RCA VICTOR

SERVICE DATA

VOLUME VIII

1952

RADIO RECEIVERS

PHONOGRAPHS

TELEVISION

RADIO CORPORATION OF AMERICA

RCA Victor Division Harrison, N. J., U. S. A.

RCA VICTOR

SERVICE DATA

- TELEVISION RECEIVERS
- RADIO RECEIVERS
- PHONOGRAPHS

This volume is a compilation of Service Data previously issued for the year 1952 with the latest changes and corrections.

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HARRISON, N. J., U. S. A.

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†denotes "Radiola"

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Identification numbers beginning with R (RC, RS, etc.) are used with all radios and some television receivers.
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RK-121	612-V1, 612V3, 612V4, R-F/I-F Chassis
RK-121A	648 PTK, 648PV Radio R-F/I-F Chassis
RK-121C	8V151, R-F/I-F Chassis
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RC-333B	94BT1, 94BK1
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RC-335A	98K
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RC-335E	11QU
RC-335F	910KG
RC-335H	99T
RC-335K	U-129
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RC-336	8QB, 8QBK Tuner Unit
RC-337	8Q1 Tuner Unit
RC-337A	8Q4 Tuner Unit
RC-337B	10Q1 Tuner Unit
RC-338	12Q4, 12QK Tuner Unit
RC-338A	12QU Tuner Unit
RC-339	HF-1
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RC-345C	95X-1
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RC-348A	96T
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RC-348D	96T1
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RC-351B	96K2, 96T3
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RC-351D	U-122E
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RC-425A	U-12
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RC-427	TRK-12 Radio Tuner Unit
RC-427A	TRK-9 Radio Tuner Unit
RC-427F	TRK-120 Radio Tuner Unit
RC-427G	TRK-90 Radio Tuner Unit
RC-429	TRK-5 Radio Tuner Unit
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RC-436	40X-50 to 40X-57
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RC-443B	8QU5-C, 8QU5-M
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RC-454	9TX-50, 9TX-50M (2nd Prod.)
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RC-457E	45X-3, 45X-4
RC-459	45X-11, 45X-12
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RC-459B	46X-1, 46X-2
RC-459C	46X-3
RC-459D	45X-11, 45X-12 (2nd Prod.)
RC-459E	45X-13 (2nd Prod.)
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RC-459H	46X-3 (2nd Prod.)
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RC-477A	5Q6
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RC-501	U-46 Tuner Unit
RC-501A	K-130 Tuner Unit
RC-502	7Q4X
RC-507	Q22, Q22A, Q32, Q121 (EM)
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RC-507B	QK23
RC-507C	QU2C
RC-507D	QU2M
RC-507F	QU3C
RC-507H	QU3M
RC-507J	Q26
RC-507K	Q27
RC-507L	QU52C
RC-507N	QU52M
RC-507U	Q121 (PM)
RC-508	Q24
RC-509	16T4
RC-509A	16T3
RC-509B	16T2
RC-509C	16K
RC-509F	16T4 (2nd Prod.)
RC-509H	16T3 (2nd Prod.)
RC-509J	16T2 (2nd Prod.)
RC-511	18T
RC-512	17K
RC-512A	19K
RC-513	110K, 110K2
RC-513A	111K
RC-514	Q20, Q21
RC-517	V-100
RC-517C	V-105
RC-517F	Radiola R-560P
RC-517H	V-135
RC-517J	Radiola R-566P
RC-518	V-300 Tuner Unit
RC-518A	V-301, V-302 Tuner Unit
RC-519	V-200
RC-521	V-205
RC-521B	V-405
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RC-561C	Q-16E
RC-563A	QB5, QB55
RC-563B	Q12
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RC-563D	Q12
RC-563E	Q11
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RC-589	54B1
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RC-589D	54B1-N
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RC-589UA	54B2 2nd Prod.
RC-589UB	54B3 2nd Prod.
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RC-602A	Q109X
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RC-610A	730TV1 Radio Section
RC-610B	730TV2 Radio Section
RC-610C	610V1, 610V2 2nd Prod.
RC-612	QB-13 Tuner Unit
RC-613A	710V2
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RC-614C	9QV5 R-F/I-F Chassis
RC-614D	9QV5 R-F/I-F Chassis
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RC-616	8V112
RC-616A	8V91
RC-616B	8TV321 Radio Section
RC-616C	8TV323 Radio Section
RC-616F	8V112 2nd Prod.
RC-616H	8V91 2nd Prod.
RC-616J	8TV321 2nd Prod. Radio Section
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RC-618D	9W102
RC-620A	4QV8C R-F/I-F Chassis
RC-620B	Q641 (50/60 cy.)
RC-620C	Q641 (25 cy.)
RC-620D	4QV8C R-F/I-F Chassis
RC-622	9W106, A106
RC-1000	16X11
RC-1000A	16X13
RC-1000B	16X14
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RC-1001B	12X, 12X2
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RC-1017A	65U, 65AU, 65U-1, Radiola 62-1
RC-1017B	65U, 65AU (50 cycle)
RC-1020	25BP (2nd Prod.)
RC-1020B	Radiola P-5 (2nd Prod.)
RC-1022	34X (2nd Prod.)
RC-1022A	12X (2nd Prod.), 35X (2nd Prod.), Radiola 522 (2nd Prod.)
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RC-1037	64F1, 64F2
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RC-1038	66X1, 66X2
RC-1038A	66X3, 66X7, 66X8, 66X9
RC-1040	66BX (3Q4 output)
RC-1040A	66BX (3V4 output)
RC-1040B	66BX (Selenium rect.)
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RC-1046	66X12
RC-1046A	66X11
RC-1046B	66X13
RC-1046C	66X11 2nd Prod.
RC-1046D	66X12 2nd Prod.
RC-1046E	66X13 2nd Prod.
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RC-1050A	75X11, 75X12 2nd Prod., 75X14, 75X15
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RC-1054C	6QU3
RC-1054D	6QV3
RC-1054E	5Q31X
RC-1054F	6QU3Y
RC-1054G	Q531
RC-1054J	QA531
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RC-1055	**7Q51 (PM)**
RC-1055C	**7Q51 (EM)**
RC-1055D	**7Q51X**
RC-1055H	**Q853 (117 v.—234 v.)**
RC-1055J	**Q853 (85—260 v.)**
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RC-1059A	8BX5, 8BX54, 8BX55 2nd Prod.
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RC-1111A	**21-T-197DE**
RC-1111B	**21-T-244**
RC-1114	**2-B-400 Series**
RC-1115	**2-BX-63**
RC-1116	**36QP (117 v.)**
RC-1116A	**36QP (117v.—234v.)**
RC-1117A	**2-US-7**
RC-1117B	**21-T-242**
RC-1117C	**2-US-7**
RC-1117D	**2-S-7**
RC-1118	**2-C-511**
RC-1118A	**2-C-512**
RC-1118B	**2-C-513**
RC-1118C	**2-C-514**
RC-1119	**2-R-51, 2-R-5,1A 2-R-52, 2-R-52A**
RC-1120	**2-C-521**
RC-1120A	**2-C-522, 2-C-527**
RC-1120B	**2-C-521**
RC-1120C	**2-C-522, 2-C-527**
RC-1120D	**2-C-521**
RC-1120E	**2-C-522, 2-C-527**
RC-1121	**2-XF-91**
RC-1121A	**2-XF-931 Series**

AUDIO AMP. AND POWER UNITS

Chassis No.	Model
RA-79	9EY31, 9EY32
RS-77	R-98
RS-79B	CV-9 Electrifier
RS-83-1	PSU-8A
RS-83-2	PSU-8B
RS-83-3	PSU-8C
RS-83A-1	PSU-10A
RS-83A-2	PSU-10B
RS-83A-3	PSU-10C
RS-83C	CV-110 Electrifier
RS-83E	TRK-9, TRK-12, TRK-90, TRK-120 Radio Power Unit
RS-84	R-91
RS-85	PSU-8E
RS-85A	PSU-10E
RS-86	R-89
RS-89	CV-9X Electrifier
RS-89A	TRK-5 Radio Power Unit
RS-89B	U-42 Power Unit
RS-90	VA-21
RS-91A	O-50
RS-91B	R-60
RS-92	M-70 Power Unit
RS-94A	OSC-22
RS-95	CV-111 Electrifier
RS-98	CV-40 Electrifier
RS-102A	U-44 Power Unit
RS-102B	U-46 Power Unit
RS-102C	K-130 Power Unit
RS-102D	U-45 Power Unit
RS-102E	V-300, V-301, V-302 Power Unit
RS-110	QU5 Power Unit
RS-111	CV-112 Electrifier
RS-111A	CV-112X Electrifier
RS-112	QU8 Power Unit
RS-112A	QU7 Power Unit
RS-114A	VHR-307 Power Unit
RS-115	QB1, QB11, QB12, QB13, 6V. Power Unit
RS-115B	QB9 Power Unit
RS-119	R-56
RS-123	612V1, 612V3, 612V4, 711V1, 711V2, 711V3 Audio Amp. & Power Supply
RS-123A	64TV, 649PTK, 8TV41 Audio Amp. & Power Supply

INDEX TO CHASSIS NO'S (Continued)

AUDIO AMP. AND POWER UNITS (Continued)

Chassis No.	Model
RS-123B	648PV Audio Amp. & Power Supply
RS-123C	741PCS, 8PCS41, 9PC41 Audio Amp. & Power Supply
RS-123D	8V151 Audio Amp. & Power Supply
RS-126	66E, 66ED, 66E-1
RS-127	63E, 63EM
RS-130	9QV5 Power Unit
RS-130A	4QV8C Power Unit
RS-132	9EY3, 93Y3M, 9EY35, 9EY36, 45-EY
RS-132A	9EY35, 9EY36, 45-EY
RS-132C	QEY3
RS-132F	45-EY, 45-EY-1
RS-132H	45-EY-15
RS-136	45-EY-3
RS-136A	45-EY-3
RS-136B	QEY5
RS-136C	45-EY-3
RS-136D	QEY5
RS-136E	**45-EY-3**
RS-136F	**QEY5 (Min. tubes)**
RS-138A	45-EY-2
RS-138B	QEY4
RS-138E	QEY4
RS-138F	45-EY-2
RS-138H	45-EY-2
RS-138L	45-EY-26
RS-138M	**45-EY-26**
RS-138N	**QEY4 (Min. tubes)**
RS-139A	**15-E, 15-E-1**
RS-140	**45-EY-4**
RS-140A	**QEY6**
RS-141	**2-S-10**
RS-141A	**21T197DE**
RS-141C	**21T244**
RS-142	**2ES3, 2ES31, 2ES31E, 2ES38, 2ES38E**
RS-142A	**2ES31Q, 2ES38Q**
RS-1000	CV-42 Electrifier
RS-1001	CV-45 Electrifier

TELEVISION CHASSIS

Chassis No.	Model
KC-3	TT-5
KC-3A	TRK-5 TV Chassis
KC-3B	TT-5 (50 cy.)
KC-3C	TRK-5 (50 cy.) TV Chassis
KC-4	TRK-12 TV Tuner
KC-4A	TRK-9 TV Tuner
KC-4B	TRK-12 (50 cy.) TV Tuner
KC-4C	TRK-9 (50 cy.) TV Tuner
KC-4F	TRK-120 TV Tuner
KC-4H	TRK-90 TV Tuner
KC-4J	TRK-120 (50 cy.) TV Tuner
KCS-20A	630TS
KCS-20B	630TCS
KCS-20C	630TS (50 cy.)
KCS-20D	630TCS (50 cy.)
KCS-20J	8TS30
KCS-20K	8TS30 (50 cy.)
KCS-21	621TS
KCS-24	648PTK TV R-F/I-F Chassis
KCS-24A	648PV TV R-F/I-F Chassis
KCS-24B	741PCS, 8PCS41 R-F/I-F Chassis
KCS-24C	8PCS41, 9PC41 R-F/I-F Chassis
KCS-24D	9PC41 R-F/I-F Chassis
KCS-25A	641TV TV Chassis
KCS-25C	641TV (50 cy.) TV Chassis
KCS-25D	8TV41 TV Chassis
KCS-25E	8TV41 (50 cy.) TV Chassis
KCS-26-1	721TS
KCS-26-2	721TS (50 cy.)
KCS-26A-1	721TCS
KCS-26A-2	721TCS (50 cy.)
KCS-27-1	730TV1, 730TV2 TV Chassis
KCS-27-2	730TV1, 730TV2 (50 cy.) TV Chassis
KCS-28	8T241, 8T243, 8T244, 9T240
KCS-28A	9T240
KCS-28B	9TC240
KCS-28C	9T246
KCS-29	8T270, 9T270
KCS-29A	8TC270, 8TC271
KCS-29C	9TC272, 9TC275
KCS-30	8TV321, 8TV323, 9TW333 TV Chassis
KCS-31	S1000, 9TW390 TV Chassis
KCS-32	8TR29
KCS-32A	8TK29
KCS-32B	8TR29
KCS-32C	8TK29
KCS-33A	8TK320
KCS-34	9TC247, 9TC249
KCS-34B	TC124, TC125, TC127, 9TC245, 9TC247, 9TC249
KCS-34C	T120, T121
KCS-38	T100, 9T246
KCS-38C	9T256
KCS-40	T164
KCS-40A	TC165, TC166, TC167, TC168
KCS-40B	6T72
KCS-41	9TW309
KCS-41A	TA129
KCS-42A	TA128
KCS-43	TA169
KCS-45	2T51
KCS-45A	2T60
KCS-46	2T81
KCS-47	6T53, 6T54
KCS-47T	6T53, 6T54
KCS-47A	6T64, 6T65, 6T71, 6T74, 6T75, 6T76
KCS-47AT	6T64, 6T65, 6T71, 6T74, 6T75, 6T76
KCS-47B	7T103, 7T104
KCS-47C	7T112, 7T122, 7T123, 7T124
KCS-47D	7T132
KCS-47E	16T152
KCS-47F	7T103B, 7T104B
KCS-47G	7T112B, 7T122B, 7T123B, 7T125B
KCS-47GF	7T112B, 7T122B, 7T123B, 7T125B
KCS-47GF-2	7T111B, 7T112B, 7T122B, 7T123B
KCS-47T	6T53, 6T54
KCS-48	6T84, 6T86, 6T87
KCS-48A	7T143
KCS-48T	6T84, 6T86, 6T87
KCS-49	9T57
KCS-49A	9T77, 9T79
KCS-49AT	9T77, 9T79
KCS-49B	9T105
KCS-49BF	9T105
KCS-49BF-2	9T105
KCS-49C	9T126, 9T128
KCS-49CF	9T126, 9T128
KCS-49CF-2	9T126, 9T128
KCS-60	9T89
KCS-60A	9T147
KCS-60T	9T89
KCS-61	4T101
KCS-62	4T141
KCS-66	17T153, 17T154, 17T155, 17T160
KCS-66A	**17T162, 17T172, 17T173, 17T174**
KCS-66C	**17T150, 17T151, 17T163**
KCS-66D	17T172K, 17T173K, 17T174K
KCS-68C	21T176, 21T177, 21T178, 21T179
KCS-68E	21T159, 21T165
KCS-68F	**21T159DE, 21T166DE, 21T174DE, 21T175DE, 21T178DE, 21T179DE**
KCS-68H	**21T197DE**
KCS-70	**U-70**
KCS-72	17T200, 17T201,
KCS-72-M1	17T202, 17T211,
KCS-72-M2	17T220
KCS-72A	**21T207, 21T207G, 2T208, 21T217, 21T218, 21T227, 21T228, 21T229**
KCS-72D-1	**21T242**
KCS-72D-2	**21T244**
KCS-74	**17T250DE, 17T261DE**
KCS-79	**U-2**
KCS-79A	**U-2A**
KK-7	TRK-12 TV Power Unit
KK-7A	TRK-9 TV Power Unit
KK-7D	TRK-12 (50-cy.) TV Power Unit
KK-7E	TRK-9 (50 cy.) TV Power Unit
KK-7F	TRK-120 TV Power Unit
KK-7J	TRK-90 TV Power Unit
KK-7H	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
Albury	17-T-220
Ashley	A-91
Ashton	17-T-211
Bancroft	21-T-174DE
Belgrove	21-T-229
Bentley	4-T-101
Benton	21-T-175DE
Blaine	1-X-51
Brandon	21-T-228
Brantley	45-W-10
Brett	17-T-250DE
Bristol	17-T-153
Brookfield	21-T-217
Calhoun	17-T-173
Carlisle	A-108
Clarendon	21-T-179, 21-T-179DE
Colby	17-T-150
Covington	17-T-172
Crafton	17-T-163
Crandall	21-T-207, 21-T-207G
Crestwood	612V1, 8V151
Cumberland	2-T-60
Donley	21-T-177
Fairfax	6-T-84
Fairfield	6-T-71, 6-T-72, 7-T-122
Farmington	21-T-166DE
Fenwick	2-S-10
Forbes	2-XF-91
Gladwin	1-X-591
Glenside	17-T-151
Globetrotter	66BX, 8BX6, BX-6, PIX-600, 2-BX-63
Grayson	X-551
Hadley	17-T-201
Hampton	17-T-160
Hartford	6-T-87
Haywood	17-T-111B
Highland	6-T-65, 7-T-112
Hillsborough	A-101
Hillsdale	9-T-126
Kendall	17-T-174
Kent	6-T-54, 7-T-104
Kentwood	17-T-202
Kerby	2-X-621
Lambert	21-T-208
Lansford	21-T-218
Lindale	21-T-227
Lindsay	2-X-61
Livingston	1-R-81
Meredith	21-T-165
Modern	6-T-75, 7-T-124
Newport	6-T-53, 7-T-103
Northampton	9-T-79
Oakland	2-S-7
Penfield	21-T-244
Personal	54B1, 8B41, B-411, 2-C-511, 2-R-51
Prentiss	8-X-541
Preston	17-T-155
Provincial	6-T-76, 7-T-125, 9-T-128
Randolph	9X561
Regency	6-T-74, 7-T-123
Reveler	BX-57
Rockingham	21-T-178, 21-T-178DE
Rutland	6-T-86, 7-T-143
Sedgwick	9-T-89, 9-T-147
Selfridge	21-T-159, 21-T-159DE
Shelby	2-T-51
Shelley	17-T-200
Somervell	2-T-81, 4-T-141
Suffolk	21-T-176
Sunderland	21-T-197DE
Super Personal	2-B-400
Talbot	16-T-152
Terrel	A-82
Torrance	9-X-571
Townley	2-XF-931
Westland	21-T-242
Whitfield	17-T-154
Winston	7-T-132
York	9-T-57, 9-T-105

