canacitor—Fixed ceramic non-insulated 130 mmf	503422	220,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R10)
11332	$\pm 2\frac{1}{2}$ %, 500 volts D.C. Temp. coef. = -750 (C18)	503447	$470,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (\text{R}11)$
39636	Capacitor—Fixed, mica, 220 mmf., 500 volts D.C. (C7)	503532	$3.9 \text{ megohm}, \pm 10\%, \frac{1}{2} \text{ watt (R2)}$
75792	Capacitor—Fixed, ceramic, insulated, 330 mmf.,	503547	4.7 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R8)
76992	$\pm 20\%$, 500 volts D.C. high K (C9) Canacitor—Fixed mica, 470 mmf., 300 volts D.C.	77527	Shaft—Tuning knob shaft
10002	(C26, C31)	75192	Shield—Tube shield for V1 Shield—Tube shield for V2
39644	Capacitor-Fixed, mica, 470 mmf., 500 volts D.C. (C3)	77087	Socket-Tube socket, 7 pin, miniature, moulded,
73473	Capacitor—Fixed, ceramic, 4700 mmt. , $+100\%$, -0% 500 volts D.C. High K disc (C5, C8, C19, C21,		saddle mounted for V1
	C22, C23, C24, C25, C29, C30, C36, C38, C39)	76336	Socket—Tube socket, 9 pin, miniature, moulded, saddle mounted for V2
73520	Capacitor—Electrolytic comprising 1 section of 80	73117	Socket—Tube socket, 7 pin, miniature, wafer for V3,
	(C33A, C33B)	01070	V4, V5, V6, V7, V8
77533	Capacitor—Fixed, miniature, tubular, paper, .001	31970	Spring—Dial cord spring Spring—Drive cord spring
	mfd., 200 volts D.C. (C27)	77524	Switch—Function switch (S1)
73920	volts (C12, C13, C28)	77517	Transformer—Output transformer (T7)
73561	Capacitor—Fixed, tubular, paper, .01 mfd., 400 volts	//511	with adjustable cores (T6)
73594	(C10) Canaciter—Fixed tubular paper 01 mfd 600 volts	76335	Transformer—First I.F. transformer—A.M.—complete
70004	(C14)	77514	with adjustable cores (12) Transformer—First LF, transformer—F.M.—complete
73562	Capacitor—Fixed, tubular, paper, .022 mfd., 400		with adjustable cores (T1)
73558	Capacitor—Fixed, tubular, paper, .047 mfd., 200 volts (C4)	76328	Transformer—Second I.F. transformer—A.M.—com- plete with adjustable cores (T4)
75071	Capacitor—Fixed, tubular, moulded, .047 mfd., 400 volts (C32)	77512	plete with adjustable cores (T3)
73551	Capacitor—Fixed, tubular, paper, 0.1 mfd., 400 volts (C35)	33726	with adjustable cores (T5) Washer_"C" washer for station selector pointer
73935	Clip-Mounting clip for I.F. transformers	00720	pulley and shaft or tuning knob shaft
77534	Coil—Choke coil (L1)	34373	Washer—"C" washer to fasten idler pulleys
77535	Coil—Choke coil (L9, L10, L11)		SPEAKER ASSEMBLIES
77526	Coil—Oscillator coil—A.M.—complete with adjust- able core (L6, L7)		971933-1
77537 77525	Coil—Oscillator coil—F.M. (L8) Coil—RF coil—A.M.—complete with adjustable core	77539	Speaker—5¼″ P.M. speaker complete with cone and voice coil (3.2 ohms)
77536	$\begin{array}{c} (L3, L4) \\ Coil-RF coil-F.M. (L2) \end{array}$		MISCELLANEOUS
77528	Connector-Combination phono input connector and	77543	Antenna—Antenna loop and back assembly com-
75474	antenna terminal board ()1) Connector—Single contact male connector for speaker lead	77543	plete with power cord (includes C37) Back—Cabinet back complete with loop, capacitor and power cord (includes C37)
77529	Connector—Two (2) contact male connector for power cord	Y2467	Cabinet—Marcon plastic cabinet less "RCA Victor" emblem and function decal
77516	Control—Tone control (R9)	77544	Capacitor—Adjustable, mica trimmer, 3-30 mmf.
77515	Control—Volume control and power switch (R7, S2) 250′ Dial Cord Reel—Dial cord (approx 49″ overall	77545	(C37) Cord—Power cord and plugs
	required)	.77542	Decal—Control function decal
77500	Drive cord (approx. 11" overall required)	77033	Emblem—"RCA Victor" emblem
//523	hub	77548	Knob—Tuning control, tone control or volume con-
16058	Grommet-Rubber grommet for mounting RF shelf		trol and power switch knob
77521	(4 required) Nut—Speednut for station selector pointer pulley	73203	Nut—Speednut to fasten "HCA Victor" emblem to cabinet.
72602	Pulley—Idler pulley for indicator cord (2 required)	77541	Pointer—Station selector pointer—A.M. Pointer—Station selector pointer—F.M.
77510	Pulley—Pulley and shaft (split) for station selector	73992	Retainer—Knob retainer (knob to cabinet)
	pointers	76837	Spring—Retaining spring for knobs (knob to shaft)

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



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The "Townley"

2-XF-933



AM-FM Radio Receiver

2-XF-931 SERIES

Chassis No. RC1121A

SERVICE DATA

- 1952 No. 17 -

PREPARED BY RCA SERVICE CO., INC. FOR **RADIO CORPORATION OF AMERICA** RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

SPECIFICATIONS

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M 121

Standard Broadcast (AN	1)	0-1600 kc
Frequency Modulation ()	FM)	8-108 mc
Intermediate Frequency	(AM)	455 kc
Intermediate Frequency	(FM)	. 10.7 mc

6170 16h - - - 0

2-XF-932

Ivory

2-XF-934 Red

2-XF-935

Beige

TUBE COMPLEMENT

(1) RCA 6BJ6
(2) RCA 19X8 Mixer-Oscillator
(3) RCA 12BA6I.F. Amplifier
(4) RCA 12AU6
(5) RCA 12AU6
(6) RCA 12AL5
(7) RCA 12AV6 AM DetAVC-Audio
(8) RCA 35C5 Audio Outpu
RCA Stock No. 77519Selenium Rectifier

CIRCUIT DESCRIPTION

This instrument, an AM-FM table radio, has eight tubes, plus selenium rectifier. Individual dials are provided for AM and FM bands. RF circuits, contained on a two tube sub-chassis, include RF amplification for both bands and a combination mixeroscillator circuit. The input circuit to the FM RF stage is broadbanded, and is tuned to the approximate FM band center at 100 mc. The mixer is pentode connected for AM operation; triode connected for FM operation. AM IF circuits use an IF amplifier and conventional diode detector with AVC. FM IF circuits include three IF amplifier stages and a discriminator detector. The two tube audio amplifier has an adjustable tone control circuit with combination bass and treble compensation. A hum-bucking circuit uses the tapped-winding output transformer. An inbuilt AM loop antenna, and line cord FM antenna, allow reception without the use of external antennas. A phono jack at the instrument rear permits the use of a record player attachment.



Radio Controls

POWER SUPPLY RATING CAUTION: DO NOT OPERATE ON D.C. DIAL LAMPS...... 2 No. 47, 6-8 volts, 0.15 amp. LOUDSPEAKER Size and Type ... 51/4" P.M. AUDIO POWER OUTPUT DIMENSIONS (Overall) Depth 73/4" Height..... 81/8" Width 139/16"

OPERATING INSTRUCTIONS

RADIO - Turn OFF-VOLUME control about half-way in a clockwise direction to turn receiver ON and provide for medium VOLUME. Allow a short warm-up period. Set FUNCTION con-trol at desired service — AM or FM. Rotate TUNING control to move the pointers to the desired AM or FM frequency. Adjust VOLUME and TONE controls as desired.

PHONOGRAPH — Connect attachment to PHONO jack at instrument rear. Switch the FUNCTION control to "PH" position. Turn on receiver and adjust VOLUME and TONE controls as desired.



Green

TUNING RANGE

2-XF-931

Maroon



Tube and Trimmer Locations

ALIGNMENT PROCEDURE

ALIGNMENT INDICATORS:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate maximum audio output during AM alignment. Connect the output meter across the speaker voice coil. The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure AVC voltage. When audio output is being measured, the volume control should be turned to maximum. Adjust tone control to mid-position.

SIGNAL GENERATOR:

For all alignment operations, connect the low side of the signal generator to the receiver chassis. If output measurement is used for AM alignment, the output of the signal generator should be kept as low as possible to avoid AVC action.

If an FM sweep generator is used for FM alignment, adjust for 10.7 mc, 0.4 mc sweep. Connect oscilloscope across C26, adjusting discriminator T6 top core for 10.7 mc crossover, and T6 bottom core for balanced peaks. Peak separation should be approximately 330 kc. When aligning the other FM tuned circuits, connect oscilloscope lead through a 220K resistor to pin 1 of V5. Follow alignment table sequence, adjusting for maximum gain and symmetrical curves.

Tube Type and Function	Tube Element	Pin No.	AM	FM	Phono
V1 6BJ6 R.F. Amp.	Plate Screen Cathode Grid	5 6 2 1	94 94 0.7 -0.5	92 92 0.9 0	92 92 0.5 0.6
V2 19X8 Mixer	Plate Screen Cathode Grid	9 8 6 7	75 75 0 –1.6	80 80 0 -2.3	80 80 0 -2.3
Osc.	Plate Grid	3	85 3.3	85.6 —3	74 -0.3
V3 12BA6 I.F. Amp.	Plate Screen Cathode Grid	5 6 7 1	94 94 0.8 0.4	92 92.3 0.9 -0.2	90 90 0.8 0.2
V4 12AU6 2nd I.F. Amp. (F.M.)	Plate Screen Cathode Grid	5 6 7 1	95 95 0.8 0	93.5 94.1 0.8 0	92 92 0.8 0
V5 12AU6 3rd I.F. Amp. (F.M.)	Plate Screen Cathode Grid	5 6 7 1	74 74 0.3 0.2	73 73 0.3 -0.4	72 72 0.4 -0.2
V6 12AL5 F.M. Det.	Plate Cathode Plate Cathode	2 5 7 1	1111		
V7 12AV6 A.M. Det. Audio Amp.	Plate Grid Plate (Diode)	7 1 5	58 -0.8 -0.5	57 -0.8 -0.3	57 -0.8 -0.3
V8 35C5 Audio Output	Plate Screen Cathode Grid	7 6 1 2-5	130 96 5.1	130 94.5 5.0	130 94.5 5.0

Tube Socket Voltages



Dial and Drive Cord Drive

AM Alignment FUNCTION SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 1 of V3 in series with .01 mfd.	455 kc.	Quiet point at high freq. end	T4 bottom core (sec.) T4 top core (pri.)
2	Tap lug 4 on AM RF coil	(mod.)		T2 bottom core (sec.) T2 top core (pri.)
3		1620 kc. (mod.)	1620 kc.	CIA-T (osc.)
4	Charle autor	1400 kc. (mod.)	1400 kc.	C37 (ant.) C1C-T (rf.)
5	placed near loop for radiated signal	600 kc. (mod.)	600 kc.	L6 (osc.) with 10,000 ohm resistor from C1C RF stator to gnd. (rocking gang)
6	-			L4 (RF) with the 10,000 ohms removed
7	Repeat steps 4, 5 and 6 until maximum gain is obtained			

FM Alignment FUNCTION SWITCH IN FM POSITION—VOLUME CONTROL MINIMUM—TONE CONTROL CENTER

	PHILTING.	In TOWN O	On The Old	
Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Pin No. 1 of V5-12AU6			T6 top core for zero d.c. (across C26) T6 bottom core for maximum d.c. (junction of R24 and R25)
2	Pin No. 1 of V4-12AU6	10.7 mc.	point at low	†T5 top core
3	Pin No. 1 of V3-12BA6	end training to the training the training the training the training training the training tra	end	T3 top core †*T3 bottom core
4	C1D Stator			T1 top core †*T1 bottom core
5		90 mc.	90 mc.	†FM osc. L8
6	1	106 mc.	106 mc.	†FM R.F. C1D-T
7	FM Ant. terminals thru 270	90 mc.	90 mc.	†FM R.F. L2
8	ohm resistor	Repeat	steps 6 and 7 u gain is obtai	ntil maximum ned
9	-	100 mc.	100 mc.	†FM Ant. coil L5

*If necessary for accurate peaking, the winding in the same trans-former not being peaked should be loaded with a 680 ohm resistor. †Connect VoltOhmyst to pin 1 of V5 through a 220K isolating re-sistor with 1/4 inch maximum exposed lead at grid terminal end. Output adjusted for 1 volt d.c. Dress VoltOhmyst lead away from input circuits. Oscillator frequency is above signal frequency on both AM and FM

Rectifier output should be approximately 139 volts, 70 ma.

CRITICAL LEAD DRESS

- All FM IF Transformer grid and plate leads should be short
 - and direct as possible and kept low, near chassis.
 - C26 leads should be kept as short as possible. C32 leads should be kept as short as possible.
- 4 00 10
- R24 and R25 leads should be kept as short as possible on T6 terminal 6 side. C27 should ground in hole near terminal 5 of V6 with short leads. s.
 - AM oscillator coil should not be tilted over toward function switch when wrapping short bus leads to switch. Keep leads V5 pin 5, to T6 term 1, as short as possible and . ف
 - low near chassis. 2.
- Dress C28 down on chassis and against terminal board. Run filament lead between V5 and V6 on side of V6 socket opposite C28. All ceramic button 4700 uuf condensers should have leads œ.
 - as short as possible. 5 10.
- Green lead from AM oscillator stator gang terminal to AM oscillator coil should be dressed against front of shield box and up above filament choke.
- RF plate choke L1, should be dressed at least $V_{i\theta}$ " away from AM R.F. coil L4 and at least $V_{i\theta}$ " from shield. Wixer grid condenser C7 should be dressed away from FM 11.
- oscillator gang stator terminal and away from leads connecting to terminals 8 and 9 of V2 socket. 12.
- Filament chokes L10 and L11 should be raised a minimum Use varnished tubing only on choke and coupling cond. of 1/16" above chassis. 13. 14.
 - end Condenser C2 should have lead on antenna terminal leads coming through shield partition slot. 15.
- not more than 3/16" long to prevent possible contact of lead Condensers C3 and C35 should use varnished tubing, not or body to "Hot" chassis.
 - vinyl, to prevent breakthrough crossing chassis edge. Oscillator grid condenser C17 should have short leads and

16.

- be dressed away from filament choke L10. 17. 18.
- Leads from loop terminal to chassis terminal board should have a minimum of three twists.



3

Schematic Circuit Diagram-Chassis No. RC1121A

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4

Simplified Schematic—"AM" Position



2-XF-931 Series

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2-XF-931 Series

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REPLACEMENT PARTS

STOCK No.	PART DESCRIPTION		STOCK No.	PART DESCRIPTION
	CHASSIS ASSEMBLIES	· · · ·	77527	Shaft—Tuning knob shaft
	RC-1121A		75192	Shield—Tube shield for V1 Shield—Tube shield for V2
77520	Bushing—Laminated bushing (%" long with shoul-		77566	Socket—Dial lamp socket
	assembly.		77087	Socket—Tube socket, 7 pin, miniature, moulded,
77522	Capacitor—Variable tuning capacitor (CIA, CIB,		76336	Socket-Tube socket, 9 pin, miniature, moulded,
70997	Capacitor—Fixed, ceramic, non-insulated, 5.6 mmf.,		72117	saddle mounted for V2 Society Tube agent 7 pin ministure water for V2
77520	± 1 mmf., 500 volts D.C. Temp. coef. $\equiv 0$ (C2)		/311/	V4, V5, V6, V7, V8
77550	\pm .5 mmf., 500 volts D.C. Temp. coef. \equiv 80 (C15)		31970	Spring—Dial cord spring
33380	Capacitor—Fixed, ceramic, non-insulated, 12 mmf., $+5\%$ 500 when D.C. Temp. cost $= 0.(C6)$		77524	Switch—Function switch (S1)
77531	Capacitor—Fixed, ceramic, non-insulated, 47 mmf.,		77666	Transformer—Filament transformer, 117 volt A.C.
775.00	$\pm 10\%$, 500 volts D.C. Temp. coef. = 0 (C17)		77517	Transformer—Output transformer (T7)
11002	$\pm 2^{1/2}$ %, 500 volts D.C. Temp. coef. = -750 (C18)		77511	Transformer—Ratio detector transformer — complete
39636	Capacitor—Fixed, mica, 220 mmf., 500 volts D.C. (C7)		76335	Transformer—First I.F. transformer—A.M.—complete
10/32	$\pm 20\%$, 500 volts D.C. High K (C9)		77514	with adjustable cores (T2)
76992	Capacitor—Fixed, mica, 470 mmf., 300 volts D.C.		//514	with adjustable cores (T1)
39644	Capacitor—Fixed, mica, 470 mmf., 500 volts D.C. (C3)		76328	Transformer—Second I.F. transformer—A.M.—com-
73473	Capacitor—Fixed, ceramic, 4700 mmf., +100%,		77513	Transformer—Second I.F. transformer—F.M.—com-
	C22, C23, C24, C25, C29, C30, C36, C38, C39)		77510	plete with adjustable cores (T3)
73520	Capacitor-Electrolytic comprising 1 section of 80		77312	with adjustable cores (T5)
	(C33A, C33B)		33726	Washer-"C" washer for station selector pointer
77533	Capacitor-Fixed, miniature, tubular, paper, .001		34373	Washer—"C" washer to fasten idler pulleys
73920	Capacitor—Fixed, tubular, paper, .0047 mfd., 600			
	volts (C12, C13, C28)		1	971933.1
73561	Capacitor—Fixed, tubular, paper, .01 mtd., 400 volts (C10)		77539	Speaker-51/4" P.M. speaker complete with cone
73594	Capacitor-Fixed, tubular, paper, .01 mfd., 600 volts			and voice coil (3.2 ohms)
73562	(C14) Capacitor—Fixed, tubular, paper, .022 mfd., 400			MISCELLANEOUS
	volts (C11)		77543	Antenna-Antenna loop and back cover complete
73558	volts (C4)		77543	Back—Cabinet back complete with loop, capacitor
75071	Capacitor—Fixed, tubular, moulded, .047 mfd., 400		VOACO	and power cord (includes C37)
73551	Capacitor—Fixed, tubular, paper, 0.1 mfd., 400 volts		12400	emblem and function decal for Model 2-XF-931
100.05	(C35)		Y2469	Cabinet—Ivory plastic cabinet less "RCA Victor"
73933	Coil—Antenna coil—F.M. (L5)		Y2470	Cabinet—Green plastic cabinet less "RCA Victor"
77534	Coil—Choke coil (L1)		V2471	emblem and function decal for Model 2-XF-933
77526	Coil—Choke coil (L9, L10, L11) Coil—Oscillator coil—A.M.—complete with adjust-		124/1	emblem and function decal for Model 2-XF-934
775.07	able core (L6, L7)		Y2472	Cabinet—Beige plastic cabinet less "RCA Victor"
77525	Coil—RF coil—A.M.—complete with adjustable core		77559	Cap-Station selector pointer cap-A.M.
775.26	(L3, L4) Coil = BE coil EM (L2)		77558	Cap-Station selector pointer cap-F.M.
77528	Connector—Combination phono input connector and		77044	(C37)
75474	antenna terminal board (J1) Connector-Single contact male connector for		77545	Cord—Power cord and plugs
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	speaker lead		77033	Emblem—"RCA Victor" emblem
77529	Connector—Two (2) contact male connector for power		77560	Grille—Metal grille Knob—Function switch knob—marcon—for Model
77516	Control—Tone control (R9)		,,,,,,,	2-XF-931
77515	Control—Volume control and power switch (R7, S2)		77550	Knob—Function switch knob—ivory—for Model
/2000	required)		77552	Knob-Function switch knob-green-for Model
77523	Drive cord (approx. 11" overall required) Drum—Variable tuning capacitor drive drum and		77556	2-XF-933 Knob—Function switch knob—red—for Model
//010	hub			2-XF-934
16058	Grommet—Rubber grommet for mounting RF shelf (4 required)		77554	Knob—Function control knob—beige—for Model 2-XF-935
31480	Lamp-Dial lamp (Mazda 47)		77547	Knob-Tuning control, tone control or volume con-
77521	Nut—Speednut for station selector pointer pulley and shaft bushing			trol and power switch knob—maroon—for Model 2-XF-931
72602	Pulley-Idler pulley for indicator cord (2 required)		77549	Knob-Tuning control, tone control or volume con-
77510	Pulley—Pulley and shaft (split) for station selector			trol and power switch knob—ivory—for Mode 2-XF-932
77519	Rectifier-Selenium rectifier, 100 MA (CR1)		77551	Knob-Tuning control, tone control or volume con
76346	Resistor—Wire wound, 1200 ohms, 4 watts (R13) Resistor—Fixed, composition:			trol and power switch knob—green—for Mode 2-XF-933
503022	22 ohms, ±10%, ½ watt (R27)		77555	Knob Tuning control, tone control or volume con
503068	$120 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R16, R30)$			trol and power switch knob—red—for Mode 2-XF-934
503115	150 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R12)		77553	Knob-Tuning control, tone control or volume con
503122	2700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R1, R17, R20) 2700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R4)			2-XF-935
503282	8200 ohms, ±10%, ½ watt (R31)		73203	Nut-Speed nut to fasten "RCA Victor" emblem to
503310	10,000 onms, $\pm 10\%$, $\frac{1}{2}$ watt (R6, R14, R23) 18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3)		77563	cabinet Pad—Cork and rubber pad $(1/32'' \times 3/16'' \times 3/16'')$
503347	47,000 ohms, ±10%, ½ watt (R18)			for mounting metal grille to cabinet
502410	100,000 onms, $\pm 3\%$, $\frac{1}{2}$ watt (R24, R25) 100,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R15, R22, R26)		77557	Retainer-Knob retainer (knob to cabinet)
503422	220,000 ohms, ±10%, ½ watt (R10)		76837	Spring-Retaining spring for knobs (knob to shaft)
503447	470,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R11) 2.2 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R5)		77561	Window-Polystyrene window for L.H. side o
503539	$3.9 \text{ megohm}, \pm 10\%, \frac{1}{2} \text{ watt (R2)}$		77562	Window-Polystyrene window for R.H. side o
503547	4.7 megohm, ±10%, ½ watt (R8)			cabinet

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



RCA VICTOR Record Demonstrator MODELS 15-E, 15-E-1

Chassis No. RS-139A, Record Changer RP-190A-1 and Two Speed Manual Turntable

SERVICE DATA

- 1951 No. 7 -

PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

Specifications

Tube Complement
1. RCA 6SQ7 A.F. Amplifier
2. RCA 6SQ7 Ph. Inverter
3. RCA 6V6GT Output
4. RCA 6V6GT Output
5. RCA 5Y3GT Rectifier
Power Supply Rating
115 volts, 60 cycles
Power Output
Undistorted
Loudspeaker
Size and type
Voice coil impedance 3.2 ohms @ 400 cycles
Pilot Lamp Manda #51 68 volta 2 amp
inor hamp

RP-190A-1 Record Changer:

The record changer will play up to fourteen 45 r.p.m. records having a $1\frac{1}{2}$ inch center hole It is identical to RP-190-2a record changer except for the omission of the power switch.

FOR RECORD CHANGER SERVICE DATA — REFER TO RP-190 SERIES SERVICE DATA.

VOLUME CONTROL STOP

This instrument is provided with a volume control stop to provide a pre-determined "maximum" volume level and yet allow normal volume control operation up to the predetermined "maximum."

Adjusting "Maximum" Volume Level:

With the instrument operating, remove the volume control knob. Note the extending ends of two coil springs (one light and one heavy) on the volume control shaft.

TO INCREASE

Turn control fully clockwise and then, with end of a pencil or similar item, press counterclockwise on the end of the LIGHT spring. Rotate control shaft clockwise until desired level is reached. Release pressure on the spring and replace knob.

TO DECREASE

Turn control fully clockwise and then, with the end of a pencil or similar item, press clockwise on the end of the HEAVY spring. Rotate control counterclockwise to a very low level. Increase volume to desired level as described above.

1 4

Weight
Cabinet Dimensions (overall) Height17%" Width 21½" Depth19%" Record Players
Automatic (RP-190A-1) Record capacity up to 14 records Type of records RCA "45" Pickup (Stock No. 75770) crystal Turntable speed 45 r.p.m.
Manuall recordRecord capacityl recordType of recordsup to 12 inch diameterPickup (Stock No. 75475)dual stylus crystalTurntable speed33 ½ or 78 r.p.m.

Manual Turntable:

The manual turntable will play one $33\frac{1}{3}$ or 78 r.p.m. record up to twelve inches in diameter. The speed is controlled by a knob on the motorboard. The correct stylus is selected by a lever knob on the end of the pickup arm.







Manual Motorboard - Motor Assembly



Speed Control Lever Assembly



Chassis Top View



15-E Pickup Arm Mounting - Manual Motorboard 15-E-1 2





Controls

MANUAL MOTORBOARD SERVICE HINTS

- (a) Stylus force of pickup arm should be 8 to 10 grams. Insufficient force resulting from use of incorrect spring or pickup may allow stylus to jump grooves. Excessive force may cause distortion and record wear.
- (b) Pickup arm pivots should be adjusted to provide a minimum of side play — yet al-lowing free vertical movement. Binding may cause stylus to jump groove.
- (c) Inner surface of turntable rim must be clean and smooth. Idler wheel and drive pulleys must have no rough spots and be free of oil and grease. Roughness may
- cause rumble oil may cause wow. (d) Lubricate idler wheel and drive pulleys with a good quality light oil — one or two drops for each is sufficient.
- (e) The pickup arm pivot shaft may be lubricated with a film of light oil. The pivot post rubber mounting should not be excessively compressed. The bearing nut should be tightened only enough to elevate the pivot shaft 1/32" above the post with the steel ball in place. This ball must be in place to permit free lateral pickup arm movement.

CRITICAL LEAD DRESS

- Dress all filament leads next to chassis. 1
- 2. Dress power cord lead, from strain relief
- grommet to on-off switch, along side apron. Dress A.C. leads at ON-OFF switch away 3. from all audio components.
- 4. Dress output tube plate leads next to chassis.
- Dress C8 next to chassis and wire with as short leads as practical.
- Dress lead from arm of low frequency tone 6. control to grid of V-3 away from A.C. leads at ON-OFF switch.

MODIFICATION

Although designed and assembled for 3-speed operation, provision is made for modification of this instrument for 33 and 45 rpm performance only. To eliminate the use of the 78 SPEED control and 78 stylus, proceed as follows:

To alter SPEED SELECTOR control

Tie both pickup arms to their rests and place the instrument on its left side (not on control knobs) on a table. Through the opening in the bottom of the cabinet, disconnect the black power plug and the phono plug from its chassis connection. While supporting the top panel, remove the hex head screw and washer, centrally located beneath the top panel at the back of the cabinet.

Place cabinet upright, move SPEED SELECTOR to 45 position, then lift off top panel assembly

From the back, the switch can be viewed from beneath the top panel and conversion effected as shown below. Bend the 33 stop to the vertical position of the adjacent 78 stop. The speed change lever (on left) should now halt against the vertical 33 stop, eliminating the 78 speed position.



Replace top panel (rubber supporting grommets must be in place) and the hex head screw and washer. NOTE: It is important that screw be tightened until top panel can be lifted approximately 1/16 inch only. The board should float freely on its mounts, there must be no restriction of movement.

Reconnect the black power plug and insert phono plug in the chassis socket. Place the instrument in the upright position and untie pickup arms.

To adapt STYLUS CONTROL LEVER -

With lever in 33 position, loosen left holding screw just enough to turn lug to the position shown below and tighten screw. This will prevent the 78 stylus from being turned for use.



Before Operation ----

Remove SPEED SELECTOR knob and turn over the CIRCULAR PLATE which will now show only 33 OFF 45 positions. Replace knob on shaft.

Reverse the left INSTRUCTIONS PLATE to read for 33 operation only.



Schematic Diagram

Replacement Parts

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	TWO SPEED MANUAL TURNTABLE		
70701	Pickup Arm Assembly 15-E	73797	Capacitor-Tubular, paper, .015 mfd., 600 volts
76734	Arm—Pickup arm shell—less cartridge, mount, and cable Bracket—Pickup arm mounting bracket complete with size	35787	Connector—Phono input connector (socket)
/0/01	pin and counterbalance spring	72776	Connector-Single contact male connector for speaker leads
76737	Cable-3 wire pickup arm cable complete with connectors	30868	(2 req'd)
76732	Knob-Stylus selector knob complete with screw	38405	Control—H.F. tone control
74230	Nut—#00-112 nut and washer to mount stylus	38402	Control-L.F. tone control and power switch
75475	Pickup-Dual stylus pickup crystal cartridge complete with	71980	Control-Volume control-less stop
75366	two stylus Din_Divot nin for country bulk	74838	Grommet—Power cord strain relief (1 set)
75357	Pivot—Pickup grm pivot (2 reg/d)	70004	Resistors—Fixed, composition:—
76733	Post—Pickup arm pivot post and stop pin	523127	270 chms, ±10%, 2 watts
76736	Ring—Retaining ring for pickup arm mounting bracket	523268	6800 ohms, ±10%, 2 watts
71097	Screw—#4 x ¼'' self tapping screw for pickup mount and	503282	$15000 \text{ ohms} + 10\%, \frac{1}{2} \text{ watt}$
76735	Spring—Counterbalance spring	503327	$27,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}$
75497	Stylus—Osmium tip stylus for 78 RPM (not coded)	503427	270,000 ohms, ±10%, ½ watt
75496	Stylus—Osmium tip stylus for 331/3 RPM (coded red)	503447	470,000 ohms, ±10%, ½ watt
	Pickup & Arm Assemblies 15-E-1	21264	10 megohm, ±20%, ½ watt
77977	Arm—Pickup arm shell (plastic)	54414	Socket—Tube socket
76947	Bearing—Pickup arm mounting bracket pivot bearing	71979	Stop-Volume control adjustable stop (two springs)
75810	Bracket—Pickup arm weight adjustment bracket	76695	Transformer—Output transformer
78227	Cable—Three wire cable complete with connectors	75566	Transformer—Power transformer, 117 volt 60 cycle
77982	Grommet-Rubber grommet for pickup arm post		FUNCTION SWITCH ASSEMBLY
76738	Knob-Stylus selector knob	72437	Cable—Shielded audio cable complete with pin plug (switch to amplifier)
74230	Nut—#00-112 nut and washer to mount stylus	74850	Capacitor—Ceramic, 1800 mmf
77979	Post-Pickup grm pivot post	75643	Capacitor—Tubular, paper, .001 mf., 1000 volts
76898	Screw—#2-56 x 3/16" headless set screw for stylus selector	30808	cables
76900	knob	30870	Connector—Two contact male connector for motor power
70033	weight adjustment bracket	76693	Lever—Speed change lever (mounted on switch shaft)
76948	Screw—Pickup arm mounting bracket pivot screw	503318	Resistors—Fixed composition:
77980	Shaft—Pickup arm pivot shaft	503356	$56,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}$ R103
75497	String—Pickup arm counterbalance spring	503510	1.0 megohm, ±10%, ½ watt
77899	Stylus—Sapphire tip stylus (.003 r. uncoded) for 78 r.p.m.	76694	Switch—Function switch—less speed change
77076	r.p.m.		lever
77983	Washer-"C" washer for lower and of nickup arm nivet		SPEAKER ASSEMBLIES
	shaft		971494-2W RL111B1
75876	Washer—"C" washer for upper end of pickup arm post	75023	RMAZ/4
77981	Washer—Metal washer for pickup arm post and shaft	76296	Cone—Cone and voice coil (3.2 ohms)
	Motor and Turntable Ascembly	76389	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)
30870	Connector-2 contact male connector for motor leads		SDEAVED ASSEMDITES
76751	Grommet-Rubber grommet to mount motor (3 req'd)		92569-12W RL111A1
76753	Motor—117 volt 60 cycle complete with mounting plate— less #76768 plate and idler wheel		RMA 274
76768	Plate—Speed control pulley mounting plate complete with	13867	Cap-Dust cap
70740	pulleys	76093	Speaker—12" P.M. speaker complete with cone and voice
76748	Pulley-/8 RPM pulley		coil
76749	Sleeve—Spring sleeve for motor shaft		NOTE:—It stamping on speaker instrument does not agree with above speaker number order replacement parts by
76755	Spring—Detent spring (below motor mounting plate)		referring to model number stamped on speaker and full
76744	Spring—Hairpin spring to retain idler wheel		description of part required.
/6/45	<pre>spring—later wheel tension spring (above motor mounting plate)</pre>	X3240	MISCELLANEOUS Baffle—Baffle board and arille cloth
76752	Turntable—Finished turntable (9" dia.)	10941	Ball—Steel ball (1/8" dia.) for pickup arm mounting
76743	Washer—Flat fibre washer for idler wheel	71599	Bracket—Pilot lamp bracket
35969	Washer—"C" washer to retain turntable on shaft	72113	Foot-Rubber foot (4 reg'd)
/0/30	wheel-Idler wheel	75697	Grommet-Rubber grommet for mounting 45 RPM changer
	45 R.P.M. AUTOMATIC RECORD CHANGER RP 190A-1	72856	Grommet—Rubber grommet for motor board (4 req'd)
	Same as listed for RP 190-2a in RP 190 Series Service Data	77984	Housing—Pickup arm pivot shaft housing (15-E-1 only)
	except for the omission of the on-oil switch and switch housing	74979	Knob—Selector switch knob—tan Knob—Tone control or volume control knob—brown
	AMPLIFIER ASSEMBLIES	11765	Lamp-Pilot lamp-Mazda 51
	RS139A	75692	Link—Motor speed change link (bent-end section only)
76685	Capacitor-Ceramic, 560 mmf.	76688	Nut-Pickup arm pivot shaft bearing nut (15-E only)
119/6	volts, 1 section of 30 mfd., 350 volts and 1 section of	73634	Nut—Speed nut for speaker mounting screws (4 req'd)
	20 mfd., 25 volts	76686	Sleeve—Rubber sleeve (39/64 O.D. x 7/16" I.D. x 11/32")
73850	Capacitor—Tubular, paper, oil impregnated, .0012 mfd., 1000 volts	14000	for pickup arm pivot post (15-E only)
73595	Capacitor—Tubular, paper, .0022 mfd., 600 voltsC12	30900	Spring—Retaining spring for knob 74057 Spring—Retaining spring for knob 72118
73795	Capacitor-Tubular, paper, .0033 mfd., 600 volts	76690	Spring—Speed change link and lever tension spring
73796	Capacitor—Tubular, paper, 0039 mid., 600 volts	76687	Washer—Rubber washer $(13/16^{\circ} O.D. \times 7/16^{\circ} I.D. \times \frac{1}{6}^{\circ})$
/3301	Cupuchor-rubulus, puper, or mid., 400 voits		to pland and provides (since a)

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS





930409 SERIES

Automatic Record Changer

SERVICE DATA

— 1952 No. 6 —

PREPARED BY RCA SERVICE CO., INC.

FOR

RADIO CORPORATION OF AMERICA

RCA VICTOR DIVISION

CAMDEN, N. J., U. S. A.

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Controls



SPECIFICATIONS

Turntable sp Record cape	Turntable speed		
	12 ten-inch		
	or 10 twelve-inch		
	or 10 ten- and twelve-inch intermixed		
930409-3	115 v. 60 cycle motor convertible to 50 cycles. Ceramic pickup Stock No. S-5652.		
930409-4	115 v. 25 cycle motor.		
	Ceramic pickup Stock No. 162A001. Used in Model 35QU.		
930409-5	115 v. 60 cvcle motor.		
	Crystal pickup Stock No. 75475 or 77779. Used in Models 2ES3, 2ES31, 2ES38, 2ES38E, 2JS1, 2JS1E, 2S7, 2S10, 2US7, 21T197DE, 21T242 and 21T244.		
930409-6	115 v. 60 cycle motor convertible to 50 cycles.		
	Ceramic pickup Stock No. 162A001.		
	Used in Models 2ES31Q, 2ES38Q, 2JS1Q and 35QU.		
930409-9	230 v. 50 cycle motor convertible to 60 cycles. Crystal pickup Stock No. 75044.		
930409-10	Same as 930409-5 except light color.		

- Used in Models 2S7, 2S10, 2US7 and 2IT242.
- 930409-11 115 v. 50 cycle motor convertible to 60 cycles. Crystal pickup Stock No. 75475 or 77779. Used in Model 2US7.

CONTROLS

The record changer has a dual control on the motorboard and a stylus selector control on the pickup arm. The inner control (circular knob) is the OFF-ON-REJECT control. Turning this knob to the center position energizes the motor and starts the turntable, when turned to the right (clockwise) it starts the mechanism into complete automatic operation. The mechanism will shut off automatically after the last record has been played but can be shut off manually by turning this knob to the left (counter-clockwise).

The outer control (double ended lever) is the speed control. It has three normal positions, "33", "45", "78" to select the turntable speed desired and a neutral position (midway between "45" and "78"). The control should be turned to this neutral position if the shanger is not expected to be in use for an extended period of time.

The stylus control has two normal positions (right and left) and one shipping position (lever pointing up). When playing $33\frac{1}{3}$ or 45 r.p.m. records the lever is turned so that "33-45" is visible on the TOP of the lever; likewise for 78 r.p.m. records "78" should be visible on the TOP.

The removable centerpost is for use with 4S r.p.m. records having the large centerhole. It must be placed over the center spindle with the "RCA" trademark monogram FACING to the FRONT. When not in use it is placed in a well at the front of the motorboard.

To load or remove records, the record stabilizer is lifted and turned off-side. After loading it is turned to the center where it rests on top of the stack of records.



Figure 1-Bottom View

LUBRICATION

The mechanism is properly lubricated when it leaves the factory, additional lubrication should not be necessary for a long period of time. If the mechanism has unusual use or high operating temperatures, it may be necessary to lubricate more frequently.

- It is suggested to use Lubriplate or STA-PUT No. 512 on:
 - 1. Pickup arm pivot.
 - Points of sliding contact with cycling slide, including:
 a. elevating rod
 - b. lift arm
 - c. roller on cycling cam
 - d. pickup arm return lever
 - e. pickup arm lever
 - 3. End of selector lever contacting tab on cycling gear.
 - 4. Turntable thrust bearing.
 - 5. Sparingly on a trip slide.
 - 6. All points of sliding contact.

Apply a small quantity of light machine oil to:

- 1. Trip pawl pivot.
- 2. Cycling engagement pawl pivot.
- 3. Bearing of record stabilizer.
- 4. Elevating rod.
- 5. Bearing of lift arm.
- 6. Bearing of reject lever.
- 7. Bearing of stop lever.
- 8. Bearing of cycling gear.
- 9. Motor bearings.

NOTE: Keep oil or grease away from all rubber parts.

Stylus Replacement

PICKUPS NO. 75044 and S-5652

The styli are held in position by small thumb nuts (one for each stylus). Loosen the nut to remove stylus.

PICKUP NO. 75475

The styli are held in position by small hex nuts (one for each stylus). Remove the nut and push threaded end of stylus through the cartridge.

PICKUP NO. 162A001

The styli are held in position by pressure fit. To remove stylus, grip with tweezers and pull straight to the front of pickup.

CAUTION:

The internal element of the pickups can be fractured by use of excessive force. It is advisable to grip stylus with pliers instead of holding pickup case while removing nuts.

Although the 78 and the 45-33½ styli are mechanically interchangeable, they should be replaced in such manner that the stylus which is coded red will contact the record when "33-45" on the stylus selector knob is visible from the top.

Record Stabilizer Arm

Two types of stabilizer arms are in use. Type "A" when raised and moved outward will remain projected beyond the edge of the motorboard. Use Stock Number 76941 (plum) or Stock Number 76942 (beige) record stabilizer housing. Type "B" when raised and moved outward will return to within the edge of the motorboard. Use Stock Number 77256 (plum) record stabilizer housing, and Stock Number 77257 record stabilizer return spring.

The replacement stabilizer arm (plum) Stock Number 77255 can be used with either Type " \mathbb{A} " or Type " \mathbb{B} ".

50/60 Cycle Conversion

Models 930409-3 and 930409-6 are made for 60 cycle operation but may be converted to 50 cycle operation.

Models 930409-9 and 930409-11 are made for 50 cycle operation but may be converted to 60 cycle operation.

To convert the above listed models it is necessary to remove the original spring sleeve from the motor shaft and install the alternate spring sleeve (in envelope attached to record changer). This is easily accomplished by holding the rotor of the motor while removing or installing the spring sleeve with a twisting motion.



Figure 2-Adjustments

ADJUSTMENTS

LANDING ADJUSTMENT

Only one landing adjustment is necessary. The landing position of the stylus is adjusted by means of the eccentric Stud (20A), mounted on the pickup arm support bracket. When adjusted for correct landing on one size of record, the landing position for other sizes of records is automatically corrected.

PICKUP ARM HEIGHT ADJUSTMENT

The pickup arm height during cycle is adjusted by means of the hex head screw (17), located in the pickup arm.

Turn control knob to "REJ" and rotate turntable by hand until arm has risen to its maximum height. Adjust screw so that stylus is 1¾ ″ above turntable.

STYLUS FORCE ADJUSTMENT

Stylus force should be 71/2 to 91/2 grams. Loosen screw (14), and move slide until the correct force is obtained.

TRIPPING

The tripping method used in this mechanism is a combina-tion of velocity and fixed diameter. Velocity tripping is ef-fective between $4\frac{3}{4}$ " and $3\frac{1}{4}$ " diameters, when the stylus moves inward $\frac{1}{8}$ " or more per revolution of the turntable. No adjustment is required.



CYCLE OF OPERATION

TURN ON-OFF-REJECT CONTROL KNOB TO REJECT POSITION & RELEASE

- The on-off-reject control knob, through the linkage of the function control lever (54), reject rod (52), and reject lever (109) actuates the power switch and the trip slide (139).
- 2. The closing of the power switch energizes the motor and starts the turntable rotating.

CYCLING STARTS

- The trip slide (139) in its movement contacts the lower trip pawl (131) and moves both the lower and the upper trip pawls which are linked together. The movement of the upper trip pawl (129) actuates the cycling engagement pawl (130A) sufficiently to cause it to engage with the projection on the hub of the rotating turntable.
- 2. The contact between the cycling engagement pawl (130A) and the projection on the turntable hub gives the necessary push for the teeth in the cycling gear (130) to engage the teeth in the shaft of the turntable and thus start the change cycle.

PICKUP ARM RISES & MOVES OUTWARD

- 1. As the cycling gear rotates, the stud (130B) mounted on the underside of the gear, rides inside a slot cut in the cycling slide (141). The rotation of the cycling gear pushes the cycling slide back, and later, allows it to return.
- As the slide moves away from the center post, an incline formed on the end of the slide causes the elevating rod (123) to rise and lift the pickup arm.
- 3. At the same time that the elevating rod is pushed upward, the pickup arm lever (124) is also pushed up by the force transferred through the spring (125). The raising of the pickup arm lever causes the two formed dimples in the pickup arm lever to engage the two holes in the pickup arm return lever (120), and couple them together. This directs the movement of the pickup arm during change cycle.
- 4. The cycling slide continues to move away from the center post until the formed end of the slide pushes against the pickup arm return lever. This relieves the force of pickup arm return lever against stop lever (115). This permits the stop lever return spring (114) to return the stop lever to the normal (raised) position.
- 5. The end (115A) of stop lever (115) pushes trip slide back ready for the next change cycle.





Figure 6



RECORD DROPS TO TURNTABLE

- 1. After the cycling slide has raised the pickup arm and is moving it outward, the lift arm (100) is actuated by the cycling slide.
- 2. The lift arm pushes up on the shaft extending from the bottom end of the center post. This shaft actuates the push-off mechanism inside the center post, and the record drops to the turntable.

SELECTION OF LANDING POSITION

- During rotation of the cycling gear the riveted tab (130C) near the center of the gear, pushes down on one end of the selector lever (103) (which is pivoted in the center) thereby raising the other end causing if to latch on the end (89A) of the twelve-inch indexing lever (89).
- 2. The mechanism is thus automatically indexed to land on a ten inch record unless the selector lever (139) is disengaged from the end of the twelve-inch indexing lever.

7 Inch Indexing:

The ten-inch indexing lever (133) is pivoted in the center and one end (133A) is held (by tensior of spring) against the top surface of the cycling gear. A hole in the gear will permit the end of the indexing lever to lower and thus raise the opposite end of the lever. A projection (133B) on the lever will at the same time lift the selector lever, permitting it to engage the top step of the pickup arm return lever (120) This position allows the pickup arm to land on the edg \ge of the seven-inch record.

10 Inch Indexing:

The ten-inch indexing lever will lift the selector lever unless a record on the turntable contacts the rubber tip of the ten-inch indexing lever (133), and prevents it from rising. When the lever is prevented from rising, the selector lever will remain in position to engage the middle step of the pickup arm return lever.

12 Inch Indexing:

When a twelve-inch record drops to the turntable, it strikes the twelve-inch indexing lever (89) and forces it backward. This disengages the end of the selector lever





(103) from the edge of the indexing lever and permits the selector lever to drop down into the recess (89B) at the end of the indexing lever. This position of the selector lever causes it to engage the bottom step of the pickup arm return lever (120) and will push the pickup arm to land on the edge of a twelve-inch record.



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930409 Series

PICKUP MOVES IN FOR LANDING

 As the cycling slide returns, the formed end (141A) on the slide moves back, permitting the pickup arm return lever spring (118) to expand. This causes the pickup arm return lever (120) to move the pickup inward until the pickup arm return lever comes against the selector lever (103). The pickup is now directly above the point of landing.

PICKUP LANDS ON RECORD

- 1. The elevating rod (123) slides down the incline on the slide permitting the pickup to land on the start of the record.
- 2. A cut-away portion (130D) of the teeth of the cycling gear stops the return movement of the slide before completion of cycle. The stud (130B) in the cycling gear rests in the first indentation (offset from center) of the slide to stabilize it in this position.
- 3. Just before the cycling gear completes cycle, a small tab (141C) on cycling slide makes contact with lower trip pawl (131) thereby moving upper trip pawl and cycling engagement pawl back. This prevents the reengagement with the projection on the turntable hub which would start a new change cycle.
- 4. On the next revolution the projection on the hub of the turntable engages with a formed lug (130E) on the outer edge of the cycling gear. The cycling gear will then rotate until the second cut-away portion (130F) of the teeth again stops the movement of the slide, this time at completion of the cycle. The stud on the cycling gear rests in the second indentation (center) of the slide to stabilize it in this position.

The purpose of this pause in the cycle is to allow the pickup to enter the starting groove of the record before the full effect of the feed-in spring is applied to the pickup arm.

RECORD PLAYS

- As the record plays, the pickup moves in toward the center of the record carrying the trip slide along. This is due to the contact made with the pickup arm lever which turns with the pickup arm pivot.
- 2. The trip slide contacts the lower trip pawl, causing both (lower and upper) trip pawls and the cycling engagement pawl to move slightly with each revolution of the record. This slight movement of the pawls is reversed each time the projection on the turntable hub comes in contact with the cycling engagement pawl. The back movement is taken up in the friction connection between the upper and lower trip pawls.

TRIPPING

This slight movement of the pawls continues as long as the pickup moves in at a constant rate of speed. When the stylus leaves the recorded section of the record, the rapid acceleration results in rapid movement of the cycling engagement pawl. The cycling engagement pawl assumes a position in which the projection on the turntable hub makes a positive contact and the cycling cam is pushed sufficiently for engagement between the teeth of the cycling gear and the teeth on the turntable hub. This starts change cycle.



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930409 Series

MECHANISM STOPS AFTER PLAYING OF LAST RECORD

After the mechanism has been tripped it again follows the preceding sequence of cycling and playing the records until the last record of the stack has been played.

- As the last record of the stack drops to the turntable the record stabilizer drops and actuates the stop arm (115). This stop arm in turn applies force to stop lever (115) through spring (115B) and connecting wire (137). At this moment the cycling slide is in the outermost position (away from centerpost) and the end (115B) of stop lever is forced against escape lever (141B) which prevents it from lowering any further.
- 2. As the cycling slide returns to the out of cycle position the end (115B) of stop lever slides off the escape lever permitting the end to extend down through the slot in the cycling slide. At this time the pickup arm return lever has rotated too far to be blocked by the other end (115C) of the stop lever and the pickup is permitted to land on the record.
- 3. After the last selection has been played the mechanism again goes into change cycle, and the cycling slide moves into its outermost position. At this moment the force which has been applied to the stop lever from the record stabilizer causes the end (115B) to lower, thus extending further through the cycling slide. The other end (115C) of stop lever raises and blocks the pickup arm return lever which at this moment is held back by the cycling slide.
- 4. As the cycling slide moves back, it carries the raised trip slide along until finally the formed end (139A) of the trip slide pushes reject lever which in turn actuates the power switch (110). This removes the power from the drive motor and mechanism stops.
- 5. The elevating rod (124) lowers the pickup arm to the rest.

45 R.P.M. CENTERPOST

For playing of 45 r.p.m. records which have a $1\frac{1}{2}$ inch center hole, the 45 r.p.m. centerpost is placed over the $1\frac{1}{4}$ inch centerpost. The push-off finger (84A), which is part of the $\frac{1}{4}$ inch centerpost actuates the slide (24), this slide actuates the separator knives (25A & 25B) and separator shelves (26A & 26B) of the 45 r.p.m. centerpost.

As the push-off finger moves up it engages a finger (24B) of the slide (24) in the 45 r.p.m. centerpost; and, as it moves horizontally, it pushes the slide against the tension of the slide return spring (27). A projecting pin (24C) on the bottom of the slide engages both shelves and both knives and forces them to turn on their pivots. The shelves are pivoted near their center and are caused to retract as the slide is forced to move by the push-off finger. The knives are pivoted at their ends and are forced outward at the same time that the shelves to the extended position.









REPLACEMENT PARTS

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			_
ILL. NO.	STOCK NO.	DESCRIPTION	
	1		
1	76913	Stabilizer-Record stabilizer-plum-complete with plastic cap for 930409-3, -4, -5, -6, -9 and -11	
14	75804	plastic cap for 930409-10	
14	75805	for 930409-3, -4, -5, -6, -9 and -11 Cap-Plastic cap-beige-for record stabilizer for	
2	77118	930409-10 Turntable—Turntable and hub assembly—maroon	l
2	77119	flock. Turntable—Turntable and hub assembly—tan	
3 4	76905	flock—for 930409-10 Nut—14—28 hex nut (jam) for pickup arm bracket Lockwasher—14 externaltypelockwasherforpickup	
35	76941	arm shaft Housing—Record stabilizer housing—plum—Type ''A'' (see Page2) for 930409-3, -4, -5, -6, -9 and -11	
35	77256	Housing—Record stabilizer housing—plum—Type ''B'' (see Page 2)	
35A	77257	Spring—Record stabilizer return spring for use with Type "B" record stabilizer housing	
35	76942	Housing—Record stabilizer housing—beige—for 930409-10	ľ
36 37 28	74782	Motorboard—Motorboard—complete Emblem—''RCA Victor'' emblem	
30	75929	and internal lockwasher	
39	75873	-for 930409-3, -4, -5, -6, -9 and -11 Housing—Pickup arm pivot shaft housing—beige—	
40	76915	for 930409-10 Knob—Reject control knob and shaft—marcon—	
40	76916	for 930409-3, -4, -5, -6, -9 and -11 Knob—Reject control knob and shaft—beige—for	
41	75827	930409-10 Rest—Pickup arm rest (maroon) for 930409-3, -4,	
41	75828	-5, -6, -9 and -11 Rest—Pickup arm rest (beige) for 930409-10	
42 43	76937	Knob—Motor speed control knob and shaft Screw—#6-32 x ¹ ⁄4″ hex head screw	
44 45	75385	Washer—''C'' washer to mount record stabilizer	1
46	75920	Screw — Screw for mounting cable clamp	
48	13830	mount pickup arm rest	
49 50	76920 77229	Rod—Motor speed control rod Grommet—Rubber grommet for motor speed con-	
51	76918	trol rod Lever—Motor speed control lever	
53	75825	Washer—"C" washer for motor speed control knob and shaft	1
54 55	76917 77227	Lever—Switch control lever Nut—Pal nut for reject control knob and shaft	
56 57	76927 76926	Arm—Stop arm assembly Spring—Return spring (coil type) for stop arm (1/4" ID x 19/32)	
58 77	75876	Screw $-6-32 \times 5/16''$ cross recessed round head screw Washer-"C" washer to mount motor	
78	76925	Spring—Spring for 45 r.p.m. centerpost housing hinge pin	
79	76922	Lid-45 r.p.m.centerpost housing lid-maroon-for 930409-3, -4, -5, -6, -9 and -11	
79	76923	Lid—45 r.p.m. centerpost housing lid—beige—for 930409-10	
80	76921	Housing—45r.p.m. centerpost housing well—lesslid and rubber bumper	
82	76924	to mount 45 r.p.m. centerpost housing Pin_Hinge pin for 45 r.p. m. centerpost housing	
83	76940	Bumper-45 r.p.m. centerpost housing rubber bumper	
147		Screw—#10-24 x ¾" binding head machine screw and internal lockwasher	ľ
	760 45	45 RPM CENTERPOST ASSEMBLY	
21	76928	Canterpost 45 r.p.m. centerpost complete Cap—Nose cap	
23	76909	Screw $=$ #4-40 x $1/4$ " cross recessed binding head screw for nose spring	
24	76933	Plate—Slider plate assembly complete with springs 24A	
25 26	76932 76931	Knife—Record separator knife (1 set) Shelf—Record support shelf (1 set)	
27 28	76934 76935	Spring—Slider return spring (coil type—2 in 1) Spring—Shelf return spring (formed)	
29 30	76936	Body—Spindle body assembly Screw—#4-40 x 7%" fillister head screw for nose cap	
31 32	76954	Rotor—Die-cast rotor Spring—Rotor lift spring (coil) (1.168" O.D. x 1"—	
33		4-5 turns) Lift—Rotor lift	
34	76929	Bearing—Bottom bearing	



Fig. 26-45 r.p.m. Centerpost Assembly

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Fig. 27-Slide Assembly

sie h

ILL.

STOCK

Late production record changers use a revised frame (Item 85) and pickup arm lever (Item 120). These items are not directly interchangeable but may be interchanged in a group as listed below.

Item No.	Early Part	Late Part	Description
85	76910	78635	Frame
119	75848	Not used	Washer
120	75849	78636	Lever
121	75850	78637	Retainer

Frames may be identified by a number which is cast into

the frame (see Fig. 28 below). Early frame is identified by number ``2525''. Late frame is identified by number ``6425''.

Levers may be identified by having or not having a bearing collar staked to the lever (see Fig. 28 below). Early lever does not have staked collar. Late lever does have staked collar.

Retainers may be identified by size. Early retainer is .312" I. D. Late retainer is .390" I. D.







Fig. 28-Alternate Slide Plate Frame

SLIDE ASSEMBLIES8476904Canterpost-33½-78 r.p.m. centerpost complets with barring8576910Frama-Main frams-(dis-cast)867337Washer-"C" washer for mounting cycling gear 878776844Lawer-12" record indexing lever 979775949Spring-12" record indexing lever spring 989875841Nut-Speed nut for 12" indexing lever return spring 999176903Spring-12" indexing lever return spring (formed) 949275841Nut-Speed nut for 12" indexing lever return spring 959375842Spring-12" indexing lever return spring (formed) 9694	NO.	NO.	DESCRIPTION
0008476904Conterpost-33/y.78r.p.m. centerpost complete with bearing8576910Frame-Main frame-(die-cast)8673373Washer-"C" washer for mounting cycling gear Washer-"C" washer for 2" indexing lever8775844Laver-12" record indexing lever spring9076309Spring-12" record indexing lever spring9176901Spring-12" indexing lever spring9275841Nut-Speed nut for 12" indexing lever return spring9375842Spring-12" indexing lever return spring (formed)94Scaw-4.44 X/* has head (indented) thread95Scaw-4.44 X/* has head (indented) thread9677191Switch-Muting witch-less mounting switch ambly switch-muting switch is return spring (formed)9677191Switch-Muting forming low muting switch ambly switch-muting switch is return spring (formed)97Tessing level low return spring (secial)98Screw-#1.48 t 13/32" binding head machine screw and internal lockwasher99Nut-1/2-20 pal nut for mounting 331/378 r.p.m. spring-Return spring (soil type) for landing se- lector lever (1100 D. t 3%-14 turns)101Screw-#10.24 t 3% binding head machine screw and internal lockwasher102Screw-#10.24 t 3%10376890Retwee return spring (soil type) for landing se- lector lever (1100 D. t 3%-14 turns)105Screw-#6.22 t 3% has head screw10677582Spring-Return spring (s			SLIDE ASSEMBLIES
avaing Dearing Dearing bearing Dearing Dearing bearing Dearing Dearing bearing TS33 Washer-"C" washer for mounting cycling gear bearing Washer-"C" washer for mounting cycling gear bearing TS33 Washer-"C" washer for 12' indexing lever bearing TS34 Lever-12' record indexing lever sturn spring conting TS34 Spring-12' indexing lever return spring conting Gerew-#4.40 k/* her head (indented) thread cutting serve to mount muting switch assembly conting serve to mount muting switch assembly Sersw-#3.48 k13/32' binding head machine screw for muting witch serve For muting switch Serve-#1.42 k/* hinding head machine screw nod internal lockwasher construct Serve-#5.42 k/* hinding head machine screw indic internal lockwasher Serve-#6.12 k/* hinding head machine screw indic internal lockwasher construct Serve-#1.24 k/* hinding head machine screw indic internal lockwasher Serve-#1.24 k/* hinding head machine screw indic internal lockwasher construct Serve-#1.24 k/* hinding head machine screw indic internal lockwasher Serve-#6.22 k/* her head screw construct Serve-#1.24 k/* hinding head Serve-#6.22 k/* her head screw	04	76904	Contemport 3314 78- p.m. contemport complete with
85 76510 Frame-Main frame-(die-cast) 86 75531 Washer-Fibre washer for mounting cycling gear 87 75845 Washer-Fibre washer for 12" indexing lever 89 75844 Lever-12" record indexing lever spring 91 76803 Washer-Pickup thrust washer (fibre) 92 75841 Nut-Speed nut for 12" indexing lever sturn spring 93 75842 Spring-12" indexing lever return spring (formed) 94	04	10504	bearing
8775845Washer-Fibre washer for mounting cycling year8875397Washer-Fibre washer for mounting cycling year9075804Lever-12" record indexing lever9176809Spring-12" record indexing lever spring9275841Nut-Speed nut for 12" indexing lever return spring (formed)93	85	76910	Frame—Main frame—(die-cast) Washer—''C'' washer for mounting cycling gear
88 75397 Washer-"C" wosher for 12" indexing lever 89 75609 Spring-12" record indexing lever spring 91 76809 Washer-Fickup thrust washer (fibre) 92 75841 Nut-Speed nut for 12" indexing lever return spring 93 75842 Spring-12" indexing lever return spring (formed) 94 Eracket-Muting switch hacket 95 Screw-#4.40 x'/* has head (inderted) thread out ing switch assembly 96 Torminal-#4 locking terminal for muting switch assembly 97 Switch-Muting switch less mounting for muting switch assembly 98 Screw = 3.48 x 13/32" binding head machine screw for muting switch assembly 99 Nut-12.20 pal nut for mounting 33'3-78 r.p.m. spindle 100 73864 Arm -Lift arm 101 Screw = 40.24 x 34" binding head machine screw and internal lockwasher 102 Spring-Return spring (coil type) for landing selector lever (110' O.D. x '.140' 103 Spring-Return spring (coil type) for landing selector lever (110' O.D. x '.140' 104 Spring-Return spring (coil type) (1/32" x 7/16' O.D. x '.140' 105 Switch-Meate screw backer (110' O.D. x '.140' 106 Screw = 6.32 x 14" hex head screw <	87	75845	Washer-Fibre washer for mounting cycling gear
89 75844 Lever-12" record indexing lever spring 91 76803 Washer-Pickup thrust washer (fibre) 92 75841 Nut-Speed nut for 12" indexing lever spring 93 75842 Spring-12" indexing lever sturn spring (formed) 94	88	75397	Washer—''C'' washer for 12" indexing lever
90 76309 Spring-12" second indexing lever spring 91 76804 Nut-Speed nut for 12" indexing lever return spring 92 75841 Nut-Speed nut for 12" indexing lever return spring 93 75842 Spring-12" indexing lever return spring 94	89	75844	Lever—12" record indexing lever
91 76803 Washer-Fickup thrust washer (fibre) 92 75842 Spring-12" indexing lever return spring (formed) 94	90	76309	Spring-12" record indexing lever spring
92 75841 Nut-Speed nut for 12" indexing lever return spring (formed) 93 75842 Spring-12" indexing lever return spring (formed) 94	91	76903	Washer—Pickup thrust washer (fibre)
33 75842 Spring-12' indexing lever return spring (formed) 94 — Bracket-Muting switch bracket 95 — Screw = #4.40 x 1/x" hex head (inderted) thread cutting serve to mount muting switch assembly 96 — Strew = #3.48 x 13/32" binding head machine screw for muting switch 98 — Screw = #3.48 x 13/32" binding head machine screw and internal lockwasher 100 75864 Arm — Lift arm 101 — Screw = #3.48 x 13/32" binding head machine screw and internal lockwasher 102 — Screw = #3.48 x 13/32" binding head machine screw and internal lockwasher 103 75859 Lever—Landing selector lever 104 — Screw = #6.32 x 1/x" hex head screw and internal lockwasher 105 — Washer—Metal washer (steel) (1/32" x 7/16" O.D. x 1/x" = 14 turns) 106 — Screw = #6.32 x 1/x" hex head screw and internal lockwasher 107 75850 Switch—"On-Off" switch complete with insulating strj [10] 108 7584 Lever—Reject lever 109 75857 Switch—"On-Off" switch complete with insulating strj [11] 111 76814 Spring-Fickup arm return lever spring (coil) <t< td=""><td>92</td><td>75841</td><td>Nut-Speed nut for 12" indexing lever return spring</td></t<>	92	75841	Nut-Speed nut for 12" indexing lever return spring
94 — Dracket—Muting switch bracket 95 — Screw # 4.40 * ¼' hox head (indented) thread cutting screw to mount muting switch assembly 96 7191 97 — Terminal # 4 locking terminal for muting switch assembly 98 — Screw - # 3.43 x 13/32" binding head machine screw for muting switch 98 — Nut - ½.20 pal nut for mounting 33½-78 r.p.m. spindle 101 — Screw - # 10.44 x ½" binding head machine screw and internal lockwasher 102 — Screw - # 10.44 x ½" binding head machine screw and internal lockwasher 103 75859 104 75800 105 — Screw - # 6.32 x ½" hax head screw 106 — Washer_Methy washer (sciel) (1/32" x 7/16" O.D. x .140) 107 Ssring - Reject spring (special) 108 Spring - Reject spring (special) 109 75856 110 75857 113 76908 114 76313 115 76313 116 77232 117 76912 118 76944 119 7848 111 76912 112 7849	93	75842	Spring-12" indexing lever return spring (formed)
 Cutting serve 2, a multing switch Jessembly Time 2, a serve 2, a multing switch Jessembly Serve - # 3.48 13/32" binding head machine screw for muting switch Screw - # 3.48 13/32" binding head machine screw and internal Jockwasher Screw - # 10-24 x ½" binding head machine screw and internal Jockwasher Screw - # 10-24 x ½" binding head machine screw and internal Jockwasher Screw - # 10-24 x ½" binding head machine screw and internal Jockwasher Screw - # 10-24 x ½" binding head machine screw and internal Jockwasher Screw - # 10-24 x ½" binding head machine screw and internal Jockwasher TS889 Lever-Landing selector lever TS889 Serew - # 6.22 x ½" hex head screw Screw - # 6.22 x ½" hex head screw T6312 Spring - Reight spring (special) T6312 Spring - Reight spring (special) T6313 Washer - "C" washer for mounting reject lever Strip - Reight spring (coll type) (.125" O.D. x 7/16" T6313 Lever - Stop lever T6314 Spring - Reiturn spring (coll type) (.125" O.D. x 7/16" T6313 Lever - Stop lever T6314 Spring - Reiturn spring (coll type) (.125" O.D. x 7/16" T6314 Spring - Reiturn spring (coll type) (.125" O.D. x 7/16" T6849 Kasher - Fire washer for pickup arm pivot shaft T6849 Kasher - Fire washer for pickup arm pivot shaft T6849 Kasher - Fire washer for pickup arm reiturn lever T6849 Kasher - Fire washer for pickup arm reiturn lever T6849 Kasher - Tire pawl spring (coil) T6849 Kasher - Fire washer for pickup arm reiturn lever T6849 Kasher - Fire washer for pickup arm spring (coil) T6850 Reitaner - Reitaning ring for pickup arm spring (coil) T6850 Reitaner - Reitaning ring for pickup arm spring (coil) T6850 Reitaner - Reitaning ri	94		Bracket-Muting switch bracket
96 77191 Switch-Muting switch-less mounting brackst 97	95		cutting screw to mount muting switch assembly
97 —— Terminal—# 4 locking terminal for muting switch assembly 98 —— Screw—#3.48 x 13/32" binding head machine screw for muting switch 99 —— Nut—V_2.20 pal nut for mounting 33V_3-78 r.p.m. spinale 100 75864 Arm—Lift arm 101 —— Screw—#10.24 x ½" binding head machine screw and internal lockwasher 103 75859 Lever—Landing selector lever 104 75860 Spring—Return spring (coil type) for landing se- lector lever (.110" O.D. x ½"-14 turns) 105 —— Screw—#6.32 t ½" hex head screw 106 —— Screw—#6.22 t ½" hex head screw 107 76312 Spring—Return spring (coil type) (.125" O.D. x 7/16" O.D. x .140) 108 75857 Switch—"On-Off" switch complete with insulating strip (111) and cover (112) 113 76908 Retaine—Switch cover retainer (flat) 114 76311 Lever—Stop lever 115 76312 Lever—Stop lever 116 72885 Strip—Baring strip for stop lever shaft 117 76912 Nut—Elseating rof 118 76944 Spring—Trip awa return lever 128 Yath Lever	96	77191	Switch-Muting switch-less mounting bracket
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97		Terminal—#4 locking terminal for muting switch
36 Image: Series and the series of the s	0.0	_	assembly Correct #3.48 x 13/32" hinding head machine screw
99 spinleNut-V_2.20 pal nut for mounting 33Vy-78 r.p.m. synale10075864Arm-Lift arm101 Screw-#10.24 x Max "binding head machine screw and internal lockwasher102 Screw-#10.24 x Max "binding head machine screw and internal lockwasher10375859Lever-Landing selector lever10475860Spring-Return spring (coil type) for landing se- lector lever (110" O.D. x Max-14 turns)105 x 140)Screw-#6.32 x Max head screw106 Screw-#6.32 x Max head screw10775312Spring-Reject spring (special)10875322Washer"C" washer for mounting reject lever10075856Lever-Reject lever10175857Switch-"On-Off" switch complete with insulating strip (111) and cover (112)11376908Retainer-Switch cover retainer (flat)11476314Spring-Pickup arm return lever spring (coil) (sp3' O.D3% turns)11876912Nut-Speed nut for mounting stop lever shaft11776912Nut-Speed nut for mounting two return lever11876944Spring-Pickup arm return lever spring (coil) (cp3' O.D3% turns)11975846WasherFibre washer for pickup arm return lever12176895Returner-Return grong (coilal) for elevating rod12276952Nut-Elevating rod12375951Red-Tirkup arm pivot shaft lever-1512476951Rod-Elevating rod125FoldSpring-Trip pawl spring	30		for muting switch
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Draw - 10-25 % % Dinding head machine serew and internal lockwasher 102	100	15864	Arm—Lift arm
102 Screw-#10.24 x_M'' binding head machine screw and internal lockwasher10375859Lever-Landing selector lever10475860Spring-Return spring (coil type) for landing se- lector lever (10° O.D. $x_M''-14$ turns)105 	101		and internal lockwasher
and internal lockwasher10375859104758605pring-Return spring (coil type) for landing selector laver ($110^{\circ} O.D. x^{3} t^{-1} 4 turns$)105	102		Screw-#10-24 x 3/8" binding head machine screw
10375859Lever-Landning selector lever10475860Spring-Return spring (coil type) for landing selector lever (.110" O.D. x $\frac{3}{4}$ "-14 turns)105			and internal lockwasher
10410500Spring-Return spring (coil type) for landing se- lactor laver (110° O.D. $\chi^{+}_{-}^{+}$ "14 turns)105 x .140)106Screw-#6-32 x 1/4" hex head screw10776312108753221097585610975856100758571107585711175857112Switch-"On-Off" switch complete with insulating strip (111) and cover (112)113769081147631411576313116772581177691211876944119788491197584811075849111769121117691211275849113769441147691411576844116772581177691211876944119758481197584811075849111169221117584911275849113769511147691211575849116772591177691211876944119758491107584911111111111111211376950114769121157631311576311167725911776357 </td <td>103</td> <td>75859</td> <td>Lever—Landing selector lever</td>	103	75859	Lever—Landing selector lever
105 Washer-Metal washer (steel) (1/32" x 7/16" O.D. x .140)106 Screw $\# 6-32 x 1/4"$ hex head screw1077631210875392109758561097585710075857101758571027585610375857104758571058115763131167722811776912118769481197584711677228117769121187694411975848119758481107584911176912112758491137694411476914115763131167722811776912118769441197584811975849120758491217584912276952121758491227695112376951124769521257630912677259127753971287539712977250129772501297725012977250129772501297725012976901129129129772501297690113076951131 <td>104</td> <td>12880</td> <td>lector lever (.110" O.D. x 3/2"-14 turns)</td>	104	12880	lector lever (.110" O.D. x 3/2"-14 turns)
106 \times .140)106 $$ Screw -#6-32 x 1/4" hex head screw10776312Spring -Reject spring (special)10875392Washer -''C'' washer for mounting reject lever10975856Lever-Reject lever10175857Switch''C'' washer for mounting reject lever11276908Retainer-Switch cover retainer (flat)11276908Retainer-Switch cover retainer (flat)11376908Retainer-Stop lever11677258Strip -Bearing strip for stop lever shaft11776912Nut-Speed nut for mounting stop lever bearing shafts11876944Spring -Pickup arm return lever spring (coil) (.593" O.D31/2 turns)11975848Washer -Fibre washer for pickup arm return lever12175850Retainer -Retaining ring for pickup arm return lever12276952Nut -Elevating rod adjustment nut lever12376951Rod -Elevating rod12476952Nut -Elevating ring spring -Trip pawl cushion spring (coil)12576906Spring -Trip pawl spring12677269Ring -Retaining ring12775337Washer -''C' washer12876901Lever-10" indexing lever13176953Pawl-Trip pawl-uower13276901Burng -Raturn spring (coil) (125" O.D. x 7/16" -14 turns)13376953Pawl-Trip pawl-uower13476314Spring -Stip slide135Washer-Metal washer (stes)) (1/	105		Washer-Metal washer (steel) (1/32" x 7/16" O.D.
106Screw - # 6-32 x 1/4" hex head screw10776312Spring-Reject spring (special)10875392Washer - "C" washer for mounting reject lever10975886Lever-Reject lever10075887Switch - "On-Off" switch complete with insulating strip (111) and cover (112)11376908Retainer-Switch cover retainer (flat)11476314Spring-Return spring (coil type) (.125" O.D. x 7/16" -14 turns)11576313Lever-Stop lever11677258Strip-Bearing strip for stop lever shaft11776912Nut-Speed nut for mounting stop lever bearing shafts11876944Spring-Pickup arm return lever spring (coil) (.593" O.D3½ turns)11975848Washer-Fibre washer for pickup arm return lever12175850Retainer-Retaining ring for pickup arm return lever12276952Nut-Elevating rod adjustment nut lever12376946Spring-Trip gawl spring12476946Spring-Trip pawl spring12576906Spring-Trip pawl cushion spring (coil)13076955Gear-Cycling gear complete with shaft and en- gagement pawl 130A13176909Bumper-Rubber bumper for 10" indexing lever13276901Lever-10" indexing lever13376901Lever-10" indexing lever13476915Gear-Cycling gear complete with shaft and en- gagement pawl 130A13576901Lever-10" indexing lever13676905Spring-Escape lever sprin			x .140)
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112Surjetn's disconstruction11376908Retainer-Switch cover retainer (flat)11476314Spring-Return spring (coll type) (.125" O.D. x 7/16" -14 turns)11576313Lever-Stop lever11677288Strip-Bearing strip for stop lever shaft11776912Nut-Speed nut for mounting stop lever bearing shafts11876944Spring-Pickup arm return lever spring (coil) (.593" O.D. $-31/2$ turns)11975848Washer-Fibre washer for pickup arm pivot shaft12075849Lever-Pickup arm return lever12175850Retainer-Retaining ring for pickup arm return lever12276952Nut-Elevating rod adjustment nut12376951Rod-Elevating rod12476966Spring-Trup arm jivot shaft and lever12576906Spring-Trip pawl cushion spring12677269Ring-Retaining ring1277537Washer-"C" washer12876309Spring-Trip pawl cushion spring (coil)13076955Pawl-Trip pawl-lower13276900Bumper-Rubber bumper for 10" indexing lever13376953Pawl-Trip pawl-lower13476314Spring-Return spring (coil type) (.125" O.D. x 7/16" -14 turns)135Screw-#6-32 x 1/4" hex head screw13775862Link-Control link13875397Washer-"C" washer13976950Slide-Trip slide14075861Spring-Escape lever spring (coil) (.120" O.D. x 1	111	75857	switch—"On-Off" switch complete with insulating
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11677258Strip-Bearing strip for stop lever shaft11776912Nut-Speed nut for mounting stop lever bearing shafts11876942Spring-Pickup arm return lever spring (coil) (.593" O.D. $-31/2$ turns)11975848Washer-Fibre washer for pickup arm pivot shaft Lever-Pickup arm return lever12175850Retainer-Retaining ring for pickup arm return lever12276951Nut-Elevating rod adjustment nut12376951Rod-Elevating rod adjustment nut12476946Shaft-Pickup arm pivot shaft and lever12576906Spring-Trip gawl spring (coila) for elevating rod12677269Ring-Retaining ring12775397Washer-"C" washer12876309Spring-Trip pawl spring12977250Pawl-Trip pawl-upper12977260Bumper-Trip pawl cushion spring (coil)13076955Gear-Cycling gear complete with shaft and engagement pawl 130A13176951Pawl-Trip pawl-lower13276900Bumper-Rubber bumper for 10" indexing lever13376901Lever-10" indexing lever13476314Spring-Escape lever spring (coil type) (.125" O.D. x 7/16"135washer-"C" washer136Screw-#6-32 x 1/4" hex head screw13775862Link-Control link13875397Washer-Tip slide14075861Spring-Escape lever spring (coil) (.120" O.D. x 1/2" -21 turns)14176956Slide-Cycling slid	115	76313	Lever_Stop lever
11776912Nut—Speed nut for mounting stop lever bearing shafts11876941Spring—Pickup arm return lever spring (coil) (.593" O.D3½ turns)11975848Washer—Fibre washer for pickup arm pivot shaft12075849Lever—Pickup arm return lever12175850Retainer—Retaining ring for pickup arm return lever12276952Nut—Elevating rod adjustment nut12376961Shaft—Pickup arm pivot shaft and lever12476946Shaft—Pickup arm pivot shaft and lever12576906Spring—Thrust spring (conical) for elevating rod12677269Ring—Retaining ring12775337Washer—"C" washer12876309Spring—Trip pawl spring12977250Pawl—Trip pawl-upper13076955Gear—Cycling gear complete with shaft and engagement pawl 130A13176937Pawl—Trip pawl—lower13276900Bumper—Rubber bumper for 10" indexing lever13476314Spring—Return spring (coil type) (.125" O.D. x 7/16" — 14 turns)135Washer—"C" washer13775862Link—Control link13875397Washer—"C" washer13976950Slide—Trip slide14075861Spring—Escape lever spring (coil) (.120" O.D. x $\frac{1}{2}"$ —21 turns)14176956Slide—Cycling slide and cam assembly—less escape lever spring14277228Spring—Stabilizing spring (coil) for cycling slide143Screw—#6-3	116	77258	Strip—Bearing strip for stop lever shaft
shafts11876944Spring-Pickup arm return lever spring (coil) (.593" O.D. $-3\frac{1}{2}$ turns)11975848Washer-Fibre washer for pickup arm pivot shaft12075849Lever-Pickup arm return lever12175850Retainer-Retaining ring for pickup arm return lever12276952Nut-Elevating rod adjustment nut12376951Rod-Elevating rod adjustment nut12476946Shaft-Pickup arm pivot shaft and lever12576906Spring-Thrust spring (coila) for elevating rod12677269Ring-Retaining ring12775337Washer-"C" washer12876309Spring-Trip pawl spring12977250Pawl-Trip pawl-upper129477249Spring-Trip pawl cushion spring (coil)13076955Gear-Cycling gear complete with shaft and engagement pawl 130A13176950Bumper-Rubber bumper for 10" indexing lever13276900Bumper-Rubber bumper for 10" indexing lever13376901Lever-10" indexing lever13476314Spring-Return spring (coil type) (.125" O.D. x 7/16" -14 turns)135Washer-Metal washer (steel) (1/32" x 7/16" O.D. x .140)136Screw # 6-32 x 1/4" hex head screw13775862Link-Control link13875397Washer-"C" washer13976950Slide-Trip slide14075861Spring-Stabilizing spring (coil) (.120" O.D. x 1/2" -21 turns)14176956Sl	117	76912	Nut-Speed nut for mounting stop lever bearing
118JostSpring-Fickup arm return lever spring (cdi) (.533' O.D3)'z turns)11975848Washer-Fibre washer for pickup arm pivot shaft12075849Lever-Pickup arm return lever12175850Retainer-Retaining ring for pickup arm return lever12276952Nut-Elevating rod adjustment nut12376951Rod-Elevating rod12476946Shaft-Pickup arm pivot shaft and lever12576906Spring-Thrust spring (conical) for elevating rod12677269Ring-Retaining ring12775397Washer-''C'' washer12876309Spring-Trip pawl spring12977249Spring-Trip pawl cushion spring (coil)13076955Gear-Cycling gear complete with shaft and engagement pawl 130A13176953Pawl-Trip pawl-lower13276900Bumper-Rubber bumper for 10" indexing lever13376901Lever-10" indexing lever13476314Spring-Return spring (coiltype) (.125" O.D. x 7/16" -14 turns)135Washer-Metal washer (steel) (1/32" x 7/16" O.D. x 140)136Screw-#6-32 x ¼" hex head screw13775862Link-Control link13875397Washer-YC' washer13976950Slide-Trip slide14075861Spring-Escape lever spring (coil) (.120" O.D. x $\frac{1}{2}"$ -21 turns)14176956Slide-Cycling slide and cam assembly-less scape lever spring14277228Spring-Stabilizing sprin		80044	shafts
11975848Washer—Fibre washer for pickup arm pivot shaft12075849Lever—Pickup arm return lever12175850Retainer—Retaining ring for pickup arm return12276952Nut—Elevating rod adjustment nut12376951Rod—Elevating rod12476946Shaft—Pickup arm pivot shaft and lever12576906Spring—Thrust spring (conical) for elevating rod12677269Ring—Retaining ring12775397Washer—''C'' washer12876309Spring—Trip pawl spring12977250Pawl—Trip pawl cushion spring (coil)13076955Gear—Cycling gear complete with shaft and en- gagement pawl 130A13176953Pawl—Trip pawl—lower13276900Bumper—Rubber bumper for 10" indexing lever13376901Lever—10" indexing lever13476314Spring—Return spring (coiltype) (.125" O.D. x 7/16" — 14 turns)135——Washer—Metal washer (steel) (1/32" x 7/16" O.D. x 140)136——Screw—#6-32 x 1/4" hex head screw13775862Link—Control link13875397Washer—''C'' washer13976950Slide—Trip slide14075861Spring—Escape lever spring (coil) (.120" O.D. x 1/2" — 21 turns)14176956Slide—Cycling slide and cam assembly—less escape lever spring14277228Spring—Escape lever spring (coil) for cycling slide143——Screw—#6-32 x 1/4" hex head screw144<	118	16944	(.593" O.D31/2 turns)
12078849Lever-Pickup arm return lever12178850Retainer-Retaining ring for pickup arm return lever12276952Nut-Elevating rod adjustment nut12376951Rod-Elevating rod12476946Shaft-Pickup arm pivot shaft and lever12576906Spring-Thrust spring (conical) for elevating rod12677269Ring-Retaining ring12775397Washer-"C" washer12876309Spring-Trip pawl spring12977250Pawl-Trip pawl cushion spring (coil)13076955Gear-Cycling gear complete with shaft and engagement pawl 130A13176953Pawl-Trip pawl-lower13276900Bumper-Rubber bumper for 10" indexing lever13376901Lever-10" indexing lever13476314Spring-Return spring (coiltype) (.125" O.D. x 7/16" -14 turns)135Washer-Metal washer (steel) (1/32" x 7/16" O.D. x 140)136Screw-#6-32 x ¼" hex head screw13775862Link-Control link13875397Washer-Trip slide14075861Spring-Escape lever spring (coil) (.120" O.D. x ½" -21 turns)14176956Slide-Cycling slide and cam assembly-less escape lever spring14277228Spring-Stabilizing spring (coil) for cycling slide143Screw-#6-32 x ¼" hex head screw14475872Plate-Bearing plate for cycling slide14576897Washer-Metal washer (brass) for cycling slide	119	75848	Washer—Fibre washer for pickup arm pivot shaft
12175850Retainer-Retaining ring for pickup arm return laver12276952Nut-Elevating rod adjustment nut12376951Rod-Elevating rod12476946Shaft-Pickup arm pivot shaft and lever12576906Spring-Thrust spring (conical) for elevating rod12677269Ring-Retaining ring12775397Washer-"C" washer12876309Spring-Trip pawl spring12977250Pawl-Trip pawl cushion spring (coil)13076955Gear-Cycling gear complete with shaft and en- gagement pawl 130A13176953Pawl-Trip pawl-lower13276901Lever-10" indexing lever13376901Lever-10" indexing lever13476314Spring-Return spring (coiltype) (.125" O.D. x 7/16" -14 turns)135Washer-Metal washer (steel) (1/32" x 7/16" O.D. x 1.140)136Screw-#6-32 x ¼" hex head screw13775862Link-Control link13875397Washer-Tc" washer13976950Slide-Trip slide14075861Spring-Escape lever spring (coil) (.120" O.D. x ½" -21 turns)14176956Slide-Cycling slide and cam assembly-less escape lever spring14277228Spring-Stabilizing spring (coil) for cycling slide (.146" O.D. $x 4/"-14/_2$ turns)143Screw-#6-32 x 1/4" hex head screw14475872Plate-Bearing plate for cycling slide14576897Washer-Metal washer (brass) for cy	120	75849	Lever—Pickup arm return lever
12276952Nut-Elevating rod adjustment nut12376951Rod-Elevating rod12476946Shaft-Pickup arm pivot shaft and lever12576906Spring-Thrust spring (conical) for elevating rod12677269Ring-Retaining ring12775397Washer-"C" washer12876309Spring-Trip pawl spring12977250Pawl-Trip pawl-upper129A77249Spring-Trip pawl cushion spring (coil)13076955Gear-Cycling gear complete with shaft and engagement pawl 130A13176953Pawl-Trip pawl-lower13276901Lever-10" indexing lever13376901Lever-10" indexing lever13476314Spring-Return spring (coiltype) (.125" O.D. x 7/16" -14 turns)135Washer-Metal washer (steel) (1/32" x 7/16" O.D. x 140)136Screw-#6-32 x 1/4" hex head screw13775862Link-Control link13875397Washer-T'C" washer13976950Slide-Trip slide14075861Spring-Escape lever spring (coil) (.120" O.D. x 1/2" -21 turns)14176956Slide-Cycling slide and cam assembly-less escape lever spring14277228Spring-Stabilizing spring (coil) for cycling slide (.146" O.D. $x 3/4"-14/2$ turns)143Screw-#6-32 x 1/4" hex head screw14475872Plate-Bearing plate for cycling slide14576897Washer-Metal washer (brass) for cycling slide146 <td>121</td> <td>75850</td> <td>Retainer-Retaining ring for pickup arm return</td>	121	75850	Retainer-Retaining ring for pickup arm return
12376951Rod-Elevating rod12476946Shaft-Pickup arm pivot shaft and lever12576906Spring-Thust spring (conical) for elevating rod12677269Ring-Retaining ring12775397Washer-"C" washer12876309Spring-Trip pawl spring12977250Pawl-Trip pawl-upper129A77249Spring-Trip pawl cushion spring (coil)13076955Gear-Cycling gear complete with shaft and en- gagement pawl 130A13176953Pawl-Trip pawl-lower13276900Bumper-Rubber bumper for 10" indexing lever13376901Lever-10" indexing lever13476314Spring-Return spring (coil type) (.125" O.D. x 7/16" -14 turns)135Screw-#6-32 x 1/4" hex head screw13775862Link-Control link13875397Washer-"C" washer13976950Slide-Trip slide14075861Spring-Escape lever spring (coil) (.120" O.D. x 1/2" -21 turns)14176955Slide-Cycling slide and cam assembly-less escape lever spring14277228Spring-Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"-141/2 turns)143Screw-#6-32 x 1/4" hex head screw14475872Plate-Bearing plate for cycling slide14576897Washer-Metal washer (bras) for cycling slide14475872Plate-Bearing plate for cycling slide14576897Washer-Metal washer (bras) for cycling slide<	122	76952	Nut-Elevating rod adjustment nut
12476946Shaft—Pickup arm pivot shaft and lever12576906Spring—Thrust spring (conical) for elevating rod12677269Ring—Retaining ring12775397Washer—"C" washer12876309Spring—Trip pawl spring12977250Pawl—Trip pawl—upper129A77249Spring—Trip pawl cushion spring (coil)13076955Gear—Cycling gear complete with shaft and en- gagement pawl 130A13176953Pawl—Trip pawl—lower13276900Bumper—Rubber bumper for 10" indexing lever13376911Lever—10" indexing lever13476314Spring—Return spring (coiltype) (.125" O.D. x7/16" —14 turns)135—x.140)136Screw—#6-32 x 1/4" hex head screw13775862Link—Control link13875397Washer—"C" washer13976950Slide—Trip slide14075861Spring—Escape lever spring (coil) (.120" O.D. x 1/2" —21 turns)14176955Slide—Cycling slide and cam assembly—less escape lever spring14277228Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"—141/2 turns)143—Screw—#6-32 x 1/4" hex head screw14475872Plate—Bearing plate for cycling slide14576897Washer—Metal washer (brass) for cycling slide146—Screw—#6-32 x 1/4" hex head screw14877934Spring—Slide detent spring	123	76951	Rod—Elevating rod
12576906Spring—Thrust spring (conical) for elevating rod12677269Ring—Retaining ring12775397Washer—"C" washer12876309Spring—Trip pawl spring12977250Pawl—Trip pawl—upper129A77249Spring—Trip pawl cushion spring (coil)13076955Gear—Cycling gear complete with shaft and en- gagement pawl 130A13176953Pawl—Trip pawl—lower13276900Bumper—Rubber bumper for 10" indexing lever13376901Lever—10" indexing lever13476314Spring—Return spring (coiltype) (.125" O.D. x 7/16" — 14 turns)135Washer—Metal washer (steel) (1/32" x 7/16" O.D. x .140)136Screw—#6-32 x 1/4" hex head screw13775862Link—Control link13875397Washer—''C'' washer13976950Slide—Trip slide14075861Spring—Escape lever spring (coil) (.120" O.D. x 1/2" — 21 turns)14176956Slide—Cycling slide and cam assembly—less escape lever spring14277228Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"-141/2 turns)143Screw—#6-32 x 1/4" hex head screw14475872Plate—Bearing plate for cycling slide14576897Washer-Metal washer (brass) for cycling slide146Screw—#6-32 x 1/4" hex head screw14877934Spring—Slide detent spring	124	76946	Shaft—Pickup arm pivot shaft and lever
126 77269 Ring-Retaining ring 127 75397 Washer-"C" washer 128 76309 Spring-Trip pawl spring 129 77250 Pawl-Trip pawl-upper 129A 77249 Spring-Trip pawl cushion spring (coil) 130 76955 Gear-Cycling gear complete with shaft and en- gagement pawl 130A 131 76953 Pawl-Trip pawl-lower 132 76900 Bumper-Rubber bumper for 10" indexing lever 133 76901 Lever-10" indexing lever 134 76314 Spring-Return spring (coil type) (.125" O.D. x 7/16" -14 turns) 135 Washer-Metal washer (steel) (1/32" x 7/16" O.D. x .140) 136 Screw-#6-32 x 1/4" hex head screw 137 75862 Link-Control link 138 75397 Washer-T'C" washer 139 76950 Slide-Trip slide 140 75861 Spring-Escape lever spring (coil) (.120" O.D. x 1/2" -21 turns) 141 76956 Slide-Cycling slide and cam assembly-less escape lever spring 142 77228 Spring-Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"-141/2 turns)	125	76906	Spring—Thrust spring (conical) for elevating rod
12775397Washer-"C" washer12876309Spring-Trip pawl spring12977250Pawl-Trip pawl-upper129A77249Spring-Trip pawl cushion spring (coil)13076955Gear-Cycling gear complete with shaft and en- gagement pawl 130A13176953Pawl-Trip pawl-lower13276900Bumper-Rubber bumper for 10" indexing lever13376901Lever-10" indexing lever13476314Spring-Return spring (coil type) (.125" O.D. x 7/16" -14 turns)135Washer-Metal washer (steel) (1/32" x 7/16" O.D. x 140)136Screw-#6-32 x 1/4" hex head screw13775862Link-Control link13875397Washer-"C" washer13976950Slide-Trip slide14075861Spring-Escape lever spring (coil) (.120" O.D. x 1/2" -21 turns)14176956Slide-Cycling slide and cam assembly-less escape lever spring14277228Spring-Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"-141/2 turns)143Screw-#6-32 x 1/4" hex head screw14475872Plate-Bearing plate for cycling slide14576897Washer-Metal washer (brass) for cycling slide146Screw-#6-32 x 1/4" hex head screw14877934Spring-Slide detent spring	126	77269	Ring—Retaining ring
12015010Spring—Trip pawl spring12977250Pawl—Trip pawl -upper129A77250Pawl—Trip pawl cushion spring (coil)13076955Gear—Cycling gear complete with shaft and en- gagement pawl 130A13176953Pawl—Trip pawl—lower13276901Lever—10" indexing lever13376901Lever—10" indexing lever13476314Spring—Return spring (coil type) (.125" O.D. x 7/16" -14 turns)135Washer—Metal washer (steel) (1/32" x 7/16" O.D. x 140)136Screw—#6-32 x ¼" hex head screw13775862Link—Control link13875397Washer—''C" washer13976950Slide—Trip slide14075861Spring—Escape lever spring (coil) (.120" O.D. x ½" -21 turns)14176956Slide—Cycling slide and cam assembly—less escape lever spring143Screw—#6-32 x ¼" hex head screw14475872Plate—Bearing plate for cycling slide (.146" O.D. x ¾"-14½ turns)143Screw—#6-32 x ¼" hex head screw14475872Plate—Bearing plate for cycling slide14576897Washer—Metal washer (brass) for cycling slide14877934Spring—Slide detent spring	127	75397	Washer-"C" washer
129417249Spring — Trip pawl cushion spring (coil)13076955Gear — Cycling gear complete with shaft and engagement pawl 130A13176953Pawl—Trip pawl—lower13276900Bumper—Rubber bumper for 10" indexing lever13376901Lever—10" indexing lever13476314Spring—Return spring (coil type) (.125" O.D. x 7/16" —14 turns)135—Washer—Metal washer (steel) (1/32" x 7/16" O.D. x 140)136—Screw—#6-32 x 1/4" hex head screw13775862Link—Control link13875397Washer—''C" washer13976950Slide—Trip slide14075861Spring—Escape lever spring (coil) (.120" O.D. x 1/2" —21 turns)14176956Slide—Cycling slide and cam assembly—less escape lever spring14277228Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"-141/2 turns)143—Screw—#6-32 x 1/4" hex head screw14475872Plate—Bearing plate for cycling slide14576897Washer—Metal washer (brass) for cycling slide14877934Spring—Slide detent spring	128	77250	Spring-Irip pawi spring
13076955Gear — Cycling gear complete with shaft and engagement pawl 130A13176953Pawl—Trip pawl—lower13276900Bumper—Rubber bumper for 10" indexing lever13376901Lever—10" indexing lever13476314Spring—Return spring (coil type) (.125" O.D. x 7/16" -14 turns)135—Washer—Metal washer (steel) (1/32" x 7/16" O.D. x .140)136—Screw—#6-32 x 1/4" hex head screw13775862Link—Control link13875397Washer—'C" washer13976950Slide—Trip slide14075861Spring—Escape lever spring (coil) (.120" O.D. x 1/2" —21 turns)14176956Slide—Cycling slide and cam assembly—less escape lever spring14277228Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"—141/2 turns)143—Screw—#6-32 x 1/4" hex head screw14475872Plate—Bearing plate for cycling slide14576897Washer—Metal washer (bras) for cycling slide14877934Spring—Slide detent spring	1294	77249	Spring-Trip pawl cushion spring (coil)
gagement pawl 130A 131 76953 132 76900 Bumper-Rubber bumper for 10" indexing lever 133 76901 Lever-10" indexing lever 134 76314 Spring-Return spring (coil type) (.125" O.D. x 7/16"	130	76955	Gear-Cycling gear complete with shaft and en-
131 76953 Pawl—Trip pawl—lower 132 76900 Bumper—Rubber bumper for 10" indexing lever 133 76901 Lever—10" indexing lever 134 76314 Spring—Return spring (coiltype) (.125" O.D. x 7/16" —14 turns) 135 — Washer—Metal washer (steel) (1/32" x 7/16" O.D. x .140) 136 — Screw—#6-32 x ¼" hex head screw 137 75862 Link—Control link 138 75377 Washer—''C'' washer 139 769505 Slide—Trip slide 140 75861 Spring—Escape lever spring (coil) (.120" O.D. x ½" —21 turns) 141 76956 Slide—Cycling slide and cam assembly—less escape lever spring 142 77228 Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x ¾"—14½ turns) 143 — Screw—#6-32 x ¼" hex head screw 144 75872 Plate—Bearing plate for cycling slide 145 76897 Washer—Metal washer (bras) for cycling slide 146 — Screw—#6-32 x ¼" hex head screw 148 77934 Spring—Slide detent spring			gagement pawl 130A
132 1900 Bumper-Rubber bumper for 10" indexing lever 133 76901 Lever-10" indexing lever 134 76314 Spring-Return spring (coil type) (.125" O.D. x 7/16" -14 turns) 135	131	76953	Pawl-Trip pawl-lower
133 76314 Spring-Return spring (coil type) (.125" O.D. x 7/16" -14 turns) 135 Washer-Matal washer (steel) (1/32" x 7/16" O.D. x .140) 136 Screw-#6-32 x 1/4" hex head screw 137 75862 Link-Control link 138 75397 Washer-"C" washer 139 76950 Slide-Trip slide 140 75861 Spring-Escape lever spring (coil) (.120" O.D. x 1/2" -21 turns) 141 76956 Slide-Cycling slide and cam assembly-less escape lever spring 142 77228 Spring-Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"-141/2 turns) 143 Screw-#6-32 x 1/4" hex head screw 144 75872 Plate-Bearing plate for cycling slide 145 76897 Washer-Metal washer (brass) for cycling slide 146 Screw-#6-32 x 1/4" hex head screw 148 77934 Spring-Slide detent spring	132	76900	Bumper-Kubber bumper for 10" indexing lever
135 -14 turns) 135 136 137 75862 138 75397 139 76950 140 75861 139 76950 140 75861 139 76950 140 75861 Spring-Escape lever spring (coil) (.120" O.D. x ¹ / ₂ " -21 turns) -21 turns) 141 76956 Slide-Cycling slide and cam assembly-less escape lever spring (coil) for cycling slide (.146" O.D. x ³ / ₄ " -14 ¹ / ₂ turns) 142 77228 Spring-Stabilizing spring (coil) for cycling slide (.146" O.D. x ³ / ₄ " -14 ¹ / ₂ turns) 143 Screw-#6-32 x ¹ / ₄ " hex head screw 144 75872 145 76897 146 147 Washer-Metal washer (brass) for cycling slide 148 77934 Spring-Slide detent spring	133	76314	Spring-Return spring (coll type) (.125" O.D x7/16"
135 Washer-Metal washer (steel) (1/32" x 7/16" O.D. x 140) 136 Screw-#6-32 x 1/4" hex head screw 137 75862 Link-Control link 138 75397 Washer-"C" washer 139 76950 Slide-Trip slide 140 75861 Spring-Escape lever spring (coil) (.120" O.D. x 1/2" -21 turns) 141 76956 Slide-Cycling slide and cam assembly-less escape lever spring 142 77228 Spring-Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"-141/2 turns) 143 Screw-#6-32 x 1/4" hex head screw 144 75872 Plate-Bearing plate for cycling slide 145 76897 Washer-Metal washer (braas) for cycling slide 146 Screw-#6-32 x 1/4" hex head screw 148 77934 Spring-Slide detent spring			-14 turns)
136 Screw - # 6-32 x 1/4" hex head screw 137 75862 LinkControl link 138 75397 Washer - "C" washer 139 76950 Slide Trip slide 140 75861 Spring Escape lever spring (coil) (.120" O.D. x 1/2" 21 turns) 141 76956 Slide Cycling slide and cam assemblyless escape lever spring 142 77228 SpringStabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"141/2 turns) 143 Screw # 6-32 x 1/4" hex head screw 144 75872 Plate Bearing plate for cycling slide 145 76897 Washer Metal washer (braas) for cycling slide 146 Screw # 6-32 x 1/4" hex head screw 148 77934 Spring Slide detent spring	135		Washer—Metal washer (steel) (1/32" x 7/16" O.D. x .140)
137 75862 Link—Control link 138 75397 Washer—"C" washer 139 76950 Slide—Trip slide 140 75861 Spring—Escape lever spring (coil) (.120" O.D. x 1/2" —21 turns) 141 76956 Slide—Cycling slide and cam assembly—less escape lever spring 142 77228 Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x 3/4"—141/2 turns) 143 Screw—# 6-32 x 1/4" hex head screw 144 75872 Plate—Bearing plate for cycling slide 145 76897 Washer—Metal washer (braas) for cycling slide 146 Screw—# 6-32 x 1/4" hex head screw 148 77934 Spring—Slide detent spring	136		Screw-#6-32 x 1/4" hex head screw
 138 75397 Washer—''C'' washer 139 76950 Slide—Trip slide 140 75861 Spring—Escape lever spring (coil) (.120" O.D. x ¹/₂" _21 turns) 141 76956 Slide—Cycling slide and cam assembly—less escape lever spring 142 77228 Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x ³/₄" - 14¹/₂ turns) 143 —— Screw—#6-32 x ¹/₄" hex head screw 144 75872 Plate—Bearing plate for cycling slide 145 76897 Washer—Metal washer (brass) for cycling slide 146 —— Screw—#6-32 x ¹/₄" hex head screw 148 77934 Spring—Slide detent spring 	137	75862	Link—Control link
 139 76950 Slide—Trip slide 140 75861 Spring—Escape lever spring (coil) (.120" O.D. x ¹/₂" —21 turns) 141 76956 Slide—Cycling slide and cam assembly—less escape lever spring 142 77228 Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x ³/₄" -14¹/₂ turns) 143 —— Screw—#6-32 x ¹/₄" hex head screw 144 75872 Plate—Bearing plate for cycling slide 145 76897 Washer—Metal washer (brass) for cycling slide 146 —— Screw—#6-32 x ¹/₄" hex head screw 148 77934 Spring—Slide detent spring 	138	75397	Washer-''C'' washer
 140 75861 Spring—Escape lever spring (coil) (.120" O.D. x 1/2" -21 turns) 141 76956 Slide—Cycling slide and cam assembly—less escape lever spring 142 77228 Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x 34"-14/2 turns) 143 —— Screw—#6-32 x 1/4" hex head screw 144 75872 Plate—Bearing plate for cycling slide 145 76897 Washer—Metal washer (brass) for cycling slide 146 —— Screw—#6-32 x 1/4" hex head screw 148 77934 Spring—Slide detent spring 	139	76950	Slide-Trip slide
141 76956 Slide-Cycling slide and cam assembly-less escape lever spring 142 77228 Spring-Stabilizing spring (coil) for cycling slide (.146" O.D. x ¾"-14½ turns) 143 Screw-#6-32 x ¼" hex head screw 144 75872 Plate-Bearing plate for cycling slide 145 76897 Washer-Metal washer (brass) for cycling slide 146 Screw-#6-32 x ¼" hex head screw 148 77934 Spring-Slide detent spring	140	75861	Spring—Escape lever spring (coil) (.120" O.D. x 1/2" —21 turns)
lever spring14277228Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x ¾"-14½ turns)143Screw—#6-32 x ¼" hex head screw14475872Plate—Bearing plate for cycling slide14576897Washer—Metal washer (brass) for cycling slide146Screw=#6-32 x ¼" hex head screw14877934Spring—Slide detent spring	141	76956	Slide—Cycling slide and cam assembly—less escape
142 77228 Spring—Stabilizing spring (coil) for cycling slide (.146" O.D. x ¾"-14½ turns) 143 Screw-#6-32 x ¼" hex head screw 144 75872 Plate —Bearing plate for cycling slide 145 76897 Washer—Metal washer (brass) for cycling slide 146 Screw-#6-32 x ¼" hex head screw 148 77934 Spring—Slide detent spring			lever spring
143 Screw-#6-32 x 1/4" hex head screw 144 75872 Plate-Bearing plate for cycling slide 145 76897 Washer-Metal washer (brass) for cycling slide 146 Screw-#6-32 x 1/4" hex head screw 148 77934 Spring-Slide detent spring	142	77228	Spring-Stabilizing spring (coil) for cycling slide
144 75872 Plate — Bearing plate for cycling slide 145 76897 Washer—Metal washer (brass) for cycling slide 146 — Screw — # 6-32 x ¹ / ₄ " hex head screw 148 77934 Spring—Slide detent spring	143		(.190 U.D. $x = 74 - 19 \frac{1}{2} turns)$ Screw = #6.32 x 1/4" hex head screw
145 76897 Washer-Metal washer (brass) for cycling slide 146 Screw-#6-32 x 1/4" hex head screw 148 77934 Spring-Slide detent spring	143	75872	Plate—Bearing plate for cycling slide
146Screw-#6-32 x ¼" hex head screw14877934Spring-Slide detent spring	145	76897	Washer—Metal washer (brass) for cycling slide
148 77934 Spring-Slide detent spring	146		Screw-#6-32 x 1/4" hex head screw
	148	77934	Spring—Slide detent spring

930409 Series

REPLACEMENT PARTS (Cont.)

ILL. NO.	STOCK NO.	DESCRIPTION
	_	MOTOR ASSEMBLIES
		Motors Stamped:
		5046-for 930409-3 & -6
	1 8	5355-for 930409-5 & -10
		5047—for 930409-9
		5432—for 930409-11
59	76744	Spring—Hairpin spring for idler wheel
60	76743	Washer—Flat metal washer
61	76750	Wheel-Idler wheel
62	77132	Plate—Drive pulley mounting plate complete with three pulleys
62A	76746	Pulley-78 r.p.m. pulley
62B	76747	Pulley-45 r.p.m. pulley
62C	76748	Pulley-33 1/3 r.p.m. pulley
63	- 1	Screw—Screw to mount drive pulley plate
64		Lockwasher—Lockwasher for pulley plate screw
65	77685	Lever—Speed shift lever for #5046, #5047, and #5432 motors (930409.3, -6, -9 and -11)
65	77133	Lever—Speed shift lever for #5355 motor (930409-5 and -10)
66	77229	Grommet-Rubber grommet for speed shift lever
67	75432	Spring—Hairpin spring for idler wheel plate and support
68	▲ 1	Plate—Idler wheel slide plate and support assembly
69	78374	Spring—Slide plate tension spring
70	76751	Grommet-Rubber grommet for motor mounting
71	76743	Washer—Slide plate bearing washer (metal)
72	76749	Sleeve—Spring sleeve pulley for 60 cycle operation
72	77686	SleeveSpring sleeve pulley for 50 cycle operation for motors #5432, #5046 and #5047 (930409-3, -6, -9 and -11)
73	30870	Connector-2 prong male connector
74	_	Motor-Motor assembly complete (Refer to page 13)
75	76755	Spring-Detent spring for speed shift lever
76	77134	Collar-Collar for speed shift lever mounting
	•	Item 68 discontinued. Use Stock No. 78371 top plate and knuckle joint assembly described at right. Two other types of motors have been used as alter- nates for the above listed motors. See page 13.



Fig. 29—Assembly of Motors Stamped 5046, 5047, 5355 and 5432

"WOW" OR SLOW SPEED-

"Wow" or slow speed is generally most noticeable in the 33 1/3 RPM position but may also occur on the 45 RPM and 78 RPM positions. The most frequent causes of "wow" and slow speed are listed below. It is suggested that all these items be checked when servicing changers.

A. CHANGERS USING IDLER WHEEL SLIDE PLATE TYPE MOTOR ASSEMBLIES

1. PIN IN SLIDE PLATE RESTRICTS MOVEMENT OF SLIDE PLATE.

This prevents idler wheel from making firm contact with turntable rim. TO CORRECT—Remove pin from slide plate and discard—remove all burrs from around the hole after pin is removed.

2. BIND IN IDLER WHEEL SLIDE PLATE.

The slide plate must be completely free to move its full travel without binding. It must be flat and without burrs or scratches.

TO CORRECT—Straighten slide plate if necessary. Remove any burrs on slide plate. Thoroughly clean slide plate and slots of casting with carbon tetrachloride. Lubricate slide plate with STA-PUT #320 to assure ample lubrication at all slide contact surfaces.

3. OIL ON RUBBER TIRES.

TO CORRECT—Wash all rubber tires with carbon tetrachloride. Do not handle with oily fingers.

4. IDLER WHEEL TENSION SPRING TOO LONG.

TO CORRECT—Remove turns if necessary—there should be only *18 active turns*. It may be necessary to remove as much as 5 turns. Stock No. 78374 spring should be used for replacement.

B. IDLER WHEEL TOP PLATE AND KNUCKLE-JOINT ASSEMBLY, STOCK NO. 78371

If the procedure in section "A" does not prove completely satisfactory for critical applications, the original slide plate assembly may be replaced with the idler wheel top plate and knuckle-joint assembly, Stock No. 78371 using the following procedure:

Disassembly

- 1. Remove turntable "C" washer and lift turntable up.
- 2. Remove idler wheel, two fiber washers, and hair pin retainer spring. (Items 59, 60, 61).
- Remove motor (held by three "C" washers) (Item 77) from changer and disengage the speed shift linkage rod (Item 49).

Transfer of Usable Parts

- Transfer rubber mounting grommets (Item 70) from old plate to new plate.
- Remove motor top plate (held by three screws to motor laminations). Motor bearings are loose and must be kept intact during the transfer of plates.
- 3. Remove detent spring (Item 75) from detent lever on bottom surface of old top plate and transfer this spring to corresponding location on new plate.
- 4. Transfer the idler speed-changer mounting plate and speed-shift lever from old plate to new plate. (Held by screw, washer, and collar.)
- 5. Assemble new plate to motor laminations. Make sure motor bearings are properly positioned and that armature is free after screws are tightened.

Assembly of New Top Plate

- Engage speed shift linkage rod, and re-assemble motor to changer.
- Install idler wheel with fiber washers, top and bottom, and hair pin retainer spring to knuckle-joint lever, applying not more than one drop of STA-PUT #320 lubricant to the idler wheel bearing.
- 3. Thoroughly clean surface of idler wheel, pulleys on speed change plate, upper end of motor shaft, and inner rim of turntable with carbon tetrachloride to remove all traces of oil and grease.
- 4. Replace turntable and retaining "C" washer, making sure that idler wheel is pressed inward under the turntable before seating the turntable, to avoid damage to the idler or knuckle-joint assembly.

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			1	1		
NO.	STOCK NO.	DESCRIPTION		NO.	NO.	DESCRIPTION
		MOTOR ASSEMBLIES				MOTOR ASSEMBLIES
		Stamped: 5685 — for 930409-9				Stamped 4638—for
8		5686—for 930409-5 & -10				930409-3,-5,-6,-10 and -11
		5687—for 930409-11		!		
· .	70750			1	78508	Wheel—Idler wheel with fibre washer
	10150	Wheel-Idler Wheel		2	78509	Washer—Fibre washer
	70744	Washer-Fibre Washer		3	78510	Washer—Felt washer
3	10144	Retainer-Idler wheel retainer (hairpin spring)		4	78511	Washer "C" washer
4	18645	Support—Idler wheel support		5	78512	Spring—Idler spring
5	78646	Retainer—Support retainer (hairpin spring)		6		Screw—Holddown plate mounting screw
6	18641	Washer-Bearing washer	1	7		Lockwasher—Holddown plate mounting screw lock-
	18648	Link—Idler wheel support link				washer
8	70074	Spacer—Metal spacer for link mounting		8	78513	Plate—Holddown plate
9	78374	Spring—Idler wheel tension spring		9	78514	Grommet—Motor mounting grommet
10		Screw—Screw for mounting plate		10	78515	Washer—Blued steel washer
11		Lockwasher—Lockwasher for mounting plate	1	11	78516	Plate—Idler plate assembly
12	76751	Grommet—Rubber grommet for motor mounting		12	78517	Link—Idler link
13	30870	Plug—Two (2) prong male plug		13	78518	Arm—Pulley plate latch arm
14	76755	Spring—Detent spring		14	78519	Spring—Pulley latch spring
15	77134	Collar—Speed shift lever collar (nut)		15	78520	Spring—Shifter latch spring
16	78371	Plate—Mounting plate assembly includes items 4,		16	78521	Lever—Latch arm lever
17	76740	5, 0, 1, 0, and 9		17	78522	Sleeve—Spring sleeve pulley for 60 cycle operation
· **	10149	of #5685, #5686 and #5687		17	78523	Sleeve—Spring sleeve pulley for 50 cycle operation
17	77686	Sleeve—Spring sleeve pulley for 50 cycle operation		18	78524	Plate—Speed pulley mounting plate-less pulleys
		of #5685 and #5687		18A	78525	Pulley—33 1/3 r.p.m. pulley
18	77685	Lever—Speed shift lever		188	78526	Pulley-45 r.p.m. pulley
19	77229	Grommet—Rubber grommet for shift lever		18C	78527	Pulley—78 r.p.m. pulley
20	77132	Plate—Speed pulley mounting plate with 3 pulleys		18D	78528	Washer—Speed pulley fibre washer
20A	76748	Pulley—33 1/3 r.p.m. speed pulley		19	78529	Lever—Speed shift lever
20B	76747	Pulley—45 r.p.m. speed pulley		20	78530	Grommet—Speed shift lever grommet
20C	76746	Pulley—78 r.p.m. speed pulley		21	30870	Plug—2 prong male plug
20D	75428	Washer—Felt washer			78531	Motor—Motor assembly COMPLETE—less mounting
20E	75427	Retainer—Retainer for speed pulleys				grommets and plug—for 115 volts, 60 cycles.
21	-	Screw—Screw for mounting pulley plate				
22	—	Lockwasher—Lockwasher for pulley plate				
	460A001	Motor-Motor assembly (#5685) COMPLETE for 230 volts, 50 cycles				MOTOR ASSEMBLIES Motor Stamped :
	78372	Motor—Motor assembly (#5686) with mounting plate				5191-for 930409-4
		and idler support—LESS idler wheel, speed shift lever and pulley mounting plate for 115 volts, 60 cycles.				Order by description
	78373	Motor-Motor assembly (#5687) COMPLETE for 115				
		10-10, 00 CJ CICS.				



Fig. 30— Assembly of Motors Stamped 5685, 5686 and 5687



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Fig. 31-Assembly of Motor Stamped 4638

REPLACEMENT PARTS (Cont.)

ILL. NO.	STOCK NO.	DESCRIPTION	ILL. NO.	STOCK NO.	DESCRIPTION
		PICKUP ASSEMBLIES For 930409-3 and 930409-9	7	76949	Arm—Pickup arm shell (plastic) for 930409-5, -10 and -11
10	S-5652	Pickup—Ceramic pickup complete with two styli —for 930409-3	7	100A001	Arm—Pickup arm shell (plastic) for 930409-34, -6 and -9
10	75044	Pickup—Crystal pickup complete with two styli —for 930409-9	7A 7B	76948 76947	Screw—Pickup arm mounting bracket pivot screw Bearing—Pickup arm mounting bracket pivot
10 A	75046	Stylus—Osmium tip stylus and holder (.003" r., uncoded) for 78 r.p.m.	8	75808	bearing Cable—Three (3) wire pickup cable complete with
10B	75045	Stylus—Osmium tip stylus and holder (.001" r., coded red) for 45-331/3 r.p.m.	8	163A001	connectors for 930409-5, -10 and -11 Cable—Three (3) wire pickup cable complete with
100	75274	Nut—Knurled nut to mount stylus PICKUP ASSEMBLIES	9		Screw — # 4-40 x $\frac{1}{8}$ " fillister head screw to mount
		For 930409-4 and 930409-6	11	76957	Swivel—Pickup cartridge mount and swivel
10 10A	162A001 490B001	Pickup—Ceramic pickup complete with two styli Stylus—Osmium tip stylus (.003" r., uncoded) for	11	130A001	Swivel—Pickup cartridge mount and swivel assem- bly for 930409-3, -4, -6 and -9
10B	490A001	Stylus—Osmium tip stylus (.001" r., coded red) for	12	75809	Spring—Pickup arm counterbalance spring
		45-331/3 r.p.m.	13	75810	Bracket—Pickup arm weight adjustment bracket (slide)
		PICKUP ASSEMBLIES For 930409-5, 930409-10 and 930409-11	14	76899	Screw-=6-32 x 1/8" round head screw for pickup arm weight adjustment bracket
10	75475	Pickup—Crystal pickup complete with two osmium styli	15	76896	Screw - = 4 x 1/4" binding head sheet metal screw to mount swivel assembly in arm
10	77779	Pickup—Crystal pickup complete with one osmium	16	75812	Spring-Lock spring (coil type) for height adjust-
10A	75497	Stylus—Osmium tip stylus (.003" r., uncoded) for	17	75813	Screw-Height adjustment screw (hex head-
10B	75496	Stylus—Osmium tip stylus (.001" r., coded red) for	18	76943	#5-40 thread)
10B	77899	Stylus—Sapphire tip stylus (.001″ r., coded red)	10	10040	ment stud
10C	74230	for 45-33 1/3 r.p.m. Nut = #00-112 nut and washer to mount stylus	19	76911	Cam—Landing adjustment cam
		PICKUP ARM ASSEMBLIES	20	10301	with pin
5 6	76902 76898	Knob—Stylus selector knob less screw Screw—#2-56 x 3/16" headless set screw for stylus selector knob	20A 20B	75816 75818	Stud—Landing adjustmentstud (eccentric) Nut—Speed nut for landing adjustmentstud

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



Fig. 32-Pickup Arm Assembly for 930409-5 and -10

Pickup Stock No. 162A001 .







Model 17T151 "Glenside" Mahogany Grained Metal Model 17T163 "Crafton" Walnut, Mahogany, Limed Oak

Model 17T150 "Colby" Mabogany Finish Metal TELEVISION RECEIVERS

MODELS 17T150, 17T151, 17T163

RCAVICTOR

Chassis No. KCS66C

- Mfr. No. 274 -

SERVICE DATA

PREPARED BY RCA SERVICE CO., INC.

FOR

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U.S.A.

GENERAL DESCRIPTION

Models 17T150, 17T151, and 17T163 are deluxe "17 inch" television receivers. The receivers are identical except for cabinets, and speakers.

Features of the television unit are: full twelve channel coverage; "totem" r-f amplifier; intercarrier FM sound system; ratio detector; 40 mc picture i-f; improved picture brilliance; pulsed picture A-G-C; A-F-C horizontal hold; stabilized vertical hold; compensated video gain control; noise saturation circuits; improved sync separator and clipper; four mc. band width for picture channel and reduced hazard high voltage supply. An auxiliary audio input jack is provided to permit the use of an external record playing attachment.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

PICTURE SIZE. 146 square inches on a 17QP4 Kinescope TELEVISION R-F FREOUENCY RANGE

All 12 television channels, 54 mc. to 88 mc., 174 mc. to 216 mc.

Picture I-F Carrier Sound I-F Carrier	Frequency Frequency 41.2	5 mc. and 4.5 mc.
VIDEO RESPONS	SE	
SWEEP DEFLEC	TION	Magnetic
FOCUS		Magnetic
POWER SUPPLY KCS66C	RATING 115 volts, 60) cycles, 190 watts
AUDIO POWER (KCS66C	OUTPUT RATING	
CHASSIS DESIG KCS66C	NATIONS In Models 17T150), 17T151 & 17T163
LOUDSPEAKERS Model 17T150 Models 17T151 & 17	5 . (971614-1) 4''x6'' PM D I163. (971490-2) 8'' PM I	ynamic, 3.2 ohms)ynamic, 3.2 ohms
WEIGHT Model	Chassis with Tubes in cabinet	Shipping Weight
17T150		
17T151		

RECEIVER ANTENNA INPUT IMPEDANCE

Choice: 300 ohms balanced or 72 ohms unbalanced.

RCA TUBE COMPLEMENT

Tul	be Used	Function
(1) RCA	6BQ7	R-F Amplifier
(2) RCA	6 X 8	R-F Oscillator and Mixer
(3) RCA	6AU6	lst Picture I-F Amplifier
(4) RCA	6CB6	. 2nd Picture I-F Amplifier
(5) RCA	6CB6	
(6) RCA	6CB6	
(7) RCA	6AG7	
(8) RCA	6AU6	lst Sound I-F Amplifier
(9) RCA	6AU6	2nd Sound I-F Amplifier
(10) RCA	6AL5	
(11) RCA	6AV6	lst Audio Amplifier
(12) RCA	6AQ5	Audio Output
(13) RCA	6CB6	AGC Amplifier
(14) RCA	6SN7GT	
(15) RCA	6SN7GT . Vert Sync Am	plifier and Vert Sweep Osc.
(16) RCA	6AQ5	Vertical Sweep Output
(17) RCA	6SN7GT	Horizontal Sync Amplifier
(18) RCA (6SN7GT Horizontal Sw	eep Oscillator and Control
(19) RCA	6BQ6GT	Horizontal Sweep Output
(20) RCA	6W4GT	Damper
(21) RCA I	B3-GT/8016	High Voltage Rectifier
(22) RCA I	170P4	

17T150, 17T151, 17T163

ELECTRICAL AND MECHANICAL SPECIFICATIONS

(Continued)

PICTURE INTERMEDIATE FREQUENCIES

Picture Carrier Frequency	45.75	mc.
Adjacent Channel Sound Trap	47.25	mc.
Accompanying Sound Traps	41.25	mc.
Adjacent Channel Picture Carrier Trap	39.25	mc.

SOUND INTERMEDIATE FREQUENCIES

Sound Carrier Frequency
VIDEO RESPONSE To 4 mc.
FOCUS
SWEEP DEFLECTION Magnetic
SCANNING
HORIZONTAL SWEEP FREQUENCY15,750 cps
VERTICAL SWEEP FREQUENCY
FRAME FREQUENCY (Picture Repetition Rate)30 cps

Channel Selector Dual Control Knobs Fine Tuning Dual Control Knobs
Picture Brightness Dual Control Knobs
Picture Horizontal Hold }Dual Control Knobs
Sound Volume and On-Off Switch Tone Control and Phono Switch
NON-OPERATING CONTROLS (not including r-f and i-f adjustments)
Picture Centering top chassis adjustment
Width rear chassis adjustment
Heightrear chassis adjustment
Horizontal Linearity rear chassis screwdriver adjustment
Vertical Linearity
Vertical Peaking Control rear chassis adjustment
Horizontal Drive rear chassis screwdriver adjustment
Horizontal Oscillator Frequencyrear chassis adjustment
Horizontal Oscillator Waveformbottom chassis adjustment
Horizontal Locking Range rear chassis adjustment
Focustop chassis adjustment
Ion Trap Magnet
Deflection Coil top chassis wing nut adjustment
AGC Control

HIGH VOLTAGE WARNING

OPERATION OF THIS RECEIVER OUTSIDE THE CABINET OR WITH THE COVERS RE-MOVED, INVOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES. WORK ON THE RECEIVER SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOR-OUGHLY FAMILIAR WITH THE PRECAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT SHIELD REMOVED.

KINESCOPE HANDLING PRECAUTIONS

DO NOT REMOVE THE RECEIVER CHASSIS, INSTALL, REMOVE OR HANDLE THE KINE-SCOPE IN ANY MANNER UNLESS SHATTERPROOF GOGGLES, AND HEAVY GLOVES ARE WORN. PEOPLE NOT SO EQUIPPED SHOULD BE KEPT AWAY WHILE HANDLING KINE-SCOPES. KEEP THE KINESCOPE AWAY FROM THE BODY WHILE HANDLING.

The kinescope bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure .For this reason, the kinescope must be handled with more care than ordinary receiving tubes.

The large end of the kinescope bulb—particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure at any time. During service if the tube sticks or fails to slip smoothly into its socket, or deflecting yoke, investigate and remove the cause of the trouble. Do not force the tube. Refer to the Receiver Installation section for detailed instructions on kinescope installation. All RCA replacement kinescopes are shipped in special cartons and should be left in the cartons until ready for installation in the receiver.

), 171151, 171163



OPERATING CONTROLS (front Panel)

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The following adjustments are necessary when turning the receiver on for the first time.

1. See that the TV-PH switch is in the "TV" position.

2. Turn the receiver "ON" and advance the SOUND VOLUME control to approximately mid-position.

3. Set the STATION SELECTOR to the desired channel.

4. Adjust the FINE TUNING control for best pix and the SOUND VOLUME control for suitable volume.

5. Turn the BRIGHTNESS control fully counter-clockwise, then clockwise until a light pattern appears on the screen.

6. Adjust the VERTICAL hold control until the pattern stops vertical movement.

7. Adjust the HORIZONTAL hold control until a picture is obtained and centered.



Figure 1—Receiver Operating Controls

UNPACKING.—These receivers are shipped complete in cardboard cartons. The kinescope is shipped in place in the receiver.

Take the receiver out of the carton and remove all packing material.

Make sure that all tubes are in place and are firmly seated in their sockets.

Check to see that the kinescope high voltage lead clip is in place.

Plug a power cord into the 115 volt a-c power source and into the receiver interlock receptacle. Turn the receiver power switch to the "on" position, the brightness control fully clockwise, and the picture control counter-clockwise.

ION TRAP MAGNET ADJUSTMENT.—Set the ion trap magnet approximately in the position shown in Figure 2. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rotating it slightly around the neck of the kinescope for the brightest raster on the screen. Reduce the brightness control setting until the raster is slightly above average brilliance. Turn the focus control (shown in Figure 2) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches of this adjustment should be made with the brightness. control at the maximum clockwise position with which good line focus can be maintained.



Figure 2-Yoke and Focus Magnet Adjustments

8. Adjust the PICTURE and BRIGHTNESS controls for suitable picture contrast and brightness.

9. In switching from one channel to another, it may be necessary to repeat steps 4 and 8.

10. When the set is turned on again after an idle period it

should not be necessary to repeat the adjustment if the positions of the controls have not been changed. If any adjustment is necessary, step number 4 is generally sufficient.

11. If the positions of the controls have been changed, it may be necessary to repeat steps 2 through 8.

12. To use a record player, plug the record-player output cable into the PHONO jack on the rear apron, and set the TV-PH switch to "PH".

DEFLECTION YOKE ADJUSTMENT.—If the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Tighten the yoke adjustment wing screw.

PICTURE ADJUSTMENTS.—It will now be necessary to obtain a test pattern picture in order to make further adjustments. Connect the antenna transmission line to the receiver.

If the Horizontal Oscillator and AGC System are operating properly, it should be possible to sync the picture at this point. However, if the AGC control is misadjusted, and the receiver is overloading, it may be impossible to sync the picture.

If the receiver is overloading, turn R175 on the rear apron (see Figure 3) counter-clockwise until the set operates normally and the picture can be synced.

CHECK OF HORIZONTAL OSCILLATOR ALIGN-MENT.—Turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in horizontal sync. Momentarily remove the signal by switching off channel then back. Normally the picture will be out of sync. Turn the control clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 2 or 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control. Pull-in should occur before the control has been turned 120 degrees from the extreme counter-clockwise position. The picture should remain in sync for approximately 90



Figure 3-Rear Chassis Adjustments
80

degrees of additional clockwise rotation of the control. At the extreme clockwise position, the picture should remain in sync and should not show a black bar in the picture.

If the receiver passes the above checks and the picture is normal and stable the horizontal oscillator is properly aligned. Skip "Alignment of Horizontal Oscillator" and proceed with "Focus Magnet Adjustment."

ALIGNMENT OF HORIZONTAL OSCILLATOR.—If in the above check the receiver failed to hold sync with the hold control at the extreme counter-clockwise position or failed to hold sync over 90 degrees of clockwise rotation of the control from the pull-in point it will be necessary to make the following adjustments.

Horizontal Frequency Adjustment.—Turn the horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the T113 horizontal frequency adjustment at the rear of the chassis until the picture is just out of sync and the horizontal blanking appears as a vertical or diagonal black bar in the raster. Then turn the T113 core until the bar moves out of the picture leaving it in sync.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the T113 rear core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 3 bars are present just before the picture pulls into sync adjust the horizontal locking range trimmer Cl81A slightly clockwise. If less than 2 bars are present, adjust Cl81A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 or 3 bars are present.

Repeat the adjustments under "Horizontal Frequency Adjustment" and "Horizontal Locking Range Adjustment" until the conditions specified under each are fulfilled. When the horizontal hold operates as outlined under "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

If it is impossible to sync the picture at this point and the AGC system is in proper adjustment it will be necessary to adjust the Horizontal Oscillator by the method outlined in the alignment procedure on page 11. For field purposes paragraph "B" under Horizontal Oscillator Waveform Adjustment may be omitted.

FOCUS MAGNET ADJUSTMENT.—The focus magnet should be adjusted so that there is approximately three-eighths inch of space between the rear cardboard shell of the yoke and the flat of the front face of the focus magnet. This spacing gives best average focus over the face of the tube.

The axis of the hole through the magnet should be parallel with the axis of the kinescope neck with the kinescope neck through the center of the opening.

PIN CUSHION CORRECTION.—Two pin-cushion correction magnets are employed to correct a small amount of pin-cushion of the raster due to the lens effect of the face of the kinescope. These magnets are mounted on small arms, one on each side of the kinescope as shown in Figure 2. The arms hinge in one plane on self tapping screws which act both as a hinge and an adjustment locking screw. When the magnets are swung towards the tube, maximum correction is obtained. Minimum correction is obtained when the arms are swung away from the tube. To adjust the magnets, loosen the two self tapping screws and position the magnets until the sides of the raster appear straight. Tighten the screws without shifting the position of the magnets. In some cases it may be necessary to twist or bend the magnet support arms to obtain the appearance of straight raster edges.

CENTERING ADJUSTMENT.—No electrical centering controls are provided. Centering is accomplished by means of a separate plate on the focus magnet. The centering plates include a locking screw which must be loosened before centering Up and down adjustment of the plate moves the picture side to side and sidewise adjustment moves the picture up and down. If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

WIDTH, DRIVE AND HORIZONTAL LINEARITY ADJUSTMENTS.—Adjustment of the horizontal drive control affects the high voltage applied to the kinescope. In order to obtain the highest possible voltage hence the brightest and best focused picture adjust horizontal drive trimmer Cl81B counter-clockwise until the picture begins to "wrinkle" in the middle then clockwise until the "wrinkle" disappears.

Turn the horizontal linearity control L107 clockwise until the picture begins to ''wrinkle'' on the right and then counterclockwise until the ''wrinkle'' disappears and best linearity is obtained.

Adjust the width control L106 to obtain correct picture width.

A slight readjustment of these three controls may be necessary to obtain the best linearity.

Adjustments of the horizontal drive control affect horizontal oscillator hold and locking range. If the drive control was adjusted, recheck the oscillator alignment.

HEIGHT AND VERTICAL LINEARITY ADJUST-MENTS.—Adjust the height control (R2O3 on chassis rear apron) until the picture fills the mask vertically. Adjust vertical linearity (R214 on rear apron) until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. Adjust centering to align the picture with the mask.

FOCUS.—Adjust the focus magnet for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

Recheck the position of the ion trap magnet to make sure that maximum brightness is obtained.

Check to see that the yoke thumbscrew and the focus magnet mounting screws are tight.



Figure 4-R-F Oscillator Adjustments

CHECK OF R-F OSCILLATOR ADJUSTMENTS.— Tune in all available stations to see if the receiver r-f oscillator is adjusted to the proper frequency on all channels. If adjustments are required these should be made by the method outlined in the alignment procedure on page 9 The adjustments for channels 2 through 12 are available from the front of the cabinet by removing the station selector escutcheon as shown in Figure 4. Adjustment for channel 13 is on top of the chassis.

AGC THRESHOLD CONTROL.—The AGC threshold control R175 is adjusted at the factory and normally should not require readjustment in the field.

To check the adjustment of the AGC Threshold Control tune in a strong signal and sync the picture. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of R175. If the picture requires an appreciable portion of a second to reappear, or bends excessively, R175 should be readjusted.

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Turn R175 fully counter-clockwise. The raster may be bent slightly. This should be disregarded. Turn R175 clockwise until there is a very, very slight bend or change of bend in the picture. Then turn R175 counter-clockwise just sufficiently to remove this bend or change of bend.

If the signal is weak, the above method may not work as it may be impossible to get the picture to bend. In this case, turn R175 clockwise until the snow in the picture becomes more pronounced, then counter-clockwise until the best signal to noise ratio is obtained.

The AGC control adjustment should be made on a strong signal if possible. If the control is set too far clockwise on a weak signal, then the receiver may overload when a strong signal is received.

FM TRAP ADJUSTMENT.—In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the LS8 core on top of the antenna matching transformer for minimum interference in the picture.

CAUTION.—In some receivers, the FM trap L58 will tune down into channel 6 or even into channel 5. Needless to say, such an adjustment will cause greatly reduced sensitivity on these channels. If channels 5 or 6 are to be received, check L58 to make sure that it does not affect sensitivity on these two channels.

Replace the cabinet back and connect the receiver antenna leads to the cabinet back. Make sure that the screws holding it are up tight, otherwise it may rattle or buzz when the receiver is operated at high volume.

KINESCOPE SCREEN CLEANING.—The kinescope safety glass is held in place by four spring clips which may be removed from the back of the front panel. This permits removing the safety glass for cleaning without the necessity of removing the chassis and kinescope.

CHASSIS REMOVAL.—To remove the chassis from the cabinet for repair or installation of a new kinescope, remove the control knobs, the cabinet back, unplug the speaker cable, the kinescope socket, the antenna cable, the yoke and high voltage cable. Take out the chassis bolts under the cabinet. Withdraw the chassis from the back of the cabinet.

KINESCOPE HANDLING PRECAUTION.—Do not install, remove, or handle the kinescope in any manner, unless shatterproof goggles and heavy gloves are worn. People not so equipped should be kept away while handling the kinescope. Keep the kinescope away from the body while handling

INSTALLATION OF KINESCOPE.—To remove the kinescope from the cabinet, loosen the two nuts and disengage the rods alongside the kinescope. Remove the wing screw which holds the yoke frame to the cabinet. Remove the kinescope, the yoke frame with yoke and focus magnet as an assembly.

Handle this tube by the portion at the edge of the screen. Do not cover the glass bell of the tube with fingermarks as it will produce leakage paths which may interfere with reception. If this portion of the tube has inadvertently been handled, wipe it clean with a soft cloth moistened with ''dry'' carbon tetrachloride.

INSTALLATION OF KINESCOPE.—Wipe the kinescope screen surface and front panel safety glass clean of all dust and fingermarks with a soft cloth moistened with "Windex" or similar cleaning agent.

Replace the kinescope and chassis by reversal of the removing process. The kinescope should be installed so that the high voltage contact is to the right when looking at it from the rear of the cabinet. The magnet of the ion trap magnet should be to the left.

CABINET ANTENNA.—A cabinet antenna is provided in model 17T163 receivers and the leads are brought out near the antenna terminal board. The cabinet antenna may be employed in place of the outdoor antenna in areas where the signals are strong and no reflections are experienced. **ANTENNAS.**—The finest television receiver built may be said to be only as good as the antenna design and installation. It is therefore important to select the proper antenna to suit the particular local conditions, to install it properly and orient it correctly.

If two or more stations are available and the two stations are in different directions, it may be possible to make a compromise orientation which will provide a satisfactory signal on all such channels.

If it is impossible to obtain satisfactory results on one or more channels, it may become necessary either to provide means for turning the antenna when switching channels or to install a separate antenna for one or more channels and to switch antennas when switching channels.

In some cases, the antenna should not be installed permanently until the quality of the picture reception has been observed on a television receiver. A temporary transmission line can be run between receiver and the antenna, allowing sufficient slack to permit moving the antenna. Then, with a telephone system connecting an observer at the receiver and an assistant at the antenna, the antenna can be positioned to give the most satisfactory results on the received signal. A shift of direction or a few feet in antenna position may effect a tremendous difference in picture reception.

REFLECTIONS.—Multiple images sometimes known as echoes or ghosts, are caused by the signal arriving at the antenna by two or more routes. The second or subsequent image occurs when a signal arrives at the antenna after being reflected off a building, a hill or other object. In severe cases of reflections, even the sound may be distorted. In less severe cases, reflections may occur that are not noticeable as reflections but that will instead cause a loss of definition in the picture.

Under certain extremely unusual conditions, it may be possible to rotate or position the antenna so that it receives the cleanest picture over a reflected path. If such is the case, the antenna should be so positioned. However, such a position may give variable results as the nature of reflecting surfaces may vary with weather conditions. Wet surfaces have been known to have different reflecting characteristics than dry surfaces.

Depending upon the circumstances, it may be possible to eliminate the reflections by rotating the antenna or by moving it to a new location. In extreme cases, it may be impossible to eliminate the reflection.

INTERFERENCE.—Auto ignition, street cars, electrical machinery and diathermy apparatus may cause interference which spoils the picture. Whenever possible, the antenna location should be removed as far as possible from highways, hospitals, doctors' offices and similar sources of interference. In mounting the antenna, care must be taken to keep the antenna rods at least 1/4 wave length (at least 6 feet) away from other antennas, metal roofs, gutters or other metal objects.

Short-wave radio transmitting and receiving equipment may cause interference in the picture in the form of moving ripples. In some instances it may be possible to eliminate the interference by the use of a trap in the antenna transmission line. However, if the interfering signal is on the same frequency as the television station, a trap will provide no improvement.

WEAK PICTURE.—When the installation is near the limit of the area served by the transmitting station, the picture may be speckled, having a "snow" effect, and may not hold steady on the screen. This condition is due to lack of signal strength from the transmitter.

RECEIVER LOCATION.—The owner should be advised of the importance of placing the receiver in the proper location in the room.

The location should be chosen—

- -Away from bright windows and so that no bright light will fall directly on the screen. (Some illumination in the room is desirable, however.)
- -To give easy access for operation and comfortable viewing.
- -To permit convenient connection to the antenna.
- -Convenient to an electrical outlet.
- -To allow adequate ventilation.

CHASSIS TOP VIEW



Figure 5-Chassis Top View

CHASSIS BOTTOM VIEW



Figure 6-Chassis Bottom View

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ALIGNMENT PROCEDURE

TEST EQUIPMENT.—To properly service the television chassis of this receiver, it is recommended that the following test equipment be available:

R-F Sweep Generator meeting the following requirements:

- (a) Frequency Ranges
 - 35 to 90 mc., 1 mc. to 12 mc. sweep width 170 to 225 mc., 12 mc. sweep width
- (b) Output adjustable with at least .1 volt maximum.
- (c) Output constant on all ranges.
- (d) "Flat" output on all attenuator positions.

Cathode-Ray Oscilloscope.—For alignment purposes, the oscilloscope employed must have excellent low frequency and phase response, and should be capable of passing a 60-cycle square wave without appreciable distortion.

For video and sync waveform observations, the oscilloscope must have excellent frequency and phase response from 10 cycles to at least two megacycles in all positions of the gain control.

Signal Generator to provide the following frequencies with crystal accuracy.

(a) Intermediate frequencies

4.5 mc. sound i-f transformer

39.25 mc. adjacent channel picture trap

41.25 mc. sound trap

45.75 mc. picture carrier

47.25 mc. adjacent channel sound trap

(b) Radio frequencies

Channel Number	Picture Carrier Freg. Mc.	Sound Carrier Freg. Mc.	Receiver R-F Osc. Freg. Mc.
2	55.25	59.75	
3	61.25	65.75	107
4	67.25	71.75	113
5	77.25	81.75	123
6	83.25	87.75	
7			
8			
- 9			233
10		197.75	
11			
12			
13			

(c) Output of these ranges should be adjustable and at least 1 volt maximum.

Heterodyne Frequency Meter with crystal calibrator if the signal generator is not crystal controlled.

Electronic Voltmeter of Junior or Senior 'VoltOhmyst' type and a high voltage multiplier probe for use with this meter to permit measurements up to 20 kv.

CAUTION: Do not short the kinescope second anode lead. Its short circuit current presents a considerable overload on the high voltage rectifier V119.

ORDER OF ALIGNMENT.—When a complete receiver alignment is necessary, it can be most conveniently performed in the following order:

(1)	Ant. Matching Unit	(6) Picture I-F Traps	(6)
(2)	R-F Unit	(7) Picture I-F Trans.	(7)
(3)	Ratio Detector	(8) Sweep Alignment of I-F	(8)
(4)	Sound I-F Trans.	(9) Horizontal Oscillator	(9)
(5)	Sound Take-Off Trans.	(10) Sensitivity Check	(10)

ANTENNA MATCHING UNIT ALIGNMENT.—The antenna matching unit is accurately aligned at the factory. Adjustment of this unit should not be attempted in the customer's home since even slight misalignment may cause serious attenuation of the signal especially on channel 2. The r-f unit is aligned with a particular antenna matching transformer in place. If for any reason, a new antenna matching transformer is installed, the r-f unit should be realigned. The F-M Trap which is mounted in the antenna matching unit may be adjusted without adversely affecting the alignment of the unit.

To align the antenna matching unit disconnect the lead from the FM trap L58 to the channel selector switch S5.

With a short jumper, connect the output of the matching unit through a 1000 mmf capacitor to the grid of the second pix i-f amplifier, pin 1 of V107.

Replace the cover on the matching unit while making all adjustments.

Remove the first pix i-f amplifier tube V106.

Connect the positive terminal of a bias box to the chassis and the potentiometer arm to the junction of R143 and R144. Set the potentiometer to produce approximately -6.0 volts of bias at the test point TP101.

Connect an oscilloscope to the video test point TP102 and set the oscilloscope gain to maximum.

Connect a signal generator to the antenna input terminals. Modulate the signal generator 30% with an audio signal.

Tune the signal generator to 45.75 mc. and adjust the generator output to give an indication on the oscilloscope. Adjust L59 in the antenna matching unit for minimum audio indication on the oscilloscope.

Tune the signal generator to 41.25 mc. and adjust L60 for minimum audio indication on the oscilloscope.

Remove the jumper from the output of the matching unit.

Connect a 300 ohm $1\!/_{\!2}$ watt composition resistor from L58 to ground, keeping the leads as short as possible.

Connect an oscilloscope low capacity crystal probe from L58 to ground. The sensitivity of the oscilloscope should be approximately 0.03 volts per inch. Set the oscilloscope gain to maximum.

Connect the r-f sweep generator to the matching unit antenna input terminals. In order to prevent coupling reactance from the sweep generator into the matching unit, it is advisable to employ a resistance pad at the matching unit terminals. Figure 11 shows three different resistance pads for use with sweep generators with 50 ohm co-ax output, 72 ohm co-ax output or 300 ohm balanced output. Choose the pad to match the output impedance of the particular sweep employed.

Connect the signal generator loosely to the matching unit antenna terminals.

Set the sweep generator to sweep from 45 mc. to 54 mc. With RCA type WR59A sweep generators, this may be accomplished by retuning channel number 1 to cover this range. With WR59B sweep generators this may be accomplished by retuning channel number 2 to cover the range. In making these adjustments on the generator, be sure not to turn the core too far clockwise so that it becomes lost beyond the core retaining spring.

Adjust L61 and L62 to obtain the response shown in figure 12. L61 is most effective in locating the position of the shoulder of the curve at 52 mc. and L62 should be adjusted to give maximum amplitude at 53 mc. and above consistent with the specified shape of the response curve. The adjustments in the matching unit interact to some extent. Repeat the above procedure until no further adjustments are necessary.

Remove the 300 ohm resistor and crystal probe connections. Restore the connection between L58 and S5. Replace V106.

R-F UNIT ALIGNMENT.—An r-f unit which is operative and requires only touch up adjustments, requires no presetting of adjustments. For such units, skip the remainder of this paragraph. For units which are completely out of adjustment, preset all adjustments to the approximate center of their range with the following exceptions: Set Cl8 so that the screw head is approximately three-eighths of an inch above chassis. Set the Tl core for maximum inductance (core turned counter-clockwise). Set Cl1 near maximum capacity (onequarter turn from tight). Do not change any of the adjustments in the antenna matching unit.

Disconnect the link from terminals "A" and "B" of TlO4 and terminate the link with a 39 ohm composition resistor.

The r-f unit is aligned with zero AGC bias. To insure that the bias will remain constant, take a clip lead and short circuit the r-f unit power terminal board terminal 3 to ground.

) Picture I-F Traps

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Connect the oscilloscope to the test point TP1 on top of the r-f unit. Set the oscilloscope gain to maximum.

Turn the receiver channel selector switch to channel 2.

Connect the output of the signal generator to the grid of the r-f amplifier, V2. To do this, remove the tube from the socket and fashion a clip by twisting one end of a small piece of wire around pin number 7. Reploce the tube in the socket leaving the end of the wire protruding from under the tube. Connect the signal generator to this wire through a 1,500 mmf capacitor.

Tune the signal generator to 43.5 mc. and modulate it $30^{\prime\prime}\bar{\rm c}$ with a 400 cycle sine wave. Adjust the signal generator for maximum output.

Adjust L65 on top of the r-f unit for minimum 400 cycle indication on the oscilloscope. If necessary, this adjustment can be retouched in the field to provide additional rejection to one specific frequency in the i-f band pass. However, in such cases, care should be taken not to adjust it so as to reduce sensitivity on channel 2.

Remove the wire clip from pin 7 of V2 and replace the tube and tube shield.

Set the channel selector switch to channel 8.

Turn the fine tuning control 30 degrees clockwise from the center of its mechanical range now and at all times when adjusting the oscillator frequency.

Adjust Cl for proper oscillator frequency, 227 mc. This may be done in several ways. The easiest way and the way which will be recommended in this procedure will be to use the signal generator as a heterodyne frequency meter and beat the oscillator against the signal generator. To do this, tune the signal generator to 227 mc. with crystal accuracy. Insert one end of a piece of insulated wire into the r-f unit through the hole provided for the adjustment for Cll. Be careful that the wire does not touch any of the tuned circuits as it may cause the frequency of the r-f unit oscillator to shift. Connect the other end of the wire to the "r-f in" terminal of the signal generator. Adjust Cl to obtain an audio beat with the signal generator.

Connect the sweep generator through a suitable attenuator as shown in Figure 11 to the input terminals of the antenna matching unit.

Connect the signal generator loosely to the antenna terminals.

Set the sweep oscillator to cover channel 8.

Set the oscilloscope to maximum gain and use the minimum input signal which will produce a useable pattern on the oscilloscope. Excessive input can change oscillator injection during alignment and produce consequent misalignment even though the response as seen on the oscilloscope may look normal.

Insert markers of channel 8 picture carrier and sound carrier, 181.25 mc. and 185.75 mc.

Adjust C9, C11, C15 and C18 for approximately correct curve shape, frequency, and band width as shown in Figure 13.

The correct adjustment of C18 is indicated by maximum amplitude of the curve midway between the markers. C15 tunes the r-f amplifier plate circuit and affects the frequency of the pass band most noticeably. C9 tunes the mixer grid circuit and affects the tilt of the curve most noticeably (assuming that C18 has been properly adjusted). C11 is the coupling adjustment and hence primarily affects the response band width.

Set the receiver channel switch to channel 6.

Adjust the signal generator to the channel 6 oscillator frequency 129 mc.

Turn the fine tuning control 30 degrees clockwise from the center of its mechanical range.

Adjust L5 for an audible beat with the signal generator as before.

Set the sweep generator to channel 6.

From the signal generator, insert channel 6 sound and picture carrier markers, 83.25 mc. and 87.75 mc.

Adjust L48, L50 and L53 for proper response as shown in Figure 13.

L50 tunes the r-f amplifier plate circuit and primarily affects the frequency of the pass band. L53 tunes the r-f amplifier grid and is adjusted to give maximum amplitude of the curve between the markers. L48 affects the tilt of the curve but not quite the same as C9 adjustment. When the circuits are correctly adjusted and L48 is rocked on either side of its proper setting, the high frequency (sound carrier) end of the curve appears to remain nearly fixed in amplitude while the picture carrier end tilts above or below this point.

Turn off the sweep and signal generators.

Connect the "VoltOhmyst" to the r-f unit test point TP1.

Adjust the oscillator injection trimmer C8 for -3.5 volts or at maximum if -3.5 volts cannot be reached. This voltage should fall between -2.5 and -5.5 volts on all channels when the alignment of all circuits is completed.

Turn the sweep oscillator and signal generator back on and recheck channel 6 response. Readjust L48, L50 and L53 if necessary.

Set the receiver channel selector switch to channel 8 and readjust Cl for proper oscillator frequency, 227 mc.

Set the sweep oscillator and signal generator to channel 8.

Readjust C9, C11, C15 and C18 for correct curve shape, frequency and band width.

Turn off the sweep and signal generators, switch back to channel 6 and check the oscillator injection voltage at TP1 if C9 was adjusted in the recheck of channel 8 response.

If the initial setting of oscillator injection trimmer C8 was far off, it may be necessary to adjust the oscillator frequency and response on channel 8, adjust the oscillator injection on channel 6 and repeat the procedure several times before the proper setting is obtained.

Turn off the sweep generator and switch the receiver to channel 13.

Adjust the signal generator to the channel 13 oscillator frequency 257 mc.

Set the fine tuning control 30 degrees clockwise from the center of its mechanical range.

Adjust L46 to obtain an audible beat. Slightly overshoot the adjustment of L46 by turning the slug a little more in the same direction from the original setting, then reset the oscillator to proper frequency by adjusting Cl to again obtain the beat.

Check the response of channels 7 through 13 by switching the receiver channel switch, sweep oscillator and marker oscillator to each of these channels and observing the response and oscillator injection obtained. See Figure 13 for typical response curves. It should be found that all these channels have the proper shaped response with the markers above 80% response.

If the markers do not fall within this requirement, switch to channel 8 and readjust C9, C11, C15 and C18 as necessary.

Turn off the sweep generator and check the channel 8 oscillator frequency. If Cl has to be readjusted for channel 8, the principle of overshooting the adjustment and then correcting by adjusting L46 should be followed in order to establish the L/C ratio for the desired oscillator tracking.

Turn the receiver channel selector switch to channel 6. Adjust L5 for correct oscillator frequency, 129 mc.

Turn the sweep oscillator on and to channel 6 and observe the response curve. If necessary readjust L48, L50 and L53.

Switch the receiver through channel 6 down through channel 2 and check for normal response curve shapes and oscillator injection voltage.

If excessive tilt in the same direction occurs on channels 2, 3 and 4, adjust Cl8 on channel 2 to overshoot the correction of this tilt, then switch to channel 6 and adjust L53 for maximum amplitude of curve between markers. This adjustment should produce "flat" response on the low channels if the other adjustments especially L48 are correct.

Likewise check channels 7 through 13, stopping on 13 for the next step.

With the receiver on channel 13, check the receiver oscillator frequency. Correct by adjustment of Cl if necessary.

Adjust the oscillator to frequency on all channels by switching the receiver and the frequency standard to each channel and adjusting the appropriate oscillator trimmer to obtain the audible beat. It should be possible to adjust the oscillator to the correct frequency on all channels with the fine tuning control in the middle third of its range. When employing WR39 calibrators to adjust the receiver oscillator, tune the calibrator to one-half the receiver oscillator frequency on channels 4, 5 and 6 and to one-fourth the receiver oscillator frequency on channels 11, 12 and 13.

ALIGNMENT PROCEDURE

	Picture	Sound	Receiver	Channel
Channel	Carrier	Carrier	R-F Osc.	Oscillator
Number	Freq. Mc.	Freq. Mc.	Freq. Mc.	Adjustment
2	55.25.			Ll
3	61.25	65.75	107	L2
4	. 67.25.	71.75	113	L3
5	77.25		123	L4
6	83.25.	87.75	129	L5
7	. 175.25			L6
8	181.25			L7
9	187.25		. 233	
10	193.25	197.75		L9
11	199.25	203.75		L10
12	. 205.25.			L11
13	211.25	215.75	257	C1

Remove the 39 ohm resistor from the link and reconnect the link to terminals "A" and "B" of TlO4.

RATIO DETECTOR ALIGNMENT.—Set the signal generator at 4.5 mc. and connect it to the second sound i-f grid, pin 1 of V102. Set the generator for 30% 400 cycle modulation.

As an alternate source of signal, the RCA WR39B or WR39C calibrator may be employed. If used connect its output cable to the grid of the 4th pix i-f amplifier pin 1 of V109. Set the frequency of the calibrator to '45.75 (pix carrier) and modulate with 4.5 mc. crystal. Also turn on the internal AM audio modulation. The 4.5 mc signal will be picked off at T110A and amplified through the sound i-f amplifier.

Connect the 'VoltOhmyst'' to the junction of R110 and R114. Connect the oscilloscope across the speaker voice coil and turn the volume control for maximum output.

Set the trimmer C226 (on the bottom of the V103 socket) for minimum capacity.

Tune the ratio detector primary, T102 top core for maximum DC output on the "VoltOhmyst." Adjust the signal level from the signal generator for 10 volts on the "VoltOhmyst" when finally peaked. This is approximately the operating level of the ratio detector for average signals.

Tune the ratio detector secondary T102 bottom core for minimum AM output on the oscilloscope.

Repeat adjustments of T102 top for maximum DC and T102 bottom for minimum output on the oscilloscope making final adjustment with the 4.5 mc. input level adjusted to produce 10 volts d-c on the "VoltOhmyst." Connect the "VoltOhmyst" to the junction of R112 and C113

Connect the "VoltOhmyst" to the junction of Rll2 and Cll3 and note the amount of d-c present. If this voltage exceeds ± 1.5 volts, adjust C226 by turning the core in until zero d-c is obtained. Readjust the TlO2 bottom core for minimum output on the oscilloscope. Repeat the adjustments of C226 and TlO2 bottom core until the voltage at Rll2 and Cll3 is less than ± 1.5 volts when TlO2 bottom core is set for minimum indication on the oscilloscope. Connect the "VoltOhmyst" to the junction of Rll0 and Rll4

Connect the 'VoltOhmyst'' to the junction of R110 and R114 and repeat the T102 top core for maximum d-c on the meter and again reset the generator output so that the meter reads minus 10 volts.

Repeat the adjustments in the above two paragraphs until the voltage at R112 and C113 is less than ± 1.5 volts when the T102 top core is set for maximum d-c at the junction of R110 and R114 and the T102 bottom core is set for minimum indication on the oscilloscope.

SOUND I-F[•] **ALIGNMENT**.—Connect the sweep generator to the first sound i-f amplifier grid, pin 1 of V101. Adjust the generator for a sweep width of 1 mc. at a center frequency of 4.5 mc.

Insert a 4.5 mc. marker signal from the signal generator into the first sound i-f grid.

Connect the oscilloscope in series with a 10,000 ohm resistor to terminal A of T101. Adjust T101 top and bottom cores for maximum gain and

Adjust T101 top and bottom cores for maximum gain and symmetry about the 4.5 mc. marker on the i-f response. The pattern obtained should be similar to that shown in Figure 14.

The output level from the sweep should be set to produce approximately 2.0 volt peak-to-peak at terminal **A** of T101 when the final touches on the above adjustment are made. It is necessary that the sweep output voltage should not exceed the specified values otherwise the response curve will be broadened permitting slight misadjustment to pass unnoticed and possibly causing distortion on weak signals.

Connect the oscilloscope to the junction of R112 and C113 and check the linearity of the response. The pattern obtained should be similar to that shown in Figure 15. SOUND TAKE-OFF ALIGNMENT.—Connect the 4.5 mc. generator in series with a 1,000 ohm resistor to terminal "C" of T110. The input signal should be approximately 0.5 volts.

Short the fourth pix i-f grid to ground, pin 1 V109, to prevent noise from masking the output indication.

As an alternate source of signal the RCA WR39B or WR39C calibrator may be used. In such a case, disregard the above two paragraphs. Connect calibrator across link circuit, T104 A, B, and modulate 45.75 carrier with 4.5 mc. crystal.

Connect the crystal diode probe of a "VoltOhmyst" to the plate of the video amplifier, pin 8 of V110.

Adjust the core of T110 for minimum output on the meter. Remove the short from pin 1 V109 to ground, if used.

PICTURE I-F TRAP ADJUSTMENT —Connect the i-f signal generator across the link circuit on terminals A and B of Tl04.

Connect the "VoltOhmyst" to test point TP101.

Obtain a 7.5 volt battery capable of withstanding appreciable current drain and connect the ends of a 1 000 ohm potentiometer across it. Connect the battery positive terminal to chassis and the potentiometer arm to the junction of Rl43 and Rl44.

Set the bias pot to produce approximately -1.0 volt of bias at test point TP101.

Connect the ''VoltOhmyst'' to test point TP102 at the picture detector.

Set the signal generator to each of the following frequencies and adjust the corresponding circuit for minimum d-c output at TP102. Use sufficient signal input to produce 1.0 volt of d-c on the meter when the final adjustment is made.

39.25	mc	 T104 top core
41.25	mc	 T105 bottom core
47.25	mc	 T106 bottom core

PICTURE I-F TRANSFORMER ADJUSTMENTS.— Set the signal generator to each of the following frequencies and peak the specified adjustment for maximum indication on the "VoltOhmyst." During alignment, reduce the input signal if necessary in order to produce 1.0 volt of d-c at test point TP102 with -1.0 volt of i-f bias at test point TP101.

		_	
43.7	mc	 	T109
45.5	mc	 	T108
41.8	mc	 	T107

To align T105 and T106 connect the sweep generator to the first picture i-f grid pin l of V106 through a 1,000 mmf ceramic capacitor. Shunt R141 R149 and terminals "A" and "F" of T109 with 330 ohm composition resistors. Set the i-f bias to -1.0 volt at test terminal TP101

Adjust T105 and T106 top cores for maximum gain and curve shape as shown in Figure 16. For final adjustments set the output of the sweep generator to produce 0.5 volts peakto-peak at the oscilloscope terminals.

To align T1 and T104 connect the sweep generator to the mixer grid test point TP2. Use the shortest leads possible with not more than one inch of unshielded lead at the end of the sweep cable.

Set the channel selector switch to channel 4.

Connect a 180 ohm composition resistor from terminal B of T105 to the junction of R135 and C132. Connect the oscilloscope diode probe to terminal B of T105 and to ground.

Couple the signal generator loosely to the diode probe in order to obtain markers.

In most receivers, C221 is variable and is provided as a band width adjustment. Preset C221 to minimum capacity.

Adjust Tl top and TlO4 bottom for maximum gain at 43.5 mc. and with 45.75 mc. at 70% of maximum response.

Adjust C221 until 41.25 mc. is at 85% response with respect to the low frequency shoulder at approximately 41.9 mc. as shown in Figure 17.

In receivers in which C221 is fixed, adjust Tl top and TlO4 bottom for maximum gain and the response shown in Figure 16.

Disconnect the diode probe, the 180 ohm and three 330 ohm resistors.

SWEEP ALIGNMENT OF PIX I-F.—Connect the oscilloscope to the test point TPl02.

Adjust the bias potentiometer to obtain -6.0 volts of bias as measured by a ''VoltOhmyst'' at test point TP101.

Leave the sweep generator connected to the mixer grid test point TP2 with the shortest leads possible and with not more than one inch of unshielded lead at the end of the sweep cable. If these precautions are not observed, the receiver may be unstable and the response curves obtained may be unreliable.

Adjust the output of the sweep generator to obtain 3.0 volts peak-to-peak on the oscilloscope.

Couple the signal generator loosely to the grid of the first pix i-f amplifier. Adjust the output of the signal generator to produce small markers on the response curve.

Retouch T108 and T109 to obtain the response shown in Figure 18. Do not adjust T107 unless absolutely necessary. If T107 is adjusted too low in frequency it will raise the level of the 41.25 mc. sound i-f carrier and may create interference in the picture. It will also cause poor adjacent channel picture rejection. If T107 is tuned too high in frequency, the level of the 41.25 mc. sound i-f carrier will be too low and may produce noisy sound in weak signal areas.

Remove the oscilloscope, sweep and signal generator connections.

Remove the bias box employed to provide bias for alignment.

HORIZONTAL OSCILLATOR ADJUSTMENT.—Normally the adjustment of the horizontal oscillator is not considered to be a part of the alignment procedure, but since the oscillator waveform adjustment may require the use of an oscilloscope, it can not be done conveniently in the field. The waveform adjustment is made at the factory and normally should not require readjustment in the field. However, the waveform adjustment should be checked whenever the receiver is aligned or whenever the horizontal oscillator operation is improper.

Horizontal Frequency Adjustment.—Tune in a station and sync the picture. If the picture cannot be synchronized with the horizontal hold control R201B, then adjust the T113 frequency core on the rear apron until the picture will synchronize. If the picture still will not sync, turn the T113 waveform adjustment core (under the chassis) out of the coil several turns from its original position and readjust the T113 frequency core until the picture is synchronized.

Examine the width and linearity of the picture. If picture width or linearity is incorrect, adjust the horizontal drive control C181B, the width control L106 and the linearity control L107 until the picture is correct.

Horizontal Oscillator Waveform Adjustment.—The horizontal oscillator waveform may be adjusted by either of two methods. The method outlined in paragraph A below may be employed in the field when an oscilloscope is not available. The service shop method outlined in paragraph B below requires the use of an oscilloscope.

A.—Turn the horizontal hold control completely clockwise. Place adjustment tools on both cores of T113 and be prepared to make simultaneous adjustments while watching the picture on the screen. First, turn the T113 frequency core (on the rear apron) until the picture falls out of sync and one diagonal black bar sloping down to the right appears on the screen. Then, turn the waveform adjustment core (under the chassis) into the coil while at the same time adjusting the frequency core so as to maintain one diagonal black bar on the screen. Continue this procedure until the oscillator begins to motorboat, then turn the waveform adjustment core out until the motorboating just stops. As a check, turn the T113 frequency core until the picture is synchronized then reverse the direction of rotation of the core until the picture begins to fall out of sync with the diagonal bar sloping down to the right. Continue to turn the frequency core in the same direction. Additional bars should not appear on the screen. Instead, the hori-zontal oscillator should begin to motorboat. Retouch the adjustment of the T113 waveform adjustment core if necessary until this condition is obtained.

B.—Connect the low capacity probe of an oscilloscope to terminal C of T113. Turn the horizontal hold control onequarter turn from the clockwise position so that the picture is in sync. The pattern on the oscilloscope should be as shown in Figure 19. Adjust the waveform adjustment core of T113 until the two peaks are at the same height. During this adjustment, the picture must be kept in sync by readjusting the hold control if necessary. 17T150, 17T151, 17T163

Remove the oscilloscope upon completion of this adjustment.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the T113 frequency core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer Cl81A slightly clockwise. If less than 2 bors are present, adjust Cl81A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 or 3 bars are present.

Turn the horizontal hold control to the maximum clockwise position. Adjust the T113 frequency core so that the diagonal bar sloping down to the right appears on the screen and then reverse the direction of adjustment so that bar just moves off the screen leaving the picture in synchronization.

SENSITIVITY CHECK.—A comparative sensitivity check can be made by operating the receiver on a weak signal from a television station and comparing the picture and sound obtained to that obtained on other receivers under the same conditions. This weak signal can be obtained by connecting the shop antenna to the receiver through a ladder type attenuator pad.

RESPONSE CURVES.—The response curves shown on page 14 are typical though some variations can be expected.

The response curves are shown in the classical manner of presentation, that is with "response up" and low frequency to the left. The manner in which they will be seen in a given test set-up will depend upon the characteristics of the oscilloscope and the sweep generator. The curves may be seen inverted and/or switched from left to right depending on the deflection polarity of the oscilloscope and the phasing of the sweep generator.

NOTES ON R-F UNIT ALIGNMENT.—Because of the frequency spectrum involved and the nature of the device, many of the r-f unit leads and components are critical in some respects. Even the power supply leads form loops which couple to the tuned circuits, and if resonant at any of the frequencies involved in the performance of the tuner, may cause serious departures from the desired characteristics. In the design of the receiver these undesirable resonant loops have been shifted far enough away in frequency to allow reasonable latitude in their components and physical arrangement without being troublesome. When the r-f unit is aligned in the receiver, no trouble from resonant loops should be experienced. However, if the unit is aligned in a jig separate from the receiver, attention should be paid to insure that unwanted resonances do not exist which might present a faulty representation of r-f unit alignment.

A resonant circuit exists between the r-f tuner chassis and the outer shield box, which couples into the antenna and r-f plate circuits. The frequency of this resonance depends on the physical structure of the shield box, and the capacitance between the tuner chassis and the front plate. This resonance is controlled in the design by using insulating washers of proper thickness in the front plate to tuner chassis mounting. The performance of the tuner will be impaired if the proper washers are not used. Obviously then, if the r-f unit is removed for service, the washers should be replaced in the correct order when the unit is replaced.

ALIGNMENT TABLE

THE DETAILED ALIGNMENT PROCEDURE BEGINNING ON PAGE 8 SHOULD BE READ BEFORE ALIGNMENT BY USE OF THE TABLE IS ATTEMPTED

Step No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT HETERODYNE FREQ. METER TO	HET. METER FREQ. MC.	CONNECT OSCILLOSCOPE TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
	,			ANTEN	INA MATCHING	UNIT AI	IGNMENT			
1	Do not adjust th 1000 mmf. to pir produce —6 volts	is unit unle 1 of V107.	ess fairly certain t Replace cover on	hat it reg matchin	uires adjustment g unit. Remove	t. Disconr V106 fron	ect lead from L58 n socket. Connect	to S5. Connect outpubias box to junction	ut of matching unit th of R143 and R144 and	urough d set to
2	Antenna termi- nals	45.75 mc. 30% mod.	Not used		Not used	-	TP102. Scope gain to max.	_	L59 for min. audio on scope	Fig. 7
3		41.25 mc. 30% mod.		-	н		11	—	L60 for min. audio on scope	Fig. 7
4	Antenna termi- nals loosely		Antennatermi- nals through pad	45 to 54 mc.		-	Scope a xtal probe to gnd.	Connect 300 ohms from L58 to gnd.	L61 and L62 to ob- tain response of Fig. 12	Fig. 7 Fig. 11 Fig. 12
					R-F UNIT AL	IGNMEN	т			
5	If unit is comple Set T1 max. cou minal 3 to grour	tely out of nterclockwi nd. Set fine f	adjustment, prese se. Set C11 ¼ turr tuning 30 degrees	t all adju from mo clockwise	stments to center ix. clockwise. Dis from mechanico	r of range connect l al center c	with following exc ink from T104 and f its range for all	eptions. Set C18 so t terminate with 39 ol oscillator adjustmen	hat head is ¾" above hms. Shortr-f unit po ts.	chassis. wer ter-
6	Grid, pin 7 of V2through 1500 mmf.	43.5 mc. 30% mod.	Not used	-	Not used	-	TP1. Gain to maximum	Set r-f unit on channel 2	L65 for min. indica- tion on scope	Fig. 7 Fig. 10
7	Not used		Not used	-	Loosely to r-f unit oscillator	227 mc.	Not used	R-F unit on chan- nel 8	Cl for beat on het. freq. meter	Fig. 7
8	Antenna termi- nals loosely	181.25 and 185.75	Antenna termi- nals through pad	Channel 8	Not used	—	TP1. Gain to maximum	13	C9, C11, C15 and C18 for response shown in Fig. 13	Fig. 7 Fig. 13
9	Not used	-	Not used	—	Loosely to r-f unit oscillator	129 mc.	Not used	R-F unit on chan- nel 6	LS for beat on het. freq. meter	Fig. 8
10	Antenna termi- nals loosely	83.25 and 87.75	Antennatermi- nals through pad	Channel 6	Not used	-	TP1. Gain to maximum	,,	L48, L50 and L53 for response shown in Fig. 13	Fig. 7 Fig. 13
11	Not used	-	Not used	-	Not used		Not used	On channel 6. Con- nect ''VoltOhmyst'' to TPl	C8 for —3.5 volts on meter	Fig. 7
12	Antenna termi- nals loosely	83.25 and 87.75	Antenna termi- nals through pad	Channel 6	Not used	-	TP1. Gain to maximum	R-F unit on chan- nel 6	Check response. Re- adjust L48, L50 and L53 if necessary	Fig. 7 Fig. 13
13	Not used		Not used	-	Loosely to r-f unit oscillator	227 mc.	Not used	R-F unit on chan- nel 8	Cl for beat on het. freq. meter	Fig. 7
14	Antenna termi- nals loosely	181.25 and 185.75	Antenna termi- nals through pad	Channel 8	Not used		TP1. Gain to maximum	11	Check response ad- just C9, C11, C15 and C18 if neces- sary	Fig. 7
15	If C9 was readju	sted in step	14, repeatstep 11,	step 13 an	d step 14 until the	condition	ins specified in each	step are fulfilled wit	hout additional adjus	stments.
16	Not used	-	Not used		Loosely to r-f unit oscillator	257 mc.	Not used	Rec. on channel 13	L46 for beat on het. freq. meter. Over- shoot L46 slightly and adjust C1 for beat.	Fig. 7
17	Antennatermi- nals loosely	211.25 215.75	Antenna termi- nals through pad	Channel 13	Not used		TP1. Gain to maximum	Rec. on channel 13 ''VoltOhmyst'' on TP1	Check to see that response is correct and -3.0 volts of osc. injection is present	Fig. 13
18		205.25 209.75		Channel 12	Not used			Rec. on channel 12		Fig. 13
19		199.25 203.75	1.0	Channel		-		Rec. on channel 11	10	Fig. 13
20		193.25 197.75	.,	Channel 10		-		Rec. on channel 10		Fig. 13
21		187.25 191.75		Channe 9	1	-		Rec. on channel 9		Fig. 13
22	*1	181.25		Channe:				Rec. on channel 8	21	Fig. 13
23		175.25		Channe 7	1 **			Rec. on channel 7		Fig. 13
24	If the response the low channe	of any cha l yet maint	nnel (steps 17 thro ain correct respon	ugh 23) is se on cha	s below 80% at ei nnel 8.	ither mar	ker, adjust C9, C1	l, C15 and C18 as ne	cessary to pull respon	⊥ se up on
25	Repeat step 13. I	f the oscille	ator is off frequenc	y oversho	ot the adjustmer	nt of Cl a	nd correct by adju	sting L46.		
26	Repeat steps 16	through 25	until all adjustm	ents are a	btained.	E 129 mc	Not used	Rec. on channel 6	L5 for beat on het	. Fig. 7
	Not useu	02.05	R to t used		unit oscillator		TPL Gain to	Rec on channel f	freq. meter	t Fig 7
28	Antenna termi nals loosely	83.25	Antennatermi- nals through pad	6 6	I Not used	_	maximum	"VoltOhmyst" on TP1	response is correc and -3.0 volts o osc. injection is present	t Fig. 1
29		77.25	11	Channe 5	1	-	,,	Rec. on channel 5	57	Fig. 13
30	11	67.25		Channe 4	1	-	11	Rec. on channel 4		Fig. 1
31		61.25 65.75	**	Channe 3	1	-		Rec. on channel 3		Fig. 1

TEST PATTERN PHOTOGRAPHS



Figure 20-Normal Picture ----

Figure 21-Focus Magnet and Ion Trap Magnet Misadjusted





Figure 22—Horizontal Linearity Control Misadjusted (Picture Cramped in Middle) 1 111

Figure 23-Width Control Misad justed





Figure 24-Horizontal Drive Control Misadjusted

> Figure 25-Transients -





Figure 26-Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position-Just Before Pulling Into Sync

Figure 27-Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position



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SERVICE SUGGESTIONS

Following is a list of symptoms of possible failures and an indication of some of the possible faults:

NO RASTER ON KINESCOPE

- (1) Incorrect adjustment of ion trap magnet. Magnet reversed either front to back or top to bottom.
- (2) V116 or V117 inoperative. Check waveforms on grids and plates.
- (3) No high voltage—if horizontal deflection is operating as evidenced by the correct waveform on terminal 1 of high voltage transformer, the trouble can be isolated to the 1B3GT circuit. Either the T114 high voltage winding is open, the 1B3GT tube is defective, its filament circuit is open or C197 is shorted.
- (4) V110 circuit inoperative-Refer to schematic and waveform chart.
- (5) Damper tube (V120) inoperative.
- (6) Defective kinescope.
- (7) R218 open.
- (8) No receiver plate voltage-filter capacitor shorted-or filter choke open.

NO VERTICAL DEFLECTION

- (1) V114B or V115 inoperative. Check voltage and waveforms on grids and plates.
- (2) Till open.
- (3) Vertical deflection coils open.

SMALL RASTER:

- (1) Low Plus B or low line voltage.
- (2) V117 defective.

POOR VERTICAL LINEARITY :

- 1) If adjustments cannot correct, change V115.
- (2) Vertical output transformer TIII defective.
- (3) V114B defective-check voltage and waveforms on grid and plate.
- (4) C168, C170, C171, C172, C173 or C174 defective.
- (5) Low plate voltage-check rectifiers and capacitors in supply circuits.
- (6) If height is insufficient, try changing V114.

POOR HORIZONTAL LINEARITY:

- (1) If adjustments do not correct, change V117, or V120.
- (2) T114 or L107 defective.
- (3) C195 or C196 defective.

WRINKLES ON SIDE OF RASTER:

- (1) C199 defective.
- (2) Defective yoke

PICTURE OUT OF SYNC HORIZONTALLY:

- (1) T113 incorrectly tuned.
- (2) R226, R227 or R201B defective.

trap magnet. (2) Defective yoke.

SYNC:

16

PICTURE STABLE BUT POOR RESOLUTION:

PICTURE SMEAR:

- (2) Open peaking coil.

PICTURE JITTER:

15

TRAPEZOIDAL OR NON SYMMETRICAL RASTER:

(1) Improper adjustment of centering of focus magnet or ion

RASTER AND SIGNAL ON KINESCOPE BUT NO SOUND:

(1) T110 defective. (2) Sound i-f, ratio detector or audio amplifier inoperative— check V101, V102, V103 and their socket voltages. (3) Audio system defective.

(4) Speaker defective.

SIGNAL AT KINESCOPE GRID BUT NO SYNC:

(1) AGC control R175 misadjusted. (2) VIII, inoperative. Check voltage and waveforms at its grid and plate.

SIGNAL ON KINESCOPE GRID BUT NO VERTICAL

(1) Check V114B and associated circuit.

(2) Integrating network inoperative—Check.

(3) V113 or V114A defective or associated circuit defective. (4) Gas current grid emission or grid cathode leakage in V114. Replace.

SIGNAL ON KINESCOPE GRID BUT NO

HORIZONTAL SYNC:

(1) T113 misadjusted—readjust as instructed on page 11. (2) V112 or V113 inoperative—check socket voltages and waveforms. (3) T113 defective.

(4) C157, C181A, C182, C183, C184, C185, C186, C187 or C188 defective.

(5) If horizontal speed is completely off and cannot be adjusted check R226, R227, R201B, R229, R230 and R231.

SOUND AND RASTER BUT NO PICTURE OR SYNC:

(1) Picture, detector or video amplifier defective-check CR101 and V110-check socket voltages. (2) Bad contact to kinescope cathode.

(1) CR101 or V110 defective. (2) Peaking coils defective-check resistance. (3) Make sure that the focus control operates on both sides of proper focus.

(4) R-F and I-F circuits misaligned.

(1) R-F or I-F circuits misaligned.

(3) This trouble can originate at the transmitter--check on another station

(1) AGC control R175 misadjusted. (2) If regular sections at the left picture are displaced change V117.

REFER

то

Fig. 13

Fig. 7

ALICHMENT TABLE

CONNECT HETERODYNE FREO. METER TO MC.

34 Check r-f response and oscillator injection on channels 7 through 13 steps 23 back up through step 17 stopping on channel 13 for the next step.

If excessive tilt in the same direction occurs on channels 2, 3 and 4, adjust C18 on channel 2 to overshoot the correction of this tilt then switch to chan-nel 6 and adjust L53 for max. amplitude of response between carrier markers.

251 mc

...

CONNECT SWEEP GENERATOR TO

4.1

Not used

SWEEP GEN. FREO. MC.

Channe 2

SIGNAL

GEN. FREQ. MC.

55.25 59.75

_

_

CONNECT

GENERATOR

Not used

Step No.

32

33

35

36

54

57

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ADJUST

MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS

Rec. on channel 2

Rec. on channel 12 LlI as above

Loosely coupled 257 mc. TP1. Gain to Rec. on channel 13 Cl for beat on het. Fig. 7 freq. meter

CONNECT

OSCILLOSCOPE





Figure 7-R-F Unit Adjustments



Figure 8-R-F Oscillator Adjustments



Figure 9-Top Chassis Adjustments



Figure 10-Bottom Chassis Adjustments

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37	**	_	••	_	**	245 mc.		Rec. on channel 11	L10 as above	Fig. 7
38		-		_		239 mc.		Rec. on channel 10	L9 as above	Fig. 7
39		_	**			233 mc.		Rec. on channel 9	L8 as above	Fig. 7
40		_				227 mc.		Rec. on channel 8	L7 as above	Fig 7
41		_				221 mc.		Rec. on channel 7	L6 as above	Fig 7
42		_				129 mc.		Rec. on channel 6	L5 as above	Fig. 7
43		_		_		123 mc.		Rec. on channel 5	L4 as above	Fig. 7
44	••	_	,,			113 mc.		Rec. on channel 4	L3 as above	Fig. 7
45	**					107 mc.		Rec. on channel 3	L2 as above	Fig 7
46		_				101 mc.		Rec on channel 2	Lil as above	Fig. 7
47	Repeat steps 35 t	hrough 46	as a check. On co	mpletion	remove 39 ohm	resistor an	d reconnect link t	o terminals A and B	of T104	1 19. I
40	RATIO DETECTOR, SOUND I-F AND SOUND TAKE-OFF ALIGNMENT									
48	I-F (pin 1, V102) or WR39B or C connect to grid 4th pix I-F (pin 1, V109.)	4.5 mc. 400 cy. mod. or 45.75 mc. mod. by 4.5 mc. and 400 cy.	Not used	_	Not used	_	Across speaker voice coil. Vol- ume control set for max. vol- ume.	"VoltOhmyst" to junction of R110 and R114. Set C226 for min. ca- pacity. Set signal gen. to give -10 V on meter.	T102 top core for max. d-c on meter. T102 bottom core for min. audio on the oscilloscope.	Fig. 9 Fig. 10
49				-		-		"VoltOhmyst" to junction Rl12 and F Cl13. If the meter reads more than ± 1.5 F volts, adjust C226 for zero on the meter and readjust Tl02 (bot.) for min. output on scope. Repeat steps 48 and 49 until all conditions are satisfied.		Fig. 9 Fig. 10
50	Sig. Gen. to 1st Snd. I-F	4.5 mc.	lst Sound I-F grid (pin 1, V101)	4.5 mc.	**	_	In series with 10,000 ohms to terminal A, of T101.	Sweep output re- duced to provide 2 v p-p on scope.	T101 top and bot. cores for max. gain and symmetry at 4.5 mc.	Fig. 9 Fig. 10 Fig. 14
51	**		.,	••		-	Junction of R112 and C113	Check for symmetrical response wave F form (positive and negative).		
52	Sig. Gen. in se- ries with 1000 ohms to T110-C or WR39 across T104 A and B.		Not used	-		_		"VoltOhmyst" xtal probe to pin 8, V110. If sig. gen. is used short pin 1, V109 to ground.	Adjust T110 for minimum reading on ''VoltOhmyst''.	Fig. 9
				PIC	FURE I-F AND 1	RAP ADJI	ISTMENT			
53	Not used	-	Not used	-	Not used	-	Not used	Connect bias box to R144 and to gnd. A on ''VoltOhmyst'' a	junction of R143 and djust to give —1.0 v t TP101	
54	Sig. Gen. across T104 A and B	39.25 mc.	**	-		-		"VoltOhmyst" to TP102. Gen. output to give -1.0 volt d-c.	T104 top core to give min. d-c on meter.	Fig. 9
55		41.25 mc.	24		• •]			T105 bot. for min.	Fig. 10
56	**	47.25 mc.	••	-	11	- 1	**		T106 bot. for min.	Fig. 10
57	**	43.7 mc.	8.5	-		-		Sig. Gen. outputto give —1.0 V d-c at TP102.	T109 for max.	Fig. 7
58	**	45.5 mc.	**					1.9	T108 for max.	Fig. 9
59	**	41.8 mc.	**		**	-	**		T107 for max.	Fig. 9
60	First pix i-f grid (pin 1, V106) loosely.	Various See Fig. 16	First pix i-f grid pin 1, V106 through 1000 mmf.	40 to 48 mc.		-	To test point TP102	Shunt R141, R149 and terminals A and F of T109 with 330 ohms, 0.5 v p-p on scope.	Adjust T105 and T106 top cores for max. gain and re- sponse shown in Fig. 16.	Fig. 9 Fig. 16
61	Connected loosely to diode probe.	Various See Fig. 17	Mixer grid test point TP2 with short lead.	40 to 48 mc.		-	Scope diode probeto T105-B and to gnd.	Rec. on chan. 4. Connect 180 ohms from T105-B to junction R135 and C132. Upon com- pletion disconnect scope and shunt- ing resistors.	Set C221 to min. Adjust T1 top and T104 bot. for max. gain at 43.5 mc. and 45.75 mc. at 70%. Adjust C221 until 41.25 mc. is at 80%.	Fig. 9 Fig. 17
62	Connected loosely to grid of 1st pix i-f.	Various See Fig. 18				—	Connect scope to TP102.	"VoltOhmyst" to TP101. Set bias box for6.0 volts on the meter. Set sweep output to produce 3.0 volts p-p on scope.	Retouch T108 and T109 to obtain re- sponse shown in Fig. 18. Do not ad- just T107 unless absolutely neces- sary.	Fig. 18

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ALIGNMENT DATA



Figure 19-Horizontal Oscillator Waveforms

- (3) Vertical instability may be due to loose connections or noise.
- (4) Horizontal instability may be due to unstable transmitted sync.

RASTER BUT NO SOUND, PICTURE OR SYNC:

- (1) Defective antenna or transmission line.
- (2) R-F oscillator off frequency.
- (3) R-F unit inoperative-check V1, V2.

PICTURE I-F RESPONSE.—At times it may be desirable to observe the individual i-f stage response. This can be achieved by the following method:

For T107, T108 or T109, shunt all i-f transformers with a 330 ohm carbon resistor except the one whose response is to be observed.

Connect a wide band sweep generator to the second pix i-f grid and adjust it to sweep from 38 mc. to 48 mc.

DARK VERTICAL LINE ON LEFT OF PICTURE:

- Reduce horizontal drive and readjust width and horizontal linearity.
- (2) Replace VI17.

LIGHT VERTICAL LINE ON LEFT OF PICTURE:

- (1) C193 defective.
- (2) V120 defective.

Connect the oscilloscope to test point TP102 and observe the overall response. The response obtained will be essentially that of the unshunted stage.

To see the response of transformers T1, T104 and T105, T106, follow the instructions given on page 10.

Figures 28 through 36 show the response of the various stages obtained in the above manner. The curves shown are typical although some variation between receivers can be expected. Relative stage gain is not shown.

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Figure 28—Overall Pix 1-F Response



Figure 31—Response of T107 Pix I-F Transformer



Figure 34–Video Response at Average Contrast



RESPONSE PHOTOGRAPHS Taken from RCA WO58A Oscilloscope

Figure 29—Response of T1-T104 Pix I-F Transformers



Figure 32–Response of T108 Pix I-F Coil



Figure 35–Video Response (100 KC Square Wave)



Figure 30—Response of T105-T106 Pix I-F Transformer



Figure 33—Response of T109 Pix I-F Coil



Figure 36–Video Response (60 Cycle Square Wave)



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

Grid of 1st Video Amplifier (Pin 4 of V110) (6AG7) Voltage Depends on Picture Figure 37-Vertical (Oscilloscope Synced to 1/2 of Vertical Sweep Rate) (6.0 Volts PP) -111

Figure 38—Horizontal (Oscilloscope Synced to ½ of Horizontal Sweep Rate) (6.0 Volts PP) ----->





Plate of 1st Video Amplifier (Pin 8 of V110) (6AG7) Voltage depends on picture Figure 39-Vertical (105 Volts PP) ------





Figure 40-Horizontal (105 Volts PP) $\rightarrow \rightarrow$

Grid of Sync Separator (Pin 4 of V113) (6SN7)

Voltage depends on picture

Figure 41-Vertical (30 Volts PP) ------

Figure 42-Horizontal (30 Volts PP)









Figure 44-Horizontal (8 Volts PP) **





Grid of Vertical Sync Amp. (Pin 4 of V114A) (6SN7)

Figure 45-Vertical (12 Volts PP) ------

Figure 46-Horizontal (5 Volts PP) ***



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

Plate of Vertical Sync Amp. (Pin 5 of V114A) (6SN7)

Figure 47–Vertical (27 Volts PP)

Figure 48-Horizontal (16 Volts PP)

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Figure 49–Grid of Vertical Sweep Osc. (Pin 1 of V114B) (6SN7) (25 Volts PP)

> Figure 50—Plate of Vertical Sweep Osc. (Pin 2 of V114B) (30 Volts PP)





Figure 51–Grid of Vertical Sweep Output (Pin 1 of V115) (6AQ5) (35 Volts PP)

Figure 52–Plate of Vertical Sweep Output (Pin 5 of V115) (6AQ5) (800 Volts PP)





Cathode of Sync Separator (Pin 3 of V113) (6SN7)

Figure 53–Vertical (11 Volts PP)

Figure 54—Horizontal (6 Volts PP)





Grid of Sync Separator (Pin 1 of V113) (6SN7)

Figure 55–Vertical (40 Volts PP)

Figure 56-Horizontal (40 Volts PP)





WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

Plate of Sync Separator (Pin 2 of V113) (6SN7)

Figure 57-Vertical (15 Volts PP)

Figure 58—Horizontal (15 Volts PP)





Grid of Hor. Sync Amp. (Pin 4 of V112) (6SN7)

Figure 59-Vertical (15 Volts PP)

Figure 60—Horizontal (15 Volts PP)





Plate of Hor. Sync Amp. (Pin 5 of V112) (6SN7)

Figure 61–Vertical (70 Volts PP)

Figure 62—Horizontal (70 Volts PP)





Grid of Hor. Sync Amp. (Pin 1 of V112) (6SN7)

Figure 63–Vertical (65 Volts PP)

Figure 64-Horizontal (65 Volts PP)





Cathode of Hor. Sync Amp. (Pin 3 of V112) (6SN7)

Figure 65–Vertical (18 Volts PP)

Figure 66—Horizontal (18 Volts PP)



WAVEFORM PHOTOGRAPHS Taken from RCA WO58A Oscilloscope

Figure 67–Grid of Horizontal Oscillator Control (Pin 1 of V116) (6SN7GT) (22 Volts PP)

Figure 68—Cathode of Horizontal Oscillator Control (Pin 3 of V116) (6SN7GT) (1.3 Volts PP)



CV 140

Figure 69—Grid of Horizontal Oscillator (Pin 4 of V116) (6SN7GT) (390 Volts PP)

Figure 70—Plate of Horizontal Oscillator (Pin 5 of V116) (6SN7GT) (140 Volts PP)



Figure 71-Terminal "C" of T113 (120 Volts PP)

Figure 72—Grid of Horizontal Output Tube (Pin 5 of V117) (6BQ6) (95 Volts PP)





Figure 73—Plate of Horizontal Output (Approx. 4000 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V117 to Ground)

Figure 74—Cathode of Damper (Pin 3 of V120) (6W4GT) (2300 Volts PP)





Figure 75–Plate of Damper (Pin 5 of V120) (6W4GT) (180 Volts PP)

Figure 76–Plate of AGC Amplifier (Pin 5 of V111) (6CB6) (600 Volts PP)



CV 1400

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VOLTAGE CHART

The following measurements represent two sets of conditions. In the first condition, a 5000 microvolt test pattern signal was fed into the receiver, the picture synced and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV97A senior "VoltOhmyst" between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c. The symbol < means less than.

				E.	Plate	E. S	Screen	E. C	Cathode	E.	Grid	
Tube No.	Tube Type	Function	Operating Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Notes on Measurements
V 1	6X8	Mixer	5000 Mu. V. Signal	9	_	8	_	6	0	7	_	
			No Signal	9	1 45 to 150	8	145 to 150	6	0	7	–2.8 to –3.5	Depending on channel
V 1	6X8	R-F Oscillator	5000 Mu. V. Signal	3	_	_	_	6	0	2	_	
			No Signal	3	88 to 108	_		6	0	2	-3.0 to -5.1	Depending on channel
V2	6BO7	R-F Amplifier	5000 Mu. V. Signal	6	_	_	_	8	-	7	_	
			No Signal	6	133 to 138	_	_	8	1.1	7	_	Depending on channel
V2	6BQ7	R-F Amplifier	5000 Mu. V. Signal	1	_	_	_	3	_	2		
			No Signal	1	260	_	-	3	133 to 138	2	_	Depending on channel
v 101	6AU6	lst Sound I-F Amp.	5000 Mu. V. Signal	5	255	6	185	7	0.8	1	-1.0	
			No Signal	5	245	6	165	7	0.9	1	0	
V102	6AU6	2d Sound I-F Amp.	5000 Mu. V. Signal	5	260	6	52	7	0.17	1	-24	
			No Signal	5	255	6	54.0	7	0.12	1	*-1.5	*Unreliable measuring point. Voltage depends on noise.
V103	6AL5	Ratio Detector	5000 Mu. V. Signal	7	0.54	_	_	1	15.1	-	_	7.5 kc deviation at 400 cycles
			No Signal	7	-0.85	_		1	*6.85	_	_	*Unreliable measuring point. Voltage depends on noise.
V 104	6AV6	lst Audio Amplifier	5000 Mu. V. Signal	7	102	_	_	2	0	1	-0.3	At min. volume
			No Signal	7	100	_		2	0	1	-0.3	At min. volume
V105	6AQ5	Audio Output	5000 Mu. V. Signal	5	245	6	254	2	17	7	0	At min. volume
			No Signal	5	240	6	250	2	17	7	0	At min. volume
V 106	6AU6	lst Pix. I-F Amplifier	5000 Mu. V. Signal	5	248	6	255	7	0.2	1	-6.7	
			No Signal	5	150	6	120	7	1.0	1	*0	*Unreliable measuring point. Make measurement at T104-D.
V107	6CB6	2nd Pix. I-F Amplifier	5000 Mu. V. Signal	5	249	6	232	2	0.15	1	-6.7	
			No Signal	5	145	6	108	2	0.8	1	0	
V 108	6CB6	3d Pix. I-F Amplifier	5000 Mu. V. Signal	5	. 145	6	135	2	1.2	1	0	
			No Signal	5	130	6	127	2	1.1	-1	0	
V 109	6CB6	4th Pix. I-F Amplifier	5000 Mu. V. Signal	5	215	6	150	2	2.1	1	0	
			No Signal	5	210	6	140	2	2.0	1	0	
V110	6AG7	Video Amplifier	5000 Mu. V. Signal	8	135	6	150	5	1.35	4	-3.0	
			No Signal	8	100	6	125	5	1.65	4	*-0.6	*Depends on noise
V111	6CB6	AGC Amplifier	5000 Mu. V. Signal	5	-35.8	6	238	2	120	1	120	AGC control set for normal operation
			No Signal	5	4.0	6	265	2	100	1	80	AGC control set for normal operation

VOLTAGE CHART

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The following measurements represent two sets of conditions. In the first condition, a 5000 microvolt test pattern signal was fed into the receiver, the picture synced and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV97A senior ''VoltOhmyst'' between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c. The symbol < means less than.

				H	E. Plate	E	Screen	E.	Cathode		E. Grid		
Tube No.	Tube Type	Function	Operating Condition	Pin No.	Volts	Pin No	v Volt	s No	ı Volts	Pin No	Volts	Notes on Measurements	
V112	6SN7G1	Hor. Sync Amplifier	5000 Mu. V Signal	2	150	_	-	3	1.2	1	-38.0	rotos on Meusulements	
			No Signal	2	143	_	_	3	0.68	1	*-18	*Unreliable measurement	
			5000 Mu. V Signal	5	77	_	_	6	0	4	-1.3	point contrage depends on noise	
		4	No Signal	5	75	_	_	6	0	4	*-0.8	*Voltage depends on noise	
V113	6SN7GT	Hor. Sync Seporator	5000 Mu. V Signal	. 2	269	_	_	3	118	1	100	Forage depends on noise.	
			No Signal	2	263	_	_	3	*90	1	*80	*Unreliable measurement	
V 113	6SN7GT	Vert. Sync Separator	5000 Mu. V Signal	5	450	_	_	6	125	4	100	points, vonage depends on noise.	
			No Signal	5	400	_	_	6	100	4	80		
V114A	6SN7GT	Vert. Sync Amplifier	5000 Mu. V Signal	. 5	12.0	_	_	6	0	4	-0.13		
			No Signal	5	11.0	_	_	6	0	4	-0.05		
V114B	6SN7GT	Vertical Oscillator	5000 Mu. V. Signal	2	*53	_	_	3	0	1	*-14.8	*Depends on setting of Vert.	
			No Signal	2	*53	_	_	3	0	1	*-14.1	hold control. Voltages shown are synced pix adjustment.	
V115	6AQ5	Vertical Output	5000 Mu. V. Signal	5	245	6	259	2	21.5	1	0		
			No Signal	5	240	6	252	2	21.6	1	0		
V 116	6SN7GT	Horizontal Osc. Contro	5000 Mu. V. I Signal	2	182	_	-	3	+8.0	1	-12.5		
			No Signal	2	180	_	-	3	-3.0	1	-19.5		
			5000 Mu. V. Signal	2	135	-	_	3	+8.8	1	-13.5	Hor. hold counter-clockwise	
			5000 Mu. V. Signal	2	225	_	_	3	+8.8	1	-12.5	Hor, hold clockwise	
V 116	6SN7GT	Horizontal Oscillator	5000 Mu. V. Signal	5	185	-		6	0	4	-58		
			No Signal	5	180	-	_	6	0	4	-67		
			5000 Mu. V. Signal	5	185	-	_	6	0	4	-58	Hor. hold counter-clockwise	
		**	5000 Mu. V. Signal	5	185		_	6	0	4	-58	Hor. hold clockwise	
V117	6BQ6GT	Horizontal Output	5000 Mu. V. Signal	Cap	*	4	168	8	18.0	5	-15.0	*High Voltage	
	1000	** **	No Signal	Cap	*	4	168	8	18.5	5	-15.0	Pulse Present	
V119	/8016	H. V. Rectifier	5000 Mu. V. Signal	Cap	*	-	_	2&7	13,500	_	_	*High Voltage Pulse Present	
			No Signal	Cap	*	_	-	2&7	13,200	_	_		
V 120	6W4GT	Damper	5000 Mu. V. Signal	5	266	_	_	3	*	_		*High Voltage	
			No Signal	5	261		-	3	*	_	_	Pulse Present	
V121	17QP4	Kinescope	5000 Mu. V. Signal	Cone	13,50 0	10	475	11	140	2	90	At average	
			No Signal	Cone	13,200	10	470	11	135	2	90	Brightness	



Figure 77-R-F Unit Wiring Diagram

CRITICAL LEAD DRESS:

- 1. Keep all wiring in the pix i-f, sound i-f and video circuits as short as possible.
- Keep the leads on Cl10, Cl11, Cl12, C200, R109, R110, R111, R112, R114, R115 and R233 as short and direct as possible.
- Do not change the bus wire connection to pin 2 of V101 and V102. Sleeving is used on these wires to insure length and to prevent shorting.
- Dress Cl14 down between Rl17 (volume control) and water S101-2.
- 5. Ground R130 to pin 3 of V106 and R138 to pin 7 of V107.
- 6. Do not change the grounding of R141, R146 and R149.
- 7. Keep the bus wire from T109-A to C146 (plug in capacitor) short and direct.
- Ground the filaments of sockets V107, V108 and V109 independently of the socket center pin. Use ground lances proved near each socket.
- 9. Dress Cl98 straight up to act as a shield between Tl01-A and Vl10-4.
- Dress C153 and R170 (kine cathode) up in the air above the terminal board.
- Keep the leads connected to Tl13-C and Tl13-D (synchoguide) down so that they will not short out when the chassis is placed in the cabinet.

- Do not reroute any wires between TlO4 and the terminal board alongside it. Keep all leads on the foot side of the terminal board.
- Dress all wires routed past T104, shielded wires W102 and W103 under the big lances near T104.
- 14. Dress all a-c leads to S102 under the large lances on the front apron.
- 15. Dress R116 close to the chassis with leads as short as possible.
- 16. Dress C212 and C221 up in the air and away from all other leads and components.
- 17. The blue lead from pin 5 of VIII to the terminal board under the high voltage cage should be routed between VII7 socket and the rear apron.
- Dress all 2 watt resistors away from each other and all other wires and components.
- 19. Dress all wires away from damper tube V120.
- 20. Blue wire from pin 5 V116 to T113-A should not be more than 5 inches long.
- 21. Dress all peaking coils up and away from the base.
- Dress all leads in the high voltage compartment away from each other and away from the high voltage transformer.

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REPLACEMENT PARTS (Continued)

STOCK	DESCRIPTION	STOCK	DESCRIPTION
			the second s
76141	Magnet-Ion trap magnet (P.M. type)	503410	100,000 ohms, ± 10%, 1/2 watt (R129, R206, R220, R268)
76633	Magnet-Pin cushion correction magnet complete with	504410	100,000 ohms, ±20%, ½ watt (R136)
	support arm	30180	120,000 ahms, ±5%, 1/2 watt (R209)
76728	Nut—Speed nut for trimmer capacitor 76800	503412	120,000 ohms. + 10%, 1/2 watt (R190, R242, R245)
18469	Plate—Bakelite mounting plate for electrolytic 75220	503415	150 000 ohms + 10% 1/2 watt (R145, R150, R186, R221)
76464	Plate-Hi-voltage plate-bakelite-complete with tube	500415	$150,000 \text{ ob } m_{2} + 20\%, 12 \text{ watt} (B170, B217)$
	socket and corona ring	519415	$150,000$ blinks, $\pm 20\%, \%$ with (2220)
76675	Rectifier—Picture detector crystal rectifier (CR101)	512415	$150,000 \text{ ohms}, \pm 5\%, 1 \text{ watt}(R250)$
76452	Rectifier—Selenium rectifier (SR101, SR102)	503418	$180,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}(R257)$
76796	Resistor—Wire wound, 5.1 ohms, 1/3 watt (R241)	503422	220,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R185, R219)
76639	Resistor—Wire wound, 180 ohms, 2 watts (R234)	503427	270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R193)
76465	Resistor-Wire wound, 330 ohms, 1 watt (R122, R123)	503433	330,000 ohms, ±10%, ½ watt (R120, R222)
76469	Resistor—Wire wound, 2500 ohms, 10 watts (R131)	512433	330,000 ohms, ±5%, 1 watt (R224)
76390	Resistor—Wire wound, 5600 ohms, 5 watts (R151)	503447	470,000 ohms, ± 10%, ½ watt (R199, R232, R264)
76638	Resistor—Wire wound, 6000 ohms, 6 watts (R163)	504447	470,000 ohms, ±20%, 1/2 watt (R121, R263)
	Resistor—Fixed, composition:—	503456	560,000 phms, +10%, 1/2 watt (R202, R270)
502043	43 ohms, ±5%, 1/2 watt (R159)	30562	$680,000$ ohms. $+5\%$. $\frac{1}{2}$ watt (R127)
30732	47 ohms, ±5%, 1/2 watt (R109)	503482	820 000 chms ± 10% 1/ watt (R20() R204 R223)
504047	47 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R233)	503510	1 march = + 1097 1/ mate (P189)
502056	56 ohms, ±5%, ½ watt (R138)	503510	1 = 10 / 0.72 with (R103)
34763	68 ohms, ±5%, ½ watt (R105, R146)	504510	$1 \text{ megonm}, \pm 40\%, \% \text{ watt}(R104)$
13961	82 ohms, ±5%, ½ watt (R101)	503512	1.2 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (K1/1)
502110	100 ohms, ±5%, ½ watt (R130)	503515	1.5megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R192)
504110	100 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R126, R133)	11769	1.8 megohm, ±5%, ½ watt (R266)
503118	180 ohms, ±10%, ½ watt (R152)	504522	2.2 megohm, ±20%, ½ watt (R207, R213)
503133	330 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R160)	503539	3.9 megohm, ±10%, ½ watt (R179)
503147	470 ohms, ±10%, ½ watt (R215)	503556	5.6 megohm, ±10%, 1/2 watt (R166)
504147	470 ohms. + 20%, 1/2 watt (R177)	503582	8.2 megohm, +10%, 1/2 watt (R255)
513147	470 ohms. ± 10%, 1 watt (R246)	504610	10 merchm. + 20%. 1/2 watt (R116)
513156	560 ohms. + 10%. 1 watt (R253)	71456	Screw_#8-32 x 7/16" wing screw to mount deflection
34766	1000 ohms. + 5%, 1/2 watt (R111)	11450	yoke
503210	1000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R135, R137, R142, R153, R180)	76455	Shaft—Connecting shaft (nylon) for picture and bright- ness controls
504210	1000 ohms, ±20%, ½ watt (R103, R108, R125, R140, R148, R156)	73584	Shield—Tube shield
20721	1000 - h	71508	Socket-Tube socket for 1B3GT/8016
50731	$1200 \text{ ohms}, \pm 5\%, \%$ watt (R110)	50367	Socket—Tube socket, 6 pin, moulded, saddle mounted
503222	$1200 \text{ shms}, \pm 10\%, \%$ watt (R163)	73117	Socket—Tube socket, 7 pin, wafer, miniature
503222	$2200 \text{ shms}_{\pm} \pm 20\%$, $\frac{1}{2}$ watt (R100)	73115	Socket-Tube socket, 7 pin, moulded, miniature, plate
30694	3900 ohme + 5% 1/2 watt (R157)		mounted
503239	3900 ohms, ± 10%, ½ watt (R228)	75222	Socket=Tube socket, octal, ceramic, plate mounted
503247	$4700 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt}(R162)$	76453	Socket-Tube socket, octal, moulded bakelite, plate
504247	4700 ohms, ± 20%, 1/2 watt (R147)		mounted
503256	5600 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R164)	31251	Socket-Tube socket, octal, water
14659	6800 ohms, ±5%, ½ watt (R114, R115, R141)	75718	Socket-Channel indicator lamp socket and lead
503268	6800 ohms, ±10%, ½ watt (R158, R176)	74834	Socket-Kinescope socket
513268	6800 ohms, ±10%, 1 watt (R155)	75173	Stud—Adjustable stud for trimmer capacitor 76800
523268	6800 ohms, ±10%, 2 watts (R235)	76636	Stud-Adjusting stud complete with guard for focus
502282	8200 ohms, ±5%, ½ watt (R229)		magnet
503282	8200 ohms, ±10%, ½ watt (R165, R196, R197, R212)	76428	Support-Bakelite support only-part of hi-voltage shield
503310	10,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R208)	76446	Switch—Tone control and phono switch (S101)
504310	10,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R172)	76795	Transformer—Hi-voltage transformer (T114)
503312	$12,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R178, R181)$	76440	Transformer-Horizontal oscillator transformer com-
503315	15,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R258)		plete with adjustable cores (T113)
523315	15,000 ohms, ±10%, 2 watts (R173)	76429	Transformer—Power transformer, 115 volts, 60 cycle
503318	$18,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R106, R113, R271)$		(1114) m. (
523318	$18,000 \text{ ohms}, \pm 10\%, 2 \text{ watts} (R161)$	76439	Transformer—Katio detector transformer complete with adjustable cores (T102, C108, C109)
503322	22,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R118, R195)	70400	Transforman Sound is ftransforman complete with ad-
71989	22,000 ohms, $\pm 5\%$, 1 watt (R210, R211)	16438	justable cores (T101, C103, C104)
513322	$44,000 \text{ ohms}, \pm 10\%, 1 \text{ watt} (K221)$	76437	Transformer-Sound take-off transformer complete with
503327	21,000 onms, ± 10%, ½ watt (R102, R119)	10.01	adjustable cores (T110, C148)
513321	22,000 ohms, $\pm 10\%$, 1 watt (R104)	76431	Transformer—Vertical output transformer (T111)
513333	33.000 ohms $\pm 10\%$ 1 watt (R169)	76432	Transformer-First pix i-f grid transformer complete
503330	$39,000 \text{ ohms} \pm 10\%$ 1/2 watt (R103)		with adjustable cores (T104, C121, R124)
503339	47 000 ohms + 10% 1/2 watt (R104 R191 R265 R267)	76434	Transformer-First pix i-f plate transformer complete
513347	47.000 ohms. + 10%, 1 watt (R132, R139, R269)		with adjustable cores (T105, C130, C131, R134)
502356	56.000 ohms. + 5%. 1/2 watt (R149)	76435	Transformer-Second pix i-f grid transformer complete
503356	56.000 ohms, +10%, ½ watt (R187, R236, R256)		with adjustable core (T106, C133)
00000	56,000 ohms, + 10%, 1 watt (R107)	76433	Transformer—Third or fourth pix i-f transformer (T107,
513356	68,000 ohms, ±10%, ½ watt (R128, R143)	80400	
513356 503368		76436	C147 CR101, L102, R154)
513356 503368 504368	68,000 ohms, +20%, 1/2 watt (R198, R205)		
513356 503368 504368 513368	$68,000 \text{ ohms}, \pm 20\%, \frac{1}{2} \text{ watt} (R198, R205)$ $68,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R226)$	1 70400	Then $A.5 matrice (L1)A. (C127)$
513356 503368 504368 513368 8064	68,000 ohms, ±20%, ½ watt (R198, R205) 68,000 ohms, ±10%, 1 watt (R226) 82,000 ohms, ±5%, ½ watt (R144)	1 76482	Trap-4.5 mc trap (L114, C137)
513356 503368 504368 513368 8064 512382	68,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R198, R205) 68,000 ohms, $\pm 10\%$, 1 watt (R226) 82,000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R144) 82,000 ohms, $\pm 5\%$, 1 watt (R231)	1 76482 76616	Trap-4.5 mc trap (L114, C137) Yoke-Deflection yoke complete with 6 contact male connector (L109, L110, L111, L112, C199, R243, R244.

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REPLACEMENT PARTS (Continued) 17T150, 17T151, 17T163

STOCK	DESCRIPTION	STOCK	
	SPEAKER ASSEMBLY	76511	Dece
	971614-1W RL100D3 RMA-274	76512	Deco
	For Model 17T150	75456	Éscu
5039	Connector—4 contact male connector for speaker (J101)	74889	Foot
76834	Speaker-4" x 6" P.M. speaker complete with cone and	76806	Glas
	voice coil less transformer and connector	76595	Kno
10150	Transformer—output transformer (1103)	76596	Kno
	SPEAKER ASSEMBLY	76593	Kno
	RL105E8	76594	Kno
	RMA-274	76591	Kno
	For Models 1/1151, 1/1163	76592	Kno
75024	Cone-Cone and voice coil assembly (3.2 ohms)	74963	Kno co
5039	Connector—4 prong male connector for speaker (J101)	75464	Kno
15022	Speaker—8" P.M. speaker complete with cone and voice coil (3.2 ohms) less transformer and plug	70007	c0
75520	Transformer—Output transformer (T103)	76597	Кпо (от Кпо
	SPEAKER ASSEMBLIES	11705	(01
	971490 2R	75459	Lam
	RMA285 For Models 17T151, 17T163	13433	gu
77129	Cone—Cone and voice coil	76589	Mas
	Note If stamping on speaker in instrument does not	76822	Nut-
	agree with above speaker number, order replacement parts by referring to model number of instrument, num-	71455	Nut- ha
	ber stamped on speaker and full description of part required.	76177	Nut-
	7CB8 CABINET BASE	76819	Pad-
	For use with Model 177150, 177151	16825	to
X3249	Pull-Door pull-mahogany finish-for marcon bases	76824	Pane
X 3250	Pull—Door pull—blonde finish—for mahogany bases	76826	Pane
	MISCELLANEOUS	76828	17: Plate
76805	Back-Cabinet back complete with power cord and ter-	76816	cro Reto
76827	Back—Cabinet back complete with power cord for Model	76809	Rod-
20104	17T163	76810	Rod-
76184	Board—"Antenna" terminal board		ho
76611	Models 17T150, 17T151	76821	Screv ibl
76812	Bracket—Hanger bracket for deflection yoke hood for Model 17T163	76808	Sleev lea
76814	Bracket—Stiffening bracket for kinescope cradle (2 req'd) for Models 17T150, 17T151	73643	Sprin
76829	Bracket-Stiffening bracket for kinescope bracket	30330	Sprin
76823	(2 reg d) for Model 111105	14270	Sprir
X3128	Cloth—Grille cloth for Models 17T150 17T151	72945	765 Sania
X3222	Cloth—Grille cloth for oak instruments for Model 17T163	36580	Sprin
X3248	Cloth-Grille cloth for mahogany or walnut instruments	76813	Strat
	for Model 17T163	76817	Supp
39153	Connector-4 contact male connector for antenna cable	76815	Supp
75474	Connector—Single contact male connector for antenna cable (2-reg'd)	75457	Wasł cho
71457	Cord—Power cord and plug	75500	Wasł
76818	Cushion—Rubber cushion (1/16" x 1" x 1/4") for kinescope and cradle support (4 reg'd)	75458	Wash nel
76807	Cushion—Vinylite cushion (formed) for picture opening	76836	Wash

The system of employing an asterisk before the stock number of new items has been discontinued.

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.

DESCRIPTION
al—Control panel function decal for maroon, ma- gany or walnut instruments
al-Control panel function decal for blonde or oak
tcheon—Channel marker escutcheon—gold
—Felt foot for cabinet (4 reg'd) for Models 17T150, T151
s—Safety glass
b— B rightness control or vertical hold control knob maroon (outer)
b—Brightness control or vertical hold control knob beige (outer)
b—Channel selector knob—maroon (inner)
b—Channel selector knob—beige (inner)
-Fine tuning control knob-maroon (outer)
b—Picture control, horizontal hold control or volume ntrol and power switch knob—marcon (inner)
b—Picture control, horizontal hold control or volume ntrol and nower switch knob—beige (inner)
b—Tone control and phono switch knob—maroon iter)
b—Tone control and phono switch knob—beige iter)
p-Channel marker escutcheon-lamp-Mazda 51
k—Channel marker escutcheon light mask—bur- ndy
K—Channel marker escutcheon light mask—me- um dark beige
-Speed nut to lock flexible straps
–#8-32 wing nut to fasten deflection yoke hood to nger bracket
-#10-32 special nut for deflection yoke hood support ls (2 reg'd)
-Rubber pad (channel) for flexible straps (2 reg'd) -Rubber pad (channel) mounted on cradle support
cushion kinescope 1—Metal front panel for mahogany or walnut in- urgents for Madel 177162
1—Metal front panel for oak instruments for Model 163
-Plate complete with weld bolts for kinescope dle lower support for Model 177163
iner—Safety glass retainer (2 req'd)
-''L'' shape threaded rod to support deflection yoke od assembly (2 reg'd) for Models 17T150, 17T151
-''L'' shape threaded rod to support deflection yoke od assembly (2 reg'd) for Model 17T163
w—#10 x 1_{36}^{*} " hex head tapping screw to lock flexestraps
e—Polyethylene sleeve for insulating high voltage d—on R.H. support rod
g—Channel marker escutcheon spring clip
g—Formed spring for safety glass retainers (4 req'd)
ng—Retaining spring for knobs 74963 and 75464
g—Retaining spring for knobs 76593, 76594, 76595, 96, 76597, 76598
ng—Retaining spring for knobs 76591 and 76592
g-Suspension spring (coil type) for ground braid
ort - Gradle support for kinescope
ort-Lower support for kinescope cradle support
ner-Felt washer-dark brown-between knob and annel marker escutcheon
er—Felt washer for cabinet back mounting screws
ner—Felt washer—beige—between knob and chan- marker escutcheon
ner—Cellulose washer—gold—for knobs



CIRCUIT SCHEMATIC DIAGRAM



17T150, 17T151, 17T163

Figure 79-Circuit Schematic Diagram

REPLACEMENT PARTS

STOCK No.	DESCRIPTION	STOCK	DESCRIPTION
	R-F UNIT ASSEMBLIES	504410	100,000 ohms, ±20%, ½ watt (R1, R5, R6)
	KRK11	504447	470,000 ohms, ±20%, ½ watt (R8)
76539	Board-Antenna matching transformer terminal board	14343	Retainer—Fine tuning shaft retaining ring
	less coils L58, L59, L60 and less capacitors C24, C25, C26, C27	75164	Rod—Actuating plunger rod (fibre) for fine tuning link
76531	Board—Terminal board, 5 contact and ground	76547	Screw—#4-40 x 1/4" adjusting screw for coils L6, L7, L8, L9, L10, L11
76522	Bracket—Vertical bracket for holding r-f OSC and mixer tube (6X8) shield (early production)	76548	Screw—#4-40 x 5/16" adjusting screw for coils L1, L2, L3, L4, L46
76845	Bracket-Vertical bracket for holding oscillator-mixer	76549	Screw—#4-40 x 3%" adjusting screw for coil L5
75186	Capacitor-Ceramic, variable, for fine tuning-plunger	76519	Shaft—Channel selector shaft and plate
	type (C2)	76134	Shaft—Fine tuning shaft and cam
93056	Capacitor-Ceramic, 5 mmf. (C26)	76518	Shield—Front shield complete with shaft bushing and bracket
70597	Capacitor—Ceramic, 8 mmf. (C29)	76534	Shield-Tube shield (plain) for V2 (also V1 in "M1"
55320	"M1")	76522	production)
76550	Capacitor—Ceramic, 12 mmf. (C3) (early production)	16555	tion)
54207	Capacitor—Ceramic, 18 mmf. (C27)	76336	Socket-Tube socket, 9 pin, miniature, bakelite, saddle
76557	Capacitor—Ceramic, 22 mmf. (C19)	76530	Socket-Tube socket, 9 pin miniature ceramic soddle
70935	Capacitor—Ceramic, 22 mmf. (C5)		mounted
76739	Capacitor—Ceramic, 21 mmr. (C25)	75191	Spacer—Insulating spacer for front plate (4 req'd)
76527	Capacitor—Mica trimmer, 55-80 mmf. (C11)	75163	Spring—Friction spring (formed) for fine tuning cam
75199	Capacitor—Ceramic, 270 m mf. (C12, C14)	30340	Spring—Hairpin spring for fine tuning link
76552	Capacitor-Ceramic, 330 mmf. (C10) (early production)	76523	Spring—Retaining spring for oscillator mixer tube shield (early production)
75198	Capacitor—Ceramic, 470 mmf. (C10) (production marked ''M1'')	75068	Spring—Retaining spring for oscillator mixer tube shield (production marked "Ml")
75166	Capacitor-Ceramic, 1500 mmf. (stand-off) (C13, C17,	73457	Spring—Return spring for fine tuning control
73748	Canacitor—Ceramic 1500 mmf (C16, C20, C23)	76554	Stator—Antenna stator complete with rotor, coils, capac- itor and resistor (S5, L42, L43, L44, L45, L54, L55, C20)
75610	Capacitor—Ceramic, 1500 mmf. (C6)	76551	Stator-Converter stator complete with rotor, coils, ca-
71088	Capacitor—Ceramic, 0.68 mmf. (C7)		pacitors and resistors (S2, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L48, C10, C12, R4, R5, R6) (early
75184	Capacitor-Ceramic, adjustable, 0.75-4 mmf. complete		production)
76545	with adjusting stud (C1, C9) Capacitor—Tubular, steatite, adjustable 0.8-2.25 mmf.	76780	Stator—Converter stator complete with rotor, coils, ca- pacitors and resistors (S2, Ll2, Ll3, Ll4, Ll5, Ll6, Ll7, Ll8, Ll9, L20, L21, L48, Cl0, Cl2, R4, R5, R6) (produc-
76781	Capacitor—Tubular, steatite, adjustable 0.8-1.4 mmf.	76546	tion marked "M1") States—Oscillator states complete with rotes, soils, and
76532	(C8) (production marked ''M1'') Capacitor—Adjustable trimmer, steatite, 1.0-4.0 mmf.	10340	capacitor (SI, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L46) (early production)
76143	(CIO)	76779	Stator—Oscillator stator complete with rotor, coils, and capacitor (S1, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8
73591	Coil—Antenna matching coil (2 reg'd)		L9, L10, L11, L46) (production marked "M1")
76560	Coil-Channel #13 converter coil (L47) (early production)	76556	Stator-R-F grid stator complete with rotor, coils and registers (S4 1.32 1.33 1.34 1.35 1.36 1.37 1.38 1.39
73477	Coil—Choke coil (L57)		L40, L41, L53, C19, R11, R12)
76763	Coil—Filament choke coil (L63, L64)	76553	Stator-R-F plate stator complete with rotor, coils, capac-
76562	Coil—R-F amplifier coupling coil (L51)		L29, L30, L31, L50, C14, R7)
76537	Coil—Shunt coil complete with adjustable core (L61)	76561	Strap—Channel #13 r-f grid strap (L52)
76538	Coil—Shunt coil complete with adjustable core (L62)	76526	Strip—Coil segment mounting strip—L.H. lower
76529	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L49 C(5)	76544	Strip—Coil segment mounting strip—L.H. upper—less trimmer
76559	Connector—Oscillator grid connector	76525	Strip-Coil segment mounting strip-R.H. center
38853	Connector—4 contact female connector—part of antenna matching transformer	13440	Stud—Capacitor stud—brass—#4-40 x 13/16" with 3/64" screw driver slot for trimmer coil L49, C15 uncoded and coded ''ER''
76460	Contact—Test point contact	75447	Stud-Capacitor stud-brass-#4-40 x 13/16" with 3/64"
75187	Core—Adjustable core for fine tuning capacitor		screw driver slot for trimmer coil L49, C15 coded numerically and "Hi Q"
76543	Core—Adjusting core for FM trap	76740	Stud-#6-32 x 1" adjusting stud for capacitor No. 76545
76521	Detent—Detent mechanism and fibre shaft	75172	(early production)
73453	Form-Coil form for coils L48, L50 & L53	15115	76781 (production marked "M1")
76524	Link—Link assembly for fine tuning	76536	Transformer-Antenna matching transformer complete
	Resistor—Fixed, composition:—	76528	(12, 024, 020, 020, 021, 136, 159, 160, 161, 162, 31) Transformer-Converter transformer (T1, B2)
503047	47 ohms, ± 10%, ½ watt (R9)	76540	Trap-FM trap complete with adjustable core (1.59)
503082	82 ohms, ± 10%, ½ watt (R10)	76535	Trap-I-F trap (L65)
504115	150 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R13)	76542	Trap-I-F trap (41.25 MC) complete with core (L60)
504210	1000 ohms, ±20%, ½ watt (R7, R14)	76541	Trap-I-F trap (45.75 MC) complete with core (L59)
503233	3300 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R4, R11, R12).	75190	Washer-Insulating washer (neoprene) for mounting
504310	10,000 ohms, \pm 20%, $\frac{1}{2}$ watt (R2)		capacitor on coil strip

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION	STOCK	DESCRIPTION
	CHASSIS ASSEMBLIES	73798	Capacitor-Tubular, paper, oil impregnated, .022 mfd.,
	KCS-66C	73810	Capacitor-Tubular, paper, oil impregnated, .022 mfd.,
76456	Bracket-Channel indicator lamp bracket	73811	Capacitor-Tubular, paper, oil impregnated, .027 mfd.,
76454	Bracket—Mounting bracket complete with insulator for picture control	73552	1000 volts (C196) Capacitor—Tubular, paper, oil impregnated, .033 mfd
76800	Capacitor—Adjustable trimmer, steatite, 14. mmf. (C226)	73596	400 volts (C223)
71496	Capacitor-Adjustable, 4-70 mmf. (C221)	73650	600 volts (C171)
75217	Capacitor—Ceramic, 10 mmf. (C219, C227) Capacitor—Mica trimmer, dual 10-160 mmf. (C181A	13558	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 200 volts (C155)
33380	C181B) Capacitar-Caramia 12 mmt (C220)	73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C212)
38868	Capacitor—Ceramic, 33 mmf. (C151)	75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts (C179, C180)
71924	Capacitor—Ceramic, 56 mmf. (C105)	73592	Capacitor-Tubular, paper, oil impregnated, .047 mfd.,
71514	Capacitor—Mica, 68 mmf. (C182) Capacitor—Ceramic. 82 mmf. (C225)	73597	Capacitor-Tubular, paper, oil impregnated, .047 mfd.,
76474	Capacitor-Mica, 82 mmf. (C157)	73792	1000 volts (C176) Capacitor—Tubular, paper, oil impregnated, 068 mfd
39396	Capacitor-Ceramic, 100 mmf. (C156, C215)	72704	200 volts (C174)
76673	Capacitor—Ceramic, 100 mmf. (C222) Capacitor—Ceramic, 220 mmf. (C177)	13184	200 volts (C153, C169)
47617	Capacitor—Ceramic, 270 mmf. (C117)	73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C178, C183)
73091	Capacitor-Mica, 270 mmf. (C218)	73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C170, C192)
76476	Capacitor—Mica, 330 mmf. (C110) Capacitor—Mica, 330 mmf. (C187, C211)	73786	Capacitor-Tubular, paper, oil impregnated, 0.27 mfd.,
73094	Capacitor—Mica, 390 mmf. (C167)	73787	200 volts (C191) Capacitor—Tubular, paper, oil impregnated, 0.47 mfd.
39644 76461	Capacitor-Mica, 470 mmf. (C111, C112)	76498	200 volts (C186)
76477	Capacitor—Mica, 820 mmf. (C190)	73477	Coil—Choke coil (L101)
75166	Capacitor-Ceramic, 1500 mmf. (stand-off) (C146)	76640	Coil—Choke coil (1.5 muh) (L115)
73473	Capacitor-Ceramic, 4700 mmf. (C122, C123, C125, C126, C127, C128, C129, C132, C134, C136, C140, C144, C224)	76442	Coil—Horizontal linearity coil complete with adjustable core (L107)
76470	Capacitor-Ceramic, dual 4700 mmf. (C135A, C135B, Claig Claig Claige Claige Claige Claige Claige	76646	Coil—Peaking coil (72 muh) (L103, R188)
73960	Capacitor—Ceramic, 10,000 mmf. (C101, C106, C139,	72619	Coil—Peaking coil (93 muh) (L104, R261)
75877	C198, C216) Capacitar—Ceramic dual 10,000 mmt (C1028, C1028	76441	Coil—Width coil complete with adjustable core (L106)
76740	C107A, C107B)	74594	Connector-2 contact male connector for power cord
74521	Capacitor-Electrolytic, 2 mfd., 10 volts (C124, C138)	5040	Connector-4 contact female connector for speaker cable (P101)
28417	Capacitor—Electrolytic, 5 mfd., 50 volts (C200) Capacitor—Electrolytic, 5 mfd., 450 volts (C201)	75542	Connector—6 contact male connector—part of deflection
75218	Capacitor-Electrolytic comprising 1 section of 10 mfd.,	50367	yoke (P102) Connector—6 contact female connector for deflection
	150 wits, 1 section of 5 mfd., 350 volts and 1 section of 150 mfd., 50 volts (C206A, C206B, C206C)	76904	yoke leads (J102)
76451	Capacitor—Electrolytic comprising 1 section of 100 mfd., 350 volts, 2 sections of 10 mfd., 350 volts and 1 section	35787	Connector—Anode connector for kinescope Connector—Phono input connector (J103)
75220	or 20 mfd., 50 volts (C205A, C205B, C205C, C205D) Capacitor—Electrolytic, 150 mfd., 200 volts (C203, C204)	76457	Connector-Second anode lead connector mounted on
76479	Capacitor-Tubular, moulded paper, oil impregnated,	76460	Contact—Test point contact
75643	Capacitor-Tubular, paper, oil impregnated, .001 mfd.	76447	Control-AGC control (R175)
73598	1000 volts (C150, C158, C165, C168)	76444	Control Brightness control (R218)
73595	600 volts (C154)	76443	Control—Horizontal and vertical hold control (R201A,
10000	600 volts (C113, C163, C173)	76445	Control—Picture control (R167)
73803	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 1000 volts (C172)	76449	Control-Vertical linearity control (R214)
73599	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 600 volts (C118)	76171	Control-Volume control and power switch (R117, S102)
73795	Capacitor-Tubular, paper, oil impregnated, .0033 mfd.,	74956	Cushion—Rubber cushion for deflection yoke hood
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd.,	74839	Fastener—Push fastener for mounting tube sockets
73561	Capacitor—Tubular, paper, ail impregnated 01 mfd	76801	Fuse-0.2 amp., 250 volts Grommet-Rubber grommet for 2nd, gnode lead evit
73594	400 volts (C115, C119, C159, C162)	37396	Grommet-Rubber grommet for mounting tube sockets
- 0001	.01 mfd., 600 volts (C188)	76830	Hood-Deflection yoke hood less cushions
73797	Capacitor—Tubular, paper, oil impregnated, .015 mfd., 600 volts (C116, C207)	76480	uack—Video jack (J104) Lead—Anode lead complete with evelet
73562	Capacitor-Tubular, paper, oil impregnated, .022 mfd., 400 volts (C160, C184)	76168	Magnet-Focus magnet complete with adjustable plate





TELEVISION RECEIVERS MODELS 17T200, 17T201, 17T202, 17T211, 17T220

Chassis No. KCS72, KCS72M1 or KCS72M2

-Mfr. No. 274-

SERVICE DATA - 1952 No. T2-

PREPARED BY RCA SERVICE CO., INC. FOR

RADIO CORPORATION OF AMERICA RCA DIVISION CAMDEN, N. J., U. S. A.