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

Model	*Record Changer*
A55	RP 168 & 960282-1
A78	RP 168 & 960282-1
A-82	RP 168 or RP 190-2 & 960282-4 or -5
A-91	RP 168 or RP 190-2 & 960284-1 or -2
A-101	RP 190-2 & 960282-4 or -5 or 960284-1 or -2
A-106	RP 168 & 960285-1
A-108	RP 168 or RP 190-2 & 960284-1 or -2
QEY4	RP 190-5
QEY5	RP 190-5
QEY6	RP 190-5
QJY	RP 168
QEY3	RP 168
QU61	960001-4
QU62	960001-4
QU68	960001-4
S1000	RP 168 & 960285-1
TA128	RP 168 & 960282-1
TA129	RP 168 & 960282-1
TA169	RP 168 & 960285-1
2-ES-3	930409-5
2-ES-31	930409-5
2-ES-31E	930409-5
2-ES-31Q	930409-6
2-ES-38	930409-5
2-ES-38E	930409-5
2-ES-38Q	930409-6
2-JS-1	930409-5
2-JS-1E	930409-5
2-JS-1Q	930409-6
2-S-7	930409-5, -10
2-S-10	930409-5, -10
2T81	RP 168 or RP 190-2 & 960282-4 or -5
2-US-7	930409-5, -10, -11
4QV8C	RP 168 & 960282-2
4T141	RP 190-2 & 960282-4 or -5
6QU3	RP 178-3
6QU3Y	RP 168
6QV3	RP 178-3
6T84	RP 168 or RP 190-2 & 960282-4 or -5 or 960284-1 or -2
6T86	RP 168 or RP 190-2 & 960284-4 or -5
6T87	RP 168 or RP 190-2 & 960284-1 or -2
7QV5	960001-4
7T143	RP 190-2 & 960284-1 or -2
8TV41	RP 177A
8TV321	RP 178
8TV323	RP 178
8V7	RP 178
8V90	RP 178
8V91	RP 178
8V112	RP 178
8V151	RP 177B
9EY3	RP 168
9EY31	RP 168
9EY32	RP 168
9EY35	RP 168
9EY35U	RP 168
9EY36	RP 168
9EY36U	RP 168
9JY	RP 168
9QV5	RP 168 & 960282-2
9T89	RP 168 or RP 190-2 & 960284-1 or -2
9T147	RP 190-2 & 960284-1 or -2
9TW309	RP 168 & RP 178
9TW333	RP 168 & RP 178
9TW390	RP 168 & RP 177B
9W51	RP 168
9W78	RP 168 & RP 178
9W101	RP 168
9W102	RP 168
9W103	RP 168
9W105	RP 168 & RP 178
9W106	RP 168 & RP 178
9Y7	RP 168
9Y51	RP 168
9Y510	RP 190-1
9Y511	RP 168
15-E, 15-E-1	RP 190A-1 & Manual turntable
21T197DE	930409-5, -10
21T242	930409-5, -10
21T244	930409-5, -10
35QU	930409-4, -6
45-EY	RP 168
45-EY-1	RP 168
45-EY-2	RP 190
45-EY-3	RP 190-1 or RP 190-3
45-EY-4	RP 190-2
45-EY-15	RP 168
45-EY-26	RP 190A-2
45-J	RP 168
45-J-2	RP 190-1
45-J-3	RP 193
45-W-9	RP 190-2
45-W-10	RP 190-2
55U, 55AU	960015
58V, 58AV	960001-1
59V1, 59AV1	960001-2
Rad. 62-1	960260-2
65U, 65AU	960260-2
65U-1	960260-2
67V1, 67AV1	960260-1
Rad. 75ZU	RP178 or 960276
77U	RP 178
77V1	960260-1
77V2	960260-1
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	960001-4 or -6
648PV	RP 176
710V2	RP 177 or RP 177A
730TV1	RP 177 or RP 177A
730TV2	RP 177 or RP 177A
711V1	960001-5
711V2	960001-5
711V3	960001-5

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

SEPARATION OF SOUND AND PICTURE IN WEAK SIGNAL 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.

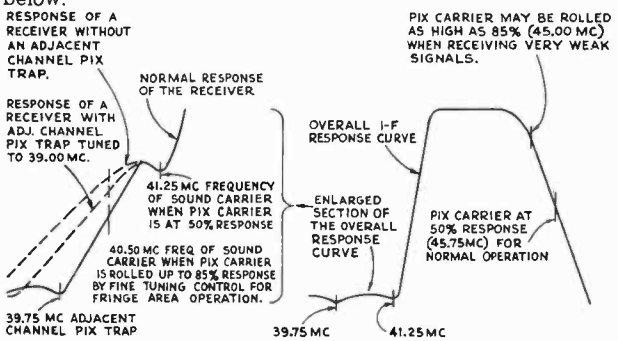


Figure 1—Details of Overall Response Curves

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 ½ turn if it is a threaded core type or approximately 1½ 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 ½ 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.

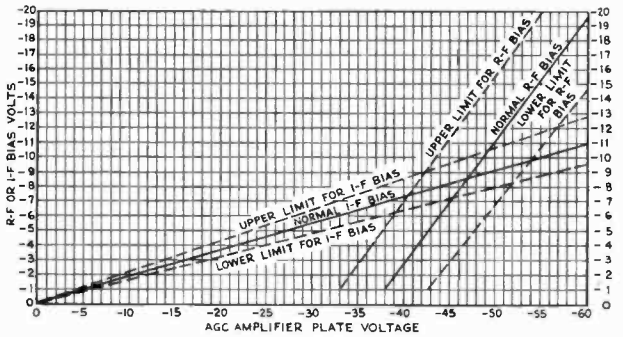


Figure 2—Chart of R-F, I-F Bias Ratios

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 R143 or R145 is too low in value and/or R144 or R150 is too high. If, however, the i-f bias actually measured —6 volts it indicates R143 or R145 is too high in value and/or R144 or R150 is too low. The resistors originally employed in production were 10% tolerance units. However, if R143 and R145 are at one limit of their tolerance and R144 and R150 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 considered 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 1N60, 1N64 and CK706. These crystals have slightly different characteristics and may not be directly interchangeable. 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 T109 transformer and matching resistor may be installed. In any event, if T109 or CR101 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 (◀) 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, ½ 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 T1 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 REFLECTIONS—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, ±10%, ½ watt, Stock No. 503510.

2. Change R186 to 3.9 meg, ±10%, ½ 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.

1. 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 RECEIVERS—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, C185 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, 8TK29	KRK5	73436	73437	73439	Short
9T240	KRK5	73436	73437	74439	Short
9TC240	KRK5A	74166	74168	74167	Long
9TC245-47-49	KRK5	73436	73437	73439	Short
9T246	KRK7	74572	74573	74574 / 74577	—
9T256	KRK7	74572	74573	74574 / 74577	—
9T270, 9TC272-5	KRK5A	74166	74168	74167	Long
9TW309	KRK5	73436	73437	73439	Short
9TW333	KRK5	73436	73437	73439	Short
9TW390	KRK5A	74166	74168	74167	Long
T100	KRK7	74572	74573	74574 / 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, TC165-6-7-8	KRK5B	73436	73437	73439	Short
TA169	KRK5B	73436	73437	73439	Short
S1000	KRK5A	74166	74168	74167	Long
6T72	KRK5B	73436	73437	73439	Short

NOTE #1—KRK5 units may be converted to KRK5A 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	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

and replace with the following Parts:

Stock Number	Description
74572	Front Plate and Bushing
74573	Shaft—Channel Selector
74574	Shaft—Fine tuning and Cam Assembly
74577	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

Receiver Model	R-F Unit	Chan. Sel. Shaft	Fine Tuning Shaft & Cam	Insulating Washer	Front Plate
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 (Round)	76754
6T53-54-64-65-71-74-75-76	KRK8B	75159	75160	75607 (Hex)	76135
6T84-86-87	KRK8B	75159	75160	76507 (Hex)	76135
7T103-103B-104-104B-111B-112-112B-122-122B-123-123B-124-125B-132	KTK8B	75159	75160	75607 (Hex)	76135
7T143	KRK8B	75159	75160	75607 (Hex)	76153
9T57-77-79	KTK8B	75159	75160	75607 (Hex)	76135
9T89	KRK8B	75159	75160	75607 (Hex)	76135
9T105-126-128	KRK8B	75159	75160	75607 (Hex)	76135
9T147	KRK8B	75159	75160	75607 (Hex)	76135
16T152	KRK8B	75159	75160	75607 (Hex)	76135
17T200-201-11-20	KRK8D	76519	76134	75607 (Hex)	76518
21T208-17-18-27-28-29	KRK8D	76519	76134	75607 (Hex)	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 R13 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.

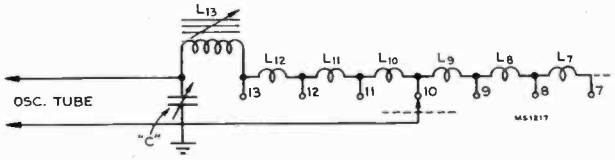


Figure 3—Simplified Schematic of R-F Oscillator.

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 (1½ 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.
2. Add a "gimmic" between oscillator tube socket plate pins or move the existing "gimmic" closer. (Use a production sample for reference—some units already have a "gimmic".)	2. Move "gimmic" away from plate pins.
3. Check cross feed capacitors for correctness of value.	3. 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 3/8 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.	
1. Move Channel 13 slug in if the stud protrudes 3/8 of an inch, or less. Move out if they protrude more than 3/8 of an inch.	1. Move Channel 13 slug out if the stud protrudes 3/8 of an inch, or less. Move in if they protrude more than 3/8 of an inch.

KRK5 AND KRK7

To Increase Channel 13 Inductance	To Decrease Channel 13 Inductance
1. Screw brass slug out of L1 and L2.	1. Screw brass slug into L1 and L2.
These slugs are available from the bottom of the r-f unit chassis and are normally cemented lightly.	

KRK8

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.
2. If the highest high channel is aligned with the fine tuning centered and the lowest high channel calls for a counter-clockwise 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.
3. 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.

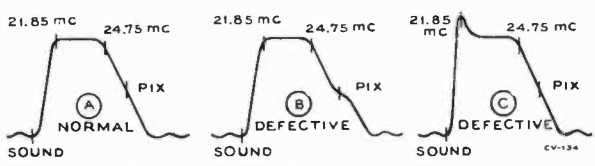


Figure 4—Overall Response Curves

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.

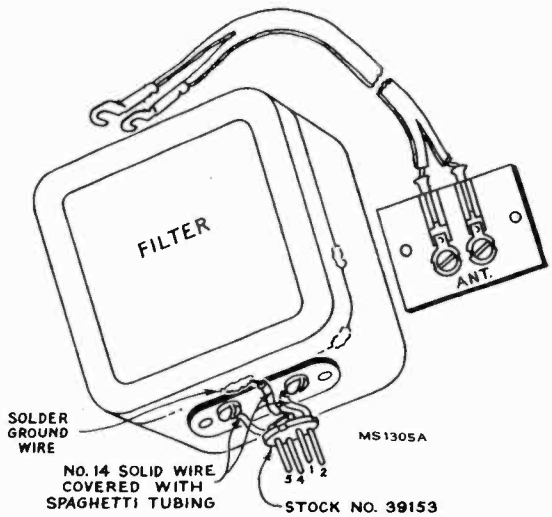


Figure 5—Filter for KRK5, KRK7 and KRK8 R-F Units

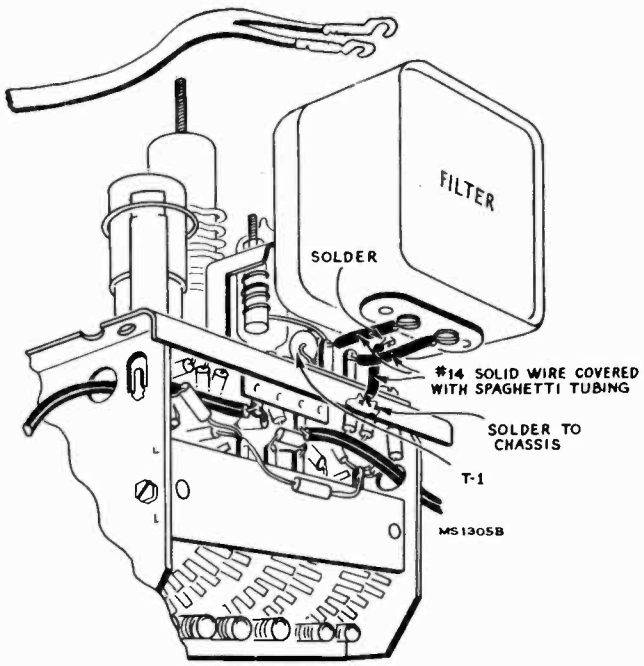


Figure 6—Filter for KRK2 R-F Units

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:

1. 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.
4. 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. 0 = ½ watt, 1 = 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 ½ watt, fixed composition resistor, 6800 ohms ±10%.

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

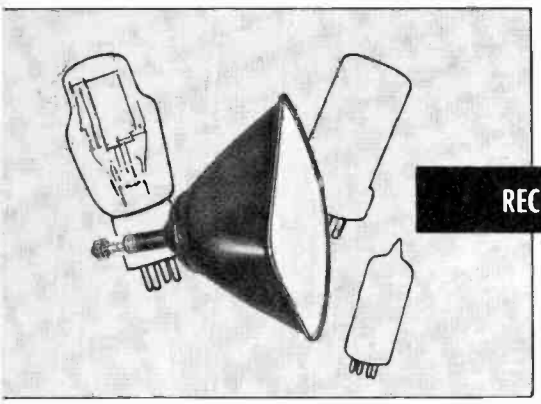
Receiver Models	Television Chassis	Radio Chassis	Record Changer	Kine-scope	R-F Tuner	Speaker Size	Television Power Supply	Audio Amplifier
TT5 (PRE WAR)	KC-3 or KC-3B†	—		5BP4	5 channels	None		
TRK5 (PRE WAR)	KC-3A or KC-3C†	RC429 & RS89A		5BP4	5 channels	12" EM		
TRK9 (PRE WAR)	KC-4A or KC-4C†	RC427A & RS83E		9AP4	5 channels	12" EM	KK-7A or KK-7E†	
TRK90 (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-7D†	
TRK120 (PRE WAR)	KC-4F or KC-4J†	RC427F & RS83E		12AP4	5 channels	12" EM	KK-7F or KK-7J†	
621TS	KCS21			7DP4	KRK2	4"x6" EM		
630TS	KCS20A or KCS20C-2†			10BP4	KRK2	5" EM		
630TCS	KCS20B or KCS20D-2†			10BP4	KRK2	12" EM		
641TV	KCS25A-1 or KCS25C-2†	RK117A	960001 (78 RPM)	10BP4	KRK2	12" EM		RS123A
648PTK	KCS24-1* KRS20-1** KRK1-1***	RK121A		5TP4	KRK2A	12" EM	KRS21	RS123A
648PV	KCS24A-1* KRS20-1** KRK1A***	RK121A	RP176 (78 RPM)	5TP4	KRK2A	12" EM	KRS21A-1	RS123B
721TS	KCS26-1 or KCS26-2†			10BP4	KRK2B-1	4"x6" EM		
721TCS	KCS26A-1 or KCS26A-2†			10BP4	KRK2B-1	12" EM		
730TV1	KCS27-1 or	RC610A	RP177	10BP4	KRK2B-1	12" PM		
730TV2	KCS27-2†	RC610B	RP177	10BP4	KRK2B-1	12" PM		
741PCS	KCS24B-1* KRS20A-1** KRK1A-1***			5TP4	KRK2A	12" EM	KRS21A-1	RS123C
8PCS41	KCS24B-1* KRS20A-1** KRK1A-1***			5TP4	KRK2A	12" EM	KRS21A-1	RS123C
8PCS41B	KCS24C-1* KRS20B-1** KRK4***			5TP4	KRK2A	12" EM	KRS21A-1	RS123C
8PCS41C	KCS24C-1* KRS20A-1** KRK1A-1***			5TP4	KRK2A	12" EM	KRS21A-1	RS123C
8TS30	KCS20J-1 or KCS20K-2†			10BP4	KRK2	5"x7" PM		
8TV41	KCS25D-1 or KCS25E-2†	RK117A	RP177A (78 RPM)	10BP4	KRK2	12" EM		RS123A
8T241, 8T243, 8T244	KCS28			10BP4	KRK5	5"x7" PM		
8T270	KCS29			16AP4	KRK5A	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		10BP4	KRK5	12" PM		
8TK320	KCS33A-1	RK135A-1		16AP4	KRK5A	12" PM		
8TV321	KCS30-1	RC616C or K	RP178	10BP4	KRK5	12" PM		
8TV323	KCS30-1	RC616B or J	RP178	10BP4	KRK5	12" PM		
9PC41(a)	KCS24C-1* KRS20B-1** KRK4***			5TP4	KRK2A	12" EM	KRS21A-1	RS123A
9PC41(b), 9PC41(c)	KCS24D* KRS20B-1** KRK4***			5TP4	KRK2A	12" EM	KRS21A-1	RS123A
9T240	KCS28			10BP4	KRK5	5"x7" PM		
9T240K	KCS28A			10BP4	KRK5	5"x7" PM		
9TC240	KCS28B			10BP4	KRK5A	12" PM		
9TC245, 9TC247, 9TC249	KCS34B or KCS34 in some 247 & 249			12LP4	KRK5	12" PM		
9T246	KCS28C or KCS38			10BP4	KRK7	5"x7" PM		
				10BP4	KRK7	5"x7" EM		
9T256	KCS38C			10BP4	KRK7	5"x7" EM		
9T270	KCS29			16AP4	KRK5A	8" PM		
9TC272, 9TC275	KCS29C			16AP4	KRK5A	12" PM		
9TW309	KCS41-1	RK135C	RP178 (78 RPM) RP168A-1(45RPM)	12LP4	KRK5	12" PM		
9TW333	KCS30-1	RC616N	RP178 (78 RPM) RP168A-1(45RPM)	10BP4	KRK5	12" PM		
9TW390	KCS31-1	RC617A	RP177B (78 RPM) RP168A-1(45RPM)	16AP4	KRK5A	12" PM		

†50 Cycle Chassis *R-F, I-F, Video Chassis **Deflection & HV Chassis ***Optical Barrel