GENERAL DESCRIPTION

Models 17T200, 17T201, 17T202, 17T211, and 17T220 are "17 inch" television receivers. The receivers are-identical except for cabinets, and speakers.

Features of the television up't are: full twelve channel coverage; intercarrier FM sound system; ratio detector; improved picture brilliance; pulsed picture A-G-C; A-F-C horizontal hold; stabilized vertical hold; noise saturation circuits; improved sync separator and clipper; 3.2 mc. band width for picture channel and reduced hazard high voltage supply. An auxiliary audio input jack is provided to permit the use of an external record playing attachment.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

RCA TUBE COMPLEMENT

		Tu	be Used	Function
(1)	RCA	6CB6	R-F Amplifier
(2)	RCA	6J6	R-F Oscillator and Mixer
(3)	RCA	6CB6	lst Picture I-F Amplifier
(4)	RCA	6CB6	
(5)	RCA	6CB6	3rd Picture I-F Amplifier
(6)	RCA	12AU7. Picture 2nd D	etector and Vert. Sync. Sep.
(7)	RCA	6CL6 (6AC7) (6AG7).	*Video Amplifier
(8)	RCA	6AU6	lst Sound I-F Amplifier
(9)	RCA	6AU6	2nd Sound I-F Amplifier
(10)	RCA	6AL5	
(1 1)	RCA	6AV6	lst Audio Amplifier
(12)	RCA	6K6GT	Audio Output
(1	13)	RCA	6AU6	AGC Amplifier
(1	14)	RCA	6SN7GT. Horizontal S	Sync. Sep. and Sync. Output
(15)	RCĂ	6J5	Vertical Sweep Oscillator
(16)	RCA	6K6GT	Vertical Sweep Output
()	17)	RCA	6SN7GT Horizontal S	weep Oscillator and Control
(18)	RCA	6BQ6GT	Horizontal Sweep Output
(1	19)	RCA	6W4GT	Damper
(2	20)	RCA	1B3-GT/8016	High Voltage Rectifier
(2	21)	RCA	17QP4	Kinescope
(2	22)	RCA	5U4G	
(2	23)	RCA	5Y3GT	Rectifier
			*(See Figu	re 07)



Model 17T200 "Shelly" Ebony Model 17T201 "Hadley" Maroon (Shown on base)



Model 17T211 "Ashton" Walnut, Mahogany, Blonde



0

Model 17T202 "Kentwooa

Mahogany, Grained

(Shown on base)

Walnut, Mahogany

	ELECTRICAL AND MEC
	PICTURE SIZE 146 square inches on a 17QP4 Kinescope
	TELEVISION R-F FREQUENCY RANGE
	All 12 television channels, 54 mc. to 88 mc., 174 mc. to 216 mc.
	Picture I-F Carrier Frequency
	Sound I-F Carrier Frequency
	POWER SUPPLY RATING 115 volts, 60 cycles, 190 watts
	AUDIO POWER OUTPUT RATING4.0 watts max.
	VIDEO RESPONSE
	SWEEP DEFLECTION Magnetic
	FOCUS
	In Models 17T20() 17T201 & 17T202
	971636-1 5" PM Dynamic, 3.2 ohms
PICTURE SIZE 146 square inches on a 17QP4 Kine TELEVISION R-F FREQUENCY RANGE All 12 television channels, 54 mc. to 88 mc., 174 mc. to 21 Picture I-F Carrier Frequency 25.5 Sound I-F Carrier Frequency 21.00 mc. and 4. POWER SUPPLY RATING 115 volts, 60 cycles, 190 AUDIO POWER OUTPUT RATING 4.0 watts VIDEO RESPONSE To 3. SWEEP DEFLECTION Mag FOCUS Mag LOUDSPEAKERS In Models 17T200, 17T201 & 17T202 In Models 17T211 & 17T220	
	(971490-3) 8'' PM Dynamic, 3.2 ohms
PICTURE SIZE 146 square inches on a 17QP4 Kinescope TELEVISION R-F FREQUENCY RANGE All 12 television channels, 54 mc. to 88 mc., 174 mc. to 216 mc. Picture I-F Carrier Frequency 25.50 mc. Sound I-F Carrier Frequency 21.00 mc. and 4.5 mc. POWER SUPPLY RATING 115 volts, 60 cycles, 190 watts AUDIO POWER OUTPUT RATING 4.0 watts max. VIDEO RESPONSE To 3.2 mc. SWEEP DEFLECTION Magnetic FOCUS Magnetic LOUDSPEAKERS In Models 17T200, 17T201 & 17T202 In Models 17T211 & 17T220	
	Net Shipping Width Height Depth
	177200 88 lbg 103 lbg $21\frac{1}{2}$ 22 $21\frac{3}{2}$
	17T20188 lbs103 lbs21½ 22 21¾
	17T202 88 lbs103 lbs21½2221¾
	17T21195 lbs116 lbs24 ¹ / ₂ 35 ¹ / ₄ 21 ³ / ₄
	17T220106 lbs130 lbs23 ³ /435 ¹ /423 ³ /4

RECEIVER ANTENNA INPUT IMPEDANCE

Choice: 300 ohms balanced or 72 ohms unbalanced.

110 17T200,17T201, 17T202, 17T211, 17T220

ELECTRICAL AND MECHANICAL SPECIFICATIONS (Continued)

PICTURE INTERMEDIATE FREQUENCIES	OPERATING CONTROLS (Front Panel)
Picture I-F Carrier Frequency	Channel Selector { Fine Tuning { Dual Control Knobs Picture { Brightness { Dual Control Knobs
SOUND INTERMEDIATE FREQUENCIES	Picture Horizontal Hold Picture Vertical Hold Dual Control Knobs
Sound I-F Carrier Frequency	Sound Volume and On-Off Switch (TV Tone & Phono Switch (Dual Control Knobs
Sound I-F Frequency	NON-OPERATING CONTROLS (not including r-f and
VIDEO RESPONSE	i-f adjustments)
FOCUS	Picture Centeringtop chassis adjustment Widthrear chassis adjustment Heightrear chassis adjustment
SWEEP DEFLECTION	Horizontal Linearity rear chassis screwdriver adjustment Vertical Linearity rear chassis adjustment
SCANNING	Horizontal Drive rear chassis screwdriver adjustment Horizontal Oscillator Frequency rear chassis adjustment
HORIZONTAL SWEEP FREQUENCY 15,750 cps	Horizontal Oscillator Waveform . bottom chassis adjustment Horizontal Locking Range rear chassis adjustment
VERTICAL SWEEP FREQUENCY	Focustop chassis adjustment Ion Trap Magnettop chassis adjustment Deflection Coil top chassis wing nut adjustment
FRAME FREQUENCY (Picture Repetition Rate) 30 cps	AGC Control

HIGH VOLTAGE WARNING

OPERATION OF THIS RECEIVER OUTSIDE THE CABINET OR WITH THE COVERS RE-MOVED, INVOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES. WORK ON THE RECEIVER SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOROUGHLY FAMILIAR WITH THE PRECAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT SHIELD REMOVED.

KINESCOPE HANDLING PRECAUTIONS

DO NOT REMOVE THE RECEIVER CHASSIS, INSTALL, REMOVE OR HANDLE THE KINESCOPE IN ANY MANNER UNLESS SHATTERPROOF GOGGLES, AND HEAVY GLOVES ARE WORN. PEOPLE NOT SO EQUIPPED SHOULD BE KEPT AWAY WHILE HANDLING KINESCOPES. KEEP THE KINESCOPE AWAY FROM THE BODY WHILE HANDLING.

The kinescope bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure. For this reason, the kinescope must be handled with more care than ordinary receiving tubes.

The large end of the kinescope bulb—particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure at any time. During service if the tube sticks or fails to slip smoothly into its socket, or deflecting yoke, investigate and remove the cause of the trouble. Do not force the tube. Refer to the Receiver Installation section for detailed instructions on kinescope installation. All RCA replacement kinescopes are shipped in special cartons and should be left in the cartons until ready for installation in the receiver.

OPERATING INSTRUCTIONS

The following adjustments are necessary when turning the receiver on for the first time.

1. See that the TV-PH switch is in the "TV" position.

2. Turn the receiver "ON" and advance the SOUND VOLUME control to approximately mid-position.

3. Set the STATION SELECTOR to the desired channel.

4. Adjust the FINE TUNING control for best pix and the SOUND VOLUME control for suitable volume.

5. Turn the BRIGHTNESS control fully counter-clockwise, then clockwise until a light pattern appears on the screen.

6. Adjust the VERTICAL hold control until the pattern stops vertical movement.

7. Adjust the HORIZONTAL hold control until a picture is obtained and centered.



Figure 1-Receiver Operating Controls

INSTALLATION INSTRUCTIONS

UNPACKING.—These receivers are shipped complete in cardboard cartons. The kinescope is shipped in place in the receiver.

Take the receiver out of the carton and remove all packing material.

Make sure that all tubes are in place and are firmly seated in their sockets.

Check to see that the kinescope high voltage lead clip is in place.

Plug a power cord into the 115 volt a-c power source and into the receiver interlock receptacle. Turn the receiver power switch to the "on" position, the brightness control fully clockwise, and the picture control counter-clockwise.

ION TRAP MAGNET ADJUSTMENT.—Set the ion trap magnet approximately in the position shown in Figure 2. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rotating it slightly around the neck of the kinescope for the brightest raster on the screen. Reduce the brightness control setting until the raster is slightly above average brilliance. Turn the focus control (shown in Figure 2) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches of this adjustment should be made with the brightness control at the maximum clockwise position with which good line focus can be maintained.



Figure 2-Yoke and Focus Magnet Adjustments

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8. Adjust the CONTRAST and BRIGHTNESS controls for suitable picture contrast and brightness.

9. In switching from one channel to another, it may be necessary to repeat steps 4 and 8.

10. When the set is turned on again after an idle period it

should not be necessary to repeat the adjustment if the positions of the controls have not been changed. If any adjustment is necessary, step number 4 is generally sufficient.

11. If the positions of the controls have been changed, it may be nécessary to repeat steps 2 through 8.

12. To use a record player, plug the record-player output cable into the PHONO jack on the rear apron, and set the TV-PH switch to "PH".

DEFLECTION YOKE ADJUSTMENT.—If the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Tighten the yoke adjustment wing screw.

PICTURE ADJUSTMENTS.—It will now be necessary to obtain a test pattern picture in order to make further adjustments. Connect the antenna transmission line to the receiver.

If the Horizontal Oscillator and AGC System are operating properly, it should be possible to sync the picture at this point. However, if the AGC control is misadjusted, and the receiver is overloading, it may be impossible to sync the picture.

If the receiver is overloading, turn R149 on the rear apron (see Figure 3) counter-clockwise until the set operates normally and the picture can be synced.

CHECK OF HORIZONTAL OSCILLATOR ALIGN-MENT.—Turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in horizontal sync. Momentarily remove the signal by switching off channel then back. Normally the picture will be out of sync. Turn the control clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 2 or 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control. Pull-in should occur before the control has been turned 120 degrees from the extreme counter-clockwise position. The picture should remain in sync for approximately 90



Figure 3-Rear Chassis Adjustments

INSTALLATION INSTRUCTIONS

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degrees of additional clockwise rotation of the control. At the extreme clockwise position, the picture should remain in sync and should not show a black bar in the picture.

If the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned. Skip "Alignment of Horizontal Oscillator" and proceed with "Focus Magnet Adjustment."

ALIGNMENT OF HORIZONTAL OSCILLATOR.—If in the above check the receiver failed to hold sync with the hold control at the extreme counter-clockwise position or failed to hold sync over 90 degrees of clockwise rotation of the control from the pull-in point, it will be necessary to make the following adjustments.

Horizontal Frequency Adjustment.—Turn the horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the T110 horizontal frequency adjustment at the rear of the chassis until the picture is just out of sync and the horizontal blanking appears as a vertical or diagonal black bar in the raster. Then turn the T110 core until the bar moves out of the picture leaving it in sync.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the TIIO rear core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer Cl6IA slightly clockwise. If less than 2 bars are present, adjust Cl6IA slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 or 3 bars are present.

Repeat the adjustments under "Horizontal Frequency Adjustment" and "Horizontal Locking Range Adjustment" until the conditions specified under each are fulfilled. When the horizontal hold operates as outlined under "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

If it is impossible to sync the picture at this point and the AGC system is in proper adjustment it will be necessary to adjust the Horizontal Oscillator by the method outlined in the alignment procedure on page 11: For field purposes paragraph "B" under Horizontal Oscillator Waveform Adjustment may be omitted.

FOCUS MAGNET ADJUSTMENT.—The focus magnet should be adjusted so that there is approximately three-eighths inch of space between the rear cardboard shell of the yoke and the flat of the front face of the focus magnet. This spacing gives best average focus over the face of the tube.

The axis of the hole through the magnet should be parallel with the axis of the kinescope neck with the kinescope neck through the center of the opening.

PIN-CUSHION CORRECTION.—Two pin-cushion correction magnets are employed to correct a small amount of pin-cushion of the raster due to the lens effect of the face of the kinescope. These magnets are mounted on small arms, one on each side of the kinescope as shown in Figure 2. The arms hinge in one plane on self tapping screws which act both as a hinge and an adjustment locking screw. When the magnets are swung towards the tube, maximum correction is obtained. Minimum correction is obtained when the arms are swung away from the tube. To adjust the magnets, loosen the two self tapping screws and position the magnets until the sides of the raster appear straight. Tighten the screws without shifting the position of the magnets. In some cases it may be necessary to twist or bend the magnet support arms to obtain the appearance of straight raster edges.

CENTERING ADJUSTMENT.—No electrical centering controls are provided. Centering is accomplished by means of a separate plate on the focus magnet. The centering plates include a locking screw which must be loosened before centering. Up and down adjustment of the plate moves the picture side to side and sidewise adjustment moves the picture up and down. If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

WIDTH, DRIVE AND HORIZONTAL LINEARITY ADJUSTMENTS.—Adjustment of the horizontal drive control affects the high voltage applied to the kinescope. In order to obtain the highest possible voltage hence the brightest and best focused picture, adjust horizontal drive trimmer C161B counter-clockwise until the picture begins to "wrinkle" in the middle then clockwise until the "wrinkle" disappears.

Turn the horizontal linearity control L108 clockwise until the picture begins to "wrinkle" on the right and then counterclockwise until the "wrinkle" disappears and best linearity is obtained.

Adjust the width control L106 to obtain correct picture width.

A slight readjustment of these three controls may be necessary to obtain the best linearity.

Adjustments of the horizontal drive control affect horizontal oscillator hold and locking range. If the drive control was adjusted, recheck the oscillator alignment.

HEIGHT AND VERTICAL LINEARITY ADJUST-MENTS.—Adjust the height control (R173 on chassis rear apron) until the picture fills the mask vertically. Adjust vertical linearity (R181 on rear apron), until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. Adjust centering to align the picture with the mask.

FOCUS.—Adjust the focus magnet for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

Recheck the position of the ion trap magnet to make sure that maximum brightness is obtained.

Check to see that the yoke thumbscrew and the focus magnet mounting screws are tight.



CHECK OF R-F OSCILLATOR ADJUSTMENTS.— Tune in all available stations to see if the receiver r-f oscillator is adjusted to the proper frequency on all channels. If adjustments are required, these should be made by the method outlined in the alignment procedure on page 9. The adjustments for channels 2 through 12 are available from the front of the cabinet by removing the station selector escutcheon as shown in Figure 4. Adjustment for channel 13 is on top of the chassis.

AGC THRESHOLD CONTROL.—The AGC threshold control Rl49 is adjusted at the factory and normally should not require readjustment in the field.

To check the adjustment of the AGC Threshold Control, tune in a strong signal and sync the picture. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of R149. If the picture requires an appreciable portion of a second to reappear, or bends excessively, R149 should be readjusted. Turn Rl49 fully counter-clockwise. The raster may be bent slightly. This should be disregarded. Turn Rl49 clockwise until there is a very, very slight bend or change of bend in the picture. Then turn Rl49 counter-clockwise just sufficiently to remove this bend or change of bend.

If the signal is weak, the above method may not work as it may be impossible to get the picture to bend. In this case, turn Rl49 clockwise until the snow in the picture becomes more pronounced, then counter-clockwise until the best signal to noise ratio is obtained.

The AGC control adjustment should be made on a strong signal if possible. If the control is set too far clockwise on a weak signal, then the receiver may overload when a strong signal is received.

FM TRAP ADJUSTMENT.—In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the L2O3 core on top of the antenna matching transformer for minimum interference in the picture.

CAUTION.—In some receivers, the FM trap L203 will tune down into channel 6 or even into channel 5. Needless to say, such an adjustment will cause greatly reduced sensitivity on these channels. If channels 5 or 6 are to be received, check L203 to make sure that it does not affect sensitivity on these two channels.

Replace the cabinet back and connect the receiver antenna leads to the cabinet back. Make sure that the screws holding it are up tight, otherwise it may rattle or buzz when the receiver is operated at high volume.

KINESCOPE SCREEN CLEANING.—The kinescope safety glass is held in place by four spring clips which may be removed from the back of the front panel. This permits removing the safety glass for cleaning without the necessity of removing the chassis and kinescope.

CHASSIS REMOVAL.—To remove the chassis from the cabinet for repair or installation of a new kinescope, remove the control knobs, the cabinet back, unplug the speaker cable, the kinescope socket, the antenna cable, the yoke and high voltage cable. Take out the chassis bolts under the cabinet. Withdraw the chassis from the back of the cabinet.

KINESCOPE HANDLING PRECAUTION.—Do not install, remove, or handle the kinescope in any manner, unless shatterproof goggles and heavy gloves are worn. People not so equipped should be kept away while handling the kinescope. Keep the kinescope away from the body while handling.

REMOVAL OF KINESCOPE.—To remove the kinescope from the cabinet, loosen the two nuts and disengage the rods alongside the kinescope. Remove the screw which holds the yoke frame to the cabinet. Remove the kinescope, the yoke frame with yoke and focus magnet as an assembly.

Handle this tube by the portion at the edge of the screen. Do not cover the glass bell of the tube with fingermarks as it will produce leakage paths which may interfere with reception. If this portion of the tube has inadvertently been handled, wipe it clean with a soft cloth moistened with "dry" carbon tetrachloride.

INSTALLATION OF KINESCOPE. — Wipe the kinescope screen surface and front panel safety glass clean of all dust and fingermarks with a soft cloth moistened with "Windex" or similar cleaning agent.

Replace the kinescope and chassis by reversal of the removing process. The kinescope should be installed so that the high voltage contact is to the right when looking at it from the rear of the cabinet. The magnet of the ion trap magnet should be to the left.

CABINET ANTENNA.—A cabinet antenna is provided in Models 17T211 and 17T220 and the leads are brought out near the antenna terminal board. The cabinet antenna may be employed in place of the outdoor antenna in areas where the signals are strong and no reflections are experienced. 113

ANTENNAS.—The finest television receiver built may be said to be only as good as the antenna design and installation. It is therefore important to select the proper antenna to suit the particular local conditions, to install it properly and orient it correctly.

If two or more stations are available and the two stations are in different directions, it may be possible to make a compromise orientation which will provide a satisfactory signal on all such channels.

If it is impossible to obtain satisfactory results on one or more channels, it may become necessary either to provide means for turning the antenna when switching channels or to install a separate antenna for one or more channels and to switch antennas when switching channels.

In some cases, the antenna should not be installed permanently until the quality of the picture reception has been observed on a television receiver. A temporary transmission line can be run between receiver and the antenna, allowing sufficient slack to permit moving the antenna. Then, with a telephone system connecting an observer at the receiver and an assistant at the antenna, the antenna can be positioned to give the most satisfactory results on the received signal. A shift of direction or a few feet in antenna position may effect a tremendous difference in picture reception.

REFLECTIONS.—Multiple images sometimes known as echoes or ghosts, are caused by the signal arriving at the antenna by two or more routes. The second or subsequent image occurs when a signal arrives at the antenna after being reflected off a building, a hill or other object. In severe cases of reflections, even the sound may be distorted. In less severe cases, reflections may occur that are not noticeable as reflections but that will instead cause a loss of definition in the picture.

Under certain extremely unusual conditions, it may be possible to rotate or position the antenna so that it receives the cleanest picture over a reflected path. If such is the case, the antenna should be so positioned. However, such a position may give variable results as the nature of reflecting surfaces may vary with weather conditions. Wet surfaces have been known to have different reflecting characteristics than dry surfaces.

Depending upon the circumstances, it may be possible to eliminate the reflections by rotating the antenna or by moving it to a new location. In extreme cases, it may be impossible to eliminate the reflection.

INTERFERENCE. — Auto ignition, street cars, electrical machinery and diathermy apparatus may cause interference which spoils the picture. Whenever possible, the antenna location should be removed as far as possible from highways, hospitals, doctors' offices and similar sources of interference. In mounting the antenna, care must be taken to keep the antenna rods at least $\frac{1}{4}$ wave length (at least 6 feet) away from other antennas, metal roofs, gutters or other metal objects.

Short-wave radio transmitting and receiving equipment may cause interference in the picture in the form of moving ripples. In some instances it may be possible to eliminate the interference by the use of a trap in the antenna transmission line. However, if the interfering signal is on the same frequency as the television station, a trap will provide no improvement.

WEAK PICTURE. — When the installation is near the limit of the area served by the transmitting station, the picture may be speckled, having a "snow" effect, and may not hold steady on the screen. This condition is due to lack of signal strength from the transmitter.

RECEIVER LOCATION.—The owner should be advised of the importance of placing the receiver in the proper location in the room.

The location should be chosen-

- -Away from bright windows and so that no bright light will fall directly on the screen. (Some illumination in the room is desirable, however.)
- -To give easy access for operation and comfortable viewing.
- To permit convenient connection to the antenna.
- -Convenient to an electrical outlet.
- -To allow adequate ventilation.

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CHASSIS TOP VIEW



Figure 5-Chassis Top View

CHASSIS BOTTOM VIEW

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Figure 6-Chassis Bottom View

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ALIGNMENT PROCEDURE

TEST EQUIPMENT.—To properly service the television chassis of this receiver, it is recommended that the following test equipment be available:

R-F Sweep Generator meeting the following requirements:

(a) Frequency Ranges

20 to 30 mc., 1 mc. and 10 mc. sweep width

- 50 to 90 mc., 10 mc. sweep width
- 170 to 225 mc., 10 mc. sweep width
- (b) Output adjustable with at least .1 volt maximum.
- (c) Output constant on all ranges.
- (d) "Flat" output on all attenuator positions.

Cathode-Ray Oscilloscope.—For alignment purposes, the oscilloscope employed must have excellent low frequency and phase response, and should be capable of passing a 60-cycle square wave without appreciable distortion.

For video and sync waveform observations, the oscilloscope must have excellent frequency and phase response from 10 cycles to at least two megacycles in all positions of the gain control.

Signal Generator to provide the following frequencies with crystal accuracy.

(a) Intermediate frequencies

22.25 and 25.5 mc. conv. and first pix i-f trans.

22.75 mc. second picture i-f transformer

24.25 mc. fourth picture i-f transformer

25.5 mc. third picture i-f transformer

25.50 mc. picture carrier

27.00 mc. adjacent channel sound trap

(b) Radio frequencies

	Picture	Sound
Channel	Carrier	Carrier
Number	Freq. Mc.	Freg. Mc.
2	55.25	59.75
3	61.25	
4	67.25	71.75
5	77.25	
6	83.25	87.75
7	175.25	179.75
8		185.75
9	187.25	191.75
10	193.25	
11	199.25	
12	205.25	209.75
13		

(c) Output of these ranges should be adjustable and at least 1 volt maximum.

Heterodyne Frequency Meter with crystal calibrator which covers the frequency range from 80 mc. to 109 mc. and from 200 mc. to 237 mc.

Electronic Voltmeter of Junior or Senior ''VoltOhmyst'' type and a high voltage multiplier probe for use with this meter to permit measurements up to 15 kv.

Service Precautions.—If possible, the chassis should be serviced without the kinescope. However, if it is necessary to view the raster during servicing, it would be a great convenience to have a bench mounted kinescope and speaker complete with a set of extension cables.

CAUTION: Do not short the kinescope second anode lead. Its short circuit current presents a considerable overload on the high voltage rectifier V117.

Adjustments Required.—Normally, only the r-f oscillator and mixer lines will require the attention of the service technician. All other circuits are either broad or very stable and hence will seldom require readjustment.

ORDER OF ALIGNMENT.—When a complete receiver alignment is necessary, it can be most conveniently performed in the following order:

- (1) R-F unit
- (2) Picture i-f transformers
- (3) Picture i-f trap

(5) Ratic detector

alignment

- (6) Sound i-f alignment(7) 4.5 Mc Trap Adjustment
- (8) Check of overall response
- (9) AGC control adjustment
- (4) Sweep of picture i-f
 - (10) Horizontal oscillator
 - alignment

R-F UNIT ALIGNMENT.—Disconnect the co-ax link from terminal 2 of the r-f unit terminal board and connect a 39 ohm composition resistor between lugs 1 and 2.

Defune T1 by backing the core all the way out of the coil.

Back the L44 core all the way out. Back the L203 core all the way out.

In order to align the r-f tuner, it will first be necessary to set the channel-13 oscillator to frequency. The shield over the bottom of the r-f unit must be in place when making any adjustments.

The oscillator may be aligned by adjusting it to beat with a crystal-calibrated heterodyne frequency meter. Couple the meter probe loosely to the receiver oscillator.

Set the channel selector switch to 13.

Adjust the heterodyne frequency meter to the correct frequency (236.75 mc).

Set the fine tuning control 30 degrees clockwise from the mechanical center of its range.

Adjust Cl for an audible beat on the heterodyne frequency meter.

Now that the channel-13 oscillator is set to frequency, we may proceed with the r-f alignment.

Turn the AGC control fully clockwise.

Obtain a 7.5 volt battery capable of withstanding appreciable current drain and connect the ends of a 1,000 ohm potentiometer across it. Connect the battery positive terminal to chassis and the potentiometer arm to terminal 3 of the r-f unit. Adjust the bias box potentiometer to produce -3.5 volts of bias at the r-f unit terminal board.

Connect the oscilloscope to the test point TPl on top of the r-f unit.

Connect the r-f sweep oscillator to the receiver antenna terminals. The method of connection depends upon the output impedance of the sweep. The P300 connections for 300-ohm balanced or 72-ohm single-ended input are shown in the circuit schematic diagram. If the sweep oscillator has a 50-ohm or 72-ohm single-ended output, 300-ohm balanced output can be obtained by connecting as shown in Figure 9.

Connect the signal generator loosely to the receiver antenna terminals.

Set the receiver channel switch to channel 8.

Set the sweep oscillator to cover channel 8.

Insert markers of channel 8 picture carrier and sound carrier, 181.25 mc. and 185.75 mc.

Adjust C9, C11, C16 and C22 for approximately correct curve shape, frequency, and band width as shown in Figure 11.

The correct adjustment of C22 is indicated by maximum amplitude of the curve midway between the markers. C16 tunes the r-f amplifier plate circuit and affects the frequency of the curve most noticeably. C9 tunes the converter grid circuit and affects the tilt of the curve most noticeably (assuming that C22 has been properly adjusted). C11 is the coupling adjustment and hence primarily affects the response band width.

Set the receiver channel switch to channel 6.

Adjust the heterodyne frequency meter to the correct frequency (108.75 mc.).

Set the fine tuning control 30 degrees clockwise from the mechanical center of its range.

Adjust L5 for an audible beat on the heterodyne frequency meter.

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Set the sweep generator to channel 6.

From the signal generator, insert channel 6 sound and picture carrier markers, 83.25 mc. and 87.75 mc.

Adjust L42, L45 and L49 for proper response as shown in Figure 12.

L42 is adjusted to give maximum amplitude of the curve between the markers. L45 primarily affects the tilt of the curve. L49 primarily affects the frequency of response.

Connect the "VoltOhmyst" to the r-f unit test point TPL.

Adjust C7 for -3.0 volts at the test point.

Retouch L42, L45 and L49 for proper response if necessary. If necessary, retouch Cll for proper band width on channel 6. Continue these retouching adjustments until proper response is obtained and -3.0 volts of oscillator injection are present at the test point, TPl.

Set the receiver channel selector switch to channel 8 and readjust Cl for proper oscillator frequency.

Set the sweep oscillator and signal generator to channel 8.

Readjust C9, C16 and C22 for correct curve shape, frequency and band width. Readjust C11 only if necessary.

Switch the receiver, the sweep oscillator and signal generator to channel 13.

Adjust L52 for maximum amplitude of the curve midway between markers and then overshoot the adjustment by turning the slug in the same direction from the initial setting a little more than the amount of turning required to reach maximum amplitude of response.

Adjust C22 for maximum amplitude of response.

Turn off the sweep generator. Adjust the L43 core for correct channel 13 oscillator frequency, then overshoot the adjustment by turning the slug a little more in the same direction from the initial setting. Reset the oscillator to proper frequency by adjustment of Cl.

Turn the sweep oscillator back on.

Check the response of channels 7 through 13 by switching the receiver channel switch, sweep oscillator and marker oscillator to each of these channels and observing the response and oscillator injection obtained. See Figure 11 for typical response curves. It should be found that all these channels have the proper shaped response with the markers above 80', response.

If the markers do not fall within this requirement, switch to channel 8 and readjust C9, C11, C16 and C22 as necessary. If C22 required adjustment, the adjustment should be overshot a small amount and corrected by adjustment of L52 to give maximum amplitude of response between the sound and picture carrier markers. The antenna circuit (L52, C22) is broad so that tracking is not particularly critical.

If the valley in the top of the selectivity curves for the high channels is deeper than normal, the curve can be flattened somewhat by decreasing the inductance of L44 by turning the core stud in. Be sure to check for undesirable resonant suckouts on channels 7 and 8 if this is done.

Turn the sweep oscillator off and check the receiver channel 8 r-f oscillator frequency. If the oscillator is off frequency overshoot the adjustment of Cl and correct by adjusting L43.

Turn the receiver channel selector switch to channel 6. Adjust L5 for correct oscillator frequency.

Turn the sweep oscillator on and to channel 6 and observe the response curve. If necessary readjust L42, L45 and L49. It should not be necessary to touch Cll.

Check the oscillator injection voltage at the test point TPl. If necessary adjust C7 to give -3 volts injection. If C7 is adjusted, switch to channel 8, and readjust C9 for proper curve shape, then recheck channel 6.

Switch the receiver through channel 6 down through channel 2 and check for normal response curve shapes and oscillator injection voltage.

Likewise check channels 7 through 13, stopping on 13 for the next step.

With the receiver on channel 13, check the receiver oscillator frequency. Correct by adjustment of Cl if necessary. Adjust the oscillator to frequency on all channels by switching the receiver and the heterodyne frequency meter to each channel and adjusting the appropriate oscillator trimmer to obtain a beat on the freq. meter. It should be possible to adjust the oscillator to the correct frequency on all channels with the fine tuning control 30 degrees clockwise from the mechanical center of its range.

Channel Number	Picture Carrier Freg. Mc.	Sound Carrier Freg. Mc.	Receiver R-F Osc. Freq. Mc.	Channel Oscillator Adjustment
2	55.25	59.75	. 80.750	
3	61.25	65.75	86.750	L2
4	67.25	71.75	92.750	L3
5	77.25	81.75	. 102.750	L4
6	83.25	87.75	108.750	L5
7	175.25	179.75	200.750	L6
8	. 181.25	185.75	206.750	L7
9	187.25	. 191.75	. 212.750	L8
10		197.75	. 218.750	L9
11	199.25	203.75	224.750	L10
12		209.75	230.750	L11
13	211.25	. 215.75	. 236.750	

Switch to channel 8 and observe the response.

Adjust Tl clockwise while watching the change in response. When Tl is properly adjusted, the selectivity curve will be slightly wider with a slightly deeper valley in its top.

Switch through all channels and observe response, oscillator injection and r-f oscillator frequency. Minor touch-ups of adjustments may be made at this time. However, if C7 or C9 are changed appreciably, then a recheck of the oscillator frequency on all channels should be made.

Reconnect the link from T101 to terminal 2 of the r-f unit terminal board.

Since Tl was adjusted during the r-f unit alignment it will be necessary to sweep the overall i-f response.

R-F UNIT TUBE CHANGES.—Since most of the circuits are low capacitance circuits the r-f unit may require readjustments when the tubes are changed.

If the 6CB6 r-f amplifier tube is changed, it may be necessary to readjust Cl6 and C22.

If the 6J6 oscillator and mixer tube is changed, then more extensive adjustments are required.

For good conversion efficiency, the oscillator injection to a triode mixer must be held reasonably close to the optimum value. Although there is some latitude in this level, it is nearly expended in the normal variation in injection from channel to channel. Consequently, the adjustment of C7 is limited primarily to establishing the conditions for good conversion. Since changes in oscillator injection affect conversion gain, it also affects the input capacity of the mixer, thus also affecting tracking of the mixer grid circuit. These tube variations with their consequent effect on circuit alignment thereby require readjustment of the r-f-unit if maximum conversion efficiency is to be retained after the 6J6 tube is changed. It may be possible, however, to try several 6J6 tubes and select one which gives satisfactory performance without realignment.

PICTURE I-F TRANSFORMER ADJUSTMENTS.— Connect the "VoltOhmyst" to the junction of Rl42 and Rl43. Turn the AGC control fully clockwise.

Obtain a 7.5 volt battery capable of withstanding appreciable current drain and connect the ends of a 1,000 ohm potentiometer across it. Connect the battery positive terminal to chassis and the potentiometer arm to the junction Rl42 and Rl43. Adjust the potentiometer for -5.0 volts indication on the "VoltOhmyst".

Set the channel switch to channel number 9, 10 or 11. Connect the ''VoltOhmyst'' to pin 2 of V110 (Pin 4 if 6AC7 or 6AG7 is used) and to ground.

Connect the output of the signal generator to the mixer grid test point TP2 in series with a 1500 mmf ceramic capacitor.

Connect a separate -5 volt bias supply to TPl with the positive terminal to ground.

Set the generator to each of the following frequencies and with a thin fiber screwdriver tune the specified adjustment for maximum indication on the "VoltOhmyst". In each instance the generator should be checked against a crystal calibrator to insure that the generator is on frequency.

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Adjust the signal generator output to give 3 volts on the "VoltOhmyst" as the final adjustment is made.

(1) 24.25 mc.—T107 (3) 22.75 mc.—T105 (2) 25.5 mc.—T106

PICTURE I-F TRAP ADJUSTMENT.—With the same connections as above, tune the generator to 27.00 mc. and adjust the TIO4 top core for minimum d-c on the "VoltOhmyst". Set the generator output so that this minimum is about 3 volts when final adjustment is made. If necessary, the i-f bias may be reduced in order to obtain the 3 volt reading on the "VoltOhmyst".

SWEEP ALIGNMENT OF PIX I-F.—To align Tl and Tl04, connect the sweep generator to the mixer grid test point TP2. In series with a 1500 mmf ceramic capacitor use the shortest leads possible, with not more than one inch of unshielded lead at the end of the sweep cable. Connect the sweep ground lead to the r-f unit outer shield.

Connect a separate -5.0 volt bias supply to TP1 with the positive terminal connected to ground and by-pass TP1 to ground with a 1500 mmf. ceramic capacitor.

Set the channel selector switch between channels 2 and 13. Clip 330 ohm resistors across terminals A and B of T106 and T107.

Preset Cl15 to minimum capacity.

Adjust the bias box potentiometer to obtain -5.0 volts of bias as measured by a "VoltOhmyst" at the junction of R142 and R143. Leave the AGC control fully clockwise.

Connect a 180 ohm composition resistor from pin 5 of V106 to terminal A of T105. Connect the oscilloscope diode probe to pin 5 of V106 and to ground.

Couple the signal generator loosely to the diode probe in order to obtain markers.

Adjust T1 (top) and T104 (bottom) for maximum gain and with 25.5 mc. at 70% of maximum response.

Set the sweep output to give 0.3 volt peak-to-peak on the oscilloscope when making the final touch on the above adjustment.

Adjust C115 until 22.25 mc. is at 70% response with respect to the low frequency shoulder of the curve as shown in Figure 12.

Disconnect the diode probe, the 180 ohm and two 330 ohm resistors.

Connect the oscilloscope to pin 2 of V110 socket (or pin 4 of 6AC7 or 6AG7).

Leave the sweep generator connected to the mixer grid test point TP2 with the shortest leads possible.

Adjust the output of the sweep generator to obtain 3.0 volts peak-to-peak on the oscilloscope.

Couple the signal generator loosely to the grid of the first pix i-f amplifier. Adjust the output of the signal generator to produce small markers on the response curve.

Retouch T105, T106 and T107 to obtain the response shown in Figure 13.

It is especially important that the 22.4 mc. marker should fall at 55% on the overall i-f response curve. If the marker should fall appreciably higher than 55%, trouble may be experienced with sound in the picture. If the marker should fall appreciably below 55% response, the sound sensitivity may be reduced and may cause the sound to be noisy in weak signal areas.

RATIO DETECTOR ALIGNMENT.—Set the signal generator at 4.5 mc. and connect it to the first sound i-f grid, pin 1 of V101.

As an alternate source of signal, the RCA WR39B or WR39C calibrator may be employed. In such a case, connect the calibrator to the grid of the third pix i-f amplifier, pin 1 of V108.

Set the frequency of the calibrator to 25.50 mc. (pix carrier) and modulate with 4.5 mc. crystal. The 4.5 mc. signal will be picked off at L102 and amplified through the sound i-f amplifier.

Connect the ''VoltOhmyst'' to pin 2 of V103.

Tune the ratio detector primary, T102 top core for maximum d-c output on the "VoltOhmyst". Adjust the signal level from the signal generator for 6 volts on the "VoltOhmyst" when finally peaked. This is approximately the operating level of the ratio detector for average signals. Connect the ''VoltOhmyst'' to the junction of R106 and C108.

Tune the ratio detector secondary T102 bottom core for zero d-c on the ''VoltOhmyst''.

Repeat adjustments of T102 top for maximum d-c at pin 2 of V103 and T102 bottom for zero d-c at the junction of R106 and C108. Make the final adjustments with the signal input level adjusted to produce 6 volts d-c on the "VoltOhmyst" at pin 2 of V103.

SOUND I-F ALIGNMENT.—Connect the signal generator to the first sound i-f amplifier grid, pin 1 of V101.

As an alternate source of signal, the RCA WR39B or WR39C calibrator may be employed as above.

Connect the "VoltOhmyst" to pin 2 of V103.

Tune the T101 top core for maximum d-c on the ''Volt-Ohmyst''.

The output from the signal generator should be set to produce approximately 6.0 volts on the 'VoltOhmyst'' when the final touches on the above adjustment are made.

4.5 MC. TRAP ADJUSTMENT.—Connect the signal generator in series with a 1,000 ohm resistor to pin 2 of V109. Set the generator to 4.5 mc. and modulate it 30% with 400 cycles. Set the output to approximately 0.5 volts.

Short the third pix i-f grid to ground, pin 1, V108, to prevent noise from masking the output indication.

Connect the crystal diode probe of an oscilloscope to the plate of the video amplifier, pin 6 of V110 (pin 8 when 6AC7 or 6AG7 is used).

Adjust the core of L103 for minimum output on the oscillo-scope.

Remove the short from pin 1, V108 to ground.

As an alternate method, this step may be omitted at this point in the alignment procedure and the adjustment made 'on the air'' after the alignment is completed.

If this is done, tune in a station and observe the picture on the kinescope. If no 4.5 mc. beat is present in the picture, when the fine tuning control is set for proper oscillator-frequency, then L103 requires no adjustment. If a 4.5 mc. beat is present, turn the fine tuning control slightly clockwise so as to exaggerate the beat and then adjust L103 for minimum beat.

CHECK OF OVERALL RESPONSE.—If desired, the overall response of the receiver can be checked on each channel.

Connect the r-f sweep generator to the receiver antenna input terminals. If necessary, employ one of the pads shown in Figure 9 to match the sweep output cable to the r-f unit.

Connect the signal generator loosely to the first pix i-f amplifier grid.

Adjust the bias potentiometer to obtain -5.0 volts of bias as measured by a ''VoltOhmyst'' at the junction of R142 and R143.

Connect the oscilloscope to pin 2 of V110 (or pin 4 if 6AC7 or 6AG7 is used).

. Check the response of channels 2 through 13 by switching the receiver channel switch and sweep oscillator to each of these channels and observing the response obtained. On each channel, adjust the output of the sweep generator to obtain 3.0 volts peak-to-peak on the oscilloscope.

I-F markers at 22.4 mc., 24.75 mc. and 25.5 mc. should be provided by the signal generator.

The response obtained in this manner should be very similar to that shown in Figure 13.

Some curves may show a 10% sag in the top between 22.75 mc. and 24.75 mc. while others may show a 10% peak in this region. This may be considered normal.

If the picture carrier is consistently high or low on all channels, T106 may be adjusted slightly. Do not adjust T105.

AGC CONTROL ADJUSTMENT.—Disconnect all test equipment except the oscilloscope which should be connected to pin 6 of V110 (pin 8 when 6AC7 or 6AG7 is used).

Connect an antenna to the receiver antenna terminals. Turn the AGC control fully counter-clockwise.

Tune in a strong signal and adjust the oscilloscope to see the video waveform.

Turn the AGC control clockwise until the tips of sync begin to be compressed, then counter-clockwise until no compression is obtained.

HORIZONTAL OSCILLATOR ADJUSTMENT .- Normally the adjustment of the horizontal oscillator is not considered to be a part of the alignment procedure, but since the oscillator waveform adjustment may require the use of an oscilloscope, it can not be done conveniently in the field. The waveform adjustment is made at the factory and normally should not require readjustment in the field. However, the waveform adjustment should be checked whenever the receiver is aligned or whenever the horizontal oscillator operation is improper.

Horizontal Frequency Adjustment.—Tune in a station and sync the picture. If the picture cannot be synchronized with the horizontal hold control R170B, then adjust the T110 frequency core on the rear apron until the picture will synchronize. If the picture still will not sync, turn the T110 waveform adjustment core (under the chassis) out of the coil several turns from its original position and readjust the T110 frequency core until the picture is synchronized.

Examine the width and linearity of the picture. If picture width or linearity is incorrect, adjust the horizontal drive control C161B, the width control L106 and the linearity control L108 until the picture is correct.

Horizontal Oscillator Waveform Adjustment.-The horizontal oscillator waveform may be adjusted by either of two methods. The method outlined in paragraph A below may be employed in the field when an oscilloscope is not available. The service shop method outlined in paragraph B below requires the use of an oscilloscope.

A.-Turn the horizontal hold control completely clockwise. Place adjustment tools on both cores of T110 and be prepared to make simultaneous adjustments while watching the picture on the screen. First, turn the T110 frequency core (on the rear apron) until the picture falls out of sync and three or four diagonal black bars sloping down to the right appear on the screen. Then, turn the waveform adjustment core (under the chassis) into the coil while at the same time adjusting the frequency core so as to maintain three or four diagonal black bars on the screen. Continue this procedure until the oscillator begins to motorboat, then turn the waveform adjustment core out until the motorboating just stops. As a check, turn the T110 frequency core until the picture is synchronized then reverse the direction of rotation of the core until the picture falls out of sync with the diagonal bars sloping down to the right. Continue to turn the frequency core in the same direction. No more than three or four bars should appear on the screen. Instead, the horizontal oscillator should begin the motorbat. Retouch the adjustment of the T110 waveform adjustment core if necessary until this condition is obtained.

B.—Connect the low capacity probe of an oscilloscope to terminal C of T110. Turn the horizontal hold control onequarter turn from the clockwise position so that the picture is in sync. The pattern on the oscilloscope should be as shown in Figure 14. Adjust the waveform adjustment core of T110 until the two peaks are at the same height. During this adjustment, the picture must be kept in sync by readjusting this the hold control if necessary.

This adjustment is very important for correct operation of the circuit. If the broad peak of the wave on the oscilloscope is lower than the sharp peak, the noise immunity becomes poorer, the stabilizing effect of the tuned circuit is reduced and drift of the oscillator becomes more serious. On the other hand, if the broad peak is higher than the sharp peak, the oscillator is overstabilized, the pull-in range becomes inadequate and the broad peak can cause double triggering of the oscillator when the hold control approaches the clockwise position.

Remove the oscilloscope upon completion of this adjustment.

Horizontal Locking Range Adjustment.-Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the T110 frequency core slightly and momentarily switch off channel.

Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C161A slightly clockwise. If less than 2 bars are present, adjust Cl61A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 or 3 bars are present.

Turn the horizontal hold control to the maximum clockwise position. Adjust the T110 frequency core so that the diagonal bar sloping down to the right appears on the screen and then reverse the direction of adjustment so that bar just moves to the left side of the screen leaving the picture in synchronization.

SENSITIVITY CHECK.—A comparative sensitivity check can be made by operating the receiver on a weak signal from a television station and comparing the picture and sound obtained to that obtained on other receivers under the same conditions.

This weak signal can be obtained by connecting the shop antenna to the receiver through a ladder type attenuator pad The number of stages in the pad depends upon the signal strength available at the antenna. A sufficient number of stages should be inserted so that a somewhat less than normal contrast picture is obtained when the picture control is at the maximum clockwise position. Only carbon type resistors should be used to construct the pad.

RESPONSE CURVES .- The response curves shown on page 14 and referred to throughout the alignment procedure were taken from a production set. Although these curves are typical, some variations can be expected.

The response curves are shown in the classical manner of presentation, that is with "response up" and low frequency to the left. The manner in which they will be seen in a given test set-up will depend upon the characteristics of the oscilloscope and the sweep generator. The curves may be seen inverted and/or switched from left to right depending on the deflection polarity of the oscilloscope and the phasing of the sweep generator.

NOTE ON R-F UNIT ALIGNMENT .- Because of the frequency spectrum involved and the nature of the device, many of the r-f unit leads and components are critical in some respects. Even the power supply leads form loops which couple to the tuned circuits, and if resonant at any of the frequencies involved in the performance of the tuner, may cause serious departures from the desired characteristics. In the design of the receiver these undesirable resonant loops have been shifted far enough away in frequency to allow reasonable latitude in their components and physical arrangement without being troublesome. When the r-f unit is aligned in the receiver, no trouble from resonant loops should be experienced. However, if the unit is aligned in a jig separate from the receiver, attention should be paid to insure that unwanted resonances do not exist which might present a faulty representation of r-f unit alignment.

A resonant circuit exists between the r-f tuner chassis and the outer shield box, which couples into the antenna and r-f plate circuits. The frequency of this resonance depends on the physical structure of the shield box, and the capacitance be-tween the tuner chassis and the front plate. In the KRK8 units, this resonance should fall between 120 and 135 mc. and is controlled in the design by using insulating washers of different thicknesses (in the front plate to tuner chassis mounting) to compensate for differences in the shield boxes of different models of receivers. The performance of the tuner, particularly on channels 7 and 8 will be impaired if the proper washers for the particular shield box involved are not used. Obviously then, if the r-f unit is removed for service, the washers should be replaced in the correct order when the unit is replaced.

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ALIGNMENT TABLE

THE DETAILED ALIGNMENT PROCEDURE BEGINNING ON PAGE 8 SHOULD BE READ BEFORE ALIGNMENT BY USE OF THE TABLE IS ATTEMPTED

					IS A	TTEMPT	ED			
STEP. No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT HETERODYNE FREQ. METER TO	HET. METER FREQ. MC.	CONNECT ''VOLTOHMYST'' TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
					R-F UN	IT ALIG	NMENT		1	
1	Disconnect t Tl by backi tuner, it will any adjustr	he co-ax l ng the cor first be n rents.	link from termi re all the way o ecessary to set th	nal 2 of the ut of the te channe	ne r-f unit termir coil. Back the L4 l 13 oscillator to f	al board 4 core al requency	and connect a 39 c l the way out. Back . The shield over the	ohm composition resist the L203 core all the w bottom of the r-f unit	or between lugs 1 and 2 vay out. In order to alig must be in place wher	2. Detune on the r-f making
2	Not used		Not used		Loosely coupled to r-f oscillator	236.75 MC.	Not used	Fine tuning 30 de- grees clockwise from mechanical center of its range. Receiver on channel 13.	Cl for an audible beat on het. freg. meter	Fig. 7
3	**						Connect "Volt- Ohmyst" to ter- minal 3 of the r-funit terminal board	Turn AGC control fully clockwise. Con- nect bias box to ter- minal 3 of r-f unit term. board	Adjust the bias box potentiometer for —3.5 volts.	
4	Antenna terminal (loosely)	181.25 185.75	Antenna terminals (see text for precaution)	Sweep- ing channel 8	Not used		Not used	Rec. on chan. 8. Conn Adjust C9, C11, C16 an shape, frequency an adjusted to give ma markers. C9 affects t frequency of respons sponse band width.	ect oscilloscope to TP1. d C22 for correct curve d band width. C22 is x. amplitude between ilt and C16 affects the ie. C11 affects the re-	Fig. 7
5	Not used		Not used	Not used	Loosely coupled to r-f oscillator	108.75		Rec. on channel 6	L5 for audible beat on het. freq. meter.	Fig. 8
6	Antenna terminal (loosely)	83.25 87.75	Antenna terminals (see text for precaution)	Channel 6	Not used	_	**.	Rec. on chan. 6. Adju proper response. L42 i amplitude between m affects till and L49 pr response. If necesso proper width.	st L42, L45 and L49 for s adjusted to give max. tarkers. L45 primarily imarily affects freq. of ary, retouch C11 for	Fig. 11
7	Not used	-	Not used	-	Not used		Connect ''Volt- Ohmyst'' to r-f unit test point TP1	Rec. on channel 6	Adjust C7 for -3.0 volts at the test point	Fig. 7 Fig. 15
8	Repeat above	e steps uni	til the specified	conditions	are obtained.				_	
9	Not used		Not used	-	Loosely coupled to r-f oscillator	206.75		Rec. on chan. 8	Cl for audible beat on het. freg. meter	Fig. 7
10	Antenna terminal (loosely)	181.25 185.75	Antenna terminals (see text for precaution)	Sweep- ing channel 8	Not used	—	Not used	Rec. on chan. 8. Rea for correct curve shap width. Readjust Cl1 c	djust C9, C16 and C22 e, frequency and band nly if necessary.	Fig. 7 Fig. 11 (8)
11		211.25 215.75		Sweep- ing channel 13	Not used	—	Not used	Rec. on chan. 13. Adju tude between marke more than required to Adjust C22 to regain response.	ast L52 for max. ampli- rs, overshoot a little preach max. response. n max. amplitude of	Fig. 7 Fig. 11 (13)
12		215.75	Not used	-	Loosely coupled to r-f oscillator	236.75		Receiver on chan. 13. channel 13 osc. freq. the osc. to proper freq	Adjust L43 for correct then overshoot. Reset by adjustment of Cl.	Fig. 7 Fig. 8
13		205.25 209.75	Antenna terminals	channel 12	Not used	-	Connect ''Volt- Ohmyst'' to r-f unit test point TP1	Rec. on chan. 12	Check to see that re- sponse is correct and —3.0 volts of osc. in- jection is present	Fig. 11
14		199.25 203.75	(see text for precaution)	channel 11	4.5	-	••	Rec. on chan. 11		Fig. 11 (11)
15		193.25 197.75	4.6	channel 10		-	**	Rec. on chan. 10		Fig. 11 (10)
16		187.25 191.75	4.6	channel 9		-		Rec. on chan. 9		Fig. 11 (9)
17		181.25 185.75	4.6	channel 8	4.6	-		Rec. on chan. 8		Fig. 11 (8)
18		175.25 179.75	11	channel 7		-		Rec. on chan. 7	.u.)	Fig. 11 (7)
19	If the respon pull response small amou	se of any o e up on th nt and cor	channel (steps l e low channel y rected by adjus	3 through vet mainta tment of 1	18) is below 80% ain correct respor 152 to give maxim	at eithe ise on ch ium amp	r marker, repeat st annel 8. If C22 requ litude of response b	ep 10 and adjust C9, C aired adjustment, the o between the sound and	' 11, C16 and C22 as new adjustment should be a picture carrier markers	cessary to overshot a a.
20	Repeat step 9). If the os	cillator is off fr	equency o	vershoot the adju	istment c	f Cl and correct by	adjusting L43.		
21	Repeat steps	13 throug	h 20 until all re	quiremen	ts are obtained.				1	T
22	Not used	=	Not used *	-	Loosely coupled to r-f oscillator	108.75		Rec. on chan. 6	L5 for zero beat on het. freq. meter	Fig. 8
23	Antenna terminals (loosely)	83.25 87.75	Antenna terminals (see text for precaution)	Sweeping channel 6	Not used	-	Not used	Observe response. If r L45 and L49. It shou touch C11.	necessary readjust L42, ld not be necessary to	Fig. 7 Fig. 11
24	Not used	-	Not used	-	Not used	-	Connect "Volt- Ohmyst" to the r-f unit test point TP1	Check osc. injection. to give —3 volts. If C channel 8, and read sponse then repeat st	If necessary adjust C7 7 is adjusted, switch to just C9 for proper re- ep 23.	Fig. 7 Fig. 11
25	Antennà terminals (loosely)	77.25 81.75	Antenna t erminals (see text for precaution)	channel 5	42	-		Rec. on chan. 5	Check to see that re- sponse is correct and 	Fig. 11 (5)

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ALIGNMENT TABLE

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STEP No.	CONNECT SIGNAL GENERATOR TO	SIGN/ GEN FREC MC.	AL G	CONNECT SWEEP SENERATOR TO	SWEEP GEN. FREQ. MC.	CON HETEF FREQ.	NECT RODYNE METER	HET. FREQ. METER MC.	CONNECT ''VOLTOHMYST'' TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
26	Äntenna terminals (loosely)	67.2 71.7	5 . 5 for	Ant. termi- nals (see text r precaution)	channel 4	l Not us	ed	-	Connect "Volt- Ohmyst" to the r-funit test point TP1	Rec. on chan. 4	Check to see that re- sponse is correct and -3.0 volts of osc. in- jection is present	Fig. 11 (4)
27	10	61.2	5		channel 3	ı		-	н	Rec. on chan. 3		Fig. 11 (3)
28		55.2 59.7	5	**	channel 2			-	41	Rec. on chan. 2	**	Fig. 11 (2)
29	Likewise ch	ck cha	nnels	7 through 13	as outlin	ned in st	ens 18 bo	ick through	n 13. stopping on ch	annel 13 for next step.		
30	Antenna	215 7		Not used		Loogal	coupled	236 75	Notured	Fine tuning 30 des	Cl for zero heat on	Fig 7
30	terminals	213.7		Not used		to r-f	oscillator	230.13	Not used	grees clockwise from mechanical center of its range. Receiver on channel 13	het. freq. meter	Alg. a
31		209.7	5	**	-	11		230.75		Rec. on chan. 12	Lll as above	Fig. 8
32	11	203.7	3	41	-			224.75	0	Rec. on chan. 11	L10 as above	Fig. 8
33		197.7	5	**				218.75	**	Rec. on chan. 10	L9 as above	Fig. 8
34		191.7	5	**	_			212.75	8.6	Rec. on chan. 9	L8 as above	Fig. 8
35		185.7	5		-			206.75		Rec. on chan. 8	L7 as above	Fig. 8
36	14	179.7	5	**	-			200.75	4.8	Rec. on chan. 7	L6 as above	Fig. 8
37		87.7	5	**	-	**		108.75	11	Rec. on chan. 6	L5 as above	Fig. 8
38		81.7	5		-			102.75	0	Rec. on chan. 5	L4 as above	Fig. 8
39		71.7	3					92.75	15	Rec. on chan. 4	L3 as above	Fig. 8
40		65.7	3	147		11		86.75		Rec. on chan. 3	L2 as above	Fig. 8
41		59.7	-			· · ·		80.75	14	Rec. on chan 2	Lil as above	Fig. 8
40	D	20 11		1		<u> </u>		00.10		Nec. on chan. a		1
42	Antenna	181.2		Antenna	Sweep-	Not us	ed			Rec. on chan. 8 Osc	illoscope at test point	Fig. 11
	terminals	185.7	5	terminals	ing channel 8					TP1. Adjust T1 clock adjusted, curve will b slightly deeper valley	wise. When properly e slightly wider with a in top.	(8)
45	Remove 39 o	hm res	istor a	ind reconnect	link fror	n T101 t	o termino E I-F AN	nl 2 of r-f u ND TRAP	nit terminal board ADJUSTMENT		1	
STEP No.	CONNECT SIGNAL GENERATOF TO		EN. REQ. MC.	GENERA TO	TOR	GEN. FREQ. MC.	CON OSCILI	INECT LOSCOPE TO	CONNECT ''VOLTOHMYST' TO	AND INSTRUCTIONS	ADJUST	REFER TO
46	Not used			Not used		-	Not use	ed	Junction of R142 & R143	2 Connect bias box to junction of R142 & R143 and to ground AGC fully clockwise	Adjust potentiometer for —5.0 volts on meter	Fig. 3
47	**			. **		—	ņ.		Test point TPl	Connect bias box to TPI and to ground	**	Fig. 7
48	Mixer grid test po TP2 in series w 1500 mmf.	int 24 ith	.25			-	**		Pin 2 of V110 and to ground	Bias boxes con- nected as above	T107 (top) for max.	Fig. 15
49		1	25.5			-			••		T106 (top) for max.	Fig.15
50	**	2	2.75	11		1			**	**	T105 (top) for max.	Fig.15
51		2	7.00			_					T104 (top) for min.	Fig. 15
52	Connected loos to diode probe	ely Vo Fi	rious See g. 13	Mixer gri point TP2 in with 1500 m	d test n series .mf.	20 to 28 mc	Scope d to pin 5 to gnd. 180 oh from pi to pin A	liode probe of V106 and Connect a m resistor n 5 of V106 of T105	Junction of R144 & R143	2 Shunt terminals A and B of T106 and T107 with 330 ohms. Bias boxes connected as abave3v p-p or scope	Set Cl15 to min. Ad- just T1 top and T104 bot. for max. gain with 25.5 mc. at 70%. Cl15 for 22.5 at 70%	Fig. 7 Fig. 16
53	Connected loos to grid of 1st pix Adjust for sm marker indicat	ely Va i-f. all Fi	rious See g. 14	4.4		**	Connec pin 2 of move sh probe	t scope to V110. Re- unt & diode used above		Remove shunts from T106 & T107	Retouch T105, T106 and T107 to obtain response shown in Fig. 13	Fig. 13
				RAT	IO DETI	CTOR,	SOUND	I-F AND	4.5 MC TRAP ALL	GNMENT		
54	Grid lst Snd. (pin 1, V101) WR39B or C connect to grid 3rd I-F (pin 1, V1	I-F 25.9 or mc pn- 4.9 pix 08)	50mc. d. by 5 mc.	Not used		-	Not use	ød	Pin 2 of V103	Set signal gen. to give 6V on meter	T102 top core for max. d-c on meter	Fig. 15
55			**	**		-				"VoltOhmyst" to ju Adjust T102 bottom meter. Repeat step conditions are satis	nction R106 and C108. a core for zero DC on s 54 and 55 until all fied.	Fig.15 Fig.16
56	Sig. Gen. to Snd. I-F grid	lst 4.	5 mc.			_			**	Signal generator output adjusted to provide 6 v on meter	T101 top core for max. DC on meter	Fig. 15
57	Sig. Gen. in set with 1000 ohms pin 2 of V109	ries 4. s to mo 40	5 mc. d.30% with 0 cy.			_	Diode pin 6 of	probe to V110	Not used	Short pin 1 of V108 to ground	Adjust L103 for mini- mum output on oscilloscope	Fig. 15





Figure 7-R-F Unit Adjustments



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Figure 9-Sweep Attenuator Pads



Figure 10-Antenna Matching Unit Response

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Figure 15-Top Chassis Adjustments



Figure 16-Bottom Chassis Adjustments

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TEST PATTERN PHOTOGRAPHS





Figure 18-Focus Magnet and Ion Trap Magnet Misadjusted



Figure 19—Horizontal Linearity Control Misadjusted (Picture Cramped in Middle)

------Figure 20-Width Control

Misadjusted



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Figure 22—Transients

Figure 23–Test Pattern Show-ing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position-Just Before Pulling Into Sync

Figure 24—Test Pattern Show-ing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position













Following is a list of symptoms of possible failures and an indication of some of the possible faults:

NO RASTER ON KINESCOPE:

- (1) Incorrect adjustment of ion trap magnet. Magnet reversed either front to back or top to bottom.
- (2) V115 or V116 inoperative. Check waveforms on grids and plates.
- (3) No high voltage—if horizontal deflection is operating as evidenced by the correct waveform on terminal 1 of high voltage transformer, the trouble can be isolated to the IB3GT circuit. Either the T111 high voltage winding is open, the IB3GT tube is defective or its filament circuit is open.
- (4) V110 circuit, inoperative—Refer to schematic and waveform chart.
- (5) Damper tube (V118) inoperative.
- (6) Defective kinescope.
- (7) R184 open.
- (8) No receiver plate voltage—filter capacitor shorted—or filter choke open.

NO VERTICAL DEFLECTION:

- V113 or V114 inoperative. Check voltage and waveforms on grids and plates.
- (2) T108 open.
- (3) Vertical deflection coils open.

SMALL RASTER:

- (1) Low Plus B or low line "oltage.
- (2) V116, V120 or V121 defective.

POOR VERTICAL LINEARITY:

- (1) If adjustments cannot correct, change V114.
- (2) Vertical output transformer T108 defective.
- (3) V113 defective—check voltage and waveforms on grid and plate.
- (4) C151, C152, C153, C155, or C156 defective.
- (5) Low plate voltage—check rectifiers and capacitors in supply circuits.
- (6) If height is insufficient, try changing V113.

POOR HORIZONTAL LINEARITY:

- (1) If adjustments do not correct, change V116, or V118.
- (2) T108 or L108 defective.
- (3) C176 or C177 defective.

WRINKLES ON SIDE OF RASTER:

- (1) C181 defective.
- (2) Defective yoke.

PICTURE OUT OF SYNC HORIZONTALLY:

- (1) T110 incorrectly tuned.
- (2) R192, R193 or R170B defective.

TRAPEZOIDAL OR NON SYMMETRICAL RASTER:

- Improper adjustment of centering of focus magnet or ion trap magnet.
- (2) Defective yoke.

RASTER AND SIGNAL ON KINESCOPE BUT NO SOUND:

- (1) L102 defective.
- (2) Sound i-f, ratio detector or audio amplifier inoperative check V101, V102, V103 and their socket voltages.
- (3) Audio system defective.
- (4) Speaker defective.

SIGNAL AT KINESCOPE GRID BUT NO SYNC:

- (1) AGC control R149 misadjusted.
- (2) Vlll, inoperative. Check voltage and waveforms at its grid and plate.

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SIGNAL ON KINESCOPE GRID BUT NO VERTICAL SYNC:

- (1) Check V113 and associated circuit.
- (2) Integrating network inoperative-Check.
- (3) V109B or V112B defective or associated circuit defective.
- (4) Gas current, grid emission or grid cathode leakage in V112. Replace.

SIGNAL ON KINESCOPE GRID BUT NO HORIZONTAL SYNC:

- (1) T110 misadjusted—readjust as instructed on page 11.
- (2) V112 inoperative—check socket voltages and waveforms.
- (3) T110 defective.
- (4) C142, C161A, C163, C165, C166, C167, C168, C169 or C170 defective.
- (5) If horizontal speed is completely off and cannot be adjusted check R192, R193, R170B, R195, R196 and R198.

SOUND AND RASTER BUT NO PICTURE OR SYNC:

- (1) Picture, detector or video amplifier defective—check V109A and V110—check socket voltages.
- (2) Bad contact to kinescope cathode.

PICTURE STABLE BUT POOR RESOLUTION:

- (1) V109A or V110 defective.
- (2) Peaking coils defective-check resistance.
- (3) Make sure that the focus control operates on both sides of proper focus.
- (4) R-F and I-F circuits misaligned.

PICTURE SMEAR:

- (1) R-F or I-F circuits misaligned.
- (2) Open peaking coil.
- (3) This trouble can originate at the transmitter—check on another station.

PICTURE JITTER:

- (1) AGC control R149 misadjusted.
- (2) If regular sections at the left picture are displaced change V116.
- (3) Vertical instability may be due to loose connections or noise.
- (4) Horizontal instability may be due to unstable transmitted sync.

RASTER BUT NO SOUND, PICTURE OR SYNC:

- (1) Defective antenna or transmission line.
- (2) R-F oscillator off frequency.
- (3) R-F unit inoperative-check V1, V2.

DARK VERTICAL LINE ON LEFT OF PICTURE:

- (1) Reduce horizontal drive and readjust width and horizontal linearity.
- (2) Replace V116.

LIGHT VERTICAL LINE ON LEFT OF PICTURE:

(1) V118 defective.



Taken from RCA WO58A Oscilloscope

Grid of Horizontal Sync Separator (Pin 1 of V112A) (6SN7) Voltage depends on picture

Figure 35–Vertical (85 Volts PP)

Figure 36—Horizontal (85 Volts PP)



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CV163/





Figure 37–Vertical (7.5 Volts PP)

Figure 38—Horizontal (5 Volts PP)

Plate of Horizontal Sync Separator (Pin 2 of V112A) (6SN7)

Figure 39–Vertical (45 Volts PP)

Figure 40—Horizontal (45 Volts PP)





Figure 41–Vertical (55 Volts PP)

Figure 42—Horizontal (55 Valts PP)



Plate of Vertical Sync Sep. (Pin 6 of V109B) (12AU7)

Figure 43–Vertical (65 Volts PP)

Figure 44—Horizontal (65 Volts PP)



















Taken from RCA WO58A Oscilloscope

Grid of Sync Output (Pin 4 V112B) (6SN7)

Figure 45-Vertical (40 Volts PP) ------

Figure 46-Horizontal (40 Volts PP) -----

Plate of Sync Output (Pin 5 of V112) (6SN7)

Figure 47-Vertical (47 Volts PP) -----

Figure 48-Horizontal (47 Volts PP) ----

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CV164D





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Figure 50–Plate of Vertical Sweep Osc. (Pin 3 of V113) (100 Volts PP)







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Figure 52–Plate of Vertical Sweep Output (Pin 3 of V114) (6K6) (715 Volts PP) -----





Cathode of Kinescope (Pin 11 of V119) (17QP4) Voltage depends on picture Figure 53-Vertical -----

Figure 54—Horizontal ***



Taken from RCA WO58A Oscilloscope

Figure 55–Grid of Horizontal Oscillator Control (Pin 1 of V115) (6SN7GT) (19 Volts PP)

Figure 56—Cathode of Horizontal Oscillator Control (Pin 3 of V115) (6SN7GT) (1.2 Volts PP)

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Figure (6 Figure

CV165C

CV165 A

Figure 57—Grid of Horizontal Oscillator (Pin 4 of V115) (6SN7GT) (330 Volts PP)

Figure 58—Plate of Horizontal Oscillator (Pin 5 of V115) (6SN7GT) (140 Volts PP)

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CV 165 E





(150 Volts PP)

Figure 59-Terminal "C" of T110

Figure 60—Grid of Horizontal Output Tube (Pin 5 of V116) (6BQ6) (90 Volts PP)

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Figure 61—Plate of Horizontal Output (Approx. 4000 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V116 to Ground)

Figure 62–Cathode of Damper (Pin 3 of V118) (6W4GT) (2350 Volts PP)

Figure 63–Plate of Dæmper (Pin 5 of V118) (6W4GT) (160 Volts PP)

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Figure 64–Plate of AGC Amplifier (Pin 5 of V111) (6AU6) (560 Volts PP)

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VOLTAGE CHART

The following measurements represent two sets of conditions. In the first condition, a 15000 microvolt test pattern signal was fed into the receiver, the picture synced and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV97A senior "VoltOhmyst" between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c. The symbol < means less than.

Tube	Tube		Operating	E. F	late	E. S	creen	E. Co	E. Cathode		Grid		
No.	Туре	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Notes on Measurements	
Vl	6]6	Mixer	15000 Mu. V. Signal	2	153	_		7	0	5	*-3 to -5	*Depending on channel	
			No Signal	2	135	_	_	7	0	5	*—3 to —5	*Depending on channel	
V 1	616	R-F Oscillator	15000 Mu. V. Signal	1	100	_	_	7	0	6	*—3 to —5	*Depending on channel	
			No Signal	1	85	-	-	7	0	6	*_3 to _5	*Depending on channel	
V2	6CB6	R-F Amplifier	15000 Mu. V. Signal	5	260	6	150	2	.1	1	-5.8		
			No Signal	5	220	6	100	2	1.0	1	-0.1		
V 101	6AU6	lst Sound I-F Amp.	15000 Mu. V. Signal	5	130	6	142	7	0.8	1	0		
			No Signal	5	116	6	129	7.	0.6	1	0		
V 102	6AU6	2d Sound I-F Amp.	15000 Mu. V. Signal	5	131	6	148	7	0	1	-5.1		
			No Signal	5	110	6	120	7	0	1 -	*0.3	*Unreliable measuring point. Voltage depends on noise.	
V 103	6AL5	Ratio Detector	15000 Mu. V. Signal	7	0	_	—	1	12	_	_	7.5 kc deviation at 1000 cycles	
			No Signal	7	0.7	_	_	1	*5.1	-	_	*Unreliable measuring point. Voltage depends on noise.	
V 104	6AV6	lst Audio Amplifier	15000 Mu. V. Signal	7	87	-	_	2	0	1	-0.7	At min. volume	
			No Signal	7	76	_	_	2	0	1	-0.6	At min. volume	
V 105	6K6GT	Audio Output	15000 Mu. V. Signal	3	260	4	263	8	19	5	-0.7	At min. volume	
			No Signal	3	250	4	251	8	18.5	5	-0.7	At min. volume	
V 106	6CB6	lst Pix. I-F Amplifier	15000 Mu. V. Signal	5	246	6	258	2	<0.1	1	-8.6		
		0.10.17	No Signal	5	108	6	108	2	0.7	1	*-0.2	*Unreliable measuring point. Make measurement at T104-B	
V 107	6CB6	Amplifier	ISOOO Mu. V. Signal	5	242	6	255	2	<0.1	1	-8.6		
			No Signal	5	108	6	.108	2	0.5	1	0.2		
V 108	6CB6	3rd Pix. I-F Amplifier	15000 Mu. V. Signal	5	133	6	172	2	2.1	1	0		
			No Signal	5	115	6	162	2	1.9	1	0		
V109A	12AU7	Picture 2d Det.	15000 Mu. V. Signal	1	-8.4	_		3	0	2	-1.3		
			No Signal	1	-1.8	-	-	3	0	2	-0.6		
V 109 B	12AU7	Vert. Sync Separator	15000 Mu. V. Signal	6	71		-	8	0	7	-40		
			No Signal	6	*50 to 100	_	_	8	0	7	*-15	*Unreliable, depends on noise	

VOLTAGE CHART

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Tube	Tube		Operating	E.	Plate	E. Screen E. Cathode		E. Grid				
No.	Туре	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Notes on Measurements
V 110	6CL6	Video Amplifier	15000 Mu. V. Signal	6	130	8	149	1	0.2	4	-1.3	AGC control set for normal operation
	*(6AC7) *(6AG7)		No Signal	6	110	8	13 0	1	0.5	4	-0.6	*Refer to Fig. 67 for socket connections
V 111	6AU6	AGC Amplifier	15000 Mu. V. Signal	5	-40	6	250	7	153	1	151	
			No Signal	5	+2.3	6	258	7	135	1	105	
V112A	6SN7GT	Hor. Sync Separator	15000 Mu. V. Signal	2	263	_	_	3	190	1	130	
			No Signal	2	258	_	_	3	138	1	110	
V112B	6SN7GT	Sync Output	15000 Mu. V. Signal	5	58	_	_	6	0	4	-2.1	
			No Signal	5	48	_	_	6	0	4	* +0.6	*Depends on noise
V 113	6]5	Vertical Oscillator	15000 Mu. V. Signal	3	70	_	_	8	0	5	-15	*Depends on setting of Vert. hold control
			No Signal	3	68	_	_	8	0	5	-14	Voltages shown are synced pix adjustment
V114	6K6GT	Vertical Output	15000 Mu. V. Signal	3	265	4	270	8	30	5	—5	
			No Signal	3	253	4	260	8	28	5	_5	
V115	6SN7GT	Horizontal Osc. Control	15000 Mu. V. Signal	2	165	_		3	+1.5	1	-21	
			No Signal	2	160	_		3	-10	1	-24	
V115	6SN7GT	Horizontal Oscillator	15000 Mu. V. Signal	5	185			6	0	4	80	
			No Signal	5	170	_	_	6	0	4		
V 116	6BQ6GT	Horizontal Output	15000 Mu. V. Signal	Cap	*	4	180	8	21.2	5	-13	*High Voltage Pulse Present
			No Signal	Cap	*	4	170	8	21.0	5	-13	*High Voltage Pulse Present
V117	1B3GT 8016	H. V. Rectifier	15000 Mu. V. Signal	Cap	*	_	_	2 & 7	14,000	_	_	*High Voltage Pulse Present
			No Signal	Cap	*		_	2&7	13,600	_		*High Voltage Pulse Present
V 118	6W4GT	Damper	15000 Mu. V. Signal	5	270	_	_	3	*	_	_	*High Voltage Pulse Present
			No Signal	5	260		_	3	*	_	_	*High Voltage Pulse Present
V119	21AP4	Kinescope	15000 Mu. V. Signal	Cap	14,000	10	400	11	170	2	120	At average Brightness
			No Signal	Cap	13,600	10	385	11	150	2	115	At average Brightness
V120 V121	5U4G 5Y3GT	Rectifiers	15000 Mu. V. Signal	4&6	_			2 & 8	285	_	_	
			No Signal	4&6		_	-	2 & 8	275	-	-	

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Figure 65-R-F Unit Wiring Diagram

CRITICAL LEAD DRESS:

- 1. Keep all wiring in the pix i-f, sound i-f and video circuits as short as possible.
- 2. Keep the leads on Cl18, Cl20, Cl22, Cl24, Cl26, Rl14, Rl21 and Rl23 as short and direct as possible.
- 3. Do not run any leads under Cl15 trimmer capacitor.
- 4. Dress Cl18 vertically parallel to terminals A and B of T104. Dress Cl35 parallel to terminals A and B of T104 close to the chassis.
- Keep C127 away from chassis with no more than 1/4 inch leads at each end.
- 6. Dress the lead from T105(C) to the terminal board, close to the chassis.
- 7. Keep all filament leads dressed close to the chassis.
- Ground filaments of V106, V107 and V108 independently of tube shields (pin 8). Use ground lances provided near pins of each socket.
- 9. Dress lead from pin 5 of V110 to J102-2 close to the chassis.
- 10. Keep leads to L103 as short as possible.

- 11. Dress C130, C132, L102, L104, L105, L114, R131, R133, R135 and R139 away from the chassis.
- 12. Do not tape kinescope cathode lead in with other kinescope leads.
- Do not change the bus wire connections to pin 2 of V101 and V102. Sleeving is used to insure length and to prevent shorting.
- Keep leads on C136 short and direct. Dress the lead from C136 to pin 5 of V111 as shown in wiring diagram.
- Do not dress C170 in such a position that adjustment of T110 is inaccessible.
- 16. Keep the leads on R201 as short and direct as possible.
- Dress the lead from pin 3 of V113 to C153 as shown in the wiring diagram.
- Mount C183 directly on the terminal board provided keeping it as far away from T109 as possible.
- 19. Dress all leads in the high voltage compartment away from each other and away from the high voltage transformer.

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REPLACEMENT PARTS (Continued)

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STOCK No.	DESCRIPTION	STOCK	DESCRIPTION
76633	Magnet—Pin cushion correction magnet complete with	503427	270,000 ohms, ±10%, ½ watt (R157)
76464	support arm Plate Hi valtage plate (bakelite) generably generalite	503433	330,000 ohms, ±10%, ½ watt (R111, R188)
10404	with tube socket and corona ring	512433	$330,000 \text{ ohms}, \pm 5\%, 1 \text{ watt (R190)}$
76796	Resistor—Wire wound, 5.1 ohms, 1/3 watt (R205)	503447	$470,000$ ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R100)
76639	Resistor—Wire wound, 180 ohms, 2 watts (R202)	504447	470,000 ohms, ± 20%, 1/2 watt (R112, R147)
76988	Resistor-Wire wound, 820 ohms, 1 watt (R113)	503456	560,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R148, R171)
76469	Resistor—Wire wound, 2500 ohms, 10 watts (R115)	503468	680,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R154, R161)
10989	Resistor - Wire wound, 4050 ohms, 7 watts (R116)	503482	$1 \text{ merch} = 10\%, \frac{1}{2} \text{ watt} (R189, R199)$
503033	33 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R130)	502511	1.1 megohm, ±5%, ½ watt (R136)
502039	39 ohms, ± 5%, ½ watt (R122)	503512	1.2 megohm, ± 10%, ½ watt (R180)
502047	47 ohins, $\pm 5\%$, $\frac{1}{2}$ watt (R119)	503515	1.5 megohm, ± 10%, ½ watt (R172)
503047	47 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R105)	11769	1.8 megohm, ±5%, ½ watt (R140)
504047	47 ohms, ±20%, ½ watt (R201)	503522	2.2 megohm, + 10%, 1/2 watt (R126, R159)
503082	82 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R101)	504610	10 megohm, ± 20%, 1/2 watt (R110)
502118	180 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R125)	71456	Screw-#8-32 x 7/16" wing screw to mount deflection
503139	$470 \text{ obm} = 10\%, \frac{1}{2} \text{ watt (R182)}$	76455	Shaft—Connecting shaft (nylon) for picture and bright-
513156	560 obms $\pm 10\%$, $\frac{1}{2}$ watt (R114)	72504	ness controls
504210	$1000 \text{ ohms} \pm 20\%$, 1 watt (R102, R118, R120, R124, R127)	76972	Shield—Tube shield for V101, V102, V103, V108 Shield—Tube shield for V109
503222	2200 ohms, ± 10%, ½ watt (R104, R212)	75718	Socket—Channel indicator lamp socket and leads
523222	2200 ohms, ± 10%, 2 watts (R131)	74834	Socket-Kinescope socket
504233	3300 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R211)	51251	V113, V116, V120, V121 for KCS72 (KCS72 uses 6AC7
523223	3300 ohms, ±10%, 2 watts (R131)	71508	for VIID) Socket—Tube socket, 6 pin, moulded—for VII7
502239	3900 ohms, ±5%, ½ watt (R129, R164)	50367	Socket-Tube socket, 6 pin, moulded, saddle mounted
503239	3900 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R194)	73117	for VII8 Socket—Tube socket, 7 pin, wafer miniature for VI01,
503256	5600 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R138)	70450	V102, V103, V104, V106, V107, V108, V111
523268	$6800 \text{ ohms}, \pm 10\%, 2 \text{ watts}$ (R203)	10455	V110 for KCS72-M1 (KCS72-M1 uses 6AG7 for V110)
513282	8200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R16, R179)	50367	Socket-Tube socket, 8 pin, moulded saddle-mounted
502310	$10,000 \text{ ohms}, \pm 5\%, \frac{1}{2} \text{ watt} (R107, R108, R123)$	72627	Socket—Tube socket, 8 pin, steatite saddle mounted for
504310	10,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R152)	76071	V115 Solut Tube context 9 aim under ministure for V109
502312	12,000 ohms, ± 5%, 1/2 watt (R121)	77470	Socket-Tube socket, 9 pin, water miniature for V109 Socket-Tube socket, 9 pin, miniature, wafer for V110 for
503312	12,000 ohms. ± 10%, 1/2 watt (R145)	76626	KCS72-M2 (KCS72-M2 uses 6CL6 for V110)
523312	12,000 ohms, \pm 10%, 2 watts (R135)	10030	magnet
503315	15,000 ohms, ± 10%, ½ watt (R153)	77011	Switch—Tone control and phono switch less volume control and power switch (S101)
503318	18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R128, R158, R166, R196)	76463	Terminal—Screw type grounding terminal
523318	$18,000 \text{ ohms}, \pm 10\%, 2 \text{ watts} (R133)$	76977	Transformer—Antenna matching transformer complete (T200, C200, C201, C202, C203, L200, L201, L202, L203,
513322	$22,000 \text{ ohms} \pm 10\%$, $\frac{1}{22}$ watt (R161, R217)	76705	
503327	$27,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R215)$	76440	Transformer-Horizontal oscillator transformer com-
513327	27,000 ohms, ± 10%, 1 watt (R218)	76082	plete with adjustable cores (T110)
513333	33,000 ohms, ±10%, 1 watt (R214)	76984	Transformer—Power transformer, 117 volts 60 cycle
503339	39,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R106, R142)	77112	(T109) Transformer_Batic detector transformer (T102, C105)
513339	39,000 ohms, ±10%, 1 watt (R132)	76981	Transformer-Sound i-f transformer complete with
503347	47,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R160)	76978	adjustable core (T101, C102, C103, R103) Transformer-Vertical output transformer (T108)
504347	47,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R144)	76979	Transformer-First pix, i-f transformer complete with
513347	47 000 ohms + 10% 1 watt (R148)	76980	adjustable cores (1104, C116, K117) Transformer—Second, third or fourth pix i-f trans-
503356	$56,000 \text{ ohms} \pm 10\%, 1 \text{ watt} (R132)$	10000	former complete with adjustable core (T105, T106, T107)
512356	56,000 ohms, ± 5%, 1 watt (R178)	75449	Trap-FM trap complete with adjustable core and stud
503368	68,000 ohms, ± 10%, ½ watt (R219)	75242	(L203, C203) Tran_L-F tran (L200, L201, C200, C201)
513368	68,000 ohms, $\pm 10\%$, 1 watt (R192)	76983	Trap-4.5 MC trap (L103, C128)
513382	82,000 ohms, ±10%, 1 watt (R191)	76616	Yoke-Deflection yoke complete with 6 contact male connector (L109, L110, L111, L112, C181, P103, R208
504410	100,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R213)		R209, R210)
513410	$100,000 \text{ ohms}, \pm 10\%, 1 \text{ watt (R175)}$		SPEAKER ASSEMBLIES
30180	120,000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R143)		971636-1W RL-101C5
503415	$150,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R174, R183, R187)}$		RMA-274
512415	150,000 ohms + 5% watt (R135)		(For Models 17T200, 17T201 & 17T202)
502418	180,000 ohms, +5%, 1/2 watt (R141)		
502427	270,000 ohms, ±5%, ½ watt (R177)	77000	Speaker—5" F.M. speaker complete with cone and voice coil (3.2 ohms)
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REPLACEMENT PARTS (Continued)

SPEAKER ASSEMBLIES 7998 Kname-Trace control and phone switch knob-maraam- manual stress of the stre	STOCK No.	DESCRIPTION		DESCRIPTION
ST400-3W RL:01056 RMA-214 (outer) (outer) (Far Model T7211 & 17720) 7728 Knab-Channel selectrik had-skory-(outer) 77902 ConstCare and value coll (J2 ahma) 77284 Knab-Tine tuning control had control had selectrik had-skory-(outer) 77902 ConstCare and value coll (J2 ahma) 77284 Knab-Tine tuning control had bad control or wetten had control are selectrik had-shory-(outer) 77903 Knab-Tine tuning control had control are selectrik had-segreter in instruments data not serve with alkae complete in instruments data not serve with alkae complete in Model 177200, 177201 77285 Knab-Tine tuning control had bad con-shory-(outer) 7799 Model Class had bad complete for Models 17720, 177201 77297 Model Channel marker excetchen light mak-badry guidy 7799 Model Class had target for delation yake had for Traggined. 77297 Model Class had target for delation yake had for Traggined. 7790 Board-Theorem Target for delation yake had for Traggined. 77297 Model 177200 7791 Board-Theorem Target for delation yake had for Traggined. 77297 Model 177200 7791 Board-Theorem Target for delation yake had for Traggined. 77207 Model 177200 7791 Board-Theorem Target for delatin yake had f		SPEAKER ASSEMBLIES	76598	Knob—Tone control and phone switch knob—marcon—
(For Models 177211 & 17720) 77201 Knab.—Channel atsletter hanb.=shopt=(inter) 75002 Cone—Cone ont voice cell (3.2 shom) 77203 Knab.—The turning central knob.—chany—(inter) 75002 Speaker, P.F. M. speaker complete with case and voice cell (3.2 shom) 77204 Knab.—The turning central knobchany—(inter) 75002 Speaker, P.F. M. speaker complete with case and voice cell (3.2 shom) 77204 Knob.—The turning central knobchany(uster) 75003 Mather theory equivalence of the speaker of huid description of part regulated. 77204 Knob.—The turning central knobchanyknob 75004 Back - Channel marker escutchen light maskbackge 7880 Mask.—Channel marker escutchen light maskbackge 75003 Back - Channel marker escutchen light maskbackge 7880 MaskChannel marker escutchen light maskbackge 75004 Back - Channel marker escutchen light maskbackge 7881 MaskChannel marker escutchen light maskbackge 75005 Back - Channel marker escutchen light maskbackge 7881 MaskChany		971490-3W RL-105E6 RMA-274	77264	(outer) Knob-Brightness control or vertical hold control knob -ebony-(outer)
7990 Conse-Conse and voice coil (3.2 ahms) 77265 Knab-First council, horizontal had control or nab- ume control and power switch hom-chony(outer) 79902 Speaker_S*P.M. speaker complete with cons and voice and (2 ohms) 77265 Knab-First council, horizontal had control or nab- ume control and power switch hom-chony (outer) 79902 MOTE: If stamping on speaker in instruments does not were trained on appeaker and full description of part regures and voice and voice and the strengt for mak-burg metric strengt on appeaker and full description of part regures and voice and voice and voice and voice and set. Cohnnel marker secuthoen light mak-burg metric strengt on appeaker and full description of part regures and voice and voice and voice and voice and secution of the strengt on the strengt for kinescope and the strengt on the strengt on the strengt for kinescope and the strengt on the strengt on the strengt on the strengt for kinescope and the strengt on the strengt on the strengt on the strengt for kinescope and the strengt on the strengt on the strengt on the strengt and the strengt on the strengt on the strengt on the strengt and the strengt on the strengt on the strengt on the strengt and the strengt on the strengt on the strengt and the strengt		(For Models 177211 & 177220)	77261	Knob—Channel selector knob—ebony—(inner)
 Contact of P. M. Space complete with constant of the control of power with knob-body-(Enter) Space of P. M. Space complete with constant of power with knob-body-(Enter) NOTE: If atomylar complete with constant does not vice output of phones result hands of the control of phones result hands-bar. NOTE: If atomylar complete in instruments does not vice output of phones. NOTE: If atomylar complete instruments does not vice output of phones. MISCELLANEOUS Back- Cahnet back complete for Madels 177201, 177200 Back- Cahnet back complete for Madels 177201, 177200 Back- Chanet marker secuthen light mask-bar. Mus- Speed nut for deflection yoke haad at the secuth on hands. Back- Chanet back complete for Madels 177201, 177200 Back- Chanet back for deflection yoke haad for make back i 177201, 17721 Back- Chanet back for deflection yoke haad for make back for deflection yoke haad for make back i 177201, 17721 Back- Chanet back for deflection yoke haad for make back i 177201, 17721 Back- Chanet back for deflection yoke haad for make back i 17720, 17720 Back- Chanet back for deflection yoke haad for make back i 17720, 17720 Back- Chanet back for deflection yoke haad i 17720 Back- Chanet back for deflection yoke haad i 177200 Back- Chanet back for deflection yoke haad i	75024	Conce Conce and voice and (2.2 shore)	77262	Knob—Fine tuning control knob—ebony—(outer)
 Finds - The store and product of the sequence of	75022	Snecker_8" P M snecker complete with some and using	77265	Knob—Picture control, horizontal hold control or vol-
 Internet with above guester humber, order replacement parts pretrients on appears on full description of part regularies. Internet pretrients on appears on full description of part regularies. Internet pretrients on appears on the description of part regularies. Internet pretrients on appears on the description of part regularies. Internet pretrients on appears on the description of part regularies. Internet pretrients on appears on the description of the description. Internet pretrients on the description of the description of the description of the description. Internet pretrients on the description of the description of the description. Internet pretries on the description of the description of the description of the description. Internet pretries on the description of the description of the description. Internet pretries on the description of the description of the description. Internet pretries on the description of the description of the description. Internet pretries on the description of the description of the description. Internet pretries on the description. Interescription. Internet pretries on the description		coil (3.2 ohms)	77263	Knob-Tone control and phono switch knob-ebony-(inner) (outer)
MisCELLARDUS T7257 Mask-Channel marker sesutcheon light mask-abege 117202 Mask-Channel marker sesutcheon light mask-abege T7257 Mask-Channel marker sesutcheon light mask-abege 117202 Back-Cabinet back complete for Models 177201, 177202 T7267 Mask-Channel marker sesutcheon light mask-abege 76181 Back-Channel marker sesutcheon light mask-abege Transmer in marker sesutcheon light mask-abege 76181 Back-L-Langer brackst for deflection yoke hood for Transmer in the sessen in marker sesutcheon light mask-abege 77010 Back-L-Langer brackst for deflection yoke hood for Transmer brackst for deflection yoke hood for 77111 Mit-Speed nut to lock fissing compartment door cradis support Transmers for Models 177201, 177202 77121 Brack-L-Langer brackst for insender for insender provide for managemer grant or instruments for Models 177201, 17720 Transmers for Models 177201, 17720 77122 Transmers for Models 177201, 17720 Transmers for Models 177201, 17720 77123 Brack-Channel marker secution compartment door for mologon grant for insender for managemers grant, marker secution compartment door for mologon grant for insender grant for insender grant for insender grant for insender grant for insende grant for insender grant for insende grant for insender grant f		agree with above speaker number, order replacement parts by referring to model number of instrument, num- ber stamped on speaker and full description of part required.	11765 75459	Lamp—Channél marker escutcheon lamp—Mazda #51 Mask—Channel marker escutcheon light mask—bur- gundy
 Pack-Cabinet back complete for Model 177201, 17720. Pack-Cabinet back complete for Model 177211, 17720. Pack-Cabinet back complete for Model 177201. Pack-L-Mange bracket for deflection yake hoad for Model 177201. Pack-L-Mange bracket for kinescope cradic for Model 17720. Parchet-Hange bracket for kinescope cradic for Model 17720. Parchet-Stifting bracket for kinescope cradic for Model 17720. Parchet-Stifting bracket for kinescope cradic for Model 17720. Parchet-Stifting bracket for kinescope cradic for Model 17720. Parchet-Grifting bracket for kinescope cradic for Model 17720. Parchet-Stifting bracket for mahogany cabinet for Model 17720. Parchet-Stifting bracket for mahogany cabinet for Model 17720. Parchet-Stifting bracket for mahogany cabinet for Model 17720. Parchet-Stifting bracket for Model 17720.		MISCELLANEOUS	76589	Mask—Channel marker escutcheon light mask—beige
 Pack—Cabinat back complete for Models 177211, 177220 Back—Cabinat back complete for Models 17721, 177220 Pack—Cabinat back complete for Models 17720, 177210, 177210 Pack—Tanger bracket for deflection yoke hoad for Models 17720, 17721, 18, 17720, 17721, 18, 17720, 177	77189	Back—Cabinet back complete for Models 17T200, 17T201, 17T202	77267	Mask—Channel marker escutcheon light mask—ebony
 Board "Antenna" terminal board. Board "Antenna" terminal board. Brecket Ranger bracket for deflection yoke hood for Models 117200. 117202. Brecket Ranger bracket for deflection yoke hood for Models 117200. 117201. Brecket Ranger bracket for deflection yoke hood for Models 11720. 117201. Brecket Ranger bracket for deflection yoke hood for Models 11720. 117201. Brecket Ranger bracket for deflection yoke hood for Models 11720. 117201. Brecket Ranger bracket for kinescope cradie (4req") Brecket Stiffening bracket for kinescope cradie (4req") Cicht Grills cloth for Models 117220. Cicht Grills cloth for mahogany and walnut instru- maching works (1787). Cicht Grills cloth for mahogany and walnut instru- maching works (1782). Connector Gonget context male connector for antenna coblet (2 req") for Models 117200. Connector House context male connector for antenna coblet (2 req") for Models 117200. Connector Route and plug Connector Route and plug Connector Route and plug Connector Route and plug (1782). Decal Control passel function deal for Model 117220. Decal Control passel function deal for Model 1177200. Brange Cannad	77190	Back—Cabinet back complete for Models 17T211, 17T220	10111	port rods (2 reg'd)
 Barcket - Hunger backst for deflection yoke hoad for Barcket - Hunger backst for deflection yoke hoad for Bracket - Hunger backst for deflection yoke hoad for Bracket - Hunger backst for deflection yoke hoad for Bracket - Hunger backst for deflection yoke hoad for Bracket - Hunger backst for deflection yoke hoad for Bracket - Hunger backst for deflection yoke hoad for Bracket - Hunger backst for deflection yoke hoad for Bracket - Hunger backst for deflection yoke hoad for Bracket - Hunger backst for kinescope cradie (are d) Bracket - Bullet catch and strike for Model 117220 Catch - Bullet catch and strike for Model 117220 Catch - Grille cloth for mahogany cabinet for Model 11720 Catch - Grille cloth for mahogany cabinet for Model 11720 Cloth - Grille cloth for mahogany cabinet for Model 11720 Cloth - Grille cloth for mahogany cabinet for Model 11720 Cloth - Grille cloth for mahogany and walnut instruments for Model 11720 Cloth - Grille cloth for mahogany and walnut instruments for Model 11720 Connector - Ganget contact male connector for antenna cable Connector - Ganget furging for antenna cable Conde Carl and connector for antenna cable Conde Carl and connector for antenna cable Gord - Dower cord and plug Straw - 84 (are haver back for Model 11720 Bracken - Contact male for Model 117220 Bracken - Contact male for Model 11720 Bracken - Contact male for Model 11720 Bracken - Contact male connector for antenna cable Conde Carl and plug Straw - 84 (are haver back for Model 11720 Bracket - Ganget for Model 11720 Bracket - Ganget for Model 11720 Bracket - Ganget for Model 11720 Brac	76184	Board—''Antenna'' terminal board.	76822	Nut-Speed nut to lock flexible straps for kinescope
 Table T. Hanger bracket for deflection yoke hood for Medel 177211 Bracket - Manger bracket for deflection yoke hood for Medel 177212 Bracket - Stiffening bracket for kinescope cradie (4 reg 'd) for Model 177202 Bracket - Stiffening bracket for kinescope cradie (4 reg 'd) for Model 177202 Bracket - Built catch and strike for Model 177202 Citch - Grille cloth for mahogany cabint for Model 177211 Citch - Grille cloth for mahogany and walnut instru- ments for Model 177202 Citch - Grille cloth for mahogany and walnut instru- ments for Model 177202 Cord - Power cord and plug Cord - Dower cord and plug Couchion - Robber cualico (1/16" x 1" x 5% x 1%") for kinescope and crast for Model 177202 Cord - Dower cord and plug Couchion - Robber cualico (1/16" x 1" x 5% x 1%") for kinescope and crast male connector for antenna cable (2 reg 'd) for Models 177201. Cord - Dower cord and plug Cord - Chanel support 4 figt "x 5%" x 1%") for kinescope and crast male connector for antenna cable (2 reg 'd) for Models 177201. Cord - Dower cord and plug Cord - Control panel function decal for mahogany or walnet for Models 177201. Cord - Dower cord and plug Cord - Dower cord panel function decal for mahogany or walnet for Models 177201. Cord - Dower cord and plug Cord - Dower cord panel function decal	76811	Bracket—Hanger bracket for deflection yoke hood for Models 17T200 17T201 17T202	77013	Nut—Speed nut for fastening "RCA Victor" emblem on metal panel for Models 17T202, 17T211 & 17T220
Model 17721768127682768276812Brocket-Manney mounted on cradle support to cushor Kinescope (a cushor Kinescope) to cushor Kinescope768176814Brocket-Stiffening brocket for kinescope cradie (4 req 'd) for Model 177207700576823Brocket-Stiffening brocket for kinescope cradie (4 req 'd) for Model 177207700576824Clap-Spring clip for spacing ground braid (772117716776825Clap-Spring clip for spacing ground braid (772117718676826Clap-Grille cloth for mohogany cabinet for Model (77211)77172076827Clap-Grille cloth for mohogany cabinet for Model (77211)7718776837Connector-All goal for mohogany cabinet for Model (77211)771720176849Connector-All goal for mohogany cabinet for antenna cable (2 req 'd) for Model 1772007761077614Connector-All goal for mohogany com reable (2 req 'd) for Model 1772007761177614Connector-All goal for mohogany com reable (2 req 'd) for Model 1772007761277614Connector-All goal for mohogany com reable (2 req 'd) for Model 1772007761377614Connector-All goal for mohogany com reable (2 req 'd) for Model 1772007761377614Connector-All goal for Model 1772007761377614Connector-All goal for mohogany com read-Control panel function decal for mahogany com read-Control panel for Model 1772007761377615Cead-Power cord and plug7662377616Decal-Control goal for Model 1772007762077617	77001	Bracket—Hanger bracket for deflection voke hood for	13634	'Nut—Speed nut for speaker mounting screws for Model 17T211
Model 177220 17811 Ped-Rubber pad (channel) for flexible straps (2 reg d) for Models 177210, 177201, 177202 76812 Breacker-Stiffming, brackt for kinescope cradic (areg'd) Models 177211, 177202 77860 76823 Breacker-Stiffming, brackt for kinescope cradic for Models 177211, 177202 77860 76824 Catch-Bullet catch and strike for Model 177202 77187 71882 Catch-Bullet catch and strike for Model 177202 77187 71883 Catch-Bullet catch and strike for Model 177202 77187 71884 Catch-Grille cloth for mahogany cabinet for Model 77002 71874 Cannector-Single contact male connector for antenna for Models 177201 77002 71875 Connector-Single contact male connector for antenna cable (2 reg d) 77010 RedTu' shope threaded rod to support deflection vake hood assembly (2 reg d) for Models 177201, 177202 77014 Cach-Control panel function date cal for mahogany or welnut instruments for Models 177201, 177202, 177201, 177201 77413 77015 Server or and paig for Models 177201, 177202, 177201, 177201 77413 Server or and paign for asset go as stating strike for door pull for kinescope and cradle support (4 reg'd) 77014 Decal-Control panel function date lift strike strike scutcheon or point winter struments for Models 177201, 177202, 177201 77413	76812	Model 177211 Bracket-Hanger bracket for deflection woke bood for	76825	Pad—Rubber pad (channel) mounted on cradle support to cushion Kinescope
76814 Bracket-Stiftening bracket for kinescope cradle (4 req'd) 77005 Panel-Metal form panel for mahagany or walnut in-struments for Models 177211 & 177221 & 177221 76829 Bracket-Stiftening bracket for kinescope cradle (or Models 17720). 177201 77260 76820 Catch-Bullet catch and strike for Model 177202 77260 77882 Catch-Grille cloth for mahagany and walnut instruments 77861 77883 Cloth-Grille cloth for mahagany and walnut instruments 77862 77894 Cloth-Grille cloth for mahagany and walnut instruments 78810 78947 Connector-4 contact male connector for antenna cable 78610 78947 Contenctor-Single contact male connector for antenna cable 78610 78948 Cad-Dewrer ord and plug 78621 78949 Decal-Control panel function dcal for mahagany or walnut instruments for Models 177200, 17720, 17		Model 17T220	76819	Pad—Rubber pad (channel) for flexible straps (2 reg'd)
 Bracket Stiffsning bracket for kinescope cradie for Model 177211, 17720 Bracket Stiffsning bracket for Model 177200 Cath-Bullet catch and strike for Model 177200 Cip-Spring clip for spacing ground braid Clip-Spring clip for spacing ground braid Clipt-Grille cloth for Models 177201, 177202 Cloth-Grille cloth for mahogany cabinet for Model 177211 Cloth-Grille cloth for mahogany and walnut instru- ments for Models 17720, 177202 Cloth-Grille cloth for mahogany and walnut instru- ments for Model 177220 Cloth-Grille cloth for mahogany and walnut instru- ments for Model 177200 Retarct-Skipg loss retainer (2 reg'd) for Models 177210, 417720 RedW. The spectrased for Model 177200 Retarct-Skipg loss retainer (2 reg'd) for Models 177210, 417720 RedW. The spectrased for Models 177210, 417720 Card-Power cond and plug Control panel for Models 17720, 177202 Card-Power cond and plug Caushon -Rubber cushion (1/16" s 1" x % s 's 's') for kinescope and cradle support deflection yoke hood assembly (2 reg'd) for Models 177210 Cushon -Rubber cushion (1/16" s 1" x % s 's') for kinescope and cradle support deflection yoke hood assembly (2 reg'd) for Models 177200 Stew - 80.32 x 1" trimit head acrew for door pull for kinescope and cradle support deflection yoke hood assembly (2 reg'd) for Models 177200 Stew - 80.32 x 1" trimit head acrew for door pull for kinescope and ranket escutheon - gold Stew - 80.32 x 1" trimit head acrew for door pull for kinescope Stew - 80.32 x 1" trimit head acrew for door pull for kinescope Stew - 80.32 x 1" trimit head acrew for door pull for kinescope Stem - Testing spring for knobs 7463, 7564, 77626 Stem - Fint tuning control hob - maroon - ((inter)) Knob -	76814	Bracket—Stiffening bracket for kinescope cradle (4 reg'd) for Models 17T200, 17T201, 17T202	77005	Panel—Metal front panel for mahogany or walnut in- struments for Models 17T211 & 17T220
 Catch-Bullet catch and strike for Model 177220 Cip-Spring clip for spacing ground braid Clip-Spring clip for spacing ground braid Clipt-Grille cloth for Models 177201, 177202 Cloth-Grille cloth for mahogany and walnut instruments for Model 177220 Connector-Single contact male connector for antenna cable Cashion-Rubber cushion (1/16' s 1'' x \$\$'' s 1\$\$'') for kinescope and cradle support (4 seq' d) for Models 177202, 177201 & 177202 Cashion-Rubber cushion (1/16' s 1'' x \$\$'' s 1\$\$'') for kinescope and cradle support (4 seq' d) for Models 177202, 177201 & 177202 Cashion-Rubber cushion (1/16' s 1'' x \$\$'' s 1\$\$'') for kinescope and cradle support (4 seq' d) for Models 177202, 177201 & 177202, 177201 & 177202, 177201 & 177202 Cashion-Rubber cushion (1/16' s 1'' x \$\$'' s 1\$\$'') for kinescope and cradle support (4 seq' d) for Models 177202, 177201 & 177202	76829	Bracket—Stiffening bracket for kinescope cradle for Models 17T211, 17T220	77,260	Panel—Metal front panel for blonde instruments for Model 17T211
76823 Clip-Spring clip for spacing ground braid 7786 Pull-Door pull for false door (2 reg'd) for Model 177202 X3192 Cloth-Grille cloth for mahogany cabinet for Model 77802 Retainer-Safety glass retainer (2 reg'd) for Model 177202 X3192 Cloth-Grille cloth for mahogany cabinet for Model 77802 Retainer-Safety glass retainer (2 reg'd) for Model 177202 X1756 Cloth-Grille cloth for mahogany and walnut instruments 78810 Retainer-Safety glass retainer (2 reg'd) for Models 177201 75474 Connector-Single contact male connector for antenna cable 78810 RedTi-Single for Models 177201 75475 Connector-4 contact male connector for antenna cable 78810 RedTi-Single for Models 177201 71815 Connector-4 contact male connector for antenna cable 78810 RedTi-Single for Models 177201 71816 Cubin-Rubber cushion (1/16' x1''x \$\$'x 'x'a') for 78812 71818 Decal-Control panel function decal for mahogany or walnut instruments for Models 177202. 78813 71818 Decal-Control panel function decal for mahogany or deflection yoke hoad screw or lock flexible strape for kinescope for insulating high voltage for kinescope. 71849 Decal-Control panel function decal for mahogany or deflection yoke hoad screw or lock flexible strape for insulating high voltage for kinescope. </td <td>71892</td> <td>Catch-Bullet catch and strike for Model 17T220</td> <td>77187</td> <td>Pull—Door pull for television compartment doors for Model 17T220</td>	71892	Catch-Bullet catch and strike for Model 17T220	77187	Pull—Door pull for television compartment doors for Model 17T220
 X3128 Clohn-Grille cloth for Models 177201, 177202 X3199 Cloth-Grille cloth for mahogany cabinet for Model 177211 Cloth-Grille cloth for mahogany and walnut instru- ments for Model 177200 Connector-Single contact male connector for antenna coble (2 reg'd) Connector-Single contact male con	76823	Clip—Spring clip for spacing ground braid	77188	Pull—Door pull for false door (2 req'd) for Model 17T220
 X1199 Cloth—Crills cloth for mahogany cabinet for Model ITT211 X1175 Cloth—Crills cloth for mahogany and walnut instruments for Model ITT220 Connector—Single contact male connector for antenna cable Connector—4 contact male connector for antenna cable Connector—4 contact male connector for antenna cable Cord—Power cord and plug Couhion—Rubber cushion (1/16" x 1" x %" x 1/4") for waint instruments for Models ITT200, ITT201 & ITT200 Cushion—Rubber cushion (1/16" x 1" x %" x 1/4") for waint instruments for Models ITT200, ITT201, K Cushion—Rubber cushion (1/16" x 1" x %" x 1/4") for waint instruments for Models ITT200, ITT201, K Pression—Rubber cushion (1/16" x 1" x %" x 1/4") for waint instruments for Models ITT200, ITT201, K Pression—Rubber cushion (1/16" x 1" x %" x 1/4") for waint instruments for Models ITT200, ITT201, K Pression—Rubber cushion (1/16" x 1" x %" x 1/4") for waint instruments for Models ITT200, ITT201, K Pression—Rubber cushion (1/16" x 1" x %" x 1/4") for waint instruments for Models ITT200, ITT201, K Pression—Rubber cushion (1/16" x 1" x %" x 1/4") for waint instruments for Models ITT200, ITT201, K Pression—Rubber cushion (1/16" x 1" x %" x 1/4") for waint instruments for Models ITT200, ITT201, K Pression—Channel marker escutcheon—gold Pression—Channel marker escutcheon—gold Pression Rubber cushion dor Model ITT220 Spring—Retaining spring for knobs 7659, 76597, 76598, 77598	X3128	Cloth-Grille cloth for Models 17T201, 17T202	77002	Retainer—Safety glass retainer (2 reg'd) for marcon, mahogany grain, mahogany or walnut instruments
 X1175 Cloth—Grills cloth for mahogany and walnut instruments for Model 177220 Connector—Single contact male connector for antenna cable (2 reg d) for Models 177201, 177201 X17547 Connector—C contact male connector for antenna cable (2 reg d) for Models 177211 & 17720 Red—'L': shape threaded rod to support deflection yoke hood assembly (2 reg d) for Models 177211 & 17720 Red—'L': shape threaded rod to support deflection yoke hood assembly (2 reg d) for Models 177211 & 17720 Red—'L': shape threaded rod to support deflection yoke hood assembly (2 reg d) for Models 177211 & 17720 Red—'L': shape threaded rod to support deflection yoke hood assembly (2 reg d) for Models 17720. Red—'L': shape threaded rod to support deflection yoke hood assembly (2 reg d) for Models 17720. Red—'L': shape threaded rod to support deflection yoke hood assembly (2 reg d) for Models 17720. Red—'L: shape threaded rod to support deflection yoke hood assembly (2 reg d) for Models 17720. Red—'L: shape threaded rod to support deflection yoke hood assembly (2 reg d) for Models 17720. Red—'L: shape threaded rod to support deflection yoke hood assembly (2 reg d) for Models 17720. Retaining spring for knobs fees to for door pull for models 17720. Retaining spring for safety glass retainses 17720. Retaining spring for knobs 74963, 75464, 77265 Spring—Retaining spring for knobs 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76593, 76594, 76593, 76594, 77265 Strap—Flexible steal trop to secure kinescope Strap—Flexible steal trop to secure kinescope Strap—Ground strap (005' x ½' soft copper strip) for Model 177220 Rob—Ficture control knob—marcon—(inner) Rob—Ficture control knob—marcon—(inner) Rob—Ficture control knob—marcon—(inner) Rob—Ficture control switch kn	X3199	Cloth—Grille cloth for mahogany cabinet for Model 17T211	76816	Retainer—Safety glass retainer (2 reg'd) for blonde instruments
15474 ConnectorSingle contact male connector for antenna cable (2 reg d) 76810 39153 Connector4 contact male connector for antenna cable 76810 71457 CordPower cord and plug 76810 76818 CushionRubber cushion (1/16" x 1" x % x 1/4") for kinescope and cradle support (4 reg d) 76811 76810 CushionRubber cushion (1/16" x 1" x % x 1/4") for kinescope and cradle support (4 reg d) 76810 77014 DecalControl panel function decal for mahagany or walnut instruments for Models 177201, 177202, 177201 76810 77014 DecalControl panel function decal for mahagany or walnut instruments for Models 17720, 177201 76810 77012 ErnblemRCA Victor" emblem for Models 177202 76801 77014 DecalControl panel function decal for Models 177202 76806 77015 EscutcheonChannel marker escutcheongold 76803 77016 FootFeit foot (4 reg'd) for Models 177201 & 177201 & 177201 77026 77850 Class -Safety glass 76837 76899 KnobBrightness control or vertical hold control knobmarcon - (outer) 76837 76899 KnobFiet uning control knobmarcon - (outer) 76833 76899 KnobBrightness control or vert	X1756	Cloth—Grille cloth for mahogany and walnut instru- ments for Model 17T220	76809	Rod''L'' shape threaded rod to support deflection yoke hood assembly (2 reg'd) for Models 17T200, 17T201 & 17T202
 39153 Connector - 4 contact male connector for antenna cable 70153 Cord-Power cord and plug 70154 Cord-Power cord and plug 70163 Cushion-Rubber cushion (1/16" x 1" x ½" x ½") for kinescope and cradle support (4 reg d) 70114 Decal-Control panel function decal for mahogany or walnut instruments for Models 177201, 177202, 177211 70124 Decal-Trade mark decal for Models 177202, 177211 70125 Emblem-"RCA Victor" emblem for Models 177202, 76820 70126 First Lindre (1 reg d) for Models 177200, 177201 70127 First Lindre (1 reg d) for Models 177200, 177201 7012 First Lindre (1 reg d) for Models 177200, 177201 7012 First Lindre (1 reg d) for Models 177200, 177201 7012 First Lindre (1 reg d) for Models 177200, 177201 7013 7014 Decal-Channel marker escutcheon-gold 7015 7015 For First Lindre (1 set) for Model 177220 70160 Spring-Retaining spring for knobs 74963, 75464, 77265 701720 Spring-Retaining spring for knobs 74963, 75464, 77265 701720 Spring-Retaining spring for knobs 74963, 75464, 77265 701720 Spring-Retaining spring for knobs 74963, 75464, 77265 7014 Spring-Retaining spring for knobs 76930, 76593, 76594, 76595, 77261, 77264, 77264, 77263 70159 Knob-Channel selector knob-maroon-(inner) 70159 70159 Knob-Channel selector knob-maroon-(inner) 70150 Knob-Briet uning control knob-maroon-(inner) 70150 Knob-Briet uning control knob-maroon-(inner) 70150 Knob-Briet uning control knob-maroon-(inner) 70150 Knob-Briet kees control or vertical hold control volume control and phone switch knob-maroon-(inner) 70150 Knob-Channel selector knob-beige-(inner) 70150 Knob-Briet uning control knob-beige	15414	Connector—Single contact male connector for antenna cable (2 reg'd)	76810	Rod—''L'' shape threaded rod to support deflection yoke hood assembly (2 reg'd) for Models 17T211 & 17T220
71457 Cord - Power cord and plug panel or hanger bracket for Models 177211 & 177220 76818 Cushion - Rubber cushion (1/16" x 1" x ½" x ½") for kinescope and cradle support (4 reg'd) 74113 Screw - # 0.3 x 1½" trimit head screw to lock flexible straps for kinescope 77014 Decal - Control panel function decal for mahogany or walnut instruments for Models 177202, 177201, 177220 76821 Screw - # 0.3 x 1½" trimit head screw to lock flexible straps for kinescope 77014 Decal - Control panel function decal for mahogany or walnut instruments for Models 177202, 177201, 177202 76821 Screw - # 0.3 x 1½" trimit head screw to lock flexible straps for kinescope 77012 Emblem - "RCA Victor" emblem for Models 177202, 177202, 177201, 177202 76803 Spring - Channel marker escutcheon spring clip 77016 Foot - Felt foot (4 reg'd) for Models 177200, 177201 & 177202, 177201, 177202 76803 Spring - Retaining spring for knobs 76593, 76594, 72652 76806 Glass - Safety glass 76831 Spring - Retaining spring for knobs 76593, 76594, 72659 76893 Knob - Channel selector knob - maroon - (outer) 74936 Spring - Suspension spring (coil) for ground braid 76894 Knob - Fine tuning control knob - maroon - (outer) 76831 Strap - Croul strap (co3" x ½" soft copper strip) for 76895 Knob - Dine control and phone switch knob - maroon - (39153	Connector—4 contact male connector for antenna cable	76632	Screw-#8 x 5/8" hex head screw for mounting front
kinescope and cradle support (4 reg'd)76821Screw -#10 x 1/3" hex head screw to lock flexible straps for kinescope77014Decal-Control panel function decal for mahogany or wint instrumants for Models 177201, 17720176821Screw -#10 x 1/3" hex head screw to lock flexible straps for kinescope71984Decal-Trade mark decal for Model 17720277643Spring-Channel marker escutcheon spring clip77012Emblem-"RCA Victor" emblem for Models 177202, 177211, 177220776820Spring-Channel marker escutcheon spring clip75456Escutcheon-Channel marker escutcheon-gold77006Spring-Retaining spring for knobs 74963, 75464, 7726376806Glass-Safety glass7683776898, 76591, 76592, 7726376905Knob-Brightness control or vertical hold control knob -maroon-(outer)74936Spring-Retaining spring for knobs 76591, 76592, 7726376936Knob-Channel selector knob-maroon-(inner)74936Spring-Retaining spring for knobs 76591, 76592, 7726376936Knob-Channel selector knob-maroon-(inner)74936Spring-Suspension spring for kinescope socket leade screw-condel in drow switch knob-maroon-(inner)76937Knob-Channel selector knob-maroon-(inner)76830Strap-Cound strag (o05" x 1/3" eoft copper strip) for Models 177211 & 1722076937Knob-Drine control and power switch knob-maroon-(inner)76830Strap-Ground strag (o05" x 1/3" eoft coppe76937Knob-Channel selector knob-beige-(inner)76830Strap-Celulese wesher-gold-for knobs76938Knob-Channel selector knob-beige-(inner)76830Strap-Celulese wesher-gold-for knobs<	76818	Cord—Power cord and plug Cushion—Rubber cushion (1/16" x 1" x 3%" x 14") for	74113	Screw—#8-32 x 1" trimit head screw for door pull for Model 17T220
walnut instruments for Models 177201, 177202, 177211 & 17720176808Sleeve—Polysthylene sleeve for insulating high voltage lead—on support rod71984Decal—Trade mark decal for Model 17722076803Spring—Channel marker escutcheon spring clip77012Emblem—''RCA Victor'' emblem for Models 177202, 177211, 17722076808Spring—Channel marker escutcheon spring for safety glass retainers75456Escutcheon—Channel marker escutcheon—gold77006Spring—Retaining spring for deflection yok hood sup- port rods76806Glass—Safety glass76837Spring—Retaining spring for knobs 76591, 76595, 76596, 76597, 76596, 77261, 7726376807Knob—Brightness control or vertical hold control knob —maroon—(outer)76813Spring—Suspension spring for knoes oscket leads76897Knob—Fine tuning control knob—maroon—(inner)76813Strap—Flexible steel strap to secure kinescope76897Knob—Fine tuning control and phone switch knob—maroon—(inner)7683Strap—Flexible steel strap to secure kinescope76896Knob—Fine tuning control and phone switch knob—maroon—(inner)7683Support—Cradle support for kinescope76896Knob—Brightness control or vertical hold control knob75451Washer—Callulose washer—gold—for knobs76897Knob—Fine tuning control knob—maroon—(inner)7683Strap—Flexible steel strap to secure kinescope76597Knob—Erion eontrol and phone switch knob—maroon—(inner)7600Support—Cradle support for kinescope76597Knob—Erion eontrol and phone switch knob—maroon—(inner)7703Support—Cradle support for kinescope<	77014	kinescope and cradle support (4 reg'd) Decal—Control panel function decal for mahogany or	76821	Screw — #10 x 1%" hex head screw to lock flexible straps for kinescope
1194Decal—Trade mark decal for Model ITT22073643Spring—Channel marker escutcheon spring clip77012Emblem—"RCA Victor" emblem for Models 17T202, ITT211, 1TT22076820Spring—Formed spring for safety glass retainers75456Escutcheon—Channel marker escutcheon—gold77006Spring—Retaining spring for keflection yoke hood support rods76806Glass—Safety glass78637Spring—Retaining spring for knobs 74963, 75464, 7726576806Glass—Safety glass78837Spring—Retaining spring for knobs 76591, 76592, 77593, 76594, 76593, 76594, 76593, 776597, 776597, 77598, 77264, 7726476807Knob—Brightness control or vertical hold control knob —maroon—(outer)74936Spring—Suspension spring for kinescope socket leade76593Knob—Channel selector knob—maroon—(inner)72936Stop—Cabinet door stop for Model 17722076894Knob—Fire tuning control knob—maroon—(outer)76813Strap—Flexible stel strap to secure kinescope76896Knob—Fire tuning control knob—maroon—(inner)76836Strap—Flexible stel strap to secure kinescope76897Knob—Erightness control and phone switch knob—maroon—(inner)76836Support—Cradle support for kinescope76896Knob—Erightness control ard phone switch knob—maroon—74836Support—Calluse washer—gold—for knobs76597Knob—Erightness control ard phone switch knob—maroon—75457Washer—Feit washer—bige—bitween knob and chan- nel marker escutcheon76597Knob—Channel selector knob—beige—(inner)75458Washer—Feit washer—ebony—between knob and chan- nel marker escutcheon76592 </td <td>71004</td> <td>walnut instruments for Models 17T201, 17T202, 17T211 & 17T220</td> <td>76808</td> <td>Sleeve—Polyethylene sleeve for insulating high voltage lead—on support rod</td>	71004	walnut instruments for Models 17T201, 17T202, 17T211 & 17T220	76808	Sleeve—Polyethylene sleeve for insulating high voltage lead—on support rod
11012EmployColorFor Models17122,76820Spring—Formed spring for safety glass retainers75456Escutcheon—Channel marker escutcheon—gold7006Spring—Retaining spring for deflection yoke hood sup- port rods74889Foot—Felt foot (4 reg'd) for Models 17T200, 17T201 & 17T20230330Spring—Retaining spring for knobs 74963, 75464, 7726576806Glass—Safety glass76837Spring—Retaining spring for knobs 76591, 76592, 77264, 7726376806Glass—Safety glass76837Spring—Retaining spring for knobs 76591, 76593, 76594, 76595, 776597, 76596, 77597, 76596, 77597, 76596, 77697, 76596, 77261, 77264, 7726376895Knob—Brightness control or vertical hold control knob —maroon—(outer)74936Spring—Suspension spring for kinescope socket leads76897Knob—Fine tuning control knob—maroon—(inner)72936Stop—Cabinet door stop for Model 17722076897Knob—Dicture control, horizontal hold control or volume control and power switch knob—maroon—(inner)760376596Knob—Tone control and phone switch kneb—maroon—76836Washer—Callulose washer—gold—for knobs76597Knob—Erightness control or vertical hold control knob —beige—(outer)75457Washer—Felt washer—dark brown—between knob and chan- nel marker escutcheon76592Knob—Channel selector knob—beige—(inner)75458Washer—Felt washer—bony—between knob and chan- nel marker escutcheon76594Knob—Channel selector knob—beige—(inner)75500Washer—Felt washer for cabinet back mounting screws	77012	Decal—Trade mark decal for Model 17T220	73643	Spring—Channel marker escutcheon spring clip
75456Escutcheon—Channel marker escutcheon—gold71006Spring—Retaining spring for deflection yoke hood support rods74889Foot—Felt foot (4 reg'd) for Models 17T200, 17T201 & 17T20230330Spring—Retaining spring for knobs 74963, 75464, 7726576806Glass—Safety glass76837Spring—Retaining spring for knobs 76591, 76592, 77261, 77261, 7726374308Hinge—Cabinet door hinge (1 set) for Model 17T22074936Spring—Suspension spring for knobs 76593, 76594, 76597, 77261, 77261, 7726376595Knob—Brightness control or vertical hold control knob —maroon—(outer)74936Spring—Suspension spring for knobs 76593, 76594, 76597, 76597, 77261, 77261, 7726376597Knob—Channel selector knob—maroon—(inner)72936Stop—Cabinet door stop for Model 17T22076591Knob—Fine tuning control knob—maroon—(inner)76813Strap—Ground strap (.005" x ½" soft copper strip) for Models 17T211 & 17T220 ½" soft copper strip) for Models 17T211 & 17T22076597Knob—Tone control and phone switch kneb—maroon— (outer)768367545776594Knob—Channel selector knob—beige—(inner)75458Washer—Felt washer—gold—for knobs76594Knob—Channel selector knob—beige—(inner)75458Washer—Felt washer—beige—between knob and chan- nel marker escutcheon76594Knob—Channel selector knob—beige—(inner)75458Washer—Felt washer—beige—between knob and chan- nel marker escutcheon76594Knob—Channel selector knob—beige—(inner)75458Washer—Felt washer for cabinet back mounting screws76595Knob—Channel selector knob—beige—(inner)75458	11012	17T211, 17T220	76820	Spring—Formed spring for safety glass retainers
74889Foot—Felt foot (4 reg'd) for Models 17T200, 17T201 & 17T20230330Spring—Retaining spring for knobs 74963, 75464, 7726576806Glass—Safety glass763776597, 76597, 76597, 76597, 75698, 77261, 77264, 7726376595Knob—Brightness control or vertical hold control knob —marcon—(outer)74936Spring—Suspension spring for knobs 76594, 76595, 75697, 75698, 72691, 77264,	75456	Escutcheon—Channel marker escutcheon—gold	11006	port rods
76806Glass-Safety glass76837Spring-Retaining spring for knobs 76593, 76594, 76595, 76595, 76596, 77261, 77264, 7726374308Hinge-Cabinet door hinge (1 set) for Model 17T22074936Spring-Suspension spring for knobs 76593, 76594, 76595, 76596, 77261, 77264, 7726376595Knob-Brightness control or vertical hold control knob -maroon-(outer)74936Spring-Suspension spring for knobs 76593, 76594, 76595, 76596, 77261, 77264, 7726376593Knob-Brightness control or vertical hold control knob -maroon-(outer)74936Spring-Suspension spring for knobs 76594, 76595, 76597, 76596, 77261, 77264, 7726376593Knob-Channel selector knob-maroon-(inner)72936Stop-Cabinet door stop for Model 17T22076591Knob-Picture control, horizontal hold control or volume control and phone switch knob-maroon-(inner)76813Strap-Flexible steal strap to secure kinescope76597Knob-Dire control and phone switch knob-maroon-(inner)77003Support-Cradle support for kinescope76596Knob-Brightness control or vertical hold control knob -beige-(outer)75457Washer-Felt washer-gold-for knobs76594Knob-Channel selector knob-beige-(inner)75458Washer-Felt washer-beige-between knob and channel marker escutcheon76592Knob-Fine tuning control knob-beige-(outer)77266Washer-Felt washer-beige-between knob and channel marker escutcheon76594Knob-Picture control, horizontal hold control or volume control and power switch knob-beige-(inner)75500Washer-Felt washer for cabinet back mounting screws	74889	Foot-Felt foot (4 req'd) for Models 17T200, 17T201 & 17T202	30330 72845	Spring—Retaining spring for knobs 74963, 75464, 77265 Spring—Retaining spring for knobs 76591, 76592, 77262
74308Hinge-Cabinet door hinge (1 set) for Model 17T22076596, 76597, 76598, 77261, 77264, 7726376595Knob-Brightness control or vertical hold control knob -maroon-(outer)74936Spring-Suspension spring for kinescope socket leads76593Knob-Channel selector knob-maroon-(inner)72936Stop-Cabinet door stop for Model 17T22076591Knob-Fine tuning control knob-maroon-(outer)76813Strap-Flexible steel strap to secure kinescope74963Knob-Picture control, horizontal hold control or volume control and power switch knob-maroon-(inner)76813Strap-Cabinet door stop for Model 17T22076597Knob-Tone control and phone switch knob-maroon-(inner)77003Support-Cradle support for kinescope76596Knob-Brightness control or vertical hold control knob -beige-(outer)76836Washer-Cellulose washer-gold-for knobs76594Knob-Channel selector knob-beige-(inner)75458Washer-Felt washer-beige-between knob and channel marker escutcheon76592Knob-Channel selector knob-beige-(outer)77266Washer-Felt washer-beige-between knob and channel marker escutcheon76594Knob-Picture control, horizontal hold control or volume control and power switch knob-beige-(outer)77266Washer-Felt washer-beige-between knob and channel marker escutcheon76594Knob-Picture control, horizontal hold control or volume control and power switch knob-beige-(inner)77260Washer-Felt washer-beige-between knob and channel marker escutcheon76594Knob-Channel selector knob-beige-(inner)77260Washer-Felt washer for cabinet back mounting screws	76806	Glass-Safety glass	76837	Spring-Retaining spring for knobs 76593, 76594, 76595.
76595Knob-Brightness control or vertical hold control knob -marcon-(outer)76500Spring-Suspension spring (coil) for ground braid76593Knob-Channel selector knob-marcon-(inner)72936Stop-Cabinet door stop for Model 17T22076591Knob-Fine tuning control knob-marcon-(outer)76813Strap-Flexible steel strap to secure kinescope74963Knob-Picture control, horizontal hold control or volume control and power switch knob-marcon-(inner)76800Strap-Ground strap (.005" x ½" soft copper strip) for Models 17T211 & 17T22076597Knob-Brightness control and phone switch knob-marcon-(outer)77003Support-Cradle support for kinescope76596Knob-Brightness control or vertical hold control knob -beige-(outer)75457Washer-Felt washer-dark brown-between knob and channel marker escutcheon76594Knob-Channel selector knob-beige-(inner)75458Washer-Felt washer-bige-between knob and channel marker escutcheon76592Knob-Fine tuning control knob-beige-(outer)77266Washer-Felt washer-beige-between knob and channel marker escutcheon75464Knob-Picture control, horizontal hold control or volume control and power switch knob-beige-(inner)77266Washer-Felt washer for cabinet back mounting screws	74308	Hinge-Cabinet door hinge (1 set) for Model 17T220	74936	10596, 16591, 16598, 11261, 11264, 77263
76593Knob—Channel selector knob—maroon—(inner)72936Stop—Cabinet door stop for Model 17T22076591Knob—Fine tuning control knob—maroon—(outer)76813Strap—Flexible steel strap to secure kinescope74963Knob—Picture control, horizontal hold control or volume control and power switch knob—maroon—(inner)76600Strap—Ground strap (.005" x ½" soft copper strip) for Models 17T211 & 17T22076597Knob—Tone control and phone switch knob—maroon—(inner)77003Support—Cradle support for kinescope76596Knob—Brightness control or vertical hold control knob —beige—(outer)75457Washer—Felt washer—dark brown—between knob and channel marker escutcheon76594Knob—Channel selector knob—beige—(inner)75458Washer—Felt washer—beige—between knob and chan- nel marker escutcheon76592Knob—Fine tuning control knob—beige—(outer)77266Washer—Felt washer—ebony—between knob and chan- nel marker escutcheon75464Knob—Picture control, horizontal hold control or vol- ume control and power switch knob—beige—(inner)75500Washer—Felt washer for cabinet back mounting screws	76595	Knob—Brightness control or vertical hold control knob —maroon—(outer)	36580	Spring—Suspension spring for kinescope socket leads Spring—Suspension spring (coil) for ground braid
76591 Knob-Fine tuning control knob-maroon-(outer) 76813 Strap-Flexible steel strap to secure kinescope 74963 Knob-Picture control, horizontal hold control or volume control and power switch knob-maroon-(inner) 76807 Strap-Ground strap (.005" x 1/2" soft copper strip) for Models 177211 & 177220 76597 Knob-Tone control and phone switch knob-maroon-(inner) 77003 Support-Cradle support for kinescope 76596 Knob-Brightness control or vertical hold control knob -beige-(outer) 76836 Washer-Cellulose washer-gold-for knobs 76594 Knob-Channel selector knob-beige-(inner) 75458 Washer-Felt washer-beige-between knob and channel marker escutcheon 76592 Knob-Fire tuning control knob-beige-(outer) 77266 Washer-Felt washer-beige-between knob and channel marker escutcheon 75464 Knob-Picture control, horizontal hold control or volume control and power switch knob-beige-(inner) 77266 75464 Knob-Picture control, horizontal hold control or volume control and power switch knob-beige-(inner) 77260 75464 Knob-Picture control, horizontal hold control or volume control and power switch knob-beige-(inner) 75500 75500 Washer-Felt washer for cabinet back mounting screws	76593	Knob-Channel selector knob-marcon-(inner)	72936	Stop-Cabinet door stop for Model 17T220
74963Knob—Picture control, horizontal hold control or volume control and power switch knob—maroon—(inner)7600057218 17722076597Knob—Tone control and phono switch knob—maroon—(outer)77003Support—Cradle support for kinescope76596Knob—Brightness control or vertical hold control knob —beige—(outer)76836Washer—Cellulose washer—gold—for knobs76594Knob—Channel selector knob—beige—(inner)75458Washer—Felt washer—beige—between knob and channel marker escutcheon76594Knob—Fine tuning control knob—beige—(outer)77266Washer—Felt washer—ebony—between knob and channel marker escutcheon75464Knob—Picture control, horizontal hold control or volume control and power switch knob—beige—(inner)77266Washer—Felt washer—ebony—between knob and channel marker escutcheon75464Knob—Picture control, horizontal hold control or volume control and power switch knob—beige—(inner)75500Washer—Felt washer for cabinet back mounting screws	76591	Knob—Fine tuning control knob—maroon—(outer)	76813	Strap—Flexible steel strap to secure kinescope
76597 Knob-Tone control and phone switch knob-marcon- (outer) 7600 Support-Cracle support for kinescope 76596 Knob-Brightness control or vertical hold control knob -beige-(outer) 76836 Washer-Cellulose washer-gold-for knobs 76594 Knob-Channel selector knob-beige-(inner) 75457 Washer-Felt washer-dark brown-between knob and channel marker escutcheon 76592 Knob-Fine tuning control knob-beige-(outer) 75458 Washer-Felt washer-beige-between knob and chan- nel marker escutcheon 75464 Knob-Picture control, horizontal hold control or vol- ume control and power switch knob-beige-(inner) 75500 Washer-Felt washer for cabinet back mounting screws	74963	Knob—Picture control, horizontal hold control or vol- umecontrol and power switch knob—maroon—(inner)	77003	Models 177211 & 177220 Support Grade support for Models
76596 Knob-Brightness control or vertical held control knob 75457 Washer-Felt washer-dark brown-between knob and channel marker escutcheon 76594 Knob-Channel selector knob-beige-(inner) 75458 Washer-Felt washer-beige-between knob and channel marker escutcheon 76592 Knob-Fine tuning control knob-beige-(outer) 77266 Washer-Felt washer-beige-between knob and channel marker escutcheon 75464 Knob-Picture control, horizontal hold control or volume control and power switch knob-beige-(inner) 75500 Washer-Felt washer for cabinet back mounting screws	76597	Knob—Tone control and phone switch knob—marcon— (outer)	76836	Washer-Cellulose washer-gold-for knobs
76594 Knob-Channel selector knob-beige-(inner) 75458 Washer-Felt washer-beige-between knob and channel marker escutcheon 76592 Knob-Fine tuning control knob-beige-(outer) 77266 Washer-Felt washer-bony-between knob and channel marker escutcheon 75464 Knob-Picture control, horizontal hold control or volume control and power switch knob-beige-(inner) 75500 Washer-Felt washer for cabinet back mounting screws	76596	Knob—Brightness control or vertical hold control knob —beige—(outer)	75457	Washer-Felt washer-dark brown-between knob and channel marker escutcheon
76592 Knob—Fine tuning control knob—beige—(outer) 77266 Washer—Felt washer—ebony—between knob and channel marker escutcheon 75464 Knob—Picture control, horizontal hold control or volume control and power switch knob—beige—(inner) 75500 Washer—Felt washer for cabinet back mounting screws	76594	Knob—Channel selector knob—beige—(inner)	75458	Washer—Felt washer—beige—between knob and chan- nel marker escutcheon
15464 Knob—Picture control, horizontal hold control or volume control and power switch knob—beige—(inner) 75500 Washer—Felt washer for cabinet back mounting screws	76592	Knob-Fine tuning control knob-beige-(outer)	77266	Washer-Felt washer-ebony-between knob and chan-
	75464	Knob—Picture control, horizontal hold control or vol- ume control and power switch knob—beige—(inner)	75500	Washer—Felt washer for cabinet back mounting screws

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

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CHASSIS WIRING DIAGRAM



Figure 66-Chassis Wiring Diagram

133 --- 134 17T200, 17T201, 17T202, 17T211, 17T220

CIRCUIT SCHEMATIC DIAGRAM KCS72M2



All capacitance values less than 1 in MF and above l in MMF unless otherwise noted.

and with no signal input. Voltages should In KCS72MI V110 was chold within $\pm 20\%$ with 117 v. a-c supply. pin connections as 6AC7).

135-136 17T200, 17T201, 17T202, 17T211, 17T220

Figure 67-Circuit Schematic Diagram

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17T200, 17T201, 17T202, 17T211, 17T220

REPLACEMENT PARTS

	STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
		R-F UNIT ASSEMBLIES	75164	Rod—Actuating plunger rod (fibre) for fine tuning lin
		KR K8D	71476	Screw = #4-40 x 1/4" adjusting screw for L6, L7, L8, L9
1	75188	Board—Terminal board, 5 contact and ground	75177	Screw _ # 4-40 x 3/a" adjusting screw for L1, L2, L3, L4, L4
1	76845	Bracket—Vertical bracket for holding oscillator tube shield	75176	Screw # 4-40 x 7/16" adjusting screw for L5
	75201	Cable—75 ohm coax cable ($7\frac{1}{4}$) complete with coil	73640	Screw— # 4-40 x 7/16" adjusting screw for L52
		(W1, L50)	74575	Screw—#4-40 x .359" adjusting screw for L42
	76965	Capacitor—Ceramic, variable for fine tuning—plunger type (C25)	76519	Shaft—Channel selector shaft and plate
	71088	Capacitor—Headed Lead, 0.68 mmf. (C27)	76134	Shaft—Fine tuning shaft and cam
	76968	Capacitor-Ceramic, 3 mmf. (C4)	76962	Shield—Oscillator and converter sections shield—snap
	75200	Capacitor-Ceramic, 12 mmf. (C24)	76967	on type Shield - Tube shield for VI, V2
	45465	Capacitor-Ceramic, 15 mmf. (C3)	75088	Socket Tube socket 7 contact miniature, ceramic
	75196	Capacitor-Ceramic, 39 mmf. (C5)	15080	saddle-mounted
	75199	Capacitor-Ceramic, 270 mmf. (C12, C13, C20)	75191	Spacer—Insulating spacer for front plate
	75641	Capacitor—Ceramic, 390 mmf. (C10)	75163	Spring—Friction spring (formed) for fine tuning cam
	75166	Capacitor-Ceramic, 1500 mmf. (C6, C14, C15, C19)	30340	Spring—Hair pin spring for fine tuning link
	73748	Capacitor—Ceramic, 1500 mmf. (C18, C26)	74578	Spring—Retaining spring for adjusting screws
	75089	Capacitor—Ceramic, dual 1500 mmf. (C17A, C17B)	76961	Spring—Retaining spring for oscillator tube shield
1	73473	Capacitor-Ceramic, 5000 mmf. (C21)	73457	Spring—Return spring for fine tuning control
	75172	Capacitor—Tubular, steatite, a djustable, 0.65 - 1.2 mmf. (C7)	75180	Stator—Antenna stator complete with rotor, coils, capa itors (C20, C21) and resistors (R9, R10, R11) (S1-4, C2 C21, L32, L33, L34, L35, L36, L37, L38, L39, L40, L4
ł	71504	Capacitor—Ceramic, 0.68 mmf. (C23)		L42, L52, R9, R10, R11)
	75184	Capacitor—Ceramic, adjustable, 0.75-4 mmf., complete with adjusting stud (Cl)	77459	Stator—Converter stator complete with rotor, coils, capaditor, and resistors (S1-2, Cl0, Cl2, Ll2, Ll3, Ll4, Ll Ll6, Ll7, Ll8, Ll9, L20, L21, L45, R4, R5, Rl2)
1	75197	Capacitor—Ceramic, 6.8 mmf. (C8)	76963	Stator—Oscillator section stator complete with roto
	75189	Capacitor—Adjustable, 7-30 mmf. (C22)		C23 (S1-1, C3, C23, L1, L2, L3, L4, L5, L6, L7, L8, L L10, L11, L43)
	75174	Capacitor—Ceramic, trimmer, 50-75 mmf. (C11)	76964	Stator-R.F. amplifier stator complete with rotor, coil
	76143	Clip+-Tubular clip for mounting stand-off capacitors	10001	capacitors (C13) and resistor (R6) (S1-3, C13, L22, L2) L24, L25, L26, L27, L28, L29, L30, L31, L49, R6)
	73477	Coil—Choke coil (L51)	75170	Strip-Coil segment mounting strip-L.H. lower
	75202	Coil—Choke coil, .56 muh (L46)	75171	Strip—Coil segment mounting strip—L.H. upper—les
	75185	Coil—Converter plate loading coil (L44)		trimmer C7
	75182	Coil—Trimmer coil (11/2 turns) with adjustable induc-	75169	Strip—Coil segment mounting strip—R.H. center
	75100	tance core and capacitor stud (screw adjustment) for converter section (C9, L47)	75446	Stud—Capacitor stud—brass—#4-40x3/16" with 3/64 screw driver slot for trimmer coils L47, L48 and capac itor Cl uncoded and coded ''ER''
	15183	core and capacitor stud (screw adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L48, C16)	75447	Stud—Capacitor stud—brass—#4.40 x 3/16" with 3/64 screw driver slot for trimmer coils L47, L48 and capac itor Cl coded numerically and "Hi-Q"
1	76460	Contact—Test point contact	75173	Stud—#6-32 x 13/16" adjusting stud for trimmer C7
	76966	Core—Adjustable core for fine tuning capacitor	75181	Transformer—Converter transformer (T1)
	75162	Detent—Detent mechanism and fibre shaft	75607	Washer—Insulating washer (hex)
	73453	Form—Coil form for L45, L49	75190	Washer—Insulating washer (neoprene) for trimmer C
	75165	Link—Link assembly for fine tuning		
ģ	76518	Plate—Front plate and shaft bearing Resistor—Fixed, composition:-		CHASSIS ASSEMBLIES
J	503027	27 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R8)		RCS12
	503068	68 ohms, ±10%, ½ watt (R13)	76456	Bracket—Channel indicator lamp bracket
ĥ	504115	150 ohms, ±20%, ½ watt (R10)	16454	picture control
	503222	2200 ohms, ±10%, ½ watt (R6)	71496	Capacitor—Adjustable, mica, 5-70 mmf. (C115)
	503239	3900 ohms, ±10%, ½ watt (R9, R11)	33098	Capacitor—Ceramic, 10 mmf. (C127)
	503247	4700 ohms, ± 10%, ½ watt (R12)	33380	Capacitor-Ceramic, 12 mmf. (C162)
	502310	1000 ohms, $\pm 5\%$. $\frac{1}{2}$ watt (R3)	75450	Capacitor-Ceramic, 39 mmf. (C203)
	504310	10,000 ohms, ±20%, ½ watt (R2)	73664	Capacitor—Ceramic, 39 mmf. (C131)
	503322	22,000 ohms, ± 10%, ½ watt (R7)	76475	Capacitor-Mica, 68 mmf. (C164)
	504410	100,000 ohms. ±20%, ½ watt (R1, R4, R5)	76474	Capacitor-Mica, 82 mmf. (C142)
	14343	Retainer—Fine tuning shaft retaining ring	75437	Capacitor-Ceramic, 100 mmf. (C202)
	1			

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17T200, 17T201, 17T202, 17T211, 17T220

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION	STOCK No.	
76673	Capacitor—Ceramic, 220 mmf. (C136)	73553	Co
75248	Capacitor-Mica, 220 mmf. (C146)	75071	Co
39638	Capacitor-Mica, 270 mmf. (C130)	73792	Co
73091	Capacitor-Mica, 270 mmf. (C140, C178)		
76476	Capacitor—Mica, 330 mmf. (C169, C175)	73784	Co
39640	Capacitor-Mica, 330 mmf. (C143)	73551	Co
73094	Capacitor-Mica, 390 mmf. (C149)		
39644	Capacitor-Mica, 470 mmf. (C107, C121)	73557	Ca
76990	Capacitor—Geramic, dual 400 mmt. (CIIIA, CIIIB, CI19A, CI19B, C125A, C125B, C126A, C126B)	73786	C
73473	Capacitor—Ceramic, 4700 mmf. (CI18, CI20, CI22, CI23, C124, C186, C189)	76994	C
73960	Capacitor—Ceramic, 10,000 mmf. (C104, C187)	70707	<u> </u>
76991	Capacitor-Geramic, dual 10,000 mmf. (CI01A, CI01B)	13181	
74521	Capacitor-Electrolytic, 5 mtd., 50 volts (Clus)	76498	CF
75218	350 volts, 1 section of 5 mfd., 350 volts and 1 section of	73591	C.
	150 mfd., 50 volts (C185A, C185B, C185C)	75241	Co
75217	ClolB)	76442	Co
76987	Capacitor—Electrolytic, comprising 1 section of 80 mfd., 400 volts and 1 section of 10 mfd., 350 volts (C182A,	76441	Co
76070	Classifier Electrolytic comparising 1 section of 100 mfd	76640	Co
10910	400 volts, 1 section of 10 mfd., 350 volts and 1 section of	76011	Co
76479	Canacitar Tubular moulded namer oil impregnated.	71527	Co
10415	.00068 mfd., 600 volts (C171)	71526	Co
75643	Capacitor-Tubular, paper, oil impregnated, .001 mfd.,	75252	Co
76005	Congritter Tubular moulded paper oil impregnated	77124	Co
16995	.0012 mfd., 600 volts (C172)	71789	Co
76508	Capacitor—Tubular, paper, oil impregnated, .0015 mfd., 600 volts (Cl38)	75474	Co
77123	Capacitor—Tubular, moulded paper, oil impregnated, .0015 mfd., 1000 volts (C155)	75482	Co
73595	Capacitor-Tubular, paper, oil impregnated, .0022 mfd.,	74594	Co
73599	600 volts (C108, C154) Capacitor—Tubular, paper, oil impregnated, .0027 mfd.,	38853	Co
72919	600 volts (C112)	50367	Co
13010	1600 volts (C114)	75542	
73795	Capacitor—Tubular, paper, oil impregnated, .0033 mtd., 600 volts (C137, C139)	76975	Co
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C110, C151)	76444	Co
73808	Capacitor—Tubular, paper, oil impregnated, .0082 mfd.,	76974	Co
73561	Capacitor-Tubular, paper, oil impregnated, .01 mfd.,	76445	Co
73594	Capacitor—Tubular, moulded paper, oil impregnated,	76976	Co
	.01 mfd., 600 volts (C170)	71498	Co
74938	Capacitor Tubular, paper, oil impregnated, .012 mfd., 200 volts (C188)	76986	Co
73797	Capacitor—Tubular, paper, oil impregnated, .015 mfd., 600 volte (C129)	76985	Co
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd.,	74956	Cı
70700	400 volts (C167)	74839 73600	Fo Fu
13198	600 volts (C157)	37396	G
73810	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 1000 volts (C177)	76459	G
73811	Capacitor—Tubular, paper, oil impregnated, .027 mfd., 1000 volts (C176)	76830	H
73596	Capacitor-Tubular, paper, oil impregnated, .033 mfd.	76168	M
. 3330	1000 volts (C152)	76141	M

DESCRIPTION apacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (Cl45, Cl66) apacitor—Tubular, moulded paper, .047 mfd., 400 volts (C159, C160) apacitor—Tubular, paper, oil impregnated, .068 mfd., 400 volts (C156) apacitor—Tubular, paper, oil impregnated, 0.1 mfd., 200 volts (C132, C133) apacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C144, C150, C158, C165, C183) apacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C153, C173) apacitor—Tubular, paper, oil impregnated, 0.27 mfd., 200 volts (C174) apacitor—Tubular, paper, oil impregnated, 0.33 mfd., 200 volts (C135) apacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C168) hoke-Filter choke (L113) oil—Antenna matching coil (2 reg'd) (Part of T200) oil—Antenna shunt coil (L202) oil—Horizontal linearity coil complete with adjustable core (L108) oil—Width coil complete with adjustable core (L106) oil—Peaking coil (1.5 muh) (L107) oil—Peaking coil (36 muh) (L101) oil—Peaking coil (93 muh) (L104) oil—Peaking coil (250 muh) (L114) oil—Peaking coil (500 muh) (L102) oil—Peaking coil (1000 muh) (L105, R216) onnector—Anode lead connector complete onnector-Phono input connector (J101) connector—Single contact male connector for speaker cable onnector-Video connector (J102) onnector-2 contact male connector for power cord onnector—4 contact female connector for antenna transformer (J200) onnector—6 contact female connector for yoke lead (J103) onnector—6 contact male connector—part of deflection yoke (P103) ontrol-AGC control (R149) ontrol-Brightness control (R184) ontrol-Height control (R173) ontrol—Horizontal and vertical hold control (R170A, R170B) ontrol-Picture control (R137) ontrol-Vertical linearity control (R181) ontrol—Volume control and power switch (R109, S102) ore—Adjustable core and stud for FM trap 75449 over-Back cover for hi-voltage compartment over-Side cover for hi-voltage compartment ushion-Rubber cushion for deflection yoke hood astener—Push fastener for mounting tube socket 76453 use-0.25 amps., 250 volts (F101) Frommet—Rubber grommet for mounting tube socket 76453 rommet—Rubber grommet for 2nd. anode lead exit lood-Deflection yoke hood less rubber cushions lagnet—Focus magnet fagnet—Ion trap magnet (P.M. type)



Model 17T250DE

"Brett" Walnut, Mahogany Shown on Base



TELEVISION RECEIVERS MODELS 17T250DE, 17T261DE

Chassis No. KCS74 or KCS74M1

- Mfr. No. 274 -

SERVICE DATA

- 1952 No. T3 -

PREPARED BY RCA SERVICE CO., INC. FOR **RADIO CORPORATION OF AMERICA** RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

GENERAL DESCRIPTION

Models 17T250DE and 17T261DE are deluxe "17 inch" tele-

Features of the television unit are: full twelve channel coverage; "totem" r-f amplifier; intercarrier FM sound system; ratio detector; 40 mc picture i-f; improved picture brilliance;

> ELECTRICAL AND MECHANICAL SPECIFICATIONS RECEIVER ANTENNA INPUT IMPEDANCE

the use of an external record playing attachment.

Choice: 300 ohms balanced or 72 ohms unbalanced.

BCA TUBE COMPLEMENT

Tu	ibe Used	Function			
(1) RCA	6BQ7				
(2) RCA	6X8	.R-F Oscillator and Mixer			
(3) RCA	6AU6	lst Picture I-F Amplifier			
(4) RCA	6CB6	. 2nd Picture I-F Amplifier			
(5) RCA	A 6CB6	.3rd Picture I-F Amplifier			
(6) RCA	6CB6	.4th Picture I-F Amplifier			
(7) RCA	6CL6 (6AG7)	* Video Amplifier			
(8) RCA	6AU6	. 1st Sound I-F Amplifier			
(9) RCA	6AU6	.2nd Sound I-F Amplifier			
(10) RCA	6AL5	Ratio Detector			
(11) RCA	6AV6	lst Audio Amplifier			
(12) RCA	6AQ5	Audio Output			
(13) RCA	6CB6				
(14) RCA	6SN7GT	Sync Separator			
(15) RCA	6SN7GT. Vert. Sync Amplif	fier and Vert. Sweep Osc.			
(16) RCA	6AQ5	Vertical Sweep Output			
(17) RCA	6SN7GT	Horizontal Sync Amplifier			
(18) RCA	6SN7GTHorizontal Swe	ep Oscillator and Control			
(19) RCA	6BQ6GT	Horizontal Sweep Output			
(20) RCA	6W4GT	Damper			
(21) RCA	1B3-GT/8016	High Voltage Rectifier			
(22) RCA	. 17QP4	Kinescope			
*(Refer to Figure 79)					



Model 17T261DE "Ainsworth" Walnut, Mahogany, Blonde

vision receivers. The receivers are identical except for cabinets, and speakers.

PICTURE SIZE......146 square inches on a 17QP4 Kinescope

TELEVISION R-F FREQUENCY RANGE

All 12 television channels, 54 mc. to 88 mc., 174 mc. to 216 mc. Picture I-F Carrier Frequency
VIDEO RESPONSE
SWEEP DEFLECTION
FOCUSMagnetic
POWER SUPPLY RATING KCS74ll5 volts, 60 cycles, 190 watts
AUDIO POWER OUTPUT RATING KCS74
CHASSIS DESIGNATIONS KCS74 or KCS74M1In Models 17T250DE and 17T261DE *KCS74 (V110-6CL6)·KCS74M1 (V110-6AG7)
LOUDSPEAKERS
Model 17T250DE
Model 17T261DE
WEIGHT Shipping Width Height Depth

	1	Shipping	Width	F	leight	I	Depth
Model		Weight	Inches	; I	nches	I	nches
17T250DE 88 lbs.		105 lbs.	 21%		225/8		223⁄4
17T261DE102 lbs.		126 lbs.	 24		371/4		231/4

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pulsed picture A-G-C; A-F-C horizontal hold; stabilized vertical hold; compensated video gain control; noise saturation circuits; improved sync separator and clipper; four mc. band width for picture channel and reduced hazard high voltage supply. An auxiliary audio input jack is provided to permit

ELECTRICAL AND MECHANICAL SPECIFICATIONS

(Continued)

PICTURE INTERMEDIATE FREQUENCIES	OPERATING CONTROLS (Front Panel)
Picture Carrier Frequency	Channel Selector
Adjacent Channel Sound Trap	Picture)
Accompanying Sound Traps	Brightness {
Adjacent Channel Picture Carrier Trap	Picture Horizontal Hold
SOUND INTERMEDIATE FREQUENCIES	Sound Volume and On-Off Switch Control and Phono Switch
Sound Carrier Frequency	NON-OPERATING CONTROLS (not including r-f and i-f adjust- ments)
VIDEO RESPONSE	Picture Centeringtop chassis adjustment
TO OWN	Widthrear chassis adjustment
FOCUS	Heightrear chassis adjustment
CHEED DEPLECTION	Horizontal Linearity rear chassis screwdriver adjustment
Sweep Der Lection Magnetic	Vertical Linearityrear chassis adjustment
	Horizontal Driverear chassis screwdriver adjustment
SCANNING Interlaced, 525 line	Horizontal Oscillator Frequencyrear chassis adjustment
	Horizontal Oscillator Waveformbottom chassis adjustment
HORIZONTAL SWEEP FREQUENCY15,750 cps	Horizontal Locking Rangerear chassis adjustment
	Focustop chassis adjustment
VERTICAL SWEEP FREQUENCY60 cps	Ion Trap Magnettop chassis adjustment
	Deflection Coiltop chassis wing nut adjustment
FRAME FREQUENCY (Picture Repetition Rate)	AGC Controlrear chassis adjustment

HIGH VOLTAGE WARNING

OPERATION OF THIS RECEIVER OUTSIDE THE CABINET OR WITH THE COVERS REMOVED, IN-VOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES. WORK ON THE RECEIVER SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOROUGHLY FAMILIAR WITH THE PRE-CAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT SHIELD REMOVED.

KINESCOPE HANDLING PRECAUTIONS

DO NOT REMOVE THE RECEIVER CHASSIS. INSTALL, REMOVE OR HANDLE THE KINESCOPE IN ANY MANNER UNLESS SHATTERPROOF GOGGLES ARE WORN. PEOPLE NOT SO EQUIPPED SHOULD BE KEPT AWAY WHILE HANDLING KINESCOPES. KEEP THE KINESCOPE AWAY FROM THE BODY WHILE HANDLING.

The kinescope bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure. For this reason, the kinescope must be handled with more care than ordinary receiving tubes.

The large end of the kinescope bulb—particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure at any time. During service if the tube sticks or fails to slip smoothly into its socket, or deflecting yoke, investigate and remove the cause of the trouble. Do not force the tube. Refer to the Receiver Installation section for detailed instructions on kinescope installation. All RCA replacement kinescopes are shipped in special cartons and should be left in the cartons until ready for installation in the receiver.

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The following adjustments are necessary when turning the receiver on for the first time.

1. See that the TV-PH tone switch is in a "TV" position.

2. Turn the receiver "ON" and advance the SOUND VOL-UME control to approximately mid-position.

3. Set the STATION SELECTOR to the desired channel.

4. Adjust the FINE TUNING control for best pix and the SOUND VOLUME control for suitable volume.

5. Turn the BRIGHTNESS control fully counter-clockwise, then clockwise until a light pattern appears on the screen.

6. Adjust the VERTICAL hold control until the pattern stops vertical movement.

7. Adjust the HORIZONTAL hold control until a picture is obtained and centered.



Figure 1—Receiver Operating Controls

INSTALLATION INSTRUCTIONS

UNPACKING.—These receivers are shipped complete in cardboard cartons. The kinescope is shipped in place in the receiver.

Take the receiver out of the carton and remove all packing material.

Make sure that all tubes are in place and are firmly seated in their sockets.

Check to see that the kinescope high voltage lead clip is in place.

Plug a power cord into the 115 volt a-c power source and into the receiver interlock receptacle. Turn the receiver power switch to the "on" position, the brightness control fully clockwise, and the picture control counter-clockwise.

ION TRAP MAGNET ADJUSTMENT. — Set the ion trap magnet approximately in the position shown in Figure 2. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rolating it slightly around the neck of the kinescope for the brightest raster on the screen. Reduce the brightness control setting until the raster is slightly above average brilliance. Turn the focus control (shown in Figure 2) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches of this adjustment should be made with the brightness control at the maximum clockwise position with which good line focus can be maintained.



Figure 2—Yoke and Focus Magnet Adjustments

DEFLECTION YOKE ADJUSTMENT. — If the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Tighten the yoke adjustment wing screw.

PICTURE ADJUSTMENTS.—It will now be necessary to obtain a test pattern picture in order to make further adjustments. Connect the antenna transmission line to the receiver.

If the Horizontal Oscillator and AGC System are operating properly, it should be possible to sync the picture at this point. However, if the AGC control is misadjusted, and the receiver is overloading, it may be impossible to sync the picture.

If the receiver is overloading, turn R181 on the rear apron (see Figure 3) counter-clockwise until the set operates normally and the picture can be synced.

CHECK OF HORIZONTAL OSCILLATOR ALIGNMENT. — Turn the horizontal hold control to the extreme counterclockwise position. The picture should remain in horizontal sync. Momentarily remove the signal by switching off channel then back. Normally the picture will be out of sync. Turn the control clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 2 or 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control. Pull-in should occur before the control has been turned 120 degrees from the extreme counter-clockwise position. The picture should remain in sync for approximately 90



Figure 3—Rear Chassis Adjustments

8. Adjust the PICTURE and BRIGHTNESS controls for suitable picture contrast and brightness.

9. In switching from one channel to another, it may be necessary to repeat steps 4 and 8.

10. When the set is turned on again after an idle period it

should not be necessary to repeat the adjustment if the positions of the controls have not been changed. If any adjustment is necessary, step number 4 is generally sufficient.

11. If the positions of the controls have been changed, it may be necessary to repeat steps 2 through 8.

12. To use a record player, plug the record-player output CHANNEL cable into the PHONO jack on the rear apron, and set the TV-FINE TUNING PH tone switch to a "PH" position.

degrees of additional clockwise rotation of the control. At the extreme clockwise position, the picture should remain in sync and should not show a black bar in the picture.

If the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned. Skip "Alignment of Horizontal Oscillator" and proceed with "Focus Magnet Adjustment."

ALIGNMENT OF HORIZONTAL OSCILLATOR. — If in the above check the receiver failed to hold sync with the hold control at the extreme counter-clockwise position or failed to hold sync over 90 degrees of clockwise rotation of the control from the pull-in point, it will be necessary to make the following adjustments.

Horizontal Frequency Adjustment. — Turn the horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the T113 horizontal frequency adjustment at the rear of the chassis until the picture is just out of sync and the horizontal blanking appears as a vertical or diagonal black bar in the raster. Then turn the T113 core until the bar moves out of the picture leaving it in sync.

Horizontal Locking Range Adjustment. — Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the T113 rear core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C191A slightly clockwise. If less than 2 bars are present, adjust C191A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 or 3 bars are present.

Repeat the adjustments under "Horizontal Frequency Adjustment" and "Horizontal Locking Range Adjustment" until the conditions specified under each are fulfilled. When the horizontal hold operates as outlined under "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

If it is impossible to sync the picture at this point and the AGC system is in proper adjustment it will be necessary to adjust the Horizontal Oscillator by the method outlined in the alignment procedure on page 11. For field purposes paragraph "B" under Horizontal Oscillator Waveform Adjustment may be omitted.

FOCUS MAGNET ADJUSTMENT. — The focus magnet should be adjusted so that there is approximately three-eighths inch of space between the rear cardboard shell of the yoke and the flat of the front face of the focus magnet. This spacing gives best average focus over the face of the tube.

The axis of the hole through the magnet should be parallel with the axis of the kinescope neck with the kinescope neck through the center of the opening.

PIN-CUSHION CORRECTION. — Two pin-cushion correction magnets are employed to correct a small amount of pin-cushion of the raster due to the lens effect of the face of the kinescope. These magnets are mounted on small arms, one on each side of the kinescope as shown in Figure 2. The arms hinge in one plane on self tapping screws which act both as a hinge and an adjustment locking screw. When the magnets are swung towards the tube, maximum correction is obtained. Minimum correction is obtained when the arms are swung away from the tube. To adjust the magnets, loosen the two self tapping screws and position the magnets until the sides of the raster appear straight. Tighten the screws without shifting the position of the magnets. In some cases it may be necessary to twist or bend the magnet support arms to obtain the appearance of straight raster edges.

CENTERING ADJUSTMENT. — No electrical centering controls are provided. Centering is accomplished by means of a separate plate on the focus magnet. The centering plates include a locking screw which must be loosened before centering. Up and down adjustment of the plate moves the picture side to side and sidewise adjustment moves the picture up and down. If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

WIDTH. DRIVE AND HORIZONTAL LINEARITY ADJUST-MENTS. — Adjustment of the horizontal drive control affects the high voltage applied to the kinescope. In order to obtain the highest possible voltage hence the brightest and best focused picture, adjust horizontal drive trimmer C191B counterclockwise until the picture begins to "wrinkle" in the middle then clockwise until the "wrinkle" disappears.

Turn the horizontal linearity control L107 clockwise until the picture begins to "wrinkle" on the right and then counterclockwise until the "wrinkle" disappears and best linearity is obtained.

Adjust the width control L106 to obtain correct picture width. A slight readjustment of these three controls may be necessary to obtain the best linearity.

Adjustments of the horizontal drive control affect horizontal oscillator hold and locking range. If the drive control was adjusted, recheck the oscillator alignment.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENTS. — Adjust the height control (R199 on chassis rear apron) until the picture fills the mask vertically. Adjust vertical linearity (R211 on rear apron), until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. Adjust centering to align the picture with the mask.

FOCUS. — Adjust the focus magnet for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

Recheck the position of the ion trap magnet to make sure that maximum brightness is obtained.

Check to see that the yoke thumbscrew and the focus magnet mounting screws are tight.



Figure 4-R-F Oscillator Adjustments

CHECK OF R-F OSCILLATOR ADJUSTMENTS. — Tune in all available stations to see if the receiver r-f oscillator is adjusted to the proper frequency on all channels. If adjustments are required, these should be made by the method outlined in the alignment procedure on page 9. The adjustments for channels 2 through 12 are available from the front of the cabinet by removing the station selector escutcheon as shown in Figure 4. Adjustment for channel 13 is on top of the chassis.

AGC THRESHOLD CONTROL. — The AGC threshold control R181 is adjusted at the factory and normally should not require readjustment in the field.

To check the adjustment of the AGC Threshold Control, tune in a strong signal and sync the picture. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of R181. If the picture requires an appreciable portion of a second to reappear, or bends excessively, R181 should be readjusted.

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Turn R181 fully counter-clockwise. The raster may be bent slightly. This should be disregarded. Turn R181 clockwise until there is a very, very slight bend or change of bend in the picture. Then turn R181 counter-clockwise just sufficiently to remove this bend or change of bend.

If the signal is weak, the above method may not work as it may be impossible to get the picture to bend. In this case, turn R181 clockwise until the snow in the picture becomes more pronounced, then counter-clockwise until the best signal to noise ratio is obtained.

The AGC control adjustment should be made on a strong signal if possible. If the control is set too far clockwise on a weak signal, then the receiver may overload when a strong signal is received.

FM TRAP ADJUSTMENT. — In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the LS8 core on top of the antenna matching transformer for minimum interference in the picture.

CAUTION. — In some receivers, the FM trap L58 will tune down into channel 6 or even into channel 5. Needless to say, such an adjustment will cause greatly reduced sensitivity on these channels. If channels 5 or 6 are to be received, check L58 to make sure that it does not affect sensitivity on these two channels.

Replace the cabinet back and connect the receiver antenna leads to the cabinet back. Make sure that the screws holding it are up tight, otherwise it may rattle or buzz when the receiver is operated at high volume.

KINESCOPE SCREEN CLEANING. — The kinescope safety glass is held in place by four spring clips which may be removed from the back of the front panel. This permits removing the safety glass for cleaning without the necessity of removing the chassis and kinescope.

CHASSIS REMOVAL. — To remove the chassis from the cabinet for repair or installation of a new kinescope, remove the control knobs, the cabinet back, unplug the speaker cable, the kinescope socket, the antenna cable, the yoke and high voltage cable. Take out the chassis bolts under the cabinet. Withdraw the chassis from the back of the cabinet.

KINESCOPE HANDLING PRECAUTION. — Do not install, remove, or handle the kinescope in any manner, unless shatterproof goggles and heavy gloves are worn. People not so equipped should be kept away while handling the kinescope. Keep the kinescope away from the body while handling.

REMOVAL OF KINESCOPE.—To remove the kinescope from the cabinet, loosen the two nuts and disengage the rods alongside the kinescope. Remove the wing screw which holds the yoke frame to the cabinet. Remove the kinescope, the yoke frame with yoke and focus magnet as an assembly.

Handle this tube by the portion at the edge of the screen. Do not cover the glass bell of the tube with fingermarks as it will produce leakage paths which may interfere with reception. If this portion of the tube has inadvertently been handled, wipe it clean with a soft cloth moistened with "dry" carbon tetrachloride.

INSTALLATION OF KINESCOPE. — Wipe the kinescope screen surface and front panel safety glass clean of all dust and fingermarks with a soft cloth moistened with "Windex" or similar cleaning agent.

Replace the kinescope and chassis by reversal of the removing process. The kinescope should be installed so that the high voltage contact is to the right when looking at it from the rear of the cabinet. The magnet of the ion trap magnet should be to the left.

CABINET ANTENNA.—A cabinet antenna is provided in these receivers and the leads are brought out near the antenna terminal board. The cabinet antenna may be employed in place of the outdoor antenna in areas where the signals are strong and no reflections are experienced. ANTENNAS.—The finest television receiver built may be said to be only as good as the antenna design and installation. It is therefore important to select the proper antenna to suit the particular local conditions, to install it properly and orient it correctly.

If two or more stations are available and the two stations are in different directions, it may be possible to make a compromise orientation which will provide a satisfactory signal an all such channels.

If it is impossible to obtain satisfactory results on one or more channels, it may become necessary either to provide means for turning the antenna when switching channels or to install a separate antenna for one or more channels and to switch antennas when switching channels.

In some cases, the antenna should not be installed permanently until the quality of the picture reception has been observed on a television receiver. A temporary transmission line can be run between receiver and the antenna, allowing sufficient slack to permit moving the antenna. Then, with a telephone system connecting an observer at the receiver and an assistant at the antenna, the antenna can be positioned to give the most satisfactory results on the received signal. A shift of direction or a few feet in antenna position may effect a tremendous difference in picture reception.

REFLECTIONS. — Multiple images sometimes known as echoes or ghosts, are caused by the signal arriving at the antenna by two or more routes. The second or subsequent image occurs when a signal arrives at the antenna after being reflected off a building, a hill or other object. In severe cases of reflections, even the sound may be distorted. In less severe cases, reflections may occur that are not noticeable as reflections but that will instead cause a loss of definition in the picture.

Under certain extremely unusual conditions, it may be possible to rotate or position the antenna so that it receives the cleanest picture over a reflected path. If such is the case, the antenna should be so positioned. However, such a position may give variable results as the nature of reflecting surfaces may vary with weather conditions. Wet surfaces have been known to have different reflecting characteristics than dry surfaces.

Depending upon the circumstances, it may be possible to eliminate the reflections by rotating the antenna or by moving it to a new location. In extreme cases, it may be impossible to eliminate the reflection.

INTERFERENCE.—Auto ignition, street cars, electrical machinery and diathermy apparatus may cause interference which spoils the picture. Whenever possible, the antenna location should be removed as far as possible from highways, hospitals, doctors' offices and similar sources of interference. In mounting the antenna, care must be taken to keep the antenna rods at least ¼ wave length (at least 6 feet) away from other antennas, metal roofs, gutters or other metal objects.

Short-wave radio transmitting and receiving equipment may cause interference in the picture in the form of moving ripples. In some instances it may be possible to eliminate the interference by the use of a trap in the antenna transmission line. However, if the interfering signal is on the same frequency as the television station, a trap will provide no improvement.

WEAK PICTURE.—When the installation is near the limit of the area served by the transmitting station, the picture may be speckled, having a "snow" effect, and may not hold steady on the screen. This condition is due to lack of signal strength from the transmitter.

RECEIVER LOCATION.—The owner should be advised of the importance of placing the receiver in the proper location in the room.

The location should be chosen-

- -Away from bright windows and so that no bright light will fall directly on the screen. (Some illumination in the room is desirable, however.)
- -To give easy access for operation and comfortable viewing.
- -To permit convenient connection to the antenna.
- -Convenient to an electrical outlet.
- -To allow adequate ventilation.



Figure 5-Chassis Top View

CHASSIS BOTTOM VIEW

17T250DE, 17T261DE



Figure 6-Chassis Bottom View

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TEST EQUIPMENT.—To properly service the television chassis of this receiver, it is recommended that the following test equipment be available:

R-F Sweep Generator meeting the following requirements:

(a) Frequency Ranges

35 to 90 mc., 1 mc. to 12 mc. sweep width

170 to 225 mc., 12 mc. sweep width

(b) Output adjustable with at least .1 volt maximum.

(c) Output constant on all ranges.

(d) "Flat" output on all attenuator positions.

Cathode-Ray Oscilloscope. — For alignment purposes, the oscilloscope employed must have excellent low frequency and phase response, and should be capable of passing a 60-cycle square wave without appreciable distortion.

For video and sync waveform observations, the oscilloscope must have excellent frequency and phase response from 10 cycles to at least two megacycles in all positions of the gain control.

Signal Generator to provide the following frequencies with crystal accuracy.

(a) Intermediate frequencies

4.5 mc., 39.25 mc., 41.25 mc., 45.75 mc., 47.25 mc.

(b) Radio frequencies

Channel Number	Picture Carrier Freq. Mc.	Sound Carrier Freq. Mc.	Receiver R-F Osc. Freq. Mc.
2	55.25	59.75	101
3	61.25	65.75	107
4	67.25	71.75	113
5	77.25	81.75	
6	83.25	87.75	129
7			
8			227
9			233
10	193.25		239
11			
12			251
13			257

(c) Output of these ranges should be adjustable and at least .1 volt maximum.

Heterodyne Frequency Meter with crystal calibrator if the signal generator is not crystal controlled.

Electronic Voltmeter of Junior or Senior "VoltOhmyst" type and a high voltage multiplier probe for use with this meter to permit measurements up to 20 kv.

ORDER OF ALIGNMENT. — When a complete receiver alignment is necessary, it can be most conveniently performed in the following order:

(1)	Ant. Matching Unit	(6)	Picture I-F Traps
(2)	R-F Unit	(7)	Picture I-F Trans.
(3)	Ratio Detector	(8)	Sweep Alignment of I-F
(4)	Sound I-F Trans.	(9)	Horizontal Oscillator
(5)	Sound Take-Off Trans.	(10)	Sensitivity Check

ANTENNA MATCHING UNIT ALIGNMENT. — The antenna matching unit is accurately aligned at the factory. Adjustment of this unit should not be attempted in the customer's home since even slight misalignment may cause serious attenuation of the signal especially on channel 2. The r-f unit is aligned with a particular antenna matching transformer in place. If for any reason, a new antenna matching transformer is installed, the r-f unit should be realigned.

The F-M Trap which is mounted in the antenna matching unit may be adjusted without adversely affecting the alignment of the unit.

To align the antenna matching unit disconnect the lead from the F-M Trap L58 to the channel selector switch S5.

With a short jumper, connect the output of the matching unit through a 1000 mmf capacitor to the grid of the second pix i-f amplifier, pin 1 of V107.

Replace the cover on the matching unit while making all adjustments.

Remove the first pix i-f amplifier tube V106.

Connect the positive terminal of a bias box to the chassis and the potentiometer arm to the junction of R193 and R194. Set the potentiometer to produce approximately -6.0 volts of bias at the junction of R193 and R194.

Connect an oscilloscope to pin 2 of V110 (pin 4 if 6AG7 used) and set the oscilloscope gain to maximum.

Connect a signal generator to the antenna input terminals. Modulate the signal generator 30% with an audio signal.

Tune the signal generator to 45.75 mc. and adjust the generator output to give an indication on the oscilloscope. Adjust L59 in the antenna matching unit for minimum audio indication on the oscilloscope.

Tune the signal generator to $41.25\,$ mc, and adjust L60 for minimum audio indication on the oscilloscope.

Remove the jumper from the output of the matching unit.

Connect a 300 ohm $\frac{1}{2}$ watt composition resistor from L58 to ground, keeping the leads as short as possible.

Connect an oscilloscope low capacity crystal probe from L58 to ground. The sensitivity of the oscilloscope should be approximately 0.03 volts per inch. Set the oscilloscope gain to maximum.

Connect the r-f sweep generator to the matching unit antenna input terminals. In order to prevent coupling reactance from the sweep generator into the matching unit, it is advisable to employ a resistance pad at the matching unit terminals. Figure 11 shows three different resistance pads for use with sweep generators with 50 ohm co-ax output, 72 ohm co-ax output or 300 ohm balanced output. Choose the pad to match the output impedance of the particular sweep employed.

Connect the signal generator loosely to the matching unit antenna terminals.

Set the sweep generator to sweep from 45 mc. to 54 mc. With RCA type WR59A sweep generators, this may be accomplished by retuning channel number 1 to cover this range. With WR59B sweep generators this may be accomplished by retuning channel number 2 to cover the range. In making these adjustments on the generator, be sure not to turn the core too far clockwise so that it becomes lost beyond the core retaining spring.

Adjust L61 and L62 to obtain the response shown in Figure 12. L61 is most effective in locating the position of the shoulder of the curve at 52 mc. and L62 should be adjusted to give maximum amplitude at 53 mc. and above consistent with the specified shape of the response curve. The adjustments in the matching unit interact to some extent. Repeat the above procedure until no further adjustments are necessary.

Remove the 300 ohm resistor and crystal probe connections. Restore the connection between L58 and S5. Replace V106.

R-F UNIT ALIGNMENT. — An r-f unit which is operative and requires only touch up adjustments, requires no presetting of adjustments. For such units, skip the remainder of this paragraph. For units which are completely out of adjustment, preset all adjustments to the approximate center of their range with the following exceptions: Set C18 so that the screw head is approximately three-eighths of an inch above chassis. Set C11 near maximum capacity (one-quarter turn from tight). Do not change any of the adjustments in the antenna matching unit.

Disconnect the link from terminals "A" and "B" of T104 and terminate the link with a 39 ohm composition resistor.

The r-f unit is aligned with zero AGC bias. To insure that the bias will remain constant, take a clip lead and short circuit the r-f unit power terminal board terminal 3 to ground.

Connect the oscilloscope to the test point TP1 on top of the r-f unit. Set the oscilloscope gain to maximum.

Turn the receiver channel selector switch to channel 2.

Connect the output of the signal generator to the grid of the r-f amplifier, V2. To do this, remove the tube from the socket and fashion a clip by twisting one end of a small piece of wire around pin number 7. Replace the tube in the socket leaving the end of the wire protruding from under the tube. Connect the signal generator to this wire through a 1,500 mmf. capacitor.

Tune the signal generator to 43.5 mc. and modulate it 30% with a 400 cycle sine wave. Adjust the signal generator for maximum output.

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Adjust L65 on top of the r-f unit for minimum 400 cycle indication on the oscilloscope. If necessary, this adjustment can be retouched in the field to provide additional rejection to one specific frequency in the i-f band pass. However, in such cases, care should be taken not to adjust it so as to reduce sensitivity on channel 2.

Remove the wire clip from pin 7 of V2 and replace the tube and tube shield.

Set the channel selector switch to channel 8.

Turn the fine tuning control 30 degrees clockwise from the center of its mechanical range now and at all times when adjusting the oscillator frequency.

Adjust C2 for proper oscillator frequency, 227 mc. This may be done in several ways. The easiest way and the way which will be recommended in this procedure will be to use the signal generator as a heterodyne frequency meter and beat the oscillator against the signal generator. To do this, tune the signal generator to 227 mc. with crystal accuracy. Insert one end of a piece of insulated wire into the r-f unit through the hole provided for the adjustment for C11. Be careful that the wire does not touch any of the tuned circuits as it may cause the frequency of the r-f unit oscillator to shift. Connect the other end of the wire to the "r-f in" terminal of the signal generator. Adjust C2 to obtain an audio beat with the signal generator.

Note.—If on some units, it is not possible to reach the proper channel 8 oscillator frequency by adjustment of C2, switch to channel 13 and adjust L46 to obtain proper channel 13 oscillator frequency as indicated in the table on page 8. Then, switch to channel 12 and adjust L11 to obtain proper channel 12 oscillator frequency. Continue down to channel 8 adjusting the appropriate oscillator trimmer to obtain the proper frequency on each channel. Then again on channel 8, adjust C2 to obtain proper channel 8 oscillator frequency. Switch back to channel 13 and adjust L46 and back to channel 8 and adjust C2.

Set the T1 core for maximum inductance (core turned counterclockwise.)

Connect the sweep generator through a suitable attenuator as shown in Figure 11 to the input terminals of the antenna matching unit.

Connect the signal generator loosely to the antenna terminals.

Set the sweep generator to cover channel 8.

Set the oscilloscope to maximum gain and use the minimum input signal which will produce a useable pattern on the oscilloscope. Excessive input can change oscillator injection during alignment and produce consequent misalignment even though the response as seen on the oscilloscope may look normal.

Insert markers of channel 8 picture carrier and sound carrier, 181.25 mc. and 185.75 mc.

Adjust C9, C11, C15 and C18 for approximately correct curve shape, frequency, and band width as shown in Figure 13.

The correct adjustment of C18 is indicated by maximum amplitude of the curve midway between the markers. C15 tunes the r-f amplifier plate circuit and affects the frequency of the pass band most noticeably. C9 tunes the mixer grid circuit and affects the tilt of the curve most noticeably (assuming that C18 has been properly adjusted). C11 is the coupling adjustment and hence primarily affects the response band width.

Set the receiver channel switch to channel 6.

Adjust the signal generator to the channel 6 oscillator frequency 129 mc.

Turn the fine tuning control 30 degrees clockwise from the center of its mechanical range.

Adjust L5 for an audible beat with the signal generator as before.

Set the sweep generator to channel 6.

From the signal generator, insert channel 6 sound and picture carrier markers, 83.25 mc. and 87.75 mc.

Adjust L48, L50 and L53 for proper response as shown in Figure 13.

L50 tunes the r-f amplifier plate circuit and primarily affects the frequency of the pass band. L53 tunes the r-f amplifier grid and is adjusted to give maximum amplitude of the curve between the markers. L48 affects the tilt of the curve but not quite the same as C9 adjustment. When the circuits are correctly adjusted and L48 is rocked on either side of its proper setting, the high frequency (sound carrier) end of the curve appears to remain nearly fixed in amplitude while the picture carrier end tilts above or below this point.

Turn off the sweep and signal generators.

Connect the "VoltOhmyst" to the r-f unit test point TP1.

Adjust the oscillator injection trimmer C8 for -3.5 volts or at maximum if -3.5 volts cannot be reached. This voltage should fall between -2.5 and -5.5 volts on all channels when the alignment of all circuits is completed.

Turn the sweep generator and signal generator back on and recheck channel 6 response. Readjust L48, L50 and L53 if necessary.

Set the receiver channel selector switch to channel 8 and readjust C2 for proper oscillator frequency, 227 mc.

Set the sweep generator and signal generator to channel 8. Readjust C9, C11, C15 and C18 for correct curve shape, frequency and band width.

Turn off the sweep and signal generators, switch back to channel 6 and check the oscillator injection voltage at TP1 if C9 was adjusted in the recheck of channel 8 response.

If the initial setting of oscillator injection trimmer C8 was far off, it may be necessary to adjust the oscillator frequency and response on channel 8, adjust the oscillator injection on channel 6 and repeat the procedure several times before the proper setting is obtained.

Turn off the sweep generator and switch the receiver to channel 13.

Adjust the signal generator to the channel 13 oscillator frequency 257 mc.

Set the fine tuning control 30 degrees clockwise from the center of its mechanical range.

Adjust L46 to obtain an audible beat. Slightly overshoot the adjustment of L46 by turning the slug a little more in the same direction from the original setting, then reset the oscillator to proper frequency by adjusting C2 to again obtain the beat.

Check the response of channels 7 through 13 by switching the receiver channel switch, sweep generator and marker oscillator to each of these channels and observing the response and oscillator injection obtained. See Figure 13 for typical response curves. It should be found that all these channels have the proper shaped response with the markers above 80% response.

If the markers do not fall within this requirement, switch to channel 8 and readjust C9, C11, C15 and C18 as necessary.

Turn off the sweep generator and check the channel 8 oscillator frequency. If C2 has to be readjusted for channel 8, the principle of overshooting the adjustment and then correcting by adjusting L46 should be followed in order to establish the L/C ratio for the desired oscillator tracking.

Turn the receiver channel selector switch to channel 6. Adjust L5 for correct oscillator frequency, 129 mc.

Turn the sweep generator on and to channel 6 and observe the response curve. If necessary readjust L48, L50 and L53.

Switch the receiver, the sweep and signal generators to channel 2 and adjust Tl clockwise to a point where there is no change in the channel 2 response as Tl is turned.

Switch the receiver through channel 6 down through channel 2 and check for normal response curve shapes and oscillator injection voltage.

If excessive tilt in the same direction occurs on channels 2, 3 and 4, adjust C18 on channel 2 to overshoot the correction of this tilt, then switch to channel 6 and adjust L53 for maximum amplitude of curve between markers. This adjustment should produce "flat" response on the low channels if the other adjustments especially L48 are correct.

Likewise check channels 7 through 13, stopping on 13 for the next step.

With the receiver on channel 13, check the receiver oscillator frequency. Correct by adjustment of C2 if necessary.

Adjust the oscillator to frequency on all channels by switching the receiver and the frequency standard to each channel and adjusting the appropriate oscillator trimmer to obtain the audible beat. It should be possible to adjust the oscillator to the correct frequency on all channels with the fine tuning control in the middle third of its range. When employing WR39 calibrators to adjust the receiver oscillator, tune the calibrator to one-half the receiver oscillator frequency on channels 4 5 and 6 and to one-fourth the receiver oscillator frequency on channels 11, 12 and 13.

Channel Number	Picture Carrier Freq, Mc.	Sound Carrier Freq. Mc.	Receiver R-F Osc. Freq. Mc.	Channel Oscillator Adjustment
2	. 55.25	59.75		Ll
3	. 61.25	65.75	107	L2
4	. 67.25	71.75		L3
5	. 77.25	81.75		L4
6	. 83.25	87.75	129	L5
7	. 175.25		221	L6
8	.181.25	185.75		L7
9	.187.25	191.75	233	L8
10	. 193.25		239	L9
.11	.199.25	203.75	245	L10
12	.205.25			L11
13	. 211.25		257	C1

Remove the 39 ohm resistor from the link and reconnect the link to terminals "A" and "B" of T104.

RATIO DETECTOR ALIGNMENT. — Set the signal generator at 4.5 mc. and connect it to the second sound if grid, pin 1 of V102. Set the generator for 30% 400 cycle modulation.

As an alternate source of signal, the RCA WR39B or WR39C calibrator may be employed. If used, connect its output cable to the grid of the 4th pix i-f amplifier, pin 1 of V109. Set the frequency of the calibrator to 45.75 (pix carrier) and modulate with 4.5 mc. crystal. Also turn on the internal AM audio modulation. The 4.5 mc. signal will be picked off at T110A and amplified through the sound i-f amplifier.

Connect the "VoltOhmyst" to the junction of R110 and R150. Connect the oscilloscope to the junction of R111 and C113.

Tune the ratio detector primary, T102 top core for maximum DC output on the "VoltOhmyst." Adjust the signal level from the signal generator for 10 volts on the "VoltOhmyst" when finally peaked. This is approximately the operating level of the ratio detector for average signals.

Connect the "VoltOhmyst" to the junction of R111 and C113.

Tune the ratio detector secondary T102 bottom core for zero d-c on the ''VoltOhmyst.''

Adjust R139 for minimum AM indication on the oscilloscope. Retune the T102 bottom core to obtain zero d-c on the "Volt-Ohmyst."

Repeat the adjustment of T102 bottom core for zero d-c on the "VoltOhmyst" and R139 for minimum AM indication on the oscilloscope until both conditions are satisfied at the same settings of the adjustments. Final touches on these adjustments must be made with the input signal adjusted to produce 10 volts d-c on the "VoltOhmyst" at the junction of R110 and R150,

SOUND I-F ALIGNMENT. — Connect the sweep generator to the first sound i-f amplifier grid, pin 1 of V101. Adjust the generator for a sweep width of 1 mc. at a center frequency of 4.5 mc.

Insert a 4.5 mc. marker signal from the signal generator into the first sound i-f grid.

Connect the oscilloscope in series with a 10,000 ohm resistor to terminal A of T101.

Adjust T101 top and bottom cores for maximum gain and symmetry about the 4.5 mc. marker on the i-f response. The pattern obtained should be similar to that shown in Figure 14.

The output level from the sweep should be set to produce approximately 2.0 volt peak-to-peak at terminal A of T101 when the final touches on the above adjustment are made. It is necessary that the sweep output voltage should not exceed the specified values otherwise the response curve will be broadened, permitting slight misadjustment to pass unnoticed and possibly causing distortion on weak signals.

Connect the oscilloscope to the junction of R111 and C113 and check the linearity of the response. The pattern obtained should be similar to that shown in Figure 15.

SOUND TAKE-OFF ALIGNMENT. — Connect the 4.5 mc. generator in series with a 1,000 ohm resistor to terminal "C" of T110. The input signal should be approximately 0.5 volts. Short the fourth pix i-f grid to ground, pin 1 V109, to prevent noise from masking the output indication.

As an alternate source of signal the RCA WR39B or WR39C calibrator may be used. In such a case, disregard the above two paragraphs. Connect calibrator across link circuit, T104 A, B, and modulate 45.75 carrier with 4.5 mc. crystal.

Connect the crystal diode probe of a "VoltOhmyst" to the plate of the video amplifier, pin 6 of V110 (pin 8 if 6AG7 used).

Adjust the core of T110 for minimum output on the meter.

Remove the short from pin 1 V109 to ground, if used.

PICTURE I-F TRAP ADJUSTMENT. — Connect the i-f signal generator across the link circuit on terminals A and B of T104.

Connect the "VoltOhmyst" to the junction of R193 and R194. Obtain a 7.5 volt battery capable of withstanding appreciable current drain and connect the ends of a 1,000 ohm potentiometer across it. Connect the battery positive terminal to chassis and the potentiometer arm to the junction of R193 and R194.

Set the bias pot to produce approximately -1.0 volt of bias at the junction of R193 and R194.

Connect the "VoltOhmyst" to pin 2 of V110 (pin 4 of 6AG7). Set the signal generator to each of the following frequencies and adjust the corresponding circuit for minimum d-c output at pin 2 of V110. Use sufficient signal input to produce 1.0

volt	of	d-c	on	the	meter	when	the	final	adjustment	is made.
	39	25 r	nc.						T104 top o	core
	41	25 r	nc.						T105 botte	om core
	47	25 1	nc						T106 botte	om core

PICTURE I.F TRANSFORMER ADJUSTMENTS. — Set the signal generator to each of the following frequencies and peak the specified adjustment for maximum indication on the "Volt-Ohmyst." During alignment, reduce the input signal if necessary in order to produce 1.0 volt of d-c at pin 2 of V110 with -1.0 volt of i-f bias at the junction of R193 and R194.

43.7	mc							×	•		•									 . 1	F 1()9	
45.5	mc																è			 '	Tl	08	1
41.8	mc.		1											,						 '	T1)	07	

To align T105 and T106, connect the sweep generator to the first picture i-f grid, pin 1 of V106 through a 1,000 mmf ceramic capacitor. Shunt R136, R143 and terminals "A" and "F" of T109 with 330 ohm composition resistors. Set the i-f bias to -1.0 volt at the junction of R193 and R194.

Connect the oscilloscope to pin 2 of V110 (pin 4 of 6AG7).

Adjust T105 and T106 top cores for maximum gain and curve shape as shown in Figure 16. For final adjustments set the output of the sweep generator to produce 0.5 volts peakto-peak at the oscilloscope terminals.

To align T1 and T104, connect the sweep generator to the mixer grid test point TP2. Use the shortest leads possible, with not more than one inch of unshielded lead at the end of the sweep cable.

Set the channel selector switch to channel 4.

Connect a 180 ohm composition resistor from terminal B of T105 to the junction of R131 and C131. Connect the oscilloscope diode probe to terminal B of T105 and to ground.

Couple the signal generator loosely to the diode probe in order to obtain markers.

Cl22 is variable and is provided as a band width adjustment. Preset Cl22 to minimum capacity.

Adjust T1 top and T104 bottom for maximum gain at 43.5 mc. and with 45.75 mc. at 70% of maximum response.

Adjust C122 until 41.25 mc. is at 85% response with respect to the low frequency shoulder at approximately 41.9 mc. as shown in Figure 17.

Disconnect the diode probe, the 180 ohm and three 330 ohm resistors.

SWEEP ALIGNMENT OF PIX I-F. — Connect the oscilloscope to pin 2 of V110 (pin 4 where V110 is a 6AG7).

Adjust the bias potentiometer to obtain -6.0 volts of bias as measured by a "VoltOhmyst" at the junction of R193 and R194.

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Leave the sweep generator connected to the mixer grid test point TP2 with the shortest leads possible and with not more than one inch of unshielded lead at the end of the sweep cable. If these precautions are not observed, the receiver may be unstable and the response curves obtained may be unreliable.

Adjust the output of the sweep generator to obtain 3.0 volts peak-to-peak on the oscilloscope.

Couple the signal generator loosely to the grid of the first pix i-f amplifier. Adjust the output of the signal generator to produce small markers on the response curve.

Retouch T108 and T109 to obtain the response shown in Figure 18. Do not adjust T107 unless absolutely necessary. If T107 is adjusted too low in frequency it will raise the level of the 41.25 mc. sound i-f carrier and may create interference in the picture. It will also cause poor adjacent channel picture rejection. If T107 is tuned too high in frequency, the level of the 41.25 mc. sound i-f carrier will be too low and may produce noisy sound in weak signal areas.

Remove the oscilloscope, sweep and signal generator connections.

Remove the bias box employed to provide bias for alignment.

HORIZONTAL OSCILLATOR ADJUSTMENT. — Normally the adjustment of the horizontal oscillator is not considered to be a part of the alignment procedure, but since the oscillator waveform adjustment may require the use of an oscilloscope, it can not be done conveniently in the field. The waveform adjustment is made at the factory and normally should not require readjustment in the field. However, the waveform adjustment should be checked whenever the receiver is aligned or whenever the horizontal oscillator operation is improper.

Horizontal Frequency Adjustment.—Tune in a station and sync the picture. If the picture cannot be synchronized with the horizontal hold control R197B, then adjust the T113 frequency core on the rear apron until the picture will synchronize. If the picture still will not sync, turn the T113 waveform adjustment core (under the chassis) out of the coil several turns from its original position and readjust the T113 frequency core until the picture is synchronized.

Examine the width and linearity of the picture. If picture width or linearity is incorrect, adjust the horizontal drive control C191B, the width control L106 and the linearity control L107 until the picture is correct.

Horizontal Oscillator Waveform Adjustment.—The horizontal oscillator waveform may be adjusted by either of two methods. The method outlined in paragraph A below may be employed in the field when an oscilloscope is not available. The service shop method outlined in paragraph B below requires the use of an oscilloscope.

A.-Turn the horizontal hold control completely clockwise. Place adjustment tools on both cores of T113 and be prepared to make simultaneous adjustments while watching the picture on the screen. First, turn the T113 frequency core (on the rear apron) until the picture falls out of sync and one diagonal black bar sloping down to the right appears on the screen. Then, turn the waveform adjustment core (under the chassis) into the coil while at the same time adjusting the frequency core so as to maintain three or four diagonal black bars on the screen. Continue this procedure until the oscillator begins to motorboat, then turn the waveform adjustment core out until the motorboating just stops. As a check, turn the T113 frequency core until the picture is synchronized then reverse the direction of rotation of the core until the picture begins to fall out of sync with the diagonal bars sloping down to the right. Continue to turn the frequency core in the same direction. No more than three or four bars should appear on the screen. Instead, the horizontal oscillator should begin to motorboat. Retouch the adjustment of the T113 waveform adjustment core if necessary until this condition is obtained.

B.—Connect the low capacity probe of an oscilloscope to terminal C of T113. Turn the horizontal hold control onequarter turn from the clockwise position so that the picture is in sync. The pattern on the oscilloscope should be as shown in Figure 19. Adjust the waveform adjustment core of T113 until the two peaks are at the same height. During this adjustment, the picture must be kept in sync by readjusting the hold control if necessary. 17T250DE, 17T261DE

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This adjustment is very important for correct operation of the circuit. If the broad peak of the wave on the oscilloscope is lower than the sharp peak, the noise immunity becomes •poorer, the stabilizing effect of the tuned circuit is reduced and drift of the oscillator becomes more serious. On the other hand, if the broad peak is higher than the sharp peak, the oscillator is overstabilized, the pull-in range becomes inadequate and the broad peak can cause double triggering of the oscillator when the hold control approaches the clockwise position.

Remove the oscilloscope upon completion of this adjustment.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the T113 frequency core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C191A slightly clockwise. If less than 2 bars are present, adjust C191A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 or 3 bars are present.

Turn the horizontal hold control to the maximum clockwise position. Adjust the T113 frequency core so that the diagonal bar sloping down to the right appears on the screen and then reverse the direction of adjustment so that bar just moves off the screen leaving the picture in synchronization.

SENSITIVITY CHECK.—A comparative sensitivity check can be made by operating the receiver on a weak signal from a television station and comparing the picture and sound obtained to that obtained on other receivers under the same conditions. This weak signal can be obtained by connecting the shop antenna to the receiver through a ladder type attenuator pad.

RESPONSE CURVES.—The response curves shown on page 14 are typical though some variations can be expected.

The response curves are shown in the classical manner of presentation, that is with "response up" and low frequency to the left. The manner in which they will be seen in a given test set-up will depend upon the characteristics of the oscilloscope and the sweep generator. The curves may be seen inverted and/or switched from left to right depending on the deflection polarity of the oscilloscope and the phasing of the sweep generator.

NOTES ON R-F UNIT ALIGNMENT .- Because of the frequency spectrum involved and the nature of the device, many of the r-f unit leads and components are critical in some respects. Even the power supply leads form loops which couple to the tuned circuits, and if resonant at any of the frequencies involved in the performance of the tuner, may cause serious departures from the desired characteristics. In the design of the receiver these undesirable resonant loops have been shifted far enough away in frequency to allow reasonable latitude in their components and physical arrangement without being troublesome. When the r-f unit is aligned in the receiver, no trouble from resonant loops should be experienced. However, if the unit is aligned in a jig separate from the receiver, attention should be paid to insure that unwanted resonances do not exist which might present a faulty representation of r-f unit alignment.

A resonant circuit exists between the r-f tuner chassis and the outer shield box, which couples into the antenna and r-f plate circuits. The frequency of this resonance depends on the physical structure of the shield box, and the capacitance between the tuner chassis and the front plate. This resonance is controlled in the design by using insulating washers of proper thickness in the front plate to tuner chassis mounting. The performance of the tuner will be impaired if the proper washers are not used. Obviously then, if the r-f unit is removed for service, the washers should be replaced in the correct order when the unit is replaced.

ALIGNMENT PROCEDURE

THE DETAILED ALIGNMENT PROCEDURE BEGINNING ON PAGE 8 SHOULD BE READ BEFORE ALIGNMENT BY USE OF THE TABLE IS ATTEMPTED

Step No.	CONNECT SIGNAL GENERATOR TO	ECT SIGNAL CONNECT SWEEP GEN. AL GEN. SWEEP GEN. ATOR FREQ. GENERATOR TO MC. TO CONNECT HET. MC. TO MC. TO MC. TO CONNECT HET. FREQ. METER FREQ. METER FREQ. TO TO		CONNECT OSCILLOSCOPE TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO			
				ANTE	NNA MATCHING	UNIT A	LIGNMENT			
1	Do not adjust th 1000 mmf. to pin produce —6 volt	uis unit unle n 1 of V107. s.	ass fairly certain t Replace cover or	hat it reg matchin	uires adjustmen ig unit. Remove	t. Discons V106 fror	nect lead from L58 n socket. Connect	to S5. Connect outp bias box to junction	ut of matching unit th of R143 and R144 and	hrough d set to
2	Antenna termi- nals	45.75 mc. 30% mod.	Not used		Not used	-	TP102. Scope gain to max.	-	L59 for min. audio on scope	Fig. 7
3		41.25 mc. 30% mod.	••	-	**	-	**	-	L60 for min. audio on scope	Fig. 7
4	Antenna termi- nals loosely		Antennatermi- nals through pad	45 to 54 mc.		-	Scope a xtal probe to gnd.	Connect 300 ohms from L58 to gnd.	L61 and L62 to ob- tain response of Fig. 12	Fig. 7 Fig. 11 Fig. 12
					R-F UNIT AI	IGNMEN	IT			
5	If unit is comple Set T1 max, cou minal 3 to group	etely out of nterclockwi nd. Set fine	adjustment, prese se. Set C11 ¼ turr tuning 30 degrees	t all adju from me clockwise	stments to center ax. clockwise. Dis from mechanico	r of range connect l il center o	with following exc ink from T104 and of its range for all	ceptions. Set C18 so t terminate with 39 o oscillator adjustmen	hat head is ¾″ above hms. Shortr-f unit po ts.	chassis werter
6	Grid, pin 7 of V2through 1500 mmf.	43.5 mc. 30% mod.	Not used	-	Not used	—	TP1. Gain to maximum	Set r-f unit on channel 2	L65 for min. indica- tion on scope	Fig. 7 Fig. 10
7	Not used	-	Not used	-	Loosely to r-f unit oscillator	227 mc.	Not used	R-F unit on chan- nel 8	Cl for beat on het. freq. meter	Fig. 7
8	Antenna termi- nals loosely	181.25 and 185.75	Antennatermi- nals through pad	Channel 8	Not used		TP1. Gain to maximum		C9, C11, C15 and C18 for response shown in Fig. 13	Fig. 7 Fig. 1
9	Not used	- 1	Not used		Loosely to r-f unit oscillator	129 mc.	Not used	R-F unit on chan- nel 6	L5 for beat on het. freq. meter	Fig. 8
10	Antenna termi- nals loosely	83.25 and 87.75	Antennatermi- nals through pad	Channel 6	Not used	-	TP1. Gain to maximum	••	L48, L50 and L53 for response shown in Fig. 13	Fig. 7 Fig. 13
11	Not used	-	Not used	-	Not used	-	Not used	On channel 6. Con- nect ''VoltOhmyst'' to TP1	C8 for -3.5 volts on meter	Fig. 7
12	Antenna termi- nals loosely	83.25 and 87.75	Antenna termi- nals through pad	Channel 6	Not used	-	TP1. Gain to maximum	R-F unit on chan- nel 6	Check response. Re- adjust L48, L50 and L53 if necessary	Fig. 7 Fig. 1
13	Not used	-	Not used		Loosely to r-f unit oscillator	227 mc.	Not used	R-F unit on chan- nel 8	Cl for beat on het. freg. meter	Fig. 7
14	Antenna termi- nals loosely	181.25 and 185.75	Antennatermi- nals through pad	Channel 8	Not used	-	TP1. Gain to maximum	**	Check response ad- just C9, C11, C15 and C18 if neces- sary	Fig. 7
15	If C9 was readju	isted in step	14, repeatstep 11,	step 13 an	d step 14 until the	conditio:	ns specified in each	step are fulfilled wit	hout additional adjus	tments
16	Not used	-	Not used	-	Loosely to r-f unit oscillator	257 mc.	Not used	Rec. on channel 13	L46 for beat on het. freq. meter. Over- shoot L46 slightly and adjust Cl for beat.	Fig. 7
17	Antenna termi- nals loosely	211.25 215.75	Antenna termi- nals through pad	Channe 13	l Not used	-	TP1. Gain to maximum	Rec. on channel 13 ''VoltOhmyst'' on TP1	Check to see that response is correct and -3.0 volts of osc. injection is present	Fig. 1
18		205.25 209.75	- +1	Channel 12	Not used	-		Rec. on channel 12	11	Fig. 1
19	11	199.25 203.75	11	Channe	1 "	- 1	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Rec. on channel 11	11	Fig. 1
20	,,	193.25	••	Channel 10	1	-		Rec. on channel 10		Fig. 1
21	,,	187.25		Channe	1 ''	-		Rec. on channel 9		Fig. 1
22		181.25	. "	Channe	1 **	- 1	,,	Rec. on channel 8		Fig. 1
23	,,	175.25	11	Channe 7	1	-		Rec. on channel 7		Fig. 1
24	If the response the low channel	of any cha	nnel (steps 17 thro ain correct respon	ugh 23) is	s below 80% at ei	ther mar	ker, adjust C9, C1	I, C15 and C18 as ne	cessary to pull respon	se up o
25	Repeat step 13. 1	If the oscille	itor is off frequence	y oversho	ot the adjustmer	nt of Cl a	nd correct by adju	sting L46.		
26	Repeat steps 16	through 25	until all adjustm	ents are c	btained.					1 -
27	Not used	-	Not used	-	Loosely to r-funit oscillator	129 mc	Not used	Rec. on channel 6	L5 for beat on het. freg. meter	. Fig. 7
28	Antenna termi nals loosely	- 83.25 87.75	Antennatermi- nals through pad	Channe 6	Not used	-	TP1. Gain to maximum	Rec. on channel 6 ''VoltOhmyst'' on TPl	Check to see that response is correct and -3.0 volts of osc. injection is present	t Fig. 1 t Fig. 1
29		77.25 81.75	**	Channe 5	.1	-	,,	Rec. on channel 5	,,	Fig.
30		67.25 71.75	,	Channe 4	.,	-	.,	Rec. on channel 4		Fig.
31	,,	61.25		Channe	1 .,	-	11	Rec. on channel 3		Fig.

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ALIGNMENT PROCEDURE

ALIGNMENT D	Ì
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Step No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT HETERODYNE FREQ. METER TO	HET. METER FREQ. MC.	CONNECT OSCILLOSCOPE TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER
32	.,	55.25	11	Channel	11	-		Rec. on channel 2		Fig. 13
33	If excessive tilt in nel 6 and adjust	the same of L53 for mo	direction occurs or ux. amplitude of r	n channel esponse b	s 2, 3 and 4, adjus etween carrier m	st Cl8 on c arkers.	hannel 2 to oversh	oot the correction of	this tilt then switch to	o chan-
34	Check r-f respon	se and osci	illator injection of	n channel	s 7 through 13 ste	eps 23 back	a up through step	17 stopping on chan	nel 13 for the next step	p.
35	Not used	-	Not used	-	Loosely coupled to r-f oscillator	257 mc.	TP1. Gain to maximum	Rec. on channel 13	Cl for beat on het. freq. meter	Fig. 7
36		-	••			251 mc.	**	Rec. on channel 12	Lll as above	Fig. 7
37		-		_		245 mc.		Rec. on channel 11	L10 as above	Fig. 7
38				-	,1	239 mc.		Rec. on channel 10	L9 as above	Fig. 7
39	, II	-		_	,,	233 mc.		Rec. on channel 9	L8 as above	Fig. 7
40		-		-		227 mc.	0	Rec. on channel 8	L7 as above	Fig. 7
41		-			**	221 mc.		Rec. on channel 7	L6 as above	Fig. 7
42	11	-				129 mc.		Rec. on channel 6	L5 as above	Fig. 7
43				-	31	123 mc.		Rec. on channel 5	L4 as above	Fig. 7
44		-		-		113 mc.		Rec. on channel 4	L3 as above	Fig. 7
45				_	**	107 mc.		Rec. on channel 3	L2 as above	Fig. 7
46				-	11	101 mc.		Rec. on channel 2	Ll as above	Fig. 7
47	Repeat steps 35 t	hrough 46	as a check. On co	mpletion.	remove 39 ohm	resistor ar	d reconnect link t	o terminals A and B	of T104.	
48	Grid 2nd Snd.	4.5 mc.	RATIO DI	TECTOR	, SOUND I-F AN	d sound —	TAKE-OFF ALIG	NMENT	T102 top core for	Fig. 9
	or WR39B or C connect to grid 4th pix I-F (pin 1, V109.)	400 cy. mod. or 45.75 mc. mod. by 4.5 mc. and 400 cy.					voice coil. Vol- ume control set for max. vol- ume.	junction of R110 and R114. Set C226 for min. ca- pacity. Set signal gen. to give	max. d-c on meter. T102 bottom core for min. audio on the oscilloscope.	Fig. 10
49				-	"	_		"VoltOhmyst" to C)13. If the meter r volts, adjust C226 f and readjust T102 (on scope. Repeat s all conditions are so	junction R112 and eads more than ± 1.5 or zero on the meter bot.) for min. output teps 48 and 49 until atisfied.	Fig. 9 Fig. 10
50	Sig. Gen. to 1st Snd. I-F	4.5 mc.	lst Sound I-F grid (pin 1, V101)	4.5 mc.		_	In series with 10,000 ohms to terminal Å, of T101.	Sweep output re- duced to provide 2 v p-p on scope.	T101 top and bot. cores for max. gain and symmetry at 4.5 mc.	Fig. 9 Fig. 10 Fig. 14
51	**				U.	-	Junction of R112 and C113	Check for symmetry form (positive and p	rical response wave negative).	Fig. 15
52	Sig. Gen. in se- ries with 1000 ohmsto T110-C or WR39 across T104 A and B.		Not used	-				"VoltOhmyst" xtal probe to pin 8, V110. If sig. gen. is used short pin 1, V109 to ground.	Adjust T110 for minimum reading on "VoltOhmyst".	Fig. 9
				PIC	TURE I-F AND T	RAP ADJ	USTMENT			
53	Not used	-	Not used	-	Not used	-	Not used	Connect bias box to R144 and to gnd. A on "VoltOhmyst" a	junction of R143 and djust to give — 1.0 v t TP101.	
54	Sig. Gen. across T104 A and B	39.25 mc.				-		"VoltOhmyst" to TP102. Gen. output to give -1.0 volt d-c.	T104 top core to give min. d-c on meter.	Fig. 9
55		41.25 mc.	••	-		-	۰۰,		T105 bot. for min.	Fig. 10
56	19	47.25 mc.	**	-]	,,		T106 bot. for min.	Fig. 10
57		43.7 mc.		-		-		Sig. Gen. outputto give -1.0 V d-c at	T109 for max.	Fig. 7
58		45.5 mc.		_	11	_ 1		,,	T108 for man	Fig. 0
59		41.8 mc							T107 fe	1 1g. 9
60	First nin i fant 3	Varian	Findation	40.			-		TIOT for max.	1 1g. 9
00	(pin I, V106) loosely.	See Fig. 16	pin 1, V106 through 1000 mmf.	40 to 48 mc.		. –	To test point TP102	Shunt R141, R149 and terminals A and F of T109 with 330 ohms, 0.5 v p-p on scope.	Adjust T105 and T106 top cores for max. gain and re- sponse shown in Fig. 16.	Fig. 9 Fig. 16
61	Connected loosely to diode probe.	Various See Fig. 17	Mixer grid test point TP2 with short lead.	40 to 48 mc.			Scope diode probeto T105-B and to gnd.	Rec. on chan. 4. Connect 180 ohms from T105-B to junction R135 and C132. Upon com- pletion disconnect scope and shunt- ing resistors.	Set C221 to min. Adjust T1 top and T104 bot. for max. gain at 43.5 mc. at 70%. Adjust C221 until 41.25 mc. is at 80%.	Fig. 9 Fig. 17
62	Connected loosely to grid of 1st pix i-f.	Various See Fig. 18	,,				Connect scope to TP102.	"VoltOhmyst" to TP101. Set bias box for -6.0 volts on the meter. Set sweep output to produce 3.0 volts p-p on scope.	Retouch T108 and T109 to obtain re- sponse shown in Fig. 18. Do not ad- just T107 unless absolutely neces- sary.	Fig. 18

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Figure 10—Bottom Chassis Adjustments

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Figure 19—Horizontal Oscillator Waveforms

TEST PATTERN PHOTOGRAPHS



Figure 20—Normal Picture

Figure 21-Focus Magnet and Ion Trap Magnet Misadjusted $\rightarrow \rightarrow$





Figure 22—Horizontal Linearity Control Misadjusted (Picture Cramped in Middle) -----

Figure 23-Width Control Misadjusted -





Figure 24—Horizontal Drive **Control** Misadjusted ----

> Figure 25—Transients ***





Figure 26-Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position -Just Before Pulling Into Sync -----

Figure 27-Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position



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(1) T113 incorrectly tuned.

(2) R226, R227 or R197B defective.