TELEVISION RECEIVER MODELS AND CHASSIS

Receiver Models	Television Chassis	Radio Chassis	Record Changer	Kine-scope	R-F Tuner	Speaker Size	Television Power Supply	Audio Amplifier
T100	KCS38			10BP4	KRK7	5"x7" EM		
T120, T121	KCS34C			12LP4	KRK5	5"x7" PM		
TC124, TC125, TC127	KCS34B			12LP4	KRK5	12" PM		
TA128	KCS42A	RK135D	960282 (33/78) RP168 (45 RPM)	12LP4	KRK5	12" PM		
TA129	KCS41A-1	RK135D	960282 (33/78) RP168C (45 RPM)	12LP4	KRK5	12" PM		
T164	KCS40			16GP4	KRK5B	8" PM		
TC165, 166, 167, 168	KCS40A			16GP4	KRK5B	12" PM		
TA169	KCS43	RK135D	960285 (33/78) RP168C (45 RPM)	16GP4	KRK5B	12" PM		
S1000	KCS31-1	RC617B	960285 (33/78) RP168C (45 RPM)	16AP4	KRK5A	12" PM		
2T51	KCS45			12LP4	KRK8	5"x7" EM		
2T60	KCS45A			12LP4	KRK8	12" PM		
2T81	KCS46	RC1090	960282 (33/78) RP168 (45 RPM)	12LP4	KRK8	12" PM		
4T101	KCS61			14EP4	KRK8C	5"x7" PM		
4T141	KCS62	RC1090	960282 (33/78) RP190-2 (45 RPM)	14EP4	KRK8C	12" PM		
6T72	KCS40B			16GP4	KRK5B	12" PM		
6T53, 6T54	KCS47 or 47T			16GP4	KRK8B	8" PM		
6T64, 65, 71, 74, 75, 76	KCS47A or 47AT			16GP4	KRK8B	12" PM		
6T84	KCS48 or 48T	RC1090	960282 or 284 RP168 or 190	16GP4	KRK8B	12" PM		
6T86, 6T87	KCS48 or 48T	RC1092	960282 or 284 RP168 or 190	16GP4	KRK8B	12" PM		
7T103, 7T104	KCS47B			17CP4	KRK8B	8" PM		
7T103B, 7T104B	KCS47F			17GP4	KRK8B	8" PM		
7T112, 122, 123, 124	KCS47C			17GP4	KRK8B	12" PM		
7T112B, 122B, 123B, 125B	KCS47G or GF			17GP4	KRK8B	12" PM		
7T112B, 122B, 123B	KCS47GF-2			17GP4	KRK8B	12" PM		
7T111B	KCS47GF-2			17GP4	KRK8B	8" PM		
7T132	KCS47D		RP190	17CP4	KRK8B	12" PM		
7T143	KCS48A	RC1092	960284 (33/78) RP190 (45 RPM)	17CP4	KRK8B	12" PM		
9T57	KCS49 or 49T			19AP4A	KRK8B	8" PM		
9T77, 9T79	KCS49A or 49AT			19AP4A	KRK8B	12" PM		
9T89	KCS60 or 60T	RC1092	960284 (33/78) RP168 or 190	19AP4A	KRK8B	12" PM		
9T105	KCS49B, 49BF or 49BF-2			19AP4A	KRK8B	8" PM		
9T126, 9T128	KCS49C, 49CF or 49CF-2			19AP4A	KRK8B	12" PM		
9T147	KCS60A	RC1092	960284 (33/78) RP190 (45 RPM)	19AP4A	KRK8B	12" PM		
16T152	KCS47E			16GP4	KRK8B	8" PM		
17T150	KCS66C			17QP4	KRK11	4"x6" PM		
17T151, 17T163	KCS66C			17QP4	KRK11	8" PM		
17T153, 154, 155, 160	KCS66			17GP4	KRK11	8" PM		
17T162, 17T174	KCS66A			17GP4	KRK11	8" PM		
17T172, 17T173	KCS66A			17GP4	KRK11	12" PM		
17T172K, 17T173K	KCS66D			17CP4	KRK11	12" PM		
17T174K	KCS66D			17CP4	KRK11	8" PM		
17T200, 17T201, 17T202	KCS72			17QP4	KRK8D	5" PM		
17T211, 17T220	KCS72			17QP4	KRK8D	8" PM		
17T250DE	KCS74			17QP4	KRK11A	8" PM		
17T261DE	KCS74			17QP4	KRK11A	12" PM		
21T159	KCS68E			21AP4	KRK11	8" PM		
21T159DE	KCS68F			21AP4	KRK11A	8" PM		
21T165	KCS68E			21AP4	KRK11	12" PM		
21T166DE	KCS68F			21AP4	KRK11A	12" PM		
21T176, 177, 178, 179	KCS68C			21AP4	KRK11	12" PM		
21T174DE, 178DE, 179DE	KCS68F			21AP4	KRK11A	12" PM		
21T197DE	KCS68H	RC1111A	930409	21AP4	KRK11A	12" PM		RS141A
21T207, 21T207G	KCS72A			21AP4	KRK8D	5" PM		
21T208, 21T217, 21T229	KCS72A			21AP4	KRK8D	8" PM		
21T218, 21T227, 21T228	KCS72A			21AP4	KRK8D	12" PM		
21T242	KCS72D-1	RC1117B-1	930409	21AP4	KRK8D	12" PM		—
21T244	KCS72D-2	RC1111B	930409	21AP4	KRK8D	12" PM		RS141C

RCA RENEWAL PRODUCTS



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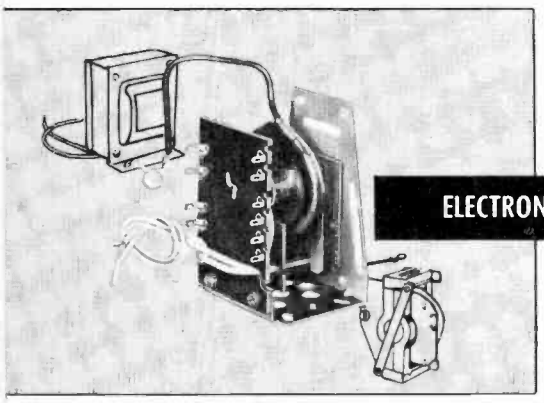

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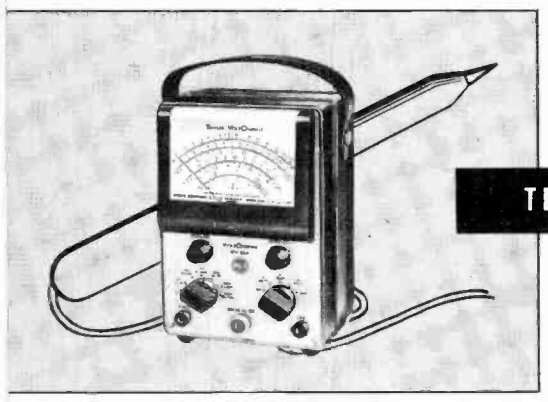

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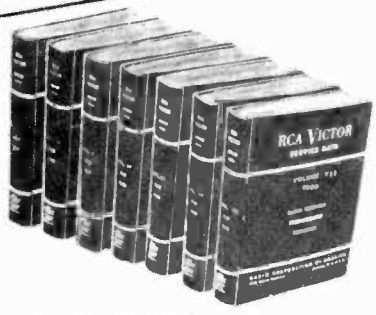

RCA VICTOR SERVICE DATA

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- ★ Alignment Procedures
- ★ Waveforms
- ★ Trouble-shooting Suggestions
- ★ Wiring Diagrams
- ★ Production Changes

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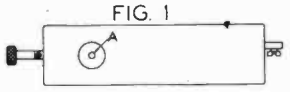
RCA CRYSTAL PICKUP DATA

CRYSTAL CARTRIDGE DRAWING CODE

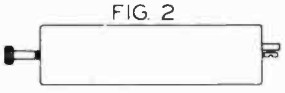
"A" Top Needle Hole
"B" Viscoloid Damper
"C" Thick (5/16-in.) Mtg. Hole
"D" Thin (7/32-in.) Mtg. Hole
"E" Grounded Lug
"F" Small Weight
"G" Large Weight
"H" Large "Cut" Weight
"J" 5/8-in. Needle Screw
"K" 11/16-in. Needle Screw
"L" 13/16-in. Needle Screw
"M" 15/16-in. Needle Screw

FIG. 1



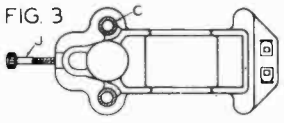
MS 1151 A

FIG. 2



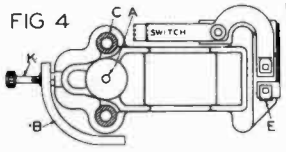
MS 1151 B

FIG. 3



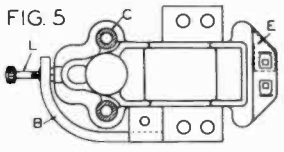
MS 1151 C

FIG. 4



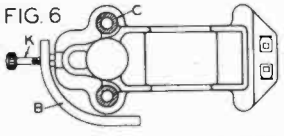
MS 1151 D

FIG. 5



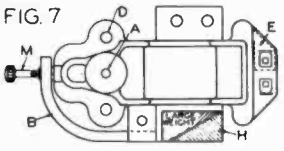
MS 1151 E

FIG. 6



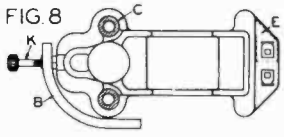
MS 1151 F

FIG. 7



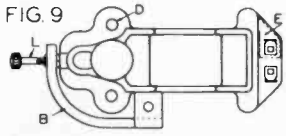
MS 1151 G

FIG. 8



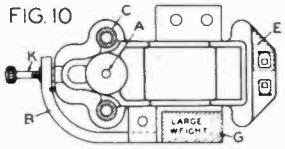
MS 1151 H

FIG. 9



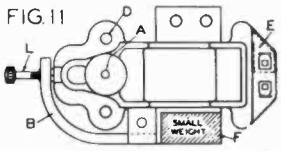
MS 1151 I

FIG. 10



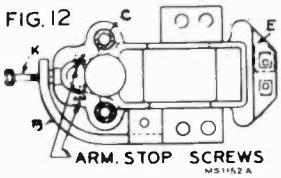
MS 1151 J

FIG. 11



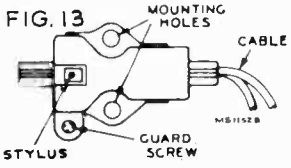
MS 1151 K

FIG. 12



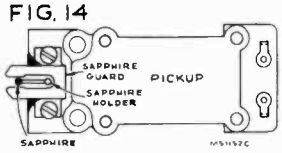
MS1152A

FIG. 13



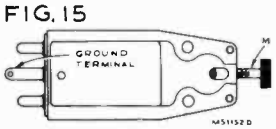
MS1152B

FIG. 14



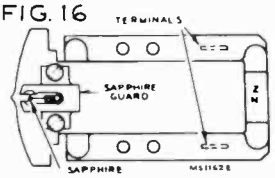
MS1152C

FIG. 15



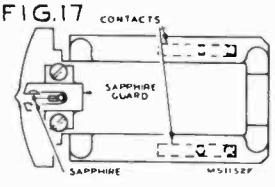
MS1152D

FIG. 16



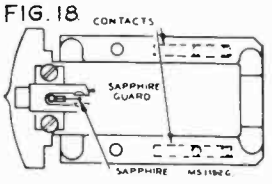
MS1152E

FIG. 17



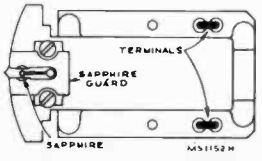
MS1152F

FIG. 18



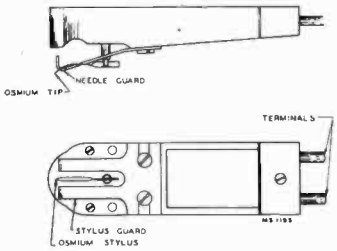
MS1152G

FIG. 19



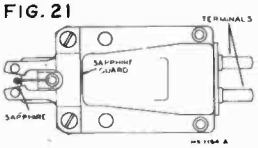
MS1152H

FIG. 20



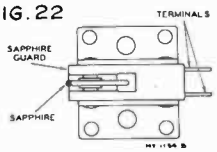
MS 1153

FIG. 21



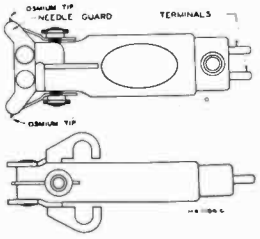
MS 1154 A

FIG. 22



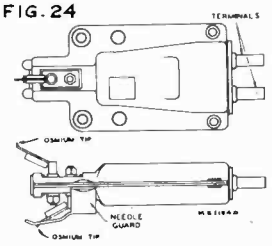
MS 1154 B

FIG. 23



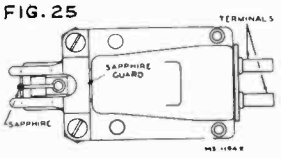
MS 1154 C

FIG. 24



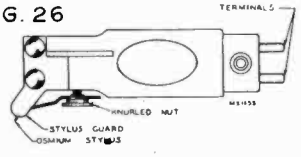
MS 1154 D

FIG. 25



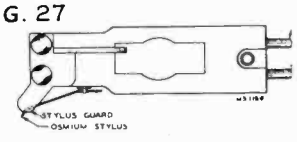
MS 1154 E

FIG. 26



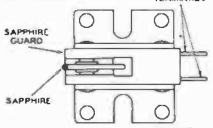
MS1155

FIG. 27



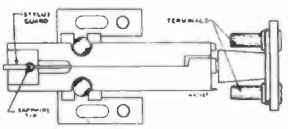
MS1156

FIG. 28



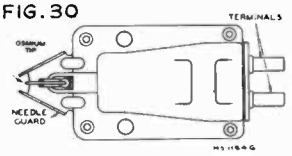
MS 1156 F

FIG. 29



MS 1157

FIG. 30



MS 1156 G

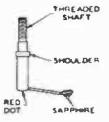


Fig. 101

MS 1160 A

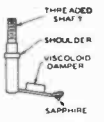


Fig. 102

MS 1160 B

Fig. 103

MS 1160 C

Fig. 104

MS 1160 D

Fig. 105

MS 1160 E

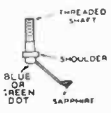


Fig. 106

MS 1160 F

Fig. 107

MS 1161 A

Fig.108

MS 1161 B

Fig. 109

MS 1161 C

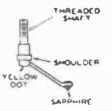


Fig. 110

MS 1161 D

Fig. 111

MS 1161 E

Fig. 112

MS 1161 F

MODEL vs. PICKUP CARTRIDGE

Model	Record Changer	Cartridge Stock No.
A-55	RP-168	* 74625
	960282-1	† 75044
A-78	RP-168	* 74625
	960282-1	† 75044
A-82	RP-168	* 74625
	RP-190-2	* 75575
	960282-4 or -5	† 75475
A-91	RP-168	* 74625
	RP-190-2	* 75575
	960284-1 or -2	† 75475
A-101	RP-190-2	* 75575
	960282-4 or -5 or 960284-1 or -2	† 75475
A-106	RP-168	* 74625
	960285-1	† 75044
A-108	RP-168	* 74625
	RP-190-2	* 75575
	960284-1 or -2	† 75475
O-50	.....	33217
QEY-3	RP-168	74984
QEY-4	RP-190-5	76297
QEY-5	RP-190-5	76297
QJY	RP-168	74984
QJY-2	RP-190-5	76297
QU-2C	.....	33905
QU-3C	.....	33905
QU-5C	RP-145E	33905
QU-51C	RP-145E	35171
QU-52C	RP-152S	35171
QU-56C	.....	33122
QU-61	960001-4	39851
QU-62	960001-4	39851
QU-68	960001-4	39851
QU-72	.....	39851
QU-72A	.....	39851
R-56	.....	39686
R-60	.....	33122
R-89	.....	31050
R-91	.....	31050
R-93B	.....	31050
R-93C	.....	31050
R-93F	.....	33122
R-94B	.....	31050
R-98	.....	31156
R-100	.....	33122
R-103S	.....	33122
R-560P	.....	33122
R-566P	RP-162	38610
S-1000	RP-168	* 74625
	960285-1	† 75044
TA-128	RP-168	* 74625
	960282-1	† 75044
TA-129	RP-168	* 74625
	960282-1	† 75044
TA-169	RP-168	* 74625
	960285-1	† 75044
U-8	.....	33122
U-9	.....	33122
U-10	.....	33122
U-12	.....	33905
U-20	.....	33905
U-25	RP-132M	31156
U-26	RP-132M	31156
U-30	RP-132M	31156
U-40	RP-139A	35171
U-42	RP-145	35171
U-43	RP-145	35171
U-44	RP-145	35171
U-45	RP-139A	35171
U-46	RP-140	33905
U-50	.....	33217
U-104	.....	31050
U-106	RP-129B (9820)	14820
U-107	RP-129A (9820)	14820
U-108	RP-129 (9820)	14820
U-109	RP-129 (9820)	14820
U-111	.....	31050
U-112	.....	31050
U-115	.....	31050
U-119	.....	31156
U-121	.....	31050
U-122E	.....	31156
UY-122E	.....	31156
U-123	RP-139B	31156
U-124	.....	31156
UY-124	.....	31156
U-125	RP-132C	31156
U-126	.....	31156
U-127E	.....	31050
U-128	RP-132	31156
U-129	RP-132F	31156
U-130	RP-132C	31156
U-132	RP-132B	32632
U-134	RP-132B	32632
V-100	.....	33122
V-101	.....	33122
V-102	.....	33905
V-105	.....	33122
V-135	RP-162	38610
V-140	RP-162	38610
V-170	RP-152	35171
V-175	RP-158	38610
V-200	RP-152A	35171
V-201	RP-152A	35171
V-205	RP-152B	37158
V-209	RP-158	38610
V-210	RP-158	38610
V-215	RP-160	38453 or 39550
V-219	RP-160	38453 or 39550
V-221	RP-160	38453 or 39550
V-225	RP-151 Top	38453
	RP-151 Bott.	38598
V-300	RP-152J	37158
V-301	RP-153	33905
V-302	RP-153	33905
V-405	RP-152J	37158
VA-15	RP-152	35171
VA-20	.....	31050
VA-21	.....	33122
VA-22	RP-139D	31156
VA-22A	RP-145C	33905
VA-24	RP-145C	33905
VHR-202	RP-155	37158
VHR-207	RP-155	37158
VHR-212	RP-161	38610
VHR-307	RP-155	37158
VHR-407	RP-155	37158
2-S7-ED	.....	73839
2-T-81	RP-168	* 74625
	RP-190-2	* 75575
	960282-4 or-5	† 75475
4-QV-8C	RP-168	*S-5578
	960282-2	†S-5652
4-T-141	RP-190-2	* 75575
	960282-4 or-5	† 75475
6-J	.....	70338
6-JM	.....	70338
6-QU	.....	33122
6-QU-3	RP-178-3	72551
6-QU-3Y	RP-168	74984
6-QV-3	RP-178-3	72551
6-T-84	RP-168	* 74625
	RP-190-2	* 75575
	960282-4 or-5	† 75475
6-T-86	RP-168	* 74625
	RP-190-2	* 75575
	960284-1 or-2	† 75475
6-T-87	RP-168	* 74625
	RP-190-2	* 75575
	960284-1 or-2	† 75475
7-QV-5	960001-4	39851
7-T-132	RP-190-2	75575
7-T-143	RP-190-2	* 75575
	960284-1 or-2	† 75475
8-QU-5C	.....	34307
8-TV-41	RP-177A	72551
8-TV-321	RP-178	72551
8-TV-323	RP-178	72551
8-V-7	RP-178	72551
8-V-90	RP-178	72551
8-V-91	RP-178	72551
8-V-112	RP-178	72551
8-V-151	RP-177B	70339
9-EY-3	RP-168	74067
9-EYM-3	RP-168	74067
9-EY-31	RP-168	74625
9-EY-32	RP-168	74625
9-EY-35	RP-168	74067
9-EY-36	RP-168	74067
9-JY	RP-168	74067
9-JYM	RP-168	74067
9-QV-5	RP-168	*S-5578
	960282-2	†S-5652
9-T-89	RP-168	* 74625
	RP-190-2	* 75575
	960284-1 or-2	† 75475
9-T-147	RP-190-2	* 75575
	960284-1 or-2	† 75475
9-TW-309	RP-168	* 74625
	RP-178	‡ 72551
9-TW-333	RP-168	* 74067
	RP-177	‡ 72551
9-TW-390	RP-168	* 74067
	RP-177	‡ 72551
9-W-51	RP-168	74625
9-W-78	RP-168	* 74625
	RP-178	‡ 72551
9-W-101	RP-168	74067
9-W-102	RP-168	74067
9-W-103	RP-168	74067
9-W-105	RP-168	* 74067
	RP-178	‡ 72551
9-W-106	RP-168	* 74625
	RP-178	‡ 72551
9-Y-7	RP-168	74067
9-Y-51	RP-168	74625
9-Y-510	RP-190-1 or-4	75476 or 76318
9-Y-511	RP-168	74625
11-QU	RP-132A	31156
12-QU	RP-132A	31156
45-EY	RP-168	74067 or 74625
45-EY-1	RP-168	74067
45-EY-2	RP-190-1 or-4	75476 or 76318
45-EY-3	RP-190-1 or-3	75476 or 76318
45-EY-15	RP-168	74067
45-J	RP-168	74067
45-J-2	RP-190-1 or-4	75476 or 76318
45-J-2	RP-190-6	74067
45-J-3	RP-193	76257
45-W-9	RP-190-2	75575
45-W-10	RP-190-2	75575
55-U, 55-AU	960015	71173 or 70338
58-V, 58-AV	960001-1	39851
59-V-1	960001-2	70332
59-AV-1	960001-2	70332
62-1	960260-2	70338
63-E	.....	70338
63-EM	.....	70338
65-U	960260-2	70338
65-AU	960260-2	70338
65-AU-1	960260-2	70338
66-E	.....	70332
66-ED	.....	70332
66-E-1	.....	70332
67-V-1	960260-1	70338
67-AV-1	960260-1	70338
75-ZU	RP-178 or 960276	72551 70338
77-V	RP-178	72551
77-V-1	960260-1	70338
77-V-2	960260-1	70338
610-V-1	960001-5or-6 or RP-177	39851 72551
610-V-2	960001-5 or-6 or RP-177	39851 72551
612-V-1	RP-176A or RP-176B	70339
612-V-3	RP-176 or RP-176B	70339
612-V-4	RP-176 or RP-176B	70339
641-TV	960001-1 or-6	39851
648-PV	RP-176	70339
710-V-2	RP-177 or RP-177A	72551
711-V-1	960001-5	39851
711-V-2	960001-5	39851
711-V-3	960001-5	39851
730-TV-1	RP-177 or RP-177A	72551
730-TV-2	RP-177 or RP-177A	72551

*=45 r.p.m.
†=78/33 r.p.m.
‡=78 r.p.m.

PICKUP CARTRIDGES WITH NEEDLE SCREW

Stock No.	Fig. No.
14820	1
30708▲	2
31050	3
31156	4
32632▲	4
33122▲	5
33217▲	6
33905▲	7
34225	8
34307	9
34710	10
35171▲	7
37158	11
39686▲	12
71173	15

▲Discontinued:
30708→use 14820
32632→use 31156
33122→use 9890
33217→use 9890
33905→use 37158
35171→use 37158
39686→use 9890

PICKUPS WITH REPLACEABLE STYLUS

Pickup Stock No.	Pickup Fig. No.	Stylus Stock No.	Stylus Fig. No.
9890	16-ZN	39863▲	101
38453▲	17-AL	38449▲	102
38598	18	38449▲	
38610	13	39564	103
39851▲	19-ZN	39863▲	101
39550	17-ZN	38449▲	102
39919	17-AL	38449▲	102
70332▲	19-AL	38449▲	102
70338	14-AL	72345	101
70339	14-AL	70915	102
72551	14-ZN	72345	101
73839	20	73840	104
74067	21	74068	105
74625	21	74818	106
74984■▲	22	74985	107
75044	23	75045①	108
		75046②	108
75475	24	75496①	109
		75497②	109
75575	25	75770	110
75976	16-ZN	39863▲	101
76257	26	76374③	111
	27	76323④	112
76297■	28	74985	107
76318▲	21	75496	109
S-5652■	23	75045①	108
		75046②	108

PICKUPS WITH FIXED STYLUS

Stock No.	Fig. No.
S-5578■	29
75476▲	30

ZN=Zinc case,
AL=Aluminum case
■Ceramic type pickup
▲Discontinued:
38449→use 70915
38453→use 39919
39851→use 75976
39863→use 73345
70332→use 75976
74984→use 76297
75476→use 74067
76318→use 74067
①33⅓ r.p.m.—RED
②78 r.p.m.—PLAIN
③For pickups marked 988370-1
④For pickups marked 988370-2
S-5652 and S-5578 are available only thru RCA International Div.

2 B 400 SERIES

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

RCA VICTOR

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

Tuning Range ..... 540-1600 kc

Intermediate Frequency ..... 455 kc

Tube Complement:

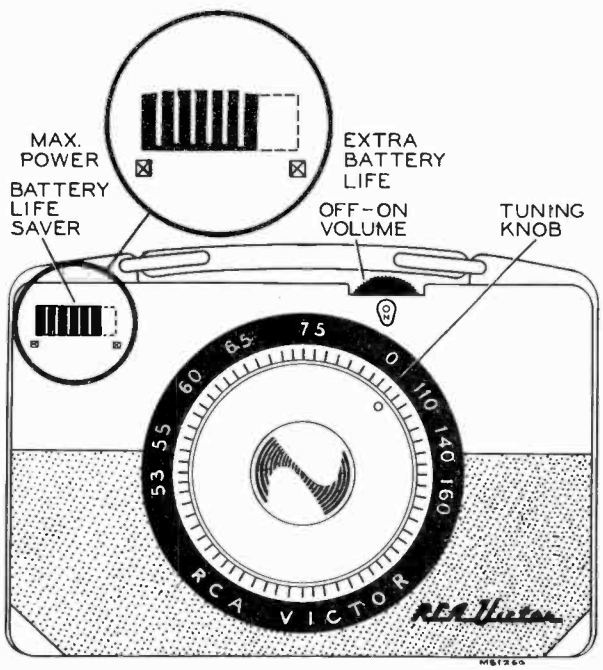
1. RCA 1R5 ..... Converter
2. RCA 1U4 ..... I.F. Amplifier
3. RCA 1U5 ..... Det. A.F.Amp. A.V.C.
4. RCA 3V4 ..... Output

Loudspeaker

Size and type ..... 2" x 3" P.M.

Voice coil impedance ..... 11¾ ohms at 1000 cycles

Weight (with batteries) ..... approx. 3¾ lbs.



Controls

Batteries Required:

Type of Battery	Current Drain — Normal Pos.	Current Drain — 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:

Undistorted ..... .075 watt

Maximum ..... 0.10 watt

Dimensions (over-all) ..... approx. 8⅞" x 5⅞" x $2\frac{11}{16}$"

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.

Off-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.

Alignment Procedure

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.

Steps	Connect high side of test osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output—
1	High side of ant. coil (terminal lug on coil which is connected to Pin #6 of 1R5 tube)	455 kc	Quiet point near 1600 kc	Trimmers of 2nd I-F trans
2				Trimmers of 1st I-F trans.
3		Repeat steps 1 and 2		
4	Short wire placed near ant. coil for radiated signal	1400 kc	14 Rock gang	C1-1T (osc.)
5		600 kc	60 Rock gang	L2 (osc.)
6		Repeat steps 4 and 5		

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 inserting 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 must 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

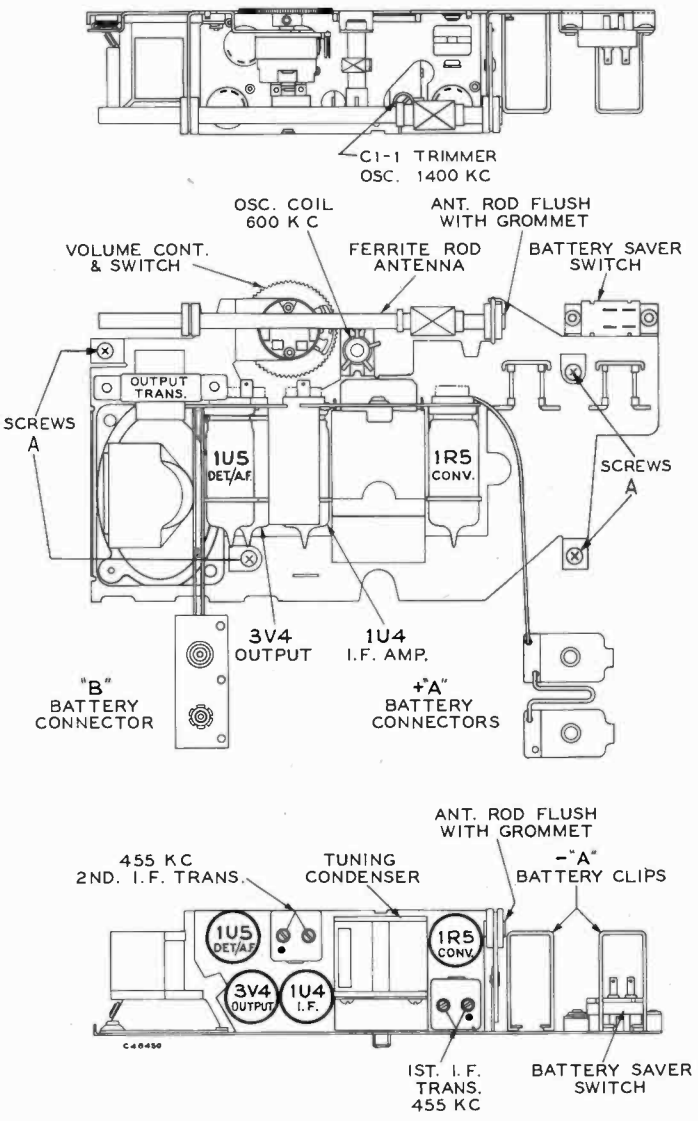
a. Remove chassis.

b. Spread the open end of the spring clip retainer no more than necessary to permit removal of clip.

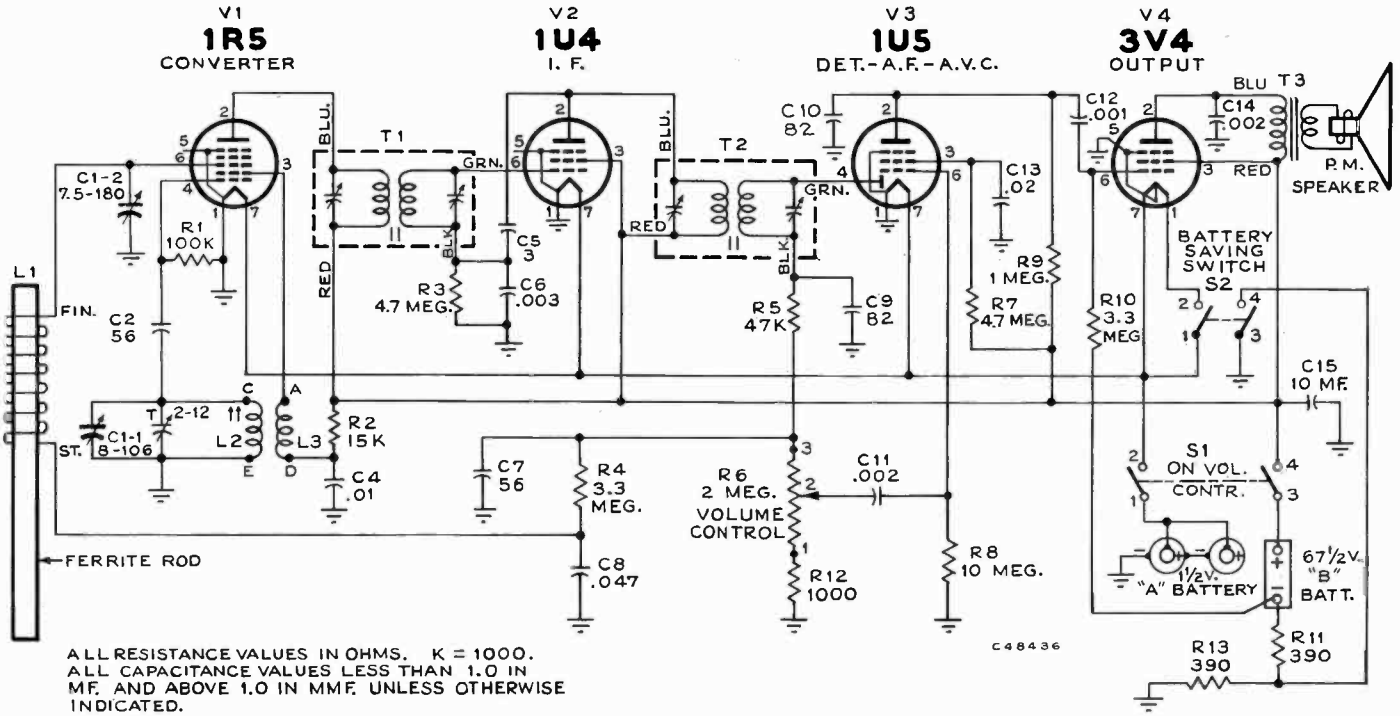
c. Slide the clip clear of the slider button.

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.

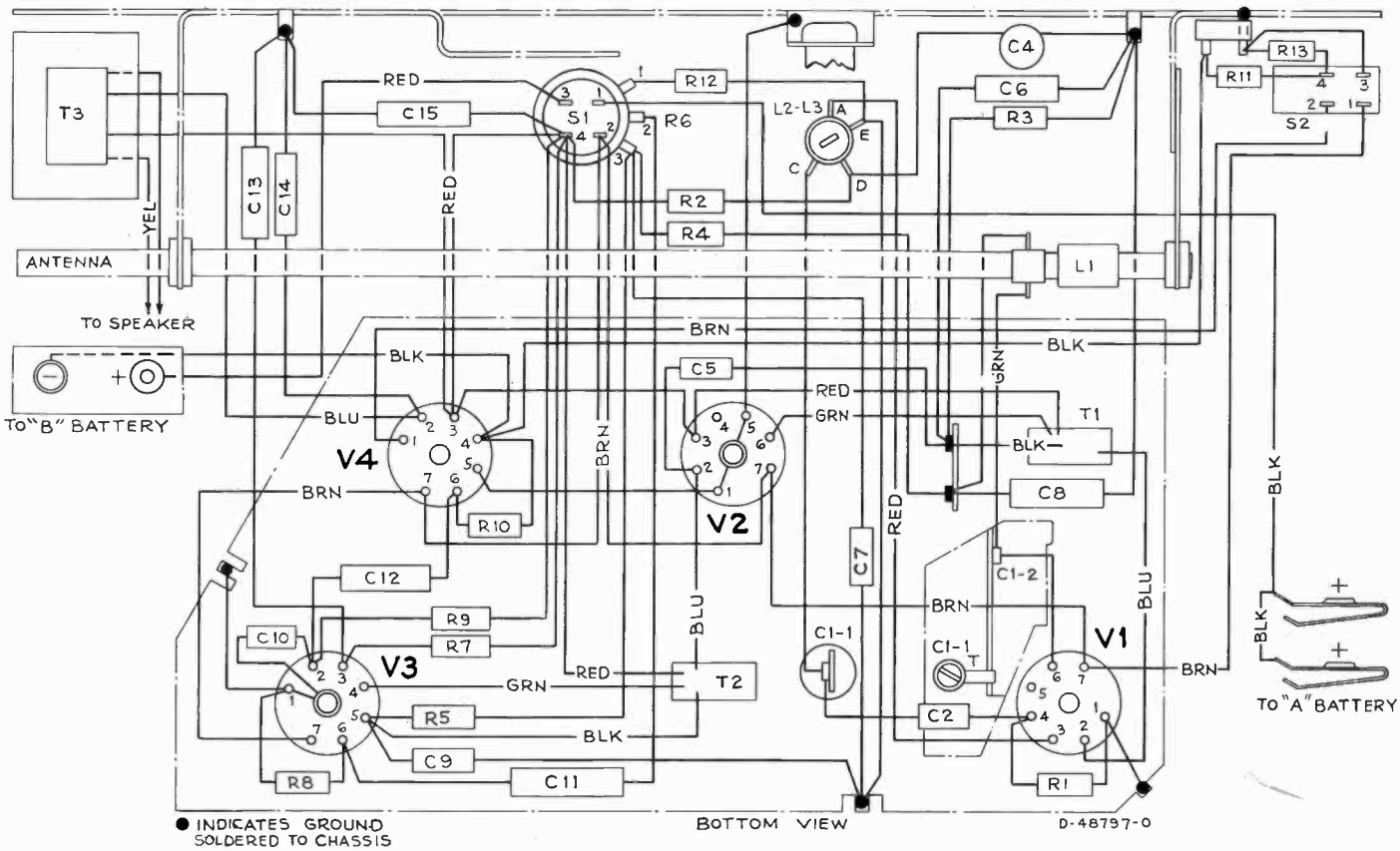


Tube and Trimmer Locations



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.



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.