SERVICE SUGGESTIONS

Following is a list of symptoms of possible failures and an indication of some of the possible faults:	(1) Impro
	trap r
NO RASTER ON KINESCOPE:	(2) Detect
 Incorrect adjustment of ion trap magnet. Magnet reversed either front to back or top to bottom. 	RASTER
(2) V116 or V117 inoperative. Check waveforms on grids and plates.	(1) T110 (2) Sound
(3) No high voltage—if horizontal deflection is operating as evidenced by the correct waveform on terminal 1 of high voltage transformer, the trouble can be isolated to the 1B3GT circuit. Either the T114 high voltage winding is open, the 1B3GT tube is defective or its filament circuit is open.	check (3) Audic (4) Speat SIGNAL
(4) V110 circuit inoperative—Refer to schematic and wave- form chart.	(1) AGC
(5) Damper tube (V119) inoperative.	(Z) VIII and r
(6) Defective kinescope.	una j
(7) R216 open.	SIGNAL
(8) No receiver plate voltage—filter capacitor shorted—or filter	(1) Check
choke open.	(2) Integr
	(3) V113
NO VERTICAL DEFLECTION:	(4) Cas
 V114B or V115 inoperative. Check voltage and waveforms on grids and plates. 	V114.
(2) T111 open.	SIGNAL
(3) Vertical deflection coils open.	(1) T113
•	(2) V112
SMALL RASTER:	wave
(1) Low Plus B or low line voltage	(3) T113
(2) V117 defective	(4) C183, defec
	(5) If ho
DOOR VERTICAL LINEARITY.	justec
(1) If a live transferred arrest change V115	R232.
(1) If adjustments cannot correct, change v115.	SOUND
(2) Venical output transformer 1111 detective.	
(3) VII4B defective—check voltage and wavelonns on grid and plate.	(I) Pictur and V
(4) C176, C180, C181, C178, C177 or C182 detective.	(2) Bad a
(5) Low plate voltage—check rectifiers and capacitors in sup- ply circuits.	PICTURE
(6) If height is insufficient, try changing V114.	(1) CR10
	(2) Peaki
POOR HORIZONTAL LINEARITY:	(3) Make
(1) If adjustments do not correct, change V117, or V119.	(4) R-F o
(2) T114 or L107 defective.	(-,
(3) C205 or C206 defective.	PICTURE
	(1) R-F o
WRINKLES ON SIDE OF RASTER:	(2) Open
(1) C208 defective.	(3) This
(2) Defective yoke.	anoth

PICTURE OUT OF SYNC HORIZONTALLY: (1) AGC control R181 misadjusted. (2) If regular sections at the left picture are displaced change V117.

OIDAL OR NON SYMMETRICAL RASTER:

oper adjustment of centering of focus magnet or ion mαgnet.

tive yoke.

AND SIGNAL ON KINESCOPE BUT NO SOUND:

defective.

d i-f, ratio detector or audio amplifier inoperative— V101, V102, V103 and their socket voltages. system defective. ker defective.

AT KINESCOPE GRID BUT NO SYNC:

control R181 misadjusted.

inoperative. Check voltage and waveforms at its grid plate.

ON KINESCOPE GRID BUT NO VERTICAL SYNC:

k V114B and associated circuit.

rating network inoperative-Check.

or V114A defective or associated circuit defective.

current, grid emission or grid cathode leakage in Replace.

ON KINESCOPE GRID BUT NO HORIZONTAL SYNC:

misadjusted-readjust as instructed on page 11. or V113 inoperative-check socket voltages and eforms.

defective.

C191A, C190, C194, C195, C197, C196, C198 or C199 ctive.

prizontal speed is completely off and cannot be aded check R226, R227, R197B, R228, R229, R230 and

AND RASTER BUT NO PICTURE OR SYNC:

re, detector or video amplifier defective—check CR101 V110--check socket voltages. contact to kinescope cathode.

E STABLE BUT POOR RESOLUTION:

01 or V110 defective.

king coils defective—check resistance.

e sure that the focus control operates on both sides of er focus.

and I-F circuits misaligned.

E SMEAR:

or 1-F circuits misaligned.

n peaking coil.

trouble can originate at the transmitter-check on ther station.

PICTURE JITTER:

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- (3) Vertical instability may be due to loose connections or noise.
- (4) Horizontal instability may be due to unstable transmitted sync.

RASTER BUT NO SOUND, PICTURE OR SYNC:

- (1) Defective antenna or transmission line.
- (2) R-F oscillator off frequency.
- (3) R-F unit inoperative-check V1, V2.

DARK VERTICAL LINE ON LEFT OF PICTURE:

- Reduce horizontal drive and readjust width and horizontal linearity.
- (2) Replace V117.

LIGHT VERTICAL LINE ON LEFT OF PICTURE:

(1) V119 defective.

PICTURE I-F RESPONSE.—At times it may be desirable to observe the individual i-f stage response. This can be achieved by the following method:

For T107, T108 or T109, shunt all if transformers with a 330 ohm carbon resistor except the one whose response is to be observed.

Connect a wide band sweep generator to the second pix i-f grid and adjust it to sweep from 38 mc. to 48 mc.

Connect the oscilloscope to test point TP102 and observe the overall response. The response obtained will be essentially that of the unshunted stage.

To see the response of transformers T1, T104 and T105, T106, follow the instructions given on page 10.

Figures 28 through 36 show the response of the various stages obtained in the above manner. The curves shown are typical although some variation between receivers can be expected. Relative stage gain is not shown.



Figure 28—Overall Pix I-F Response



Figure 31—Response of T107 Pix I-F Transformer



Figure 34—Video Response at Average Contrast

44.5MC. 45.75MC. 41.25MC.

RESPONSE PHOTOGRAPHS Taken from RCA WO58A Oscilloscope

Figure 29—Response of T1.T104 Pix I-F Transformers



Figure 32—Response of T108 Pix I-F Coil



Figure 35—Video Response (100 KC Square Wave)



Figure 30—Response of T105-T106 Pix I-F Transformer



Figure 33—Response of T109 Pix I-F Coil



Figure 36—Video Response (60 Cycle Square Wave)





Taken from RCA WO58A Oscilloscope

Grid of Video Amplifier (Pin 2 of V110) (6CL6) (Pin 4 of V110) (6AG7)

Figure 37—Vertical (Oscilloscope Synced to ½ of Vertical Sweep Rate) (6 Volts PP)

Figure 38—Horizontal (Oscilloscope Synced to ½ of Horizontal Sweep Rate) (6 Volts PP)



Plate of Video Amplifier (Pin 6 of V110) (6CL6) (Pin 8 of V110) (6AG7)

Voltage depends on picture

Figure 39—Vertical (105 Volts PP)

Figure 40—Horizontal (105 Volts PP) →→→







Grid of Sync Separator (Pin 4 of V113) (6SN7)

Voltage depends on picture Figure 41—Vertical (30 Volts PP)

Figure 42—Horizontal (30 Volts PP) →→→





Plate of Sync Separator (Pin 5 of V113) (6SN7) Voltage depends on picture Figure 43—Vertical (33 Volts PP)

Figure 44—Horizontal (8 Volts' PP)





Grid of Vertical Sync Amp. (Pin 4 of V114A) (6SN7) Figure 45—Vertical (12 Volts PP)

Figure 46—Horizontal (5 Volts PP) →→→



WAVEFORM PHOTOGRAPHS Taken from RCA W058A Oscilloscope

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Plate of Vertical Sync Amp. (Pin 5 of V114A) (6SN7) Figure 47—Vertical (27 Volts PP)

Figure 48—Horizontal (16 Volts PP) →





Figure 49—Grid of Vertical Sweep Osc. (Pin 1 of V114B) (6SN7) (25 Volts PP)

Figure 50—Plate of Vertical Sweep Osc. (Pin 2 of V114B) (30 Volts PP) →→→→



Figure 51—Grid of Vertical Sweep Output (Pin 1 of V115) (6AQ5) (35 Volts PP)

Figure 52—Plate of Vertical Sweep Output (Pin 5 of V115) (6AQ5) (800 Volts PP)







Cathode of Sync Separator (Pin 3 of V113) (6SN7) Figure 53—Vertical (11 Volts PP)

Figure 54—Horizontal (6 Volts PP) ↔





Grid of Sync Separator (Pin 1 of V113) (6SN7) Figure 55—Vertical (40 Volts PP) Figure 56—Horizontal (40 Volts PP)

Figure 56—Horizontal (40 Volts PP)



CV138C











WAVEFORM PHOTOGRAPHS Taken from RCA WO58A Oscilloscope

Figure 60—Horizontal (15 Volts PP) -





Plate of Hor Sync Amp (Pin 5 of V112) (6SN7) Figure 61-Vertical (70 Volts PP) ------

Figure 62-Horizontal (70 Volts PP) ***





Grid of Hor Sync Amp (Pin 1 of V112) (6SN7) Figure 63-Vertical (65 Volts PP) ------

Figure 64-Horizontal (65 Volts PP) -





Cathode of Hor Sync Amp (Pin 3 of V112) (6SN7) Figure 65—Vertical (18 Volts PP) ------

Figure 66—Horizontal (18 Volts PP) ***



Taken from RCA WO58A Oscilloscope

Figure 67—Grid of Horizontal Oscillator Control (22 Volts PP) (Pin 1 of V116) (6SN7GT)

Figure 68—Cathode of Horizontal Oscillator Control (1.3 Volts PP) (Pin 3 of V116) (6SN7GT)



CV140A

Figure 69—Grid of Horizontal Oscillator (390 Volts PP) (Pin 4 of V116) (6SN7GT)

Figure 70—Plate of Horizontal Oscillator (140 Volts PP) (Pin 5 of V116) (6SN7GT)



Figure 71—Terminal "C" of T114 (120 Volts PP)

Figure 72—Grid of Horizontal Output Tube (95 Volts PP) (Pin 5 of V117) (6BQ6)



Figure 73—Plate of Horizontal Output (Approx. 4000 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V117 to Ground)

Figure 74—Cathode of Damper (2300 Volts PP) (Pin 3 of V119) (6₩4GT)



Figure 75—Plate of Damper (180 Volts PP) (Pin 5 of V119) (6W4GT)

.

Figure 76—Plate of AGC Amplifier (Pin 5 of V111) (6CB6) (600 Volts PP)



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VOLTAGE CHART

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The following measurements represent two sets of conditions. In the first condition, a 5000 microvolt test pattern signal was fed into the receiver, the picture synced and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV97A senior "VoltOhmyst" between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c.

				E. 1	Plate	E. S	creen	E. Co	thode	E.	Grid	
Tube No.	Tube Type	Function	Operating Condition	Pin No:	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Notes on Measurements
V1	6 X 8	Mixer	5000 Mu. V. Signal	9	_	8	_	6	0	7	_	
			No Signal	9	145 to 150	8	145 to 150	6	0	7	-2.8 to -3.5	Depending on channel
VI	6 X 8	R-F Oscillator	5000 Mu. V. Signal	3	-	_	_	6	0	2	_	
			No Signal	3	88 to 108	_		6	0	2	-3.0 to -5.1	Depending on channel
V 2	6BQ7	R-F Amplifier	5000 Mu. V. Signal	6	_		-	8	-	7		
			No Signal	6	133 to 138	_	_	8	1.1	7	_	Depending on channel
V 2	6BQ7	R-F Amplifier	5000 Mu. V. Signal	1				3	_	2	_	
			No Signal	1	260	_	_	3	133 to 138	2	_	Depending on channel
V101	6AU6	lst Sound I-F Amp.	5000 Mu. V. Signal	5	140	6	152	7	0.3	1	-3.8	
			No Signal	5	112	6	122	7	0.8	1	-0.2	
V1 02	6AU6	2d Sound I-F Amp.	5000 Mu. V. Signal	5	258	6	58	7	0.19	1	-21	
			No Signal	5	255	6	55	7	0.22	1	*-2.5	*Unreliable measuring point. Voltage depends on noise.
V103	6AL5	Ratio Detector	5000 Mu. V. Signal	7	0.4			1	16.8	_	_	7.5 kc deviation at 400 cycles
			No Signal	7	0.5		_	1	*9.35	_	_	*Unreliable measuring point. Voltage depends on noise.
V 104	6 AV 6	lst Audio Amplifier	5000 Mu. V. Signal	7	95	_		2	0	1	-0.6	At min. volume
			No Signal	7	95		_	2	0	1	-0.6	Āt min. volume
V105	6AQ5	Audio Output	5000 Mu. V. Signal	5	263	6	273	2	18.2	7	0	At min. volume
			No Signal	5	262	6	272	2	18.2	7	0	At min. volume
V1 06	6AU6	lst Pix. I-F Amplifier	5000 Mu. V. Signal	5	242	6	279	7	0.06	1	-7.6	
			No Signal	5	140	6	135	7	1.03	1	*0	*Unreliable measuring point. Make measurement at T104-D.
V 107	6CB6	2nd Pix, I-F Amplifier	5000 Mu. V. Signal	5	240	6	267	2	0.2	1	-7.6	
			No Signal	5	131	6	110	2	0.9	1	0	
V108	6CB6	3d Pix. I-F Amplifier	5000 Mu. V. Signal	5	127	6	112	2	0.92	1	0	
			No Signal	5	121	6	110	2	0.96	1	0	
V 109	6CB6	4th Pix. I-F Amplifier	5000 Mu. V. Signal	5	194	6	159	2	2.4	1	0	
			No Signal	5	198	6	150	2	2.2	1	0	
V 110	6CL6 •6AG7	Video Amplifier	5000 Mu. V. Signal	6	128	8	192	1	1.12	2	-3.5	*See Figure 79 for socket connections
			No Signal	6	72	8	142	1	1.48	2	†–0.9	†Depends on noise
V 111	6CB6	AGC Amplifier	5000 Mu. V. Signal	5	-51	6	278	2	116	1	108	AGC control set for normal operation
			No Signal	5	0.9	6	282	2	100	1	54	AGC control set for normal operation

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VOLTAGE CHART

17T250DE, 17T261DE

The following measurements represent two sets of conditions. In the first condition, a 5000 microvolt test pattern signal was fed into the receiver, the picture synced and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV97A senior "VoltOhmyst" between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c.

				E.	Plate	E.S	creen	E. C	athode	E.	Grid	
Tube No.	Tube Type	Function	Operating Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Notes on Measurements
V 112	6SN7GT	Hor. Sync. Amplifier	5000 Mu. V. Signal	2	162	-	_	3	1.4	1	-40	
			No Signal	2	152	_	_	3	0.52	1	*-24	*Unreliable measurement point. Voltage depends on noise.
			5000 Mu. V. Signal	5	84	_	_	6	0	4	-1.38	
			No Signal	5	98	_	_	6	0	4	*1.08	*Voltage depends on noise.
V 113	6SN7GT	Hor. Sync. Separator	5000 Mu. V. Signal	2	290	_	_	3	95	1	50	
			No Signal	2	285	_	_	3	*56	1	*38	*Unreliable measurement points. Voltage depends on noise.
V 113	6SN7GT	Vert. Sync. Separator	5000 Mu. V. Signal	5	115	_	_	6	0	4	-58	
			No Signal	5	59	_		6	0	4	-11	
V 114A	6SN7GT	Vert. Sync. Amplifier	5000 Mu. V. Signal	5	45		_	6	O	4	0.03	
			No Signal	5	43	_	_	6	O	4	O	
V114B	6SN7GT	Vertical Oscillator	5000 Mu. V. Signal	2	*72	_		3	0	1	*-15.3	*Depends on setting of Vert. hold
			No Signal	2	*70	_		3	0	1	*-15	synced pix adjustment.
V 115	6AQ5	Vertical Output	5000 Mu. V. Signal	5	270	6	290	2	27	1	0	
			No Signal	5	267	6	285	2	26	1	0	
V 116	6SN7GT	Horizontal Osc. Control	5000 Mu. V. Signal	2	237		_	3	-10	1	-28.5	
			No Signal	2	228	_		3	-18	1	-29.5	
			5000 Mu. V. Signal	2	104	_		3	-36.3	1	-44	Hor. hold counter-clockwise
			5000 Mu. V. Signal	2	246		_	3	-11.5	1	-26	Hor. hold clockwise
V 116	6SN7GT	Horizontal Oscillator	5000 Mu. V. Signal	5	200	-	_	6	0	4	-75	
			No Signal	5	197		_	6	0	4	78	
			5000 Mu. V. Signal	5	193	_		6	0	4	-93	Hor. hold counter-clockwise
			5000 Mu. V. Signal	5	198		_	6	0	4	-74	Hor hold clockwise
V 117	6BQ6GT	Horizontal Output	5000 Mu. V. Signal	Сар	•	4	190	8	19.2	5	-16	*High Voltage
			No Signal	Сар	+	4	190	8	19.2	5	-15.3	Pulse Present
V 118	1B3GT /8016	H. V. Rectifier	5000 Mu. V. Signal	Cap	•			2&7	15,150		_	*High Voltage
			No Signal	Cap	•	_		2&7	15,300	_	_	Pulse Present
V 119	6W4GT	Damper	5000 Mu. V. Signal	5	287			3	•		_	*High Voltage
			No Signal	5	280			3	•		_	Pulse Present
V 120	17QP4	Kinescope	5000 Mu. V. Signal	Cone	15,150	10	568	11	178	2	117	Åt gvergge
			No Signal	Cone	15,300	10	560	11	151	2	101	Brightness



Figure 77-R.F Unit Wiring Diagram

CRITICAL LEAD DRESS

- 1. Keep all wiring in the pix i.f, sound i-f and video circuits as short as possible.
- Keep the leads on C110, C111, C112, R108, R139, R150, R111, R109, R110 and R233 as short and direct as possible.
- Do not change the bus wire connection to pin 2 of V101 and V102. Sleeving is used on these wires to insure length and to prevent shorting.
- Dress C115 down between R114 (volume control) and wafer S101-B.
- 5. Ground R126 to pin 3 of V106 and R134 to pin 7 of V107.
- 6. Do not change the grounding of R136, R140 and R143.
- Keep the bus wire from T109-A to C144 (plug in capacitor) short and direct.
- Ground the filaments of sockets V107, V108 and V109 independently of the socket center pin. Use ground lances proved near each socket.
- 9. Dress C148 straight up to act as a shield between T101-A and V110-2.
- Dress C155 and R160 (kine cathode) up in the air above the terminal board.
- Keep the leads connected to T113-C and T113-D (synchoguide) down so that they will not short out when the chassis is placed in the cabinet.

- 12. Do not reroute any wires between T104 and the terminal board alongside it. Keep all leads on the foot side of the terminal board.
- Dress all wires routed past T104, shielded wires W102 and W103 under the big lances near T104.
- 14. Dress all a-c leads to S102 under the large lances on the front apron.
- Dress R113 close to the chassis with leads as short as possible.
- Dress C158 and C122 up in the air and away from all other leads and components.
- 17. The lead from pin 5 of V111 to the terminal board under the high voltage cage should be routed between V117 socket and the rear apron.
- Dress all 2 watt resistors away from each other and all other wires and components.
- 19. Dress all wires away from damper tube V119.
- The wire from pin 5 V116 to T113-A should not be more than 5 inches long.
- 21. Dress all peaking coils up and away from the base.
- 22. Dress all leads in the high voltage compartment away from each other and away from the high voltage transformer.

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
76642	Resistor—Wire wound, 6750 ohms, 10 watts (R156)	503482	820,000 ohms, ±10%, ½ watt (R188, R200, R222, R231)
	Resistor—Fixed, composition:	503510	$1 \text{ megohm}, \pm 10\%, \frac{1}{2} \text{ watt} (R177)$
503047	47 ohms, ±10%, ½ watt (R108, R154, R233)	11769	1.8 megohm, ±5%, ½ watt (R161)
502056	56 ohms, ±5%, ½ watt (R134)	39063	1.8 megohm, ±5%, 1 watt (R229)
34763	68 ohms, ±5%, ½ watt (R140)	503522	2.2 megohm, ±10%, ½ watt (R189, R204, R207)
502082	82 ohms, ±5%, ½ watt (R101)	503539	3.9 megohm, ±10%, ½ watt (R174)
502110	100 ohms, ±5%, ½ watt (R126)	503582	8.2 megohm, ±10%, ½ watt (R163)
503110	100 ohms, ±10%, ½ watt (R122, R129)	503610	10 megohm, ±10%, ½ watt (R113)
503118	180 ohms, ±10%, ½ watt (R144)	71456	Screw-No. 8-32 x 7/16" wing screw for mounting de-
503122	220 ohms, ±10%, ½ watt (R153)		flection yoke
503133	330 ohms, ±10%, ½ watt (R213)	76455	Shaft—Connecting shaft (nylon) for picture and bright- ness controls
503147	470 ohms, ±10%, ½ watt (R123)	73584	Shield-Tube shield for V101, V102, V103, V106, V107,
513147	470 ohms, ±10%, 1 watt (R120, R212)		V109
503168	680 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R157)	75718	Socket—Channel indicator lamp socket
502210	1000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R150)	74834	Socket—Kinescope socket
503210	1000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (H107, H121, H125, H131, R133, R137, R142, R145, R175)	75222	Socket—Tube socket, octal, ceramic, plate mounted for V116
503212	1200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R178)	31251	Socket—Tube socket, octal, wafer, for V112, V113, V114, V117
503222	2200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R159)	50367	Socket—Tube socket, 6 pin, moulded, saddle-mounted
503222	2200 ohms, $\pm 10\%$, 2 watts (R164)		for V119
512222	$2200 \text{ obms}, \pm 10\%, \%$ watt (R218)	71508	Socket-Tube socket, 6 pin, moulded for V118
502239	3900 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R151)	73117	Socket—Tube socket, 7 pin, wafer, miniature, for V101, V102, V103, V104, V105, V106, V107, V108, V109, V111
503239	3900 ohms, ±10%, ½ watt (R225)	73115	Socket-Tube socket, 7 pin, moulded, miniature, plate-
513247	4700 ohms, $\pm 10\%$, 1 watt (R155)	76453	Socket—Tube socket, octal, moulded, saddle-mounted
503256	$5600 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R172)$		for V110 (6AG7) for KCS47M1
14659	6800 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R109, R110)	76971	Socket—Tube socket, 9 pin, wafer, miniature, for V110 (6CL6) for KCS74
513268	6800 ohms, ±10%, 1 watt (R147)	76636	Stud—Adjusting stud complete with guard for focus
503282	8200 ohms, ±10%, ½ watt (R210)		magnet
503310	10,000 ohms, ±10%, ½ watt (R115, R205)	76428	Support—Bakelite support only—part of hi-voltage shield
513310	10,000 ohms, ±10%, 1 watt (R141)	7,7215	Switch—Tone control and phono switch (S101)
523310	10,000 ohms, ±10%, 2 watts (R236)	76463	lerminal—Screw type grounding terminal
503312	12,000 ohms, ±10%, ½ watt (R171, R173)	//198	with adjustable cores (T104, C125, R124)
513312	12,000 ohms, ±10%, 1 watt (R176)	77197	Transformer—First pix i-f plate transformer complete
503318	18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R105, R184, R190, R228)	76435	Transformer—Second pix i-f grid transformer complete
513322	22,000 ohms, ±10%, 1 watt (R227)		with adjustable core (T106, C134)
503333	33,000 ohms, ±10%, ½ watt (R132, R183, R192)	76433	Transformer—Third or fourth pix i-f transformer (T107, T108)
503339	39,000 ohms, ±10%, ½ watt (R111)	76436	Transformer—Fifth pix i-f transformer (T109, C143, C146,
513339	39,000 ohms, ±10%, 1 watt (R180)		L102, R146, CR101)
512343	43,000 ohms, ±5%, 1 watt (R209)	76795	Transformer—Hi-voltage transformer (T114)
30787	47,000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R193)	76440	Transformer—Horizontal oscillator transformer complete with adjustable cores (T113)
503347	47,000 ohms, ±10%, 42 watt (R103, R169)	76997	Transformer-Output transformer (T103)
502256	$47,000 \text{ ohms}, \pm 10\%, 1 \text{ wall (R127, R135, R191, R232)}$	76429	Transformer_Power_transformer_117_volt_60_evol
523356	56,000 ohms $\pm 10\%$, $\frac{1}{2}$ watte (R145)	/0123	(T112)
503368	68 000 ohms, ±10%, 2 watts (1100)	76438	Transformer—Sound i-f transformer complete with ad-
513368	$68.000 \text{ ohms}, \pm 10\%, 1 \text{ watt (R226)}$		justable cores (T101, C103, C104)
513382	$82,000 \text{ ohms}, \pm 10\%, 1 \text{ watt } (R224)$	76437	Transformer—Sound take-off transformer complete with adjustable cores (T110, C147)
503410	100,000 ohms, ±10%, ½ watt (R203, R217)	76439	Transformer—Ratio detector transformer complete with
512410	100,000 ohms, ±5%, 1 watt (R230)		adjustable cores (T102, C108, C109)
30180	120,000 ohms, ±5%, ½ watt (R206)	76431	Transformer—Vertical output transformer (T111)
503415	150,000 ohms, ±10%, ½ watt (R160, R179, R215, R220)	77225	Trap-4.5 MC trap (L105, C149)
3046	200,000 ohms, ±5%, ½ watt (R194)	76616	Yoke—Deflection yoke complete with 6 contact male
503422	220,000 ohms, ±10%, ½ watt (R214)		R240, R241)
502427	270,000 ohms, ±5%, ½ watt (R162)		SPEAKER ASSEMBLIES
503427	270,000 ohms, ±10%, ½ watt (R185)		971490-3W
503433	330,000 ohms, ±10%, ½ watt (R116, R221)		RL-105E6
512433	330,000 ohms, ±5%, 1 watt (R223)		
503439	390,000 ohms, ±10%, ½ watt (R196)	75004	(101 Index 17/1200L)
503447	470,000 ohms, ±10%, ½ watt (R117, R148, R168, R234)	75024	Snegker_8" P.M. snegker complete with cone and mine
503456	560,000 ohms, ±10%, ½ watt (R198)	10022	coil (3.2 ohms)
G			

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REPLACEMENT PARTS (Continued)

STOCE No.	DESCRIPTION	STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES	76594	Knob—Channel selector knob—beige—ior blonde ma- hogany instruments (inner)
	92569-12W RL-111A1 RM-274	76593	Knob—Channel selector knob—maroon—for mahogany or walnut instruments (inner)
	(For Model 17T261DE)	76592	Knob—Fine tuning control knob—beige—for blonde ma- hogany instruments (outer)
75682 76389	Cone—Cone and voice coil (3.2 ohms) Sneaker—12" P.M. speaker complete with cone and	76591	Knob—Fine tuning control knob—maroon—for mahogany or walnut instruments (outer)
	voice coil (3.2 ohms) NOTE: If stamping on speaker in instruments does	74963	Knob—Picture control, horizontal hold control or volume control and power switch knob—maroon—for ma-
	ment parts by referring to model number of instru- ment, number stamped on speaker and full description of part required.	75464	Knob—Picture control, horizontal hold control or volume control and power switch knob—beige—for blonde mahogany instruments (inner)
	MISCELLANEOUS	76598	Knob-Tone control and phono switch knob-beige-for
77213	Back—Cabinet back complete with terminal board and power cord for Model 17T250DE	76597	Knob—Tone control and phono switch knob—maroon—
77214	Back—Cabinet back complete with power cord for Model 17T261DE	11765	Lamp—Channel marker escutcheon lamp—Mazda 51
76184	Board—Antenna terminal board	76589	Mask-Channel marker escutcheon light mask-beige-
76590	Bracket—Hang&r bracket for deflection yoke hood as- sembly	75459	for blonde manogany instruments Mask—Channel marker escutcheon light mask—bur-
77028	Bracket—Support bracket (''L'' shape) for kinescope masking panel (2 required)	77022	Mask—Polystyrene masking panel
76599	Bracket—''U'' shape bracket for deflection yoke hood support rod	77013	Nut-Speednut for fastening "RCA Victor" emblem to cabinet (3 required)
77029	Clip—Retaining clip (top or bottom) for safety glass retainer	73634	Nut—Speednut for speaker mounting screws for Model 17T261DE
77030	Clip—Retaining clip (sides) for safety glass retainer	76177	Nut—No. 10-32 special nut for deflection yoke hood sup-
X1756	Cloth—Grille cloth for mahogany or walnut instruments for Model 17T250DE	76601	port rods
X3222	Cloth—Grille cloth for blonde mahogany instruments	77027	Retainer-Safety glass retainer
X3199	Cloth—Grille cloth for mahogany or walnut instruments for Model 17T261DE	77024	Rod—''L'' shape threaded rod to support deflection yoke hood assembly
75474	Connector—Single contact male connector for antenna cable	76632	Screw—No. 8 x 5/8" hex head wood screw for mount- ing hanger bracket
39153	Connector-4 contact male connector for antenna cable	76808	Sleeve—Polyethylene sleeve for insulating high voltage
71457	Cord—Power cord and plug	73643	Spring-Channel marker escutcheon spring clip
77031	Cushion—Adhesive cushion (sponge rubber—¾" dia.) for masking panel	76820	Spring—Formed spring for glass retainer clips (6 re-
76698	Cushion—Rubber cushion for kinescope masking panel support bracket	77025	Spring—Formed spring for kinescope masking panel
77034	Decal—Control function decal for mahogany or walnut instruments	77006	Spring—Retaining spring (coil) for deflection yoke hood support rod nut
76512	Decal—Control function decal for blonde mahogany in- struments	30330	Spring—Retaining spring for knobs 74963, 75464
77244	Emblem—"Deluxe" emblem for mahogany or walnut instruments for Model 17T250DE	72845	Spring—Retaining spring for knobs 76591, 76592
77245	Emblem—"Deluxe" emblem for blonde instruments for Model 17T250DE	76837	Spring—Retaining spring for knobs 76593, 76594, 76595, 76596, 76597, 76598
77487	Emblem"Deluxe" emblem for Model 17T261DE	77032	Spring—Suspension spring clip (formed) for ground braid
77012	Emblem—''RCA Victor'' emblem	36580	Spring—Suspension spring (coil) for ground braid
75456	Escutcheon—Channel marker escutcheon	76600	Strap—Grounding strap (upper strip—1/2" x 18")
72113	Foot-Rubber foot (4 required) for Model 17T250DE	77023	Washer-Cellulose washer-gold-for knobs
37396	Glass—Safety glass Grommět—Rubber grommet for mounting speaker for	75500	Washer—Felt washer for masking panel or cabinet back mounting screws
76596	Model 17T261DE Knob-Brightness control or vertical hold control knob-	75458	Washer—Felt washer—beige—between knob and chan- nel marker escutcheon for blonde mahogany instru-
	beige—for blonde mahogany instruments (outer)		ments
76595	Knob—Brightness control or vertical hold control knob —marcon—for mahogany or walnut instruments (outer)	75457	Washer—Felt washer—dark brown—between knob and channel marker escutcheon for mahogany or walnut instruments

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.




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165----166 17T250DE, 17T261DE KCS74 CIRCUIT SCHEMATIC DIAGRAM (*KCS74M1)



All resistance values in ohms. K = 1000All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted.

Direction of arrows at controls indicates clockwise rotation

All voltages measured with "VoltOhmyst" and with no signal input. Voltages should hold within $\pm 20\%$ with 117 v. a-c supply. 167-168

17T250DE, 17T261DE

Figure 79-Circuit Schematic Diagram

In some receivers, a 6AG7 tube was en ployed in place of the 6CL6 video amplifier and was connected as shown in inset above

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17T250DE, 17T261DE

REPLACEMENT PARTS

STOCE No.	DESCRIPTION		STOCK No.	DESCRIPTION
	R-F UNIT ASSEMBLIES KRK11A		76548	Screw—No. 4-40 x 5/16" adjusting screw for coils L1, L2, L3, L4, L46
76539	Board—Antenna matching transformer terminal board		76519	Shaft—Channel selector shaft and plate
	less coils L58, L59, L60 and less capacitors C24, C25,		76134	Shaft—Fine tuning shaft and cam
76501	C20, C27		77147	Shield—Front shield complete with shaft bushing and
76531	Board—Terminal board, 5 contact and ground		76534	Shield—Tube shield
76965	Capacitor—Ceramic, variable, for fine tuning—plunger		76530	Socket—Tube socket, 9 pin, miniature, ceramic, saddle- mounted for V1
93056	type (C2) Capacitor—Ceramic, 5 mmf. (C26, C32)		76336	Socket—Tube socket, 9 pin, miniature, bakelite, saddle-
70597	Capacitor—Ceramic, 8 mmf. (C29)		77149	Spacer—Metal spacer for front plate
55326	Capacitor—Ceramic, 10 mmf. (C3)		75163	Spring-Friction spring (formed) for fine tuning cam
54207	Capacitor—Ceramic, 18 mmf. (C27)		30340	Spring-Hairpin spring for fine tuning link
76557	Capacitor—Ceramic, 22 mmf. (C19, C31)		75068	Spring-Retaining spring for tube shield
76558	Capacitor—Ceramic, 22 mmf. (C5)		77204	Spring-Return spring for fine tuning control
70935	Capacitor—Ceramic, 27 mmf. (C25)		76554	Stator—Antenna stator complete with rotor, coils, ca-
76739	Capacitor—Ceramic, 33 mmf. (C24)			pacitors and resistor (S5, C20, L42, L43, L44, L45,
77460	Capacitor—Ceramic, 220 mmf. (C10)		77252	Stater Converter stater complete with roter coils cu-
75199	Capacitor—Ceramic, 270 mmf. (C12, C14)		//353	pacitor and resistors (S2, C10, C12, L12, L13, L14,
75166	Capacitor—Ceramic, 1500 mmf. (stand-off) (C13, C17, C21, C22, C28, C30)		772.05	L15, L16, L17, L18, L19, L20, L21, L47, L48, R4, R5, R6) Stator—Oscillator stator complete with rotor, coils and
75610	Capacitor—Ceramic, 1500 mmf. (C6)			capacitors (S1, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8,
73748	Capacitor-Ceramic, 1500 mmf. (C16, C20, C23)			L9, L10, L11, L46)
71088	Capacitor—Ceramic, 0.68 mmf. (C7)		76553	pacitor and resistor (S3, C14, L22, L23, L24, L25, L26,
77151	Capacitor—Tubular, steatite, adjustable, 0.8-3.0 mmf. (C8)			L27, L28, L29, L30, L31, L50, R7)
75184	Capacitor—Ceramic, adjustable, 0.80-3.8 mmf, complete with adjusting stud (C9)		76556	Stator—R-F grid stator complete with rotor, coils, ca- pacitor and resistors (S4, C19, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L53, R11, R12)
76532	Capacitor—Adjustable trimmer, steatite, 1.4. mmf. (C18)		76561	Strap-Channel No. 13 r-f grid strap (L52)
76527	Capacitor—Mica trimmer, 55-80 mmf. (C11)		76525	Strip—Coil segment mounting strip—RH center
76143	Chp—Tubular chp for mounting stand-on capacitors		76526	Strip—Coil segment mounting strip—LH lower
73591	Coll—Antenna matching coll (2 required)		76544	Strip—Coil segment mounting strip — LH upper — less
75763	Coil Filgment choke coil (L63, L64)		75440	trimmer
77206	Coil—Filgment choke coil (L56)		/3440	and coded "ER")
76562	Coil—R-F amplifier coupling coil (L51)		75447	Stud-Capacitor stud for trimmer coil L49, C15 (coded
77153	Coil—R-F choke coil (L66)		707.40	numerically and "Hi Q")
76537	Coil—Shunt coil complete with adjustable core (L61)		/6/40	pacitor
76538	Coil—Shunt coil complete with adjustable core (L62)		77152	Terminal—Terminal for mounting C8 trimmer
76529	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f		76536	Transformer—Antenna matching transformer complete (T2, C24, C25, C26, C27, L58, L59, L60, L61, L62, J1)
20050	Section (143, C13)		77148	Transformer—Convertor transformer (T1, R3)
38633	ing transformer (J1)		76540	Trap—FM trap complete with adjustable core (L58)
76559	Connector—Oscillator grid connector		76535	Trap—I-F trap (L65)
76460	Contact—Test point contact		76542	Trap-I-F trap (41.25 MC) complete with core (L60)
77202	Core-Adjustable core for fine tuning capacitor		76541	Irap—I-F trap (45.75 MC) complete with core (L59)
76543	Core—Adjusting core for FM trap		12130	capacitor
76521	Detent-Detent mechanism and fibre shaft			-
73453	Form-Coil form for coils L48, L50, L53			CHASSIS ASSEMBLIES
77203	Link—Link assembly for fine tuning			KCS74
76728	Nut—Speednut for mounting adjustable trimmer 76532	Ì	76450	Prosket Channel indicates Jamp brasket
	Resistor—Fixed, composition:		76430	Bracket—Channel indicator lamp bracket
503047	47 ohms, ±10%, ½ watt (R9)		/6434	picture control
503082	82 ohms, ±10%, ½ watt (R10)		71496	Capacitor—Adjustable trimmer, 5-70 mmf. (C122)
503115	150 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R13)		75217	Capacitor-Mica trimmer, dual 10-160 mmf. (C191A,
503210	1000 ohms, ±10%, ½ watt (R7, R14)			C191B)
503233	3300 ohms, ±10%, ½ watt (R4, R11, R12)		33380	Capacitor-Ceramic, 12 mmf. (C193)
503247	4700 ohms, ±10%, ½ watt (R2)		39044	Capacitor-Ceramic, 15 mmf. (C154)
503410	100,000 ohms, ±10%, ½ watt (R1, R5, R6)		73664	Capacitor-Ceramic, 39 mmf. (C153)
503447	470,000 ohms, ±10%, ½ watt (R8)		71924	Capacitor-Ceramic, 56 mmf. (C105)
14343	Retainer—Fine tuning shaft retaining ring		/6475	Capacitor—Mica, 68 mmf. (C192)
75164	Rod—Actuating plunger rod (fibre) for fine tuning link		76474	Capacitor—Mica, 82 mmf. (C163)
76547	Screw—No. 4-40 x 1/4" adjusting screw for coils L6, L7, L8, L9, L10, L11		39396	Capacitor—Ceramic, 100 mmt. (C114, C162)
76549	Screw—No. 4.40 x $\frac{3}{8}$ " adjusting screw for coil L5		51416	Capacitor—Ceramic, 100 mmi. (C152) Capacitor—Mica, 180 mmf. (C167)

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17T250DE, 17T261DE

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION	STOCK No.	
76673	Capacitor-Ceramic, 220 mmf. (C184)	73784	Co
73091	Capacitor—Mica, 270 mmf. (C207)	TOTAL	
47617	Capacitor-Ceramic, 270 mmf. (C118)	73551	Co
39640	Capacitor—Mica, 330 mmf. (C166)	73557	Co
76476	Capacitor-Mica, 330 mmf. (C198)		
73094	Capacitor-Mica, 390 mmf. (C174)	73786	
54003	Capacitor-Mica, 470 mmi. (CIIU, CIII)	73787	Ca
75166	Capacitor—Ceramic, 1300 mmf. (C126, C127, C128, C129,	70400	
/34/3	Ci30, Ci31, Ci35, Ci36, Ci39, Ci42, C216)	76143	Cli
76470	Class, Class, Class, Claud, 4700 mmil. (Class, Class, Clas	73477 76442	Co Co
73960	Capacitor-Ceramic, 10,000 mmf. (C145, C148)		
75877	Capacitor-Ceramic, dual, 10,000 mmf. (C101A, C101B,	76441	Co
74521	Crongeitor—Electrolytic, 5 mfd., 50 volts (C112)	77195	
28417	Capacitor-Electrolytic, 5 mfd., 450 volts (C183)	76647	Co
75218	Capacitor-Electrolytic, comprising 1 section of 10 mfd.,	71526	Co
	350 volts, 1 section of 5 mfd., 350 volts and 1 section of 150 mfd., 50 volts (C212A, C212B, C212C)	77194	Co
76451	Capacitor-Electrolytic, comprising 1 section of 100 mfd.,	71789	Co
	350 volts, 2 sections of 10 mfd., 350 volts and 1 sec-	35787	Co
75220	Capacitor—Electrolytic, 150 mfd., 200 volts (C209, C210)	75474	Co
76479	Capacitor—Tubular, moulded, oil impregnated, .00068	75482	Co
75249	mfd., 600 volts (C200)	74594	Co
76995	600 volts (C164, C172, C190)	50367	Co (
70333	mfd., 600 volts (C201)	75542	
73802	600 volts (C159)	77200	Co Co
73595	Capacitor—Tubular, paper, oil impregnated, .0022 mid., 600 volts (C113, C161, C173, C176, C177, C178)	76448	Co
73599	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 600 volts (C119)	77201	Co I
73818	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 1600 volts (C121)	76445 77199	Co Co
73795	Capacitor—Tubular, paper, oil impregnated, .0033 mtd., 600 volts (C160)	76449	Ço
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C115, C187)	77010	Co Co
73789	Capacitor—Tubular, paper, oil impregnated, .0068 mfd., 400 volts (C151)	76985	Co
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 400 volts (C116, C120, C165)	74956 74839	Fa
73594	Capacitor—Tubular, moulded, oil impregnated, .01 mfd.,	73600	Fu
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd.,	76459	Gr
73798	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 500 volts (C179)	76830	Ho
73810	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 1000 volts (C26)	76168	Mo
73811	Capacitor—Tubular, paper, oil impregnated, .027 mfd.,	76141 76633	Mo
73596	Capacitor—Tubular, paper, oil impregnated, .033 mfd.,	18469	Plo
73790	Capacitor—Tubular, paper, oil impregnated, .039 mfd.,	76464	Plo
73558	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 200 volts (CI21)	77196	Pri
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C158, C197)		Í
75071	Capacitor-Tubular, moulded, .047 mfd., 400 volts (C188,	76675	Re
73592	Capacitor—Tubular, paper, oil impregnated, .047 mfd.,	76796	Re
73597	ouv volts (C124) Capacitor—Tubular, paper, oil impregnated, .047 mfd.,	76639	Re
73792	1000 volts (C186) Capacitor-Tubular paper oil impregnated 068 mfd	34473	Re
10134	400 volts (C182)	76390	Re

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DESCRIPTION apacitor—Tubular, paper, oil impregnated, 0.1 míd., 200 volts (C155, C175) Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C170, C185, C194) apacitor—Tubular, paper, oil impregnated, 0.1 mfd., \$00 volts (C181, C203) apacitor—Tubular, paper, oil impregnated, 0.27 mfd., 200 volts (C202) apacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C157, C168, C196) hoke—Filter choke (L115) lip—Tubular clip to mount stand off capacitor oil-Choke coil (L101) oil—Horizontal linearity coil complete with adjustable core (L107) oil—Width coil complete with adjustable core (L106) oil-R-F choke coil (1.5 muh) (L109) oil—Peaking coil (120 muh) (L103, R149) oil—Peaking coil (180 muh) (L108, R152) oil—Peaking coil (250 muh) (L104) oil—Peaking coil (1000 muh) (L110) onnector—Anode connector onnector-Phono input connector (J101) onnector—Single contact male connector for speaker cable (2 required) onnector-Video connector (J102) onnector-2 contact male connector for power cord onnector—6 contact female connector for yoke leads (1103)onnector—6 contact male connector—part of deflection yoke (P103) ontrol-AGC control (R181) ontrol-Brightness control (R216) ontrol-Height control (R199) ontrol—Horizontal and vertical hold control (R197A, R197B) ontrol-Picture control (R158) ontrol—Ratio detector balance control (R139) ontrol—Vertical linearity control (R211) ontrol—Volume control and power switch (R114, S102) over—Back cover for hi-voltage compartment over—Side cover for hi-voltage compartment ushion-Rubber cushion for deflection yoke hood astener—Push fastener for mounting tube socket for V116 and tube socket 76453 use—0.25 amps. (F101) rommet—Rubber grommet for 2nd anode lead exit rommet—Rubber grommet for mounting tube socket for V116 and tube socket 76453 ood—Deflection yoke hood less rubber cushions agnet—Focus magnet agnet—Ion trap magnet (P.M. type) agnet—Pin cushion correction magnet complete with support arm ate—Bakelite mounting plate for electrolytic 75220 ate—Hi-voltage plate—bakelite—complete with tube socket and corona ring rinted Circuit—Consisting of 1 section of 22,000 ohms, 2 sections of 8200 ohms, 1 section of .002 mfd., and 2 sections of .005, mfd. PC101 (C213, C214, C215, R165, B166, B167) ectifier—Picture detector crystal rectifier (CR101) ectifier-Selenium rectifier (CR102, CR103) esistor—Wire wound, 5.1 ohms, 1/3 watt (R237) esistor—Wire wound, 180 ohms, 2 watts (R235) esistor—Wire wound, 680 ohms, 1 watt (R119) esistor—Wire wound, 2000 ohms, 10 watts (R128) esistor—Wire wound, 5600 ohms, 5 watts (R138)





Model 2111/5DE "Benton" Model 2111/5DE "Benton" Model 21T176 "Suffolk" Model 21T177 "Donley" Walnut, Mahogany, Limed Oak Walnut, Mahogany, Limed Oak Walnut, Mahogany, Limed Oak

Models 21T159, 21T159DE,

"Selfridge" Walnut, Mabogany, Limed Oak

Walnut, Mahogany, Limed Oak







Function

Video Amplifier

Ratio Detector

AGC Amplifier

Sync Separator

Dampers

Rectifiers

.1st Picture I-F Amplifier 2nd Picture I-F Amplifier

3rd Picture I-F Amplifier

4th Picture I-F Amplifier

1st Sound I-F Amplifier

2nd Sound I-F Amplifier

Vertical Sweep Output

High Voltage Rectifier

Horizontal Sync Amplifier

Audio Output

... Horizontal Sweep Oscillator and Control

Kinescope

Horizontal Sweep Output

(15) RCA 6SN7GT. Vert Sync Amplifier and Vert Sweep Osc.

1st Audio Amplifier

R-F Amplifier

"Rockingham" Walnut, Mahogany "Clarendon" Walnut, Mahogany, Maple

GENERAL DESCRIPTION

Features of these receivers are: full twelve channel coverage; "totem" r-f amplifier; intercarrier FM sound system; ratio detector; 40 mc picture i-f; improved picture brilliance; pulsed picture A-G-C; A-F-C horizontal hold; stabilized vertical hold; compensated video gain control; noise saturation circuits; improved sync. separator and clipper; four mc. band width for picture channel and reduced hazard high voltage supply. An auxiliary audio input jack is provided to permit the use of an external record playing attachment.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

PICTURE SIZE 227 square inches on a 21AP4 Kinescope
TELEVISION R-F FREQUENCY RANGE
All 12 television channels, 54 mc. to 88 mc., 174 mc. to 216 mc.
Sound I.F. Carrier Frequency
bound 1-r Carner Frequency
POWER SUPPLY RATING 115 volts, 60 cycles, 300 watts
AUDIO POWER OUTPUT RATING
CHASSIS DESIGNATIONS
CS68C In Models 21T176, 21T177, 21T178, 21T179
(CS68E In Models 21T159, 21T165
CS68F In Models 21T159DE, 21T166DE, 21T174DE,
21T175DE, 21T178DE, 21T179DE
Model Chassis with Tubes Shipping

MOGÉL	Chassis with lubes	Shipping
Weight	in Cabinet	Weight
21T159, 21T159DE .	104 lbs.	125 lbs.
21T165		149 lbs.
21T166DE		152 lbs.
21T174DE		172 lbs.
21T175DE	152 lbs.	.184 lbs.
21T176		159 lbs.
21T177		174 lbs.
21T178, 21T178DE .	148 lbs.	. 182 lbs.
21T179, 21T179DE	153 lbs.	187 lbs.

RECEIVER ANTENNA INPUT IMPEDANCE

Choice: 300 ohms balanced or 72 ohms unbalanced.

Models 21T178, 21T178DE, Models 21T179, 21T179DE

RCA TUBE COMPLEMENT Tube Used

(1) RCA 6BQ7

(2) RCA 6X8

(3) RCA 6AU6

(4) RCA 6BC6 (5) RCA 6CB6

(6) RCA 6CB6

(7) RCA 6AG7

(8) RCA 6AU6

(9) RCA 6AU6

(10) RCA 6AL5

(11) RCA 6AV6

(12) RCA 6AQ5

(13) RCA 6CB6

(14) RCA 6SN7GT

(16) RCA 6AO5 .

(17) RCA 6SN7GT

(18) RCA 6SN7GT

(20) RCA 6W4GT (2 tubes)

(21) RCA 1B3-GT/8016

(22) RCA 5U4G (2 tubes)

(19) RCA 6CD6G

(23) RCA 21AP4

N SA PALA	8/11
24.4.1	

ELECTRICAL AND MECHANICAL SPECIFICATIONS (Continued)

LOUDSPEAKERS

Models 217159, 217159DE (971490-2) 8" PM dynamic, 3.2 ohms Models 217165, 217166DE, 217174DE, 217175DE, 217178DE, 217179DE (92561-14W) 12" PM Dynamic, 3.2 ohms Models 217176, 177, 178 and 179 (971494-1W) 12" PM Dynamic, 3.2 ohms

PICTURE INTERMEDIATE FREQUENCIES

Picture Carrier Frequency	45.75 mc.
Adjacent Channel Sound Trap	47.25 mc.
Accompanying Sound Traps	41.25 mc.
Adjacent Channel Picture Carrier Trap	39.25 mc.

SOUND INTERMEDIATE FREQUENCIES

Sound Carrier Frequenc	41.25 mc. and 4.5	mc.
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VIDEO RESPONSE	mc.
FOCUS Magn	etic
SWEEP DEFLECTION Magn	etic
SCANNING Interlaced, 525	line
HORIZONTAL SWEEP FREQUENCY	cps
VERTICAL SWEEP FREQUENCY	cps
FRAME FREQUENCY (Picture Repetition Rate)	cps

OPERATING CONTROLS (Front Panel)

Channel Selector
Fine Tuning
Picture Dual Control Knobs
Brightness }
Picture Horizontal Hold
Picture Vertical Hold
Sound Volume and On-Off Switch Dual Control Knobs
Tone Control and Phono Switch
NON-OPERATING CONTROLS (not including r-f and i-f adjust- ments)
Picture Centering top chassis adjustment
Width rear chassis adjustment
Height
Horizontal Linearity rear chassis screwdriver adjustment
Vertical Linearity
Vertical Peaking Control
Horizontal Drive rear chassis screwdriver adjustment
Horizontal Oscillator Frequency rear chassis adjustment
Horizontal Oscillator Waveform bottom chassis adjustment
Horizontal Locking Range rear chassis adjustment
Focus top chassis adjustment
Ion Trap Magnet top chassis adjustment
Deflection Cciltop chassis wing nut adjustment
AGC Control rear chassis adjustment

HIGH VOLTAGE WARNING

OPERATION OF THIS RECEIVER OUTSIDE THE CABINET OR WITH THE COVERS REMOVED, IN-VOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES. WORK ON THE RECEIVER SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOROUGHLY FAMILIAR WITH THE PRE-CAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT SHIELD REMOVED. BE SURE THE GROUND STRAP, BETWEEN THE YOKE ASSEMBLY AND THE CHASSIS, IS SECURELY FASTENED BEFORE TURNING THE RECEIVER ON.

KINESCOPE HANDLING PRECAUTIONS

DO NOT REMOVE THE RECEIVER CHASSIS, INSTALL, REMOVE OR HANDLE THE KINESCOPE IN ANY MANNER UNLESS SHATTERPROOF GOGGLES ARE WORN. PEOPLE NOT SO EQUIPPED SHOULD BE KEPT AWAY WHILE HANDLING KINESCOPES. KEEP THE KINESCOPE AWAY FROM THE BODY WHILE HANDLING.

The kinescope bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure. For this reason, the kinescope must be handled with more care than ordinary receiving tubes.

The large end of the kinescope bulb—particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure at any time. During service if the tube sticks or fails to slip smoothly into its socket, or deflecting yoke, investigate and remove the cause of the trouble. Do not force the tube. Refer to the Receiver Installation section for detailed instructions on kinescope installation. All RCA replacement kinescopes are shipped in special cartons and should be left in the cartons until ready for installation in the receiver.

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The following adjustments are necessary when turning the receiver on for the first time.

1. See that the TV-PH switch is in the "TV" position.

2. Turn the receiver "ON" and advance the SOUND VOL-UME control to approximately mid-position.

3. Set the STATION SELECTOR

to the desired channel.

4. Adjust the FINE TUNING control for best pix and the SOUND VOLUME control for suitable volume.

5. Turn the BRIGHTNESS control fully counter-clockwise, then clockwise until a light pattern appears on the screen.

6. Adjust the VERTICAL hold control until the pattern stops vertical movement.

7. Adjust the HORIZONTAL HO hold control until a picture is HORI obtained and centered.

INSTALLATION INSTRUCTIONS

UNPACKING.—These receivers are shipped complete in cardboard cartons. The kinescope is shipped in place in the receiver.

Take the receiver out of the carton and remove all packing material.

Install the control knobs on the proper control shafts.

Make sure that all tubes are in place and are firmly seated in their sockets.

Check to see that the kinescope high voltage lead clip is in place.

Plug a power cord into the 115 volt a-c power source and into the receiver interlock receptacle.

Turn the receiver power switch to the "on" position, the brightness control fully clockwise, and the picture control counter-clockwise.

ION TRAP MAGNET ADJUSTMENT.—Set the ion trap magnet approximately in the position shown in Figure 2. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rotating it slightly around the neck of the kinescope for the brightest raster on the screen.

DEFLECTION YOKE ADJUSTMENT.—If the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Tighten the yoke adjustment wing screw.

PICTURE ADJUSTMENTS.—It will now be necessary to obtain a test pattern picture in order to make further adjustments. Connect the antenna transmission line to the receiver.





VERTICAL HOLD HORIZONTAL HOLD VERTICAL BRIGHTNESS DN-OFF SOUND & PHONO VOLUME SWITCH SUND & PHONO VOLUME SWITCH SELECTOR FINE TUNING

Figure 1-Receiver Operating Controls

8. Adjust the PICTURE and BRIGHTNESS controls for suitable picture contrast and brightness.

9. In switching from one channel to another, it may be necessary to repeat steps 4 and 8.

10. When the set is turned on again after an idle period it should not be necessary to re-

peat the adjustment if the positions of the controls have not been changed. If any adjustment is necessary, step number 4 is generally sufficient.

 If the positions of the controls have been changed, it may be necessary to repeat steps 2 through 8.

12. To use a record player, plug the record-player output cable into the PHONO jack on the rear apron, and set the TV-PH switch to "PH."

If the Horizontal Oscillator and AGC System are operating properly, it should be possible to sync the picture at this point. However, if the AGC control is misadjusted, and the receiver is overloading, it may be impossible to sync the picture.

If the receiver is overloading, turn R175 on the rear apron (see Figure 3) counter-clockwise until the set operates normally and the picture can be synchronized.

CHECK OF HORIZONTAL OSCILLATOR ALIGNMENT.— Turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in horizontal sync. Momentarily remove the signal by switching off channel then back. Normally the picture will be out of sync. Turn the control clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 2 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control. Pull-in should occur before the control has been turned 120 degrees from the extreme counter-clockwise position. The picture should remain in sync for approximately 90 degrees of additional clockwise rotation of the control. At the extreme clockwise position, the picture should remain in sync and should not show a black bar in the picture.

If the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned. Skip "Alignment of Horizontal Oscillator" and proceed with "Centering Adjustment."



Figure 3-Rear Chassis Adjustments

INSTALLATION INSTRUCTIONS

21T159, 21T159DE, 21T165 21T166DE, 21T174DE, 21T175DE 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

ALIGNMENT OF HORIZONTAL OSCILLATOR.—If in the above check the receiver failed to hold sync with the hold control at the extreme counter-clockwise position or failed to hold sync over 90 degrees of clockwise rotation of the control from the pull-in point, it will be necessary to make the following adjustments.

Horizontal Frequency Adjustment.—Turn the horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the T114 horizontal frequency adjustment at the rear of the chassis until the picture is just out of sync and the horizontal blanking appears as a vertical or diagonal black bar in the raster. Then turn the T114 core until the bar moves out of the picture leaving it in sync.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain' in sync. If so turn the T114 rear core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 2 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C181A slightly clockwise. If less than 2 bars are present, adjust C181A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 bars are present.

Repeat the adjustments under "Horizontal Frequency Adjustment" and "Horizontal Locking Range Adjustment" until the conditions specified under each are fulfilled. When the horizontal hold operates as outlined under "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

If it is impossible to sync the picture at this point and the AGC system is in proper adjustment it will be necessary to adjust the Horizontal Oscillator by the method outlined in the alignment procedure on Page 11. For field purposes paragraph "B" under Horizontal Oscillator Waveform Adjustment may be omitted.

FOCUS MAGNET ADJUSTMENTS.—The focus magnet should be adjusted so that there is approximately three-eighths inch of space between the rear cardboard shell of the yoke and the flat of the front face of the focus magnet. This spacing gives best average focus over the face of the tube.

The axis of the hole through the magnet should be parallel with the axis of the kinescope neck with the kinescope neck through the middle.

CENTERING ADJUSTMENT.—No electrical centering controls are provided. Centering is accomplished by means of a separate plate on the focus magnet. The centering plate includes a locking screw which must be loosened before centering. Up and down adjustment of the plate moves the picture side to side and sidewise adjustment moves the picture up and down.

If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the ion trap magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

WIDTH. DRIVE AND HORIZONTAL LINEARITY ADJUST-MENTS.—Adjustment of the horizontal drive control affects the high voltage applied to the kinescope. In order to obtain the highest possible voltage hence the brightest and best focused picture, adjust horizontal drive trimmer C181B for maximum drive (minimum capacity) consistent with a linear raster. Compression of the raster due to excessive drive can be seen as a white vertical bar or bars in the right half of the picture. Besides compression caused by excessive drive, another item to watch for is the change in linearity at the extreme left with changes of brightness control setting. By proper adjustment of the linearity coil, the changes in linearity with changes in brightness can be made negligible. In general, to achieve this condition, the linearity coil should be set slightly on the high inductance side (core slightly clockwise) of the optimum position and the linearity rheostat R209 should be as far clockwise as possible.

Note: In late production receivers, R209 has been omitted since it normally was operated at zero resistance.

Preset the following adjustments as directed:

A.—Place the width plug (P105) in the minimum width position (top).

B.—Set the width control coil L106 in approximately mid position.

C.—Set the linearity control coil L107 near minimum inductance (counter-clockwise).

 $D.{-\!\!\!-}Set$ the linearity control rheostat near zero resistance (clockwise).

E.—Set the drive capacitor C181B in the maximum drive position (counter-clockwise).

If the raster is cramped or shows compression bars on the right half of the picture turn C181B clockwise until this condition is just eliminated.

Adjust the linearity control coil L107 clockwise until best linearity and maximum deflection or best compromise are obtained then turn one quarter turn clockwise from this position.

Retouch the drive trimmer C181B if necessary to obtain best linearity and maximum width.

Check the horizontal linearity at various settings of the brightness control R218. There should be no compression of the right half and no appreciable change of linearity especially at the extreme left of the picture. If objectional change does occur, turn linearity coil L107 slightly clockwise and repeat the test.

Adjust the width control L106 to fill the mask.

If the left side of the picture appears stretched, turn the linearity control rheostat R209 counter-clockwise. If the left side of the picture is cramped, turn R209 clockwise. Whenever possible, correct nonlinearity by adjustment of R209 rather than by reduction of drive.

If the line voltage is low and it becomes impossible to fill the mask, move the width plug P105 to the bottom position. The width coil L106 is inoperative in this position.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENTS.— Adjust the height control (R203 on chassis rear apron) until the picture fills the mask vertically. Adjust vertical linearity (R214 on rear apron), until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. If the top few lines of the picture are stretched or squeezed, adjust the vertical peaking control R207 until this condition is corrected.

FOCUS.—Adjust the focus magnet for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

Recheck the position of the ion trap magnet to make sure that maximum brightness is obtained.

If necessary readjust centering to align the picture with the mask,

CHECK OF R-F OSCILLATOR ADJUSTMENTS.—Tune in all available stations to see if the receiver r-f oscillator is adjusted to the proper frequency on all channels. If adjustments are required, these should be made by the method outlined in the alignment procedure on page 7. The adjustments for channels 2 through 12 are available from the front of the cabinet by removing the station selector escutcheon as shown in Figure 4. Adjustment for channel 13 is on top of the chassis.



AGC THRESHOLD CONTROL.—The AGC threshold control R175 is adjusted at the factory and normally should not require readjustment in the field.

To check the adjustment of the AGC Threshold Control, tune in a strong signal and sync the picture. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of R175. If the picture requires an appreciable portion of a second to reappear, or bends excessively, R175 should be readjusted

Turn R175 fully counter-clockwise. The raster may be bent slightly. This should be disregarded. Turn R175 clockwise until there is a very, very slight bend or change of bend in the picture. Then turn R175 counter-clockwise just sufficiently to remove this bend or change of bend.

If the signal is weak, the above method may not work as it may be impossible to get the picture to bend. In this case, turn R175 clockwise until the snow in the picture becomes more pronounced, then counter-clockwise until the best signal to noise ratio is obtained.

The AGC control adjustment should be made on a strong signal if possible. If the control is set too far clockwise on a weak signal, then the receiver may overload when a strong signal is received.

FM TRAP ADJUSTMENT.—In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the L58 core on top of the antenna matching transformer for minimum interference in the picture.

CAUTION.—In some receivers, the FM trap L58 will tune down into channel 6 or even into channel 5. Needless to say, such an adjustment will cause greatly reduced sensitivity on these channels. If channels 5 or 6 are to be received, check L58 to make sure that it does not affect sensitivity on these two channels.

Replace the cabinet back and connect the receiver antenna leads to the cabinet back. Make sure that the screws holding it are up tight, otherwise it may rattle or buzz when the receiver is operated at high volume.

CABINET ANTENNA.—A cabinet antenna is provided in these receivers and the leads are brought out near the antenna terminal board. The cabinet antenna may be employed in place of the outdoor antenna in areas where the signals are strong and no reflections are experienced.

KINESCOPE HANDLING PRECAUTION.—Do not install, remove, or handle the kinescope in any manner, unless shatterproof goggles and heavy gloves are worn. People not so equipped should be kept away while handling the kinescope. Keep the kinescope away from the body while handling.

Handle this tube by the metal rim at the edge of the screen. Do not cover the glass bell of the tube with fingermarks as it will produce leakage paths which may interfere with reception. If this portion of the tube has inadvertently been handled, wipe it clean with a soft cloth moistened with "dry" carbon tetrachloride.

To remove the kinescope from the cabinet, loosen the two nuts and disengage the rods alongside the kinescope. Remove the wing screw which holds the yoke frame to the cabinet. Remove the kinescope, the yoke frame with yoke and focus or centering magnet as an assembly.

INSTALLATION OF KINESCOPE.—Handle this tube by the metal rim at the edge of the screen. Do not cover the glass bell of the tube with fingermarks as it will produce leakage paths which may interfere with reception. If this portion of the tube has inadvertently been handled, wipe it clean with a soft cloth moistened with "dry" carbon tetrachloride.

Wipe the kinescope screen surface and front panel safety glass clean of all dust and fingermarks with a soft cloth moistened with "Windex" or similar cleaning agent.

Turn the tube so that the key on the base of the tube will be down and insert the neck of the kinescope through the deflection coil and focus magnet. If the tube sticks or fails to slip into place smoothly, investigate and remove the cause of the trouble. Do not force the tube.

Replace the kinescope and yoke frame assembly in the cabinet. Insert the wing screw and tighten. Engage the two side rods into the yoke frame and tighten the two nuts. Slide

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the deflection yoke as far forward as possible. If this is not done, difficulty will be encountered in adjusting the ion trap and focus magnet because of shadows on the corner of the raster.

Slide the chassis into the cabinet, then insert and tighten the four chassis bolts.

Slip the ion trap magnet over the neck of the kinescope.

Connect the kinescope socket to the tube base and connect the high voltage lead from the rim of the kinescope into the high voltage bushing on the high voltage compartment.

Reconnect all other cables. Do not forget to replace the yoke frame grounding strap. Perform the entire set-up procedure beginning with the Ion Trap Magnet Adjustment.

ANTENNAS.—The finest television receiver built may be said to be only as good as the antenna design and installation. It is therefore important to select the proper antenna to suit the particular local conditions, to install it properly and orient it correctly.

If two or more stations are available and the two stations are in different directions, it may be possible to make a compromise orientation which will provide a satisfactory signal on all such channels.

If it is impossible to obtain satisfactory results on one or more channels, it may become necessary either to provide means for turning the antenna when switching channels or to install a separate antenna for one or more channels and to switch antennas when switching channels.

In some cases, the antenna should not be installed permanently until the quality of the picture reception has been observed on a television receiver. A temporary transmission line can be run between receiver and the antenna, allowing sufficient slack to permit moving the antenna. Then, with a telephone system connecting an observer at the receiver and an assistant at the antenna, the antenna can be positioned to give the most satisfactory results on the received signal. A shift of direction or a few feet in antenna position may effect a tremendous difference in picture reception.

REFLECTIONS.—Multiple images sometimes known as echoes or ghosts, are caused by the signal arriving at the antenna by two or more routes. The second or subsequent image occurs when a signal arrives at the antenna after being reflected off a building, a hill or other object. In severe cases of reflections, even the sound may be distorted. In less severe cases, reflections may occur that are not noticeable as reflections but that will instead cause a loss of definition in the picture.

Under certain extremely unusual conditions, it may be possible to rotate or position the antenna so that it receives the cleanest picture over a reflected path. If such is the case, the antenna should be so positioned. However, such a position may give variable results as the nature of reflecting surfaces may vary with weather conditions. Wet surfaces have been known to have different reflecting characteristics than dry surfaces.

Depending upon the circumstances, it may be possible to eliminate the reflections by rotating the antenna or by moving it to a new location. In extreme cases, it may be impossible to eliminate the reflection.

INTERFERENCE.—Auto ignition, street cars, electrical machinery and diathermy apparatus may cause interference which spoils the picture. Whenever possible, the antenna location should be removed as far as possible from highways, hospitals, doctors offices and similar sources of interference. In mounting the antenna, care must be taken to keep the antenna rods at least ¼ wave length (at least 6 feet) away from other antennas, metal roofs, gutters or other metal objects.

Short-wave radio transmitting and receiving equipment may cause interference in the picture in the form of moving ripples. In some instances it may be possible to eliminate the interference by the use of a trap in the antenna transmission line. However, if the interfering signal is on the same frequency as the television station, a trap will provide no improvement.

WEAK PICTURE.—When the installation is near the limit of the area served by the transmitting station, the picture may be speckled, having a "snow" effect, and may not hold steady on the screen. This condition is due to lack of signal strength from the transmitter.

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Figure 5-Chassis Top View



Figure 6-Chassis Bottom View

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TEST EQUIPMENT.—To properly service the television chassis of this receiver, it is recommended that the following test equipment be available:

 $R\mbox{-}F$ Sweep Generator meeting the following requirements:

(a) Frequency Ranges

35 to 90 mc., 1 mc. to 12 mc. sweep width

170 to 225 mc., 12 mc. sweep width

(b) Output adjustable with at least .1 volt maximum.

(c) Output constant on all ranges.

(d) "Flat" output on all attenuator positions.

Cathode-Ray Oscilloscope. — For alignment purposes, the oscilloscope employed must have excellent low frequency and phase response.

For video and sync waveform observations, the oscilloscope must have excellent frequency and phase response from 10 cycles to at least two megacycles in all positions of the gain control.

Signal Generator to provide the following frequencies with crystal accuracy.

(a) Intermediate frequencies

4.5 mc., 39.25 mc., 41.25 mc., 45.75 mc., 47.25 mc.

(b) Radio frequencies

Channel Number	Picture Carrier Freq. Mc.	Sound Carrier Freg. Mc.	Receiver R-F Osc. Freq. Mc.
2	55.25		101
3	61.25	65.75	107
4	67.25		113
5	77.25		
6	83.25		
7 :	175.25		
8	181.25		
9	187.25		233
10			239
11	199.25	203.75	245
12	205.25	209.75	251
13	211.25		

(c) Output of these ranges should be adjustable and at least .1 volt maximum.

Heterodyne Frequency Meter with crystal calibrator if the signal generator is not crystal controlled.

Electronic Voltmeter of Junior or Senior "VoltOhmyst" type and a high voltage multiplier probe for use with this meter to permit measurements up to 20 kv.

ORDER OF ALIGNMENT.—When a complete receiver alignment is necessary, it can be most conveniently performed in the following order:

(1)	Ant. Matching Unit	(6)	Picture I-F Traps
(2)	R-F Unit	(7)	Picture I-F Trans.
(3)	Ratio Detector	(8)	Sweep Alignment of I-F
(4)	Sound I-F Trans.	(9)	Horizontal Oscillator
(5)	Sound Take-Off Trans.	(10)	Sensitivity Check

ANTENNA MATCHING UNIT ALIGNMENT. — The antenna matching unit is accurately aligned at the factory. Adjustment of this unit should not be attempted in the customer's home since even slight misalignment may cause serious attenuation of the signal especially on channel 2. The r-f unit is aligned with a particular antenna matching transformer in place. If for any reason, a new antenna matching transformer is installed, the r-f unit should be realigned.

The F-M Trap which is mounted in the antenna matching unit may be adjusted without adversely affecting the alignment of the unit.

To align the antenna matching unit disconnect the lead from the F-M trap L58 to the channel selector switch S1Eor S5.

With a short jumper, connect the output of the matching unit through a 1000 mmf. capacitor to the grid of the second pix i-f amplifier, pin 1 of V107.

Replace the cover on the matching unit while making all adjustments.

Remove the first pix i-f amplifier tube V106.

Connect the positive terminal of a bias box to the chassis and the potentiometer arm to the junction of R143 and R144. Set the potentiometer to produce approximately -6.0 volts of bias at the junction of R143 and R144. Connect an oscilloscope to the video test point TP102 or pin 4, V110 and set the oscilloscope gain to maximum.

Connect a signal generator to the antenna input terminals. Modulate the signal generator 30% with an audio signal.

Tune the signal generator to 45.75 mc. and adjust the generator output to give an indication on the oscilloscope. Adjust LS9 in the antenna matching unit for minimum audio indication on the oscilloscope.

Tune the signal generator to 41.25 mc. and adjust L60 for minimum audio indication on the oscilloscope.

Remove the jumper from the output of the matching unit.

Connect a 300 ohm $\frac{1}{2}$ watt composition resistor from L58 to ground, keeping the leads as short as possible.

Connect an oscilloscope low capacity crystal probe from L58 to ground. The sensitivity of the oscilloscope should be approximately 0.03 volts per inch. Set the oscilloscope gain to maximum.

Connect the r-f sweep generator to the matching unit antenna input terminals. In order to prevent coupling reactance from the sweep generator into the matching unit, it is advisable to employ a resistance pad at the matching unit terminals. Figure 11 shows three different resistance pads for use with sweep generators with 50 ohm co-ax output, 72 ohms co-ax output or 300 ohm balanced output. Choose the pad to match the output impedance of the particular sweep employed.

Connect the signal generator loosely to the matching unit antenna terminals.

Set the sweep generator to sweep from 45 mc. to 54 mc. With RCA type WR59A sweep generators, this may be accomplished by retuning channel number 1 to cover this range. With WR59B sweep generators this may be accomplished by retuning channel number 2 to cover the range. In making these adjustments on the generator, be sure not to turn the core too far clockwise so that it becomes lost beyond the core retaining spring.

Adjust L61 and L62 to obtain the response shown in figure 12. L61 is most effective in locating the position of the shoulder of the curve at 52 mc. and L62 should be adjusted to give maximum amplitude at 53 mc. and above consistent with the specified shape of the response curve. The adjustments in the matching unit interact to some extent. Repeat the above procedure until no further adjustments are necessary.

Remove the 300 ohm resistor and crystal probe connections. Restore the connection between LS8 and S1Eor S5. Replace V106.

R-F UNIT ALIGNMENT.—An r-f unit which is operative and requires only touch up adjustments, requires no presetting of adjustments. For such units, skip the remainder of this paragraph. For units which are completely out of adjustment, preset all adjustments to the approximate center of their range with the following exceptions. Set C18 so that the screw head is approximately three-eighths of an inch above chassis. Set C11 near maximum capacity (one-quarter turn from tight). Do not change any of the adjustments in the antenna matching unit.

Disconnect the link from terminals "A" and "B" of T104 and terminate the link with a 39 ohm composition resistor.

The r-f unit is aligned with zero A-G-C bias. To insure that the bias will remain constant, take a clip lead and short circuit the r-f unit power terminal board terminal 3 to ground.

Connect the oscilloscope to the test point TP1 on top of the r-f unit. Set the oscilloscope gain to maximum.

Turn the receiver channel selector switch to channel 2.

Connect the output of the signal generator to the grid of the r-f amplifier, V2. To do this, remove the tube from the socket and fashion a clip by twisting one end of a small piece of wire around pin number 7. Replace the tube in the socket leaving the end of the wire protruding from under the tube. Connect the signal generator to this wire through a 1,500 mmf. capacitor.

Tune the signal generator to 43.5 mc. and modulate it 30% with a 400 cycle sine wave. Adjust the signal generator for maximum output.

Adjust L65 on top of the r-f unit for minimum 400 cycle indication on the oscilloscope. If necessary, this adjustment can be retouched in the field to provide additional rejection to one specific frequency in the i-f band pass. However, in such cases, care should be taken not to adjust it so as to reduce sensitivity on channel 2.

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Set the channel selector switch to channel 8.

Turn the fine tuning control 30 degrees clockwise from the center of its mechanical range now and at all times when adjusting the oscillator frequency.

Adjust C1 in KRK11 or C2 in KRK11A for proper oscillator frequency, 227 mc. This may be done in several ways. The easiest way and the way which will be recommended in this procedure will be to use the signal generator as a heterodyne frequency meter and beat the oscillator against the signal generator. To do this, tune the signal generator to 227 mc. with crystal accuracy. Insert one end of a piece of insulated wire into the r-f unit through the hole provided for the adjustment for C11. Be careful that the wire does not touch any of the tuned circuits as it may cause the frequency of the r-f unit oscillator to shift. Connect the other end of the wire to the "r-f in" terminal of the signal generator. Adjust C1 in KRK11 or C2 in KRK11A to obtain an audio beat with the signal generator.

Note—If, on some KRK11A units, it is not possible to reach the proper channel 8 oscillator frequency by adjustment of C2, switch to channel 13 and adjust L46 to obtain proper channel 13 oscillator frequency as indicated in the table on page 10. Then switch to channel 12 and adjust L11 to obtain proper channel 12 oscillator frequency. Continue down to channel 8 adjusting the appropriate oscillator trimmer to obtain the proper frequency on each channel. Then again on channel 8 adjust C2 to obtain proper channel 8 oscillator frequency. Switch back to channel 13 and adjust L46 and back to channel 8 and adjust C2.

Set the T1 core for maximum inductance (core turned counter-clockwise).

Connect the sweep generator through a suitable attenuator as shown in Figure 11 to the input terminals of the antenna matching unit.

Connect the signal generator loosely to the antenna terminals.

Set the sweep generator to cover channel 8.

Set the oscilloscope to maximum gain and use the minimum input signal which will produce a usable pattern on the oscilloscope. Excessive input can change oscillator injection during alignment and produce consequent misalignment even though the pattern on the oscilloscope may look normal.

Insert markers of channel 8 picture carrier and sound carrier, 181.25 mc. and 185.75 mc.

Adjust C9, C11, C15 and C18 for approximately correct curve shape, frequency, and band width as shown in Figure 13.

The correct adjustment of C18 is indicated by maximum amplitude of the curve midway between the markers. C15 tunes the r-f amplifier plate circuit and affects the frequency of the pass band most noticeably. C9 tunes the mixer grid circuit and affects the tilt of the curve most noticeably (assuming that C18 has been properly adjusted). C11 is the coupling adjustment and hence primarily affects the response band width.

Set the receiver channel switch to channel 6.

Adjust the signal generator to the channel 6 oscillator frequency 129 mc.

Turn the fine tuning control 30 degrees clockwise from the center of its mechanical range.

Adjust L5 for an audible beat with the signal generator as before.

Set the sweep generator to channel 6.

From the signal generator, insen channel 6 sound and picture carrier markers, 83.25 mc. and 87.75 mc.

Adjust L48, L50 and L53 for proper response as shown in Figure 13.

LSO tunes the r-f amplifier plate circuit and primarily affects the frequency of the pass band. LS3 tunes the r-f amplifier grid and is adjusted to give maximum amplitude of the curve between the markers. L48 affects the tilt of the curve but not quite the same as C9 adjustment. When the circuits are correctly adjusted and L48 is rocked on either side of its proper setting, the high frequency (sound carrier) end of the curve appears to remain nearly fixed in amplitude while the picture carrier end tilts above or below this point.

Turn off the sweep and signal generators.

Connect the "VoltOhmyst" to the r-f unit test point TP1.

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Adjust the oscillator injection trimmer C8 for -3.5 volts or at maximum if -3.5 volts cannot be reached. This voltage should fall between -2.5 and -5.5 volts on all channels when the alignment of all circuits is completed.

Turn the sweep generator and signal generator back on and recheck channel 6 response. Readjust L48, L50 and L53 if necessary.

Set the receiver channel selector switch to channel 8 and readjust Cl in KRK11 or C2 in KRK11A for proper oscillator frequency, 227 mc.

Set the sweep generator and signal generator to channel 8. Readjust C9, C11, C15 and C18 for correct curve shape, frequency and band width.

Turn off the sweep and signal generators, switch back to channel 6 and check the oscillator injection voltage at TP1 if C9 was adjusted in the recheck of channel 8 response.

If the initial setting of oscillator injection trimmer C8 was far off, it may be necessary to adjust the oscillator frequency and response on channel θ , adjust the oscillator injection on channel 6 and repeat the procedure several times before the proper setting is obtained.

Turn off the sweep generator and switch the receiver to channel 13.

Adjust the signal generator to the channel 13 oscillator frequency 257 mc.

Set the fine tuning control 30 degrees clockwise from the center of its mechanical range.

Adjust L46 to obtain an audible beat. Slightly overshoot the adjustment of L46 by turning the slug a little more in the same direction from the original setting, then reset the oscillator to proper frequency by adjusting C1 in KRK11 or C2 in KRK11A to again obtain the beat.

Check the response of channels 7 through 13 by switching the receiver channel switch, sweep generator and marker oscillator to each of these channels and observing the response and oscillator injection obtained. See Figure 13 for typical response curves. It should be found that all these channels have the proper shaped response with the markers above 80% response.

If the markers do not fall within this requirement, switch to channel 8 and readjust C9, C11, C15 and C18 as necessary.

Turn off the sweep generator and check the channel 8 oscillator frequency. If Cl or C2 was réadjusted for channel 8, the principle of overshooting the adjustment and then correcting by adjusting L46 should be followed in order to establish the L/C ratio for the desired oscillator tracking.

Turn off the sweep generator and check the channel 6 oscillator frequency. Adjust L5 for correct oscillator frequency, 129 mc.

Turn the sweep generator on and to channel 6 and observe the response curve. If necessary readjust L48, L50 and L53.

For KRK11A units switch to channel 2 and tune T1 clockwise to a point where there is no change in the channel 2 response as T1 is turned.

Switch the receiver through channel 6 down through channel 2 and check for normal response curve shapes and oscillator injection voltage.

If excessive tilt in the same direction occurs on channels 2, 3 and 4, adjust C18 on channel 2 to overshoot the correction of this tilt, then switch to channel 6 and adjust L53 for maximum amplitude of curve between carrier markers. This adjustment should produce "flat" response on the low channels if the other adjustments, especially L48, are correct.

Likewise check r-f response and oscillator injection on channels 7 through 13, stopping on 13 for the next step.

With the receiver on channel 13, check the receiver oscillator frequency. Correct by adjustment of C1 in KRK11 or C2 in KRK11A if necessary.

Adjust the oscillator to frequency on all channels by switching the receiver and the frequency standard to each channel and adjusting the appropriate oscillator trimmer to obtain the audible beat. It should be possible to adjust the oscillator to the correct frequency on all channels with the fine tuning control in the middle third of its range. When employing WR39 calibrators to adjust the receiver oscillator, tune the calibrator to one half the receiver oscillator frequency on channels 4, 5 and 6 and to one fourth the receiver oscillator frequency on channels 11, 12 and 13.

ALIGNMENT PROCEDURE

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	Picture	Sound	Receiver	Channel
Channel	Carrier	Carrier	R-F Osc.	Oscillator
Number	Freq. Mc.	Freq. Mc.	Freq. Mc.	Adjustment
2	55.25		101	L l
3	61.25	65.75	107	L2
4		71.75	113	L3
5	77.25	81.75	123	L4
6	83.25	87.75	129	L5
7	175.25	179.75	221	L6
8	181.25	185.75	227	L7
9	187.25			L8
10	. 193.25	197.75		L 9
11	199.25	203.75		L10
12	205.25	209.75	251	L 11
13	211.25	215.75	257	C1

Remove the 39 ohm resistor from the link and reconnect the link to terminals "A" and "B" of T104.

RATIO DETECTOR ALIGNMENT.—In order to obtain good ratio detector alignment an AM modulated signal generator that is exceptionally free from FM modulation must be employed. Set the signal generator at 4.5 mc. and connect it to the second sound i.f grid, pin 1 of V102. Set the generator for 30% 400 cycle modulation.

As an alternate source of signal, the RCA WR39B or WR39C calibrator may be employed. If used, connect it to the grid of the 4th pix i-f amplifier, pin 1, V109. Set the frequency of the calibrator to 45.75 (pix carrier) and modulate with 4.5 mc. crystal. Also turn on the internal AM audio modulation. The 4.5 mc. signal will be picked off at T110A and amplified through the Sound i-f amplifier.

Connect the "VoltOhmyst" to the junction of R110 and R114. Connect the oscilloscope across the speaker voice coil and turn the volume control for maximum output.

Adjust C226 on the bottom of the V103 socket for minimum capacity.

Tune the ratio detector primary, T102 top core for maximum DC output on the "VoltOhmyst." Adjust the signal level from the signal generator for minus 10 volts on the "VoltOhmyst" when finally peaked. This is approximately the operating level of the ratio detector for average signals.

Connect the "VoltOhmyst" to the junction of R112 and C113. Adjust the T102 bottom core for zero d-c on the meter. Then, turn the core to the nearest minimum AM output on the oscilloscope.

Repeat adjustments of T102 top for maximum DC and T102 bottom for minimum output on the oscilloscope making final adjustment with the 4.5 mc. input level adjusted to produce 10 volts d-c on the "VoltOhmyst" at the junction of R110 and R114.

Connect the "VoltOhmyst" to the junction of R112 and C113 and note the amount of d-c present. If this voltage exceeds ± 1.5 volts, adjust C226 by turning it in until zero d-c is obtained. Readjust the T102 bottom core for minimum output on the oscilloscope. Repeat adjustments of C226 and T102 bottom core until the voltage at R112 and C113 is less than ± 1.5 volts when T102 bottom core is set for minimum output on the oscilloscope.

Connect the "VoltOhmyst" to the junction of R110 and R114 and repeak T102 top core for maximum d-c on the meter and again reset the generator so as to have -10 volts on the meter.

Repeat the adjustments in the above two paragraphs until the voltage at R112 and C113 is less than ± 1.5 volts when the T102 top core is set for maximum d-c at the junction of R110 and R114 and the T102-bottom core is set for minimum indication on the oscilloscope.

SOUND I-F ALIGNMENT.—Connect the sweep generator to the first sound i-f amplifier grid, pin 1 of V101. Adjust the generator for a sweep width of 1 mc. at a center frequency of 4.5 mc.

Insert a 4.5 mc. marker signal from the signal generator into the first sound i-f grid. With the WR39B or WR39C calibrators the 4.5 mc. crystal signal may be obtained at the R-F out terminal by turning the variable osc. switch off, the calibrate switch to 4.5 mc. and the volume control with mod. off.

Connect the oscilloscope in series with a 10,000 ohm resistor to terminal A of T101.

Adjust T101 top and bottom cores for maximum gain and

symmetry about the 4.5 mc. marker on the i-f response. The pattern obtained should be similar to that shown in Figure 14.

The output level from the sweep should be set to produce approximately 2.0 volt peak-to-peak at terminal A of T101 when the final touches on the above adjustment are made. It is necessary that the sweep output voltage should not exceed the specified values otherwise the response curve will be broadened, permitting slight misadjustment to pass unnoticed and possibly causing distortion on weak signals.

Connect the oscilloscope to the junction of R112 and C113 and check the linearity of the response. The pattern obtained should be similar to that shown in Figure 15.

SOUND TAKE-OFF ALIGNMENT.—Connect the 4.5 mc. generator in series with a 1000 ohm resistor to terminal "C" of T110. The input signal should be approximately 0.5 volt.

Short the fourth pix if grid to ground, pin 1 V109, to prevent noise from masking the output indication.

As an alternate source of signal the RCA WR39B or WR39C calibrator may be used. In such a case, disregard the above two paragraphs. Connect calibrator across link circuit, T104 A, B, and modulate 45.75 with 4.5 mc. crystal.

Connect the crystal diode probe of a "VoltOhmyst" to the plate of the video amplifier, pin 8 of V110.

Adjust the core of T110 for minimum output on the meter. Remove the short from pin 1 V109 to ground, if used.

PICTURE I-F TRAP ADJUSTMENT.—Connect the i-f signal generator across the link circuit on terminals A and B of T104. Connect the "VoltOhmyst" to the junction of R143 and R144. Obtain a 7.5 volt battery capable of withstanding appreciable

current drain and connect the ends of a 1,000 ohm potentiometer across it. Connect the battery positive terminal to chassis and the potentiometer arm to the junction of R143 and R144.

Set the bias to produce approximately -1.0 volt of bias at the junction of R143 and R144.

Connect the "VoltOhmyst" to pin 4 of V110, the 6AG7 video amplifier.

Set the signal generator to each of the following frequencies and adjust the corresponding circuit for minimum d-c output at pin 4 of V110. Use sufficient signal input to produce 1.0 volt of d-c on the meter when the final adjustment is made.

39.25	mc.	 									T104 top core
41.25	mc.										T105 bottom core
47.25	mc.										T106 bottom core

PICTURE I-F TRANSFORMER ADJUSTMENTS.—Set the signal generator to each of the following frequencies and peak the specified adjustment for maximum indication on the "Volt-Ohmyst." During alignment, reduce the input signal if necessary in order to produce 1.0 volt of d-c at pin 4 of V110 with —1.0 volt of i-f bias at the junction of R143 and R144.

43:7 mc.	 T 109
45.5 mc.	 T 108
41.8 mc.	 T107

To align T105 and T106, connect the sweep generator to the first picture i-f grid, pin 1 of V106 through a 1000 mmf. ceramic capacitor. Shunt R141, R149 and terminals "A" and "F" of T109 with 330 ohm composition resistors. Set the i-f bias to -1.0 volt at the junction of R143 and R144.

Connect the oscilloscope to pin 4 of V110.

Adjust T105 and T106 top cores for maximum gain and curve shape as shown in Figure 16. For final adjustment set the output of the sweep generator to produce 0.5 volt peak-to-peak at the oscilloscope terminals.

To align T1 and T104, connect the sweep generator to the mixer grid test point TP2. Use the shortest leads possible, with not more than one inch of unshielded lead at the end of the sweep cable.

Set the channel selector switch to channel 4.

Connect a 180 ohm composition resistor from terminal B of T105 to the junction of R135 and C132. Connect the oscilloscope diode probe to terminal B of T105 and to ground.

Couple the signal generator loosely to the diode probe in order to obtain markers.

In some receivers, C220 is variable and is provided as a bandwidth adjustment. Preset C220 to minimum capacity.

Adjust T1 (top) and T104 (bottom) for maximum gain at 43.5 mc. and with 45.75 mc. at 70% of maximum response.

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Adjust C220 until 41.25 mc. is at 85% response with respect to the low frequency shoulder at approximately 41.9 mc. as shown in Figure 17.

In receivers in which C220 is fixed, adjust T1 (top) and T104 (bottom) for maximum gain and the response shown in Figure 17.

Disconnect the diode probe, the 180 ohm and three 330 ohm resistors.

SWEEP ALIGNMENT OF PIX I-F.—Connect the oscilloscope to pin 4 of V110.

Ådjust the bias potentiometer to obtain -6.0 volts of bias as measured by a "VoltOhmyst" at the junction of R143 and R144.

Leave the sweep generator connected to the mixer grid test point TP2 with the shortest leads possible and with not more than one inch of unshielded lead at the end of the sweep cable. If these precautions are not observed, the receiver may be unstable and the response curves obtained may be unreliable.

Adjust the output of the sweep generator to obtain 3.0 volts peak-to-peak on the oscilloscope.

Couple the signal generator loosely to the grid of the first pix if amplifier. Adjust the output of the signal generator to produce small markers on the response curve.

Retouch T108 and T109 to obtain the response shown in Figure 18. Do not adjust T107 unless absolutely necessary. If T107 is adjusted too low in frequency it will raise the level of the 41.25 mc. sound i-f carrier and may create interference in the picture. It will also cause poor adjacent channel picture rejection. If T107 is tuned too high in frequency, the level of the 41.25 mc. sound i-f carrier will be too low and may produce noisy sound in weak signal areas.

Remove the oscilloscope, sweep and signal generator connections.

Remove the bias box employed to provide bias for alignment.

HORIZONTAL OSCILLATOR ADJUSTMENT. — Normally the adjustment of the horizontal oscillator is not considered to be a part of the alignment procedure, but since the oscillator waveform adjustment may require the use of an oscilloscope, it can not be done conveniently in the field. The waveform adjustment is made at the factory and normally should not require readjustment in the field. However, the waveform adjustment should be checked whenever the receiver is aligned or whenever the horizontal oscillator operation is improper.

Horizontal Frequency Adjustment.—Tune in a station and sync the picture. If the picture cannot be synchronized with the horizontal hold control R201B, then adjust the T114 frequency core on the rear apron until the picture will synchronize. If the picture still will not sync, turn the T114 waveform adjustment core (under the chassis) out of the coil several turns from its original position and readjust the T114 frequency core until the picture is synchronized.

Examine the width and linearity of the picture. If picture width or linearity is incorrect, adjust the horizontal drive control C181B, the width control L106 and the linearity control L107 until the picture is correct.

Horizontal Oscillator Waveform Adjustment.—The horizontal oscillator waveform may be adjusted by either of two methods. The method outlined in paragraph A below may be employed in the field when an oscilloscope is not available. The service shop method outlined in paragraph B below requires the use of an oscilloscope.

A.-Turn the horizontal hold control completely clockwise. Place adjustment tools on both cores of T114 and be prepared to make simultaneous adjustments while watching the picture on the screen. First, turn the T114 frequency core (on the rear apron) until the picture falls out of sync and one diagonal black bar sloping down to the right appears on the screen. Then, turn the waveform adjustment core (under the chassis) into the coil while at the same time adjusting the frequency core so as to maintain one diagonal black bar on the screen. Continue this procedure until the oscillator begins to motorboat, then turn the waveform adjustment core out until the motorboating just stops. As a check, turn the T114 frequency core until the picture is synchronized then reverse the direction of rotation of the core until the picture begins to fall out of sync with the diagonal bar sloping down to the right. Continue to turn the frequency core in the same direction. Additional bars should not appear on the screen. Instead, the horizontal oscillator should begin to motorboat. Retouch the adjustment of the T114 waveform adjustment core if necessary until this condition is obtained.

B.—Connect the low capacity probe of an oscilloscope to terminal C of T114. Turn the horizontal hold control one-quarter turn from the clockwise position so that the picture is in sync. The pattern on the oscilloscope should be as shown in Figure 19. Adjust the waveform adjustment core of T114 until the two peaks are at the same height. During this adjustment, the picture must be kept in sync by readjusting the hold control if necessary.

This adjustment is very important for correct operation of the circuit. If the broad peak of the wave on the oscilloscope is lower than the sharp peak, the noise immunity becomes poorer, the stabilizing effect of the tuned circuit is reduced and drift of the oscillator becomes more serious. On the other hand, if the broad peak is higher than the sharp peak, the oscillator is overstabilized, the pull-in range becomes inadequate and the broad peak can cause double triggering of the oscillator when the hold control approaches the clockwise position.

Remove the oscilloscope upon completion of this adjustment.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the T114 frequency core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 2 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C181A slightly clockwise. If less than 2 bars are present, adjust C181A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 bars are present.

Turn the horizontal hold control to the maximum clockwise position. Adjust the T114 frequency core so that the diagonal bar sloping down to the right appears on the screen and then reverse the direction of adjustment so that bar just moves off the screen leaving the picture in synchronization.

SENSITIVITY CHECK.—A comparative sensitivity check can be made by operating the receiver on a weak signal from a television station and comparing the picture and sound obtained to that obtained on other receivers under the same conditions. This weak signal can be obtained by connecting the shop antenna to the receiver through a ladder type attenuator pad.

RESPONSE CURVES.—The response curves shown on page 14 are typical, though some variations can be expected.

The response curves are shown in the classical manner of presentation, that is with "response up" and low frequency to the left. The manner in which they will be seen in a given test set-up will depend upon the characteristics of the oscilloscope and the sweep generator.

NOTES ON R-F UNIT ALIGNMENT.—Because of the frequency spectrum involved, many of the r-f unit leads are critical in some respects. Even the power supply leads form loops which couple to the tuned circuits, and if resonant at any of the frequencies involved in the performance of the tuner, may cause serious departures from the desired characteristics. In the design of the receiver these undesirable resonant loops have been shifted far enough away in frequency to allow reasonable latitude in physical arrangement without being troublesome. When the r-f unit is aligned in the receiver, no trouble from resonant loops should be experienced. However, if the unit is aligned in a jig separate from the receiver, attention should be paid to insure that unwanted resonance does not exist which might present a faulty representation of alignment.

A resonant circuit exists between the r-f tuner chassis and the outer shield box, which couples into the antenna and r-f plate circuits. The frequency of this resonance depends on the structure of the shield box. This resonance is controlled by using insulating washers of proper thickness in the front plate to tuner chassis mounting. Obviously, if the r-f unit is removed for service, the washers should be replaced in the correct order.

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77.25 81.75

67.25 71.75

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ALIGNMENT TABLE

THE DETAILED ALIGNMENT PROCEDURE BEGINNING ON PAGE 8 SHOULD BE READ BEFORE ALIGNMENT BY USE OF THE TABLE IS ATTEMPTED CONNECT OSCILLOSCOPE MISCELLANEOUS CONNECTIONS CONNECT SIGNAL CONNECT CONNECT HET SWEEP HETERODYNE FREQ. METER TO ADIUST Step SIGNAL GEN. FREQ SWEEP GEN. FREQ METER REFER FREQ. AND GENERATOR TO No TO MC TO MC ANTENNA MATCHING UNIT ALIGNMENT Do not adjust this unit unless fairly certain that it requires adjustment. Disconnect lead from L58 to SIE. Connect output of matching unit through 1000 mmf. to pin 1 of V107 Replace cover on matching unit. Remove V106 from socket. Connect bias box to junction of R143 and R144 and set to produce -6 volts. 1 45.75 mc. Not used Pin 4, V110 Scope L59 for min. audio on 2 Antenna termi-Not used Fig. 7 nala 30% mod. gain to max. scope " " 3 41.25 mc L60 for min. audio on Fig. 7 30% mod scope " Scope a xtal probe Connect 300 ohms from L58 to and. L61 and L62 to obtain response of Fig. 12 Fig. 7 Fig. 11 45 to 4 Antenna termi-Antenna terminals loosely nals through pad 54 mc. to and. Fig. 12 **R-F UNIT ALIGNMENT** If unit is completely out of adjustment, preset all adjustments to center of range with following exceptions. Set C18 so that head is 3/6" above chassis. Set C11 14 turn from max clockwise. Disconnect link from T104 and terminate with 39 ohms. Short r-f unit power terminal 3 to ground. Set fine tuning 30 degrees clock-5 wise from mechanical center of its range for all oscillator adjustments. Grid, pin 7 of 43.5 mc. V2 through 1500 30% mod TP1. Gain to maxi-Set r.f unit on chan-nel 2 L65 for min. indication Fig. 7 Fig. 10 6 Not used Not used mum on scope mmf. Cl-KRK11, or C2-KRK-11A for beat on freq. meter Loosely to r-f unit oscillator 227 mc. R-F unit on channel 8 Not used Fig. 7 7 Not used ____ Not used _ C9. C11. C15 and C18 8 Antenna termi-nals loosely 181.25 Antenna termi-nalsthrough pad Channel Not used TPL. Gain to maxi-R-F unit on channel 8 Fig. 7 Fig. 13 Set Tl max. counter-clockwise for response shown in in Fig. 13 and 185.75 8 mum L5 for beat on het. freq. Fig. 8 Loosely to r-f unit oscillator 129 mc. R-F unit on channel 6 9 Not used Not used Not used _ _ meter L48, L50 and L53 for Fig. 7 Fig. 13 TP1. Gain to maxi 83.25 Channel Not used 10 Antenna termi-nals loosely Antenna termiresponse shown in Fig. 13 nals through pad mum and 87.75 6 C8 for -3.5 volts on On channel 6. Con-nect "VoltOhnyst" Fig. 7 11 Not used _ Not used Not used Not used nect to TP1 meter Check response. Read-just L48, L50 and L53 if Fig. 7 Fig. 13 83.25 TP1. Gain to maxi-R-F unit on channel 6 12 Antenna termi Antenna termi-Channel Not used nals through pad nals loosely mum and 87.75 6 necessary Cl-KRK11, or C2-KRK-11A for beat on freq. Loosely to r-f 227 mc Not used R-F unit on channel 8 Fig. 7 13 Not used Not used meter ... Check response adjust C9 Cl1, C15 and C18 TP1. Gain to maxi Fig. 7 14 Antenna termi-nals loosely 181.25 Antenna termi-nals through pad Channel Not used _ mum and 185.75 if necessary 15 If C9 was readjusted in step 14, repeat step 11, step 13 and step 14 until the conditions specified in each step are fulfilled without additional adjustments. Loosely to r-f unit oscillator L46 for beat on het. 257 mc. Rec. on channel 13 Fig. 7 16 Not used Not used Not used freq. meter. Overshoot L46 slightly and adjust C1-KRK11 or C2-KRK-11A for beat 17 TP1. Gain to maxi-Rec. on channel 13 "VoltOhmyst" on TP1 Check to see that re-Fig. 13 211.25 Channel 13 Not used Antenna termi-Antenna termisponse is correct and -3.0 volts of osc. injecnals loosel 215.75 nals through pad mum tion is present ... 205.25 209.75 11 ... Rec. on channel 12 Fig. 13 18 Channel Not used 12 19 .. 199.25 ., " " Rec. on channel 11 " Fig. 13 Channel 203.75 20 ... 193.25 197.75 Rec. on channel 10 .. Fig. 13 Channel 10 ... 187.25 191.75 Fig. 13 21 Rec. on channel 9 Channel ~ 11 " ... Fig. 13 22 181.25 Rec. on channel 8 Channel 185 75 23 ... 175.25 " Rec. on channel 7 11 Fig. 13 Channel If the response of any channel (steps 17 through 23) is below 80% at either marker, adjust C9, C11, C15 and C18 as necessary to pull response up on the low channel 24 yet maintain correct response on channel 8. Repeat step 13. If the oscillator is off frequency overshoot the adjustment of Cl in KRK11 or C2 in KRK11A and correct by adjusting L46. 25 26 Repeat steps 16 through 25 until all adjustments are obtained. Loosely to r-f unit oscillator L5 for beat on het, freq. Fig. 7 27 Not used Not used 129 mc. Not used Rec. on channel 6 meter Adjust T1 core clock-28 Antenna termi-nals loosely 55.25 59.75 Antenna termi-nalsthrough pac Channel Not used TP1. Gain to maxi-Rec. on channel 2 Fig. 7 wise to a point at which channel 2 response does mum not change " .. Rec. on channel 6. "VoltOhmyst" on TP1 Check to see that re-Fig. 7 Fig. 13 29 .. Channel Not used 83.25 87.75 sponse is correct and -3.0 volts of osc. injection is present ,, ... "

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Channel

Channel

Fig. 13

Fig. 13

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Rec. on channel 5

Rec. on channel 4

...

TEST PATTERN PHOTOGRAPHS



Figure 20-Normal Picture

Figure 21-Focus Magnet and Ion Trap Magnet Misadjusted





Figure 22-Horizontal Linearity Control Misadjusted (Picture Cramped in Middle) · 111

Figure 23-Width Control Misadjusted



B



Figure 25—Transients ----





Figure 26-Test Pattern Show ing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position-Just Before Pulling Into Sync ----

Figure 27-Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position

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21T159, 21T159DE, 21T165 21T166DE, 21T174DE, 21T175DE 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

Following is a list of symptoms of possible failures and an indication of some of the possible faults:

NO RASTER ON KINESCOPE:

- (1) Incorrect adjustment of ion trap magnet. Magnet reversed either front to back or top to bottom.
- (2) V116 or V117 inoperative. Check waveforms on grids and plates.
- (3) No high voltage---if horizontal deflection is operating as evidenced by the correct waveform on terminal 1 of high voltage transformer, the trouble can be isolated to the 1B3GT circuit. Either the T115 high voltage winding is open, the 1B3GT tube is defective, its filament circuit is open or C197 is shorted.
- (4) V110 circuit inoperative-Refer to schematic and waveform chart.
- (5) Damper tubes (V119 or V120) inoperative.
- (6) Defective kinescope. (7) B218 open
- (8) No receiver plate voltage-filter capacitor shorted-or filter choke open

NO VERTICAL DEFLECTION:

- (1) V114B or V115 inoperative. Check voltage and waveforms on grids and plates.
- (2) T111 or T112 open. (3) Vertical deflection coils open.

SMALL RASTER: (1) Low Plus B or low line voltage. (2) V117 defective

POOR VERTICAL LINEARITY:

- (1) If adjustments cannot correct, change V115.
- (2) Vertical output transformer T112 defective.
- (3) V114B defective-check voltage and waveforms on grid and plate.
- (4) C170, C171, C201D or C202B defective. (5) Low plate voltage-check rectifiers and capacitors in supply circuits
- (6) If height is insufficient try changing V114.

POOR HORIZONTAL LINEARITY:

- (1) If adjustments do not correct, change V117, V119 or V120. (2) T115 or L107 defective.
- (3) C195 or C219 defective.

WRINKLES ON SIDE OF RASTER:

(1) C193 defective. (2) Defective yoke.

PICTURE OUT OF SYNC HORIZONTALLY:

- (1) T114 incorrectly tuned. (2) R226, R227 or R201B defective.

TRAPEZOIDAL OR NON SYMMETRICAL RASTER:

- (1) Improper adjustment of focus magnet or ion trap magnet. (2) Defective yoke.
- RASTER AND SIGNAL ON KINESCOPE BUT NO SOUND:
- (1) T110 defective.
 - (2) Sound i-f, ratio detector or audio amplifier inoperative
 - check V101, V102, V103 and their socket voltages.
 - (3) Audio system defective.
 - (4) Speaker defective.

CRITICAL LEAD DRESS:

- 1. Keep all wiring in the pix i-f, sound i-f and video circuits as short as possible.
- Keep the leads on C110, C111, C112, C200, R109, R110, 2. R111, R112, R114, R115 and R233 as short and direct as possible.
- 3. Do not change the bus wire connection to pin 2 of V101 and V102. Sleeving is used on these wires to insure length and to prevent shorting.
- 4. Dress C114 down between R117 volume control) and wafer S101-2.
- 5. Ground R130 to pin 3 of V106 and R138 to pin 7 of V107.

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SERVICE SUGGESTIONS

SIGNAL AT KINESCOPE GRID BUT NO SYNC:

(1) AGC control R175 misadjusted.

(2) V111, inoperative. Check voltage and waveforms at its grid and plate

SIGNAL ON KINESCOPE GRID BUT NO VERTICAL SYNC:

(1) Check V114B and associated circuit-C165, etc.

(2) Integrating network inoperative-Check.

(3) V113 or V114A defective or associated circuit defective.

(4) Gas current grid emission or grid cathode leakage in V114. Replace

SIGNAL ON KINESCOPE GRID BUT NO HORIZONTAL SYNC:

(1) T114 misadjusted-readjust as instructed on page 11. (2) V112 or V113 inoperative-check socket voltages and wave-

(3) T114 defective.

forms

(4) C215, C157, C181A, C182, C183, C184, C185, C186 or C187 defective.

(5) If horizontal speed is completely off and cannot be adjusted check R226, R227, R201B, R229, R230 and R231.

SOUND AND RASTER BUT NO PICTURE OR SYNC:

(1) Picture, detector or video amplifier defective-check CR101 and V110-check socket voltages. (2) Bad contact to kinescope cathode.

PICTURE STABLE BUT POOR RESOLUTION:

(1) CR101 or V110 defective.

(2) Peaking coils defective-check resistance.

(3) Make sure that the focus control operates on both sides of proper focus.

(4) R-F and I-F circuits misaligned.

PICTURE SMEAR:

(1) R-F or I-F circuits misaligned.

(2) Open peaking coil.

(3) This trouble can originate at the transmitter-check on another station.

PICTURE IITTER:

V117

sync.

(1) AGC control R175' misadjusted.

(2) If regular sections at the left picture are displaced change

(3) Vertical instability may be due to loose connections or noise. (4) Horizontal instability may be due to unstable transmitted

RASTER BUT NO SOUND, PICTURE OR SYNC:

(1) Defective antenna or transmission line. (2) R-F oscillator off frequency. (3) R-F unit inoperative—check V1, V2.

DARK VERTICAL LINE ON LEFT OF PICTURE:

(1) Reduce horizontal drive and readjust width and horizontal linearity

(2) Replace V117.

LIGHT VERTICAL LINE ON LEFT OF PICTURE:

(1) C193 defective. (2) V119 or V120 defective

6. Do not change the grounding of R141, R146 and R149.

7. Keep the bus wire from T109-A to C146 (plug in capacitor) short and direct.

8. Ground the filaments of sockets of V107, V108 and V109 independently of the socket center pin. Use ground lances provided near each socket.