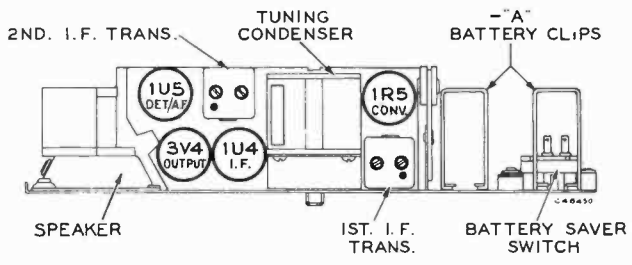
Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1114
76847	Antenna—Ferrite rod antenna (L1)
76846	Capacitor—Variable tuning capacitor (C1-1, C1-2)
57090	Capacitor—Ceramic, 3 mmf. (C5)
75784	Capacitor—Ceramic, 56 mmf. (C2, C7)
75785	Capacitor—Ceramic, 82 mmf. (C9, C10)
73960	Capacitor—Ceramic, 10,000 mmf. (C4)
73964	Capacitor—Electrolytic, 10 mfd., 70 volts (C15)
72792	Capacitor—Tubular, paper, .001 mfd., 200 volts (C12)
73750	Capacitor—Tubular, paper, .002 mfd., 200 volts (C11, C14)
73961	Capacitor—Tubular, paper, .003 mfd., 200 volts (C6)
71928	Capacitor—Tubular, paper, .02 mfd., 200 volts (C13)
73558	Capacitor—Tubular, paper, .047 mfd., 200 volts (C8)
76852	Clip—"A" battery mounting clip (formed spring wire) (2 required)
75010	Clip—"C" clip and screw to mount output transformer
75774	Coil—Oscillator coil complete with adjustable core (L2, L3)
76854	Contact—"A" battery contact (2 required)
75773	Control—Volume control and power switch (R6, S1)
37396	Grommet—Rubber grommet for antenna rod (2 required)
76853	Insulator—Bakelite insulator for ferrite rod antenna
76851	Knob—Volume control and power switch knob—less set screw
76855	Lead—"B" battery lead complete with connector
	Resistor—Fixed, composition:—
503139	390 ohms, ±10%, ½ watt (R11, R13)
504210	1000 ohms, ±20%, ½ watt (R12)
503315	15,000 ohms, ±10%, ½ watt (R2)
504347	47,000 ohms, ±20%, ½ watt (R5)
504410	100,000 ohms, ±20%, ½ watt (R1)
504510	1 megohm, ±20%, ½ watt (R9)
504533	3.3 megohm, ±20%, ½ watt (R4, R10)
504547	4.7 megohm, ±20%, ½ watt (R3, R7)
504610	10 megohm, ±20%, ½ watt (R8)
70527	Screw—#6-32 x 3/16" socket head set screw for volume control knob
75780	Socket—Tube socket, 7 pin, miniature, saddle mounted
76848	Switch—Battery saver switch (S2)
76849	Transformer—First I.F. transformer (T1)
76850	Transformer—Second I.F. transformer (T2)
75777	Tansformer—Output transformer (T3)
	SPEAKER ASSEMBLY 92523-W
76373	Speaker—2" x 3" P.M. speaker complete with cone and voice coil
	MISCELLANEOUS
76841	Back—Case back—GREY—for Model 2B400
77159	Back—Case back—BLACK—for Model 2B401
77160	Back—Case back—IVORY—for Model 2B402
77161	Back—Case back—GREEN—for Model 2B403
77162	Back—Case back—TAN—for Model 2B404
77163	Back—Case back—RED—for Model 2B405
76859	Button—Battery saver switch slider button—GREY—for Model 2B400
77164	Button—Battery saver switch slider button—BLACK—and spring clip for Model 2B401
77165	Button—Battery saver switch slider button—IVORY—and spring clip for Model 2B402
77166	Button—Battery saver switch slider button—GREEN—and spring clip for Model 2B403
77167	Button—Battery saver switch slider button—TAN—and spring clip for Model 2B404
77168	Button—Battery saver switch slider button—RED—and spring slip for Model 2B405
76838	Case—Case assembly—GREY—less handle, links and back for Model 2B400
77154	Case—Case assembly—BLACK—less handle, links and back for Model 2B401
77155	Case—Case assembly—IVORY—less handle, links and back for Model 2B402
77156	Case—Case assembly—GREEN—less handle, links and back for Model 2B403
77157	Case—Case assembly—TAN—less handle, links and back for Model 2B404
77158	Case—Case assembly—RED—less handle, links and back for Model 2B405
76860	Clip—Retaining spring clip for battery saver switch slider button
76842	Dial—Polystyrene dial scale—GREY—for Model 2B400
77169	Dial—Polystyrene dial scale—BLACK—for Model 2B401
77170	Dial—Polystyrene dial scale—IVORY—for Model 2B402
77171	Dial—Polystyrene dial scale—GREEN—for Model 2B403
77172	Dial—Polystyrene dial scale—TAN—for Model 2B404
77173	Dial—Polystyrene dial scale—RED—for Model 2B405
76844	Emblem—"RCA Victor" emblem
73843	Grille—Metal grille—perforated—GREY—for Model 2B400
77179	Grille—Metal grille—perforated—GOLD—for Models 2B401 and 2B402
77180	Grille—Metal grille—perforated—GREEN—for Model 2B403
77181	Grille—Metal grille—perforated—TAN—for Model 2B404
77182	Grille—Metal grille—perforated—RED—for Model 2B405
73839	Handle—Carrying handle—BLACK—for Models 2B400 and 2B401
77183	Handle—Carrying handle—BEIGE—for Model 2B402
77184	Handle—Carrying handle—GREEN—for Model 2B403
77185	Handle—Carrying handle—BROWN—for Model 2B404
77186	Handle—Carrying handle—RED—for Model 2B405
76856	Knob—Tuning control knob—GREY—for Model 2B400
77174	Knob—Tuning control knob—BLACK—for Model 2B401
77175	Knob—Tuning control knb—IVORY— for Model 2B402
77176	Knob—Tuning control knob—GREEN—for Model 2B403
77177	Knob—Tuning control knob—TAN—for Model 2B404
77178	Knob—Tuning control knob—RED—for Model 2B405
73840	Link—Carrying handle link (2 req'd)
73858	Ring—Bearing ring for tuning knob
7C857	Screw—#4-40 x 7/32" cross recessed binder head machine screw for mounting chassis (4 req'd)
74734	Spring—Spring clip for tuning control knob

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

Incorrect Tube Location Label:

A few 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.

RCA VICTOR

AC-DC-Battery Portable Receiver

MODEL 2BX63

Chassis No. RC-1115

SERVICE DATA

— 1952 No. 8 —

PREPARED BY RCA SERVICE CO., INC.

FOR

RADIO CORPORATION OF AMERICA

RCA VICTOR DIVISION

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

Specifications

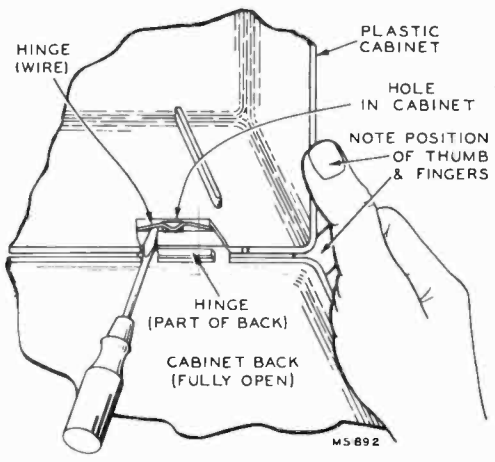
Tuning Range ..... 540-1,600 kc
Intermediate Frequency ..... 455 kc
Power Supply Rating
Power Line Operation
115 volts, d. c. or 50 to 60 cycles a. c. ..... 15 watts
or
Battery Operated ..... using RCA VS 057W Battery
(Average battery life — 100 hrs. intermittent service)
Battery current ..... "A" 50 ma., "B" 13 ma.

Tube Complement
(1) RCA 1T4 ..... R.F. Amplifier
(2) RCA 1R5 ..... Converter
(3) RCA 1T4 ..... I.F.-Amplifier
(4) RCA 1U5 ..... Det. — AVC — 1st A.F.
(5) RCA 3V4 ..... Output
A selenium rectifier is used.

Weight (Approx.)
Without battery . . 4 lb. 10 oz. With battery . . 7 lb. 12 oz.
Power Output
Undistorted ..... 0.170 watt
Maximum ..... 0.320 watt
Loudspeaker ..... 4 in. P.M.
Voice Coil impedance ..... 3.2 ohms at 400 cycles
Cabinet Dimensions
Height . . . . 8 in. Width . . . . 12½ in. Depth . . . . 5⅝ in.

To Remove Hinges

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



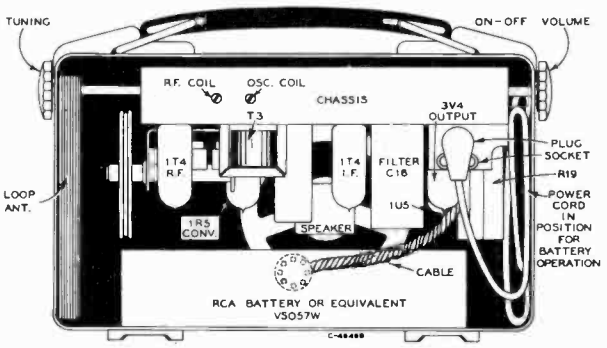
Removal of Cabinet Back

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 to
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

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—remove chassis—remove bottom plate.			
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.			1st I.F. Trans. T1 Top & Bottom
4	Replace bottom cover and install chassis in cabinet. Re-connect loop.			
5	Short wire placed near loop for radiated signal	1620 kc	min. cap.	1600 kc osc. trimmer C1-3T
6		1400 kc	1400 kc Signal	1400 kc r.f. & ant. trimmers*
7		Connect a 22,000 ohm resistor in parallel with r.f. tuning cond. C1-2		
8		600 kc	600 kc Signal	L4 osc. core* while rocking gang
9		Remove the 22,000 ohm resistor from r.f. tuning cond. 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.

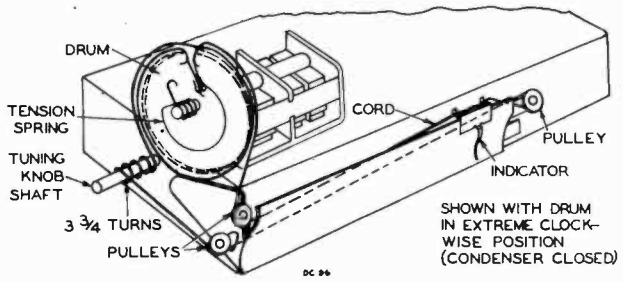
Critical Lead Dress

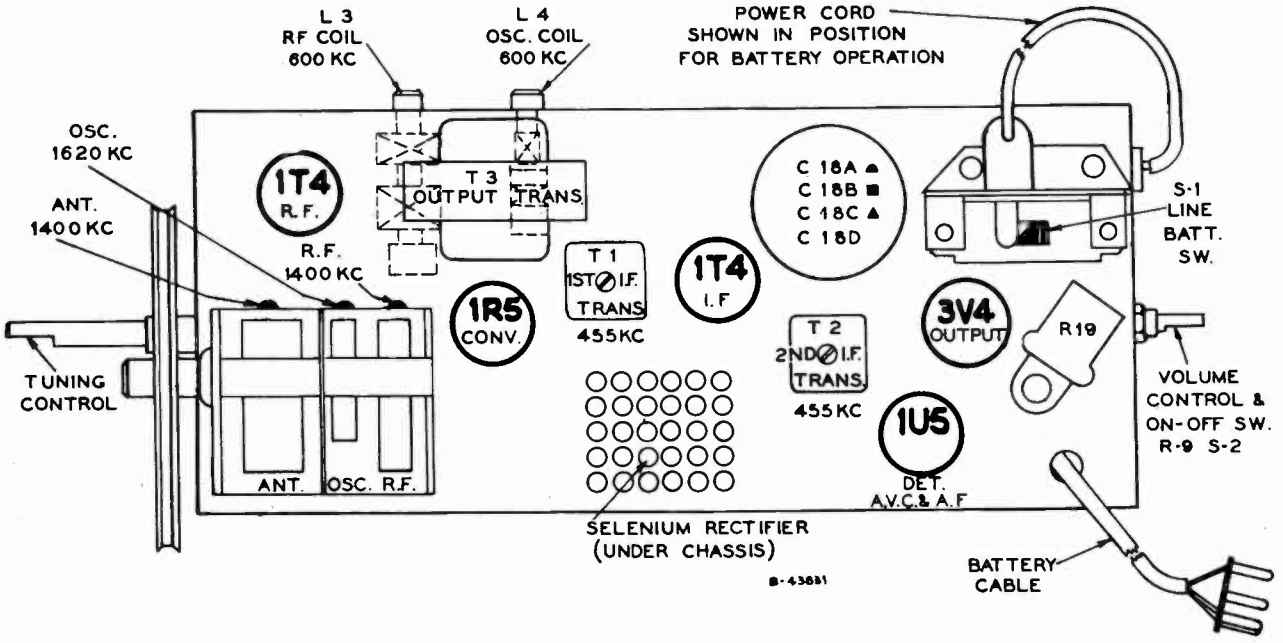
1. Dress all filament leads next to chassis.
2. Use short pigtail leads on components to V1, Pin 6.
3. Dress gang leads direct to avoid excess lead length.
4. Dress loop leads away from gang tuning drum.
5. Dress capacitors C3, C4, C6 for RF shielding.
6. Use short pigtail lead on C21 to V3-2 and dress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

CAUTION.—

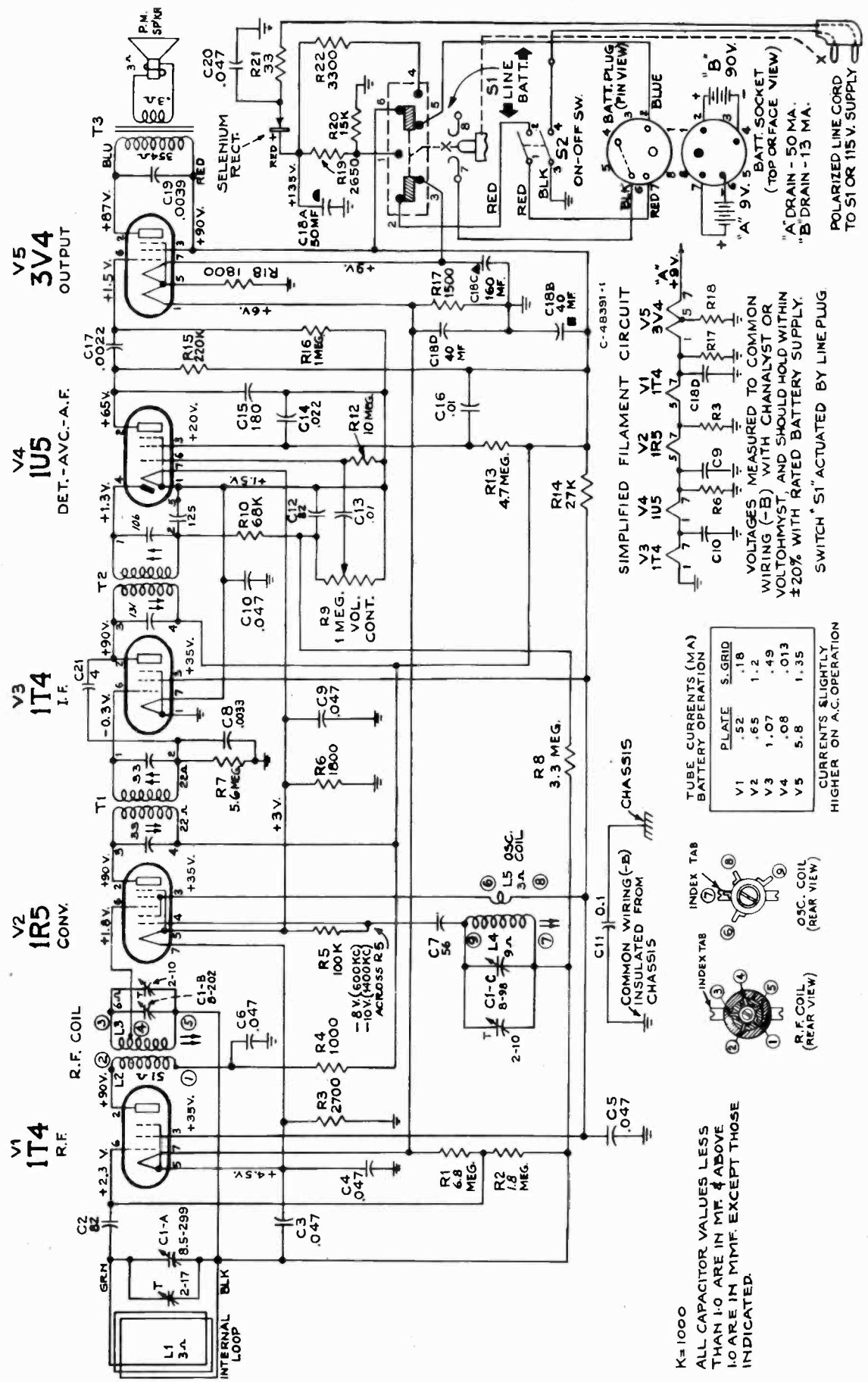
Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.

Dial-Indicator and Drive Mechanism





Tube and Trimmer Locations



Schematic Diagram—Chassis No. RC-1115

Replacement Parts

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC-1115
77054	Capacitor—Variable tuning capacitor complete with drive drum C1A, C1B, C1C
73153	Capacitor—Ceramic, 4 mmf. C21
39622	Capacitor—Mica, 56 mmf. C7
71514	Capacitor—Ceramic, 82 mmf. C2, C12
51416	Capacitor—Mica, 180 mmf. C15
76659	Capacitor—Electrolytic comprising 1 section of 50 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 C18A, C18B, C18C, C18D
73595	Capacitor—Tubular, paper, .0022 mfd., 600 volts .. C17
73795	Capacitor—Tubular, paper, .0033 mfd., 600 volts .. C8
73796	Capacitor—Tubular, paper, .0039 mfd., 600 volts .. C19
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts C13, C16
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts C14
73558	Capacitor—Tubular, paper, .047 mfd., 200 volts C4, C5, C9, C10
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts C3, C6
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts C20
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts C11
73935	Clip—Mounting clip for I.F. transformer
73114	Coil—Oscillator coil complete with adjustable core L4, L5
74992	Coil—RF coil complete with adjustable core .. L2, L3
71041	Connector—5 contact male connector or battery cable
72776	Connector—Single contact pin connector or output transformer leads (2 req'd)
75474	Connector—Single contact male connector for output transformer leads
74285	Control—Volume control and power switch ... R9, S2
72953	Cord—250' Drive Cord Reel (approx. 50" required)
70022	Cord—Power cord and plug
77051	Dial—Metal dial scale complete with (3) pulleys
74838	Grommet—Power cord strain relief (1 set)
72283	Grommet—Rubber grommet for mounting variable capacitor
18469	Plate—Bakelite mounting plate for electrolytic
77053	Pointer—Station selector pointer
72602	Pulley—Drive cord pulley
74322	Rectifier—Selenium rectifier
74319	Resistor—Wire wound, 2650 ohms, 7 watts R19
	Resistor—Fixed, composition:—
514033	33 ohms, ±20%, 1 watt R21
504210	1000 ohms, ±20%, ½ watt R4
503215	1500 ohms, ±10%, ½ watt R17
503218	1800 ohms, ±10%, ½ watt R6, R18
503227	2700 ohms, ±10%, ½ watt R3
513233	3300 ohms, ±10%, 1 watt R22
504315	15,000 ohms, ±20%, ½ watt R20
503327	27,000 ohms, ±10%, ½ watt R14
504368	68,000 ohms, ±20%, ½ watt R10
504410	100,000 ohms, ±20%, ½ watt R5
503422	220,000 ohms, ±10%, ½ watt R15
504510	1 megohm, ±20%, ½ watt R16
503518	1.8 megohm, ±10%, ½ watt R2
503533	3.3 megohm, ±10%, ½ watt R8
504547	4.7 megohm, ±20%, ½ watt R13
503556	5.6 megohm, ±10%, ½ watt R7
503568	6.8 megohm, ±10%, ½ watt R1
504610	10 megohm, ±20%, ½ watt R12
73117	Socket—Tube socket, 7 pin, miniature
76368	Spring—Drive cord spring
71039	Switch—"Line-Battery" switch S1
73129	Transformer—First I.F. transformer complete with adjustable cores T1
75487	Transformer—Second I.F. transformer complete with adjustable cores T2
71047	Transformer—Output transformer T3
33726	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLIES 971495-7W RL-108B10
77055	Speaker—4" P.M. speaker complete with cone and voice coil (3.2 ohms)
	MISCELLANEOUS
77068	Antenna—Antenna loop assembled to polystyrene frame and support L1
77060	Back — Cabinet back — polystyrene — complete with strikes
77061	Cap—Carrying handle cap and chassis support
77065	Case—Case front—less handle, handle support, caps, links and chassis mounting screw
77064	Emblem—"RCA Victor" emblem
77057	Eyelet—Metal eyelet for mounting loop assembly
77066	Grille—Metal grille
77056	Grommet—Rubber grommet for mounting loop assembly
77063	Handle—Carrying handle
74790	Hinge—Cabinet hinge (2 req'd)
77248	Knob—Control knob
77062	Link—Carrying handle link
77013	Nut—Speed nut for fastening "RCA Victor" emblem
76671	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
74734	Spring—Spring clip for knobs
77467	Washer—Knob washer—felt
77067	Window—Clear vinylite dial window

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

RCA VICTOR

A-C Operated Clock Radio Receiver

2-C-511 SERIES

Chassis No. RC-1118

SERVICE DATA

— 1952 No. 12 —

2C511 *Black & Gray* | *2C512* *Ivory* | *2C513* *Red* | *2C514* *Two Tone Gray*

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

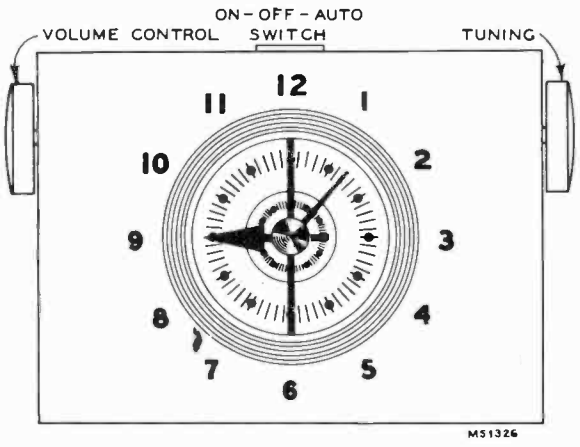
SPECIFICATIONS

Tuning Range ..... 540-1600 kc
Intermediate Frequency ..... 455 kc
Tube Complement:
(1) RCA 12BE6 ..... Converter
(2) RCA 6BJ6 ..... I.F. Amplifier
(3) RCA 12AV6 ..... Det.-AVC-A.F. Amp.
(4) RCA 6AK6 ..... Output
RCA Stock No. 77292 ..... Rectifier
Power Supply Rating:
115 volts a.c., 60 cycles ..... 20 watts
CAUTION: DO NOT OPERATE ON D.C.

Loudspeaker:
Size and type ..... 3 in. P.M.
Voice Coil impedance ..... 3.2 ohms at 400 cycles
Power Output:
Undistorted ..... 0.19 watts
Maximum ..... 0.35 watts
Tuning Drive Ratio ..... 1 to 1 (Direct Drive)
Weight ..... 4½ lbs.
Dimensions (overall):
Height....6" Width....8½" Depth....4½"

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.

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.

ALIGNMENT TABULATION

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	455 kc	Quiet-point 1600 kc end of dial	T2 (top and bottom) 2nd I-F trans.
2	Stator of C1-A through .01 mfd.			T1 (top and bottom) 1st I-F trans.
3	Short wire placed near loop to radiate signal	1620 kc	Min. cap.	osc. trimmer C1B-T
4		1400 kc	1400 kc signal	ant. trimmer C1A-T
5		600 kc	600 kc (rock)	(osc. coil) Slug L3
6		Repeat steps 3, 4, and 5		

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.

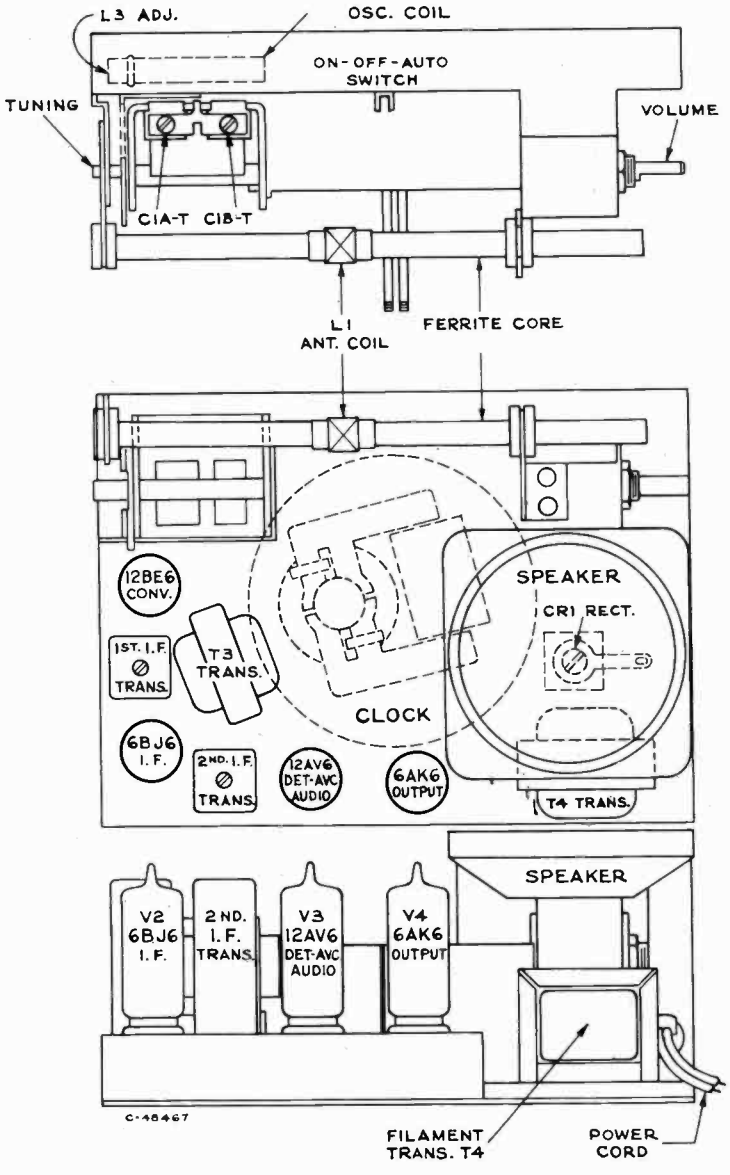
Assembly—Reassemble in the reverse order. Secure the bottom cover to the chassis with the four self-tapping screws. Next, insert the single self-tapping screw holding the chassis to the bottom of the cabinet base. Center the chassis mounting holes so that they line up with the holes in the cabinet and 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 $\frac{1}{32}$" 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.

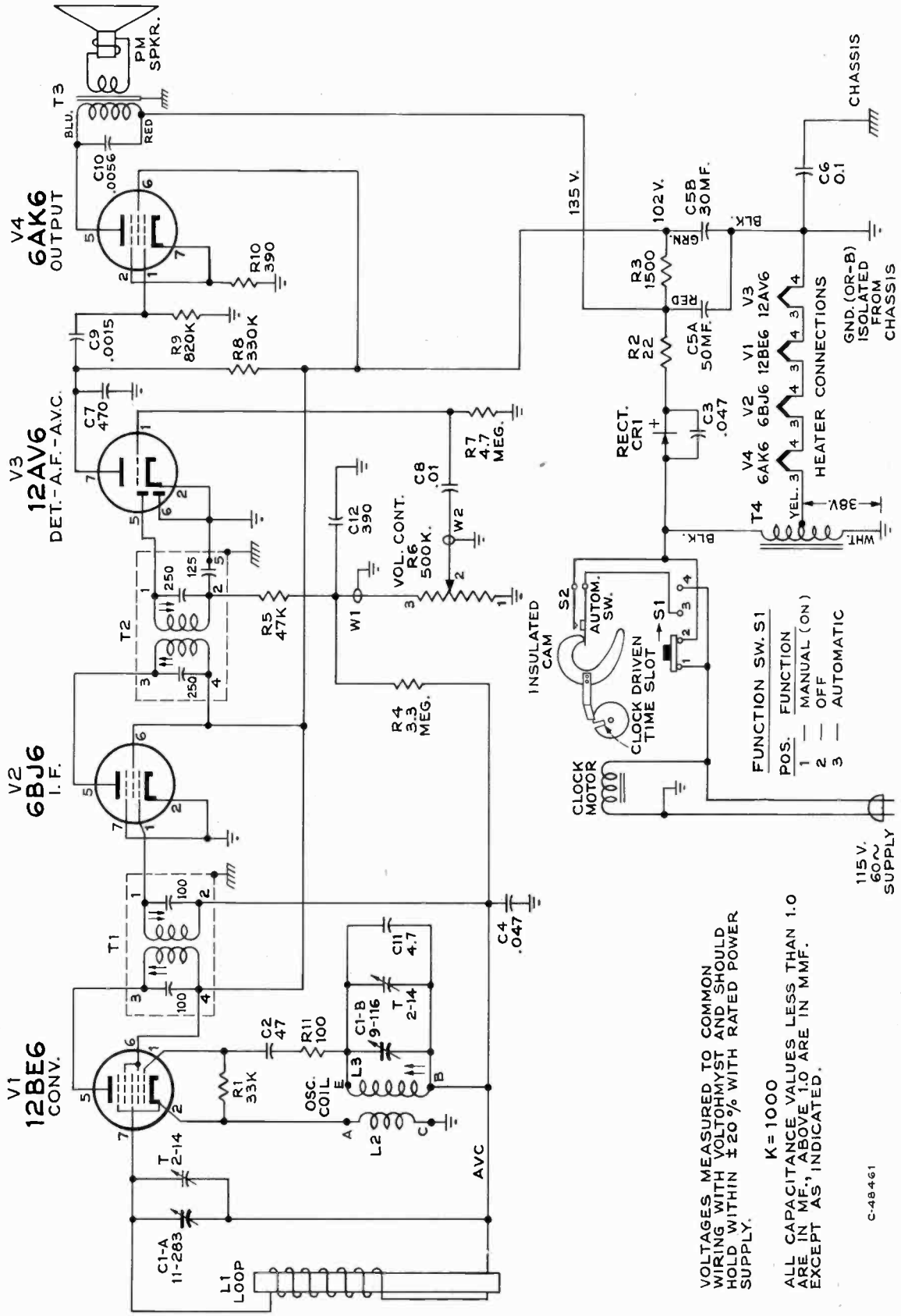
Assembly—Proceed in the reverse order. Solder clock leads, and secure clock to chassis pan with two hex head nuts. Reassemble speaker to speaker mounting bracket.

CRITICAL LEAD DRESS

1. 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.
3. Dress electrolytic capacitor leads and filament transformer leads away from selenium rectifier.
4. Plate and grid leads of 12BE6 and 6BJ6 tubes should be kept as short and direct as possible.



Tube and Trimmer Locations



Schematic Circuit Diagram—Chassis No. RC1118

REPLACEMENT PARTS

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLIES
	RC 1118—Model 2C511 RC 1118A—Model 2C512
	RC 1118B—Model 2C513 RC 1118C—Model 2C514
77410	Antenna—Ferrite rod antenna complete with windings L1
77408	Capacitor—Variable tuning capacitor ... C1A, C1B
77471	Capacitor—Ceramic, 4.7 mmf. C11
75609	Capacitor—Ceramic, 47 mmf. C2
75641	Capacitor—Ceramic, 390 mmf. C12
75198	Capacitor—Ceramic, 470 mmf. C7
77427	Capacitor—Electrolytic comprising 1 section of 50 mfd., 150 volts and 1 section of 30 mfd., 150 volts C5A, C5B
77425	Capacitor—Tubular, paper, .0015 mfd., 200 volts C9
77488	Capacitor—Tubular, paper, .0056 mfd., 400 volts C10
77424	Capacitor—Tubular, paper, .01 mfd., 200 volts ... C8
77422	Capacitor—Tubular, paper, .047 mfd., 400 volts .. C4
75071	Capacitor—Tubular, moulded, .047 mfd., 400 volts C3
77423	Capacitor—Tubular, paper, 0.1 mfd., 400 volts ... C6
77421	Clip—"C" clip for mounting speaker
75010	Clip—"C" clip for mounting output transformer
73935	Clip—Mounting clip for I.F. transformer
77411	Coil—Oscillator coil complete with adjustable core L2, L3
77409	Control—Volume control R6
70392	Cord—Power cord and plug
77404	Cover—Chassis bottom cover
77419	Cushion—Foam rubber cushion for speaker rim or bottom cover
74838	Grommet—Power cord strain relief (1 set)
77418	Grommet—Rubber grommet for mounting ferrite rod antenna
77405	Insulator—Bakelite insulator for variable tuning capacitor
77406	Insulator—Ferrite rod antenna mounting insulator —L.H.
77407	Insulator—Ferrite rod antenna mounting insulator —R.H.
77292	Rectifier—Selenium rectifier CR1
	Resistor—Fixed, composition:—
503022	22 ohms, ±10%, ½ watt R2
503110	100 ohms, ±10%, ½ watt R11
503139	390 ohms, ±10%, ½ watt R10
532215	1500 ohms, ±10%, 2 watts R3
503333	33,000 ohms, ±10%, ½ watt R1
503347	47,000 ohms, ±10%, ½ watt R5
503433	330,000 ohms, ±10%, ½ watt R8
503482	820,000 ohms, ±10%, ½ watt R9
503533	3.3 megohm, ±10%, ½ watt R4
503547	4.7 megohm, ±10%, ½ watt R7
75780	Socket—Tube socket, 7 pin. miniature, saddle mounted
77415	Switch—Function switch S1
77413	Transformer—Filament transformer 117 volts A.C. input T4
77414	Transformer—Output transformer T3
77416	Transformer—1st. I.F. transformer complete with adjustable cores T1
77417	Transformer—2nd. I.F. transformer complete with adjustable cores T2
77420	Washer—Shoulder washer (nylon) for variable tuning capacitor mounting (3 req'd)
	SPEAKER ASSEMBLIES
	971920-1
77428	Speaker—3" P.M. speaker complete with cone and voice coil (3.2 ohms)
	MISCELLANEOUS
77430	Back—Polystyrene cabinet back—gray tan—for Model 2C511
77505	Back—Polystyrene cabinet back—ivory—for Model 2C512
77507	Back—Polystyrene cabinet back—red—for Model 2C513
77509	Back—Polystyrene cabinet back—gray—for Model 2C514
77433	Button—Slide button for function switch less clip
77429	Case — Polystyrene case front — black — complete with window less back for Model 2C511
77504	Case — Polystyrene case front — ivory — complete with window less back for Model 2C512
77506	Case—Polystyrene case front—red—complete with window less back for Model 2C513
77508	Case — Polystyrene case front — gray — complete with window less back for Model 2C514
77434	Clip—Spring clip for function switch slide button
77431	Dial—Dial knob—gray tan—for Model 2C511
77498	Dial—Dial knob—ivory—for Model 2C512
77499	Dial—Dial knob—red—for Model 2C513
77500	Dial—Dial knob—gray—for Model 2C514
77432	Knob—Volume control knob—gray tan—for Model 2C511
77501	Knob—Volume control knob—ivory—for Model 2C512
77502	Knob—Volume control knob—red—for Model 2C513
77503	Knob—Volume control knob—gray—for Model 2C514
77412	Knob—Timer knob
77437	Screw—#6 x 5/16" cross recessed truss head tapping screw for mounting chassis
77436	Screw—#6-32 x 3/16" cross recessed truss head machine screw for mounting chassis to case
77435	Screw—#6-32 x 5/16" cross recessed truss head machine screw for fastening case assembly
74734	Spring—Spring clip for dial knob or volume control knob
77467	Washer—Knob Washer—felt
	CLOCK ASSEMBLY
* * *	Clock—If clock mechanism repair becomes necessary, remove the clock from the radio. The RCA Victor Distributor in your area will advise you of the address of the nearest authorized service station for clock mechanisms. Repair facilities and replacement parts are available at these authorized service stations.

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

RCA VICTOR

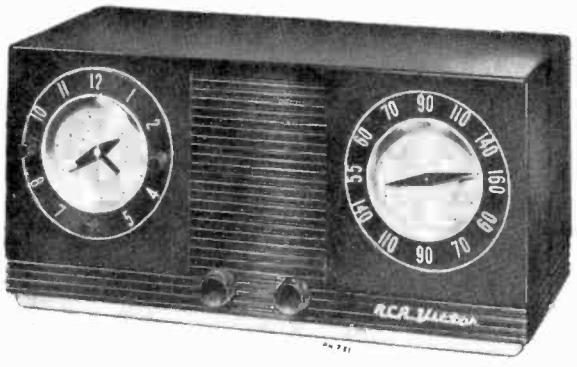
A-C Operated Clock Radio Receiver

2-C-521 SERIES

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

SERVICE DATA

— 1952 No. 10 —



2C521 *Maroon* | *2C522* *Ivory* | *2C527* *White*

PREPARED BY RCA SERVICE CO., INC.
FOR
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 12AV6 ..... Det.-AVC-A.F. Amp.
(4) RCA 50C5 ..... Output
(5) RCA 35W4 ..... Rectifier
Power Supply Rating:
115 volts a.c., 60 cycles ..... 30 watts
CAUTION:—DO NOT OPERATE ON D.C.