9. Dress C198 straight up to act as a shield between T101-A and V110-4.

10. Dress C153 and R170 (kine cathode) up in the air above the terminal board

ALIGNMENT TABLE

21T166DE, 21T174DE, 21T175DE 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

21T159, 21T159DE, 21T165

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						_				
Step No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT HETERODYNE FREQ. METER TO	HET. METER FREQ. MC.	CONNECT OSCILLOSCOPE TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
32	.,	61.25 65.75	"	Channel 3	"		"	Rec. on channel 3	**	Fig. 13
33	11	55.25 59.75		Channel 2		—	"	Rec. on channel 2	"	Fig. 13
34	If excessive tilt in L53 for max. amp	n the same plitude of r	direction occurs or esponse between c	arrier marke	, 3 and 4, adjust Cl rs.	8 on chann	nel 2 to overshoot the	correction of this tilt th	nen switch to channel 6 ar	nd adjust
35	Check r-f respon	se and osci	llator injection on	channels 7 t	hrough 13 steps 23	back up th	rough step 17 stoppi	ng on channel 13 for th	e next step.	
36	Not used	-	Not used	-	Loosely coupled to r-f oscillator	257 mc.	TP1. Gain to maxi- mum	Rec. on channel 13	Cl-KRK11 or C2-KRK- 11A for beat on het. freq. meter	Fig. 7
37		-	"	-	"	251 mc.	"	Rec. on channel 12	Lll as above	Fig. 7
20		_		_	"	245 mc.	"	Rec. on channel 11	L10 as above	Fig. 7
30			"		"	239 mc.		Rec. on channel 10	L9 as above	Fig. 7
39			,,			233 mc		Bec. on channel 9	L8 as above	Fig 7
40			"			227 mc	17	Rec. on channel 8	1.7 as above	Fig 7
41						221	"	Reg. on ohannel 7	T6 as above	Fig. 7
42	"					221 mc.	"	nec. on channel 7	Lo as above	Fig. 7
43	"					129 mc.		Rec. on Channel 6	L5 as above	Fig. 7
44	"	-	"			123 mc.		Rec. on channel 5	L4 as above	Fig. 7
45			"		"	113 mc.	"	Rec. on channel 4	L3 as above	Fig. 7
46		-	"		"	107 mc.	"	Rec. on channel 3	L2 as above	Fig. 7
47	11	_	"		"	101 mc.	11	Rec. on channel 2	Ll as above	Fig. 7
40	Report stone 35 t	brough 46	as a check. On co	ompletion, re	move 39 ohm resist	or and rec	onnect link to termin	als A and B of T104.		
40		intough to	RATI	O DETECT	OR, SOUND I-F AN	ND SOUNI	D TAKE-OFF ALIGN	MENT		
49	Grid. 2nd Snd. I-F (pin 1, V102) or WR39B or C connect to grid 4th pix I-F (pin 1, V109)	4.5 mc. 400 cy. mod. or 45.75 mc. mod. by 4.5 mc. and 400 cy.	Not used	-	Not used		Across speaker voice coil. Volume control set for max. volume	"VoltOhmyst" to junction of R110 and R114. Set C226 for min. capacity. Set signal gen. to give -10 V on meter.	T102 top core for max. d-c on meter. T102 bot- tom core for min. audio on the oscilloscope.	Fig. 9 Fig. 10
50			"	-		—	"	"VoltOhmyst" to jun the meter reads more C226 for zero on the (bot.) for min. output and 49 until all condi	ction R112 and C113. If than \pm 1.5 volts, adjust meter and readjust T102 on scope. Repeat steps 48 tions are satisfied.	Fig. 9 Fig. 10
51	Sig. Gen. to 1st Snd. I-F	4.5 mc.	lst Sound I-F grid (pin 1, V101)	4.5 mc.	"	—	In series with 10,- 000 ohms to termi- nal A, of T101	Sweep output re- duced to provide 2 v p-p on scope.	T101 top and bot. cores for max. gain and sym- metry at 4.5 mc.	Fig. 9 Fig. 10 Fig. 14
52		"	11			—	Junction of R112 and C113	Check for symmetric (positive and negative	cal response wave-form a).	Fig. 15
53	Sig. Gen. in se- ries with 1000 ohms to T110-C or WR39 across T104 A and B	"	Not used	-	,,			"VoltOhmyst" xtal probe to pin 8, V110. If sig. gen. is used short pin 1, V109 to ground.	Adjust T110 for mini- mum reading on ''Volt- Ohmyst''	Fig, 9
				I	PICTURE I-F AND	TRAP ADJ	USTMENT			
54	Not used	-	Not used	-	Not used	-	Not used .	Connect bias box and tion of R143 and R144	d "VoltOhmyst" to junc- and to gnd. Adjust bias	
55	Sig. Gen. across T104 A and B	39.25 mc.		-		-	11	"VoltOhmyst" to pin 4, V110. Gen. output	T104 top core to give min. d-c on meter.	Fig. 9
							17	v give - 1.0 volt d-c.	TIOS bot for m	Fig. 10
56	"	41.25 mc.				-			TIOS DOL IOF min.	Fig. 10
57	"	47.25 mc.				-			1106 bot. for min.	Fig. 10
58	"	43.7 mc.	"	-	"	-	"	Sig. Gen. output to give -1.0 V dc at Pin 4, V110.	T109 for max.	Fig. 7
59	"	45.5 mc.		_	**	_ 1	"	"	T108 for max.	Fig. 9
60	"	41.8 mc							T107 for max.	Fig. 9
61	First pix i-f grid (pin 1, V106) loosely	Various See Fig. 16	First pix i-f grid pin 1, V106 through 1000	40 to 48 mc.		-	To pin 4 of V110	Shunt R141, R149 and terminals A and F of T109 with 330	Adjust T105 and T106 top cores for max. gain and response shown in	Fig. 9 Fig. 16
62	Connected loosely to diode probe	Various See Fig. 17	mmf. Mixer grid test point TP2 with short lead	40 to 48 mc.			Scope diode probe to T105-B and to gnd.	Rec. on chan. 4. Con- nect 180 ohms from T105-B to junction R135 and C132. Upon completion discon- nect scope and shunt-	Set C221 to min. Adjust T1 top and T104 bot. for max. gain at 43.5 mc. and 45.75 mc. at 70%. Adjust C221 until 41.25 mc. is at 80%.	Fig. 9 Fig. 17
63	Connected loosely to grid of lst pix i-f	Various See Fig. 18				_	Connect scope to pin 4 of V110	"VoltOhmyst" to pin 4, VIIO. Set bias box for -6.0 volts on the meter. Set sweep output to produce 3.0 volts p-n on score	Retouch T108 and T109 to obtain response shown in Fig. 18. Do not adjust T107 unless absolutely necessary.	Fig. 18

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Figure 7-R-F Unit Adjustments



Figure 8-R-F Oscillator Adjustments



Figure 9-Top Chassis Adjustments



Figure 10-Bottom Chassis Adjustments

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Figure 19—Horizontal Oscillator Waveforms

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SERVICE SUGGESTIONS

- 11. Keep the leads connected to T114-C and T114-D (synchroguide) down so that they will not short out when the chassis is placed in the cabinet.
- 12. Do not reroute any wires between T104 and the terminal board along side it.
- Dress all wires routed past T104, shielded wires W102 and W103 under the big lances near T104.
- Dress all a-c leads to S102 under the large lances on the front apron and away from R243.
- 15. Dress R116 close to the chassis using short leads.
- 16. Dress C206, C221 and C212 up in the air and away from all other leads and components.
- 17. Dress all leads away from bleeder resistor R243.

18. The blue lead from pin 5 of V111 to the terminal board under the high voltage cage should be routed between V117 socket and the rear apron.

21T159, 21T159DE, 21T165 21T166DE, 21T174DE, 21T175DE

21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

- 19. Keep leads on C214 as short and direct as possible.
- Dress R206 away from all other wires and components to prevent excessive heating.
- Keep the wire from the vertical output transformer T114 away from the 5U4G rectifier tubes.
- 22. Dress all 2 watt resistors away from each other and all other wires and components.
- 23. Dress all wires away from damper tubes V119 and V120.
- 24. Keep blue wire from pin 5 V116 to T114-A under 5" long.
- 25. Dress all peaking coils up and away from the base.

PICTURE I-F RESPONSE

It may be desirable to observe the individual i-f stage response. To do this use the following method:

For T107, T108 or T109, shunt all i-f transformers with a 330 ohm carbon resistor except the one to be observed.

Connect a wide band sweep generator to the second pix i-f grid and adjust it to sweep from 38 mc. to 48 mc.

Connect the oscilloscope to TP102 and observe the overall response. It will essentially be that of the unshunted stage.

To see the response of transformers T1, T104 and T105, T106, follow the instructions given on page 10.

Figures 28 through 36 show the response of the various stages obtained in the above manner. The curves shown are typical although some variation between receivers can be expected.



Figure 28—Overall Pix I-F Response



Figure 31—Response of T107 Pix I-F Transformer



Figure 34—Video Response at Average Contrast



RESPONSE PHOTOGRAPHS

Figure 29—Response of T1-T104 Pix I-F Transformers



Figure 32—Response of T108 Pix I-F Coil



Figure 35—Video Response (100 KC Square Wave)



Figure 30—Response of T105-T106 Pix I-F Transformer



Figure 33—Response of T109 Pix I-F Coil



Figure 36—Video Response (60 Cycle Square Wave)

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WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

Grid of 1st Video Amplifier (Pin 4 of V110) (6AG7)

Figure 37—Vertical (Oscilloscope Synced to ½ of Vertical Sweep Rate) (5.5 Volts PP)

Figure 38—Horizontal (Oscilloscope Synced to ½ of Horizontal Sweep Rate) (5.5 Volis PP)





Plate of 1st Video Amplifier (Pin 8 of V110) (6AG7) Voltage depends on picture Figure 39—Verticat (110 Volts PP)

Figure 40—Horizontal (110 Volts PP)





Voltage depends on picture

Figure 41—Vertical (75 Volts PP)

Figure 42—Horizontal (75 Volts PP)



Figure 43—Plate of Sync Separator (Pin 5 of V113) (6SN7) (35 Volts PP) Voltage depends on picture

Figure 44—Cathode of Sync Separator (Pin 6 of V113) (6SN7) (10 Volts PP)

Figure 45—Grid of Vert. Sync Amplifier (Pin 4 of V114A) (6SN7) (12 Volts PP)

Figure 46—Plate of Vert Sync Amplifier (Pin 5 of V114A) (6SN7) (100 Volts PP)

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WAVEFORM PHOTOGRAPHS Taken from RCA WO58A Oscilloscope

Figure 47—Grid of Vertical Oscillator (Pin 1 of V114B) (6SN7) (135 Volts PP)

> Figure 48—Plate of Vertical Oscillator (Pin 2 of V114B) (6SN7) (105 Volts PP)

Figure 49—Grid of Vertical Output (105 Volts PP) (Pin 1 of V115) (6AQ5)

Figure 50—Plate of Vertical Output (900 Volts PP) (Pin 5 of V115) (6AQ5)

Figure 51—Cathode of Vertical Output (1.0 Volts PP) (Pin 2 of V115) (6AQ5)

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Figure 52—Grid of Kinescope (Pin 2 of V121) (12 Volts PP)

Cathode of Sync Separator (Pin 3 of V113) (6SN7)

Figure 53—Vertical (15 Volts PP)

Figure 54—Horizontal (8 Volts PP)

Grid of Sync Separator (Pin 1 of V113) (6SN7)

Figure 55-Vertical (110 Volts PP)

Figure 56—Horizontal (110 Volts PP)

21T159, 21T159DE, 21T165 21T166DE, 21T174DE, 21T175DE 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

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e.













CV 147C









WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

Plate of Sync Separator (Pin 2 of V]13) Figure 57—Vertical (30 Volts PP)

Figure 58—Horizontal (30 Volts PP)

Grid of Hor Sync Amp (Pin 4 of V112) (6SN7) Figure 59—Vertical (30 Volts PP)

Figure 60—Horizontal (30 Volts PP)

Plate of Hor Sync Amp (Pin 5 of V112) (6SN7) Figure 61—Vertical (85 Volts PP)

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Figure 62—Horizontal (85 Volts PP)

Grid of Hor Sync Amp (Pin 1 of V112) (6SN7)

Figure 63—Vertical (75 Volts PP)

Figure 64—Horizontal (75 Volts PP)

Cathode of Hor Sync Amp (Pin 3 of V112) (6SN7)

Figure 65—Vertical (18 Volts PP)

Figure 66—Horizontal (18 Volts PP)

WAVEFORM PHOTOGRAPHS Taken from RCA WO58A Oscilloscope

CV 149A

Figure 67—Grid of Horizontal Oscillator Control (25 Volts PP) (Pin 1 of V116) (6SN7GT)

Figure 68—Cathode of Horizontal Oscillator Control (1.3 Volts PP) (Pin 3 of V116) (6SN7GT)



Figure 69—Grid of Horizontal Oscillator (550 Volts PP) (Pin 4 of V110) (6SN7GT)

Figure 70—Plate of Horizontal Oscillator (290 Volts PP) (Pin 5 of V116) (6SN7GT)

CV 149E

CV 149E

Figure 74-C

CV150A



Figure 71—Terminal "C" of T114 (150 Volts PP)

Figure 72—Grid of Horizontal Output Tube (140 Volts PP) (Pin 5 of V117) (6CD6G)

Figure 73—Plate of Horizontal Output (Approx. 5400 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V117 to Ground)

Figure 74—Cathode of Damper (2300 Volts PP) (Pin 3 of V119) (6W4GT)

Figure 75—Plate of Damper (100 Volts PP) (Pin 5 of V119) (6W4GT)

Figure 76—Plate of AGC Amplifier (Pin 5 of V111) (6CB6) (700 Volts PP) 21T159, 21T159DE, 21T165 21T166DE, 21T174DE, 21T175DE 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE











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VOLTAGE CHART

The following measurements represent two sets of conditions. In the first condition, a 5000 microvolt test pattern signal was fed into the receiver, the picture synchronized and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV97A senior "VoltOhmyst" between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c.

Tube	Tube		Operating	E.	Plate	E. S	Screen	E. C	athode	E.	Grid	T	T	Net
No.	Туре	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Plate (ma.)	Screen (ma.)	Measurements
V1	6X8	Mixer	5000 Mu. V. Signal	9	160	8	160	6	0	7	-2.4 to -3.0	_		
			No Signal	9	145	8	145	6	0	7	-2.8 to -3.5	_	_	
V 1	6X8	R-F Oscillator	5000 Mu. V. Signal	3	9 5	-	_	6	0	2	-3.8 to -5.5		_	
			No Signal	3	90	_	_	6	0	2	-3.0 to -5.1			
V2	6BQ7	R-F Amplifier	5000 Mu. V. Signal	6	170		_	8	0.1	7		_	-	
			No Signal	6	133	-	-	8	1.1	7	0	_	-	
V2	6BQ7	R-F Amplifier	5000 Mu. V. Signal	1	270			3	170	2				
			No Signal	1	260		_	3	133	2	_	_	_	Depending on channel
V 101	6AU6	lst Sound I-F Amp.	5000 Mu. V. Signal	5	127	6	124	7	0.7	1	-0.4	6.0	3.0	
			No Signal	5	126	6	123	7	0.5	1	-1.2	5.0	3.0	
V 102	6AU6	2d Sound I-F Amp.	5000 Mu. V. Signal	5	132	6	60	7	0.14	1	-10	2.8	1.2	
			No Signal	5	131	6	65	7	0.14	1	-5	2.0	1.0	
V103	6AL5	Ratio Detector	5000 Mu. V. Signal	7	1.0		-	1	9.2	_	_	_		
	15		No Signal	7	0		_	1	8.0	-	_		_	
V104	6AV6	lst Audio Amplifier	5000 Mu. V. Signal	7	90		-	2	0	1	0.7	0.45	_	At min.
			No Signal	7	86			2	0	1	-0.7	0.45	_	volume
V105	6AQ5	Audio Output	5000 Mu. V. Signal	5	350	6	360	2	150	7	116	30.0	2.0	Āt min.
			No Signal	5	346	6	356	2	145	7	114	30.0	2.0	volume
V106	6AU6	lst Pix. I-F Amplifier	5000 Mu. V. Signal	5	180	6	230	7	0.15	1	-6.5	1.5	0.3	
			No Signal	5	97	6	129	7	1.0	1	0	7.0	3.0	
V 107	6CB6	2nd Pix. I-F Amplifier	5000 Mu. V. Signal	5	236	6	233	2	0.1	1	-6.5	1.5	0.14	
			No Signal	5	226	6	138	2	0,85	1	0	12.0	3.0	
V108	6CB6	3d Pix. I-F Amplifier	5000 Mu. V. Signal	5	149	6	144	2	0.9	1	0	11.0	3.0	
			No Signal	5	129	6	133	2	0.8	1	0	10.0	2.0	
V 109	6CB6	4th Pix. I-F Amplifier	5000 Mu. V. Signal	5	178	6	163	2	2.2	1	0	8.9	2.1	
			No Signal	5	165	6	150	2	2.0	1	0	7.9	2.1	
V 110	6AG7	Video Amplifier	5000 Mu. V. Signal	8	130	6	172	5	1.2	4	*-5.0	22.5	5.5	*Depends on picture
			No Signal	8	130	6	107	5	0.8	4	*2.0	15.0	4.0	*Depends on picture

VOLTAGE CHART

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			0	E. 1	Plate	E. S	Screen	E. C.	athode	E.	Grid	т	T	Notes on	
Tube No.	Tube Type	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Plate (ma.)	Screen (ma.)	Measurements	
V111	6CB6	AGC Amplifier	5000 Mu. V. Signal	5	-27	6	238	2	152	1	155	0.1	3.4	AGC control set for	
			No Signal	5	4.5	6	218	2	135	1	118	0	0	operation	
V112	6SN7GT	Hor. Sync Amplifier	5000 Mu. V. Signal	2	152	_	_	3	0.9	1	-44	1.1	_		
			No Signal	2	135	_	_	3	*0.4	1	*-30	0.5	_	*Depends on noise	
			5000 Mu. V. Signal	5	86	_		6	0	4	-2.0	5.5	_		
			No Signal	5	50	-	_	6	0	4	-1.8	4.6	_		
V113	6SN7GT	Hor. Sync Separator	5000 Mu. V. Signal	2	374		_	3	216	1	155	1.2	_		
			No Signal	2	372		_	3	155	1	134	0.8	_		
V113	6SN7GT	Vert. Sync Separator	5000 Mu. V. Signal	5	345	_	_	6	205 [.]	4	135	< 0.1	_		
			No Signal	5	340	_		6	160	4	130	< 0.1	_		
V1148	6SN7GT	Vert. Sync Amplifier	5000 Mu. V. Signal	5	7.0		_	6	0	4	-0.2	0.6	_		
1146	obiir ar	Thipmer	No	5	*7.0			6	0	4	*0	0.5	_	*Depends on noise	
V114B	6SN7GT	Vertical Oscillator	5000 Mu. V. Signal	2	176	_	_	3	0	1	-27	0.2	_		
			No Signal	2	176	-	_	3	0	1	-27	0.2			
V115	6AQ5	Vertical Output	5000 Mu. V. Signal	5	359	6	359	2	30	r	0	17.3	1.2		
			No Signal	5	357	6	357	2	29	1	0	17.3	1.2		
V116	6SN7GT	Horizontal Osc. Control	No Signal	2	188	_	_	3	-24	1	-42	0.37			
			5000 Mu. V. Signal	2	145	_	_	3	-18	1	-42	0.4	_	Hor. hold coun- ter-clockwise	
			5000 Mu. V. Signal	2	230		_	3	-18	1	-42	0.4	_	Hor. hold clockwise	
V116	6SN7GT	Horizontal Oscillator	5000 Mu. V. Signal	5	258	_	_	6	0	4	*91	2.0		Depends on Oscillator	
			No Signal	5	256		_	6	0	4	*-94	2.0	_	Adjustment	
V117	6CD6G	Horizontal Output	5000 Mu. V. Signal	Cap	*	8	165	3	12.5	5	-30	110	15.0	*High Voltage	
			No Signal	Cap	*	8	165	3	12.5	5	-30	110	15.0	Pulse Present	
V118	1B3GT /8016	H. V. Rectifier	5000 Mu. V. Signal	Cap		_	_	2&7	16,000	-	_	0.2	_	*High Voltage	
			No Signal	Cap		_	_	2&7	16,400	_	_	0.2	_	Pulse Present	
V119 V120	6W4GT	Dampers	5000 Mu. V. Signal	5	355	_	_	3	*	_	_	57		*High Voltage	
			No Signal	5	353		_	3	*	_	_	57	_	Pulse Present	
V 121	21AP4	Kinescope	5000 Mu. V. Signal	Cone	16,000	10	555	11	140	2	82	0.2	_	At average	
			No Signal	Cone	16,400	10	550	11	132	2	76	0.2		Brightness	
V122 V123	5U4G	Rectifiers	5000 Mu. V. Signal	4&6	388	_	_	2&8	389	_	_	*139		Per	
		1	No Signal	4&6	386	_	_	2&8	387	_		*145		TUDE	



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196 --- 197 21T159DE, 21T166DE 21T174DE, 21T175DE 21T178DE, 21T179DE



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R-F UNIT WIRING DIAGRAMS

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Figure 79-KRK11 R-F Unit Wiring Diagram



Figure 80-KRK11A R-F Unit Wiring Diagram

CIRCUIT SCHEMATIC DIAGRAM, KCS68F



condition at the time of printing. All resistance values in ohms. K = 1000.

and above 1 in MMF unless otherwise noted. clockwise rotation.

The schematic is snown in the latest All capacitance values less than 1 in MF Direction of arrows at controls indicates

All voltages measured with "VoltOhmyst" Figure 81—Circuit Schematic and with no signal input. Voltages should 30 hold within $\pm 20\%$ with 117 v. a-c supply.

M5 708

MULTIPLIER



CIRCUIT SCHEMATIC DIAGE M, KCS68C, KCS68E

21T159DE, 21T166DE 21T174DE, 21T175DE 21T178DE, 21T179DE



F101 and R253. In some receivers a 270 mmf. capacitor C217 was connected from the junction of R253 and F101 to ground. In early production r-f units, C10 was 330 mmf., C8 was 0.8 ± 1.4 mmt., C3 was 12 mmf. and L47 was shown as a coil. TP2 was connected at the junction of L47 and C9. Early production r-f units are unmarked. Late productior, r-f units are marked M1. Replacement parts are affected.

The schematic is shown in the latest condition at the time of printing. All resistance value in ohms, K = 1000. 31

All capacitance values less than I in FM and above 1 in MMF unless otherwise noted.

clockwise rotation.

Diagram, KCS68F



203-204 21T159, 21T165 21T176, 21T177

Direction of arrows at controls indicates

All voltages measured with "VoltOhmyst" Figure 82—Circuit Schematic and with no signal input. Voltages should Diagram, KCS68C, KCS68E 32 hold within $\pm 20\%$ with 117 v. a-c supply.

21T159, 21T159DE, 21T165 REPLACEMENT PARTS 21T166DE, 21T174DE, 21T175DE

21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	BE UNIT ASSEMBLIES	504410	100.000 ohms. + 20% 1/2 watt (B1, B5, B6)
	KRK11, KRK11A	504447	$470.000 \text{ ohms}, \pm 20\%, \frac{1}{2} \text{ watt} (R, R)$
76520	Board Entenna matching transformer terminal heard less	14343	Retainer—Fine tuning shaft retaining ring
/0000	coils L58, L59, L60 and less capacitors C24, C25, C26, C27	75164	Rod—Actuating plunger rod (fibre) for fine tuning link
76531	Board—Terminal board, 5 contact and ground	76547	Screw-#4-40 x 1/4" adjusting screw for coils L6, L7, L8, L9,
76522	Bracket—Vertical bracket for holding 6X8 tube shield (early production KRK11)	76548	L10, L11 Screw—#4-40 x 5/16" adjusting screw for coils L1, L2, L3,
76845	Bracket—Vertical bracket for holding 6X8 tube shield (pro- duction marked "M1" or KRK11A)	76549	L4, L46 Screw—#4-40 x ¾" adjusting screw for coil L5
75186	Capacitor—Ceramic, variable for fine tuning—plunger type	76519	Shaft—Channel selector shaft and plate
76965	(KRK11) Capacitor—Ceramic variable for fine tuning—nlunger type	76134	Shaft—Fine tuning shaft and cam
92056	(C2) (KRK11A) (C2) (KRK11A)	76518	Shield—Front shield complete with shaft bushing and bracket (KRK11)
70597	Capacitor—Ceramic, 8 mmf. (C29)	77147	Shield—Front shield complete with shaft bushing and bracket. KBK11A
55326	Capacitor-Ceramic, 10 mmf. (C3) (production marked	76534	Shield—Tube shield for V2 (also V1 in M1 production)
76550	Capacitor—Ceramic, 12 mmf. (C3) (early production	76533	Shield—Tube shield (lead coated) for V1 (early production KRK11)
54207	KRK11) Capacitor—Ceramic, 18 mmf, (C27)	76336	Socket—Tube socket, 9 pin, miniature, bakelite, saddle
76557	Capacitor—Ceramic, 22 mmf. (C19) (C31, KRK11A)	76530	Socket—Tube socket, 9 pin, miniature, ceramic, saddle
76558	Capacitor—Ceramic, 22 mmf. (C5)	75191	Spacer—Insulating spacer for front plate (4 reg'd)
70935	Capacitor—Ceramic, 27 mmi. (C25)	77149	Spacer—Metal spacer for front plate, KRK11A
76527	Capacitor—Mica trimmer, 55-80 mmf. (C11)	75163	Spring—Friction spring (formed) for fine tuning cam
77460	Capacitor-Ceramic, 220 mmf. (C10) (KRK11A)	30340	Spring—Hairpin spring for fine tuning link
75199	Capacitor-Ceramic, 270 mmf. (C12, C14)	76523	Spring-Retaining spring for 6X8 tube shield (early pro-
76552	Capacitor—Ceramic, 330 mmf. (C10) (early production KRK11)	75068	Spring—Retaining spring for oscillator-mixer tube shield
75198	Capacitor-Ceramic, 470 mmf. (C10) (production marked	73457	(production marked "MI" and KRKIIA)
75166	(cla cla cla cla cla cla cla cla cla cla	77204	Spring—Return spring for fine tuning control, KRK11Å
/5100	C22, C28)	76554	Stator—Antenna stator complete with rotor, coils, capacitor
73748	Capacitor—Ceramic, 1500 mmf. (C16, C20, C23)	76551	and resistor (SIE, L42, L43, L44, L45, L54, L55, C20)
75610	Capacitor—Ceramic, 1500 mmf. (C6)	76551	tors and resistors (S1B, L12, L13, L14, L15, L16, L17, L18,
75184	Capacitor—Ceramic, 0.00 mmil. (C7) Capacitor—Ceramic, adjustable, 0.75-4 mmf., complete with		L19, L20, L21, L48, C10, C12, R4, R5, R6 (early production KRK11)
	adjusting stud (C1, C9)	76780	Stator-Converter stator complete with rotor, coils, capaci-
76545	Capacitor—Tubular, steatite, adjustable, 0.8—2.25 mmf. (C8) (early production KRK11)		tors and resistors (S1B, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L48, C10, C12, R4, R5, R6) (production
76781	Capacitor—Tubular, steatite, adjustable 0.8—2.25 mmf. (C8) (production marked "M1" KRK11)	77353	Stator-Converter stator complete with rotor coils capaci
77151	Capacitor—Tubular, steatite, adjustable, 0.8—3.0 mmf. (C8) (KBK11A)		tors and resistors (SIB, C10, C12, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L47, L48, B4, B5, B6) (KBK11A)
76532	Capacitor—Adjustable trimmer, stratite, 1.0—4.0 mmf. (C18)	76546	Stator—Oscillator stator complete with rotor, coils and ca- pacitor (S1A, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10,
76143	Clip—Tubular clip for mounting stand-off capacitors	76779	Stator-Oscillator stator complete with rotor coils and ca
73591	Coil—Channel #13 converter coil (L47) (early production		pacitor (SIA, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L46) (production marked "M1" KBK11)
70477	KRK11)	77205	Stator-Oscillator stator complete with rotor, coils and ca-
75762	Coll-Choke coll (L57)		pacitors (SIA, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9,
77206	Coil—Filament choke coil (L56) (KRK11Å)	76556	Stator-R-F grid stator complete with rotor coils and resis.
76562	Coil—R-F amplifier coupling coil (L51)		tors (S1D, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41,
77153	Coil-R-F choke coil (L66) (KRK11A)	76552	L53, C19, R11, R12) Stater, B.F. plate stater complete with rates, calls, conseitant
76537	Coil—Shunt coil complete with adjustable core (L61)	76555	and resistor (SIC, L22, L23, L24, L25, L26, L27, L28, L29,
76538	Coil—Shunt coil complete with adjustable core (L62)		L30, L31, L50, C14, R7)
76529	core and capacitor stud (screw adjustment) for r-f sec-	76526	Strap—Channel #13 r-t grid strap (L52) Strip—Coil segment mounting strip—L.H. lower
76559	non (143, 015) Connector—Oscillator grid connector	76544	Strip-Coil segment mounting strip-L.H. upper-less trim-
38853	Connector-4 contact female connector-part of antenna	Terar	mer Stein Call and the State
	matching transformer	76525	Strip—Coil segment mounting strip—R.H. center
76460	Contact—Test point contact	/ 3440	screw driver slot for trimmer coil L49, C15 uncoded and
75187	Core—Adjustable core for fine tuning capacitor, KRK11		coded "ER"
77202	Core-Adjustable core for fine tuning capacitor (KHKIIA)	75447	Stud—Capacitor stud—brass—#4-40 x 13/16" with 3/64"
76521	Detent—Detent mechanism and fibre shaft		ically and "Hi Q"
73453	Form-Coil form for coils L48, L50 & L53	76740	Stud-#6-32 x 1" adjusting stud for capacitor No. 76545
76524	Link-Link assembly for fine tuning, KRK11	77150	(early production KHK11)
77203	Link—Link assembly for fine tuning (KRK11A)	76526	Transformer Antenna matching transformer Kakila
76728	Nut—Speednut for mounting adjustable trimmer 76532 (KRK11A)	/0330	C24, C25, C26, C27, L58, L59, L60, L61, L62, J1)
	Resistor—Fixed, compositions:—	76528	Transformer-Converter transformer (KRK11)
503047	47 ohms, ± 10%, ½ watt (R9)	77148	Transformer—Converter transformer T1, R3 (KRK11A)
503082	82 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R10)	76540	Trap—FM trap complete with adjustable core (L58)
504115	150 ohms, \pm 20%, $\frac{1}{2}$ watt (R13)	76535	Trap—I-F trap (L65)
504210	1000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R7, R14)	76542	Trap—I-F trap (41.25 mc.) complete with core (L60)
502247	3300 ohms, ± 10%, 1/2 watt (R4, R11, R12)	76541	Trap—I-F trap (45.75 mc.) complete with core (L59)
504310	$10,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (\text{H2 for KHK11A})$	75190	Washer—Insulating washer (neoprene) for mounting ca-

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES		73553	Capacitor—Tubular paper oil imprognated 047 mfd 400
	KCS 68C in Models 21T176, 21T177, 21T178, 21T179		75071	volts (C137, C183) Capacitor—Tubular, moulded, .047 mfd., 400 volts (C179,
	KCS 68E in Models 21T159, 21T165 KCS68F in Models 21T159DE, 21T166DE, 21T174DE, 21T175DE,		73592	C180) Capacitor—Tubular, paper, oil impregnated, .047 mfd., 600
	21T178DE, 21T179DE		73815	volts (C155, C171, C185, C192) Capacitor—Tubular, paper, cil impregnated, .068 mfd., 1000
76456 76490	Bracket—Channel indicator lamp bracket Bracket—Mounting bracket complete with insulator for pic-		73551	volts (C195, C196) Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 200
12118	ture control Cap—6CD6 tube connector cap		73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600
76800	Capacitor—Adjustable trimmer steatite 1.4 mmf. (C226) Capacitor—Ceramic, 3 mmf. (C152)		73794	volts (C173) Capacitor—Tubular, paper, oil impregnated, 0.22 mfd., 400
71496	Capacitor—Adjustable, 5-70 mmf. (C220) Capacitor—Mica trimmer, dual 10-160 mmf. (C181A, C181B)		74957	Capacitor—Tubular, paper, oil impregnated, 0.22 mfd., 600
39044	Capacitor—Ceramic, 15 mmf. (C151)		73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200
76577 76574	Capacitor—Ceramic, 33 mml. (C206) Capacitor—Ceramic, 39 mmf. (C177)		76498	Choke—Filter choke (L108)
39042	Capacitor—Ceramic, 47 mmf. (C150)		76143	Clip—Tubular clip for mounting stand-off capacitor #75166
71924	Capacitor—Ceramic, 56 mmi. (C103) V Capacitor—Mica 82 mmf. (C157, C182)	ł	76672	Coil—Filament winding only for hi-voltage transformer
71514	Capacitor—Ceramic, 82 mmf. (C225)		76483	Coil—Horizontal linearity coil complete with adjustable core
39396	Capacitor-Ceramic, 100 mmf. (C156, C166)		-	(L107)
76578	Capacitor-Mica, 100 mmf. (C176)		76646	Coil—Peaking coil (72 muh) (1.103 R161)
76576	Capacitor—Ceramic, 150 mmf. (C212)		76647	Coil—Peaking coil (180 muh) (L114, R166)
44202	Capacitor—Ceramic, 150 mmf., 2000 volts (C212) (KCS68F)		75252	Coil—Peaking coil (500 muh) (L105, L113)
76575	Capacitor—Ceramic, 180 mmf. (C211)		76640	CoilR-F choke coil (1.5 muh) (L117, L118)
47617	Capacitor-Ceramic, 270 mmf. (C117)		76510	Connector Phone input connector (1103)
76579	Capacitor—Mica, 270 mmf. (C187)		76863	Connector—Anode connector complete with terminal and
76473	Capacitor—Mica, 330 mmf. (C11), C112)			contact
76488	Capacitor-Ceramic, 500 mmf., 30,000 volts (C197)		76457	Connector—2nd anode lead connector—mounted on hi-volt- age capacitor
75166	Capacitor-Ceramic, 1500 mmf. (stand-off) (C146)		74594	Connector—2 contact male connector for power cord
73748	Capacitor—Ceramic, 1500 mmf. (C221)		5040	Connector—4 contact female connector for speaker cable
73473	Capacitor—Ceramic, 4700 mini. (C122, C123, C127, C125, C132, C132, C136, C140, C147, C224) Capacitor—Ceramic, dual 4700 mmf. (C123A, C123B, C135A,		50367	Connector—6 contact female connector for yoke leads (J102)
73960	C135B, C141A, C141B, C142A, C142B) Capacitor—Ceramic, 10,000 mmf. (C101, C106, C126, C139,		75517	yoke (Plo2) Contact—Anode connector contact only
	C143, C198, C214)		76460	Contact—Test point contact
75877	Clo7A, Clo7B)		76447	Control—AGC control (R175)
76742	Capacitor-Electrolytic, 2 mfd., 10 volts (C124, C138)		76444	Control—Brightness control (R218)
74521	Capacitor—Electrolytic, 5 mfd., 50 volts (C200)		76443	Control—Horizontal and vertical hold control (R201A,
75510	Capacitor—Electrolytic, comprising 2 sections of 35 mfd., 450 volts, 1 section of 10 mfd., 450 volts and 1 section of		77201	R201B) (KCS68C, KCS68E) Control—Horizontal and vertical hold control (R201A,
-	5 mfd., 450 volts (C203A, C203B, C203C, C203D)		76445	Control—Picture control (R167)
/6485	450 volts, 1 section of 10 mfd., 450 volts and 1 section of		76449	Control—Vertical linearity control (R214)
70400	10 mfd., 200 volts (C202A, C202B, C202C, C202D) Consister Electrolytic comprising 1 section of 35 mfd.		76803	Control—Volume control and power switch (R117, S102)
/0400	450 volts, 1 section of 25 mfd., 450 volts, 1 section of 20 mfd., 200 volts, and 1 section of 100 mfd., 50 volts (Coolb)		77223	Control—Volume control and power switch (R117, S102) (KCS68F)
75643	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 600		76497	Control—Vertical peaking control (R207)
	volts (C158, C161, C167)		76985	Cover-Side cover for hi-voltage compartment
73801	Volts (C189) Capacitor—Tubular, paper, oil impregnated, .001 mid., 1000 Capacitor—Tubular, moulded, oil impregnated, .0015 mfd.		74956	Cushion-Rubber cushion for deflection yoke hood (2 req'd)
73505	600 volts (C190) Capacitor—Tubular, paper, oil impregnated, 0022 mfd, 600		74839 73600	Fastener—Push fastener for mounting tube sockets Fuse—0.25 amp., 250 volts (F101)
/3535	volts (C113, C163)		37396	Grommet-Rubber grommet for mounting tube sockets
73803	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 1000 volts (C169)		76459	Grommet—Hubber grommet for 2nd anode lead exit Hood—Deflection yoke hood less rubber cushions (KCS68C, KCS68E)
73599	<pre>volts (Cl18)</pre>		77035	Hood—Deflection yoke hood less rubber cushions (KCS68F)
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C114, C120, C149, C154, C164)		75482	Jack—Video jack (J104)
73808	Capacitor—Tubular, paper, oil impregnated, .0082 mfd., 600 volts (C207)		76652	Magnet—Focus magnet complete (screw driver adjustment type)
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 400 volts (C115, C119, C159, C162, C218)		76141	Magnet—Ion trap magnet (P.M. type)
73594	Capacitor—Tubular, moulded, oil impregnated, .01 mfd., 600 volts (C165, C188)		76728	Nut—Speednut for mounting trimmer capacitor C226 Plate—Hi-voltage plate (bakelite) complete less transformer
73797	Capacitor—Tubular, paper, oil impregnated, .015 mfd., 600 volts (C116)		76649	socket and lead Radiator—Heat dissipating radiator for 6CD6 tube
73562	Capacitor—Tubular, paper, oil impregnated, 022 mfd., 400		76675	Rectifier—Picture detector crystal rectifier (CR101)
72700	volts (C160, C174, C175, C184)		76468	Resistor—Wire wound, 1.5 ohms, 1/3 watt (R242)
12138	volts (C216)		74015	Resistor-Wire wound, 100 ohms, 2 watts (R234)

21T159, 21T159DE, 21T165 21T166DE, 21T174DE, 21T175DE 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

21T159, 21T159DE, 21T165 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

21T166DE, 21T174DE, 21T175DE REPLACEMENT PARTS (Continued)

STOCK No.

X3251

71599 76599

13103 71892

X1917

X1918 X1756

X3222

X3089

X3199

71457 76631

76698

77245

77012

74308 76595

STOCK No.	DESCRIPTION		No.	DESCRIPTION
76682	Hesistor—Wire wound, 200 onms, 5 Watts (R206) Resistor—Wire wound, 220 ohms, 1 watt (R123) (VCS68C		503539	$3.9 \text{ megohm}, \pm 10\%, \frac{1}{2} \text{ watt (R179)}$
/0403	KCS68E)		503582	$8.2 \text{ megohm}, \pm 10\%, \frac{1}{2} \text{ watt} (R177, R186)$
76642	Besistor-Wire wound 6750 ohms 10 watts (B163)		503610	10 megohm, \pm 10%, $\frac{1}{2}$ watt (R199) (KCS68C, KCS68E)
76499	Resistor—Wire wound comprising (R243A, R243B, R243C,		303610	10 megohm, \pm 10%, $\frac{1}{2}$ watt (R116)
10100	R243D, R243E, R243F):		76650	Ring-Anchoring ring for radiator hold-down spring
	l section of 950 ohms 16 watts		71456	Screw-#8-32 x 7/16" wing screw to mount deflection yoke
	1 section of 450 ohms, 6 watts		76487	Shatt—Connecting shaft—nylon—for picture and brightness
	1 section of 1500 ohms 5 watts	11	735.04	CONTROLS Shield Tube shield
	l section of 1200 ohms 1 watt		75364	Shield Tube shield
	l section of 10.000 ohms 5 watts and		75710	Shield—Tube shield for vertical oscillator, VII4
	l section of 7000 ohms 5 watts		74024	Socket-Channel indicator lamp socket
	Projeter Fixed composition		21264	Socket-Ainescope socket
502043	$43 \text{ obms} \pm 5\%$ 16 matt (B159) (KCS68C KCS68E)		73249	Socket Tube cocket estal examin plate mounted
502043	43 ohms, $\pm 5\%$, $\frac{1}{2}$ wall (R135) (RC500C, RC500L)		76453	Socket Tube socket, octal, ceramic, plate mounted
502056	$56 \text{ obms} \pm 50/16 \text{ watt} (R139)$		31251	Socket Tube socket, octal, mounded bakente, plate mounted
34763	$68 \text{ ohms} \pm 5\% \text{ 1/6 watt} (B105 B146)$		71508	Socket-Tube socket, 6 contact, moulded hakelite
502082	$82 \text{ ohms} \pm 5\% / 16 \text{ watt} (R100, R140)$		50367	Socket_Tube socket, 6 contact, moulded pakelite
502110	$100 \text{ obms} \pm 5\% 1/6 \text{ watt} (B130)$		71494	Socket-Tube socket, 7 pin, moulded, saddle mounted
503110	100 ohms, ± 10%, ½ watt (B122 B126 B133)			miniature
503118	180 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R152)		73117	Socket-Tube socket, 7 pin, wafer, miniature
503122	220 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (B174)		76651	Spring-Springs for securing 6CD6 radiator (3 reg'd)
503147	470 ohms, ± 10%, ½ watt (B216) (KCS68F)		76636	Stud-Adjusting stud complete with guard for focus magnet
513147	$470 \text{ ohms}, \pm 10\%, 1 \text{ watt} (B123, B246)$		75173	Stud-Adjusting stud for trimmer capacitor
503156	560 ohms, ± 10%, ½ watt (B216) (KCS68C KCS68E)		76428	Support-Bakelite support only-part of hi-voltage shield
503168	$680 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R162)$		76493	Switch-Tone control and phono switch (S101)
503182	$820 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R180)$		77222	Switch-Tone control and phono switch less volume control
502210	1000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R111)			and power switch (S101)
503210	1000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (B102, B103, B108, B125, B135,		76463	Terminal—Screw type grounding terminal
	R137, R140, R156, R165, R191)		76501	Transformer—Hi-voltage transformer less filament winding
513210	1000 ohms, ± 10%, 1 watt (R215 for KCS68C, KCS68E)			(T115)
502212	1200 ohms, ± 5%, 1/2 watt (R110)	1	76440	Transformer—Horizontal oscillator transformer complete with
503212	1200 ohms, ± 10%, 1/2 watt (R183)		RELAT	adjustable cores (T114)
513212	1200 ohms, ±10%, 1 watt (R215 for KCS68F)		76495	Transformer—Power transformer, 115 volt, 60 cycle (T113)
503222	2200 ohms, ± 10%, 1/2 watt (R148)		76439	Transformer—Ratio detector transformer complete with ad-
503227	2700 ohms, ± 10%, ½ watt (R208) (KCS68C, KCS68E)		76420	Transformer Sound if then former consults with a direct
503233	3300 ohms, ± 10%, ½ watt (R208) (KCS68F)		/0430	able cores (T10) C103 C104)
02237	3900 ohms, ± 5%, 1/2 watt (R157)	i	76437	Transformer-Sound take-off transformer complete with ad-
502256	5600 ohms, ±5%, 1/2 watt (R141 for KCS68F)	1		iustable cores (T110, C148)
503239	3900 ohms, ± 10%, ½ watt (R228)	1	76494	Transformer-Vertical output transformer (T112)
513256	5600 ohms, ± 10%, 1 watt (R164)		74144	Transformer-Vertical oscillator transformer (T111)
14659	6800 ohms, ±5%, 1/2 watt (R114, R115, R141 for KCS68C and		76432	Transformer-First pix i-f grid transformer complete with
	KCS68E; R114, R115 for KCS68F)			adjustable cores (T104, C121, R124) (KCS68C, KCS68E)
503268	6800 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R158) (KCS68C, KCS68E)		77198	Transformer—1st pix i-f grid transformer complete with
513268	$6800 \text{ ohms}, \pm 10\%, 1 \text{ watt (R155)}$			adjustable cores (T104, C121, R124) (KCS68F)
502282	$8200 \text{ ohms}, \pm 5\%, \frac{1}{2} \text{ watt (H141) (KCS68C, KCS68E)}$		76434	Transformer—First pix i-f plate transformer complete with
503282	$8200 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R150, R197)$			Adjustable cores (1105, C130, C131, H134) (KCS68C, KCS68F)
523282	$8200 \text{ onms}, \pm 10\%, 2 \text{ watts} (R235, R253)$		77197	Transformer_lst nix if plate transformer complete with
503310	$10,000 \text{ onms}, \pm 10\%, \frac{1}{2} \text{ watt} (R128, R143, R147, R205, R211, R229)$,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	adjustable cores (T105, C130, C131, R134) (KCS68F)
513310	$10.000 \text{ obms} \pm 10\% 1 \text{ matt} (B160) (KCS60E)$		76435	Transformer—Second pix i-f grid transformer complete with
222210	$10,000 \text{ ohms}, \pm 10\%, 1 \text{ watt} (R100) (RC5007)$			adjustable cores (T106, C133)
12212	$10,000$ ohms, $\pm 10\%$, 2 walls (R151)		76433	Transformer-Third or fourth pix i-f transformer (T107,
02210	$12,000 \text{ ohms}, \pm 10\%, 1 \text{ wall (R101)}$	1		T108)
03310	$10,000 \text{ ohms}, \pm 10\%, \%$ wall (1113, 1103, 1234)		76436	Transformer-Fifth pix i-f transformer (T109, C145, C147,
03322	$22,000$ ohms, $\pm 10\%$, $\frac{4}{2}$ wall (R110, R154, R155, R156)			CR101, L102, R154)
03322	27,000 chins, ± 10%, %2 watt (1113, 11/0) 33,000 chins + 10% 1/c stratt (1107 100 100 1020)	1	76482	Trap-4.5 mc. trap (L116, C213)
03330	39 000 ohms + 10% 16 watt (D110 D150)		76653	Yoke—Deflection yoke complete with 6 contact male con-
03347	$47000 \text{ ohms} \pm 10\% \text{ l/s} \text{ watt} (R112, R153)$			nector (L109, L110, L111, L112, C193, C199, C205, P102)
13347	$47.000 \text{ ohms} \pm 10\%$] watt (R227) (KCSEPE)			SPEAKER ASSEMBLIES
02356	$56.000 \text{ ohms} \pm 10\% \text{ k} \text{ watt} (\text{R144} \text{ R140})$			971490-2W, RL 105C18
03356	56 000 ohms + 10% 1/2 watt (R106)			For Models 21T159, 21T159DE
13356	56,000 ohms + 10%, 1 watt (R226, R221)		75824	Cone Cone and voice coil (2.2 - two)
12368	$68000 \text{ ohms} \pm 5\%$ 1 watt (R210 R230)		5020	Connector 4 prong male plug for speaker (1101)
13368	$68000 \text{ ohms} \pm 10\%$] watt (R205 R227)		75022	Speaker 9" DM speaker complete with some with
13382	$82.000 \text{ ohms} \pm 10\%$ 1 watt (R226, R257)		10022	coil (3.2 ohms) less transformer and plug
02410	100 000 ohms + 5% 1/2 watt (B173)		75520	Transformer-Output transformer (T103)
03410	$100,000 \text{ ohms} \pm 10\%, \gamma_2 \text{ watt} (R1/3)$,0020	Transformer Output italisioniller (1103)
04410	100,000 ohms, ± 10%, %2 wait (R135) (VCScor VCScor)			SPEAKER ASSEMBLIES
03412	$120,000 \text{ ohms} \pm 10\%$ $1/2 \text{ watt} (R130) (RC308C, RC308E)$			971490-2 R
03415	150,000 ohms + 10%, 1/2 watt (R1/0)	-		For Models 21T159, 21T159DE
	R221, R236)		77129	Cone—Cone and voice coil
12415	150,000 ohms, ± 5%, 1 watt (B224)			
02422	220,000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R129)			SPEAKER ASSEMBLIES
03422	220,000 ohms, ± 10%, 1/2 watt (B185, B193, B237)			92569-14-W, RL-111A11
03427	$270,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R186, R186, R287)$		75682	Cone-Cone and voice coil (3.2 ohms)
03433	330,000 ohms, ± 10%, 1/2 watt (R120 R222) (R256 KCS68F)		5039	Connector-4 contact male connector
03439	390.000 ohms. ± 10% 1/2 watt (R255) (R256 KC6600		76833	Speaker-12" P.M. speaker complete with cone and voice
	KCS68E)			coil less transformer and plug
Ó3447	470,000 ohms, ± 10%, 1/2 watt (R121, R160, R171, R188, R190)		75520	Transformer—Output transformer
03468	680,000 ohms. ± 10%, 1/2 watt (R189)			SPEAKER ASSEMBLIES
03482	820,000 ohms, ± 10%, 1/2 watt (R200 in KSC68F) (R202			971494.1 W RI 111 R2
- [R223)		76206	Cone_ Cone and upice coil (2.2 chere)
03510	1 megohm, ± 10%, 1/2 watt (R182, R202, R204, R232)		5020	Connector, A contact male connector (1101)
00515	1.5 megohm + 10% 1/2 watt (B192)		76399	Speaker_12" DM speaker complete with some and
03515			10000	operation is in the speaker complete with cone and voice
03515	$3.3 \text{ megohm}, \pm 10\%, \frac{1}{2} \text{ watt (R213)}$			coil (3.2 ohms) less transformer and plug

21T159, 21T159DE, 21T165 21T166DE, 21T174DE, 21T175DE 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

REPLACEMENT PARTS (Continued)

DESCRIPTION	STOCK No.	DESCRIPTION
21CB9 CABINET BASE (For use with Model 21T159)	74963	Knob—Picture control, horizontal hold control or volume control and power switch knob—maroon—for mahogany or walput instrumente (inner).
Pull-Door pull	74001	KnobPicture control, horizontal hold control or volume control and power switch knob-tan-for maple instru-
Back-Cabinet back complete with power cord for Model	75464	ments (inner) Knob—Picture control, horizontal hold control or volume
Back—Cabinet back complete with power cord and ter- minal board for Model 21T159DE	76507	control and power switch knob—beige—for oak instru- ments (inner)
Back—Cabinet back complete with power cord for Models 21T165, 21T176, 21T177, 21T178, 21T179	76626	mahogany or walnut instruments (outer)
Back—Cabinet back complete with power cord for Models 21T174DE, 21T178DE, 21T179DE	76598	ple instruments (outer) Knob-Tone control and phono switch knob-beige-for oak
Board—Antenna terminal board Bracket—Hanger bracket from cabinet top panel to deflec-	11765	instruments (outer) Lamp—Channel marker escutcheon or pilot lamp—Mazda
tion yoke hood Bracket—Masking panel support bracket (2 req'd)	75459	#51 Mask—Channel marker escutcheon—light mask—burgundy
Bracket—Pilot lamp bracket Bracket—''U'' shape bracket for holding ''L'' shape support	76589	— for manogany of Walnut instruments Mask—Channel marker escutcheon—light mask—medium dark heige. for cak or maple instruments
Bumper-Rubber bumper for kinescope (as req'd)	76696	Mask—Polystyrene masking panel for kinescope
Cap—Pilot lamp cap Catch—Bullet catch and strike for doors	77246	struments, Model 21T179DE Medallion—Phonograph and dog medallion for mahogany
Clip—Ornamental clip (metal) for grille bars for Model 211174DE	76728	or walnut instruments, Model 21TI79DE Nut-Speed nut for trimmer capacitor C226
Model 21T159	73634	Nut-Speed nut for speaker mounting screws
Cloth—Grille cloth for oak instruments for Model 217159 Cloth—Grille cloth for mahogany or walnut instruments for	76177	Nut-#10-32 special nut for deflection yoke hood support rod (2 red'd)
Cloth—Grille cloth for blonde mahogany instruments for Models 21T166DF 21T124DF or for oak instruments for	77013	Nut—Speednut for fastening "RCA Victor" emblem, "De- luxe" emblem, or medallion ornaments to cabinet
Models 211165, 211175DE, 211177	76601 76570	Pad—Kinescope edge support pad (4 reg'd) Plate—Back plate for center door pull for Model 21T178
Cloth—Grille cloth for oak instruments for Model 211176 Cloth—Grille cloth for mahogany or walnut instruments for	76645	Pull—Door pull (2 req'd) for mahogany or walnut Model
Models 21T165, 21T176, 21T177, 21T178, 21T179, 21T166DE, 21T174DE, 21T175DE, 21T178DE, 21T179DE or for maple	77046	Pull—Door pull for Model 21T174DE Pull—Door pulls (1 set) for upper doors for Model
Connector—Single contact male connector for antenna cable	77045	21T179DE Pull_Door pulls for lower doors for Model 21T179DE
(2 req'd) Connector 4 contact male connector for antenna cable	76756	Pull-Door pull (2 req'd) for oak Model 211176
Cord—Power cord and plug	76571	Pull—Door pull for Model 21T177 Pull—Center door pull for Model 21T178 (2 reg'd)
Cushion—Rubber cushion for dust sealing the kinescope Cushion—Rubber cushion for safety glass (4 reg'd)	76568	Pull-Upper door pull for Model 21T178 (4 req'd)
Cushion—Rubber cushion for masking panel support bracket	76198	Pull—Door pull for upper L.H. door for Model 211179 Pull—Door pull for upper L.H. door for Model 211179
Decal-Control function decal for mahogany or walnut	76197	Pull—Door pull for upper R.H. door for Model 21T179 Bod—"L" shape threaded rod to support deflection voke
Decal—Control function decal for blonde mahogany, oak or	76632	hood assembly (2 req'd) Screw—#8 x $\frac{5}{4}$ " self tapping hex head wood screw to
Decal—Control function decal for mahogany, walnut or manle instruments		mount kinescope panel (12 req'd) or hanger bracket (2 req'd)
Decal—Trade mark decal	74279	Screw—#8-32 x 7/6" trimit head screw for Model 21T176 door pulls for Model 12T179 upper door pulls
Decal— His Master's voice decal for Model 2111/3DE Decal—"RCA Victor" decal for Models 21T174DE, 21T175DE,	74269	Screw—#8-32 x 3/4" trimit head screw for upper door pull for Model 21T178
Emblem—"RCA Victor" emblem	74113	Screw—#8-32 x 1" trimit head screw for door pull for Model 21T177
Emblem— Deluxe" emblem for blond or maple instruments for Models 21T159DE, 21T179DE	74307	Screw-#8-32 x 11/6" trimit head screw for center door pull for Model 21T178
Emblem— Deluxe" emblem for manogany or walnut instru- ments for Models 21T159DE, 21T179DE	75626	Screw—#8-32 x 11/4" trimit head screw for door pull for lower doors for Model 21T179
211175DE, 211178DE	76630	Spring—Formed spring for kinescope masking panel (6 reg'd)
Emblem—"RCA Victor" for Models 2111/5DE, 211174DE,	30330	Spring—Retaining spring for knobs #74001, 74963 & 75464
21T178DE Escutcheon-Channel marker escutcheon	77006	Spring—Retaining spring for deflection yoke hood support
Foot—Rubber foot for Model 21T159 cabinet (4 req'd) Glass—Safety glass	14270	rod nut Spring—Retaining spring for knobs #76593, 76594, 76595,
Grommet—Rubber grommet for mounting speaker (3 req'd)	72642	76596, 76597, 76598, 76623, 76624, 76625 & 76626
Hinge—Cabinet door hinge (1 set) Knob—Brightness control or vertical hold control knob—	76837	Spring—Spring chip for channel marker escutcheon Spring—Retaining spring for knobs #76593, 76594, 76595,
marcon-for mahogany or walnut instruments (outer)	74926	76596, 76597, 76598, 76624, 76625, 76626
maple instruments (outer)	72936	Stop—Cabinet door stop
Knob-Brightness control or vertical hold control knob	76600	Strap—Grounding strap (copper strip—½" x 18" long)
Knob—Channel selector knob—maroon—for mahogany or walnut instruments (inner)	75457	Washer—Felt washer—dark brown—between knob and channel marker escutcheon for mahogany or walnut
Knob—Channel selector knob—tan—for maple instruments	75523	Washer-Felt washer-tan-between knob and channel
Knob-Channel selector knob-beige-for oak instruments	75458	Washer—Felt washer—beige—between knob and channel
Knob—Fine tuning control knob—maroon—for mahogany	75500	marker escutcheon for oak instruments Washer—Felt washer for cabinet back mounting screws
Knob—Fine tuning control knob—tan—for maple instruments	76836	(4 req'd) Washer—Cellulose washer—gold—for knobs for Models
(outer) Knob—Fine tuning control knob—beige—for oak instru-	77023	21T159, 21T165, 21T176, 21T177, 21T178, 21T179 Washer—Cellulose washer—gold—for knobs for Models
ments (outer)		21T159DE, 21T174DE, 21T178DE, 21T179DE

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.





TELEVISION, AM-FM RADIO, PHONOGRAPH COMBINATION MODEL 21-T-197DE

Chassis Nos. Television Chassis KCS68H Radio Chassis RC1111A, Audio Amplifier RS141A Record Changer 930409-5

— Mfr. No. 274 —

SERVICE DATA – 1952 No. T10 –

PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

GENERAL DESCRIPTION

Model 21-T-197DE is a deluxe television—AM-FM radio phonograph combination. The receiver employs 29 tubes plus 4 rectifiers and a 21 inch kinescope.

Model 21-T-197DE "Sunderland"

Mahogany

A three speed record changer is provided to play 331/3, 45

and 78 RPM records. The receiver is provided with cabinet antennas for AM, FM and television where local conditions permit their use.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

PICTURE SIZE 227 square inches on a 21AP4 Kinescope

TELEVISION R-F FREQUENCY RANGE

All 12 television channels, 54 mc. to 88 mc., 174 mc. to 216 mc.
Fine Tuning Range ± 250 kc. on chan. 2, ± 650 kc. on chan. 13
Picture Carrier Frequency
Sound Carrier Frequency. 41.25 mc.

RADIO TUNING RANGE

Broadcast	. 540-1,600 kc.
Frequency Modulation	
Intermediate Frequency—AM	455 kc.
Intermediate Frequency—FM	

POWER SUPPLY RATING

115 volts, 60 cycles, 410 watts max.

CHASSIS DESIGNATIONS

Television Chassis KCS68H
Radio Chassis
Audio Chassis
Record Changer
Refer to Service Data 930409 for record changer information

WEIGHT

Chassis with Tubes in	Cabinet.	ana la sera.	222 lbs.
Shipping Weight			

DIMENSIONS (inches)	Width	Height	Depth
Cabinet (outside)	433/8	391/8	271/8

RECEIVER ANTENNA INPUT IMPEDANCE

Choice: 300 ohms balanced or 72 ohms unbalanced.

RCA TUBE COMPLEMENT Tube Used Television Chassis Function (2) RCA 6X8..... R-F Oscillator and Mixer (3) RCA 6AU6 1st Picture I-F Amplifier (4) RCA 6CB6 2nd Picture I-F Amplifier (5) RCA 6CB6..... 3rd Picture I-F Amplifier (7) RCA 6AG7 . Video Amplifier (8) RCA 6AU6. lst Sound I-F Amplifier (9) RCA 6AU6. 2nd Sound I-F Amplifier (10) RCA 6AL5 Ratio Detector (11) RCA 6AV6.....lst Audio Amplifier (12) RCA 6CB6.....AGC Amplifier (13) RCA 6SN7GT Sync Separator (14) RCA 6SN7GT. Vert Sync Amplifier and Vert Sweep Osc. (15) RCA 6AQ5. Vertical Sweep Output (16) RCA 6SN7GT Horizontal Sync Amplifier (17) RCA 6SN7GT Horizontal Sweep Oscillator and Control (18) RCA 6CD6G...... Horizontal Sweep Output (20) RCA 1B3-GT/8016..... High Voltage Rectifier (21) RCA 5U4G (2 tubes) Rectifiers (22) RCA 21AP4Kinescope Radio Chassis RC1111A (2) RCA 6J6......Mixer and Oscillator (3) RCA 6BA6 I-F Amplifier (4) RCA 6AU6 F-M Driver (5) RCA 6AL5.....Ratio Detector (6) RCA 6AV6.... AM Detector AVC and Audio Amplifier Audio Chassis RS141A (1) RCA 6C4 Phase Inverter (2) RCA 6V6GT (2 tubes) Audio Output (3) RCA 5Y3GT Rectifier



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ELECTRICAL AND MECHANICAL SPECIFICATIONS (Continued)

PICTURE INTERMEDIATE FREQUENCIES

Picture Carrier Frequency	45.75 mc
Adjacent Channel Sound Trap	.47.25 mc
Accompanying Sound Traps	41.25 mc
Adjacent Channel Picture Carrier Trap	.39.25 mc

SOUND INTERMEDIATE FREQUENCIES

VIDEO RESPONSE
FOCUS
SWEEP DEFLECTION
SCANNING Interlaced, 525 line
HORIZONTAL SWEEP FREQUENCY
VERTICAL SWEEP FREQUENCY
FRAME FREQUENCY (Picture Repetition Rate)

Channel Selector }
Fine Tuning)
Picture Dual Control Knobs
Brightness)
Picture Horizontal Hold
Picture Vertical Hold
Sound Volume and On-Off SwitchDual Control Knobs
NON-OPERATING CONTROLS (not including r-f and i-f adjustments)
Picture Centering top chassis adjustment
Width rear screwdriver chassis adjustment
Height
Horizontal Linearityrear chassis screwdriver adjustment
Vertical Linearityrear chassis adjustment
Vertical Peaking Control rear chassis adjustment
Horizontal Drive rear chassis screwdriver adjustment
Horizontal Oscillator Frequency rear chassis adjustment
Horizontal Oscillator Waveform bottom chassis adjustment
Horizontal Locking Rangerear chassis adjustment
Focus
Ion Trap Magnettop chassis adjustment
Deflection Coil top chassis wing nut adjustment
AGC Control rear chassis adjustment

OPERATING CONTROLS (Front Panel)

HIGH VOLTAGE WARNING

OPERATION OF THIS RECEIVER OUTSIDE THE CABINET OR WITH THE COVERS REMOVED, INVOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES. WORK ON THE RECEIVER SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOROUGHLY FAMILIAR WITH THE PRECAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT SHIELD REMOVED. BE SURE THE GROUND SPRING, BETWEEN THE YOKE ASSEMBLY AND THE CHASSIS, IS SECURELY FASTENED BEFORE TURNING THE RECEIVER ON.

KINESCOPE HANDLING PRECAUTIONS

DO NOT REMOVE THE RECEIVER CHASSIS, INSTALL, REMOVE OR HANDLE THE KINE-SCOPE IN ANY MANNER UNLESS SHATTERPROOF GOGGLES ARE WORN. PEOPLE NOT SO EQUIPPED SHOULD BE KEPT AWAY WHILE HANDLING KINESCOPES. KEEP THE KINESCOPE AWAY FROM THE BODY WHILE HANDLING.

The kinescope bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure. For this reason, the kinescope must be handled with more care than ordinary receiving tubes.

The large end of the kinescope bulb—particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure at any time. During service if the tube sticks or fails to slip smoothly into its socket, or deflecting yoke, investigate and remove the cause of the trouble. Do not force the tube. Refer to the Receiver Installation section for detailed instructions on kinescope installation. All RCA replacement kinescopes are shipped in special cartons and should be left in the cartons until ready for installation in the receiver.

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The following adjustments are necessary when turning the receiver on for the first time.

1. Turn the radio FUNCTION switch to TV.

2. Turn the receiver "ON" and advance the SOUND VOL-UME control to approximately mid-position.

3. Set the CHANNEL SE-LECTOR to the desired channel.

4. Adjust the FINE TUN-ING control for best sound fidelity and SOUND VOLUME for suitable volume.

5. Turn the BRIGHTNESS control fully counterclockwise, then clockwise until a light pattern appears on the screen.

6. Adjust the VERTICAL hold control until the pattern stops vertical movement.

7. Adjust the HORIZON-TAL hold control until a picture is obtained and centered.

8. Turn the BRIGHTNESS control counterclockwise until the retrace lines just disappear.

9. Adjust the PICTURE control for suitable picture contrast.



Figure 1-Receiver Operating Controls

10. In switching from one channel to another, it may be necessary to repeat steps numbers 4 and 9.

11. When the set is turned on again after an idle period, it should not be necessary to repeat the adjustments if the positions of the controls have not been changed. If any ad-

> justment is necessary, step number 4 is generally sufficient.

> 12. If the positions of the controls have been changed, it may be necessary to repeat steps numbers 1 through 9.

13. For radio operation turn the radio FUNCTION switch to AM or FM and tune in station with the radio TUN-ING control.

14. For phono operation, turn the function switch to PH. Set the stylus on the phono tone arm to 78 or 33-45 whichever applies. Set speed control to the desired speed. Place a record on the turntable (for 45 RPM records place 45 RPM centerpost over spindle) and turn phono to "ON" position.

REFER TO PAGES 180 TO 193 FOR TELEVISION ALIGNMENT PRO-CEDURE AND WAVE FORM PHOTOGRAPHS

INSTALLATION INSTRUCTIONS

ION TRAP MAGNET ADJUSTMENT.—Set the ion trap magnet approximately in the position shown in Figure 2. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rotating it slightly around the neck of the kinescope for the brightest raster on the screen. Reduce the brightness control setting until the raster is slightly above average brilliance. Turn the



Figure 2-Ion Trap and Centering Magnet Adjustments

focus control (shown in Figure 2) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches of this adjustment should be made with the brightness control at the maximum clockwise position with which good line focus can be maintained.

DEFLECTION YOKE ADJUSTMENT.—If the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Tighten the yoke adjustment wing screw.

PICTURE ADJUSTMENTS.—It will now be necessary to obtain a test pattern picture in order to make further adjustments. Connect the antenna transmission line to the receiver.

If the Horizontal Oscillator and AGC System are operating properly, it should be possible to sync the picture at this point. However, if the AGC control is misadjusted, and the receiver is overloading, it may be impossible to sync the picture.

If the receiver is overloading, turn R175 on the rear apron (see Figure 3) counter-clockwise until the set operates normally and the picture can be synchronized.

CHECK OF HORIZONTAL OSCILLATOR ALIGN-MENT.—Turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in horizontal sync. Momentarily remove the signal by switching off channel then back. Normally the picture will be out of sync. Turn the control clockwise slowly. The number of diagonal

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black bars will be gradually reduced and when only 2 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control. Pull-in should occur before the control has been turned 120 degrees from the extreme counter-clockwise position. The picture should remain in sync for approximately 90 degrees of additional clockwise rotation of the control. At the extreme clockwise position, the picture should remain in sync and should not show a black bar in the picture.

If the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned. Skip "Alignment of Horizontal Oscillator" and proceed with "Focus Magnet Adjustment."



Figure 3-Rear Chassis Adjustments

ALIGNMENT OF HORIZONTAL OSCILLATOR.—If in the above check the receiver failed to hold sync with the hold control at the extreme counter-clockwise position or failed to hold sync over 90 degrees of clockwise rotation of the control from the pull-in point, it will be necessary to make the following adjustments.

Horizontal Frequency Adjustment.—Turn the horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the Tll4 horizontal frequency adjustment at the rear of the chassis until the picture is just out of sync and the horizontal blanking appears as a vertical or diagonal black bar in the raster. Then turn the Tll4 core until the bar moves out of the picture leaving it in sync.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the T114 rear core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 2 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C181A slightly clockwise. If less than 2 bars are present, adjust C181A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 bars are present.

Repeat the adjustments under "Horizontal Frequency Adjustment" and "Horizontal Locking Range Adjustment" until the conditions specified under each are fulfilled. When the horizontal hold operates as outlined under "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

If it is impossible to sync the picture at this point and the AGC system is in proper adjustment it will be necessary to adjust the Horizontal Oscillator by the method outlined in the alignment procedure. For field purposes paragraph "B" under Horizontal Oscillator Waveform Adjustment may be omitted.

FOCUS MAGNET ADJUSTMENTS.—The focus magnet should be adjusted so that there is approximately three-eighths inch of space between the rear cardboard shell of the yoke and the flat of the front face of the focus magnet. This spacing gives best average focus over the face of the tube.

The axis of the hole through the magnet should be parallel with the axis of the kinescope neck with the kinescope neck through the middle.

CENTERING ADJUSTMENT.—No electrical centering controls are provided. Centering is accomplished by means of a separate plate on the focus magnet. The centering plate includes a locking screw which must be loosened before centering. Up and down adjustment of the plate moves the picture side to side and sidewise adjustment moves the picture up and down.

If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the ion trap magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

WIDTH, DRIVE AND HORIZONTAL LINEARITY ADJUSTMENTS.—Adjustment of the horizontal drive control affects the high voltage applied to the kinescope. In order to obtain the highest possible voltage hence the brightest and best focused picture, adjust horizontal drive trimmer C181B for maximum drive (minimum capacity) consistent with a linear raster. Compression of the raster due to excessive drive can be seen as a white vertical bar or bars in the right half of the picture. Besides compression caused by excessive drive, another item to watch for is the change in linearity at the extreme left with changes of brightness control setting, By proper adjustment of the linearity coil, the changes in linearity with changes in brightness can be made negligible. In general, to achieve this condition, the linearity coil should be set slightly on the high inductance side (core slightly clockwise) of the optimum position.

Preset the following adjustments as directed:

A.—Place the width plug (P105) in the minimum width position (top).

B.—Set the width control coil LlO6 in approximately mid position.

C.—Set the linearity control coil L107 near minimum inductance (counter-clockwise).

D.—Set the drive capacitor Cl8lB in the maximum drive position (counter-clockwise).

If the raster is cramped or shows compression bars on the right half of the picture turn Cl8lB clockwise until this condition is just eliminated.

Adjust the linearity control coil L107 clockwise until best linearity and maximum deflection or best compromise are obtained then turn one quarter turn clockwise from this position.

Retouch the drive trimmer C181B if necessary to obtain best linearity and maximum width.

Check the horizontal linearity at various settings of the brightness control R218. There should be no compression of the right half and no appreciable change of linearity especially at the extreme left of the picture. If objectional change does occur, turn linearity coil L107 slightly clockwise and repeat the test.

Adjust the width control L106 to fill the mask.

If the line voltage is low and it becomes impossible to fill the mask, move the width plug PlO5 to the bottom position. The width coil LlO6 is inoperative in this position.

HEIGHT AND VERTICAL LINEARITY ADJUST-MENTS.—Adjust the height control (R203 on chassis rear apron) until the picture fills the mask vertically. Adjust vertical linearity (R214 on rear apron), until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. If the top few lines of the picture are stretched or squeezed, adjust the vertical peaking control R207 until this condition is corrected.

FOCUS.—Adjust the focus magnet for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

Recheck the position of the ion trap magnet to make sure that maximum brightness is obtained.

If necessary readjust centering to align the picture with the mask.

CHECK OF R-F OSCILLATOR ADJUSTMENTS.— Tune in all available stations to see if the receiver r-f oscillator is adjusted to the proper frequency on all channels. If adjustments are required, these should be made by the method outlined in the alignment procedure on page 9. The adjustments for channels 2 through 12 are available from the front of the cabinet by removing the station selector escutcheon as shown in Figure 4. Adjustment for channel 13 is on top of the chassis.



Figure 4-R-F Oscillator Adjustments

AGC THRESHOLD CONTROL.—The AGC threshold control R175 is adjusted at the factory and normally should not require readjustment in the field.

To check the adjustment of the AGC Threshold Control, tune in a strong signal and sync the picture. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of R175. If the picture requires an appreciable portion of a second to reappear, or bends excessively, R175 should be readjusted.

Turn R175 fully counter-clockwise. The raster may be bent slightly. This should be disregarded. Turn R175 clockwise until there is a very, very slight bend or change of bend in the picture. Then turn R175 counter-clockwise just sufficiently to remove this bend or change of bend.

If the signal is weak, the above method may not work as it may be impossible to get the picture to bend. In this case, turn R175 clockwise until the snow in the picture becomes more pronounced, then counter-clockwise until the best signal to noise ratio is obtained.

The AGC control adjustment should be made on a strong signal if possible. If the control is set too far clockwise on a weak signal then the receiver may overload when a strong signal is received.

FM TRAP ADJUSTMENT.—In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the L58 core on top of the antenna matching transformer for minimum interference in the picture.

CAUTION.—In some receivers, the FM trap L58 will tune down into channel 6 or even into channel 5. Needless to say such an adjustment will cause greatly reduced sensitivity on these channels. If channels 5 or 6 are to be received check L58 to make sure that it does not affect sensitivity on these two channels.

Replace the cabinet back and connect the receiver antenna leads to the cabinet back. Make sure that the screws holding it are up tight otherwise it may rattle or buzz when the receiver is operated at high volume.

CABINET ANTENNA.—A cabinet television antenna is provided in these receivers and the leads are brought out near the antenna terminal board. The cabinet antenna may be employed in place of the outdoor antenna in areas where signals are strong and no reflections are experienced. However, if reception is unsatisfactory, it will be necessary to employ an outdoor antenna or an indoor antenna which can be oriented.

RADIO OPERATION.—Turn the receiver function switch to the AM and FM positions and check the radio for proper operation.

RECORD CHANGER OPERATION.—Turn the receiver function switch to the phono position and check the record player for proper operation.

KINESCOPE HANDLING PRECAUTION.—Do not install, remove, or handle the kinescope in any manner, unless shatter-proof goggles are worn. People not so equipped should be kept away while handling the kinescope. Keep the kinescope away from the body while handling.

Handle this tube by the metal rim at the edge of the screen. Do not cover the glass bell of the tube with fingermarks as it will produce leakage paths which may interfere with reception. If this portion of the tube has inadvertently been handled, wipe it clean with a soft cloth moistened with "dry" carbon tetrachloride.

To remove the kinescope from the cabinet, loosen the two nuts and disengage the rods alongside the kinescope. Remove the wing screw which holds the yoke frame to the cabinet. Remove the kinescope, the yoke frame with yoke and focus or centering magnet as an assembly.

INSTALLATION OF KINESCOPE.—Handle this tube by the metal rim at the edge of the screen. Do not cover the glass bell of the tube with fingermarks as it will produce leakage paths which may interfere with reception. If this portion of the tube-has inadvertently been handled wipe it clean with a soft cloth moistened with "dry" carbon tetrachloride.

Wipe the kinescope screen surface and front panel safety glass clean of all dust and fingermarks with a soft cloth moistened with "Windex" or similar cleaning agent.

Turn the tube so that the key on the base of the tube will be down and insert the neck of the kinescope through the deflection coil and focus magnet. If the tube sticks, or fails to slip into place smoothly investigate and remove the cause of the trouble. Do not force the tube.

Replace the kinescope and yoke frame assembly in the cabinet. Insert the wing screw and tighten. Engage the two side rods into the yoke frame and tighten the two nuts. Slide the deflection yoke as far forward as possible. If this is not done, difficulty will be encountered in adjusting the ion trap and focus magnet because of shadows on the corner of the raster.

Slide the chassis into the cabinet, then insert and tighten the four chassis bolts.

Slip the ion trap magnet over the neck of the kinescope.

Connect the kinescope socket to the tube base and connect the high voltage lead from the rim of the kinescope into the high voltage bushing on the high voltage compartment.

Reconnect all other cables. Do not forget to replace the yoke frame grounding spring. Perform the entire set-up procedure beginning with the Ion Trap Magnet Adjustment.



Figure 5-Instrument Cable Diagram

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CHASSIS TOP VIEW



Figure 6-Chassis Top View

*



Figure 7-Chassis Bottom View

RADIO SCHEMATIC DIAGRAM



- The 1st FM i-f plate lead should be dressed away from the r-f amp plate. _
 - Dress the Jst AM $\operatorname{i-f}$ plate lead to the S2 wafer away from the AM $r\!\cdot\!\!\!\!\!$ coil. N
 - Dress the a-c power switch wires away from all audio components m ≠
- Dress C26 down toward the base between the terminal board and the side apron.
- The C18 bypass ground should be as close to the r-f shelf ground strap as possible. ي. م
- All leads from the r-f shelf leaving through the shields must be Dress C25 away from the arm contact of the volume control.

αċ

- All leads for FM should be kept short especially on the r-f shelf. kept as short as possible. ъ.
- Dress the a-c leads in the RS141 chassis away from the audio ġ

All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted. Direction of arrows at controls indicates clock-wise rotation.

All resistance values in ohms, K = 1000.

Diagram

11. Dress all leads away from R101 in RS141. input leads and components.

RADIO ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer to the mechanical max. calibration point at extreme left end of dial. When making a complete alignment follow the table below in sequence. Connect the output meter across the speaker voice coil, and turn the receiver volume control to max. Turn tone controls for maximum highs and maximum lows.

"AM" I-F ALIGNMENT

Test-Oscillator.-Connect low side of the test-osc. to the chassis, and keep the output as low as possible to avoid a-v-c action.

Steps	Connect the High Side of the Test Osc. to—	Tune Test Osc. to-	Function Switch	Turn Radio Dial to—	Adjust the following
1	Pin No. 1 of (43) in series with .01 mfd.	455 kc. Mödulated	AM	Low Freq. end of Dial	†Top and bot. cores of T4 For max. voltage across voice coil.
2	Stator of C1-D in series with .01 mfd.	455 kc. Modulated	AM	Low Freq. end of Dial	†Top and bot. cores of T2 For max. voltage across voice coil.

tFor proper adjustment of the i-f cores start with the cores all the way out. The first peak obtained will be the correct one.

"FM" ALIGNMENT PROCEDURE

Connect probe of "VoltOhmyst" to negative side of C39 and low side to chassis. Top shield must be on and the bottom shield off.

Steps	Connect the High Side of the Test Osc. to—	Tune Test Osc. to-	Function Switch	Turn Radio Dial to—	Adjust the following
3	Pin No. 1 of V4 in series with .01 mfd.	10.7 mc. 30% AM Modulated	FM		Top of Ratio d-c† Trans. TS for maximum DC on ''VoltOhmyst.''
4	Pin No. 1 of V4 in series with .01 mfd.		FM		Bottom of Ratio d-c† Trans. T5 for minimum audio output on meter.
5	Repeat steps 3 and 4 as ne	cessary making fina	l adjustmen	t with input set to g	pive approx4.0 v. on ''VoltOhmyst.''
6	Pin No. 1 of V3 in series with .01 mfd.	10.7 mc.	FM	88 mc.	†Top and bottom cores of T3 for maximum d-c across C39.
7	Stator of C1-C in series with .01 mfd.	10.7 mc.	FM	88 mc.	†Top and bottom cores of T1 for maximum d-c across C39.
8	Connect sweep generator cable to antenna termi- nals through 120 ohms in each side of line.	90 mc. 22.5 kc. FM mod.	FM	90 mc.	OSC, L8 for max. audio, output.
9		106 mc. 22.5 kc. FM mod.	FM	Tune to signal	ANT, C1-FT and R-F C1-CT for max. voltage across C39.
10		90 mc. 22.5 kc. FM mod.	FM	Tune to signal	ANT, L1 and R-F L2 for max. voltage across C39.
11	Repeat steps 8, 9 and 10 as required.				
10	Contraction should be at least 180 kg				

12 Connect a scope to junct. R33 and C35. Check response and linearity. Peak separation should be at least

tFor proper adjustment of the i-f cores start with the cores all the way out. The first peak obtained will be the correct one.

"AM" R-F ALIGNMENT

Steps	Connect the High Side of the Test Osc. to-	Tune Test Osc. to-	Function Switch	Turn Radio Dial to—	Adjust the following
13		1,620 kc.	AM	Min. capacity	*Osc. C1-BT for maximum output.
14	E-tornal radiating loop	1,400 kc.	AM	Tune to signal	*C1-DT and C1-ET for max. output.
15	and couple loosely to receiver loop.	600 kc.	AM	Tune to signal	‡Osc. L5 for max. output while rocking gang.
16	•	600 kc.	AM	Tune to signal	***R-F L7 for max. output.
10	D	10	al agin in cor	withinity is obtained	

9

17 Repeat steps 13, 14, 15 and 16 until no additional gain in sens

Clip a 10,000 ohm resistor across Cl-D when making this adjustment. ***Be sure the resistor employed in step 15 is removed for this adjustment.

*All R-F shields must be in place.





Figure 9-Radio Top View

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TELEVISION VOLTAGE CHART

The following measurements represent two sets of conditions. In the first condition, a 5000 microvolt test pattern signal was fed into the receiver, the picture synchronized and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV 97A senior ''VoltOhmyst'' between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c.

(TP)	77 1		0	E . F	Plate	E. S	creen	E. Co	athode	E.	Grid			Notes on	
No.	Type	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	l Plate (ma.)	Screen (ma.)	Notes on Measurements	
171	0.80	M	5000 Mu. V. Signal	9	160	8	160	6	0	7	−2.4 to −3.0	_	_		
VI	048	Mixer	No Signal	9	145	8	145	6	0	7	-2.8 to -3.5	_	-		
		R-F	5000 Mu. V. Signal	3	95	_	_	6	0	2		_	_		
Vl	6X8	Oscillator	No Signal	3	90	-	_	6	0	2		_	_		
		R-F	5000 Mu. V. Signal	6	170	-		8	0.1	7		_	_		
V2	6BQ7	Ämplifier	No Signal	6	133	_	_	8	1.1	7	0	-	_		
		R-F	5000 Mu. V. Signal	1	270	-		3	170	2	_	1	_ 1		
V2	6BQ7	Amplifier	No Signal	1	260	_	-	3	133	2		-	_	Depending on channel	
		lst Sound	5000 Mu. V. Signal	5	127	6	124	7	0.7	1	-0.4	6.0	3.0		
V101	6AU6	I-F Amp.	No Signal	5	126	6	123	7	0.5	1	-1.2	5.0	3.0		
		2d Sound	5000 Mu. V. Signal	5	132	6	60	7	0.14	1	_10	2.8	1.2		
V102	6AU6	I-F Amp.	No Signal	-5	131	6	65	7	0.14	1	-5	2.0	1.0		
		Ratio	5000 Mu. V. Signal	7	1.0		_	1	9.2	_	-	_	-	- 111	
V103	6AL5	Detector	No Signal	7	0		-	1	8.0	_	_	-	-		
		lst Äudio	5000 Mu. V. Signal	7	90	_	-	2	0	1	-0.7	0.45	-	At min.	
V104	6AV6	Åmplifier	No Signal	7	86	_		2	0	1	-0.7	0.45	_	volume	
		lst Pix. I-F	5000 Mu. V. Signal	5	180	6	230	7	0.15	1	-6.5	1.5	0.3		
V106	6AU6	Amplifier	No Signal	5	97	6	129	7	1.0	1	0	7.0	3.0		
		2nd Pix. I-F	5000 Mu. V Signal	5	236	6	233	2	0.1	1	-6.5	1.5	0.14		
V107	6CB6	Amplifier	No Signal	5	226	6	138	2	0.85	1	0	12.0	3.0		
		3d Pix. I-F	5000 Mu. V Signal	. 5	149	6	144	2	0.9	1	0	11.0	3.0		
V108	6CB6	Amplifier	No Signal	5	129	6	133	2	0.8	1	0	10.0	2.0		
		4th Pix. I-F	5000 Mu. V Signal	. 5	178	6	163	2	2.2	1	0	8.9	2.1		
V109	6CB6	Amplifier	No Signal	5	165	6	150	2	2.0	1	0	7.9	2.1		
		Video	5000 Mu. V Signal	. 8	130	6	172	2 5	1.2	4	*-5.0	22.5	5.5	*Depends on picture	
V110	6ÅG7	Amplifier	No Signal	8	130	6	107	5	0.8	4	*-2.0	15.0	4.0	*Depends on picture	
		AGC	5000 Mu. V Signal	. 5	-2	7 6	238	3 2	152	1	155	0.1	3.4	AGC control set for	
V111	6CB6	Amplifier	No Signal	5	4.5	5 6	218	3 2	2 135	5 1	118	0	0	normal operation	

TELEVISION VOLTAGE CHART

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Tube	TT 1			E. 1	Plate	ES	creen	E. C	athode	E	. Grid		T	
No.	Tube Type	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Plate (ma.)	Screen (ma.)	Notes on Measurements
			5000 Mu. V. Signal	2	152		_	3	0.9	1	-44	1.1	_	
		Hor. Sync	No Signal	2	135	_	_	3	*0.4	1	*-30	0.5	_	*Depends on noise
V112	6SN7GT	GT Amplifier	5000 Mu. V. Signal	5	86		_	6	0	4	-2.0	5.5	_	
		-	No Signal	5	50	_	_	6	0	4	-1.8	4.6	_	
		Hor. Sync	5000 Mu. V. Signal	2	374	_	_	3	2 16	1	155	1.2	_	
V113	6SN7GT	Separator	No Signal	2	372	-	_	3	155	1	134	0.8	_	
		Vert. Sync	5000 Mu. V. Signal	5	345	_	_	6	205	4	153	<0.1	_	
V113	6SN7GT	6SN7GT Separator		5	340	_	_	6	160	4	130	<0.1	_	
		Vert. Sync	5000 Mu. V. Signal	5	7.0	_	_	6	0	4	-0.2	0.6	_	
V114A	6SN7GT	Amplifier	No Signal	5	*7.0	_		6	0	4	*0	0.5	_	*Depends on noise
		Vertical	5000 Mu. V. Signal	2	176	_	_	3	0	1	-27	0.2		
V114B	6SN7GT	Oscillator	No Signal	2	176	_	_	3	0	1	-27	0.2	_	
		Vertical	5000 Mu. V. Signal	5	359	6	359	2	30	1	0	17.3	1.2	
V115	6AQ5	Output	No Signal	5	357	6	357	2	29	1	0	17.3	1.2	
			5000 Mu. V. Signal	2	145	-	_	3	-18	1	-42	0.4	· _	Hor. hold couñter- clockwise
V116	6SN7GT	Horizontal Osc. Control	5000 Mu. V. Signal	2	230	_	-	3	-18	1	-42	0.4	_	Hor. hold clockwise
			No Signal	2	188		_	3	-24	1	-42	0.37	_	
		Horizontal	5000 Mu. V. Signal	5	258	_	-	6	0	4	*—91	2.0	_	* Depends on
V11 6	6SN7GT	Oscillator	No Signal	5	256	—	_	6	0	4	*—94	2.0		Oscillator Adjustment
		Horizontal	5000 Mu. V. Signal	Cap	+	8	165	3	12.5	5	-30	110	15.0	*High Voltage
V117	6CD6G	Output	No Signal	Cap	*	8	165	3	12.5	5	_30	110	15.0	Pulse Present
	1B3GT	H. V.	5000 Mu. V. Signal	Cap	*	_	_	2& 7	16,000	-	_	0.2	_	*High Voltage
V118	/8016	Rectifier	No Signal	Cap	*	_	_	2&7	16,400	_	_	0.2	_	Pulse Present
V119			5000 Mu. V. Signal	5	355		-	3	*	_	_	57	_	*High Voltage
V 120	6W4GT	Dampers	No Signal	5	353	-	_	3	*	_	_	57		Pulse Present
VIDI	21 & D.4	Kinescone	5000 Mu. V. Signal	Cone	16,000	10	555	11	140	2	82	0.2	_	At average
V 121	21MF4	Amescope	, No Signal	Cone	16,400	10	550	11	132	2	76	0.2	_	Brightness
V122			5000 Mu. V. Signal	4&6	388	-	_	2&8	389	_	_	*139		* Per
V123	5U4G	Rectifiers	No Signal	4&6	386	-	_	2&8	387	-	-	*145	_	Tube

R-F UNIT WIRING DIAGRAM



Figure 12-KRK11A R-F Unit Wiring Diagram

CRITICAL LEAD DRESS:

- 1. Keep all wiring in the pix i-f, sound i-f and video circuits as short as possible.
- 2. Keep the leads on C110, C111, C112, C200, R109, R110, R111, R112, R114, R115 and R233 as short and direct as possible
- 3. Do not change the bus wire connections to pin 2 of V101 and V102. Sleeving is used on these wires to insure length and to prevent shorting.
- 4. Dress Cll4 down between Rll7 (volume control) and wafer S101-2.
- 5. Ground R130 to pin 3 of V106 and R138 to pin 7 of V107.
- 6. Do not change the grounding of R141, R146 and R149.
- 7. Keep the bus wire from T109-A to C146 (plug in capacitor) short and direct.
- 8. Ground the filaments of sockets of V107, V108 and V109 independently of the socket center pin. Use ground lances provided near each socket.
- 9. Dress C198 straight up to act as a shield between T101-A and V110-4.
- 10. Dress C153 and R170 (kine cathode) up in the air above the terminal board.
- 11. Keep the leads connected to Tll4-C and Tll4-D (synchroguide) down so that they will not short out when the chassis is placed in the cabinet.
- 12. Do not reroute any wires between T104 and the terminal board alongside it. Keep all leads on the foot side of the terminal board.

- 13. Dress all wires routed past TlO4, shielded wires WlO2 and W103 under the big lances near T104.
- 14. Dress all a-c leads to S102 under the large lances on the front apron and away from R243.
- 15. Dress R116 close to the chassis with leads as short as possible.
- 16. Dress C206, C221 and C212 up in the air and away from all other leads and components.
- 17. Dress all leads away from bleeder resistor R243.
- 18. The blue lead from pin 5 of VIII to the terminal board under the high voltage cage should be routed between V117 socket and the rear apron.
- 19. Keep leads on C214 as short and direct as possible.
- 20. Dress R206 away from all other wires and components to prevent excessive heating.
- 21. Keep the wire from the vertical output transformer T114 away from the 5U4G rectifier tubes.
- 22. Dress all 2 watt resistors away from each other and all other wires and components.
- 23. Dress all wires away from damper tubes V119 and V120.
- 24. Blue wire from pin 5 V116 to T114-A should not be more than 5 inches long.
- 25. Dress all peaking coils up and away from the base.



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TELEVISION SCHEMATIC DIAGRAM KCS68H



All resistance values in ohms. K = 1000. All capacitance values less than 1 in MF and above in 1 MMF unless otherwise noted.

Direction of arrows at controls indicates clockwise rotation.

REFER TO PAGES 180 TO 193 FOR TELE-

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All voltages measured with ''VoltOh-myst'' and with no signal input. Voltages should hold within $\pm 20\%$ with 117 v. a-c supply.

Figure 14-Television Schematic Diagram

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REPLACEMENT PARTS

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	R-F UNIT ASSEMBLIES	76554	Stator—Antenna stator complete with rotor, coils, capac- itor and resistor (S5, C20, L42, L43, L44, L45, L54,
76539	Board—Antenna matching transformer terminal board less coils L58, L59, L60 and less capacitors C24, C25, C26, C27	77353	Stator—Converter stator complete with rotor, coils, capacitor and resistors (S2, C10, C12, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L47, L48, B4, B5, B6)
76531	Board—Terminal board, 5 contact and ground	77205	Stator-Oscillator stator complete with rotor, coils and
76845 76965	Bracket-Vertical bracket for holding VI tube shield Capacitor-Ceramic, variable for fine tuning-plunger		L9, L10, L11, L46)
93056	type (C2) Capacitor—Ceramic 5 mmf (C26 C32)	76553	Stator—R-F plate stator complete with rotor, coils, capacitor and resistor (S3, C14, L22, L23, L24, L25,
70597	Capacitor—Ceramic, 8 mmf. (C29)	76556	L26, L27, L28, L29, L30, L31, L50, R7) Stator-R-F stator complete with rotor, coils, capacitor
55326 54207	Capacitor—Ceramic, 10 mmf. (C3) Capacitor—Ceramic, 18 mmf. (C27)		and resistors (S4, C19, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L53, R11, R12)
76557	Capacitor-Ceramic, 22 mmf. (C19, C31)	76561	Strap—Channel = 13 r-f grid strap (L52)
76558 70935	Capacitor—Ceramic, 22 mmf. (C5) Capacitor—Ceramic, 27 mmf. (C25)	76525	Strip—Coil segment mounting strip—RH center Strip—Coil segment mounting strip—LH lower
76739	Capacitor—Ceramic, 33 mmf. (C24)	76544	Strip-Coil segment mounting strip-LH upper-less
77460	Capacitor—Ceramic, 220 mmf. (C10) Capacitor—Coromic, 270 mmf. (C12, C14)	75446	Stud—Capacitor stud for trimmer coil L49, C15 (uncoded
75166	Capacitor—Ceramic, 1500 mmf. (c12, C14) Capacitor—Ceramic, 1500 mmf. (stand-off) (C13, C17, C21, C22, C28, C30)	75447	and coded ''ER'') Stud—Capacitor stud for trimmer coil L49, C15 (coded numerically and ''Hi O'')
75610	Capacitor-Ceramic, 1500 mmf. (C6)	76740	Stud-#6-32 x 1" adjusting stud for adjustable capacitor
71088	Capacitor-Ceramic, 1500 mmf. (C16, C20, C23) Capacitor-Ceramic, 0.68 mmf. (C7)	77152	Terminal—Terminal for mounting C8 trimmer
77151	Capacitor-Tubular, steatite, adjustable, 0.8-3.0 mmf.	10536	(T2, C24, C25, C26, C27, L58, L59, L60, L61, L62, J1)
75184	(C8) Capacitor—Ceramic, adjustable, 0.80—3.8 mmf. com-	77148	Transformer-Converter transformer (T1, R3)
76532	plete with adjusting stud (C9)	76535	Trap-I-F trap (L65)
70002	(Cla)	76542	Trap—I-F trap (41.25 mc) complete with core (L60)
76527	Capacitor—Mica trimmer, 55-80 mmf. (C11) Clip—Tubular clip for mounting stand off capacitors	76541	Trap-I-F trap (45.75) complete with core (L59)
73591	Coil—Antenna matching coil (2 reg'd)	15150	capacitor
73477	Coil-Choke coil (L57)		
76763	Coil—Filament choke coil (L63, L64) Coil—Filament choke coil (L56)		TELEVISION CHASSIS ASSEMBLIES
76562	Coil—R-F amplifier coupling coil (L51)		KCS68H
77153	Coil-R-F choke coil (L66)	76456	Bracket-Channel indicator lamp bracket
76537	Coil—Shunt coil complete with adjustable core (L61)	76490	Bracket-Mounting bracket complete with insulator for
76529	Coil—Trimmer coil (3 turns) with adjustable inductance	12118	Cap-6CD6 tube connector cap
	section (L49, C15)	76800	Capacitor Adjustable trimmer, steatite, 1-4 mmf. (C226)
38853	Connector-4 contact female connector-part of match- ing transformer (J1)	71496	Capacitor—Adjustable trimmer, 5-70 mmf. (C220) Capacitor—Mica, trimmer, dual 10-160 mmf. (C181A,
76559	Connector—Oscillator grid connector	39044	C181B) Consister Commin 15(C151)
76460	Contact—Test point contact	76577	Capacitor-Ceramic, 33 mmf., 6000 volts (C206)
76543	CoreAdjusting core for FM trap	76574	Capacitor-Ceramic, 39 mmf. (C177)
76521	Detent—Detent mechanism and fibre shaft	39042	Capacitor—Ceramic, 47 mmf. (C150)
73453	Form—Coil form for coils L48, L50, L53	76474	Capacitor – Mica, 82 mmf. (C157, C182)
76728	Nut-Speednut for mounting adjustable trimmer 76532	39396	Capacitor-Ceramic, 100 mmf. (C156, C166)
503047	Resistor - Fixed, composition :-	44202	Capacitor—Mica, 100 mmf. (C176) Capacitor—Ceramic 150 mmf. (C168, C215)
503082	$82 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R9)}$	76576	Capacitor-Ceramic, 150 mmf., 2003 volts (C212)
504115	150 ohms, ± 20%, ½ watt (R13)	76575	Capacitor-Ceramic, 180 mmf., 3500 volts (C211)
504210	1000 ohms, 20%, 1/2 watt (R7, R14)	54003	Capacitor-Mica, 270 mmf. (C187) Capacitor-Mica, 470 mmf. (C111, C112)
503247	4700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R2)	76488	Capacitor-Ceramic, 500 mmf., 30,000 volts (C197)
504410	100,000 ohms, ± 20%, 1/2 watt (R1, R5, R6)	75166	Capacitor-Ceramic, 1500 mmf., stand-off (C146)
14343	470,000 ohms, ± 20%, ½ watt (R8)	13413	Cl32, Cl34, Cl36, Cl40, Cl44)
75164 76547	Rod—Actuating plunger rod (fibre) for fine tuning link Screw $= \pm 4.40 \times \frac{1}{4}$ adjusting screw for coils L6. L7. L8.	76470	Cupacitor—Ceramic, dual 4700 mmf. (C123A, C123B, C135A, C135B, C141A, C141B, C142A, C142B, C224A, C224B)
76549	L9, L10, L11 Screw = #4.40 x 3/4" adjusting screw for anil 1.5	75877	Capacitor-Ceramic, dual 10,000 mmf. (C102A, C102B,
76548	Screw $- = 4.40 \times 7_8$ adjusting screw for coil L5 Screw $- = 4.40 \times 3_{16}$ adjusting screw for coils L1, L2, L3, L4, L46	73960	Capacitor—Ceramic, 10,000 mmf. (C126, C139, C143, C198, C214)
76519	Shaft—Channel selector shaft and plate	76742	Capacitor-Electrolytic, 2 mfd., 10 volts (C124, C138)
76134	Shart—rine tuning shaft and cam Shield—Front shield complete with shaft bushing and bracket	74521 28417	Capacitor-Electrolytic, 5 mfd., 50 volts (C200) Capacitor-Electrolytic, 5 mfd., 450 volts (C204)
76534 76530	Shield—Tube shield Socket—Tube socket, 9 pin, miniature, ceramic, saddle- mounted for VI	77474	Capacitor-Electrolytic comprising 1 section of 35 mfd., 450 volts, 1 section of 25 mfd., 450 volts and 1 section of 100 mfd., 50 volts (C201A, C201B, C201C)
76336	Socket—Tube socket, 9 pin, miniature, bakelite, saddle-	75510	Capacitor-Electrolytic comprising 2 sections of 35 mfd.,
77149	mounted for V2 SpacerMetal spacer for front plate		of 5 mfd., 450 volts (C202A, C202B, C202C, C202D, C203A, C202B, C202C, C202B, C
75163	Spring-Friction spring (formed) for fine tuning cam	75643	Capacitor-Tubular, paper oil impropried 001 - (1
30340	Spring-Hairpin spring for fine tuning link		1000 volts (C158, C161, C167, C189)
77204	Spring-Return spring for fine tuning control	76508	Capacitor—Tubular, moulded, oil impregnated, .0015 mfd., 600 volts (C190)
		1	

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STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION
77468	Capacitor-Tubular, paper. oil impregnated, .0018 mfd.,		76682	Resistor-Wire wound, 200 ohms, 5 watts (R206)
73595	600 volts (C114) Capacitan Tubular paper ail imprograted 0022 mfd		77472	Resistor – Wire wound, comprising 1 section of 950 ohms,
	600 volts (C113, C163)			ohms, 5 watts, 1 section of 1200 ohms, 1 watt and 1
73803	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 100 volts (C169)			R243D, R243E)
73920	Capacitor-Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C118, C149, C154, C164)	11	76642	Resistor-Wire wound, 6750 ohms, 10 watts (R163)
73561	Capacitor-Tubular, paper, oil impregnated, .01 mfd.,		76265	Resistor—Wire wound, 18,000 ohms, 10 watts (R245) Resistor—Fixed, composition:—
73594	Capacitor—Tubular, moulded, oil impregnated, .01 mfd		503047	47 ohms, ± 10%, ½ watt (R109, R159, R233)
73797	600 volts (C165, C188)		34763	68 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R166)
	600 volts (C116)		502082	82 ohms, ±5%, ½ watt (R101)
73562	Capacitor-Tubular, paper, oil impregnated, .022 mfd., 400 volts (C160, C174, C175, C184, C207)		502110	100 ohms, ± 5%, ½ watt (R130) 100 ohms, ±10%, ½ watt (R126, R133)
73798	Capacitor-Tubular, paper, oil impregnated, .022 mfd.,		503118	180 ohms, ±10%, ½ watt (R152)
73553	Capacitor-Tubular, paper, oil impregnated, .047 mfd.,	11	503122 503147	220 ohms, ±10%, ½ watt (R174) 470 ohms, ±10%, ½ watt (R216)
75071	400 volts (C137, C183, C185) Capacitor—Tubular, moulded, .047 mfd., 400 volts		503168	680 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R162)
72592	(C179, C180)		503182	820 ohms, ± 10%, ½ watt (R180)
13332	600 volts (C171, C192)		503210	1000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R111) 1000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R103, R108, R125, R135, R137,
73815	Capacitor—Tubular, paper, oil impregnated, .068 mfd., 1000 volts (C195, C196)		502212	R140, R165, R191) 1200 ohms, +5%, ½ watt (R110)
73551	Capacitor-Tubular, paper, oil impregnated, 0.1 mfd.,		513212	1200 ohms, ±10%, 1 watt (R215)
73557	Capacitor-Tubular, paper, oil impregnated, 0.1 mfd.,		503212	1200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R183) 2200 ohms, $\pm 10\%$, $\frac{1}{6}$ watt (R148)
73794	600 volts (C173) Capacitor—Tubular, paper, oil impregnated, 0.22 mfd.		503233	3300 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R208)
74057	400 volts (C153)		502239	3900 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R157)
14551	600 volts (C170)		503239	5600 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R141)
73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C186, C191, C219)		513256	5600 ohms, ±10%, 1 watt (R164)
76498	Choke-Filter choke (L108)		14659 513268	6800 ohms, ± 5%, ½ watt (R114, R115) 6800 ohms, ± 10%, 1 watt (R155)
75241	Coil—Antenna shunt coil (L202)		503282	8200 ohms, ±10%. 1/2 watt (R150, R197)
76672	Coil—Filament winding only for hi-voltage transformer (Part of T115)		523282	8200 ohms, ± 10%, 2 watts (R235, R253)
73477	Coil-Choke coil (L101)		505510	R211, R229)
76483	core (L107)		513310 523310	10,000 ohms, ±10%, 1 watt (R168) 10,000 ohms, ±10%, 2 watts (R151)
76646 76647	Coil—Peaking coil (72 muh) (L103, R161) Coil—Peaking coil (180 muh) (L114, R166)		513312	12,000 ohms, ±10%, 1 watt (R181)
75252	Coil—Peaking coil (500 muh) (L105, L113)		503315 503318	15,000 ohms, ± 10%, ½ watt (R118) 18,000 ohms, ± 10%, ¼ watt (R169, R254)
76640 76510	Coil—R-F choke coil (1.5 muh) (L117, L118) Coil—R-F choke coil (4.7 muh) (L115)		503322	22,000 ohms, ±10%, ½ watt (R194, R195, R196)
76484	Coil-Width coil complete with adjustable core (L106)		503327	27,000 ohms, ± 10%, ½ watt (R119, R176) 33,000 ohms, ± 10%, ½ watt (R107, R132, R139, R258)
77475	Connector-4 contact female connector for power cora		503339	$39,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R112, R153)}$
50367	input cable (J106) Connector—6 contact female connector for yoke leads		503347	47,000 ohms, ±10%, ½ watt (R104, R131)
75542	(J102) Connector—6 contact male connector—part of deflection		502356	56,000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R144, R149)
10015	yoke (P102)		513356	56,000 ohms. ± 10%, 1 watt (R106, R226, R231)
16863	Connector—Anode connector complete with terminal and contact		512368	68,000 ohms, ± 5%. 1 watt (R230) 68,000 ohms, ± 10%. 1 watt (R210, R225)
35787 76457	Connector—Audio to radio connector (J103)		513382	82,000 ohms, ±10%, 1 watt (R257)
70151	the hi-voltage capacitor		502410 503410	100,000 ohms, ± 5%, ½ watt (R173)
75482	Connector—Video input connector (J104) Control—AGC control (R175)		503412	120,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R178)
76444	Control—Brightness control (R218)		503415	150,000 ohms. ± 10%, ½ watt (R145, R170, R172, R187, R217, R221, R236)
77201	Control-Horizontal and vertical hold control (R201A,		512415	150,000 ohms, ± 5%, 1 watt (R224)
76445	Control—Picture control (R167)		502422	220,000 ohms, 5%, ½ watt (R129) 220,000 ohms, ±10%, ½ watt (R185, R193, R237)
77473	Control—Tone control, volume control and power switch (R117A R117B S102)		503427	270,000 ohms, ±10%, ½ watt (R184)
76449	Control-Vertical linearity control (R214)		503433	330,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R222, R256) 390,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R255)
76497 77136	Control—Vertical peaking control (R207) Cover—Back cover for hi-voltage compartment	5	503447	470,000 ohms, ± 10%, ½ watt (R160, R171, R188, R190)
76985	Cover-Side cover for hi-voltage compartment	5	503468	680,000 ohms, ±10%, ½ watt (R189)
74956	Fastener—Push fastener for mounting tube sockets	5	503510	$1 \text{ megohm}, \pm 10\%, \frac{1}{2} \text{ watt} (R200, R223)$
73600	Fuse-0.25 amp., 250 volts (F101) Grommet-Rubber grommet for 2nd anode lead exit	5	503515	1.5 megohm. ± 10%, ½ watt (R192)
37396	Grommet-Rubber grommet for mounting tube sockets	5	512533	3.3 megohm, ±10%, ½ watt (R213) 3.3 megohm, ±5%, 1 watt (R127)
76654 76480	Hood—Deflection yoke hood less rubber cushions Lead—Anode lead complete with eyelet	5	503539	3.9 megohm, ±10%, ½ watt (R179)
76168	Magnet-Focus magnet	5	503582	8.2 megohm, ± 10%, ½ watt (R177, R186)
76728	Nut-Speednut for mounting trimmer Capacitor C		76650	Ring—Anchoring ring for V117 radiator springs
76500	Plate—Hi-voltage plate (bakelite) complete less trans- former, socket and lead		71456	Screw -= 8-32 x 7/16" wing screw for mounting deflection
76649	Radiator—Heat dissipating radiator for V117		76487	Shaft-Connecting shaft (nylon) for picture and bright-
76468	Rectifier—Ficture detector crystal rectifier (CR101) Resistor—Wire wound, 1.5 ohms, 1/3 watt (R242)	1	73584	ness controis Shield—Tube shield for V101, V102, V103, V106, V107. V111
74015	Resistor-Wire wound, 100 ohms, 2 watts (R234)		76741	Shield—Tube shield for V114

21-**T**-197DE

REPLACEMENT PARTS (Continued)

21-**T**-197DE

	STOCK	DESCRIPTION	STOCK	DECODIOTION	
	NO.	DESCRIPTION	No.	DESCRIPTION	
	75718	Socket-Channel indicator lamp socket	77314	Coil-R-F coil-FM (L2)	
	74834	Socket-Kinescope socket	33514	Connector-Dual single contact female connector for	
	10455	mounted for VIIO	35787	Connector—Single contact female connector for audio	
	73249	Socket—Tube socket, octal, ceramic, plate mounted for V116	74879	cable (J2)	
	31251	Socket-Tube socket, octal, wafer for V112, V113, V114	75062	Connector—2 contact female connector for antenna leads Connector—9 contact male connector for power input	
	71508	V117, V122, V123 Socket Tube contact moulded behalite for	70000	(J1)	
	11500	V118	75561	Control—Tone control—H.F. (R29) Control—Tone control—L F. (R16)	
	50367	Socket-Tube socket, 6 pin, moulded, saddle mounted for V119 V120	75537	Control – Volume control and power switch (R19, S2)	
	71494	Socket—Tube socket, 7 pin, moulded, saddle mounted,	72953	Cord-Drive cord (approx. 57" over-all)	
	73117	miniature for V115 Sachet Tube cachet 7 pin wafer miniature for V101	15564	Coupling—Spring coupling for function switch extension shaft	
	13111	V102, V103, V104, V106, V107, V108, V109, V111	74839	Fastener-Push fastener to fasten RF shelf (4 reg'd)	
	76651	Spring-Coil spring for securing V117 radiator (3 reg'd)	75548	Grommet—Rubber grommet for mounting slides (4	
	76636	Stud—Adjusting stud for trimmer capacitor Stud—Adjusting stud complete with guard for focus	16058	Grommet—Rubber grommet for mounting RF shelf	
		magnet	11765	(4 reg'd) Lemp — Diel Jemp — Marda 51	
	76428	Support—Bakelite support only—part of hi-voltage shield	77311	Latch—Bottom cover latch	
	76501	Transformer—Hi-voltage transformer less filament wind-	77486	Nut—Speednut for latch adjustment screw	
	70440	ing (Part of T115)	76421	Pin-Slide mechanism stop pin	
	-16440	plete with adjustable cores (T114)	35641	Pulley-Drive cord pulley-1%" dia.	
	76495	Transformer—Power transformer, 117 volts 60 cycle	500000	Resistor-Fixed, composition :-	
	76439	Transformer—Ratio detector transformer complete with	503039	39 onms, ± 10%, ½ watt (R3) 68 ohms, ± 10%, ½ watt (R21)	
	70.000	adjustable cores (T102, C108, C109)	503110	100 ohms, ±10%, ½ watt (R14, R34)	
	76438	Transformer—Sound i-f transformer complete with adjustable cores (T101, C103, C104)	503112	120 ohms, ±10%, ½ watt (R30)	
	76437	Transformer-Sound take off transformer complete with	503139	390 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R12)	
	74144	adjustable core (THU, C148) Transformer—Vertical oscillator transformer (T111)	503168	$1000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R0, R25, R32)}$	
	76494	Transformer—Vertical output transformer (T112)	502212	1200 ohms, ±5%, ½ watt (R36)	
	77198	Transformer-1st. pix i-f grid transformer complete with	502233	3300 ohms, ± 5%, ½ watt (R35)	
	77197	Transformer—lst. pix i-f plate transformer complete	503282	$8200 \text{ ohms} \pm 10\%$, $\frac{1}{2} \text{ watt} (R5)$	
	70.425	with adjustable cores (T105, C130, C131, R134)	503318	18,000 ohms. $\pm 10\%$, $\frac{1}{2}$ watt (R13, R17)	
	16435	with adjustable cores (T106, C133)	503322	22,000 ohms, ±10%. 1/2 watt (R22, R31)	
1	76433	Transformer—3rd. or 4th. pix i f transformer (T107, T108)	503327	27,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R9, R18)	1
	76436	Transformer—5th. pix i-f transformer (T109, C145, C147, L102, P154, CR101)	503356	$56,000 \text{ ohms}, \frac{1}{2} \text{ watt} (R26)$	
	76482	Trap-4.5 MC trap (L116, C213)	503412	120,000 ohms, ± 10%, ½ watt (R11, R15)	
	76653	Yoke—Deflection yoke complete with 6 contact male	503415	150,000 ohms, ±10%, ½ watt (R4, R24)	
		P102)	503422	$220,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R23)}$	
			503447	470,000 ohms, ±10%, ½ watt (R38)	
		RADIO CHASSIS ASSEMBLIES	503510	1 megohm, ±10%, ½ watt (R39)	
		RCIIIIA	503515	1.5 megohm, ±10%, ½ watt (R10) 2.2 megohm, ±10%, ½ watt (R1 R7 R8)	
	77308	Capacitor-Variable tuning capacitor (CIA, CIB, CIC,	503610	10 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R20)	
	75010	CID, CIE, CIF)	504622	22 megohm, ±20%, ½ watt (R27)	
	77352	Capacitor-Ceramic, 5 mmt. (C12, C41) Capacitor-Ceramic, 6.8 mmf. (C16)	75540	Shatt—Tuning knob shaft Shield—Tube shield for VI_V6	
	39044	Capacitor-Ceramic, 15 mmf. (C14)	75192	Shield—Tube shield for V2	
	76348	Capacitor-Ceramic, 47 mmf. (C10)	77310	Slide—Slide mechanism (2 reg'd)	
	39396	Capacitor-Geramic, 68 mmf. (C15, C17) Capacitor-Ceramic, 100 mmf. (C5)	31364 74179	Socket—Dial lamp socket Socket—Tube socket, 7 contact miniature for VI V3	
	75614	Capacitor-Ceramic, 150 mmf. (C13, C28, C31)		V4, V5	
	75611	Capacitor-Ceramic, 220 mmf. (C3)	77306	Socket—Tube socket, 7 pin, moulded, saddle mounted for V2	
	39640	Capacitor-Mica, 330 mmf. (C36, C37)	73117	Socket-Tube socket, 7 contact, miniature wafer for V6	
	73473	Capacitor-Ceramic, 4700 mmf. (C2, C4, C7, C9, C11. C18.	77312	Spring—Actuating spring for bottom cover latch	
	202.12	C20, C23, C24, C27, C32, C34, C35, C40)	76332	Spring-Drive cord spring	
	77468	Capacitor-Tubular, paper, 0018 mfd 600 volte (C8)	75563	Spring—Retaining spring for function switch extension shaft	
	73795	Capacitor-Tubular, paper, .0033 mfd., 600 volts (C25)	76422	Spring—Retaining spring for slide mechanism stop pin	
	73920	Capacitor-Tubular, paper, .0047 mfd., 600 volts (C30)	77304	Support-Polystyrene support for FM oscillator coil com-	
	72490	Capacitor Tubular, paper, .005 mfd., 200 volts (C33, C38)	77476	plete with mounting bracket	
	73797	Capacitor-Tubular, paper015 mfd., 600 volts (C29)	73743	Transformer-Ratio detector transformer complete with	
	77469	Capacitor-Tubular, paper, .018 mfd., 200 volts (C21)	10110	adjustable core (T5)	
	73562	Capacitor-Tubular, paper022 mfd., 400 volts (C26)	75558	Transformer-lst. i-f transformer-AM-complete with	
	73935	Clip-Mounting clip for i-f transformer 75558 and 76328	75559	Transformer-lst, i-f transformer-FM-complete with	
	77313	Coil—Antenna coil—FM (Ll)		adjustable cores (Tl)	
	71942	Coil—Filament choke coil (L9. L10)	76328	Transformer-2nd. i-f transformer-AM-complete with	
	75569	Coil-Oscillator coil-AM-complete with adjustable core	75560	Transformer-2nd, i-f transformer-FM-complete with	
		(13, 14, 15)			
	77315	Coil—Oscillator coil—FM (L8)		adjustable cores (T3)	

REPLACEMENT PARTS (Continued)

STOCK	DESCRIPTION		STOCK	DESCRIPTION
	ROLL-OUT MECHANISM ASSEMBLY FOR RADIO CHASSIS RC-1111A		71599 76599	Bracket—Pilot lamp bracket Bracket—''U'' shape bracket for deflection yoke hood support rod
77332	Antenna—Radio antenna loop less cable		74579	Support Rubber bumper for L.H. upper door
77319	Bracket-Dial lamp socket bracket-L.H.		74296	Cable—Shielded pickup cable complete with pin plug
77318	Bracket—Dial lamp socket bracket—R.H. Connector—2 contact (polarized) male connector for		73561	Capacitor—Tubular, paper, .01 mfd., 400 volts
11005	radio antenna cable		13103	Cap—Pilot lamp cap
77477	Dial—Polystyrene dial scale		X3130	Catch—Bullet catch and strike Cloth—Grille cloth
77316	Frame-Plastic mounting frame-maroon-for chassis		30870	Connector—2 contact male connector for motor cable
	and record changer		74752	Connector—2 contact male connector for FM cable
77322	Pointer—Station selector pointer		39153 75474	Connector—4 contact male connector for antenna cable Connector—Single contact male connector for antenna coble (2 reg (4)
			71457	Cord—Power cord and plug—part of back cover
	RS141A		76698	Cushion—Rubber cushion for masking panel support bracket
74206	Cable Shielded and is cable complete with sin shore		76627	Cushion—Rubber cushion for safety glass
14250	part of interconnecting cable		77243	Decal—''His Master's Voice'' decal
72447	Cable—Shielded audio cable complete with two (2) pin		71984	Decal—''RCA Victor'' decal
77324	Capacitor—Electrolytic comprising 1 section of 30 mfd.		77483	Decal—'Television controls function decal Decal—''IIHE'' decal
	450 volts, 1 section of 30 mfd., 350 volts and 1 section of 40 mfd 25 volts (C101A C101B C101C)		74273	Decal—''Victrola'' decal
75643	Capacitor—Tubular paper, oil impregnated, .001 mfd.,		77244	Emblem—''Deluxe'' emblem
72700	1000 volts (C103, C104)		77033	Emblem—"RCA Victor" emblem
73562	Capacitor-Tubular, paper, .0068 mtd., 400 volts (C105) Capacitor-Tubular, paper, .022 mfd., 400 volts (C102)		76622	Escutcheon—Channel marker escutcheon Glass—Safety glass
30868	Connector-2 contact female connector for phono power		37396	Grommet-Rubber grommet for speaker mounting
77478	—part of interconnecting cable (P103) Connector—4 contact male connector for radio power		73420	(3 req'd) Hinge—Butt hinge for L.H. upper door (3 req'd)
75064	input—part of interconnecting cable (P104)		74308	Hinge-Door hinge (1 set)
15064	ing cable (P101)		76595	Knob—Brightness control, vertical hold control or tele- vision tone control knob—maroon (outer)
72776 73637	Pin—Contact pin for speaker lead (2 reg'd) Resistor—Wire wound, 2200 ohms, 5 watts (R101)		74963	Knob—Picture control, horizontal hold control or tele- vision volume control and power switch knob—maroon
503110	Resistor—Fixed, composition:-		77330	Knob—Radio function switch knob—maroon
522127	270 ohms, ±5%, 2 watts (R107)		77328	Knob-Radio tuning control, tone control or volume
502233	3300 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R102)		76593	Knob-Television channel selector knob-marcon (inner)
503368	$68,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R105)}$		76591	Knob-Television fine tuning control knob-maroon
503447	$470,000$ ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R103)		11765	(outer) Lamp—Pilot or channel marker escutcheon lamp—
77479	Shell—Shell for 4 contact male connector		75450	Mazda 51
31364	Socket—Pilot lamp socket	11	15459	gundy
73117	Socket—Tube socket, octal, water Socket—Tube socket, 7 pin, miniature, wafer		76696	Mask—Polystyrene masking panel
77323 75566	Transformer—Output transformer (T202) Transformer—Power transformer 117 volts 60 cycle		76177	Nut-#10-32 special nut for deflection yoke hood sup- port rods
	(T101)		76894	Nut—Spring nut for changer mounting screws
			77013	Nut—Speed nut for speaker mounting screws Nut—Speed nut for mounting medallion 77246, emblem
	SPEAKER ASSEMBLY		76601	77244 and emblem 77033
	92569-12W		77481	Pull—Door pull—lower (4 req'd)
	RL-111A1		77348	Pull—Door pull—upper (2 reg'd)
	RMA-274		10020	hood assembly
75682	Cone-Cone and voice coil (3.2 obms)		75623	Screw — #8 x 3/4" trimit head screw for door pull 77348
76093	Speaker-12" P.M. speaker complete with cone and voice		73643	Spring-Channel marker escutcheon spring clip
	coil (3.2 ohms)		76630	Spring—Formed spring for kinescope masking panel
	Note:-If stamping on speaker in instruments does not		11000	port rod
	parts by referring to model number of instrument,		30330	Spring—Retaining spring for knob #74963
	part required.		76837	Spring-Retaining spring for knobs #76593 and 76595
			74734	Spring-Spring clip for radio knobs #77328 and 77330
	MISCELLANDOUS		75902	Spring—Suspension spring for amplifier cable
	MIDCEDEAMEOUS		72936	Stop-Door stop
77480	Back-Television compartment back cover complete with		76600	Strap—Grounding strap $(.005'' \times \frac{1}{2}'' \times 18'' \text{ soft copper})$ Stud=10-32 x 134'' stud for mounting and the
75707	power cord		77023	Washer-Cellulose washer-gold-for television control
76184	Board—TV antenna terminal board		75457	knobs Washer-Felt washer-dark brown between knob
76629	Bracket-Hanger bracket for deflection yoke hood			channel marker escutcheon
76697	assembly Bracket—Masking panel support bracket (2 reg'd)		75500	Washer—Felt washer for kinescope mask or back cover mounting scerws
	provide the second seco			

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.



Models 21T207, 21T207G "Crandall" Mahogany





Model 21T208 "Lambert" Walnut, Mahogany

Model 21T217 "Brookfield" Walnut, Mahogany



21T227, 21T228, 21T229 Chassis No. KC572A -- Mfr. No. 274-

SERVICE DATA

PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.



Model 21T218 "Lansford" Walnut, Mahogany, Blonde



Model 21T227 "Lindale" Walnut, Mahogany, Blonde





Model 21T228 "Brandon" Walnut, Mahogany, Maple

Model 21T229 "Belgrove" Walnut, Mahogany, Limed Oak

ELECTRICAL AND MECHANICAL SPECIFICATIONS PICTURE SIZE 227 square inches on a 21AP4 Kinescope RCA TUBE COMPLEMENT

TELEVISION R-F FREQUENCY RANGEAll 12 television channels, 54 mc. to 88 mc., 174 mc. to 216 mc.Picture I-F Carrier Frequency
AUDIO POWER OUTPUT RATING 4.0 watts max. VIDEO RESPONSE To 3.2 mc. SWEEP DEFLECTION Magnetic FOCUS Magnetic
LOUDSPEAKERS
Models 21T207, 207G (971636-1) 5" PM Dynamic, 3.2 ohms
Models 21T208, 217, 229. (971490-3) 8" PM Dynamic, 3.2 ohms
Models 21T218, 227, 228. (92569-12) 12" PM Dynamic, 3.2 ohms
WEIGHT AND DIMENSIONS (inches)
Net Shinning
Model Weight Weight Width Height Depth
$21T207$ 94 115 $28^{1/2}$ $28^{1/4}$ $27^{1/2}$
21T207G 105 126 285% 28 ¹ / ₄ 285%
217208 94 115 25^{1} / ₆ 24^{3} / ₄ 25^{1} / ₈
217217 104 132 26 $393%$ $251%$
217218 112 144 2756 3916 24
21727 130 162 $271/6$ $401/6$ $271/6$
$211221 \dots 100 \dots 102 \dots 10754 \dots 2078 \dots 2178$
211228 132 164 27% 39% 20%
211229
RECEIVER ANTENNA INPUT IMPEDANCE

Tube Used Function (1) RCA 6CB6 R-F Amplifier (2) RCA 6J6. R-F Oscillator and Mixer (3) RCA 6CB6 lst Picture I-F Amplifier (4) RCA 6CB6. 2nd Picture I-F Amplifier (6) RCA 12AU7 Picture 2nd Detector and Vert. Sync. Sep. (7) RCA 6AG7 (6AC7, 6CL6). Video Amplifier (8) RCA 6AU6.....lst Sound I-F Amplifier (10) RCA 6AL5 Ratio Detector (11) RCA 6AV6 lst Audio Amplifier (12) RCA 6K6GT Audio Output (13) RCA 6AU6 AGC Amplifier (14) RCA 6SN7GT ... Horizontal Sync. Sep. and Sync. Output (15) RCA 6J5. Vertical Sweep Oscillator (16) RCA 6K6GT Vertical Sweep Output (17) RCA 6SN7GT ... Horizontal Sweep Oscillator and Control (18) RCA 6BQ6GT..... Horizontal Sweep Output (19) RCA 6W4GT.....Damper (20) RCA 1B3-GT/8016..... High Voltage Rectifier (21) RCA 21AP4 (21EP4) Kinescope (22) RCA 5U4G Rectifier

230 21**T207**, 21**T207G**, 21**T208**, 21**T217** 21**T218**, 21**T227**, 21**T228**, 21**T229**

ELECTRICAL AND MECHANICAL SPECIFICATIONS

(Continued)

PICTURE INTERMEDIATE FREQUENCIES OPERATING CONTROLS (Front Panel) Picture Carrier Frequency. 25.50 mc. Adjacent Channel Sound Trap. 27.00 mc. SOUND INTERMEDIATE FREQUENCIES Picture Vertical Hold { Sound Carrier Frequency. 21.00 mc. Sound I.F. Frequency. 4.5 mc. VIDEO RESPONSE. To 3.2 mc. FOCUS. Magnetic Sweep DEFLECTION Magnetic SCANNING. Interlaced, 525 line HORIZONTAL SWEEP FREQUENCY 15,750 cps VERTICAL SWEEP FREQUENCY (Picture Repetition Rate). 30 cps 30 cps		
Picture Carrier Frequency 25.50 mc. Channel Selector { Fine Tuning } Dual Control Knobs Adjacent Channel Sound Trap 27.00 mc. Picture Horizontal Hold { Picture Vertical Hold } Dual Control Knobs SOUND INTERMEDIATE FREQUENCIES Sound Carrier Frequency 21.00 mc. Sound Volume and On-Off Switch { TV Tone & Phono Switch Dual Control Knobs Sound LF. Frequency 4.5 mc. NON-OPERATING CONTROLS (not including r-f and i-f adjustments) FOCUS Magnetic Picture Centering top chassis adjustment Horizontal Linearity SWEEP DEFLECTION Magnetic Width rear chassis adjustment Horizontal Linearity SCANNING Interlaced, 525 line Horizontal Locking Range rear chassis adjustment Horizontal Locking Range VERTICAL SWEEP FREQUENCY 15,750 cps top chassis adjustment Horizontal Locking Range top chassis adjustment Horizontal Locking Range FRAME FREQUENCY (Picture Repetition Rate) 30 cps top chassis adjustment Pin Cushion Correction Magnets (217207G only)	PICTURE INTERMEDIATE FREQUENCIES	OPERATING CONTROLS (Front Panel)
Adjacent Channel Sound Trap. 27.00 mc. SOUND INTERMEDIATE FREQUENCIES Picture Brightness Sound Carrier Frequency. 21.00 mc. Sound LF. Frequency. 21.00 mc. Sound I.F. Frequency. 4.5 mc. VIDEO RESPONSE To 3.2 mc. FOCUS. Magnetic Sweep DeFLECTION Magnetic SCANNING. Interlaced, 525 line HORIZONTAL SWEEP FREQUENCY 15,750 cps VERTICAL SWEEP FREQUENCY 15,750 cps FRAME FREQUENCY (Picture Repetition Rate) 30 cps	Picture Carrier Frequency	Channel Selector Fine Tuning
SOUND INTERMEDIATE FREQUENCIES Picture Horizontal Hold } Picture Vertical Hold } Picture Vertical Hold } Picture Vertical Hold } Dual Control Knobs Sound Carrier Frequency 21.00 mc. Sound I.F. Frequency 4.5 mc. VIDEO RESPONSE To 3.2 mc. FOCUS Magnetic SWEEP DEFLECTION Magnetic SCANNING Interlaced, 525 line HORIZONTAL SWEEP FREQUENCY 15,750 cps VERTICAL SWEEP FREQUENCY 60 cps FRAME FREQUENCY (Picture Repetition Rate) 30 cps	Adjacent Channel Sound Trap	Picture Brightness Dual Control Knobs
Sound Carrier Frequency 21.00 mc. Sound I.F. Frequency 4.5 mc. VIDEO RESPONSE To 3.2 mc. FOCUS Magnetic FOCUS Magnetic SWEEP DEFLECTION Magnetic SCANNING Interlaced, 525 line HORIZONTAL SWEEP FREQUENCY 15,750 cps VERTICAL SWEEP FREQUENCY 15,750 cps VERTICAL SWEEP FREQUENCY 60 cps FRAME FREQUENCY (Picture Repetition Rate) 30 cps	SOUND INTERMEDIATE FREQUENCIES	Picture Horizontal Hold Picture Vertical Hold Dual Control Knobs
Sound I.F. Frequency	Sound Carrier Frequency	Sound Volume and On-Off Switch
VIDEO RESPONSE To 3.2 mc. FOCUS Magnetic FOCUS Magnetic SWEEP DEFLECTION Magnetic SCANNING Interlaced, 525 line HORIZONTAL SWEEP FREQUENCY 15,750 cps VERTICAL SWEEP FREQUENCY 60 cps FRAME FREQUENCY (Picture Repetition Rate) 30 cps NON-OPERATING CONTROLS (not including r-f and i-f adjustments) Picture Centering top chassis adjustment Width rear chassis adjustment Horizontal Linearity rear chassis adjustment Horizontal Drive rear chassis adjustment Horizontal Coscillator Frequency rear chassis adjustment Horizontal Locking Range rear chassis adjustment Frame FREQUENCY (Picture Repetition Rate) 30 cps	Sound I.F. Frequency	TV Tone & Phono Switch J Dual Control Knobs
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VERTICAL SWEEP FREQUENCY 60 cps Focus top chassis adjustment VERTICAL SWEEP FREQUENCY 60 cps Ion Trap Magnet top chassis adjustment FRAME FREQUENCY (Picture Repetition Rate) 30 cps AGC Control rear chassis adjustment FINAME FREQUENCY (Picture Repetition Rate) 30 cps AGC Control rear chassis adjustment Pin Cushion Correction Magnets (21T207G only) 100 cms 100 cms 100 cms	HORIZONTĂL SWEEP FREQUENCY15,750-cps	Horizontal Oscillator Waveformbottom chassis adjustment Horizontal Locking Rangerear chassis adjustment
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	FRAME FREQUENCY (Picture Repetition Rate) 30 cps	AGC Control rear chassis adjustment Pin Cushion Correction Magnets (21T207G only)

top chassis adjustment

HIGH VOLTAGE WARNING

OPERATION OF THIS RECEIVER OUTSIDE THE CABINET OR WITH THE COVERS RE-MOVED, INVOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES. WORK ON THE RECEIVER SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOROUGHLY FAMILIAR WITH THE PRECAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT SHIELD REMOVED.

KINESCOPE HANDLING PRECAUTIONS

DO NOT REMOVE THE RECEIVER CHASSIS, INSTALL, REMOVE OR HANDLE THE KINESCOPE IN ANY MANNER UNLESS SHATTERPROOF GOGGLES ARE WORN. PEOPLE NOT SO EQUIPPED SHOULD BE KEPT AWAY WHILE HANDLING KINESCOPES. KEEP THE KINESCOPE AWAY FROM THE BODY WHILE HANDLING.

The kinescope bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure. For this reason, the kinescope must be handled with more care than ordinary receiving tubes.

The large end of the kinescope bulb—particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure at any time. During service if the tube sticks or fails to slip smoothly into its socket, or deflecting yoke, investigate and remove the cause of the trouble. Do not force the tube. Refer to the Receiver Installation section for detailed instructions on kinescope installation. All RCA replacement kinescopes are shipped in special cartons and should be left in the cartons until ready for installation in the receiver.

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The following adjustments are necessary when turning the receiver on for the first time.

1. See that the TV-PH switch is in the "TV" position.

2. Turn the receiver "ON" and advance the SOUND VOLUME control to approximately mid-position.

3. Set the STATION SELECTOR to the desired channel.

4. Adjust the FINE TUNING control for best pix and the SOUND VOLUME control for suitable volume.

5. Turn the BRIGHTNESS control fully counter-clockwise, then clockwise until a light pattern appears on the screen.

6. Adjust the VERTICAL hold control until the pattern stops vertical movement.

7. Adjust the HORIZONTAL hold control until a picture is obtained and centered.



Figure 1-Receiver Operating Controls

INSTALLATION INSTRUCTIONS

UNPACKING.—These receivers are shipped complete in cardboard cartons. The kinescope is shipped in place in the receiver.

Take the receiver out of the carton and remove all packing material.

Make sure that all tubes are in place and are firmly seated in their sockets.

Check to see that the kinescope high voltage lead clip is in place.

Plug a power cord into the 115 volt a-c power source and into the receiver interlock receptacle. Turn the receiver power switch to the ``on'' position, the brightness control fully clockwise, and the picture control counter-clockwise.

ION TRAP MAGNET ADJUSTMENT.—Set the ion trap magnet approximately in the position shown in Figure 2. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rotating it slightly around the neck of the kinescope for the brightest raster on the screen. Reduce the brightness control setting until the raster is slightly above average brilliance. Turn the focus control (shown in Figure 2) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches of this adjustment should be made with the brightness control at the maximum clockwise position with which good line focus can be maintained.



8. Adjust the CONTRAST and BRIGHTNESS controls for suitable picture contrast and brightness.

9. In switching from one channel to another, it may be necessary to repeat steps 4 and 8.

10. When the set is turned on again after an idle period it

should not be necessary to repeat the adjustment if the positions of the controls have not been changed. If any adjustment is necessary, step number 4 is generally sufficient.

11. If the positions of the controls have been changed, it may be necessary to repeat steps 2 through 8.

12. To use a record player, plug the record-player output cable into the PHONO jack on the rear apron, and set the TV-PH switch to "PH"

DEFLECTION YOKE ADJUSTMENT.—If the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Tighten the yoke adjustment wing screw.

PICTURE ADJUSTMENTS.—It will now be necessary to obtain a test pattern picture in order to make further adjustments. Connect the antenna transmission line to the receiver.

If the Horizontal Oscillator and AGC System are operating properly, it should be possible to sync the picture at this point. However, if the AGC control is misadjusted, and the receiver is overloading, it may be impossible to sync the picture.

If the receiver is overloading, turn R149 on the rear apron (see Figure 3) counter-clockwise until the set operates normally and the picture can be synced.

CHECK OF HORIZONTAL OSCILLATOR ALIGN-MENT.—Turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in horizontal sync. Momentarily remove the signal by switching off channel then back. Normally the picture will be out of sync. Turn the control clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 2 or 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control. Pull-in should occur before the control has been turned 120 degrees from the extreme counter-clockwise position. The picture should remain in sync for approximately 90



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degrees of additional clockwise rotation of the control. At the extreme clockwise position, the picture should remain in sync and should not show a black bar in the picture.

If the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned. Skip "Alignment of Horizontal Oscillator" and proceed with "Focus Magnet Adjustment."

ALIGNMENT OF HORIZONTAL OSCILLATOR.—If in the above check the receiver failed to hold sync with the hold control at the extreme counter-clockwise position of failed to hold sync over 90 degrees of clockwise rotation of the control from the pull-in point, it will be necessary to make the following adjustments.

Horizontal Frequency Adjustment.—Turn the horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the T110 horizontal frequency adjustment at the rear of the chassis until the picture is just out of sync and the horizontal blanking appears as a vertical or diagonal black bar in the raster. Then turn the T110 core until the bar moves out of the picture leaving it in sync.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the Tl10 rear core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync

If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer Cl61A slightly clockwise. If less than 2 bars are present, adjust Cl61A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 or 3 bars are present.

Repeat the adjustments under "Horizontal Frequency Adjustment" and "Horizontal Locking Range Adjustment" until the conditions specified under each are fulfilled. When the horizontal hold operates as outlined under "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

If it is impossible to sync the picture at this point and the AGC system is in proper adjustment it will be necessary to adjust the Horizontal Oscillator by the method outlined in the alignment procedure on page 11: For field purposes paragraph "B" under Horizontal Oscillator Waveform Adjustment may be omitted.

FOCUS MAGNET ADJUSTMENT.—The focus magnet should be adjusted so that there is approximately three-eighths inch of space between the rear cardboard shell of the yoke and the flat of the front face of the focus magnet. This spacing gives best average focus over the face of the tube.

The axis of the hole through the magnet should be parallel with the axis of the kinescope neck with the kinescope neck through the center of the opening.

PIN-CUSHION CORRECTION.—Two pin-cushion correction magnets are employed to correct a small amount of pin-cushion of the raster due to the lens effect of the face of the kinescope. These magnets are mounted on small arms, one on each side of the kinescope as shown in Figure 2. The arms hinge in one plane on self tapping screws which act both as a hinge and an adjustment locking screw. When the magnets are swung towards the tube, maximum correction is obtained. Minimum correction is obtained when the arms are swung away from the tube. To adjust the magnets, loosen the two self tapping screws and position the magnets until the sides of the raster appear straight. Tighten the screws without shifting the position of the magnets. In some cases it may be necessary to twist or bend the magnet support arms to obtain the appearance of straight raster edges.

CENTERING ADJUSTMENT.—No electrical centering controls are provided. Centering is accomplished by means of a separate plate on the focus magnet. The centering plates include a locking screw which must be loosened before centering. Up and down adjustment of the plate moves the picture side to side and sidewise adjustment moves the picture up and down. If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

WIDTH, DRIVE AND HORIZONTAL LINEARITY ADJUSTMENTS.—Adjustment of the horizontal drive control affects the high voltage applied to the kinescope. In order to obtain the highest possible voltage hence the brightest and best focused picture, adjust horizontal drive trimmer Cl6lB counter-clockwise until the picture begins to "wrinkle" in the middle then clockwise until the "wrinkle" disappears.

Turn the horizontal linearity control L108 clockwise until the picture begins to "wrinkle" on the right and then counterclockwise until the "wrinkle" disappears and best linearity is obtained.

Adjust the width control L106 to obtain correct picture width.

A slight readjustment of these three controls may be necessary to obtain the best linearity.

Adjustments of the horizontal drive control affect horizontal oscillator hold and locking range. If the drive control was adjusted, recheck the oscillator alignment.

HEIGHT AND VERTICAL LINEARITY ADJUST-MENTS.—Adjust the height control (R173 on chassis rear apron) until the picture fills the mask vertically. Adjust vertical linearity (R181 on rear apron), until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. Adjust centering to align the picture with the mask.

FOCUS.—Adjust the focus magnet for maximum definition in the test pattern vertical 'wedge'' and best focus in the white areas of the pattern.

Recheck the position of the ion trap magnet to make sure that maximum brightness is obtained.

Check to see that the yoke thumbscrew and the focus magnet mounting screws are tight.



Figure 4-R-F Oscillator Adjustments

CHECK OF R-F OSCILLATOR ADJUSTMENTS.— Tune in all available stations to see if the receiver r-f oscillator is adjusted to the proper frequency on all channels. If adjustments are required, these should be made by the method outlined in the alignment procedure on page 9. The adjustments for channels 2 through 12 are available from the front of the cabinet by removing the station selector escutcheon as shown in Figure 4. Adjustment for channel 13 is on top of the chassis.

AGC THRESHOLD CONTROL.—The AGC threshold control R149 is adjusted at the factory and normally should not require readjustment in the field.

To check the adjustment of the AGC Threshold Control, tune in a strong signal and sync the picture. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of R149. If the picture requires an appreciable portion of a second to reappear, or bends excessively, R149 should be readjusted.

Turn R149 fully counter-clockwise. The raster may be bent slightly. This should be disregarded. Turn R149 clockwise until there is a very, very slight bend or change of bend in the picture. Then turn R149 counter-clockwise just sufficiently to remove this bend or change of bend.

If the signal is weak, the above method may not work as it may be impossible to get the picture to bend. In this case, turn Rl49 clockwise until the snow in the picture becomes more pronounced, then counter-clockwise until the best signal to noise ratio is obtained.

The AGC control adjustment should be made on a strong signal if possible. If the control is set too far clockwise on a weak signal, then the receiver may overload when a strong signal is received.

FM TRAP ADJUSTMENT.—In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the L2O3 core on top of the antenna matching transformer for minimum interference in the picture.

CAUTION.—In some receivers, the FM trap L203 will tune down into channel 6 or even into channel 5. Needless to say, such an adjustment will cause greatly reduced sensitivity on these channels. If channels 5 or 6 are to be received, check L203 to make sure that it does not affect sensitivity on these two channels.

Replace the cabinet back and connect the receiver antenna leads to the cabinet back. Make sure that the screws holding it are up tight, otherwise it may rattle or buzz when the receiver is operated at high volume.

KINESCOPE SCREEN CLEANING.—The kinescope safety glass is held in place by four spring clips which may be removed from the back of the front panel. This permits removing the safety glass for cleaning without the necessity of removing the chassis and kinescope.

CHASSIS REMOVAL.—To remove the chassis from the cabinet for repair or installation of a new kinescope, remove the control knobs, the cabinet back, unplug the speaker cable, the kinescope socket, the antenna cable, the yoke and high voltage cable. Take out the chassis bolts under the cabinet. Withdraw the chassis from the back of the cabinet.

KINESCOPE HANDLING PRECAUTION.—Do not install, remove, or handle the kinescope in any manner, unless shatterproof goggles and heavy gloves are worn. People not so equipped should be kept away while handling the kinescope. Keep the kinescope away from the body while handling.

REMOVAL OF KINESCOPE.—To remove the kinescope from the cabinet, loosen the two nuts and disengage the rods alongside the kinescope. Remove the screw which holds the yoke frame to the cabinet. Remove the kinescope, the yoke frame with yoke and focus magnet as an assembly.

Handle this tube by the portion at the edge of the screen. Do not cover the glass bell of the tube with fingermarks as it will produce leakage paths which may interfere with reception. If this portion of the tube has inadvertently been handled, wipe it clean with a soft cloth moistened with "dry" carbon tetrachloride.

INSTALLATION OF KINESCOPE.—Wipe the kinescope screen surface and front panel safety glass clean of all dust and fingermarks with a soft cloth moistened with "Windex" or similar cleaning agent.

Replace the kinescope and chassis by reversal of the removing process. The kinescope should be installed so that the high voltage contact is to the right when looking at it from the rear of the cabinet. The magnet of the ion trap magnet should be to the left.

CABINET ANTENNA.—A cabinet antenna is provided in some receiver models and the leads are brought out near the antenna terminal board. The cabinet antenna may be employed in place of the outdoor antenna in areas where the signals are strong and no reflections are experienced. 233

ANTENNAS.—The finest television receiver built may be said to be only as good as the antenna design and installation. It is therefore important to select the proper antenna to suit the particular local conditions, to install it properly and orient it correctly.

If two or more stations are available and the two stations are in different directions, it may be possible to make a compromise orientation which will provide a satisfactory signal on all such channels.

If it is impossible to obtain satisfactory results on one or more channels, it may become necessary either to provide means for turning the antenna when switching channels or to install a separate antenna for one or more channels and to switch antennas when switching channels.

In some cases, the antenna should not be installed permanently until the quality of the picture reception has been observed on a television receiver. A temporary transmission line can be run between receiver and the antenna, allowing sufficient slack to permit moving the antenna. Then, with a telephone system connecting an observer at the receiver and an assistant at the antenna, the antenna can be positioned to give the most satisfactory results on the received signal. A shift of direction or a few feet in antenna position may effect a tremendous difference in picture reception.

REFLECTIONS.—Multiple images sometimes known as echoes or ghosts, are caused by the signal arriving at the antenna by two or more routes. The second or subsequent image occurs when a signal arrives at the antenna after being reflected off a building, a hill or other object. In severe cases of reflections, even the sound may be distorted. In less severe cases, reflections may occur that are not noticeable as reflections but that will instead cause a loss of definition in the picture.

Under certain extremely unusual conditions, it may be possible to rotate or position the antenna so that it receives the cleanest picture over a reflected path. If such is the case, the antenna should be so positioned. However, such a position may give variable results as the nature of reflecting surfaces may vary with weather conditions. Wet surfaces have been known to have different reflecting characteristics than dry surfaces.

Depending upon the circumstances, it may be possible to eliminate the reflections by rotating the antenna or by moving it to a new location. In extreme cases, it may be impossible to eliminate the reflection.

INTERFERENCE.—Auto ignition, street cars, electrical machinery and diathermy apparatus may cause interference which spoils the picture. Whenever possible, the antenna location should be removed as far as possible from highways, hospitals, doctors' offices and similar sources of interference. In mounting the antenna, care must be taken to keep the antenna rods at least 1/4 wave length (at least 6 feet) away from other antennas, metal roofs, gutters or other metal objects.

Short-wave radio transmitting and receiving equipment may cause interference in the picture in the form of moving ripples. In some instances it may be possible to eliminate the interference by the use of a trap in the antenna transmission line. However, if the interfering signal is on the same frequency as the television station, a trap will provide no improvement.

WEAK PICTURE. — When the installation is near the limit of the area served by the transmitting station, the picture may be speckled, having a "snow" effect, and may not hold steady on the screen. This condition is due to lack of signal strength from the transmitter.

RECEIVER LOCATION.—The owner should be advised of the importance of placing the receiver in the proper location in the room.

The location-should be chosen—

- -Away from bright windows and so that no bright light will fall directly on the screen. (Some illumination in the room is desirable, however.)
- -To give easy access for operation and comfortable viewing.
- -To permit convenient connection to the antenna.
- Convenient to an electrical outlet.
- -To allow adequate ventilation.

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CHASSIS TOP VIEW



Figure 5-Chassis Top View

CHASSIS BOTTOM VIEW

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Figure 6-Chassis Bottom View

ALIGNMENT PROCEDURE

TEST EQUIPMENT.—To properly service the television chassis of this receiver, it is recommended that the following test equipment be available:

R-F Sweep Generator meeting the following requirements:

- (a) Frequency Ranges
 - 20 to 30 mc., 1 mc. and 10 mc. sweep width
 - 50 to 90 mc., 10 mc. sweep width
- 170 to 225 mc., 10 mc. sweep width
- (b) Output adjustable with at least .1 volt maximum.
- (c) Output constant on all ranges.
- (d) "Flat" output on all attenuator positions.

Cathode-Ray Oscilloscope.—For alignment purposes, the oscilloscope employed must have excellent low frequency and phase response, and should be capable of passing a 60-cycle square wave without appreciable distortion.

For video and sync waveform observations, the oscilloscope must have excellent frequency and phase response from 10 cycles to at least two megacycles in all positions of the gain control.

Signal Generator to provide the following frequencies with crystal accuracy.

- (a) Intermediate frequencies
 - 22.25 and 25.5 mc. conv. and first pix i-f trans.
 - 22.75 mc. second picture i-f transformer
 - 24.25 mc, fourth picture i-f transformer
 - 25.5 mc. third picture i-f transformer
 - 25.50 mc. picture carrier

27.00 mc. adjacent channel sound trap

(b) Radio frequencies

	Picture	Sound
Channel	Carrier	Carrier
Number	Freq. Mc.	Freq. Mc.
2	55.25	
3	61.25	65.75
4	67.25	71.75
5	77.25	
6	83.25	87.75
7	175.25	179.75
8	181.25	185.75
9	187.25	
10.	193.25	197.75
11	199.25	
12	205.25	209.75
13	211.25	

(c) Output of these ranges should be adjustable and at least .l volt maximum.

Heterodyne Frequency Meter with crystal calibrator which covers the frequency range from 80 mc. to 109 mc. and from 200 mc. to 237 mc.

Electronic Voltmeter of Junior or Senior "VoltOhmyst" type and a high voltage multiplier probe for use with this meter to permit m asurements up to 15 kv.

Service Precautions.—If possible, the chassis should be serviced without the kinescope. However, if it is necessary to view the raster during servicing, it would be a great convenience to have a bench mounted kinescope and speaker complete with a set of extension cables.

CAUTION: Do not short the kinescope second anode lead. Its short circuit current presents a considerable overload on the high voltage rectifier V117.

Adjustments Required.—Normally, only the r-f oscillator and mixer lines will require the attention of the service technician. All other circuits are either broad or very stable and hence will seldom require readjustment.

ORDER OF ALIGNMENT.—When a complete receiver alignment is necessary, it can be most conveniently performed in the following order:

- (1) R-F unit
- (2) Picture i-f transformers
- (3) Picture i-f trap
- (4) Sweep of picture i-f
- (5) Ratio detector

(8) Check of overall response(9) AGC control adjustment

- (10) Horizontal oscillator
- alignment

R-F UNIT ALIGNMENT.—Disconnect the co-ax link from terminal 2 of the r-f unit terminal board and connect a 39 ohm composition resistor between lugs 1 and 2.

Detune Tl by backing the core all the way out of the coil.

Back the L44 core all the way out. Back the L203 core all the way out.

In order to align the r-f tuner, it will first be necessary to set the channel-13 oscillator to frequency. The shield over the bottom of the r-f unit must be in place when making any adjustments.

The oscillator may be aligned by adjusting it to beat with a crystal-calibrated heterodyne frequency meter. Couple the meter probe loosely to the receiver oscillator.

Set the channel selector switch to 13.

Adjust the heterodyne frequency meter to the correct frequency (236.75 mc).

Set the fine tuning control 30 degrees clockwise from the mechanical center of its range.

Adjust Cl for an audible beat on the heterodyne frequency meter.

Now that the channel-13 oscillator is set to frequency, we may proceed with the r-f alignment.

Turn the AGC control fully clockwise.

Obtain a 7.5 volt battery capable of withstanding appreciable current drain and connect the ends of a 1,000 ohm potentiometer across it. Connect the battery positive terminal to chassis and the potentiometer arm to terminal 3 of the r-f unit. Adjust the bias box potentiometer to produce -3.5 volts of bias at the r-f unit terminal board.

Connect the oscilloscope to the test point TPl on top of the r-f unit.

Connect the r-f sweep oscillator to the receiver antenna terminals. The method of connection depends upon the output impedance of the sweep. The P300 connections for 300-ohm balanced or 72-ohm single-ended input are shown in the circuit schematic diagram. If the sweep oscillator has a 50-ohm or 72-ohm single-ended output, 300-ohm balanced output can be obtained by connecting as shown in Figure 9.

Connect the signal generator loosely to the receiver antenna terminals.

Set the receiver channel switch to channel 8.

Set the sweep oscillator to cover channel 8.

Insert markers of channel 8 picture carrier and sound carrier, 181.25 mc. and 185.75 mc.

Adjust C9, C11, C16 and C22 for approximately correct curve shape, frequency, and band width as shown in Figure 11.

The correct adjustment of C22 is indicated by maximum amplitude of the curve midway between the markers. Cl6 tunes the r-f amplifier plate circuit and affects the frequency of the curve most noticeably. C9 tunes the converter grid circuit and affects the tilt of the curve most noticeably (assuming that C22 has been properly adjusted). Cl1 is the coupling adjustment and hence primarily affects the response band width.

Set the receiver channel switch to channel 6.

Adjust the heterodyne frequency meter to the correct frequency (108.75 mc.).

Set the fine tuning control 30 degrees clockwise from the mechanical center of its range.

Adjust L5 for an audible beat on the heterodyne frequency meter.

(6) Sound i-f alignment

alignment

ormers (7) 4.5 Mc Trap Adjustment

Set the sweep generator to channel 6.

From the signal generator, insert channel 6 sound and picture carrier markers, 83.25 mc. and 87.75 mc.

Adjust L42, L45 and L49 for proper response as shown in Figure 12.

L42 is adjusted to give maximum amplitude of the curve between the markers. L45 primarily affects the tilt of the curve. L49 primarily affects the frequency of response.

Connect the "VoltOhmyst" to the r-f unit test point TPL.

Adjust C7 for -3.0 volts at the test point.

Retouch L42, L45 and L49 for proper response if necessary. If necessary, retouch Cl1 for proper band width on channel 6. Continue these retouching adjustments until proper response is obtained and -3.0 volts of oscillator injection are present at the test point, TP1.

Set the receiver channel selector switch to channel 8 and readjust Cl for proper oscillator frequency.

Set the sweep oscillator and signal generator to channel 8.

Readjust C9, C16 and C22 for correct curve shape, frequency and band width. Readjust C11 only if necessary.

Switch the receiver, the sweep oscillator and signal generator to channel 13.

Adjust L52 for maximum amplitude of the curve midway between markers and then overshoot the adjustment by turning the slug in the same direction from the initial setting a little more than the amount of turning required to reach maximum amplitude of response.

Adjust C22 for maximum amplitude of response.

Turn off the sweep generator. Adjust the L43 core for correct channel 13 oscillator frequency, then overshoot the adjustment by turning the slug a little more in the same direction from the initial setting. Reset the oscillator to proper frequency by adjustment of C1.

Turn the sweep oscillator back on.

Check the response of channels 7 through 13 by switching the receiver channel switch, sweep oscillator and marker oscillator to each of these channels and observing the response and oscillator injection obtained. See Figure 11 for typical response curves. It should be found that all these channels have the proper shaped response with the markers above 80% response.

If the markers do not fall within this requirement, switch to channel 8 and readjust C9, C11, C16 and C22 as necessary. If C22 required adjustment, the adjustment should be overshot a small amount and corrected by adjustment of L52 to give maximum amplitude of response between the sound and picture carrier markers. The antenna circuit (L52, C22) is broad so that tracking is not particularly critical.

If the valley in the top of the selectivity curves for the high channels is deeper than normal, the curve can be flattened somewhat by decreasing the inductance of L44 by turning the core stud in. Be sure to check for undesirable resonant suckouts on channels 7 and 8 if this is done.

Turn the sweep oscillator off and check the receiver channel 8 r-f oscillator frequency. If the oscillator is off frequency overshoot the adjustment of Cl and correct by adjusting L43.

Turn the receiver channel selector switch to channel 6. Adjust L5 for correct oscillator frequency.

Turn the sweep oscillator on and to channel 6 and observe the response curve. If necessary readjust L42, L45 and L49. It should not be necessary to touch Cl1.

Check the oscillator injection voltage at the test point TPl. If necessary adjust C7 to give -3 volts injection. If C7 is adjusted, switch to channel 8, and readjust C9 for proper curve shape, then recheck channel 6.

Switch the receiver through channel 6 down through channel 2 and check for normal response curve shapes and oscillator injection voltage.

Likewise check channels 7 through 13, stopping on 13 for the next step.

With the receiver on channel 13, check the receiver oscillator frequency. Correct by adjustment of Cl if necessary. Adjust the oscillator to frequency on all channels by switching the receiver and the heterodyne frequency meter to each channel and adjusting the appropriate oscillator trimmer to obtain a beat on the freq. meter. It should be possible to adjust the oscillator to the correct frequency on all channels with the fine tuning control 30 degrees clockwise from the mechanical center of its range.

	Picture	Sound	Receiver	Channel
Channel	Carrier	Carrier	R-F Osc.	Oscillator
Number	Freg. Mc.	Freq. Mc.	Freg. Mc.	Adjustment
2	55.25		. 80.750	Ll
3	61.25	65.75	86.750	L2
4		71.75	92.750	L3
5	77.25		. 102.750	L4
6	83.25	87.75	108.750	L5
7	175.25	179.75	. 200.750	L6
8	181.25	185.75	206.750	L7
9	187.25			L8
10	193.25	197.75	. 218.750	L9
11	199.25	203.75		L10
12	205.25	209.75		Lll
13	211.25		236.750	Cl

Switch to channel 8 and observe the response.

Adjust Tl clockwise while watching the change in response. When Tl is properly adjusted, the selectivity curve will be slightly wider with a slightly deeper valley in its top.

Switch through all channels and observe response, oscillator injection and r-f oscillator frequency. Minor touch-ups of adjustments may be made at this time. However, if C7 or C9 are changed appreciably, then a recheck of the oscillator frequency on all channels should be made.

Reconnect the link from T101 to terminal 2 of the r-f unit terminal board.

Since Tl was adjusted during the r-f unit alignment it will be necessary to sweep the overall i-f response.

R-F UNIT TUBE CHANGES.—Since most of the circuits are low capacitance circuits the r-f unit may require readjustments when the tubes are changed.

If the 6CB6 r-f amplifier tube is changed, it may be necessary to readjust C16 and C22.

If the 6J6 oscillator and mixer tube is changed, then more extensive adjustments are required.

For good conversion efficiency, the oscillator injection to a triode mixer must be held reasonably close to the optimum value. Although there is some latitude in this level, it is nearly expended in the normal variation in injection from channel to channel. Consequently, the adjustment of C7 is limited primarily to establishing the conditions for good conversion. Since changes in oscillator injection affect conversion gain, it also affects the input capacity of the mixer, thus also affecting tracking of the mixer grid circuit. These tube variations with their consequent effect on circuit alignment thereby require readjustment of the r-f unit if maximum conversion efficiency is to be retained after the 6J6 tube is changed. It may be possible, however, to try several 6J6 tubes and select one which gives satisfactory performance without realignment.

PICTURE I-F TRANSFORMER ADJUSTMENTS.— Connect the "VoltOhmyst" to the junction of Rl42 and Rl43. Turn the AGC control fully clockwise.

Obtain a 7.5 volt battery capable of withstanding appreciable current drain and connect the ends of a 1,000 ohm potentiometer across it. Connect the battery positive terminal to chassis and the potentiometer arm to the junction Rl42 and Rl43. Adjust the potentiometer for -5.0 volts indication on the "VoltOhmyst".

Set the channel switch to channel number 9, 10 or 11.

Connect the "VoltOhmyst" to pin 4 of V110 (pin 2 if 6CL6 is used) and to ground.

Connect the output of the signal generator to the mixer grid test point TP2 in series with a 1500 mmf ceramic capacitor.

Connect a separate -5 volt bias supply to TP1 with the positive terminal to ground.

Set the generator to each of the following frequencies and with a thin fiber screwdriver tune the specified adjustment for maximum indication on the "VoltOhmyst". In each instance the generator should be checked against a crystal calibrator to insure that the generator is on frequency.

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ALIGNMENT PROCEDURE

Adjust the signal generator output to give 3 volts on the "VoltOhmyst" as the final adjustment is made.

(1) 24.25 mc.—T107 (3) 22.75 mc.—T105 (2) 25.5 mc.—T106

PICTURE I-F TRAP ADJUSTMENT.—With the same connections as above, tune the generator to 27.00 mc. and adjust the TIO4 top core for minimum d-c on the "VoltOhmyst". Set the generator output so that this minimum is about 3 volts when final adjustment is made. If necessary, the i-f bias may be reduced in order to obtain the 3 volt reading on the "VoltOhmyst".

SWEEP ALIGNMENT OF PIX I-F.—To align Tl and T104, connect the sweep generator to the mixer grid test point TP2. In series with a 1500 mmf ceramic capacitor use the shortest leads possible, with not more than one inch of unshielded lead at the end of the sweep cable. Connect the sweep ground lead to the r-f unit outer shield.

Connect a separate -5.0 volt bias supply to TP1 with the positive terminal connected to ground and by-pass TP1 to ground with a 1500 mmf. ceramic capacitor.

Set the channel selector switch between channels 2 and 13. Clip 330 ohm resistors across terminals A and B of T106 and T107.

Preset Cl15 to minimum capacity.

Adjust the bias box potentiometer to obtain -5.0 volts of bias as measured by a ''VoltOhmyst'' at the junction of R142 and R143. Leave the AGC control fully clockwise.

Connect a 180 ohm composition resistor from pin 5 of V106 to terminal A of T105. Connect the oscilloscope diode probe to pin 5 of V106 and to ground.

Couple the signal generator loosely to the diode probe in order to obtain markers.

Adjust T1 (top) and T104 (bottom) for maximum gain and with 25.5 mc. at $70\,\%$ of maximum response.

Set the sweep output to give 0.3 volt peak-to-peak on the oscilloscope when making the final touch on the above adjustment.

Adjust Cl15 until 22.25 mc. is at 70% response with respect to the low frequency shoulder of the curve as shown in Figure 12.

Disconnect the diode probe, the 180 ohm and two 330 ohm resistors.

Connect the oscilloscope to pin 4 (pin 2 if $\delta CL6$ is used) of V110 socket.

Leave the sweep generator connected to the mixer grid test point TP2 with the shortest leads possible.

Adjust the output of the sweep generator to obtain 3.0 volts peak-to-peak on the oscilloscope.

Couple the signal generator loosely to the grid of the first pix i-f amplifier. Adjust the output of the signal generator to produce small markers on the response curve.

Retouch T105, T106 and T107 to obtain the response shown in Figure 13.

It is especially important that the 22.4 mc. marker should fall at 55% on the overall i-f response curve. If the marker should fall appreciably higher than 55%, trouble may be experienced with sound in the picture. If the marker should fall appreciably below 55% response, the sound sensitivity may be reduced and may cause the sound to be noisy in weak signal areas.

RATIO DETECTOR ALIGNMENT.—Set the signal generator at 4.5 mc. and connect it to the first sound i-f grid, pin 1 of V101.

As an alternate source of signal, the RCA WR39B or WR39C calibrator may be employed. In such a case, connect the calibrator to the grid of the third pix i-f amplifier, pin 1 of V108.

Set the frequency of the calibrator to 25.50 mc. (pix carrier) and modulate with 4.5 mc. crystal. The 4.5 mc. signal will be picked off at L102 and amplified through the sound i-f amplifier.

Connect the "VoltOhmyst" to pin 2 of V103.

Tune the ratio detector primary, T102 top core for maximum d-c output on the "VoltOhmyst". Adjust the signal level from the signal generator for 6 volts on the "VoltOhmyst" when finally peaked. This is approximately the operating level of the ratio detector for average signals. Connect the "VoltOhmyst" to the junction of R106 and C108.

Tune the ratio detector secondary T102 bottom core for zero d-c on the ''VoltOhmyst''.

Repeat adjustments of T102 top for maximum d-c at pin 2 of V103 and T102 bottom for zero d-c at the junction of R106 and C108. Make the final adjustments with the signal input level adjusted to produce 6 volts d-c on the "VoltOhmyst" at pin 2 of V103.

SOUND I-F ALIGNMENT.—Connect the signal generator to the first sound i-f amplifier grid, pin 1 of V101.

As an alternate source of signal, the RCA WR39B or WR39C calibrator may be employed as above.

Connect the "VoltOhmyst" to pin 2 of VI03.

Tune the TlOl top core for maximum d-c on the "Volt-Ohmyst".

The output from the signal generator should be set to produce approximately 6.0 volts on the 'VoltOhmyst' when the final touches on the above adjustment are made.

4.5 MC. TRAP ADJUSTMENT.—Connect the signal generator in series with a 1,000 ohm resistor to pin 2 of V109. Set the generator to 4.5 mc. and modulate it 30% with 400 cycles. Set the output to approximately 0.5 volts.

Short the third pix i-f grid to ground, pin 1, V108, to prevent noise from masking the output indication.

Connect the crystal diode probe of an oscilloscope to the plate of the video amplifier, pin 8 (pin 6 if 6CL6 is used) of V110.

Adjust the core of L103 for minimum output on the oscilloscope.

Remove the short from pin 1, V108 to ground.

As an alternate method, this step may be omitted at this point in the alignment procedure and the adjustment made 'on the air'' after the alignment is completed.

If this is done, tune in a station and observe the picture on the kinescope. If no 4.5 mc. beat is present in the picture, when the fine tuning control is set for proper oscillator-frequency, then L103 requires no adjustment. If a 4.5 mc. beat is present, turn the fine tuning control slightly clockwise so as to exaggerate the beat and then adjust L103 for minimum beat.

CHECK OF OVERALL RESPONSE.—If desired, the overall response of the receiver can be checked on each channel.

Connect the r-f sweep generator to the receiver antenna input terminals. If necessary, employ one of the pads shown in Figure 9 to match the sweep output cable to the r-f unit.

Connect the signal generator loosely to the first pix i-f amplifier grid.

Adjust the bias potentiometer to obtain -5.0 volts of bias as measured by a ''VoltOhmyst'' at the junction of Rl42 and Rl43.

Connect the oscilloscope to pin 4 (pin 2 if 6CL6 is used) of V110.

Check the response of channels 2 through 13 by switching the receiver channel switch and sweep oscillator to each of these channels and observing the response obtained. On each channel, adjust the output of the sweep generator to obtain 3.0 volts peak-to-peak on the oscilloscope.

I-F markers at 22.4 mc., 24.75 mc. and 25.5 mc..should be provided by the signal generator.

The response obtained in this manner should be very similar to that shown in Figure 13.

Some curves may show a 10% sag in the top between 22.75 mc. and 24.75 mc. while others may show a 10% peak in this region. This may be considered normal.

If the picture carrier is consistently high or low on all channels, T106 may be adjusted slightly. Do not adjust T105.

AGC CONTROL ADJUSTMENT.—Disconnect all test equipment except the oscilloscope which should be connected to pin 8 (pin 6 if 6CL6 is used) of V110.

Connect an antenna to the receiver antenna terminals. Turn the AGC control fully counter-clockwise.

Tune in a strong signal and adjust the oscilloscope to see the video waveform.

Turn the AGC control clockwise until the tips of sync begin to be compressed, then counter-clockwise until no compression is obtained.

ALIGNMENT PROCEDURE

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HORIZONTAL OSCILLATOR ADJUSTMENT.—Normally the adjustment of the horizontal oscillator is not considered to be a part of the alignment procedure, but since the oscillator waveform adjustment may require the use of an oscilloscope, it can not be done conveniently in the field. The waveform adjustment is made at the factory and normally should not require readjustment in the field. However, the waveform adjustment should be checked whenever the receiver is aligned or whenever the horizontal oscillator operation is improper.

Horizontal Frequency Adjustment.—Tune in a station and sync the picture. If the picture cannot be synchronized with the horizontal hold control R170B, then adjust the T110 frequency core on the rear apron until the picture will synchronize. If the picture still will not sync, turn the T110 waveform adjustment core (under the chassis) out of the coil several turns from its original position and readjust the T110 frequency core until the picture is synchronized.

Examine the width and linearity of the picture. If picture width or linearity is incorrect, adjust the horizontal drive control C161B, the width control L106 and the linearity control L108 until the picture is correct.

Horizontal Oscillator Waveform Adjustment.—The horizontal oscillator waveform may be adjusted by either of two methods. The method outlined in paragraph A below may be employed in the field when an oscilloscope is not available. The service shop method outlined in paragraph B below requires the use of an oscilloscope.

A.—Turn the horizontal hold control completely clockwise. Place adjustment tools on both cores of T110 and be prepared to make simultaneous adjustments while watching the picture on the screen. First, turn the T110 frequency core (on the rear apron) until the picture falls out of sync and three or four diagonal black bars sloping down to the right appear on the screen. Then, turn the waveform adjustment core (under the chassis) into the coil while at the same time adjusting the frequency core so as to maintain three or four diagonal black bars on the screen. Continue this procedure until the oscillator begins to motorboat, then turn the waveform adjustment core out until the motorboating just stops. As a check, turn the T110 frequency core until the picture is synchronized then reverse the direction of rotation of the core until the picture falls out of sync with the diagonal bars sloping down to the right. Continue to turn the frequency core in the same direction! No more than three or four bars should appear on the screen. Instead, the horizontal oscillator should begin the motorboat. Retouch the adjustment of the T110 waveform adjustment core if necessary until this condition is obtained.

B.—Connect the low capacity probe of an oscilloscope to terminal C of T110. Turn the horizontal hold control onequarter turn from the clockwise position so that the picture is in sync. The pattern on the oscilloscope should be as shown in Figure 14. Adjust the waveform adjustment core of T110 until the two peaks are at the same height. During this adjustment, the picture must be kept in sync by readjusting the hold control if necessary.

This adjustment is very important for correct operation of the circuit. If the broad peak of the wave on the oscilloscope is lower than the sharp peak, the noise immunity becomes poorer, the stabilizing effect of the tuned circuit is reduced and drift of the oscillator becomes more serious. On the other hand, if the broad peak is higher than the sharp peak, the oscillator is overstabilized, the pull-in range becomes inadequate and the broad peak can cause double triggering of the oscillator when the hold control approaches the clockwise position.

Remove the oscilloscope upon completion of this adjustment.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the T110 frequency core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer Cl61A slightly clockwise. If less than 2 bars are present, adjust Cl61A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 or 3 bars are present.

Turn the horizontal hold control to the maximum clockwise position. Adjust the T110 frequency core so that the diagonal bar sloping down to the right appears on the screen and then reverse the direction of adjustment so that bar just moves to the left side of the screen leaving the picture in synchronization.

SENSITIVITY CHECK.—A comparative sensitivity check can be made by operating the receiver on a weak signal from a television station and comparing the picture and sound obtained to that obtained on other receivers under the same conditions.

This weak signal can be obtained by connecting the shop antenna to the receiver through a ladder type attenuator pad. The number of stages in the pad depends upon the signal strength available at the antenna. A sufficient number of stages should be inserted so that a somewhat less than normal contrast picture is obtained when the picture control is at the maximum clockwise position. Only carbon type resistors should be used to construct the pad.

RESPONSE CURVES.—The response curves shown on page 14 and referred to throughout the alignment procedure were taken from a production set. Although these curves are typical, some variations can be expected.

The response curves are shown in the classical manner of presentation, that is with "response up" and low frequency to the left. The manner in which they will be seen in a given test set-up will depend upon the characteristics of the oscilloscope and the sweep generator. The curves may be seen inverted and/or switched from left to right depending on the deflection polarity of the oscilloscope and the phasing of the sweep generator.

NOTE ON R-F UNIT ALIGNMENT .- Because of the frequency spectrum involved and the nature of the device, many of the r-f unit leads and components are critical in some respects. Even the power supply leads form loops which couple to the tuned circuits, and if resonant at any of the frequencies involved in the performance of the tuner, may cause serious departures from the desired characteristics. In the design of the receiver these undesirable resonant loops have been shifted far enough away in frequency to allow reasonable latitude in their components and physical arrangement without being troublesome. When the r-f unit is aligned in the receiver, no trouble from resonant loops should be experienced. However, if the unit is aligned in a jig separate from the receiver, attention should be paid to insure that unwanted resonances do not exist which might present a faulty representation of r-f unit alignment.

A resonant circuit exists between the r-f tuner chassis and the outer shield box, which couples into the antenna and r-f plate circuits. The frequency of this resonance depends on the physical structure of the shield box, and the capacitance between the tuner chassis and the front plate. In the KRK8 units, this resonance should fall between 120 and 135 mc. and is controlled in the design by using insulating washers of different thicknesses (in the front plate to tuner chassis mounting) to compensate for differences in the shield boxes of different models of receivers. The performance of the tuner, particularly on channels 7 and 8 will be impaired if the proper washers for the particular shield box involved are not used. Obviously then, if the r-f unit is removed for service, the washers should be replaced in the correct order when the unit is replaced.

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ALIGNMENT TABLE

THE DETAILED ALIGNMENT PROCEDURE BEGINNING ON PAGE 8 SHOULD BE READ BEFORE ALIGNMENT BY USE OF THE TABLE IS ATTEMPTED

STEP. No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT HETERODYNE FREQ. METER TO	HET. METER FREQ. MC.	CONNECT ''VOLTOHMYST'' TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
					R-F UN	IT ALIG	NMENT		<u> </u>	
1	Disconnect Tl by backi tuner, it will any adjustn	the co-ax l ng the cor l first be ne nents.	ink from termin e all the way ou cessary to set the	al 2 of th it of the c channel	e r-f unit termir coil. Back the L4 13 oscillator to f	nal board 4 core all requency	and connect a 39 c l the way out. Back . The shield over the	hm composition resist the L203 core all the w bottom of the r-f unit	or between lugs 1 and 2 vay out. In order to alig must be in place when	2. Detune in the r-f making
2	Not used		Not used		Loosely coupled to r-f oscillator	236.75 MC,	Not used	Fine tuning 30 de- grees clockwise from mechanical center of its range. Receiver on channel 13.	Cl for an audible beat on het. freg. meter	Fig. 7
3	. 14						Connect "Volt- Ohmyst" to ter- minal 3 of the r-funit terminal board	Turn AGC control fully clockwise. Con- nect bias box to ter- minal 3 of r-f unit term. board	Adjust the bias box potentiometer for —3.5 volts.	
4	Antenna termìnal (loosely)	181.25 185.75	Antenna terminals (see text for precaution)	Sweep- ing channel 8	Not used	-	Not used	Rec. on chan. 8. Conn Adjust C9, C11, C16 ar shape, frequency an adjusted to give ma markers. C9 affects t frequency of respon sponse band width.	ect oscilloscope to TP1. Id C22 for correct curve d band width. C22 is x. amplitude between iilt and C16 affects the se. C11 affects the re-	Fig. 7 Fig. 8
5	Not used		Not used	Not used	Loosely coupled to r-f oscillator	108.75	14	Rec. on channel 6	L5 for audible beat on het. freg. meter.	Fig. 8
6	Antenna terminal (loosely)	83.25 87.75	Antenna terminals (see text for precaution)	Channel 6	Not used	-		Rec. on chan. 6. Adju proper response. L42 i amplitude between n affects tilt and L49 pr response. If necesso proper width.	est L42, L45 and L49 for is adjusted to give max, markers. L45 primarily imarily affects freq. of ary, retouch Cll for	Fig. 12
7	Not used	-	Not used	-	Not used	-	Connect "Volt- Ohmyst" to r-f unit test point TP1	Rec. on channel 6	Adjust C7 for -3.0 volts at the test point	Fig. 7 Fig. 9
8	Repeat abov	re steps un	til the specified c	onditions	are obtained.					
9	Not used		Not used	-	Loosely coupled to r-f oscillator	206.75		Rec. on chan. 8	Cl for audible beat on het. freg. meter	Fig. 7
10	Antenna terminal (loosely)	181.25 185.75	Antenna terminals (see te ⁺ for precaution)	Sweep- ing chonnel 8	Not used		Not used	Rec. on chan. 8. Rec for correct curve shap width. Readjust Cl1	idjust C9, C16 and C22 pe, frequency and band only if necessary.	Fig. 7 Fig. 12 (8)
11		211.25 215.75		Sweep- ing channel 13	Not used	-	Not used	Rec. on chan. 13, Adj tude between mark, more than required t Adjust C22 to regai response.	Fig. 7 Fig. 12 (13)	
12		215.75	Not used	-	Loosely coupled to r-f oscillator	236.75		Receiver on chan. 13 channel 13 osc. freq the osc. to proper free	. Adjust L43 for correct . then overshoot. Reset g. by adjustment of Cl.	Fig. 7 Fig. 8
13	"	205.25 209.75	Antenna ter.ninals	channel 12	Not used	_	Connect "Volt- Ohmyst" to r-f unit test point TP1	Rec. on chan. 12	Check to see that re- sponse is correct and —3.0 volts of osc. in- jection is present	Fig. 8 Fig. 12
14	44	199.25 203.75	(see text for precaution)	channel 11	0	-		Rec. on chan. 11	**	Fig. 12 (11)
15	14	193.25 197.75		channel 10	4.5	-		Rec. on chan, 10	.1	Fig. 12 (10)
16	0	187.25		channel 9		-		Rec. on chan. 9		Fig. 12
17	**	181.25		channel	-14	-		Rec. on chan. 8		Fig. 12
18		175.25	11	channel 7		-	16	Rec. on chan. 7	**	Fig. 12
19	If the respo pull respon small amo	nse of any se up on ti unt and co	channel (steps l he low channel y prrected by adjus	3 through ret maint tment of	n 18) is below 809 ain correct respo L52 to give maxim	% at eithe onse on cl mum am	r marker, repeat si nannel 8. If C22 req plitude of response	ep 10 and adjust C9, C uired adjustment, the between the sound and	Cll, Cl6 and C22 as ne adjustment should be picture carrier marker	cessary to overshot a
20	Repeat step	9. If the c	scillator is off fr	equency	overshoot the ad	justment	of Cl and correct b	y adjusting L43.		
21	Repeat step	s 13 throu	gh 20 until all re	quiremer	uts are obtained.					
22	Not used	-	Not used	-	Loosely coupled to r-f oscillato	1 108.75 r		Rec. on chan. 6	L5 for zero beat on het. freg. meter	Fig. 8
23	Antenna terminals (loosely)	83.25 87.75	Ant. termi- nals (see text for precaution	Sweepin channel 6	g Not used	-	Not used	Observe response. If L45 and L49. It sho touch C11.	necessary readjust L42, uld not be necessary to	Fig. 7 Fig. 12
24	Not used	-	Not used	-	Not used	-	Connect "Volt- Ohmyst" to the r-funit test point TP1	Check osc. injection to give —3 volts. If C channel 8, and rea sponse then repeat s	. If necessary adjust C7 7 is adjusted, switch to djust C9 for proper re- tep 23.	Fig. 7 Fig. 12
25	Antenna terminals (loosely)	77.25 81.75	Ant. termi- nals (see text for precautio	channe 5 n)	1 **	-		Rec. on chan. 5	Check to see that re- sponse is correct and 	Fig. 12 (5)

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21T207, 21T207G, 21T208, 21T217,

21T218, 21T227, 21T228, 21T229 TOP AND BOTTOM CHASSIS ADJUSTMENTS



Figure 15-Top Chassis Adjustments



Figure 16-Bottom Chassis Adjustments

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Figure 17-Normal Picture

Figure 18—Focus Magnet and Ion Trap Magnet Misadjusted



Figure 19—Horizontal Linearity Control Misadjusted (Picture Cramped in Middle)

Figure 20-Width Control Misadjusted ----



Figure 21—Horizontal Drive Control Misadjusted

Figure 22-Transients



Figure 23-Test Pattern Show-ing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position-Just Before Pulling Into Sync

Figure 24—Test Pattern Show-ing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position











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ALIGNMENT TABLE

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229

									211210, 21	1221, 211220, 2	11449
STEF No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	GEN. FREO. MC.	CON HETEI FREQ.	NECT RODYNE METER	HET. FREQ. METIR MC.	CONNECT VOLTOHMYST TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
26	Antenna terminals (loosely)	67.25 71.75 fc	Ant. termi nals (see text precaution)	channe 4	l Not us	ed		Connect "Volt- Ohmyst" to the r-funit test point TP1	Rec. on chan. 4	Check to see that re- sponse is correct and -3.0 volts of osc. in- jection is present	Fig. 12 (4)
27		61.25 65.75		channe 3	1		-		Rec. on chan. 3		Fig. 12 (3)
28	- 11	55.25 59.75	14	channe 2	1		-	5.6	Rec. on chan. 2	. 14	Fig. 12 (2)
29	Likewise che	ck channels	7 through 13	. as outli	ned in st	eps 18 ba	ck through	13. stopping on ch	annel 13 for next step		
- 20	Sub-ma	216 75	Naturad		Treasel	r coupled	236 75	Not used	Fine tuning 30 de-	Cl for zero beat on	Fig. 7
30	terminals	213.13			to r-f	oscillator	100.10		grees clockwise from mechanical center of its range. Receiver on channel 13	het. freq. meter	
31		209.75		-			230.75		Rec. on chan. 12	Lll as above	Fig. 8
32	1.6	203.75		-			224.75		Rec. on chan. 11	L10 as above	Fig. 8
33		197.75	· 11	_			218.75		Rec. on chan. 10	L9 as above	Fig. 8
34		191.75	10	_	10		212.75		Rec. on chan. 9	L8 as above	Fig. 8
35		185.75		-			206.75		Rec. on chan. 8	L7 as above	Fig. 8
36		179.75			-11-		200.75		Rec. on chan. 7	L6 as above	Fig. 8
37		87.75	11	_			108 75		Rec. on chan. 6	L5 as above	Fig. 8
20		01.76					102 75		Rec. on chan 5	L4 as above	Fig 8
38		01.75					102.10		Rec. on chun. o	12 as above	Fig. 0
39		71.75		ments			92.75		Rec. on chan. 4	L3 ds dbove	Fig. o
40		65.75		-			86.75		Rec. on chan. 3	L2 as above	Fig. 8
41	**	59.75		-			80.75		Rec. on chan. 2	Ll as above	Fig. 8
42	Repeat steps	30 through	41 as a check.								
43	Antenna terminals	181.25 185.75	Antenna terminals	Sweep- ing channel 8	Not use	94	-		Rec. on chan. 8. Osc TP1. Adjust T1 clock adjusted, curve will be slightly deeper valley	illoscope at test point wise. When properly e slightly wider with a in top.	Fig. 12 (8)
44	Switch throu	h all chan	nels and obser	rve respo	nse, osci	llator inj	ection and	r-f oscillator frequ	ency. Minor touch-up	s of adjustments may	be made
	at this time.	However, if	C7 or C9 are d	changed	apprecio	bly, then	a recheck	of the oscillator fre	quency on all channe	is should be made.	
45	Remove 39 of	m resistor	and reconnect	link from	n T101 t	o termina	l 2 of r-f u	nit terminal board.			
				:	PICTUR	E I-F AN	D TRAP	ADJUSTMENT			
STEP No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	GENERA TO	CT P FOR	GEN. FREQ. MC.	CON OSCILL	NECT OSCOPE	CONNECT VOLTOHMYST TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
46	Not used		Not used		-	Not use	d	Junction of R142 & R143	Connect bias box to junction of R142 & R143 and to ground AGC fully clockwise	Adjust potentiometer for —5.0 volts on meter	Fig. 3
47	+ 1				-	41		Test point TP1	Connect bias box to TP1 and to ground	11	Fig. 7
48	Mixer grid test poi TP2 in series wit 1500 mmf.	nt 24.25 h			-			Pin 4 of V110 and to ground	Bias boxes con- nected as above	T107 (top) for max.	Fig. 9
49		25.5	1.5		-			••		T106 (top) for max.	Fig. 9
60	• •	22.75			_			••		T105 (top) for max.	Fig. 9
61	14	22.10								T104 (ton) for min.	Fig. 9
52	Connected loose to diode probe	ly Various See Fig. 13	Mixer gri point TP2 ir with 1500 m	d test 1 series mf.	20 to 28 mc	Scope di to pin 5 o to gnd. 180 ohr from pin to pin A	ode probe f V106 and Connect a n resistor n 5 of V106 of T105	Junction of R142 & R143	Shunt terminals A and B of T106 and T107 with 330 ohms. Bias boxes connected as above3v p-p on scope	Set Cl15 to min. Ad- just Tl top and Tl04 bot. for max. gain with 25.5 mc. at 70%. Cl15 for 22.5 at 70%	Fig. 7 Fig. 10
53	Connected loose to grid of 1st pix i- Adjust for smo marker indicatio	ly Various f. See all Fig. 14 n.	5.5			Connect pin 4 of move shu probe	scope to V110. Re- ant & diode		Remove shunts from T106 & T107	Retouch T105, T106 and T107 to obtain response shown in	
							Sed above			Fig. 14	Fig. 14
54			RAT	IO DETE	CTOR,	SOUND I	I-F AND 4	.5 MC TRAP ALIC	GNMENT	Fig. 14	Fig. 14
	Grid 1st Snd. I (pin 1, V101) o WR39B or C con nect to grid 3rd p I-F (pin 1, V10	F 25.50mc. pr mod. by 4.5 mc. 8)	RAT Not used	IO DETE	CTOR,	SOUND 1	d	.5 MC TRAP ALIC	SNMENT Set signal gen. to give 6V on meter	Fig. 14 T102 top core for max. d-c on meter	Fig. 14 Fig. 9
55	Grid let Snd. I (pin 1, V101) of WR39B or C con nect to grid 3rd p I-F (pin 1, V10	F 25.50mc. mod. by 4.5 mc. 8)	RAT Not used	IO DETE		SOUND 1	d	.5 MC TRAP ALIC Pin 2 of V103	SMENT Set signal gen. to give 6V on meter "VoltOhmyst" to jun Adjust T102 bottom meter. Repeat steps conditions are satisf	Fig. 14 T102 top core for max. d-c on meter action R106 and C108, core for zero DC on 54 and 55 until all ied.	Fig. 14 Fig. 9 Fig. 9 Fig. 10
55 56	Grid let Snd. I (pin 1, V101) of WR39B or C con nect to grid 3rd p I-F (pin 1, V10 '' Sig. Gen. to 1 Snd. I-F grid	F 25.50mc. pr mod. by 4.5 mc. 8)	RAT Not used			Not use	d	.5 MC TRAP ALIC Pin 2 of V103	SMENT Set signal gen. to give 6V on meter "VoltOhmyst" to juu Adjust Tl02 bottom meter. Repeat step conditions are satisf Signal generator output adjusted to provide 6 v on meter	Fig. 14 T102 top core for max. d-c on meter notion R106 and C108. core for zero DC on s 54 and S5 until all ted. T101 top core for max. DC on meter	Fig. 14 Fig. 9 Fig. 9 Fig. 10 Fig. 9





Figure 7-R-F Unit Adjustments



Figure 8-R-F Oscillator Adjustments



Figure 9-Sweep Attenuator Pads



Figure 10-Antenna Matching Unit Response



Following is a list of symptoms of possible failures and an indication of some of the possible faults:

NO RASTER ON KINESCOPE:

- (1) Incorrect adjustment of ion trap magnet. Magnet reversed either front to back or top to bottom.
- (2) V115 or V116 inoperative. Check waveforms on grids and plates.
- (3) No high voltage—if horizontal deflection is operating as evidenced by the correct waveform on terminal 1 of high voltage transformer, the trouble can be isolated to the IB3GT circuit. Either the T111 high voltage winding is open, the IB3GT tube is defective or its filament circuit is open.
- (4) V110 circuit, inoperative—Refer to schematic and waveform chart.
- (5) Damper tube (V118) inoperative.
- (6) Defective kinescope.
- (7) R184 open.
- (8) No receiver plate voltage—filter capacitor shorted—or filter choke open.

NO VERTICAL DEFLECTION:

- V113 or V114 inoperative. Check voltage and waveforms on grids and plates.
- (2) T108 open.
- (3) Vertical deflection coils open.

SMALL RASTER:

- (1) Low Plus B or low line voltage.
- (2) V116, V120 or V121 defective.

POOR VERTICAL LINEARITY:

- (1) If adjustments cannot correct, change V114.
- (2) Vertical output transformer T108 defective.
- (3) V113 defective—check voltage and waveforms on grid and plate.
- (4) C151, C153, C152, C155, or C156 defective.
- (5) Low plate voltage—check rectifiers and capacitors in supply circuits.
- (6) If height is insufficient, try changing V113.

POOR HORIZONTAL LINEARITY:

- (1) If adjustments do not correct, change V116, or V118.
- (2) T108 or L108 defective.
- (3) C176 or C177 defective.

WRINKLES ON SIDE OF RASTER:

- (1) C181 defective.
- (2) Defective yoke.

PICTURE OUT OF SYNC HORIZONTALLY:

- (1) T110 incorrectly tuned.
- (2) R192, R193 or R170B defective.

TRAPEZOIDAL OR NON SYMMETRICAL RASTER:

- (1) Improper adjustment of centering of focus magnet or ion trap magnet.
- (2) Defective yoke.

RASTER AND SIGNAL ON KINESCOPE BUT NO SOUND:

- (1) L102 defective.
- (2) Sound i-f, ratio detector or audio amplifier inoperative check V101, V102, V103 and their socket voltages.
- (3) Audio system defective.
- (4) Speaker defective.

SIGNAL AT KINESCOPE GRID BUT NO SYNC:

- (1) AGC control R149 misadjusted.
- (2) V111, inoperative. Check voltage and waveforms at its grid and plate.

SIGNAL ON KINESCOPE GRID BUT NO VERTICAL SYNC:

- (1) Check V113 and associated circuit.
- (2) Integrating network inoperative-Check.
- (3) V109B or V112B defective or associated circuit defective.
- (4) Gas current grid emission or grid cathode leakage in V112. Replace.

SIGNAL ON KINESCOPE GRID BUT NO HORIZONTAL SYNC:

- (1) T110 misadjusted—readjust as instructed on page 11.
- (2) V112 inoperative-check socket voltages and waveforms.
- (3) T110 defective
- (4) C142, C161Å, C163, C165, C167, C166, C168, C187 or C188 defective.
- (5) If horizontal speed is completely off and cannot be adjusted check R192, R193, R170B, R196, R195 and R198.

SOUND AND RASTER BUT NO PICTURE OR SYNC:

- (1) Picture, detector or video amplifier defective—check V109A and V110—check socket voltages.
- (2) Bad contact to kinescope cathode.

PICTURE STABLE BUT POOR RESOLUTION:

- (1) V109A or V110 defective.
- (2) Peaking coils defective-check resistance.
- (3) Make sure that the focus control operates on both sides of proper focus.
- (4) R-F and I-F circuits misaligned.

PICTURE SMEAR.

- (1) R-F or I-F circuits misaligned.
- (2) Open peaking coil.
- (3) This trouble can originate at the transmitter—check on another station.

PICTURE JITTER:

- (1) AGC control R149 misadjusted.
- (2) If regular sections at the left picture are displaced change V116.
- (3) Vertical instability may be due to loose connections or noise.
- (4) Horizontal instability may be due to unstable transmitted sync.

RASTER BUT NO SOUND, PICTURE OR SYNC:

- (1) Defective antenna or transmission line.
- (2) R-F oscillator off frequency.
- (3) R-F unit inoperative-check V1, V2.

DARK VERTICAL LINE ON LEFT OF PICTURE:

- Reduce horizontal drive and readjust width and horizontal linearity.
- (2) Replace V116.

LIGHT VERTICAL LINE ON LEFT OF PICTURE:

(1) V118 defective.













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WAVEFORM PHOTOGRAPHS Taken from RCA WO58A Oscilloscope

> Grid of Horizontal Sync Separator (Pin 1 of V112A) (6SN7) Voltage depends on picture

Figure 35–Vertical (85 Volts PP)

Figure 36—Horizontal (85 Volts PP)

Cathode of Horizontal Sync Sep. (Pin 3 of V112A) (6SN7)

Figure 37–Vertical (7.5 Volts PP)

Figure 38—Horizontal (5 Volts PP)



Plate of Horizontal Sync Separator (Pin 2 of V112A) (6SN7)

Figure 39–Vertical (45 Volts PP)

Figure 40—Horizontal (45 Volts PP)



Figure 42—Horizontal (55 Volts PP)

Plate of Vertical Sync Sep. (Pin 6 of V109B) (12AU7)

Figure 43–Vertical (65 Volts PP)

Figure 44—Horizontal (65 Volts PP)

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WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

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Figure 49—Grid of Vertical Sweep Osc. (Pin 5 of V113) (6J5) (30 Volts PP) ------

>

Figure 50—Plate of Vertical Sweep Osc. (Pin 3 of V113) (100 Volts PP)

->

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Figure 52–Plate of Vertical Sweep Output (Pin 3 of V114) (6K6) (715 Volts PP)

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Cathode of Kinescope (Pin 11 of V119) (17QP4) Voltage depends on picture Figure 53-Vertical

Figure 54—Horizontal ----







WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229







CV165 A

Figure 57—Grid of Horizontal Oscillator (Pin 4 of V115) (6SN7GT) (330 Volts PP)

-

Figure 58–Plate of Horizontal Oscillator (Pin 5 of V115) (6SN7GT) (140 Volts PP)

Figure 59–Terminal "C" of T110 (150 Volts PP)

Figure 60—Grid of Horizontal Output Tube (Pin 5 of V116) (6BQ6) (90 Volts PP)

22.2

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Figure 62—Cathode of Damper (Pin 3 of V118) (6W4GT) (2350 Volts PP)

→→→



Figure 63–Plate of Damper (Pin 5 of V118) (6W4GT) (160 Volts PP)

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Figure 64–Plate of AGC Amplifier (Pin 5 of V111) (6AU6) (560 Volts PP)









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VOLTAGE CHART

The following measurements represent two sets of conditions. In the first condition, a 15000 microvolt test pattern signal was fed into the receiver, the picture synced and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV97A senior "VoltOhmyst" between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c. The symbol < means less than.

Tube	Tube		Operating	E. 1	Plate	E. S	creen	E. C	athode	E.	Grid	
No.	Туре	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Notes on Measurements
Vl	6]6	Mixer	15000 Mu. V. Signal	2	153	-		7	0	5	*-3 to -5	*Depending on channel
			No Signal	2	135	_	_	7	0	5	*-3 to -5	*Depending on channel
V 1	6]6	R-F Oscillator	15000 Mu. V. Signal	1	100			7	0	6	*—3 to —5	*Depending on channel
			No Signal	1	85	_		7	0	6	*-3 to -5	*Depending on channel
V2	6CB6	R-F Amplifier	15000 Mu. V. Signal	5	260	6	150	2	.1	1	5.8	
			No Signal	5	220	6	100	2	1.0	1	-0.1	
V 101	6AU6	lst Sound I-F Amp.	15000 Mu. V. Signal	5	130	6	142	7	0.8	1	0	
			No Signal	5	116	6	129	7	0.6	1	0	
V102	6AU6	2d Sound I-F Amp.	15000 Mu. V. Signal	5	131	6	148	7	0	1	-5.1	
			No Signal	5	110	6	120	7	0	1	*-0.3	*Unreliable measuring point. Voltage depends on noise.
V 103	6AL5	Ratio Detector	15000 Mu. V. Signal	7	0	_	_	1	12	_	-	7.5 kc deviation at 1000 cycles
			No Signal	7	0.7	-	_	1	*5.1	_	_	*Unreliable measuring point. Voltage depends on noise.
V104	6AV6	lst Audio Amplifier	15000 Mu. V. Signal	7	87	_	_	2	0	1	-0.7	At min. volume
			No Signal	7	76	_	-	2	0	1	-0.6	At min. volume
V105	6K6GT	Audio Output	15000 Mu. V. Signal	3	260	4	263	8	19	5	-0.7	At min. volume
	*:		No Signal	3	250	4	251	8	18.5	5	-0.7	At min. volume
V106	6CB6	Ist Pix. I-F Amplifier	ISOOO Mu. V. Signal	5	246	6	258	2	< 0.1	1	-8.6	
		2 1 0 1 7	No Signal	5	108	6	108	2	0.7	1	*0.2	*Unreliable measuring point. Make measurement at T104-B
V107	6CB6	Amplifier	ISOOO Mu. V. Signal	5	242	6	255	2	<0.1	1	-8.6	
			Signal	5	108	6	108	2	0.5	1	-0.2	
V108	6CB6	3rd Pix. I-F Amplifier	15000 Mu. V. Signal	5	133	6	172	2	2.1	1	0	
			No Signal	5	115	6	162	2	1.9	1	0	
V109A	12AU7	Picture 2d Det.	15000 Mu. V. Signal	1	-8.4	-	-	3	0	2	-1.3	
			No Signal	1	-1.8	-	-	3	0	2	-0.6	
V109B	12AU7	Vert. Sync Separator	15000 Mu. V. Signal	6	71		-	8	0	7	-40	
			No Signal	6	*50 to 100	-	-	8	0	7	*15	*Unreliable, depends on noise

VOLTAGE CHART

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m 1	77 1		Onesting	E. I	Plate	E. Se	creen	E. Co	athode	E. (Grid	
No.	Тире Туре	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Notes on Measurements
V 110	6AG7 (6AC7, 6CL6)	Video Amplifier	15000 Mu. V. Signal	6	130	8	149	1	0.2	4	-1.3	AGC control set for normal operation
*	Refer to for pin c	schematic onnections	No Signal	6	110	8	130	1	0.5	4	-0.6	*Refer to Fig. 67 for socket connections
V111	6AU6	AGC Amplifier	15000 Mu. V. Signal	5	-40	6	250	7	153	1	151	
			No Signal	5	+2.3	6	258	7	135	1	105	
V112A	6SN7GT	Hor. Sync Separator	15000 Mu. V. Signal	2	263	_	-	3	190	1	130	
			No Signal	2	258	_	-	3	138	1	110	
V112B	6SN7GT	Sync Output	15000 Mu. V. Signal	5	58	_	-	6	0	4	-2.1	
			No Signal	5	48	_	-	6	0	4	* +0.6	*Depends on noise
V 113	6]5	Vertical Oscillator	15000 Mu. V. Signal	3	70	_	_	8	0	5	-15	*Depends on setting of Vert. hold control
			No Signal	3	68	-	-	8	0	5	_14	Voltages shown are synced pix adjustment
V 114	6K6GT	Vertical Output	15000 Mu. V. Signal	3	265	4	270	8	30	5	—5	
			No Signal	3	253	4	260	8	28	5	—5	
V115	6SN7GT	Horizontal Osc. Control	15000 Mu. V. Signal	2	165	-	-	3	+1.5	1	-21	
			No Signal	2	160	-		3	_10	1	-24	
V 115	6SN7GT	Horizontal Oscillator	15000 Mu. V. Signal	5	185	_		6	0	4	-80	
			No Signal	5	170	_	_	6	0	4	-88	
V 116	6BQ6GT	Horizontal Output	15000 Mu. V. Signal	Cap	*	4	180	8	21.2	5	-13	*High Voltage Pulse Present
			No Signal	Cap	*	4	170	8	21.0	5	-13	*High Voltage Pulse Present
V117	1B3GT 8016	H. V. Rectifier	15000 Mu. V. Signal	Cap	*		_	2&7	14,000	_	_	*High Voltage Pulse Present
			No Signal	Cap	*	_	_	2&7	13,600	_	-	*High Voltage Pulse Present
V 118	6W4GT	Damper	15000 Mu. V. Signal	5	270	_	-	3	*	-		*High Voltage Pulse Present
			No Signal	5	260	-	_	3	4:		-	*High Voltage Pulse Present
V119	21AP4	Kinescope	15000 Mu. V. Signal	Cap	14,000	10	400	11	170	2	120	At average Brightness
			No Signal	Cap	13,600	10	385	11	150	2	115	At average Brightness
V120 V121	5U4G 5Y3GT	Rectifiers	15000 Mu. V. Signal	4&6	_	_	_	2&8	285	-	_	
			No Signal	4&6		-	-	2 & 8	275	_	-	

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R-F UNIT WIRING DIAGRAM



Figure 65-KRK-8D R-F Unit Wiring Diagram

CRITICAL LEAD DRESS:

- 1. Keep all wiring in the pix i-f, sound i-f and video circuits as short as possible.
- 2. Keep the leads on Cl18, Cl20, Cl22, Cl24, Cl26, Rl14, Rl21 and Rl23 as short and direct as possible.
- 3. Do not run any leads under C115 trimmer capacitor.
- 4. Dress Cl18 vertically parallel to terminals A and B of T104. Dress Cl35 parallel to terminals A and B of T104 close to the chassis.
- 5. Keep Cl27 away from chassis with no more than 1/4 inch leads at each end.
- 6. Dress the lead from T105(C) to the terminal board, close to the chassis.
- 7. Keep all filament leads dressed close to the chassis.
- Ground filaments of V106, V107 and V108 independently of tube shields (pin 8). Use ground lances provided near pins of each socket.
- 9. Dress lead from pin 5 of V110 to J102-2 close to the chassis.
- 10. Keep leads to L103 as short as possible.

- Dress L102, L104, L105, L114, C130, R131, R133, R135, R139 and C132 away from the chassis.
- 12. Do not tape kinescope cathode lead in with other kinescope leads.
- Do not change the bus wire connections to pin 2 of V101 and V102. Sleeving is used to insure length and to prevent shorting.
- Keep leads on Cl36 short and direct. Dress the lead from Cl36 to pin 5 of Vlll as shown in wiring diagram.
- Do not dress C170 in such a position that adjustment of T110 is inaccessible.
- 16. Keep the leads on R201 as short and direct as possible.
- Dress the lead from pin 3 of V113 to C153 as shown in the wiring diagram.
- Mount C183 directly on the terminal board provided keeping it as far away from T109 as possible.
- Dress all leads in the high voltage compartment away from each other and away from the high voltage transformer.



CIRCUIT SCHEMATIC DIAGRAM

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Figure 67-Chassis KCS72A Circuit Schematic Diagram

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The schematic is shown in the latest condition. The below tell how early receivers differed from the sche shown above.

5	some	receivers,	C21 was omitted.
In	some	receivers,	CC130 was 120 mm
-			1 11. 0010

In some receivers, R131 was 3300 ohmš. In some receivers, R132 was 47,000 ohms. In some receivers, R133 was 27,000 ohms. In some receivers, R135 was 12,000 ohms. In some receivers, R182 was 470 ohms.

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STO	257 21 T 20 21 T 21
Ċ K	87
	21T207G, 21T208, 21T217, 21T227, 21T228, 21T229
	REPLACEMI
STOCK	NT PAI
	RTS

75176	75177	71476	75164	14343	504410	503322	502310	503247	503239	503222	504115	503068	503027		76518	75165	75162	76966	76460	001C1	76102	75182	75185	75202	76143	75174	75189	75197	75184	71504	75172	73473	73748	75166	75641	75199	75196	45465	76968	71088	COROJ	1	75201	76845	75188			STOCK	
Screw-#4-40 x 7/16" adjusting screw for L5	Screw-#4-40 x 3/2" adjusting screw for L1. L2. L3. L4. L43	Screw—#4-40 x ¼" adjusting screw for L6, L7, L8, L9, L10,	Rod-Actuating plunger rod (fibre) for fine tuning link	Retainer-Fine tuning shaft retaining ring	$100,000 \text{ ohms}, \pm 20\%, \frac{1}{2} \text{ watt (R1, R4, R5)}$	10,000 ohms, ±20%, ½ watt (K2) 22.000 ohms, ±10%, ½ watt (R7)	10,000 ohms, ±5%, ½ watt (R3)	4700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R12)	3900 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R9, R11)	2200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R6)	150 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R10)	68 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R13)	27 ohms, ±10%, ½ watt (R8)	Resistor-Fixed, composition:-	Plate-Front plate and shaft bearing	Link-Link asembly for fine tuning	Detent—Detent mechanism and fibre shaft	Core-Adjustable core for fine tuning capacitor	Contact-Test point contact	Coll – 1 rimmer coll (> turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L48, C16)	Converter section (US, L41)	Coil-Trimmer coil (1½ turns) with adjustable induct- ance core and capacitor stud (screw adjustment) for	Coil-Converter plate loading coil (L44)	Coil-Choke coil, .56 muh (L46)	Chip—Tubular clip for mounting standoff capacitors	Capacitor-Ceramic, trimmer, 50-75 mmf. (C11)	Capacitor—Ādjustable, 7-30 mmf. (C22)	Capacitor-Ceramic, 6.8 mmf. (C8)	Capacitor—Ceramic, adjustable, 0.75—4 mmf., complete with adjusting stud (C1)	Capacitor-Ceramic, 0.68 mmf. (C23)	Capacitor—Tubular, steatite, adjustable, 0.65—1.2 mmf. (C7)	Capacitor-Ceramic, 5000 mmf. (C21)	Capacitor-Ceramic, 1500 mmf. (C18, C26) Capacitor-Ceramic, dual 1500 mmf. (C17A, C17B)	Capacitor-Ceramic, 1500 mmf. (C6, C14, C15, C19)	Capacitor-Ceramic, 390 mmf. (C10)	Capacitor-Ceramic, 270 mmf. (C12, C13, C20)	Consister Comming 29 mm f (C5)	Capacitor-Ceramic, 12 mmt. (C44) Concriter-Ceramic 15 mmf (C3)	Capacitor-Ceramic, 3 mmf. (C4)	Capacitor-Headed lead, 0.68 mmf. (C27)	Capacitor-Ceramic, variable, for line tuning-plunger type (C2)		Cable 75 ohm coax cable $(71\%'')$ complete with coil (W1,	Bracket-Vertical bracket for holding oscillator tube shield	Board—Terminal board, 5 contact and ground	KRK8D	R-F UNIT ASSEMBLIES	DESCRIPTION	
76461	39644	39640 73094	206476	73091	39638	47617	75248	76673	75437	76474	76475	73664	33380	33098	71496	16454	76456			75190	75607	75173 75181		75447		75446	75169	75171	75170	76964		76963	6ChII	77,00	75180	73457	76961	30340	75163	75191	75088	76967	76962	76134	76519	74575	73640	STOCK	
Capacitor-Ceramic, 500 mmf., 20,000 volts (C179)	Canacitor Mica. 470 mmf. (C107. C121)	Capacitor-Mica, 390 mmf. (C143)	Capacitor-Mica, 330 mmt. (C169, C175)	Capacitor-Mica, 270 mmf. (C140, C178)	Capacitor-Mica, 270 mmf. (C130)	Capacitor-Ceramic, 270 mmf. (C106)	Capacitor-Mica, 220 mmf. (C146)	Capacitor-Ceramic, 220 mmf. (C136)	Capacitor-Ceramic, 100 mmf. (C202)	Capacitor-Mica, 82 mmf. (C142)	Capacitor-Mica, 68 mmf. (C164)	Capacitor-Ceramic, 39 mmf. (C203)	Capacitor-Ceramic, 12 mmf. (C162)	Capacitor-Ceramic, 10 mmf. (C127)	Capactor—Adjustable, mica, 5-70 mmf. (C115)	Bracket-Mounting bracket complete with insulator for picture control	Bracket-Channel indicator lamp bracket	KCS72-A	CHASSIS ASSEMBLIES	Washer—Insulating washer (neoprene) for trimmer C7	Washer-Insulating washer (hex)	Stud-#6-32 x ¹³ /16" adjusting stud for trimmer C7 Transformer—Converter transformer (T1)	coded numerically an "Hi-Q"	Stud-Capacitor stud-brass-#4.40 x $3/16''$ with $3/64''$ screw driver slot for trimmer coils L47, L48 and capacitor C1	driver slot for trimmer coils L47, L48 and capacitor C1 uncoded and coded "ER"	Stud-Capacitor stud-brass-#4-40 x $3/6''$ with $3/64''$ screw	Strin-Coil somert mounting strin-R H conter	Strip-Coil segment mounting strip-L.H. upper-less	L25, L26, L27, L28, L29, L30, L31, L49) Strip—Coil segment mounting strip—L.H. lower	Stator-R-F amplifier stator complete with rotor, coile, capacitor (C13) and resistor (R6) (S1-3, L22, L23, L24,	segment, colis, adjusting screws and capacitors C3, C23 (S1-1, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L43)	Stator-Oscillator section stator complete with rotor,	Stator-Converter stator complete with foror. coils, ca- pacitors (C10, C12) and resistors (R4, R5, R12) (S1-2, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L45)	L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L52)	Stator-Antenna stator complete with rotor, coils, capac- itors (C20, C21) and resistors (R9, R10, R11) (S1-4, L32,	Spring-Return spring for fine tuning control	Spring-Retaining spring for agjusting screws	Spring-Hair pin spring for fine tuning link	Spring—Friction spring (formed) for fine tuning cam	Spacer-Insulating spacer for front plate	Socket—Tube socket, 7 contact, miniature, ceramic, saddle-mounted	Shield-Tube shield for V1, V2	Shield—Oscillator and converter sections shield—snap-on type	Shaft-Fine tuning shaft and cam	Shaft-Channel selector shaft and plate	Screw—#4-40 x .359" adjusting screw for L42	Screw#4-40 x 7/16" adjusting screw for LS2	DESCRIPTION	

1, 0.47 mfd., 504047 47 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R201) 2, 0.47 mfd., 503082 82 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R101)
503047 47 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R105)
502047 47 ohms, ±5%, 1/2 watt (R119)
$\frac{1}{102039} = \frac{1}{39} \text{ ohms}, \pm 5\%, \frac{1}{2} \text{ watt (R122)}$
1 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R130) ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R122)
position vatt (R130)
watts (R116)
512433 503439 503447 504447
1433 330,000 shms, ±10%, 1433 330,000 shms, ±5%, 1433 330,000 shms, ±5%, 1439 390,000 shms, ±10%, 1447 470,000 shms, ±10%, 1447 470,000 shms, ±10%, 1447 470,000 shms, ±20%,
±5%, ½ watt (R177) ±10%, ½ watt (R15) ±10%, ½ watt (R19) ±5%, 1 watt (R190) ±10%, ½ watt (R196)
(141) (177) R157) R111, R188) R111, R188) R168)
75024
024 Cone- 022 Speake coil (
me-Cone and voit eaker-8" P.M. sp coil (3.2 ohms) 92569-12 (For Mode ne-Cone and void eaker-12" P.M. sp coil (3.2 ohms)
roice coil speaker c -12W, RL odels 2172 - odels 2172 . speaker . speaker
208, 208, 208, 208, 207, 207, 207, 207, 207, 207, 207, 207

З

REPLACEMENT PARTS (Continued)

REPLACEMENT PARTS (Continued)

X3199 X3222 76595 76625 76594 76593 76593 75456 72113 77684 76622 37396 74308 76631 77268 71457 76698 X1756 71892 STOCK 76599 76629 × × a ы м м a × ÷ Ô H H н C

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229 REPLACEMENT PARTS (Continued)

The system of employing an asterisk before the stock number of new items has been discontinued. APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.



Model 21-T-242 "Westland" Mahogany, Blonde Mahogany



Model 21-T-244 "Penfield" Mahogany

Models 21-T-242 and 21-T-244 are 21 inch television, radio, phonograph combinations. Model 21-T-242 features an AM radio and Model 21-T-244 features an AM, FM radio. Both models employ a three speed record changer and a 12" PM dynamic speaker.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

TELEVISION R-F FREQUENCY RANGE

All 12 television channels, 54 mc. to 88 mc., 174 mc. to 216 mc.
Picture I-F Carrier Frequency
Sound I-F Carrier Frequency
VIDEO RESPONSE To 3.2 mc.
SWEEP DEFLECTION Magnetic
FOCUS Magnetic
POWER SUPPLY RATING
21-T-242
21-T-244. 190 watts max.

CHASSIS DESIGNATIONS

In Model 21-T-242... Television Chassis KCS72D-1, Radio Chassis RC1117B and Record Changer 930409-5 or -10.

In Model 21-T-244... Television Chassis KCS72D-2, Radio Chassis RC1111B, Audio Amplifier RS141C and Record Changer 930409-5 (mah.).

See Service Data 930409 for Record Changer information.

AUDIO POWER OUTPUT RATING. KCS72D, 4 watts max. RC1117B......2.4 watts max., RS141C......10 watts max.

LOUDSPEAKER (92569-12) 12" PM Dynamic, 3.2 ohms

WEIGHT

Model	Net Weight	Shipping Weight
21-T,242		207 lbs.
21-T-244		232 lbs.

RECEIVER ANTENNA INPUT IMPEDANCE Choice: 300 ohms balanced or 72 ohms unbalanced. RCA TUBE COMPLEMENT

		Tυ	be Used	Television Cha	issis	Function
(1)	RCA	6CB6			R-F Amplifier
(2)	RCA	6J6		F Oscill	lator and Mixer
(3)	RCA	6CB6		st Pictu	re I-F Amplifier
(4)	RCA	6CB6		d Pictu	re I-F Amplifier
(5)	RĊĀ	6CB6		d Pictu	re I-F Amplifier
(6)	RCA	12AU7. Pi	cture 2nd Detecto	r and V	Vert. Sync. Sep.
(7)	RCA	6AG7		أسترجع	Video Amplifier
(8)	RCA	6AU6		lst Sour	nd I-F Amplifier
(9)	RCA	6AU6		nd Sour	nd I-F Amplifier
(10)	RCA	6AL5			Ratio Detector
(11)	RCA	6AV6		lst .	Audio Amplifier
(12)	RCA	6K6GT			Audio Output
(13)	RCA	6AU6			AGC Amplifier
(14)	RCA	6SN7GT	Horizontal Sync. S	Зер. ал	d Sync. Output
(15)	RCA	6J5	Ver	tical S	weep Oscillator
(16)	RCA	6K6GT		Vertica	l Sweep Output
(17)	RCA	6SN7GT I	Iorizontal Sweep	Oscilla	tor and Control
(18)	RCA	6BQ6GT	Но	rizonta	l Sweep Output
(19)	RCA	6W4GT			Damper
(20)	RCA	1B3-GT/80	16	High V	oltage Rectifier
(21)	RCA	21AP4			Kinescope
(22)	RCA	5U4G			Rectifier
(23)	RCA	5Y3GT			Rectifier

RCAVICTOR

TELEVISION, RADIO,

PHONOGRAPH COMBINATION

Models 21-T-242, 21-T-244

Chassis No. KCS72D-1 or KCS72D-2 930409 and RC1117B or RC1111B and RS141C —Mfr. No. 274—

SERVICE DATA -- 1952 No. T9 PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

GENERAL DESCRIPTION

Radio Chassis RC1111B

	RCA	1)
Oscillator and Mixer	RCA	2)
I-F Amplifier	RCA	3)
	RCA	4)
Ratio Detector	RCA	5)
AM 2nd Det. and 1st Audio Amp.	RCA	6)

21T242, 21T244 ELECTRICAL AND MECHANICAL SPECIFICATIONS (cont'd)

RCA TUBE COMPLEMENT **OPERATING CONTROLS (Front)** Radio Chassis 1117B Tube Used Function (1) RCA 12BE6. Converter Picture Dual Control Knobs Brightness } (4) RCA 6AQ6. Phase Inverter Sound Volume and On-Off Switch } Dual Control Knobs (5) RCA 35C5 Audio Output (2 tubes) TV Tone Switch NON-OPERATING CONTROLS (not including R-F and Audio Chassis RS141C I-F adjustments) (1) RCA 6C4..... Phase Inverter (2) RCA 6V6GT Audio Output (2 tubes) (2) DOA EVOOT

(3) NCA 513G1
HORIZONTAL SWEEP FREQUENCY
VERTICAL SWEEP FREQUENCY
FRAME FREQUENCY (Picture Repetition Rate)30 cps
SCANNINGInterlaced, 525 line

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 Picture Centering
 top chassis adjustment

 Width
 rear chassis adjustment

 Height
 rear chassis adjustment

 Vertical Linearity
 rear chassis adjustment

 Horizontal Drive
 rear chassis adjustment

 Horizontal Oscillator Frequency
 rear chassis adjustment

 Horizontal Oscillator Waveform
 bottom chassis adjustment

 Horizontal Locking Range
 rear chassis adjustment

 Focus
 top chassis adjustment

 Ion Trap Magnet
 top chassis wing nut adjustment

 Deflection Coil
 top chassis wing nut adjustment

HIGH VOLTAGE WARNING

OPERATION OF THIS RECEIVER OUTSIDE THE CABINET OR WITH THE COVERS RE-MOVED, INVOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES. WORK ON THE RECEIVER SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOR-OUGHLY FAMILIAR WITH THE PRECAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT SHIELD REMOVED. BE SURE THE GROUND STRAP, BETWEEN THE YOKE ASSEMBLY AND THE CHASSIS, IS SECURELY FASTENED BEFORE TURNING THE RECEIVER ON.

KINESCOPE HANDLING PRECAUTIONS

DO NOT REMOVE THE RECEIVER CHASSIS, INSTALL, REMOVE OR HANDLE THE KINE-SCOPE IN ANY MANNER UNLESS SHATTERPROOF GOGGLES ARE WORN. PEOPLE NOT SO EQUIPPED SHOULD BE KEPT AWAY WHILE HANDLING KINESCOPES. KEEP THE KINESCOPE AWAY FROM THE BODY WHILE HANDLING.

The kinescope bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure. For this reason, the kinescope must be handled with more care than ordinary receiving tubes.

The large end of the kinescope bulb—particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure at any time. During service if the tube sticks or fails to slip smoothly into its socket, or deflecting yoke, investigate and remove the cause of the trouble. Do not force the tube. Refer to the Receiver Installation section for detailed instructions on kinescope installation. All RCA replacement kinescopes are shipped in special cartons and should be left in the cartons until ready for installation in the receiver.

The following adjustments are necessary when turning the receiver on for the first time:

1. Turn the radio FUNCTION switch to TV.

2. Turn the receiver "ON" and advance the SOUND VOLUME control to approximately mid-position.

3. Set the STATION SELECTOR to the desired channel. 4. Adjust the FINE TUNING control for best sound fidelity

and the VOLUME control for suitable volume. 5. Turn the BRIGHTNESS control fully counter-clockwise,

then clockwise until a pattern appears on the screen. 6. Adjust the VERTICAL hold control until the pattern

stops vertical movement.

7. Adjust the HORIZONTAL hold control until a picture is obtained and centered.

8. Adjust the PICTURE and BRIGHTNESS controls for suitable picture contrast and brightness.

9. In switching from one channel to another, it may be necessary to repeat steps 4 and 8.

10. When the set is turned on again after an idle period it should not be necessary to repeat the adjustments if the positions of the controls have not been changed. If any adjustment is necessary, step No. 4 is generally sufficient.

11. If the positions of the controls have been changed, it may be necessary to repeat steps 1 through 8.



Figure 1-21T242 Operating Controls

RADIO OPERATION

Model 21T242

1. Turn the RADIO TRANSFER switch to RADIO-PHONO position.

2. Turn the RADIO-PHONO tone switch to a radio position.

3. Tune in the desired station with the TUNING control. 4. Adjust tone as desired.

Model 21T244

l. Turn the television TRANSFER switch to the RADIO position.

2. Turn the radio FUNCTION switch to AM or FM position.

3. Tune in the desired station with the TUNING control. 4. Adjust BASS and TREBLE controls for desired tone. Normal tone is with the BASS control fully counter-clockwise and the TREBLE control fully clockwise.

PHONOGRAPH OPERATION

1. Turn the radio FUNCTION switch to the PHONO position.

2. Set speed control on changer to the desired speed.

3. Set stylus on tone arm to proper position for record to be used. (For 45 RPM records place 45 RPM centerpost over center spindle.)

4., Place a record on the changer and turn the changer power switch to "ON" position.



Figure 2-21T244 Operating Controls

REFER TO PAGES 236 TO 249 FOR TELEVISION ALIGNMENT PRO-CEDURE AND WAVE FORM PHOTOGRAPHS

3

INSTALLATION INSTRUCTIONS

ION TRAP MAGNET ADJUSTMENT.—Set the ion trap magnet approximately in the position shown in Figure 3. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rotating it slightly around the neck of the kinescope for the brightest raster on the screen. Reduce the brightness control setting until the raster is slightly above average brilliance. Turn the focus control (shown in Figure 3) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches of this adjustment should be made with the brightness control at the maximum clockwise position with which good line focus can be maintained.



Figure 3-Yoke and Focus Magnet Adjustments

21T242, 21T244

DEFLECTION YOKE ADJUSTMENT.—If the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Tighten the yoke adjustment wing screw.

PICTURE ADJUSTMENTS.—It will now be necessary to obtain a test pattern picture in order to make further adjustments. Connect the antenna transmission line to the receiver.

If the Horizontal Oscillator and AGC System are operating properly, it should be possible to sync the picture at this point. However, if the AGC control is misadjusted, and the receiver is overloading, it may be impossible to sync the picture.

If the receiver is overloading, turn R149 on the rear apron (see Figure 4) counter-clockwise until the set operates normally and the picture can be synced.

CHECK OF HORIZONTAL OSCILLATOR ALIGN-MENT.—Turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in horizontal sync. Momentarily remove the signal by switching off channel then back. Normally the picture will be out of sync. Turn the control clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 2 or 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control. Pull-in should occur before the control has been turned 120 degrees from the extreme counter-clockwise position. The picture should remain in sync for approximately 90 degrees of additional clockwise rotation of the control. At the



Figure 4-Rear Chassis Adjustments

extreme clockwise position, the picture should remain in sync and should not show a black bar in the picture.

If the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned. Skip "Alignment of Horizontal Oscillator" and proceed with "Focus Magnet Adjustment."

ALIGNMENT OF HORIZONTAL OSCILLATOR.—If in the above check the receiver failed to hold sync with the hold control at the extreme counter-clockwise position or failed to hold sync over 90 degrees of clockwise rotation of the control from the pull-in point, it will be necessary to make the following adjustments.

Horizontal Frequency Adjustment.—Turn the horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the T110 horizontal frequency adjustment at the rear of the chassis until the picture is just out of sync and the horizontal blanking appears as a vertical or diagonal black bar in the raster. Then turn the T110 core until the bar moves out of the picture leaving it in sync.