Appliance Rating ..... 115 volts, 15 a.

Loudspeaker:
Size and type ..... 4 in. P.M.
Voice Coil impedance ..... 3.2 ohms at 400 cycles

Power Output:
Undistorted ..... 1.2 watts
Maximum ..... 1.6 watts

Tuning Drive Ratio ..... 10 to 1 (5 turns of knob)
Weight ..... 5½ lbs.

Cabinet Dimensions:
Height . . . 6⅛" Width . . . 11¾" Depth . . . 5½"

Operating Instructions

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

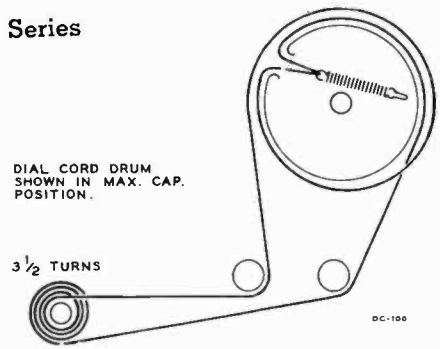
Appliances—1. To use appliance outlet, plug appliance into rear receptacle, and turn clock "RADIO" knob to "ON" position. If operation of the radio is not desired at the same time, push radio slide-switch lever on the back panel to the off position (lever pushed to the left).

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.

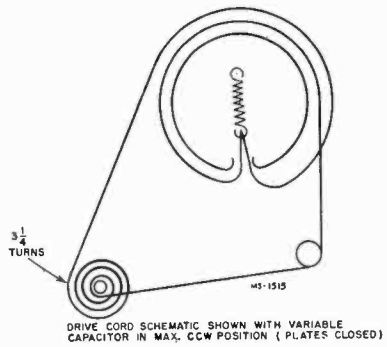
In remounting the clock, new sheet metal clips should be used. These should be heated until hot enough to soften the plastic slightly upon contact. Place the clock in its mounting rim and push the heated clips on tightly, using a pair of pliers or other holding tool.

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

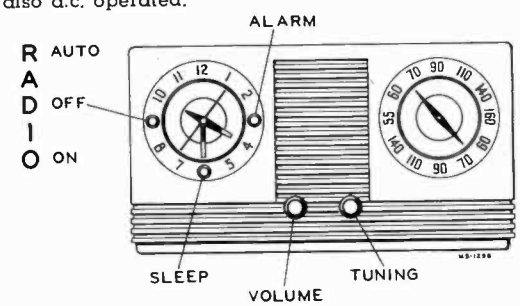
Alignment Procedure

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	455 kc.	Quiet-point 1600 kc end of dial	T2 (top and bottom) 2nd I-F trans.
2	Stator of C1-B through .1 mfd.			T1 (top and bottom) 1st I-F trans.
3	Short wire placed near loop to radiate signal	1620 kc	Min. cap.	osc. trimmer
4		1400 kc	1400 kc signal	ant. trimmer
*5		600 kc	600 kc signal	osc. coil L1, L2 (rock gang)
6		Repeat steps 3, 4, and 5.		

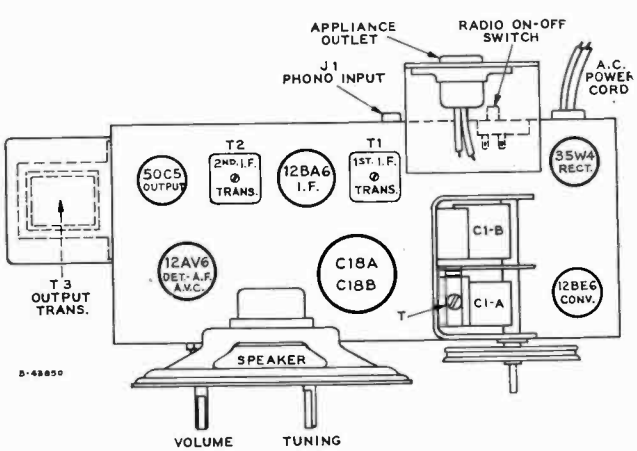
*Necessary only on receivers having RC-1120D, E chassis.

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.

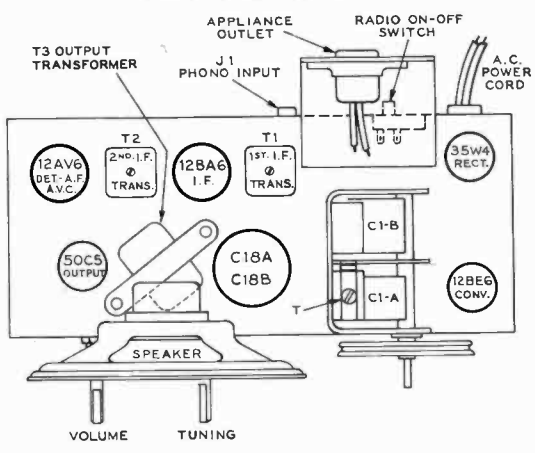
On a.c. operation an isolation transformer (115 v./115 v.) may be necessary for the receiver if the test oscillator is also a.c. operated.



Clock Radio Controls

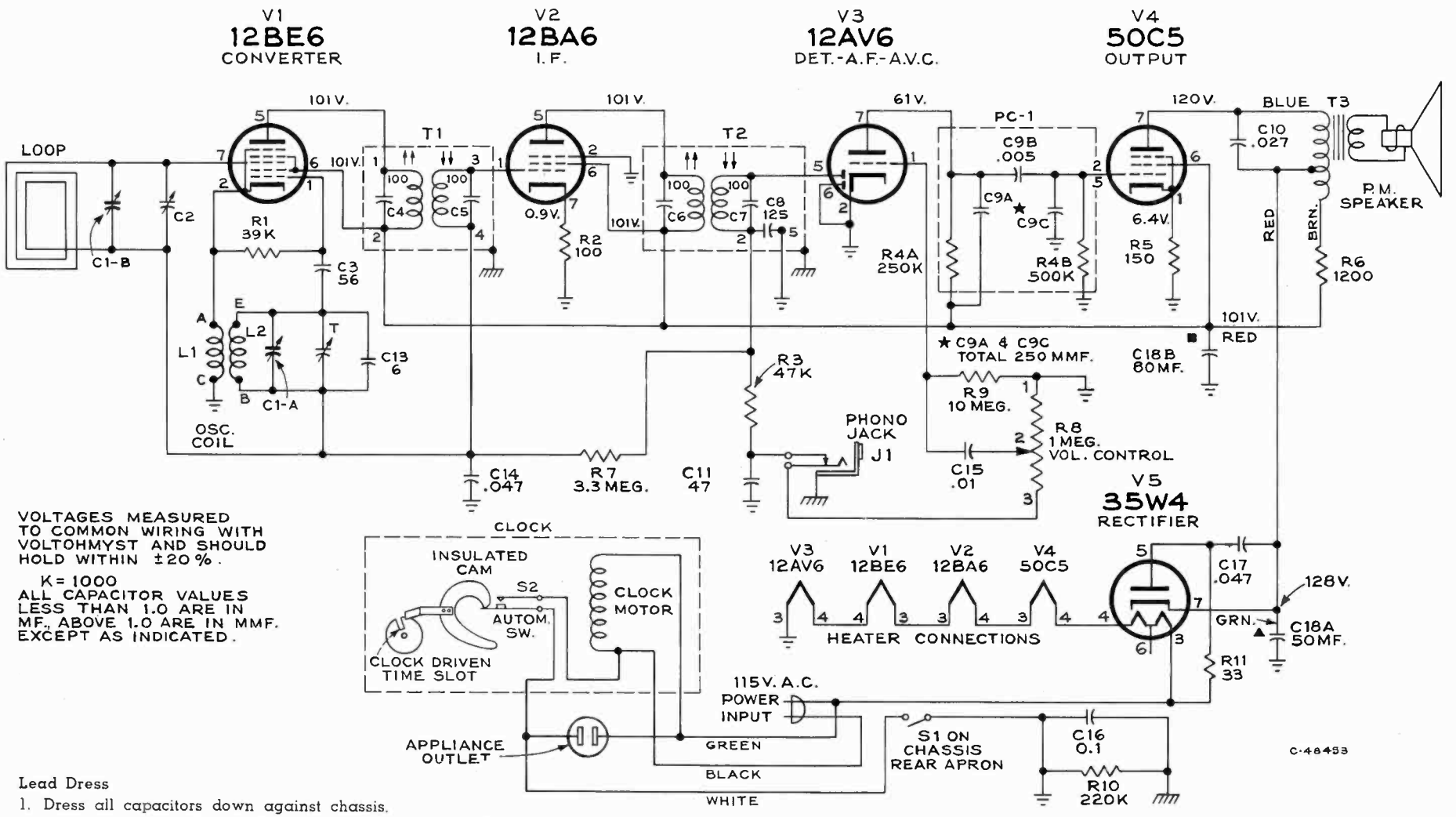


Chassis RC-1120, RC-1120A



Chassis RC-1120B, C, D, E

Tube and Trimmer Locations

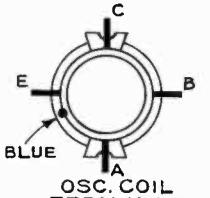


VOLTAGES MEASURED TO COMMON WIRING WITH VOLTOHMYST AND SHOULD HOLD WITHIN ±20%.

K = 1000
ALL CAPACITOR VALUES LESS THAN 1.0 ARE IN MF., ABOVE 1.0 ARE IN MMF. EXCEPT AS INDICATED.

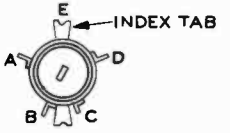
Lead Dress

1. Dress all capacitors down against chassis.
2. C-15 must be located so that connection to Pin #1 of 12AV6 is short as possible and condenser butts against rim of volume control.
3. Connect outside foil of all condensers as indicated in schematic diagram.
4. Dress Filament, B+ and B– leads down against chassis.
5. Dress R2, 12BA6 cathode resistor, down against tube center post with leads to Pin 2 and Pin 7 as short as possible.
6. Dress R3 above and away from R7.



OSC. COIL TERM. VIEW

RC-1120, RC-1120A, B, C



OSC. COIL BOTTOM VIEW

RC-1120D, E

FOR CHASSIS RC-1120B
RC-1120C
C11 IS OMITTED
R10 IS OMITTED

FOR CHASSIS RC-1120D, RC-1120E
AS ABOVE, ALSO
OSC COIL (L1, L2) HAS
ADJUSTABLE CORE.

Schematic Circuit Diagram—Chassis No. RC-1120 Series

REPLACEMENT PARTS

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLIES
	RC-1120, RC-1120B—Model 2-C-521 **RC-1120A, RC-1120C—Models 2-C-522, 2-C-527**
77357	Capacitor—Variable tuning capacitor complete with drive drum C1A, C1A-T, C1B
77364	Capacitor—Ceramic, 6 mmf. C13
76348	Capacitor—Ceramic, 47 mmf. C11
77116	Capacitor—Ceramic, 56 mmf. C3
73520	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd., 150 volts, ...C18A, C18B
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts..C15
73554	Capacitor—Tubular, paper, .027 mfd., 400 volts..C10
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts C14, C17
73551	Capacitor—Tubular, paper, 0.1 mfd., 400 volts..C16
73935	Clip—Mounting clip for I.F. transformer
77356	Coil—Oscillator coil L1, L2
78586	Coil—Oscillator coil complete with adjustable core (L1, L2) RC-1120D, E only
75482	Connector—Phono input connector J1
52131	Connector—2 contact female connector for appliance outlet (RC-1120, RC-1120A, D, E)
77901	Connector—2 contact female connector for appliance outlet (RC-1120B, RC-1120C)
77359	Control—Volume control R8
72953	Cord—250' Drive Cord Reel (approx. 26" required)
70392	Cord—Power cord and plug
28451	Cover—Insulating cover for electrolytic
77360	Grommet—Rubber grommet for mounting tuning capacitor
73693	Grommet—Power cord strain relief (1 set)
28452	Plate—Bakelite mounting plate for electrolytic
77355	Plate—Dial back plate complete with pointed escutcheon (RC-1120, RC-1120A)
77900	Plate—Dial back plate (RC-1120B, RC-1120C)
77354	Pointer—Station selector pointer
77365	Printed Circuit ..PC1 (C9A, C9B, C9C, R4A, R4B)
77363	Pulley—Drive cord idler pulley
	Resistor—Fixed, composition:—
513033	33 ohms, ±10%, 1 watt R11
503110	100 ohms, ±10%, ½ watt R2
503115	150 ohms, ±10%, ½ watt R5
513212	1200 ohms, ±10%, 1 watt R6
503339	39,000 ohms, ±10%, ½ watt R1
503347	47,000 ohms, ±10%, ½ watt R3
503422	220,000 ohms, ±10%, ½ watt R10
503533	3.3 megohm, ±10%, ½ watt R7
503610	10 megohm, ±10%, ½ watt R9
77358	Shaft—Tuning knob shaft (RC-1120, RC-1120A)
77909	Shaft—Tuning knob shaft (RC-1120B, C, D, E)
76870	Shield—Tube shield
77115	Socket—Tube socket, 7 pin, miniature, moulded
51955	Socket—Tube socket, 7 pin, miniature, moulded, saddle-mounted
75780	Socket—Tube, 7 pin min., molded, saddle-mounted, for V1, V4, V5 (RC-1120D, E only)
77306	Socket—Tube, 7 pin min., molded, saddle-mounted, for V2, V3 (RC-1120D, E only)
77361	Spring—Drive cord spring (RC-1120, RC-1120A)
77902	Spring—Drive cord spring (RC-1120B, RC-1120C)
31418	Spring—Drive cord spring (RC-1120D, RC-1120E)
32875	Switch—Radio power switch S1
75486	Transformer—First I.F. transformer, complete with adjustable cores T1, C4, C5
75487	Transformer—Second I.F. transformer, complete with adjustable cores T2, C6, C7, C8
77362	Transformer—Output transformer (RC-1120, RC-1120A) T3
77903	Transformer—Output transformer (RC-1120B, C, D, E)
33726	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLIES
	B12A512 RL108E7
77226	Speaker—4" P.M. speaker complete with cone and voice coil (3.2 ohms)
	MISCELLANEOUS
77367	Antenna—Antenna loop complete with back cover —maroon—for Model 2C521 (RC-1120, RC-1120A) Includes C2
77904	Antenna—Antenna loop complete with back cover —maroon—for Model 2C521 (RC-1120B, C, D, E)
77368	Antenna—Antenna loop complete with back cover —ivory—for Models 2C522, and 2C527 (RC-1120, RC-1120A) .....Includes C2
77905	Antenna—Antenna loop complete with back cover —ivory—for Models 2C522, 2C527 (RC-1120B, C, D, E)
77367	Back—Cabinet back—maroon—and antenna loop for Model 2C521 (RC-1120, RC-1120A), Includes C2
77904	Back—Cabinet back complete with antenna loop—maroon—for Model 2C51 (RC-1120B, C, D, E)
77368	Back—Cabinet back—ivory—and antenna loop for Models 2C522 and 2C527 (RC-1120, RC-1120A), Includes C2
77905	Back—Cabinet back complete with antenna loop—ivory—for Models 2C522, 2C527 (RC-1120B, C, D, E)
X3304	Baffle—Baffle board and grille cloth for Model 2C521
X3305	Baffle—Baffle board and grille cloth for Models 2C522 and 2C527
Y2463	Cabinet—Plastic cabinet—maroon—complete with crystals (2) for Model 2C521
Y2464	Cabinet—Plastic cabinet—ivory—complete with crystals for Model 2C522
Y2465	Cabinet—Plastic cabinet—white—complete with crystals for Model 2C527
77372	Clip—Spring clip for mounting timer assembly (5 req'd)
77033	Emblem—"RCA Victor" emblem
77369	Knob—Timer control knob—maroon—for Model 2C521
77370	Knob—Timer control knob—ivory—for Model 2C522
77371	Knob—Timer control knob—white—for Model 2C527
77373	Knob—Tuning control or volume control knob—maroon—for Model 2C521
77374	Knob—Tuning control or volume control knob—ivory—for Model 2C522
77375	Knob—Tuning control or volume control knob—white—for Model 2C527
77013	Nut—Speed nut to fasten "RCA Victor" emblem to cabinet
77491	Window—Polystyrene window for radio or timer dials
	CLOCK ASSEMBLY
	Clock—If clock mechanism repair becomes necessary, remove the clock from the radio. The RCA Victor Distributor in your area will advise you of the address of the nearest authorized service station for clock mechanisms. Repair facilities and replacement parts are available at these authorized service stations.

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

Model 2 ES 3

Model 2 ES 38

RCA VICTOR

Automatic Record Player

Models 2 ES 3, 2 ES 38

Chassis No. RS-142

Record Changer 930409-5

SERVICE DATA

— 1952 No. 4 —

PREPARED BY RCA SERVICE CO., INC.
FOR
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

115 volts, 60 cycles A.C. ..... 50 watts

Loudspeaker

Model 2 ES 3 ..... 4" x 6" PM
Model 2 ES 38 ..... 8" PM
Voice coil impedence ..... 3.2 ohms at 400 cycles

Power Output

Undistorted ....1.2 watts Maximum ....1.5 watts

Dimensions (overall)

	Height	Width	Depth
Model 2 ES 3	10¾"	13⅞"	13½"
Model 2 ES 38	9⅞"	16½"	19"

Weight

Model 2 ES 3 ..... 15 lbs.
Model 2 ES 38 ..... 24 lbs.

Record Changer (930409-5)

Turntable speed ..... 33⅓, 45 or 78 r.p.m.
Record capacity .....Up to fourteen 7 inch RCA type
or twelve 10 inch.
or ten 12 inch.
or ten 10 in. and 12 in. intermixed.
Pickup (Stock No. 75475)..Crystal with replaceable styli.