Horizontal Locking Range Adjustment.—Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. The picture may remain in sync. If so turn the T110 rear core slightly and momentarily switch off channel. Repeat until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync. If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer Cl61A slightly clockwise. If less than 2 bars are present, adjust Cl61A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 2 or 3 bars are present.

Repeat the adjustments under "Horizontal Frequency Adjustment" and "Horizontal Locking Range Adjustment" until the conditions specified under each are fulfilled. When the horizontal hold operates as outlined under "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

If it is impossible to sync the picture at this point and the AGC system is in proper adjustment it will be necessary to adjust the Horizontal Oscillator by the method outlined in the alignment procedure on page 11. For field purposes paragraph "B" under Horizontal Oscillator Waveform Adjustment may be omitted.

FOCUS MAGNET ADJUSTMENT.—The focus magnet should be adjusted so that there is approximately three-eighths inch of space between the rear cardboard shell of the yoke and the flat of the front face of the focus magnet. This spacing gives best average focus over the face of the tube.

The axis of the hole through the magnet should be parallel with the axis of the kinescope neck with the kinescope neck through the center of the opening.

CENTERING ADJUSTMENT.—No electrical centering controls are provided. Centering is accomplished by means of a separate plate on the focus magnet. The centering plates include a locking screw which must be loosened before centering. Up and down adjustment of the plate moves the picture side to side and sidewise adjustment moves the picture up and down.

If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

WIDTH, DRIVE AND HORIZONTAL LINEARITY ADJUSTMENTS.—Adjustment of the horizontal drive control affects the high voltage applied to the kinescope. In order to obtain the highest possible voltage hence the brightest and best focused picture, adjust horizontal drive trimmer C161B counter-clockwise until the picture begins to "wrinkle" in the middle then clockwise until the "wrinkle" disappears.

Turn the horizontal linearity control L108 clockwise until the picture begins to "wrinkle" on the right and then counterclockwise until the "wrinkle" disappears and best linearity is obtained.

Adjust the width control L106 to obtain correct picture width.

A slight readjustment of these three controls may be necessary to obtain the best linearity.

Adjustments of the horizontal drive control affect horizontal oscillator hold and locking range. If the drive control was adjusted, recheck the oscillator alignment.

HEIGHT AND VERTICAL LINEARITY ADJUST-MENTS.—Adjust the height control (R173 on chassis rear apron) until the picture fills the mask vertically. Adjust vertical linearity (R181 on rear apron), until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. Adjust centering to align the picture with the mask.

FOCUS.—Adjust the focus magnet for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

Recheck the position of the ion trap magnet to make sure that maximum brightness is obtained.

Check to see that the yoke thumbscrew and the focus magnet mounting screws are tight.

21T242, 21T244

CHECK OF R-F OSCILLATOR ADJUSTMENTS.— Tune in all available stations to see if the receiver r-f oscillator is adjusted to the proper frequency on all channels. If adjustments are required, these should be made by the method outlined in the alignment procedure on page 9. The adjustments for channels 2 through 12 are available from the front of the cabinet by removing the station selector escutcheon as shown in Figure 5. Adjustment for channel 13 is on top of the chassis.



Figure 5-R-F Oscillator Adjustments

AGC THRESHOLD CONTROL.—The AGC threshold control R149 is adjusted at the factory and normally should not require readjustment in the field.

To check the adjustment of the AGC Threshold Control, tune in a strong signal and sync the picture. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of R149. If the picture requires an appreciable portion of a second to reappear, or bends excessively, R149 should be readjusted.

Turn Rl49 fully counter-clockwise. The raster may be bent slightly. This should be disregarded. Turn Rl49 clockwise until there is a very, very slight bend or change of bend in the picture. Then turn Rl49 counter-clockwise just sufficiently to remove this bend or change of bend.

If the signal is weak, the above method may not work as it may be impossible to get the picture to bend. In this case, turn R149 clockwise until the snow in the picture becomes more pronounced, then counter-clockwise until the best signal to noise ratio is obtained.



Figure 6-Model 21T242 Cable Diagram

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The AGC control adjustment should be made on a strong signal if possible. If the control is set too far clockwise on a weak signal, then the receiver may overload when a strong signal is received.

FM TRAP ADJUSTMENT.—In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the L2O3 core on top of the antenna matching transformer for minimum interference in the picture.

CAUTION.—In some receivers, the FM trap L203 will tune down into channel 6 or even into channel 5. Needless to say, such an adjustment will cause greatly reduced sensitivity on these channels. If channels 5 or 6 are to be received, check L203 to make sure that it does not affect sensitivity on these two channels.

Replace the cabinet back and connect the receiver antenna leads to the cabinet back. Make sure that the screws holding it are up tight, otherwise it may rattle or buzz when the receiver is operated at high volume.

KINESCOPE SCREEN CLEANING.—The kinescope safety glass is held in place by four spring clips which may be removed from the back of the front panel. This permits removing the safety glass for cleaning without the necessity of removing the chassis and kinescope.

CHASSIS REMOVAL.—To remove the chassis from the cabinet for repair or installation of a new kinescope, remove the control knobs, the cabinet back, unplug the speaker cable, the kinescope socket, the antenna cable, the yoke and high voltage cable. Take out the chassis bolts under the cabinet. Withdraw the chassis from the back of the cabinet.

RADIO OPERATION

Model 21T242

Turn the RADIO-TV TRANSFER switch to radio. Turn the radio function switch to RADIO and check radio for proper operation.

Model 21T244

Turn the TELEVISION TRANSFER switch to the RADIO position. Turn the radio function switch to the AM and FM positions and check the radio for proper operation.



Figure 7-Model 21T244 Cable Diagram

TELEVISION CHASSIS TOP VIEW





TELEVISION CHASSIS BOTTOM VIEW

21T242, 21T244



Figure 9-Television Chassis Bottom View
RADIO SCHEMATIC DIAGRAM



RADIO DATA

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Dial Pointer Adjustment.—Rotate tuning condenser fully counter-clockwise (plates fully meshed). Adjust indicator pointer so that it is 3^{15} " from the left hand edge of the dial back plate.



Figure 11-Dial Cord and Drive



Figure 12-Chassis Top View

Alignment Procedure

Output Meter.—Connect meter across speaker voice coil. Turn volume control to maximum.

Test Oscillator.—Connect low side of test oscillator to common wiring in series with a .1 mf. capacitor. If the test oscillator is a-c operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common wiring at the electrolytic capacitor. Keep the oscillator output low to prevent a-v-c action.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the fol- lowing for max. output
1	I-F grid, in series with .1 mfd.	455 ha	Quiet point	Pri. & Sec. 2nd I-F transformer
2	Converter grid in series with .1 mfd.	455 KC	end of dial	Pri. & Sec. Ist I-F transformer
NOT	E ANTENN	A LOOP	AND RECOF	D CHANGER
M	UST BE IN CA	BINET I	FOR THE FO	DLLOWING
<u>М</u> З	Short wire placed near loop for	1,620 kc	FOR THE FO Extreme R. H. end (gang open)	C1B-T (osc.)
M 3 4	UST BE IN CA Short wire placed near loop for radiated signal	BINET 1 1,620 kc	FOR THE FO Extreme R. H. end (gang open) 1,400 kc	ClB-T (osc.) C5 (ant.)

RADIO DATA



CRITICAL LEAD DRESS

- The 1st FM if plate lead should be dressed away from the r-f amp plate.
- Dress the 1st AM i-f plate lead to the S2 wafer away from the AM r-f coil.
- Dress the a-c power switch wires away from all audio components.
- Dress C26 down toward the base between the terminal board and the side apron.
- 5. The C18 bypass ground should be as close to the r-f shelf ground strap as possible.
- 6. Dress C25 away from the arm contact of the volume control.
- All leads from the r-f shelf leaving through the shields must be kept as short as possible.
- 8. Dress the a-c leads in the RS141 chassis away from the audio input leads and components.

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RADIO ALIGNMENT PROCEDURE

Before aligning set, completely mesh the gang and set the dial pointer to the mechanical max. calibration point at extreme left end of dial. When making a complete alignment follow the table below in sequence. Connect the output meter across the speaker voice coil, and turn the receiver volume control to max. Turn tone controls for maximum highs and maximum lows.

"AM" I-F ALIGNMENT

Test-Oscillator.—connect low side of the test-osc. to the chassis, and keep the output as low as possible to avoid a-v-c action.

	Steps	Connect the High Side of the Test Osc. to—	Tune Test Osc. to—	Function Switch	Turn Radio Dial to—	Adjust the following
ļ	1	Pin No. 1 of (43) in series with .01 mfd.	455 kc. Modulated	AM	Low Freq. end of Dial	†Top and bot. cores of T4 For max. voltage across voice coil.
	2	Stator of C1-D in series with .01 mfd.	455 kc. Modulated	AM	Low Freq. end of Dial	†Top and bot. cores of T2 For max. voltage across voice coil.

†For proper adjustment of the i-f cores start with the cores all the way out. The first peak obtained will be the correct one.

FM ALIGNMENT PROCEDURE

Connect probe of "VoltOhmyst" to negative side of C39 and low side to chassis. Top shield must be on and the bottom shield off.

Steps	Connect the High Side of the Test Osc. to—	Tune Test Osc. to—	Function Switch	Radio Dial Tuned to—	Adjust
3	Pin No. 1 of V4 in series with .01 mfd.	10.7 mc.	FM		Top of Ratio d-c† Trans. T5 for maximum DC on ''VoltOhmyst''
4	Pin No. 1 of V4 in series with .01 mfd.	30% AM Modulated	FM		Bottom of Ratio d-c† Trans. T5 for minimum audio output on meter.
5	Repeat steps 3 and 4 as no	ecessary making find	al adjustmen	t with input set to g	ive approx4.0 v. on 'VoltOhmyst."
6	Pin No. 1 of V3 in series with .01 mfd.	10.7 mc.	FM	88 mc.	Top and bottom cores of T3 for maximum d-c across C39
7	Stator of Cl-C in series with .01 mfd.	10.7 mc.	FM	88 mc.	†Top and bottom cores of T1 for maximum d-c across C39.
8	Connect sweep generator cable to antenna termi-	90 mc. 22.5 kc. FM mod.	FM	88 mc.	‡OSC, L8 for max. audio output.
9	nals through 120 ohms in each side of line.	106 mc. 22.5 kc. FM mod.	FM	Tune to signal	ANT, Cl-FT and R-F Cl-CT for max. voltage across C39.
10		90 mc. 22.5 kc. FM mod.	FM	Tune to signal	‡ANT, L1 and R-F L2 for max. voltage across C39.
11	Repeat steps 8, 9 and 10 c	is required.			
12	Connect a scope to junctio	on R33 and C35, ch	eck response	and linearity. Pea	k separation should be at least 180 kc.

†For proper adjustment of the i-f cores start with the cores all the way out. The first peak obtained is the correct one. ‡Adjustable by increasing or decreasing spacing between turns.

"AM" R-F ALIGNMENT

I					
Steps	Connect the High Side of the Test Osc. to—	Tune Test Osc. to—	Function Switch	Turn Radio Dial to—	Adjust the following
13		1,620 kc.	AM	Min. capacity	*Osc. Cl-BT for maximum output.
14	External radiating loop	1,400 kc.	AM	Tune to signal	*Cl-DT and Cl-ET for max, output,
15	and couple loosely to receiver loop.	600 kc.	AM	Tune to signal	‡Osc. L5 for max. output while
16		600 kc.	AM	Tune to signal	***R-F L7 for max. output.
17.	Repeat steps 13, 14, 15 and	d 16 until no additi	onal gain in	sensitivity is obtaine	d.

Repeat steps 15, 14, 15 and 16 uniti no additional gain in sensitivity is obtained.

[‡]Clip a 10,000 ohm resistor across C1-D when making this adjustment. ***Be sure the resistor employed in step 15 is removed for this adjustment.

*All R-F shields must be in place.

RADIO VOLTAGE CHART

Voltages shown are as read with "VoltOhmyst" between indicated terminal and chassis, with receiver operating on 117 volts, and with no signal input.

Tube Type and Function	Tube Element	Pin No.	АМ	FM	Phono
V1 6CB6 R-F Amp	Plate Screen Cathode Grid	5 6 2 1	215 74 0.4 -0.8	180 62 0.4 0.4	-
V2 6J6 Osc. and Mixer	Plate Grid Plate Grid	2 5 1 6	55 -1.2 43 2.0	58 	1111
V3 6BA6 I-F Amp	Plate Screen Cathode Grid	5 6 7 1	210 126 0.9 0.8	210 115 0.7 0.2	- - -
V4 6AU6 Driver	Plate Screen Cathode Grid	5 6 7 1	216 150 1.5 0	216 150 1.5 0	

_					
Tube Type and Function	Tube Element	Pin No.	АМ	FM	Phono
V5 6AL5 Ratio Det.	_	_	_	-	-
V6 6AV6 Audio Amp.	Plate Grid	7 1	88 —0.7	88 —0.7	104 —0.8
V102 6C4 Phase Inverter	Plate Cathode Grid	5 7 6	87.5 11 16	88 11 16	120 13 19
V103 6V6GT V104 6V6GT Audio Power Output	Plate Screen Cathode Grid	3 4 8 5	300 224 0 17	300 224 0 17	298 292 0 _21
V101 5Y3GT Rectifier	Fil.	8	305	305	307

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TELEVISION VOLTAGE CHART

The following measurements represent two sets of conditions. In the first condition, a 15000 microvolt test pattern signal was fed into the receiver, the picture synced and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV97A senior "VoltOhmyst" between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c. The symbol < means less than.

Tube	Tube		Operating	Е.,	Plate	E. S	creen	E. C	athode	E.	Grid	
No.	Туре	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Notes on Measurements
V1	616	Mixer	15000 Mu. V. Signal	2	153	-	_	7	0	5	*_3 to _5	*Depending on channel
			No Signal	2	135	_	_	7	0	5	*_3 to _5	*Depending on channel
V 1	6]6	R-F Oscillator	15000 Mu. V. Signal	1	100	-	-	7	0	6	*_3 to _5	*Depending on channel
			No Signal	1	85	-	_	7	0	6	*_3 to _5	*Depending on channel
V2	6CB6	R-F Amplifier	15000 Mu. V. Signal	5	260	6	150	2	1	1	-5.8	
			No Signal	5	220	6	100	2	1.0	1	-0.1	
V 101	6AU6	lst Sound I-F Amp.	15000 Mu. V. Signal	5	130	6	142	7	0.8	1	0	
			No Signal	5	116	6	129	7	0.6	1	0	
V 102	6AU6	2d Sound I-F Amp.	15000 Mu. V. Signal	5	131	6	148	7	0	1	-5.1	
			No Signal	5	110	6	120	7	0	1	*—0.3	*Unreliable measuring point. Voltage depends on noise.
V 103	6AL5	Ratio Detector	15000 Mu. V. Signal	7	0	_	-	1	12	_	_	7.5 kc deviation at 1000 cycles
			No Signal	7	0.7		-	1	*5.1	-	_	*Unreliable measuring point. Voltage depends on noise.
V 104	6AV6	lst Audio Amplifier	15000 Mu. V. Signal	7	87		-	2	0	1	-0.7	At min. volume
			No Signal	7	76	_	_	2	0	1	-0.6	At min. volume
V 105	6K6GT	Audio Output	15000 Mu. V. Signal	3	260	4	263	8	19	5	-0.7	At min. volume
		1 - 5- 7 5	No Signal	3	250	4	251	8	18.5	5	-0.7	Åt min. volume
V 106	6CB6	Amplifier	15000 Mu. V. Signal	5	246	6	258	2	< 0.1	1	-8.6	
		2nd Dia IE	No Signal	5	108	6	108	2	0.7	1	*—0.2	*Unreliable measuring point. Make measurement at T104-B
V107	6CB6	Amplifier	Signal	5	242	6	255	2	< 0.1	1	-8.6	
			Signal	5	108	6	108	2	0.5	1	-0.2	
V 108	6CB6	3rd Pix. I-F Amplifier	15000 Mu. V. Signal	5	133	6	172	2	2.1	1	0	
		Distant	No Signal	5	115	6	162	2	1. 9	1	0	
V 10 9A	12AU7	2d Det.	Signal	1	-8.4	-	_	3	0	2	-1.3	
			No Signal	1	-1.8	-	-	3	0	2	-0.6	
V109B	12AU7	Vert. Sync Separator	15000 Mu. V. Signal	6	71	_	-	8	0	7	-40	
			No Signal	6	*50 to 100	_	_	8	0	7	*—15	*Unreliable, depends on noise





Figure 18-Chassis Wiring Diagram, KCS72D-1

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TELEVISION VOLTAGE CHART

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R-F UNIT WIRING DIAGRAM

			Operation	E.	Plate	E. 5	Screen	E. C	Cathode	E.	Grid	
lube No,	Tube Type	Function	Condition	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Notes on Measurements
V 110	6AG7	Video Amplifier	15000 Mu. V. Signal	8	130	6	149	5	0.2	4	_1.3	AGC control set for normal operation
			No Signal	8	110	6	130	5	0.5	4	-0.6	AGC control set for normal operation
V111	6AU6	AGC Amplifier	15000 Mu. V. Signal	5	40	6	250	7	153	1	151	
4	F.		No Signal	5	+2.3	6	258	7	135	1	105	
V112A	6SN7GT	Hor. Sync Separator	15000 Mu. V. Signal	2	263	-	-	3	190	1	130	
			No Signal	2	258	-	_	3	138	1	110	
V112B	6SN7GT	Sync Output	15000 Mu. V. Signal	5	58	-	_	6	0	4	-2.1	· · · · · · · · · · · · · · · · · · ·
			No Signal	5	48	_		6	0	4	* +0.6	*Depends on noise
V113	6J5	Vertical Oscillator	15000 Mu. V. Signal	3	70	-	-	8	0	5	-15	*Depends on setting of Vert. hold control
			No Signal	3	68	-	-	8	0	5	-14	Voltages shown are synced pix adjustment
V114	6K6GT	Vertical Output	15000 Mu. V. Signal	3	265	4	270	8	30	5	-5	
			No Signal	3	253	4	260	8	28	5	5	
V115	6SN7GT	Horizontal Osc. Control	15000 Mu. V. Signal	2	165	-		3	+1.5	1	-21	
			No Signal	2	160	_	-	3	_10	1	-24	
V115	6SN7GT	Horizontal Oscillator	15000 Mu. V. Signal	5	185	_	_	6	0	4	-80	
			No Signal	5	170	_	-	6	0	4	-88	
V116	6BQ6GT	Horizontal Output	15000 Mu. V. Signal	Cap	*	4	180	8	21.2	5	-13	*High Voltage Pulse Present
			No Signal	Cap	*	4	170	8	21.0	5	-13	*High Voltage Pulse Present
V117	1B3GT /8016	H. V. Rectifier	15000 Mu. V. Signal	Сар	*	_		2&7	14,000	_	_	*High Voltage Pulse Present
			No Signal	Сар	*	_	_	2&7	13,600	-	_	*High Voltage Pulse Present
V118	6W4GT	Damper	15000 Mu. V. Signal	5	270	_	_	3	*	_	_	*High Voltage Pulse Present
			No Signal	5	260	·	_	3	*	-	-	*High Voltage Pulse Present
V119	21AP4	Kinescope	15000 Mu. V. Signal	Cap	14,000	10	400	11	170	2	120	At average Brightness
			No Signal	Сар	13,600	10	385	11	150	2	115	At average Brightness
V120 V121	5U4G 5Y3GT	Rectifiers	15000 Mu. V. Signal	4&6	_	_	_	2 & 8	285		_	
			No Signal	4&6		_	_	2&8	275	_	_	



Figure 17-R-F Unit Wiring Diagram

CRITICAL LEAD DRESS:

- 1. Keep all wiring in the pix i-f, sound i-f and video circuits as short as possible.
- 2. Keep the leads on Cl18, Cl20, Cl22, Cl24, Cl26, Rl14, R121 and R123 as short and direct as possible.
- 3. Do not run any leads under C115 trimmer capacitor.
- 4. Dress Cl18 vertically parallel to terminals A and B of T104. Dress C135 parallel to terminals A and B of T104 close to the chassis.
- 5. Keep C127 away from chassis with no more than $\frac{1}{4}$ inch leads at each end.
- 6. Dress the lead from T105(C) to the terminal board, close to the chassis.
- 7. Keep all filament leads dressed close to the chassis.
- 8. Ground filaments of V106, V107 and V108 independently of tube shields (pin 8). Use ground lances provided near pins of each socket.
- 9. Dress lead from pin 5 of V110 to J102-2 close to the chassis.

10. Keep leads to L103 as short as possible.

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- 11. Dress C130, C132, L102, L104, L105, L114, R131, R133, R135 and R139 away from the chassis.
- 12. Do not tape kinescope cathode lead in with other kinescope leads.
- 13. Do not change the bus wire connections to pin 2 of V101 and V102. Sleeving is used to insure length and to prevent shorting.
- 14. Keep leads on C136 short and direct. Dress the lead from C136 to pin 5 of V111 as shown in wiring diagram.
- 15. Do not dress C170 in such a position that adjustment of T110 is inaccessible.
- 16. Keep the leads on R201 as short and direct as possible.
- 17. Dress the lead from pin 3 of V113 to C153 as shown in the wiring diagram.
- 18. Mount C183 directly on the terminal board provided keeping it as far away from T109 as possible.
- 19. Dress all leads in the high voltage compartment away from each other and away from the high voltage transformer.

CHASSIS WIRING DIAGRAM, KCS72D-2



TELEVISION CIRCUIT SCHEMATIC DIAGRAM

I-F AMPL.

TIDE SRD. PIX

C125A \$R125

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V 109 B 12 AU 7 VERT. SYNC. SEPARATOR

+ 260 V.

C1258

R164

R165

R2IB 27K



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REFER TO PAGES 236 TO 249 FOR TELE-VISION ALIGNMENT PROCEDURE AND WAVE FORM PHOTOGRAPHS

All resistance values in ohms. K = 1000.

R195

All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted.

Direction of arrows at controls indicates clockwise rotation.



All voltages measured with "VoltOhmyst" and with no signal input. Voltages should hold within $\pm 20\%$ with 117 v. a-c supply.

Figure 20-Television Circuit Schematic Diagram

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REPLACEMENT PARTS

	STOCK No.	DESCRIPTION		STOCK No.	DESCRIPTION
		R-F UNIT ASSEMBLIES		75447	Stud—Capacitor stud—brass—#4-40 x 3/16" with 3/64"
	75188 76845	Board—Terminal board, 5 contact and ground Bracket—Vertical bracket for holding oscillator tube		75173 75181	tor Cl coded numerically and "Hi-O" Stud-#6-32 x 13/16" adjusting stud for trimmer C7 Transformer-LE converter transformer (T1)
Ì	75201	Cable—75 ohm coax cable (7¼") complete with coil (W1 L50)		75607 75190	Washer—Insulating washer (hex) Washer—Insulating washer (neoprene) for trimmer C7
	76965	Capacitor—Ceramic, variable, for fine tuning—plunger type (C25)			CHASSIS ASSEMBLIES
	75172	Capacitor—Tubular, steatite, adjustable, 0.65—1.2 mmf. (C7)			KCS72D1—Model 21T242 KCS72D2—Model 21T244
	71088 75184	Capacitor—Geramic, 0.05 mmf. (C27) Capacitor—Geramic, adjustable, 0.75—4 mmf., complete with adjusting stud (C1)		76456 76454	Bracket—Channel indicator lamp bracket Bracket—Mounting bracket complete with insulator for
	76968 75197	Capacitor—Ceramic, 5 mmf. (C4)		33098	Capacitor-Ceramic, 10 mmf. (C127)
	75189	Capacitor-Adjustable, 7-30 mmf. (C22)		15211	Cle1B)
	45465	Capacitor—Ceramic, 15 mmf. (C3)		75450	Capacitor—Ceramic, 12 mmf. (C162) Capacitor—Ceramic, 39 mmf. (C203)
	75196	Capacitor-Ceramic, 39 mmf. (C5)		73664	Capacitor-Ceramic, 39 mmf. (C131)
	75199	Capacitor—Ceramic, trimmer—50-75 mmr. (C11) Capacitor—Ceramic, 270 mmf. (C12, C13, C20)		76475 76474	Capacitor-Mica, 68 mmf. (C164)
	75641	Capacitor-Ceramic, 390 mmf. (C10)	П	75437	Capacitor—Ceramic, 100 mmf. (C202)
	75166	Capacitor—Ceramic, 1500 mmf. (C6, C14, C15, C19)	Ш	39630	Capacitor-Mica, 120 mmf. (C130)
1	75089	Capacitor—Ceramic, 1500 mmr. (C18, C26) Capacitor—Ceramic, dual 1500 mmf. (C17A, C17B)	11	75248	Capacitor—Mica, 220 mmf. (C146)
1	73473	Capacitor-Ceramic, 5000 mmf. (C21)	11	47617	Capacitor—Ceramic, 220 mmf. (C136)
· [76143	Clip—Tubular clip for mounting stand-off capacitors	11	76579	Capacitor-Mica, 270 mmf. (C140, C178)
	75202	Coil—Choke coil (L51) Coil—Choke coil 56 mub (L46)	11	76476	Capacitor—Mica, 330 mmf. (C169, C175)
	75185	Coil—Converter plate loading coil (L44)		73094	Capacitor—Mica, 390 mmf. (C143)
	75182	Coil-Trimmer coil (11/2 turns) with adjustable induc-		39644	Capacitor-Mica, 470 mmf. (C107, C121)
		converter section (C9, L47)		76461	Capacitor—Ceramic, 500 mmf., 20,000 volts (C179)
	75183	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L48 C16)		76990	C124, C186, C189) Capacitor—Ceramic, dual 4700 mmf. (C117A, C117B)
	76460	Contact—Test point contact		76991	Ciliga, Ciliga
	76966	Core—Adjustable core for fine tuning capacitor		73960	Capacitor—Ceramic, 10,000 mmf. (C104, C187)
	73453	Form—Coil form for 1.45 1.49		74521	Capacitor-Electrolytic, 5 mfd., 50 volts (C109)
	75165	Link—Link assembly for fine tuning		75218	Capacitor—Adjustable, mica, 5-70 mmf. (C115) Capacitor—Electrolytic, comprising 1 section of 10 mfd
	76518	Plate—Front plate and shaft bearing			350 volts, 1 section of 5 mfd., 350 volts and 1 section of
	503027 503068	27 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R8) 68 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R13)		76987	Capacitor—Electrolytic comprising 1 section of 80 mfd., 400 volts and 1 section of 10 mfd., 350 volts (C182A,
	503115	$150 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R10)$		76970	C182B) Canagitar-Floatrolutia comprising Lastian of 100 mfd
	503239	$3900 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R9, R11)$		10510	400 volts and 1 section of 10 mfd., 350 volts and 1 section
	503247	4700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R12)		70470	of 20 mfd., 50 volts (C184A, C184B, C184C)
	502310	$10,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R3)}$		16419	.00068 mfd., 600 volts (C171)
	503322	22,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R7)		75643	Capacitor-Tubular, paper, oil impregnated, .001 mfd.,
	503410	100,000 ohms, ± 10%, ½ watt (R1, R4, R5)		76995	Capacitor—Tubular moulded paper oil impregnated
	75164	Retainer—Fine tuning shaft retaining ring Rod—Actuating plunger rod (fibre) for fine tuning link		76508	.0012 mfd., 600 volts (C172) Canacitor—Tubular paper oil impregnated .0015 mfd
	71476	Screw - #4-40 x 1/4" adjusting screw for L6, L7, L8, L9, L10, L11		77123	600 volts (C138) Capacitor—Tubular, moulded paper, oil impregnated.
	75176	Screw #4.40 x 7/16" adjusting screw for L5 Screw #4.40 x 7/16" adjusting screw for L5		73595	.0015 mfd., 1000 volts (C155) Capacitor—Tubular, paper, oil impregnated, .0022 mfd.,
	74575	Screw — #4-40 x 1/10 adjusting screw for L52 Screw — #4-40 x .359" adjusting screw for L42		73599	600 volts (C108, C154) Capacitor—Tubular, paper, oil impregnated, .0027 mfd.,
	76134	Shaft—Fine tuning shaft and cam		73818	Capacitor—Tubular, paper, oil impregnated, .0027 mfd.,
	76967	type Shield—Tube shield for V1, V2		73795	Capacitor—Tubular, paper, oil impregnated, .0033 mfd., 600 volts (C137, C139)
	75088	Socket—Tube socket, 7 contact, miniature, ceramic, saddle-mounted		73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C110, C151)
	75191 75163	Spacer—Insulating spacer for front plate Spring—Friction spring (formed) for fine tuning cam		73808	Capacitor—Tubular, paper, oil impregnated, .0082 mfd., 1000 volts (C147)
	30340	Spring—Hair pin spring for fine tuning link		73561	Capacitor-Tubular, paper, oil impregnated, .01 mfd.,
	76961	Spring—Retaining spring for oscillator tube shield		73594	Capacitor—Tubular, moulded paper, oil impregnated.
	73457 75180	Spring—Return spring for fine tuning control Stator—Antenna stator complete with rotor, coils, capaci-		74938	.01 mfd., 600 volts (C170) Capacitor—Tubular, paper, oil impregnated, .012 mfd.,
		tors (C20, C21) and resistors (R9, R10, R11) (S1-4, C20, C21, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41,		73797	200 volts (C188) Capacitor—Tubular, paper, oil impregnated, .015 mfd.,
	77459	Stator—Converter stator complete with rotor, coils, ca-		73562	600 volts (Cl29) Capacitor—Tubular, paper, oil impregnated, .022 mfd.,
		C10, C12, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L45, P4, P5, P12)		73798	400 volts (C167) Capacitor—Tubular, paper, oil impregnated, .022 mfd.,
	76963	Stator-Oscillator section stator complete with rotor, seg- ment, coils, adjusting screws and canaditors (C3, C23)		73810	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 1000 volts (C172)
		(S1-1, C3, C23, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L43)		73811	Capacitor—Tubular, paper, oil impregnated, .027 mfd., 1000 volts (C176)
	76964	Stator—R-F amplifier stator complete with rotor, coils, capacitor (Cl3) and resistor (R6) (S1-3, Cl3, L22, L23, L24 L25 L25 L27		73596	Capacitor—Tubular, paper, oil impregnated, .033 mfd., 1000 volts (C152)
	75170	Strip—Coil segment mounting strip—L.H. lower		73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C145, C166)
	75171	Strip—Coil segment mounting strip—L.H. upper—less trimmer C7		75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts
	75169	Strip—Coil segment mounting strip—R.H. center Stud—Canacitor stud—brace #4.40 = 2/16/		73792	Cipacitor-Tubular, paper, oil impregnated, .068 mfd.,
	-0110	screw driver slot for trimmer coils L47, L48 and capaci- tor Cl uncoded and coded "ER"		73784	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 200 volts (C132, C133)
L	1				

21T242, 21T244

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REPLACEMENT PARTS (Continued)

STOCK		STOCK		
No.	DESCRIPTION	No.	DESCRIPTION	
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C144, C150, C158, C165, C183)	503356 512356	56,000 ohms, ±10%, ½ watt (R146, R185, R204) 56,000 ohms, ±5%, 1 watt (R178)	
73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C153, C173)	503368 513368	68,000 ohms, ±10%, ½ watt (R219) 68,000 ohms, ±10%, 1 watt (R192)	
73786	Capacitor—Tubular, paper, oil impregnated, 0.27 mfd., 200 volts (Cl74)	513382 503410	82,000 ohms, ±10%, 1 watt (R191) 100,000 ohms, ±10%, ½ watt (R183, R213)	
76994	Capacitor—Tubular, paper, oil impregnated, 0.33 mtd., 200 volts (Cl35)	513410 30180	100,000 ohms, ±10%, 1 watt (R175) 120,000 ohms, ±5%, ½ watt (R143)	
70400	Capacitor—Tubular, paper, oil impregnated, 0.47 mtd., 200 volts (C168)	503415 512415	150,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R139, R174, R187) 150,000 ohms, $\pm 5\%$, 1 watt (R195)	
76498	Choke—Filter choke (L113) Coil—Antenna matching coil (2 reg'd) (Part of T200)	502418	180,000 ohms, ±5%, ½ watt (R141) 270,000 ohms, ±5%, ½ watt (R141)	
76442	Coil—Antenna shunt coil (L202) Coil—Horizontal linearity coil complete with adjustable	503427	270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R157) 270,000 hms, $\pm 10\%$, $\frac{1}{2}$ watt (R157)	
76640	Coil—Peaking coil (1.5 muh) (L107)	512433	$330,000 \text{ ohms}, \pm 5\%, 1 \text{ watt (R111, R100)}$	
71527	Coil—Peaking coil (36 muh) (L101) Coil—Peaking coil (93 muh) (L104)	503439 503447	$390,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R168)}$ $470,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R112, R147, R150, R200)}$	
75252	Coil—Peaking coil (250 muh) (L114) Coil—Peaking coil (500 muh) (L102)	503456 503468	560,000 ohms, ±10%, ½ watt (R148, R171) 680,000 ohms, ±10%, ½ watt (R154, R161)	
76441	Coil—Vidth coil complete with adjustable core (L106)	503482 503510	820,000 ohms, ±10%, ½ watt (R189, R199) 1 megohm, ±10%, ½ watt (R155)	
38853	Connector 4 contact female connector for power cord transformer (J200)	502511 503512	1.1 megohm, ±5%, ½ watt (R136) 1.2 megohm, +10%, ½ watt (R180)	
50367	Connector—6 contact female connector for yoke lead	503515 11769	1.5 megohm. $\pm 10\%$, $\frac{1}{2}$ Watt (R172) 1.8 megohm. $\pm 5\%$, $\frac{1}{2}$ watt (R140)	
75542	Connector—6 contact male connector—part of deflection	39063	1.8 megohm, ±5%, 1 watt (R197) 2.2 megohm, ±10%, 16 watt (R197)	
77008	Connector—Anode connector complete with terminal and contact	503610	10 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R110) 10 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R110)	-
35787 76457	Connector—Phono input connector (J101) Connector—Second anode lead connector—mounted on	71450	Screw — #0-32 x 1/10 wing screw for mounting deflection yoke	
75474	the hi-voltage capacitor Connector—Single contact male connector for sneaker	70487	ness controls	
75482	cable Connector—Video connector (J102)	76972	Shield-Tube shield for VI01, VI02, VI03, VI08 Shield-Tube shield for VI09	
76975 76444	Control—AGC control (R149) Control—Brightness control (R184)	75718	Socket—Channel indicator lamp socket and leads Socket—Kinescope socket	
76448 76974	Control—Height control (R173) Control—Horizontal and vertical hold control (R170A.	31251	Socket-Tube socket, octal, water for V105, V112, V113, V116, V120, V121	
76445	R170B) Control—Picture control (R137)	71508 50367	Socket—Tube socket, 6 pin, moulded for VI17 Socket—Tube socket, 6 pin, moulded, saddle-mounted	
76976 77010	Control—Vertical linearity control (R181) Control—Volume control and power switch (R109, S102)	73117	for V118 Socket—Tube socket, 7 pin, wafer miniature for V101,	
71498 76986	Core—Adjustable core and stud for FM trap 75449 Cover—Back cover for hi-voltage compartment	50367	Socket—Tube socket, 8 pin, moulded, saddle-mounted	
76985 74956	Cover—Side cover for hi-voltage compartment Cushion—Rubber cushion for deflection yoke hood	72627	for V114 Socket—Tube socket, 8 pin, steatite saddle-mounted for	
74839 73600	Fastener—Push fastener for mounting tube socket 76453 Fuse—0.25 amp., 250 volts (F101)	76971	V115 Socket—Tube socket, 9 pin, wafer miniature for V109	
76459 37396	Grommet—Rubber grommet for 2nd. anode lead exit Grommet—Rubber grommet for mounting tube socket	76453	Socket—Tube socket, octal, moulded, saddle mounted for V110	
76654	76453 Hood—Deflection yoke hood less rubber cushions	76636	Stud—Adjusting stud complete with guard for focus magnet	-
76168	Lead—Anode lead complete with eyelet Magnet—Focus magnet	70402	control and power switch (S101)	
76464	Plate—Hi-voltage plate (bakelite) assembly complete	76977	Transformer—Antenna matching transformer complete	
76796	Resistor-Wire wound, 5.1 ohms, 1/3 watt (R205)	70705	(1200, C200, C201, C202, C203, H200, H201, H202, H203, J200)	
76988	Resistor—Wire wound, 180 ohms, 2 watts (R202) Resistor—Wire wound, 820 ohms, 1 watt (R113)	76440	Transformer—Hi-voltage transformer (1111) Transformer—Horizontal oscillator transformer com-	
76989	Resistor—Wire wound, 2500 ohms, 10 watts (R115) Resistor—Wire wound, 4650 ohms, 7 watts (R116)	76997	Transformer-Output transformer (T103)	
503033	Resistor—Fixed, composition:— 33 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R130)	76984	Transformer—Power transformer, 115 volts, 60 cycle (T109)	
502039	47 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R122) 47 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R119)	77112	Transformer—Ratio detector transformer (T102, C105) Transformer—Sound i-f transformer complete with	
503082	$47 \text{ orms}, \pm 10\%, \frac{1}{2} \text{ watt} (R105, R201)$ 82 ohms, $\pm 10\%, \frac{1}{2} \text{ watt} (R101)$	76978	adjustable core (T101, C102, C103, R103) Transformer—Vertical output transformer (T108)	
503139	100 orms, $\pm 5\%$, $\frac{1}{2}$ watt (R123) 390 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R182)	76979	Transformer—First pix i-f transformer complete with adjustable cores (T104, C116, R117)	
513156	$\frac{1}{100}$ ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R107) 560 ohms, $\pm 10\%$, 1 watt (R207)	76980	Transformer—Second, third or fourth pix i-f trans- former complete with adjustable core (T105, T106, T107)	
503222	2200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R104, R212) 2200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R104, R212)	75449	Trap—FM complete with adjustable core and stud (L203, C203)	
523233	$3300 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R211)$ 3300 ohms, $\pm 10\%, 2 \text{ watts} (R131)$	75242 76983	Trap-IF. trap (L200, L201, C200, C201) Trap-4.5 MC trap (L103, C128)	
502239	3900 ohms, ±5%, ½ watt (R129, R164) 3900 ohms, ±10%, ½ watt (R194)	76616	Yoke—Deflection yoke complete with 6 contact male connector (L109, L110, L111, L112, C181, P103, R208,	
503256 523268	5600 ohms, ±10%, ½ watt (R138) 6800 ohms, ±10%, 2 watts (R203)		R209, R210) RADIO CHASSIS ASSEMBLIES	
503282 513282	8200 ohms, ±10%, ½ watt (R176, R179) 8200 ohms, ±10%, 1 watt (R165)	1 .	RC-1117B	
502310 503310	10,000 ohms, ±5%, ½ watt (R107, R108, R123) 10,000 ohms, ±10%, ½ watt (R152)	76876	(For Model 21T242) Antenna—Antenna loop complete	
502312 503312	12,000 ohms. ± 5%, ½ watt (R121) 12,000 ohms. ± 10%, ½ watt (R145)	76867	Capacitor-Variable tuning capacitor complete with drive drum (CIA, CIB)	
503315 523315	15,000 ohms, ±10%, ½ watt (R153) 15,000 ohms, ±10%, 2 watts (R135)	76872 77116	Capacitor—Adjustable, trimmer, 2.5—30 mmf. (C5) Capacitor—Ceramic, 56 mmf. (C4)	
503318 523318	18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R128, R158, R166, R196) 18,000 ohms, $\pm 10\%$, 2 watts (R133)	76347 73013	Capacitor—Ceramic, 120 mmf. (C13) Capacitor—Electrolytic comprising 1 section of 80 mfd.,	
503322 513322	22,000 ohms, ±10%, ½ watt (R167, R217) 22,000 ohms, 10%, 1 watt (R193)		150 volts, 1 section of 30 mfd., 150 volts and 1 section of 10 mfd., 150 volts (C17A, C17B, C17C)	
503327 513327	27,000 ohms, ±10%, ½ watt (R215) 27,000 ohms, ±10%, 1 watt (R218)	73851	Capacitor-Tubular, paper, .0018 mfd., 1600 volts (C7, C8, C21)	
513333	33,000 ohms, ±10%, 1 watt (R214) 39,000 ohms, ±10%, ¹ 4 watt (R106, R142)	73795 73796	Capacitor—Tubular, paper, .0033 mfd., 400 volts (Cl2) Capacitor—Tubular, paper, .0039 mfd., 600 volts (Cl4,	
503347	$47,000 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R144, R160)$ $47,000 \text{ ohms}, \pm 5\%, \frac{1}{2} \text{ watt} (R144, R160)$	73920	C19, C20) Capacitor-Tubular, paper, .0047 mfd., 600 volts (C10)	
513347	47,000 ohms, $\pm 10\%$, 1 watt (R132)	73561 73562	Capacitor—Tubular, paper, .0. mtd., 400 volts (C16) Capacitor—Tubular, paper, .022 mfd., 400 volts (C11, C15)	

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REPLACEMENT PARTS (Continued)

DESCRIPTION

Capacitor—Tubular, moulded paper, 047 mfd., 400 volts (CI8)

Connector—Single contact male connector for loop lead Connector—Single contact male connector for speaker

Connector-2 contact female connector for motor cable

(J1) Control—Volume control (R11) Cord—Drive cord (approx. 53" overall) Cord—Power cord and plug Grommet—Power cord strain relief (1 set) Grommet—Rubber grommet to mount variable tuning

capacitor (3 reg'd) Lamp-Dial lamp-Mazda 51 Plate-Dakelite mounting plate for electrolytic Plate-Dial back plate complete with four (4) pulleys

Plate-Dial back plate complete with four (1) puncys less dial Pointer-Station selector pointer Rectifier-Selenium rectifier (SR1) Resistor-Nominal value, 95 ohms, @ 38° C with negative temperature coefficient (R23) Resistor-Wire wound, 66 ohms, 5 watts (R22)

Resistor-Wire wound, 66 ohms, 5 watts (R22) Resistor-Fixed, composition:-82 ohms, ± 10%, ½ watt (R19) 270 ohms, ± 10%, ½ watt (R2) 1800 ohms, ± 10%, ½ watt (R2) 1800 ohms, ± 10%, ½ watt (R2) 12,000 ohms, ± 10%, ½ watt (R17) 27,000 ohms, ± 10%, ½ watt (R2) 120,000 ohms, ± 10%, ½ watt (R2) 68,000 ohms, ± 10%, ½ watt (R1) 120,000 ohms, ± 10%, ½ watt (R1) 120,000 ohms, ± 10%, ½ watt (R1) 120,000 ohms, ± 10%, ½ watt (R1) 130,000 ohms, ± 10%, ½ watt (R2) 68,000 ohms, ± 10%, ½ watt (R1) 1000 ohms, ± 10%, ½ watt (R2) 100 ohms, ± 10%, ½ watt (R15) 10 megohm, ± 10%, ½ watt (R12, R15) Shaft-Tuning knob shaft Sheid-Tube socket, 7 pin, miniature moulded, saddle-mounted

Socket-Tube socket, 7 pin, miniature moulded. saddle-mounted Socket-Tube socket, 7 pin, miniature moulded Spring-Drive cord spring Switch-Radio-phono switch less volume control (S1) Switch-Radio-TV'' switch (S3, S4) Transformer-First i-f transformer complete with ad-justable cores (T1) Transformer-Second i-f transformer complete with ad-

Transformer—Second i-f transformer complete with ad-justable cores (T2) Transformer—Output transformer (T3) Washer—''C'' washer for tuning knob shaft

CHASSIS ASSEMBLIES

(For Model 21T244)

Antenna-Radio antenna loop complete less cable Capacitor-Variable tuning capacitor (Cl-1. Cl-2, Cl-3, Cl-4, Cl-5, Cl-6) Capacitor-Ceramic, 5 mmf. (Cl2, C41) Capacitor-Ceramic, 6.8 mmf. (Cl6) Capacitor-Ceramic, 15 mmf. (Cl4) Capacitor-Ceramic, 47 mmf. (Cl9) Capacitor-Ceramic, 68 mmf. (Cl5, Cl7) Capacitor-Ceramic, 68 mmf. (Cl5, Cl7)

Capacitor-Ceramic, 64 mmf. (C10) Capacitor-Ceramic, 68 mmf. (C15, C17) Capacitor-Ceramic, 100 mmf. (C5) Capacitor-Ceramic, 150 mmf. (C13, C28, C31) Capacitor-Ceramic, 220 mmf. (C3) Capacitor-Mica, 330 mmf. (C36, C37) Capacitor-Ceramic, 4700 mmf. (C2, C4, C7, C9, C11, C18, C20, C23, C24, C27, C32, C34, C35, C40) Capacitor-Electrolytic, 2 mfd., 50 volts (C39) Capacitor-Tubular, paper, .0018 mfd., 600 volts (C3) Capacitor-Tubular, paper, .003 mfd., 400 volts (C25) Capacitor-Tubular, paper, .003 mfd., 400 volts (C30) Capacitor-Tubular, paper, .005 mfd., 200 volts (C32) Capacitor-Tubular, paper, .018 mfd., 200 volts (C29) Capacitor-Tubular, paper, .018 mfd., 400 volts (C22) Capacitor-Tubular, paper, .018 mfd., 200 volts (C21) Capacitor-Tubular, paper, .018 mfd., 200 volts (C22) Capacitor-Tubular, paper, .018 mfd., 200 volts (C22) Capacitor-Tubular, paper, .022 mfd., 400 volts (C22) Capacitor-Tubular, paper, .047 mfd., 200 volts (C21) Capacitor-Tubular, paper, .047 mfd., 200 volts (C22) Capacitor-Tubular, paper, .047 mfd., 200 volts (C32) Cail-Antenna coil-FM (L1) Coil-Oscillator coil-AM-complete with adjustable core (L3, L4, L5) Coil-Oscillator coil-FM (L8)

Connector-Single contact female connector for phono

Connector—Single contact female connector for audio cable (J2)

Coil-Oscillator coil-AM -complete with adjustable of (L3, L4, L5)
 Coil-Oscillator coil-FM (L8)
 Coil-R-F coil-AM -complete with adjustable (L6, L7)
 Coil-R-F coil-FM (L2)

RC1111B

Clip—Mounting clip for i-f transformer Coil—Oscillator coil (L2, L3) Coil—Oscillator coil—complete with adjustable core

52131 Connector—2 contact female connector for power input (J3)

36422 Connector-3 contact female connector for phono cable

73553 Capacitor-Tubular, paper, .047 mfd., 400 volts (C2, C3, C6)

STOCK

75543

74879 74882

72953 75564

V4. V5

cord pulley

283

STOCK No.

75071

30868

11765 28452 77376

77378 76871 73072

77379

503082 503127

73037

77122 33726

77332 77308

71942 75569

77314 33742

35787

cable (J3)

cable

(P2)

21**T**242, 21**T**244

DESCRIPTION

284 21T242, 21T244 STOCK Connector -2 contact female connector for phono power Connector -2 contact female connector for phono power cable (PI) Connector -2 contact female connector for antenna leads Connector -2 contact (polarized) male connector for antenna loop cable Connector -9 contact male connector for power input (J1) Control - Tone control -H.F. (R29) Control - Tone control -H.F. (R16) Control - Volume control and power switch (R19, S2) Cord - Drive cord (approx. 57" overall) Coupling - Spring coupling for function switch exten 75682 76093 78564 Coupling—Spring coupling for function switch exten-sion shaft 74839 Fastener—Push fastener to fasten RF shelf (4 reg'd) Grommet—Rubber grommet for mounting RF shelf Put74839Fastener-Push fastener to fasten RF shelf (4 req'd)
Grommet-Rubber grommet for mounting RF she
(4 req'd)11765Lamp-Dial lamp-Mazda #51
72602Pulley-Drive cord pulley
1%" dia.
Resistor-Fixed, composition:-
Resistor-Fixed, composition:-
S030391g50306868 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3)
50311010ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3)
5031121220 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3)
5031391350306868 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3)
5031391450310100 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3)
503139100 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3)
503168100 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3)
5032161000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R35)
5032121200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R35)
5032221200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R35)
5032151300 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R35)
5032221300 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R31)
5032221300 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R35)
50331515000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R37)
50332650333939,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R37)
50335650300 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R22)
50342220,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R1, R1, R5)
503415503427270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R23)
503427503427270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R23)
503427503427270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R4, R24)
503422503427270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R10)
503515<tr 77381 77391 75707 76184 76629 76697 75694 76599 76699 75696 74579 77397 74296 71892 70142 X3222 X3130 75474 74752 77306 Socket-Tube socket, 7 pin, moulded, saddle-mounted 77399 for V2 Socket—Tube socket, 7 contact, miniature wafer for V6 73117 76332 75563 75 77398 30868 74192 77304 Support—Polystyrene support for FM oscillator coil complete with mounting bracket
 77307 Switch—Function switch (SI)
 73743 Transformer—Ratio detector transformer complete with adjustable core (T5)
 75558 Transformer—Ist. i-f transformer—AM—complete with adjustable core (T1)
 76328 Transformer—Statistic transformer—AM—complete with adjustable core (T4) 39153 77461 70392 76698 Washer-"C" washer for tuning knob shaft or drive 76631 76627 71984 77345 77344 77347

77343

77342

77349

74273

77380

77394 77012

75456 74205

77392 1

76622

37396

77402 H 73420 H

71764

74308 H

AMPLIFIER ASSEMBLIES RS141C

(For Model 21T244)

(For Model 21T244) 74296 (Cable—Shielded audio cable complete with pin plug (Includes P102) 77324 (Capacitor—Electrolytic comprising 1 section of 30 mfd., 450 volts, 1 section of 30 mfd., 350 volts and 1 section of 40 mfd., 25 volts (Cl01A, Cl01B, Cl01C) 75643 (Capacitor—Tubular, paper, oil impregnated, .001 mfd., 1000 volts (Cl03, Cl04) 73789 (Capacitor—Tubular, paper, .022 mfd., 400 volts (Cl05) 73562 (Capacitor—Tubular, paper, .022 mfd., 400 volts (Cl02) 75064 (Condector—9 contact female connector for power input cable (Pl01) 70392 (Cord—Power cord and plug 74838 Grommet—Power cord strain relief (1 set) 72776 Pin—Contact pin for speaker lead (2 reg'd) Resistor—Wire wound, 2200 ohms, 5 watts (R101) Resistor—Fixed, composition:— 7 Resistor—Wire wound, 2200 ohms, 5 watts (R101) Resistor—Fixed, composition:— 100 ohms, ±10%, ½ watt (R108) 7 270 ohms, ±5%, 2 watts (R107) 3 3300 ohms, ±5%, ½ watt (R102) 8 68,000 ohms, ±10%, ½ watt (R103) 7 470,000 ohms, ±10%, ½ watt (R103) 7 470,000 ohms, ±10%, ½ watt (R104, R106) 1 Socket—Tube socket, octal, wafer 3 Transformer—Output transformer (T102) 6 Transformer—Power transformer, 117 volts, 60 cycle (T101) 503110 503368 503382 503447 3125

REPLACEMENT PARTS (Continued)

	7	
DESCRIPTION	STOCK	DESCRIPTION
SPEAKER ASSEMBLIES	77346	Hinge-Cabinet door hinge for center door (1 set) for
92569-12W	76596	Knob-Brightness control, vertical hold control or tele-
RMA-274	76595	vision tone control knob—beige (outer) Knob—Brightness control, vertical hold control or tele-
Cone—Cone and voice coil (3.2 ohms) Speaker— $12^{\prime\prime}$ P.M. speaker complete with cone and voice coil (3.2 ohms)	75464	vision tone control knob-maroon (outer) Knob-Picture control, horizontal hold control or tele- vision volume control and power switch knob-beige-
Note:—If stamping on speaker in instruments does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full idescription of	74963	for Models 21T242 and 21T244 and radio-phono volume control knob for Model 21T242 (inner) Knob—Picture control, horizontal hold control or tele- vision volume control and power switch knob—maroon —for Models 21T242 and 21T244 and radio phone
part required.	77384	volume control knob for Model 21T242 (inter) Knob-Radio phono function switch-beige-(outer) for
MISCELLANEOUS	77383	Knob-Radio phono function switch knob-maroon-
Back—Television compartment back cover complete with power cord for Model 21T242	77330	Knob-Radio function switch knob-maroon-for Model
Back—Television chassis compartment back cover com-	77386	Knob-Radio tuning control knob-beige-(outer) for
Board-"A"-"FM" terminal board for Model 21T244	77385	Model 21T242 Knob—Radio tuning control knob—maroon—(outer) for
Board—TV antenna terminal board Bracket—Hanger bracket for deflection voke hood	77328	Model 21T242 Knob—Radio tuning control, tone controls or volume
assembly Bracket—Masking panel support bracket (2 reg'd)		control and power switch knob-maroon-for Model 21T244
Bracket—Record changer rollout mechanism stop bracket less rubber bumper	76594 76593	Knob—Television channel selector knob—beige (inner) Knob—Television channel selector knob—maroon
Support rod	76592	Knob-Television fine tuning control knob-beige (outer)
Bumper—Rubber bumper for kinescope (as req'd) Bumper—Rubber bumper for rollout mechanism stor	76591	nnob—Television fine tuning control knob—maroon (outer)
bracket Bumper-Rubber humper for door for Model 21T244	77382	Knob—Transfer switch or radio tuning control knob— beige—(inner) for Model 21T242
Cable—Interconnecting cable complete with 2 contact	75945	Knob—Transfer switch or radio tuning control knob— maroon—(inner) for Model 21T242
Model 21 T244	77388	Knob-Transfer switch knob-beige-(outer, for Model 21T242
for Model 217244	77387	Knob-Transfer switch knob-maroon-(outer) for Model 21T242
Clamp—Dial clamp for Model 21T242	77389	Knob—Transfer switch knob—maroon—for Model 21T244
Cloth—Grille cloth for blonde instruments Cloth—Grille cloth for mahogany or walnut instruments	76589	Mask-Channel marker escutcheon light mask-beige
Connector—Single contact male connector for television antenna cable (2 reg'd) or for amplifier cable (2 reg'd)	75459	Mask—Channel marker escutcheon light mask—bur- gundy
for Model 21T244	77036	Mask—Polystyrene masking panel Nut—Speed nut for speaker mounting screws
for Model 21T244	77013	Nut-Speed nut to fasten "RCA Victor" emblem
Connector—2 contact female connector (terminal board type) for radio speaker cable for Model 21T244	76601	port rods
Connector—2 contact female connector (terminal board type) for TV speaker cable for Model 21T244	77401	Pan-Record changer mounting pan (metal)-beige-
Connector—2 contact male connector for motor cable Connector—3 contact male connector for pickup cable	77400	Pan-Record changer mounting pan (metal)-plum-
for Model 21T242 Connector—4 contact male connector for television	76421	Pin-Slide mechanism stop pin
antenna cable Cord—Power cord and plugs (male & female) for tele-	77393	Plate—Dial back plate less dial and pointer for Model 21T244
vision chassis back cover	77395	Pointer—Station selector pointer for Model 21T244 Pull—Cabinet door pull for Model 21T242
Model 21T244	77348	Pull-Cabinet door pull for center doors for Model 21T244
bracket	76628	Rod—''L'' shape threaded rod to support deflection yoke
Cusnion—Rubber cushion for dust sealing the kinescope Cushion—Rubber cushion for safety glass	76632	nooa assembly Screw—#8 x 5%" hex head wood screw for hanger bracket
Decal—''RCA Victor'' decal Decal—Radio control panel function decal for blonde in-	75623	or masking panel support bracket Screw—#8-32 x ½" trimit head screw for door pull 77348
struments for Model 21T242 Decal—Radio control panel function decal for mahagany	74113	for Model 21T244 Screw—#8-32 x 1" trimit head screw for door pulls 73909
or walnut instruments for Model 21T242 Decal—Radio control panel function decal for Model	77403	and 77341 Slide—Mounting pan slide mechanism
21T244	73643	Spring—Channel marker escutcheon spring clip
instruments for Model 21T242	77006	Spring-Retaining spring for deflection yoke hood sup-
Pecal—Television control panel function decal for mahogany or walnut instruments for Model 21T242	76422	port rod Spring—Retaining spring for slide mechanism stop pin
Decal—Television control panel function decal for Model 21T244	30330 76837	Spring—Retaining spring for knobs 74963 and 75464 Spring—Retaining spring for knobs 75945, 76593, 76594.
Decal—''Victrola'' decal Dial—Glass dial scale for Model 21T242		76595, 76596, 77382, 77383, 77384, 77385, 77386, 77387, 77388 and 77389
Dial—Glass dial scale for Model 21 T244 mblem—"RCA Victor" emblem	72845 74734	Spring—Retaining spring for knobs 76591 and 76592 Spring—Spring clip for knobs 77328 and 77330 for Model 217244
scutcheon—Channel marker escutcheon scutcheon—Dial escutcheon less dial for Model 217242	72936	Stop-Door stop
scutcheon—Dial scale escutcheon less dial for Model	76600	Strap—Grounding strap (.005 x ½" x 7" soft copper strip) Switch—Transfer switch for Model 21T244
alass—Safety Glass	77023	Washer-Cellulose washer-gold-for knobs (1 ¹⁴ " O. D.)
rommet—Power cord strain relief (1 set) rommet—Rubber grommet for speaker mounting	75450	fer switch knob for Model 21 T244
(3 req'd) andle—Pullout handle for mounting pan	15458	wasner—reit wasnerbeige—between knob and channel marker escutcheon
inge-Butt hinge for L.H. door for Model 21T242	75457	Washer—I elt washer—dark brown—between knob and channel marker escutcheon
linge—Cabinet door hinge (1 set) for main doors	75500	Washer—Felt washer for back cover or masking panel mounting screws

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



RCAVICTOR

UHF SELECTOR MODELS U1A, U1B

Chassis Nos. KRK 19, KRK 19A

- Mfr. No. 274 ---SERVICE DATA

---- 1952 No. T6 ----

PREPARED BY RCA SERVICE CO., INC. FOR RADIO CORPORATION OF AMERICA RCA VICTOR DIVISION CAMDEN, N. J., U. S. A.

GENERAL DESCRIPTION

UHF Selectors Models UIA and UIB permit the reception of any one UHF television station within receiving range when employed with a VHF television receiver.

The unit employs one tube and a crystal rectifier. Filament

ELECTRICAL SPECIFICATIONS

TELEVISION R-F FREQUENCY RANGE

POWER SUPPLY RATING

Filament

UHF Selector UIA is provided with a 52 inch power cable

with a 7 pin miniature adapter socket for use with television receivers which employ a 6AQ5 audio output stage.

UHF Selector U1B is provided with a similar power cable except that it employs an octal adapter socket for use with television receivers which use a 6K6GT or 6V6 audio output tube.

Table No. 2 on pages 3 and 4 lists all RCA Victor television receivers to date and the UHF Selector to be employed. Consult the table and select the proper selector for the receiver.

Mount the UHF Selector on the back cover of the cabinet with the adjustment screw holes facing up. Be sure to locate the selector so that the selector switch may be reached conveniently from the top or side of the cabinet and so that the cables may be easily attached.

Mount the selector VHF terminal board on the back of the cabinet.

To install the UHF Selector power cable, remove the television receiver audio output tube and plug the adapter socket into the receiver audio tube socket. In all television-radio combinations, except models 21T242 and 21T244 plug the adapter into the radio's audio output tube socket. Insert the audio output tube into the adapter socket. Ground the black lead with the spade terminal under the most convenient screw on the chassis. Dress the power cable out the back of the cabinet in the most convenient and orderly manner. With the and of the power cable hanging out the back of the cabinet, fasten the receiver back cover in place making sure that the cable is not pinched under at any point. Connect the power cable to the selector.

Connect the UHF antenna to the UHF Selector UHF antenna terminals.

Connect the VHF antenna to the Selector's VHF antenna terminals.

Connect the UHF Selector output leads to the television receiver antenna terminals.

and plate power is obtained from the receiver to which it is attached. The two models are identical except for power cables. The UHF Selector units may be mounted on the back of the receiver cabinet or other convenient location, as long as the selector switch is accessible.

ANTENNA INPUT IMPEDANCE

72 ohms unbalanced.

TUBE COMPLEMENT	
Tube Used	Function
RCA 6AF4	Oscillator
CK 710	stal Mixer

INSTALLATION INSTRUCTIONS

The UHF Selector is wired with a jumper across R6 as shown in the schematic diagram for receivers which provide 270 volts at the adapter socket. If the receiver provides 370 volts at the adapter socket, the jumper across R6 should be removed. See Table 2 for recommendations for RCA Victor receivers.

USE ON OTHER MAKES OF RECEIVERS

The UIA and UIB UHF Selectors will provide satisfactory UHF reception on other makes of receivers provided that the proper voltages for operation of the selector can be obtained from the receiver.

The UIA and UIB UHF Selectors were designed for use on receivers in which the tube filaments are fed in parallel from a 6.3 volt transformer winding. Since the black lead of the selector power cable is connected to the selector chassis, the Ul series selectors should not be employed with any receiver in which a direct connection exists between the a-c power line and the receiver d-c power supply.

The plate voltage available from the receiver may not be optimum for operation of the selector as wired. It is very important that between 60 and 90 volts should be present at the junction of R2 and R6 in order to obtain optimum crystal current. The voltage at the junction of R2 and R6 should be measured with a "VoltOhmyst" and with the UHF Selector shield in place. To obtain proper voltage at R2 and R6, shunt R4, R5 and R6 as necessary with resistors of adequate wattage to obtain the desired voltage.

The television receiver operating voltages should not be materially altered by the installation of the UHF Selector.

In some makes of receivers it may be necessary to rewire the adapter socket and cable to suit the particular type of audio output tube. In some instances where filament wiring difficulties are encountered, it may be necessary to remove the adapter socket and wire the power cable into the television receiver.

ADJUSTMENT INSTRUCTIONS

The 6AF4 oscillator coil is provided with shorting Jumper "B" which is connected in place in a new UHF Selector unit. With this strap in place, the selector will tune from channel 45 through 83.

If the channel to be received is below channel 45, Jumper "B" must be clipped out and removed. The selector will then tune from channel 14 through 44.

Turn the receiver on and to channel 5 or 6, whichever is vacant in the operating area. Switch the UHF Selector switch to the UHF operating position. Set the television receiver fine tuning control to the middle of its range and the volume control clockwise until background noise is heard.

Adjust the UHF Selector Primary, Secondary and Oscillator adjustments to the approximate locations as indicated in Table 1.

Adjust the selector oscillator trimmer C13 until sound from the desired UHF station is heard. This adjustment must be made very slowly for it is easy to pass by the proper adjustment point without hearing the sound, particularly if the signal is weak.

Once the sound is obtained, adjust the primary trimmer C1 for the best sound and picture. Next, adjust the secondary trimmer C3 for best sound and picture.

Readjust the UHF Selector oscillator trimmer so that the best sound and picture occur when the television receiver fine tuning control is in the middle of its range. Repeak C1 and C3 for best sound and picture.

Note: In adjusting the UHF Selector oscillator, it may be possible to obtain sound in two positions of the oscillator trimmer. However, for proper reception of both sound and picture, the oscillator should be lower in frequency than the station picture carrier. Therefore, if sound is heard in two positions of the trimmer, the most clockwise position is the correct one.

The input circuits to the UHF Selector 'tune very sharply particularly the primary. If the UHF signal is very weak, the primary and secondary trimmers C1 and C3 must be in approximately the correct adjustment in order to be able to hear the sound upon adjusting the oscillator trimmer C13. If it is not possible to hear the sound by the method described above, preset the primary and secondary trimmers one-quarter turn in the same direction from their previous position and search for the sound by adjustment of oscillator trimmer C13. Repeat this procedure until the sound is obtained. If the above enthod should not work, try connecting one side of the transmission line to the crystal at L2 and the other side to the chassis.

Under some conditions interfering beats may be obtained between the UHF Selector oscillator and harmonics of the television receiver oscillator which show up as lines in the picture. In some cases these may be eliminated by adjusting the receiver fine tuning for elimination of the beat, then retuning the selector oscillator core for best sound and picture. As an alternate method switch the television receiver to **any** vacant channel between 2 and 6 and retune the UHF Selector oscillator trimmer C13 to obtain sound and picture.

Under some conditions, adjacent channel interference may be experienced if the VHF station is strong and the UHF signal is weak. In such cases, it may be desirable to provide a shielded cable between the UHF Selector unit and the television receiver r-f unit.

As a test for drift, turn the receiver off for five minutes then turn it on again. Within approximately one minute it should be possible to receive the UHF station by adjustment of the receiver fine tuning control and without the necessity of readjusting the UHF Selector oscillator.

When it is desired to receive a VHF station on the television receiver, switch the UHF selector switch to the VHF position and operate the receiver normally.

TABLE 1-ADJUSTMENTS V	ERSUS CHA	NNEL N	UMBER
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CHANNEL	PRIMARY & SECONDARY	OSCILLATOR
14	6.5 turns CW	l turn CW
15-16	5.5 turns CW	1 turn CCW
17-19	5.0 turns CW	2 turns CCW
20-23	4.5 turns CW	3 turns CCW
24-27	3.5 turns CW	4 turns CCW
28-32	2.5 turns CW	5 turns CCW
33-37	2.0 turns CW	6 turns CCW
38-41	1.5 turns CW	7 turns CCW
42-44	1.0 turn CW	8 turns CCW
45-46	.5 turn CW	1 turn CW
47-50	.5 turn CCW	1 turn CCW
51-54	1.0 turn CCW	2 turns CCW
55-60	1.5 turns CCW	3 turns CCW
61-67	2.0 turns CCW	4 turns CCW
68-75	2.5 turns CCW	5 turns CCW
76-82	3.0 turns CCW	6 turns CCW
83	3.5 turns CCW	7 turns CCW







UIA, UIB

REPLACEMENT PARTS UIA, UIB



BALUN—In some cases it may be possible to employ the VHF antenna for UHF reception by connecting a balun to the selector VHF antenna terminal board and to J1. Check to insure that the permanently connected balun does not impair VHF reception.



TABLE The table below lists all RCA Victor television receivers NO. 2 to date and data regarding the selector to be employed. The voltages in the receiver and hence the voltage at the selector may vary depending on the signal strength, the ac line voltage and the particular chassis involved. In some cases, therefore, it may be necessary to employ slightly different values of resistors across K4 than that specified in the table below. In any event, the voltage at the junction of R2 and R6 should be between 60 and 90 volts as measured with a "VoltOhmyst" with the selector shield in place, with the receiver operating and the desired UHF channel being received.

STOCK No.	DESCRIPTION
77275	Adapter-7 pin miniature tube adapter for IIIA
77276	Adapter-Standard octal tube adapter for UIB
74104	Board—"VHF Antenna" terminal board less cable
77273	Capacitor—Tubular trimmer, 0.5—3 mmf., complete with adjustable core (C13)
77272	Capacitor—Tubular trimmer, 0 5—5.0 mmf., complete with adjustable core (C1, C3)
77277	Capacitor-Ceramic, 3 mmf. (C4)
76557	Capacitor-Ceramic, 22 mmf. (C5)
77278	Capacitor-Ceramic, disc, 47 mmf. (C8, C9)
77084	Capacitor—Ceramic, feed-thru, 1000 mmf. (C10, C11, C12)
77280	Coil-Cathode choke coil (L8, R3)
77279	Coil—Heater choke coil (L3, L6, L7)
77281	Coil—Oscillator coil (L9)
77088	Connector—Single contact, for antenna connection (II)
5040	Connector-4 contact female, for adapter cable (12)
5039	Connector-4 contact male connector for power cable
77271	Printed Circuit—Input printed circuit comprising two inductances and one capacitance (1) 12 (2)
77282	Rectifier-Germanium crystal rectifier (CR1)
	Resistor-Fixed, composition:
503210	1000 ohms, ±10%, ½ watt (R2)
523282	8200 ohms, ±10%, 2 watts (R6)
503310	10,000 ohms, ±10%, ½ watt (R1)
523333	33,000 ohms, ±10%, 2 watts (R4, R5)
75192	Shield—Tube shield for V1
77274	Socket—Tube socket, 7 pin, miniature, steatite sad- dle-mounted for V1
76961	Spring-Retaining spring for tube shield
46760	Switch-"UHF-VHF" switch (S1, S2)

77283 Transformer—I-F transformer (T1)

BECEWER NODELC	AUDIO OUTPUT		USE	IUIDADED	
RECEIVER MODELS	TUBE	VOLTS	SELECTOR	ACROSS R6	ACROSS R4 AND R5
621TS	6K6GT	200	UIB	Leave In	22K, 1 watt
630TS, 630TCS	6K6GT	265	UIB	Leave In	None
641TV	6F6G	270	UIB	Leave In	None
648PTK	6F6G	270	UIB	Leave In	None
648PV	6F6G	270	UIB	Leave In	None
721TS, 721TCS	6K6GT	200	U1B	Leave In	22K, 1 watt
730TV1, 730TV2	6K6GT	245	U1B	Leave In	None
741PCS	6F6G	250	UIB	Leave In	None
8PCS41	6F6G	250	UIB	Leave In	None
8TS30	6K6GT	245	UIB	Leave In	None
8TV41	6F6G	270	U1B	Leave In	None
8T241, 8T243, 8T244	6K6GT	80	UIB	Leave In	Jumper across R4
8T270, 8TC270, 8TC271	6K6GT	152	UIB	Leave In	6.8K, 0.5 watt
8TR29, 8TK29	6K6GT	80	UIB	Leave In	Jumper across R4
8TK320	6V6GT	152	UIB	Leave In	6.8K, 0.5 watt
8TV321, 8TV323	6V6GT	295	U1B	- Leave In	None
9PC41	6F6G	250	UIB	Leave In	None
9T240, 9T240K, 9TC240	6K6GT	80	UIB	Leave In	Jumper across R4
9TC245, 9TS247, 9TC249	6K6GT	80	U1B	Leave In	Jumper across R4
9T246	6K6GT	80	UIB	Leave In	Jumper across R4
9T256	6K6GT	80	U1B	Leave In	Jumper across R4
9T270, 9TC272, 9TC275	6K6GT	152	U1B	Leave In	6.8K, 0.5 watt
9TW309	6V6GT	80	UIB	Leave In	Jumper across R4
9TW333	6V6GT	217	UIB	Leave In	33K. 1 watt

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F

UIA, UIB

TABLE NO. 2-Continued

PECEWER MODELS	AUDI	O OUTPUT				-
RECEIVER MODELS	TUBE	VOLTS	SELECTOR	JUMPER ACROSS R6	JUMPER OR RESISTOR ACROSS R4 AND R5	
9TW390	6V6GT	210	UIB	Leave In	27K. 1 watt	-
T100	6K6GT	80	UIB	Leave In	Jumper across B4	-
T120, T121	6K6GT	80	UIB	Leave In	Jumper across R4	-
TC124, TC125, TC127	6K6GT	80	UIB	Leave In	Jumper across R4	_
TA128	6V6GT	80	UIB	Leave In	lumper across R4	_
TA129	6V6GT	80	UIB	Leave In	Jumper across R4	_
T164, TC165, TC166, TC167, TC168	6K6GT	120	UIB	Leave In	5K 1 wate	_
TA 169	6V6GT	85	UIB	Leave In	lumper geroes P4	_
S1000	6V6GT	210	UIB	Leave In	27K 1 worth	_
2T51, 2T61	6AQ5	268	UIA	Leave In	None	_
2T81	6V6GT	210	UIB	Leave In	None	_
4T101	6AQ5	270	UIA	Leave In	Z/K, I watt	_
4T141	6V6GT	210	UIB	Leave In	None	-
6T72	6K6GT	120	UIB	Leave In	Z/K, I watt	_
6T53, 6T54, 6T64, 6T65	6K6GT	360	IIIB	Clip Out	SK, I watt	4
6T71, 6T74, 6T75, 6T76	6K6GT	360	UIB	Clip Out	None	-
6T84	6V6GT	210	UIB	Legue In	None	-
6T86, 6T87	6V6GT	290	UIB	Leave In	2/K, I watt	-
7T103, 7T103B, 7T104, 7T104B	6K6GT	360	UIB	Clip Out	None	-
7T11B, 7T112, 7T112B, 7T122	6K6GT	360	UIB	Clip Out	None	-
7T122B, 7T123, 7T123B, 7T124	6K6GT	360	UIB	Clip Out	None	-
7T125B	6K6GT	360	UIB	Clip Out	None	
7T132	6AQ5	360	UIA	Logue In	None	
7T143	6V6GT	290	UIB	Leave In	None	-
9T57, 9T77, 9T79	6K6GT	360	UIB	Clip Out	None	
9789	6V6GT	290	UIB	Logue In	None	
9T105, 9T126, 9T128	6K6GT	360	UIB	Clin Out	None	
9T147	6V6GT	290	UIB	Leave In	None	
16T152	6K6GT	360	UIB	Clin Out	None	
17T150, 17T151, 17T163	6AQ5	250			None	
17T153, 17T154, 17T155, 17T160	6AQ5	250	UI A	Leave In	None	
17T162, 17T172, 17T172K, 17T173	6AQ5	250		Leave In	None	
17T173K, 17T174, 17T174K	6AQ5	250	ULA	Leave in	None	
17T200, 17T201, 17T202	6K6GT	250	UIR	Leave in	None	
17T211, 17T220	6K6GT	250	TID	Leave In	None	
17T250DE, 17T261DE	6AQ5	250		Leave in	None	
21T159, 21T159DE, 21T165	6ÃO5	250	UIA	Leave In	None	
21T174DE, 21T176, 21T177	68.05	250	UIA	Clip Out	None	
21T178, 21T178DE, 21T179, 21T179DE	6405	250	UIA	Chp Out	None	
21T197DE	6V6CT	200	TUD	Chp Out	None	
21T208, 21T217, 21T218	6K6GT	250	UIB	Leave In	None	
21T227, 21T228, 21T229	6K6GT	250	UIB	Leave In	None	
21T242 See note below	6K6GT	250	UIB	Leave In	None	
21T244 See note below	6K6CT	250	UIB	Leave In	None	
	ovogi	250	UIB ,	Leave In	None	

NOTE: Model 21T242 and 21T244 receivers have separate audio systems for radio and television operation. It is therefore necessary to plug the power cable adapter into the television audio output tube socket rather than into the radio audio system.





UHF Selectors Models U2, U2A

RCAVICTOR UHF SELECTORS

MODELS U2, U2A

Chassis Nos. KCS 79 or KCS 79A

- Mfr. No. 274 -

SERVICE DATA

— 1952 No. T7 —

PREPARED BY RCA SERVICE CO., INC.

RADIO CORPORATION OF AMERICA

RCA VICTOR DIVISION

CAMDEN, N. J., U. S. A.

GENERAL DESCRIPTION

UHF Selectors Models U2 and U2A permit the reception of any two UHF television stations within receiving range when employed with a VHF television receiver. These units employ two tubes, a crystal rectifier and a selenium power rectifier. The units are housed in small metal cabinets and are operated by a single control knob.

ELECTRICAL SPECIFICATIONS

TELEVISION R-F FREQUENCY RANGE

POWER SUPPLY RATING

WEIGHT AND DIMENSIONS

Net Weight	Shipping Weight	Width Inches	Height Inches 4%	Depth Inches 7¾
5	0 1/2	8%	4 1/16	1 78

ANTENNA INPUT IMPEDANCE

UHF—300 ohms balanced (or 72 ohms unbalanced on U2). VHF—300 ohms balanced.

TUBE COMPLEMENT

Tube Used					Function
CK 710				 	Crystal Mixer
6BO7 (U2), 6BO7A (U2A)					R-F Oscillator
6CB6					I-F Amplifier

INSTALLATION INSTRUCTIONS

Remove the UHF Selector from the shipping carton. Make sure that all tubes are in place and firmly seated in their sockets. Place the selector on top of or near the VHF television receiver in a position which will permit convenient operation.

The UHF Selectors have been designed to operate from either of two or three types of antenna installations. They will operate from the VHF antenna, or from a separate UHF antenna with 300 ohm transmission line (or with the U2, from a separate UHF antenna with 72 ohm co-ax transmission line).

In all cases, the VHF antenna transmission line must be disconnected from the VHF receiver and reconnected to the selector VHF antenna terminals. A short length of 300 ohm line must then be connected between the VHF receiver antenna terminals and the selector terminals marked "Receiver".

If the UHF signals from the VHF antenna are strong and free from reflections, the above connections are all that are required.

Model U2

If a separate UHF antenna with 300 ohm transmission line is employed, connect the line to the terminal board marked "UHF". Then disconnect the 300 ohm line to the UHF terminal board TBI on the inside of the selector. Make sure that the balun is connected to the terminal board marked "UHF" and is also connected to the selector input jack JI.

If a separate UHF antenna with 72 ohm co-ax transmission line is employed, remove the balun from Jl, attach a male co-ax fitting to the UHF antenna transmission line and plug it into the selector co-ax input Il. Dress or tape the co-ax line so that it cannot be pulled out if the customer moves the selector.

See figures 1 2 and 3 for proper connections of the different transmission lines.

Model U2A

If a separate UHF antenna with 300 ohm transmission line is employed, connect the line to the terminal board marked "UHF ANT". Disconnect the 300 ohm jumper to the "UHF ANT" terminal board, at the UHF ANT terminal board TB4.

If desired a separate UHF antenna with 72 ohm co-ax transmission line may be employed. Remove the jumper from TB4 and connect the co-ax transmission line, through a "balun" to the "UHF ANT" terminal board.

See figures 4, 5 and 6 for proper connections of the different transmission lines.

Plug the television receiver power cord into the a-c receptacle on the back of the selector, and plug the selector power cord into the nearest 110 volt a-c outlet. With this connection, if the VHF receiver "on-off" switch is left in the on position, both the receiver and the selector will be controlled by the selector switch.

With the selector switch in the VHF position, the receiver is turned on, the selector is on but in standby condition and the VHF antenna is connected through to the receiver.

With the selector switch in the UHF l position, the selector is operating, the VHF antenna is disconnected from the receiver, the selector output is connected to the receiver and the antenna employed for UHF operation is connected to the selector input. A similar condition exists when the selector switch is in the UHF 2 position.

To receive a UHF station, switch the selector switch to UHF 1 or UHF 2 and the television receiver to channel 5 or 6, whichever is vacant in the receiving area. Tune the VHF receiver fine tuning control to obtain the best sound and picture. U2, U2A

INSTALLATION INSTRUCTIONS

Model U2



Figure 1-Connections for Employing VHF Antenna for UHF Reception



Figure 4-Connections for Employing VHF Antenna for UHF Reception



To adjust the UHF selectors to the particular UHF stations to be received, connect the antenna, selector and VHF receiver as indicated in the installation instructions on page 1.

Tune the VHF receiver to channel 5 or 6 whichever is vacant in the receiving area.

Set the UHF selector switch to UHF 1. Preset the oscillator tank capacitor C15 and the harmonic tank capacitor C19 as indicated in the table.

Temporarily connect the UHF antenna directly to the crystal CRI as follows. Disconnect the balun matching stub from the input jack II (or the 300 chm jumper on Model U2A from the UHF ANT terminal board). Connect a bus wire to the center conductor of the balun connector PI (on U2A to right hand terminal of UHF ANT terminal board TB4). Insert the other end of the bus wire $1\frac{1}{2}$ inches straight into the $\frac{1}{2}$ inch hole directly below J1 (or TB4) on the selector chassis rear apron. Make contact with the center of the black eyelet terminal.

Adjust C15 slightly until sound is heard, then retouch C15 and Cl9 for best sound and picture with minimum inter-ference. The use of an insulated slotted tuning stick is recommended for these adjustments.

Remove the bus wire and reconnect the balun to J1 or jumper to TB4. Starting C2 and C4 at minimum capacity (maximum counterclockwise) turn both trimmers to obtain the best sound and picture.

To adjust the U2 UHF selector for a second channel, switch the selector switch to UHF 2. Preset the oscillator capacitor Cl4 and the harmonic tank capacitor Cl8 as indicated in the appropriate table.

Connect the antenna to the crystal as before.

Tune C14 slightly until sound is heard then adjust C14 and C18 until best sound and picture with minimum interference is obtained.

Then reconnect the antenna to J1 or TB4 and tune C1 and C3 for best sound and picture.

ADJUSTMENTS VERSUS CHANNEL NUMBER

Model U2

The turns listed in the table below are from the minimum capacity position of the trimmer-(maximum counterclcckwise position).

UHF Channel	OS Cl4	C Tai 4 or C	nk 15	Harmo Cla	nic Tank 3 or C19
14-16	.13.0	turns	CW		turns CW
17-19	.11.5	turns	CW	11.5	turns CW
20-22	.10.25	turns	CW		turns CW
23-25	9.0	turns	CW	9.5	turns CW



Figure 2—Connection for Employing Separate UHF Antenna with 300 Ohm Lead-In Model U2A



Figure 5-Connection for Employing Separate UHF Antenna with 300 Obm Lead-In



Figure 3—Connection for Employing Separate UHF Antenna with 72 Ohm Co-ax Lead-In



Figure 6—Connection for Employing Separate UHF Antenna with 72 Obm Co-ax Lead-In

UHF	OSC Tank	Harmonic Tank
Channel	C14 or C15	C18 or C19
26-28	8.25 turns CW	8.5 turns CW
29-31		7.75 turns CW
32-34	6.25 turns CW	
35-37		6.5 turns CW
38-40	4.75 turns CW	6.25 turns CW
41-43		5.75 turns CW
44-46		5.25 turns CW
47-49		5.0 turns CW
50-52		4.75 turns CW
53-55		4.25 turns CW
56-58		4.0 turns CW
59-61		3.5 turns CW
62-64		3.25 turns CW
65-67		3.0 turns CW
68-70		2.75 turns CW
71-73		2.5 turns CW
74-76	6.5 turns CW	2.25 turns CW
77-79	6.0 turns CW	2.0 turns CW
80-83	5.5 turns CW	1.75 turns CW

ADJUSTMENTS VERSUS CHANNEL NUMBER

Model U2A

The turns listed in the table below are from the minimum capacity position of the trimmer-(maximum counterclockwise position).

The second secon	-7 ·	
UHF	OSC Tank	Harmonic Tank
Channel	C14 or C15	C18 or C19
.14-16		
17-19		9.75 turns CW
20-22		8.75 turns CW
23-25		8.0 turns CW
26-28	10.5 turns CW	7.25 turns CW
29-31	9.25 turns CW	6.5 turns CW
32-34		5.75 turns CW
35-37	7.0 turns CW	5.25 turns CW
38-40	6.0 turns CW	4.75 turns CW
41-43	5.0 turns CW	4.5 turns CW
44-46	3.75 turns CW	4.0 turns CW
47-49		3.75 turns CW
50-52		3.5 turns CW
53-55		3.25 turns CW
56-58		3.0 turns CW
59-61		2.75 turns CW
62-64		. 2.5 turns CW
65-67	10.75 turns CW	2.25 turns CW
68-70	9.75 turns CW	2.0 turns CW
71-73		1.75 turns CW
74-76	8.25 turns CW	1.5 turns CW
77-79	7.5 turns CW	1.25 turns CW
80-83	5.5' turns CW	1.0 turns CW

Notes on Adjustments—For proper reception, the oscillator harmonic employed for conversion must be lower in frequency than the UHF station. If two slightly different positions of the oscillator core produce sound from the desired station, the most clockwise position is the correct one.

In tuning one oscillator it may occasionally happen that the oscillator tank of the circuit not in use may be tuned to the same frequency. If this occurs, the second oscillator tank may act as a trap absorbing energy from the first oscillator and causing poor operation. In such a case, detune the second oscillator tank until the first oscillator circuit is adjusted. Once adjusted for the proper channels no difficulty should be experienced from this source as it is extremely unlikely that both oscillators would be operating on the same frequency.

When properly aligned, the crystal current should be 0.75 for best noise figure. This current can be measured by disconnecting the test link on top of the chassis and inserting a 0-5 milliampere meter between the link and ground.

Under some conditions interfering beats may be obtained between the UHF Selector oscillator and harmonics of the television receiver oscillator which show up as lines in the picture. In some cases these may be eliminated by adjusting the receiver fine tuning for elimination of the beat, then returning the selector oscillator core for best sound and picture.

The oscillators in the selectors operate in the 200 mc. to 300 mc. range. The oscillator signal applied to the crystal mixer is taken from a harmonic tank in the oscillator circuits. The usual practice as listed in the table is to employ the oscillator second harmonic for reception of channels 14 through 46, and the third harmonic for reception of channels 47 through 83. In rare cases where interference is obtained due to a beat between the UHF selector oscillator and a harmonic of the VHF receiver oscillator, it may be possible to eliminate it by tuning the oscillator to a different frequency and employing a different harmonic.

Under some conditions, adjacent channel interference may be experienced if the VHF station is strong and the UHF signal is weak. In such cases, it may be desirable to provide a shielded cable between the UHF Selector unit and the television receiver r-f unit.

As a test for drift, turn the selector off for five minutes then turn it on again. Within approximately one minute it should be possible to receive the UHF station by adjustment of the receiver fine tuning control and without the necessity of readjusting the UHF Selector oscillator.

When it is desired to receive a VHF station on the television receiver, switch the selector switch to the VHF position and operate the receiver normally.

I-F ALIGNMENT

Construct a 300 ohm balanced detector as shown in figure 8 and connect it to the VHF selector terminal board marked "Receiver" (TB2).

Connect a high gain oscilloscope to the balanced detector and set the gain to maximum.

Connect an attenuator pad of the type shown in figure 9 to the output cable of the VHF sweep generator. Connect the output of the attenuator pad through a 470 mmf. ceramic capacitor to the cathode, pin 2 of Vl.

Set the sweep generator to sweep from 70 mc. to 95 mc. As an alternate method when using RCA type WR59 sweep generators, switch the generator to channel 5 to see the low frequency side of the response curve and to channel 6 to see the high frequency side of the response curve.

Insert markers from a VHF marker generator by loosely coupling the generator output cable to the cathode, pin 2 of V1.

Adjust the primary and secondary cores of T2 until the response shown in figure 8 is obtained.

Check of R-F Circuits—Adjust the selector for the reception of 2 UHF stations as described in the adjustment instructions.

Connect a 0-5 milliampere meter to the crystal by opening the test connection on top of the chassis and connecting the meter in series with the test connection and ground.

The crystal current should be 0.75 ma. on each channel. The oscillator injection trimmers were set at the factory to produce this value of current. However if it should become necessary to readjust the oscillator injection, this may be done by adjusting capacitors C26 and/or C27. These capacitors consist of a large metal headed tack mounted in a feed through bushing in the wall of the oscillator compartment. Adjustment is affected by sliding the head towards or away from the harmonic tank capacitors C18 or C19. To prevent the adjustment from changing, the body of the tack is then soldered in place.

The measurement of crystal current should be made with the selector adjusted for reception of a station but with no signal input and with the oscillator compartment bottom shield in place. Do not adjust the injection to compensate for a defective crystal or oscillator tube.



Figure 7-Chassis top view



Figure 8-300 Ohm Balanced Detector



Figure 9—Attenuator Pad



Figure 10-Adjustment Locations

Figure 11-I-F Response

U2, U2A

CIRCUIT SCHEMATIC DIAGRAMS



Figure 12-U2 Schematic Diagram, KCS79



Figure 13-U2A Schematic Diagram, KCS79A

REPLACEMENT PARTS

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STOCK No.	DESCRIPTION	STOCK	DESCRIPTION
	CHASSIS ASSEMBLIES	11765	Lamp-Pilot lamp-Mazda #51
	KCS79, KCS79A	77282	Rectifier-Germanium rectifier (CR1)
75020		77292	Rectifier-Selenium rectifier (CR2)
77200	Board Antenna terminal board		Resistor-Fixed, composition :-
11290	adjustable core (C1, C2, C3, C4, C18, C19)	513027	27 ohms, ±10%, 1 watt (R1, R2)
77210	Capacitor-Ceramic, 2 mmf. (C16, C17)	503068	68 ohms, ± 10%, ½ watt (R5)
77277	Capacitor-Ceramic, 3 mmf. (C5, C28)	513210	1000 ohms, ±10%, 1 watt (R9)
77340	Capacitor-Tubular trimmer, 1.0-10.0 mmf., complete	523210	1000 ohms, ±10%, 2 watts (R10)
	with adjustable core (C14, C15, L16, L17)	503239	3900 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R6, R8)
53511	Capacitor—Ceramic, 10 mmf. (C23)	503410	100,000 ohms, ±10%, ½ watt (R11, R12, R13, R14)
72570	Capacitor-Ceramic, 27 mmf. (C12, C13)	503456	560,000 ohms, ± 10%, ½ watt (R3, R4)
70596	Capacitor-Ceramic, 33 mmf. (C24, C25)	77284	Shield—Oscillator shield for Model U2A
76347	Capacitor-Ceramic, 120 mmf. (C6)	77285	Shield—r-f shield
77293	Capacitor-Ceramic, 470 mmf. (C8, C9, C22)	76967	Shield—Tube shield for Vl
77084	Capacitor-Ceramic, feed-thru, 1000 mmf. (C7, C10,	76534	Shield—Tube shield for V2
		35574	Socket-Lamp socket
77086	Capacitor—Electrolytic comprising 1 section of 50 mfd.,	77087	Socket—Tube socket, 7 pin, miniature for Vl
	C21B. C21C)	76530	Socket—Tube socket, 9 pin, miniature for V2
77298	Coil-Choke coil (L13, P7)	77289	Switch-Selector switch (S1, S2)
77296	Coil-Fundamental oscillator coil (L9, L10)	78578	Transformer—Antenna input transformer (T3)
77297	Coil-Harmonic tank coil (L1) L12)	77288	Transformer—i-f transformer (T2)
77153	Coil_r-f choke coil (L5 L7 L8 L14 L15)	77287	Transformer—Power transformer, 117 volt, 60 cycle (T1)
77279	Coil—r-f choke coil (L6)		MISCELLANEOUS
77294	Coil-r-f coil (primary and secondary) (L1, L2, L3, L4)	77300	Back—Cabinet back complete with power cord
77088	Connector—Single contact connector for UHF an- tenna (J1) for model U2	77212	Connector—Single contact male connector for antenna matching assembly
52131	Connector-2 contact female connector for television	77033	Emblem-"RCA Victor" emblem
· · · · ·	power (J2)	74889	Foot-Felt foot
74594	Connector-2 contact male connector for power input	77299	Knob-Selector knob
76460	Contact—Test point contact	77013	Nut—Speed nut to fasten emblem
77286	Cover—Oscillator section shielding Cover for Model U2A	74734	Spring—Spring clip for knob

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS





Model U70





GENERAL DESCRIPTION

UHF Selector Model U70 permits the reception of any UHF television station within receiving range when employed with a VHF television receiver. The unit employs three tubes plus rectifier and a crystal mixer.

	TELEVISION	R-F	FREQUENCY	RANGE
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I-F Output Frequency...... Channel 5 or 6

POWER SUPPLY RATING 115 volts, 60 cycles, 40 watts

WEIGHT AND DIMENSIONS

Net	Shipping	Width	Height	Depth
Weight	Weight	Inches	Inches	Inches
10 lbs.	12 lbs.	111/8	81/4	9 ²¹ /32

The UHF Selector has been designed to operate from either of three types of antenna installations.

In all cases, the VHF antenna transmission line must be disconnected from the VHF receiver and reconnected to the selector VHF antenna terminals. A short length of 300 ohm line must then be connected between the VHF receiver antenna terminals and the selector terminals marked "Receiver."

If the UHF signals from the VHF antenna are strong and free from reflections, the above connections are all that are required. See Figure 1.

If a separate UHF antenna with 300 ohm transmission line is employed, connect the line to the selector terminal board marked UHF. Then, disconnect the 300 ohm line which runs over the fiber back and into the selector. Tape the ends of these leads so that they will not short other terminals on the back and cause trouble. See Figure 2.

If a separate UHF antenna with 72 ohm co-ax transmission line is employed, remove the balun, attach a male co-ax fitting to the antenna transmission line and plug it into the selector co-ax input at the lower left hand corner on the selector rear apron. Dress or tape the co-ax line so that it cannot be pulled out if the customer moves the selector. See Figure 3.



Figure 1—Selector Connections When VHF Antenna Is Employed For UHF Reception.



Figure 2—Selector Connections For Use of Separate UHF Antenna With 300 Ohm Lead-In.



CAMDEN, N. J., U. S. A.

ELECTRICAL SPECIFICATIONS

ANTENNA INPUT IMPEDANCE

UHF -- Choice: 300 ohms balanced or 72 ohms unbalanced. VHF - 300 ohms balanced.

TUBE COMPLEMENT

Tube Used	Function
6AF4	F Oscillator
6CB6lst I	-F Amplifier
6CB62nd I	F Amplifier
5Y3GT	Rectifier
A 1N82 crystal is used as a mixer.	

INSTALLATION INSTRUCTIONS

Plug the television receiver power cord into the a-c receptacle on the back of the selector and plug the selector power cord into the nearest 110 volt a-c outlet. With this connection, if the VHF receiver "on-off" switch is left in the "on" position, both the receiver and the selector will be controlled by the selector function switch.

With the selector function switch in the VHF position, the receiver is turned "on," the selector is "on" but in stand-by condition and the VHF antenna is connected through to the receiver.

With the selector function switch in the UHF position, the selector is operating, the VHF antenna is disconnected from the receiver, the selector output is connected to the receiver and the antenna employed for UHF operation is connected to the selector input.

To receive a UHF station, switch the selector function switch to UHF and the television receiver to channel 5 or 6, whichever is vacant in the receiving area. Tune in the UHF station by adjusting the selector tuning knob. The selector dial is calibrated in channel numbers as an aid in locating the channel. Tune the selector for best sound and picture. In some instances interference may result if the receiver fine tuning control is not properly adjusted. If this should occur, adjust fine tuning until the interference is eliminated and retune the selector for the best sound and picture.



Figure 3—Selector Connections For Use of Separate UHF Antenna With 72 Ohm Co-Ax.

TEST EQUIPMENT The following test equipment is required for alignment of the U70 UHF Selector:

A UHF sweep generator with a range of 470 mc. to 890 mc.

A VHF sweep generator with a range of 70 mc. to 90 mc. A UHF marker generator for locating 480, 630 and 840 mc.

A UHF marker generator for locating 460, 650 and 640 mic. A VHF marker generator capable of supplying 72.5 mc.,

76.5 mc., 82.5 mc., 88.5 mc. and 92.5 mc. signals.

An oscilloscope with a high gain vertical amplifier.

A milliammeter with a 0-5 ma. range.

A resistive pad for terminating the sweep generator cable. A 300 ohm balanced detector.

A small protractor.

I-F ALIGNMENT

Second I-F Stage — Construct a 300 ohm balanced detector as shown in Figure 4 and connect it to terminal board TB3.

Connect a high gain oscilloscope to the balanced detector and set the gain to maximum.

Connect a jumper across terminals A and B of Tl.

Connect a 72 ohm attenuator pad of the type shown in Figure 5 to the output cable of the sweep and connect the output of the pad to the grid, pin 1 of V2 and to ground.

Set the sweep generator to sweep from 72 mc. to 90 mc. As an alternate, an RCA WR59 sweep generator may be employed and switched to channel 5 to see the low frequency side of the response curve and to channel 6 to see the high frequency side of the response curve.

Insert markers from the VHF marker generator by loosely coupling the generator output cable to the grid of V2.

Adjust the T2 pri. and sec. cores and the bandwidth trimmer C22 to obtain response as shown in Figure 9A.

The bandwidth capacitors C22 (and C21 in T1) consist of a short piece of wire soldered to terminal A and the free end inserted into a ceramic tube capacitor. Adjustment is made by pushing the wire in further or pulling it out.

First I-F Stage — Remove the jumper from terminals A and B of T1 and reconnect it across terminals A and B of T2.

Connect the balanced detector across T2 terminals C and D. Connect the output cable of the sweep generator with the

72 ohm pad through a 1,500 mmf. capacitor to pin 2 of V1. Connect the VHF marker generator loosely to pin 2 of V1.

Adjust the T1 pri. and sec. cores and the bandwidth trimmer C21 to obtain the response shown in Figure 9B.

Overall I-F Response — Leave the sweep generator connected to the cathode of V1.

Remove the jumper across terminals A and B of T2.

Connect the balanced detector across terminal board TB3.

The overall if response should appear as shown in Figure 9C. The oscilloscope gain should be kept at maximum and the input kept low to prevent overloading the selector.

If excessive tilt of the curve is present, retouch the T1 and T2 pri. and sec. cores until the curve is reasonably flat.

R-F ALIGNMENT

If the selector needs only touch-up adjustments, no presetting of the tuning cores is required. However, if the selector is completely out of alignment, the tuning cores should be preset as follows. With the dial drive mechanism $1\frac{1}{4}$ turns from the low frequency stop (channel 14 end of the dial), set the C18 oscillator tuning core as shown in the Figure 6A. The cores of the r-f tuning capacitors C1 and C2 should be set as shown in Figure 6B. The tapered end of the L9 core should be set about $\frac{3}{4}$ of an inch from the closest end of the L9 coil as shown in Figure 6C.

Turn the dial drive mechanism until it comes up against the stop at the low frequency (channel 14) end of the dial. Turn the dial pointer on its shaft until the pointer coincides with the end marker on the dial back plate.

Turn the dial drive mechanism until the pointer is 17 degrees to the left of center of the dial when the selector is sitting in an upright position. This position should be located with a protractor to insure accuracy. Make a small mark on the dial back plate so that the dial can be returned to this position quickly and accurately throughout the remainder of the alignment procedure. This is the 630 mc. calibration point.

Connect the 300 ohm balanced detector across terminals A and B of T1 and shunt a 1,000 ohm resistor across terminals C and D of T1.

Connect the UHF sweep generator through a 6 db pad to the 72 ohm co-ax input to the selector at Jl. It is necessary to

use the pad so that impedances will be matched. Otherwise standing waves on the sweep cable may become objectionable. Connect the UHF marker gen. loosely to the selector input.

Connect a VHF marker generator loosely to the cathode of V1. Insert an 82.5 mc. marker into the selector.

630 Mc. Adjustments — Turn the dial drive mechanism until the dial pointer points to the 630 mc. calibration mark scribed on the dial back plate at 17 degrees left of center.

Insert a 630 mc. marker from the UHF marker generator.

Set the UHF sweep generator to sweep from 615 mc. to 645 mc. and observe the output on the oscilloscope. If the sweep generator is not sweeping the correct frequency range, it may be necessary to readjust the sweep in order to center the 630 mc. marker on the response curve.

The shields must be in place over the top and bottom of the r-f section when making any adjustments.

Adjust the C18 oscillator core until the markers for 630 mc. and 82.5 mc. coincide on the sweep pattern.

Adjust the cores of the r-f tuning capacitors C1 and C2 to obtain a maximum amplitude, symmetrical response curve centered about the 82.5 mc. marker.

Set the bandwidth adjustment L2 until the response bandwidth is 20 mc. at 70% response.

Tune L5 for max. response at the center of the bandpass.

Repeat the adjustments of C1, C2, L2 and L5 if necessary.

Plug the 0-5 milliammeter into the crystal current jack J2. The current should be between 0.8 ma. and 5 ma. If this current is not obtained, either the crystal is defective or the oscillator is not functioning properly. The bottom cover should be in place when measuring crystal current.

Turn off the sweep and marker generators. If the crystal current decreases by more than 10%, it indicates that excessive input signals are being employed. Proper alignment cannot be obtained under such conditions.

490 Mc. Adjustments — Set the UHF marker gen. to 490 mc. Set the UHF sweep gen. to sweep 475 mc. to 505 mc.

Turn off the 82.5 mc. marker generator.

Turn the UHF selector toward the low frequency end of the band. Tune the selector and the sweep generator until the 490 mc. marker is centered in the bandpass.

Turn the 82.5 mc. marker back on.

Adjust C18 until the markers coincide. Then, overshoot the adjustment by an amount slightly less than the amount of adjustment required to get the markers to coincide. Then close or spread the turns on the L9 coil until the markers again coincide.

Repeat the adjustments in the section above labeled "630 Mc. Adjustments." C1, C2, L2 and L5 probably will not require retouching. Then repeat the adjustments in the section above labeled "490 Mc. Adjustments." Continue the repetition of the 630 mc. and 490 mc. adjustments until no further adjustments are required. Make the final adjustment at 630 mc. before proceeding with the next section.

840 Mc. Adjustment — Set the UHF marker gen. to 840 mc. Turn off the 82.5 mc. marker generator.

Adjust the UHF sweep gen. to sweep 825 mc. to 855 mc.

Turn the UHF selector dial drive and the sweep generator until the 840 mc. marker is centered in the bandpass of the response curve on the oscilloscope.

Turn the 82.5 mc. marker back on.

Adjust the L9 core until the two markers coincide.

Check of Tracking — Turn off the UHF marker generator. Tune the sweep generator across the band in small steps.

Tune in the sweep generator with the selector.

The response on the oscilloscope should not fall below 70% response between the 76.5 mc. and 88.5 mc. markers obtained from the VHF marker generator.

The crystal current should be between 0.8 and 5 ma. at all points between 470 mc. and 890 mc. when measured with the bottom shield in place and with no signal input.

Overall Response Check — Leave the sweep and signal generators connected as for r-f alignment. Remove the 1,000 ohm resistor from terminals C and D of T1. Connect the 300 ohm balanced detector across the output terminal board TB3 and observe the overall response which should be similar to that shown in Figure 9. If excessive tilt appears, it may cause the picture to be overpeaked or smeared depending on the direction of the tilt. The maximum tilt or sag of the curve should not exceed 30%.

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Air Check — As a final test, the selector should be tested on the air by receiving a known weak signal. If the picture obtained seems excessively snowy for a particular selector unit, it may be necessary to replace the mixer crystal CR1. If the crystal is changed, the r-f alignment should be retouched. A good crystal may perform no better than a defective one unless the r-f section is aligned for the good crystal.





Cable Attenuator



Figure 6-Preset for R-F Adjustments







Figure 8 — Dial Cord and Drive







Figure 10 — Top Chassis Adjustments



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REPLACEMENT PARTS

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES		Resistor—Fixed, composition:
	KCS70	503033	33 ohms, ±10%, ½ watt (R1)
77097	Back—Back cover complete with three (3) terminal	503047	47 ohms, ±10%, ½ watt (R4)
	boards	503068	68 chms, ±10%, ½ watt (R5)
76184	Board—Terminal board for back cover	503115	150 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R2)
77069	Bracket-Mounting bracket for r-1 tuning assembly (includes L2 and part of L1 L3 C1 C2) less	523133	330 ohms, $\pm 10\%$, 2 watt (R13)
	glass tubing	503212	$1,200 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt (R8)}$
76522	Bracket—Vertical bracket for tube shield for 6AF4	543415	$1,500 \text{ ohms}, \pm 10\%, 2 \text{ watt} (R10, R12)$
77072	Bushing—Drive shaft bushing (in rear of coil spring)	503222	$2,200 \text{ ohms}, \pm 10\%, \frac{1}{2} \text{ watt} (R3)$
77210	Capacitor—Ceramic, 2 mmf. (C16)	503282	$8,300 \text{ ohms} \pm 10\%, 42 \text{ watt}(R11)$
77108	Capacitor—Ceramic, 9 mmf. (C11)	503310	$10.000 \text{ ohms} \pm 10\% \frac{1}{2} \text{ watt}(\text{REF})$
77085	Capacitor—Ceramic, feed-thru, 10 mmf. (C3)	513322	22.000 ohms + 10%, 1 watt(R9)
45465	Capacitor—Ceramic, 15 mmf. (C20)	77078	Shaft—Drive shaft
77209	Capacitor—Ceramic, 18 mmf. (C15)	77092	Shield—Shield assembly for oscillator tuning as-
70935	Capacitor—Ceramic, 27 mmf. (C12, C13)		sembly
70599	Capacitor Ceramic, 56 mmi. (C5)	77091	Shield—Shield assembly for r-f tuning assembly
77084	Capacitor—Ceramic, 470 minit, (C4, C7, C6, C3, C10)	77090	Shield—Tube shield for 6AF4
77252	Capacitor—Ceramic, 1 000 mmf (C6)	76967	Shield—Tube shield for 6CB6
77086	Canacitor—Electrolytic comprising 1 section of 50	31251	Socket—Tube socket, octal, wafer
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	mfd., 200 volts and 2 sections of 30 mfd., 200	31364	Socket—Dial lamp socket
·	volts (C19A, C19B, C19C)	//08/	Socket-lube socket, 7 pin, miniature, moulded
77102	Clamp—Polystyrene clamp for oscillator tuning ca- pacitor and coil (2 required)	77207	Socket—Tube socket, 7 pin, miniature, steatite,
77109	Coil-Choke coil (L6, L7; L8, L10)		saddle-mounted
77083	Coil—Cathode peaking coil (L5)	77071	Spring—Drive shaft spring
77224	Coil—Oscillator tuning coil (L9)	12007	Spring—Drive cord spring
72618	Coil—Peaking coil (20 muh) (L4)	75069	Spring-Retaining spring for adjusting cores
77212	Connector—Single contact male connector for an-	77200	Support Operillates tuning spill support (along table)
75474	Connector—Single contact male connector for W3, W4 W5	77099	Support—Polystyrene support only for oscillator tun- ing coil and canacitor
77088	Connector-Single contact connector for 72 ohm an-	77089	Switch—Function and power switch (S1, S2)
50101	tenna connection (J1)	76463	Terminal—Screw type grounding terminal
72052	Connector 2 contact female connector (J3)	77080	Transformer—Power transformer, 117 volts, 60 cycles
72953	Cord Drive cord (approx. 23 overall)	77081	(15) Transformer-First if transformer complete with ad
70392	Cord—Power cord and plug	//001	justable cores (T1, C21)
77074	Core—Adjusting core assembly for r-f tuning as- sembly capacitors C1 and C2	77082	Transformer—Second if transformer complete with adjustable cores (T2, C22)
77075	Core—Adjusting core assembly for oscillator tuning capacitor C18	77100	Tubing—Capacitor tubing (glass) for oscillator tun- ing capacitor (Part of C18)
77076	Core—Adjusting core assembly for oscillator tuning coil L9	77070	Tubing—Capacitor tubing (glass) for r-f tuning as- sembly capacitors C1 and C2
77093	Cover—Bottom cover for oscillator tuning shield Crystal—See Bectifier	2917	Washer—''C'' washer for drive shaft and drive cord pulleys
77103	Cushion—Rubber cushion for mounting oscillator tuning coil (2 required) or oscillator tuning ca-	33726 77098	Washer—"C" washer for plate and bushing re- tainer post Washer—Spring washer for drive shaft
74838	Grommet—Power cord strain relief (1 cot)		
77079	Holder—Holder for crystal rectifier	77111	MISCELLANEOUS
75482	Jack—Test jack (I2)	77110	Clamp—Dial clamp (2 required)
11765	Lamp—Dial lamp—Mazda 51	77033	Emblem_"RCA Victor" emblem
77106	Plate—Dial back plate and bushing less dial and	77492	Foot—Bubber foot (4 required)
77073	pulley Plate—Plate complete with five (5) bushings for	77251	Knob—Function and power switch knob—marcon— for mahogany and walnut instruments
77005	drive shaft and adjusting cores	77844	Knob-Function and power switch knob-beige-
77077	Pointer-Station selector pointer		for blonde mahogany instruments
77105	Pulley Drive cord puller (134" dial and bushing assembly	77140	Knob—Tuning control knob—maroon—for mahogany
77094	Pulley—Drive cord pulley (1% dia.) and shaft Pulley—Drive cord pulley (2¾" dia.) and shaft assembly	77843	and walnut instruments Knob—Tuning control knob—beige—for blonde ma-
77489 30340	Rectifier—Crystal rectifier 1N82 (CR1) Retainer—Retainer ring for drive shoft	77013	Nut-Speednut to fasten emblem to cabinet
	inclusion may for arrive shall	/4/34	spring—spring cup for knobs

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