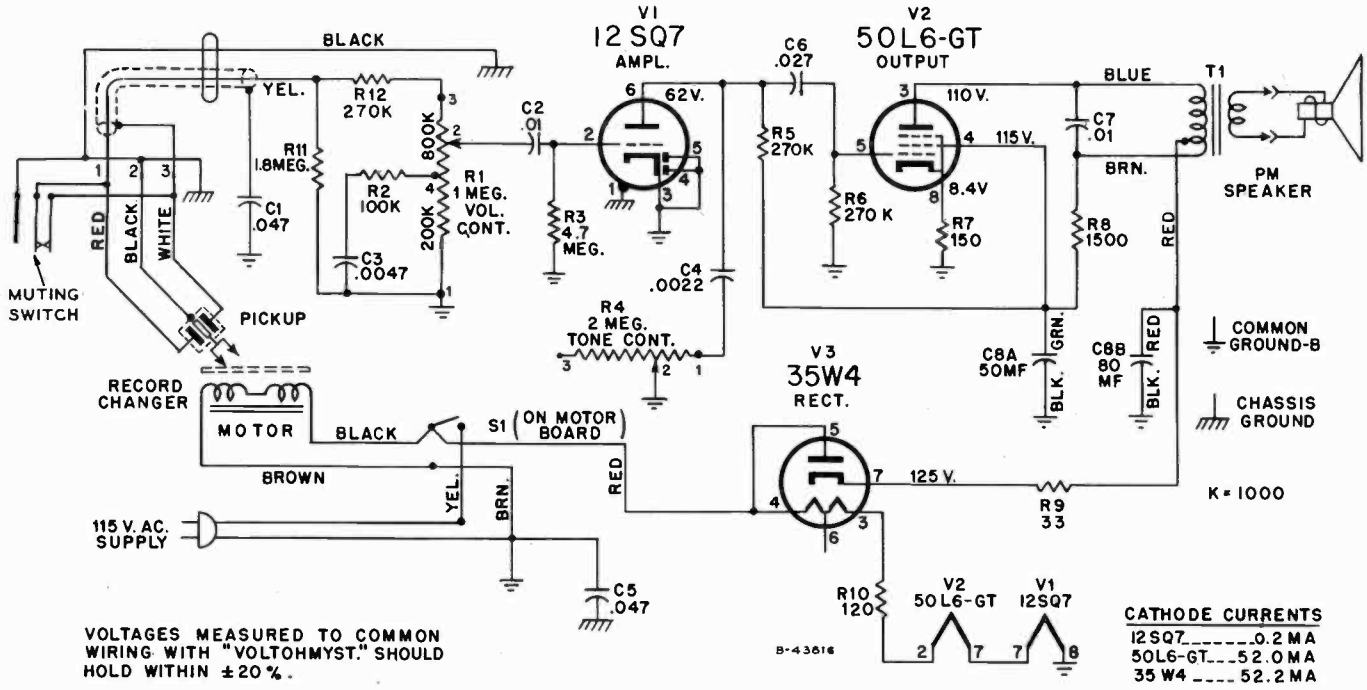
REPLACEMENT PARTS

STOCK No.	DESCRIPTION
	AMPLIFIER ASSEMBLIES RS 142
75980	Capacitor—Electrolytic comprising 1 section of 50 mfd., 150 volts and 1 section of 80 mfd., 150 volts C8A, C8B
73595	Capacitor—Tubular, paper, .0022 mfd., 600 volts..C4
73920	Capacitor—Tubular, paper, .0047 mfd., 600 volts..C3
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts..C2, C7
73554	Capcitor—Tubular, paper, .027 mfd., 400 volts..C6
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts..C1, C5
75562	Control—Tone control R4
76885	Control—Volume control R1
70392	Cord—Power cord and plug
73693	Grommet—Output transformer leads strain relief (1 set)
74838	Grommet—Power cord strain relief (1 set)
72314	Resistor—Wire wound, 120 ohms, 5 watts R10
	Resistors—Fixed, composition:
514033	33 ohms, ±20%, 1 watt R9
503115	150 ohms, ±10%, ½ watt R7
503215	1500 ohms, ±10%, ½ watt R8
503410	100,000 ohms, ±10%, ½ watt R2
503427	270,000 ohms, ±10%, ½ watt R5, R6, R12
503518	1.8 megohm, ±10%, ½ watt R11
504547	4.7 megohm, ±20%, ½ watt R3
70827	Socket—Tube socket, octal, wafer, for 12SQ7 and 50L6GT tubes
73117	Socket—Tube socket, 7 pin, miniature, wafer for 35W4 tube
75939	Transformer—Output transformer T1
	SPEAKER ASSEMBLIES FOR MODEL 2ES3 922258-6 W RL 100 C7
76886	Speaker—4" x 6" P.M. speaker complete with cone and voice coil (3.2 ohms)
	SPEAKER ASSEMBLIES FOR MODEL 2ES38 92586-4 W RL 105C4
75024	Cone—Cone and voice coil (3.2 ohms)
74664	Speaker—8" P.M. speaker complete with cone and voice coil (3.2 ohms)

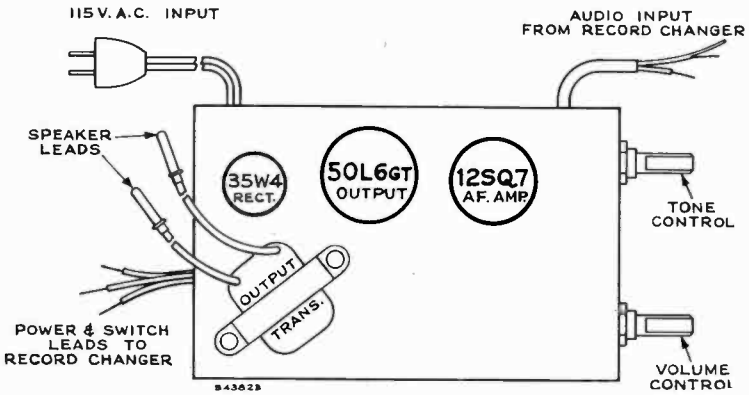
STOCK No.	DESCRIPTION
	Note: If stamping on speaker in instruments does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS FOR MODEL 2ES3
X1756	Cloth—Grille cloth
77139	Knob—Control Knob.
76895	Foot—Rubber foot (4 required)
73634	Nut—Speed nut for No. 8 screw for speaker bracket mounting screws
76887	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)
74734	Spring—Spring clip for knobs
	MISCELLANEOUS FOR MODEL 2ES38
77128	Button—Plug button and ventilating screen (3 required)
76890	Catch—Cabinet catch and lock (2 required)
74273	Decal—"Victrola" decal
74809	Emblem—"RCA Victor" emblem
77126	Escutcheon—Knob well escutcheon
77059	Fastener—No. 2 x 11/16" wood screw and stud for fastening pickup arm hold-down strap
76891	Foot—Cabinet foot and glide (8 required)
76555	Handle—Carrying handle only
76889	Hinge—Cabinet lid hinge (2 required)
75945	Knob—Control knob—maroon
76520	Loop—Carrying handle loop and plate (2 required)
76894	Nut—No. 10-32 spring nut for changer mounting stud
73634	Nut—Speednut for speaker mounting screws (4 required)
77127	Plate—Background plate (perforated) for knobs
75902	Spring—Cable suspension spring (coil)
14270	Spring—Retaining spring for knob
76892	Strap—Hold down strap for pickup arm
76893	Stud—No. 10-32 x 1¾" special stud for mounting changer (2 required)
77125	Support—Lid support

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

2 ES 3, 2 ES 38



Schematic Diagram



Amplifier Top View

CRITICAL LEAD DRESS

1. Dress R_3 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.

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

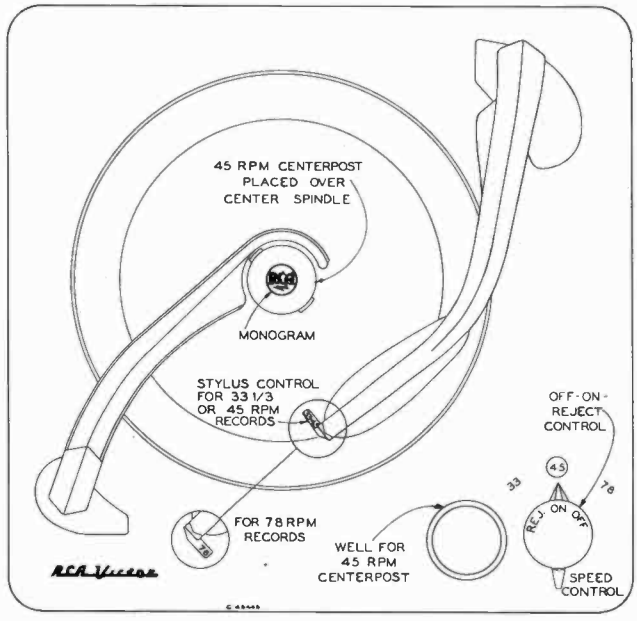
CONTROLS

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 33⅓ 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.



Record Changer Controls

RCA VICTOR

Automatic Record Player

Model 2ES31

Chassis No. RS-142

Record Changer 930409-5

SERVICE DATA

— 1952 No. 7 —

PREPARED BY RCA SERVICE CO., INC.
FOR
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

115 volts, 60 cycles A.C. ..... 50 watts

Loudspeaker

Size and type ..... 4" x 6" PM
Voice coil impedance ..... 3.2 ohms at 400 cycles

Power Output

Undistorted ....1.2 watts Maximum ....1.5 watts

Dimensions (overall)

Height 10¾" Width 13⅞" Depth 13½"

Weight

Net weight ..... 15 lbs.

Record Changer (930409-5)

Turntable speed ..... 33⅓, 45 or 78 r.p.m.
Record capacity .....Up to fourteen 7 inch RCA type
or twelve 10 inch.
or ten 12 inch.
or ten 10 in. and 12 in. intermixed.

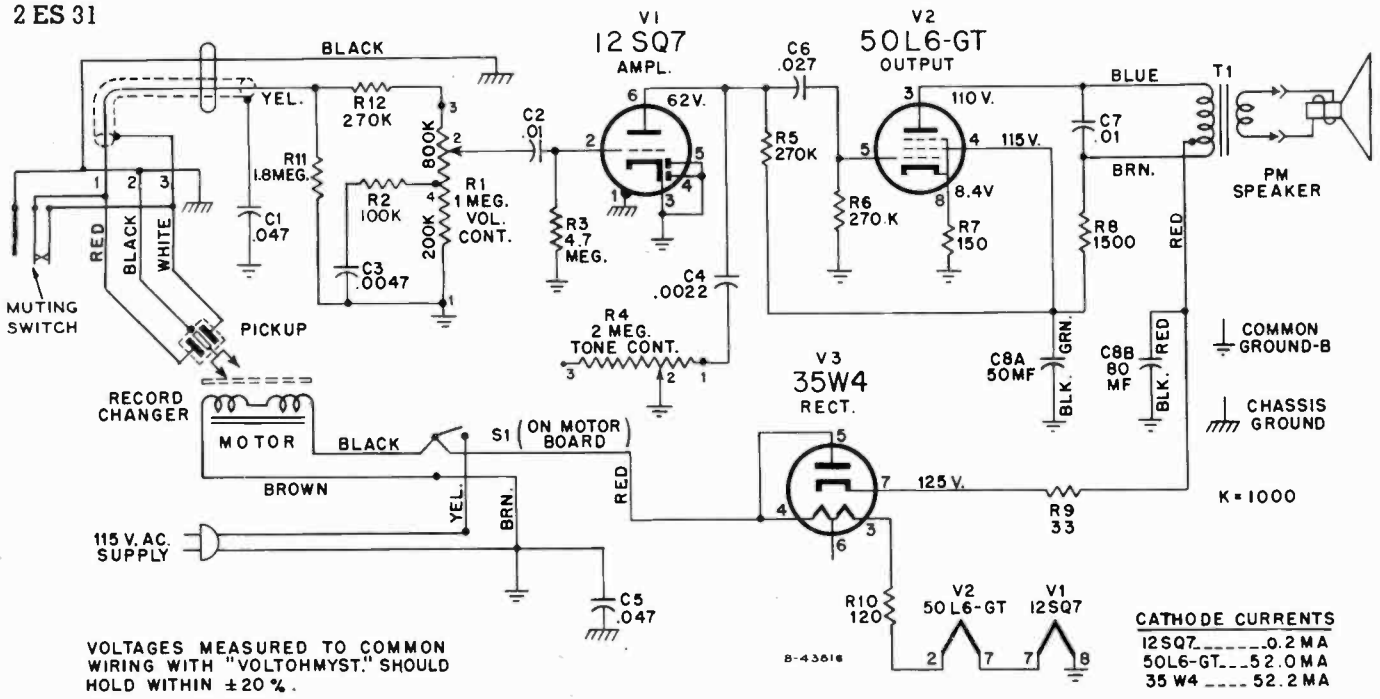
Pickup (Stock No. 75475)..Crystal with replaceable styli.

REPLACEMENT PARTS

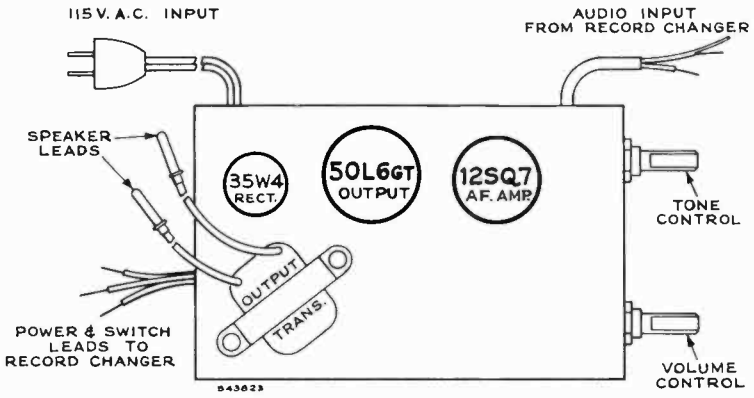
STOCK No.	DESCRIPTION
	AMPLIFIER ASSEMBLIES RS-142
75980	Capacitor—Electrolytic comprising 1 section of 50 mfd., 150 volts and 1 section of 80 mfd., 150 volts C8A, C8B
73595	Capacitor—Tubular, paper, .0022 mfd., 600 volts..C4
73920	Capacitor—Tubular, paper, .0047 mfd., 600 volts..C3
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts..C2, C7
73554	Capacitor—Tubular, paper, .027 mfd., 400 volts..C6
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts..C1, C5
75562	Control—Tone control R4
76885	Control—Volume control R1
70392	Cord—Power cord and plug
73693	Grommet—Output transformer leads strain relief (1 set)
74838	Grommet—Power cord strain relief (1 set)
72314	Resistor—Wire wound, 120 ohms, 5 watts R10
	Resistors—Fixed, composition:
514033	33 ohms, ±20%, 1 watt R9
503115	150 ohms, ±10%, ½ watt R7
503215	1500 ohms, ±10%, ½ watt R8
503410	100,000 ohms, ±10%, ½ watt R2
503427	270,000 ohms, ±10%, ½ watt R5, R6, R12
503518	1.8 megohm, ±10%, ½ watt R11
504547	4.7 megohm, ±20%, ½ watt R3
70827	Socket—Tube socket, octal, wafer, for 12SQ7 and 50L6GT tubes
73117	Socket—Tube socket, 7 pin, miniature, wafer for 35W4 tube
75939	Transformer—Output transformer T1
	SPEAKER ASSEMBLY 922258-6 W RL 100 C7
76886	Speaker—4" x 6" P.M. speaker complete with cone and voice coil (3.2 ohms)
	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 description of part required.
	MISCELLANEOUS
Y2400	Cabinet—Plastic cabinet—maroon
X1756	Cloth—Grille cloth
76888	Cover—Cabinet bottom cover less rubber feet
76787	Foot—Rubber foot (4 req'd)
77139	Knob—Control knob
73634	Nut—Speed nut for #8 screw for speaker bracket mounting screws
76894	Nut—#10-32 spring nut for changer mounting stud
74734	Spring—Spring clip for knobs
76893	Stud—#10-32 x 1¾" special stud for mounting changer (2 req'd)

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

2 ES 31



Schematic Diagram



Amplifier Top View

CRITICAL LEAD DRESS

1. Dress R_3 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.

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

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).

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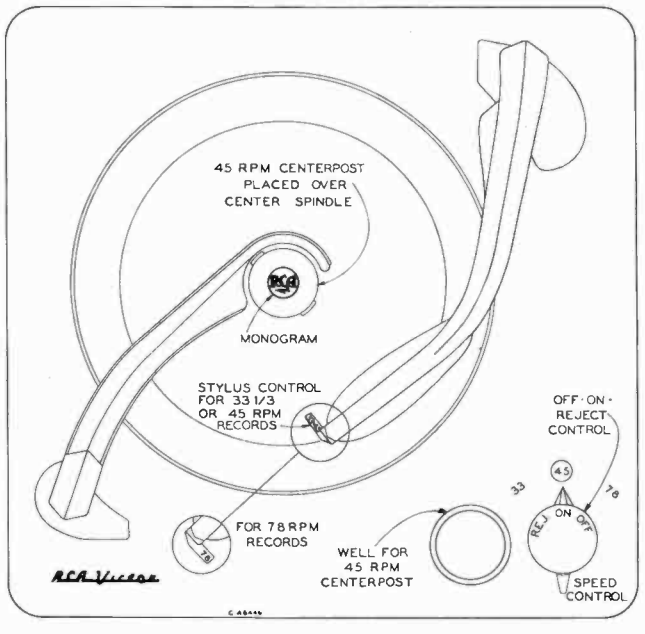
The removable centerpost is for use with 45 r.p.m. records having the large centerhole. It must be placed over the center spindle with the "RCA" trademark monogram FACING to the FRONT. When not in use it is placed in a well at the front of the motorboard.



Record Changer Controls

RCA VICTOR

Record Changer Attachment

MODEL 2JS1
SERVICE DATA

— 1952 No. 2 —

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

SPECIFICATIONS

Record Changer (930409-5)

Turntable speed ..... 33⅓, 45 or 78 r.p.m.
Record capacity..... Up to fourteen 7 inch RCA type or twelve 10 inch.
or ten 12 inch.
or ten 10 in. and 12 in. intermixed.
Pickup (Stock No. 75475)... Crystal with replaceable styli.

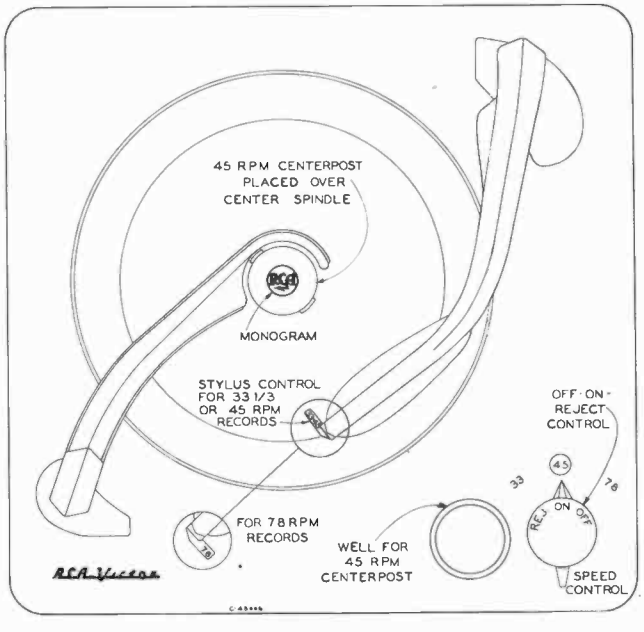
Power Supply Rating

115 volts, 60 cycles A.C. ..... 15 watts

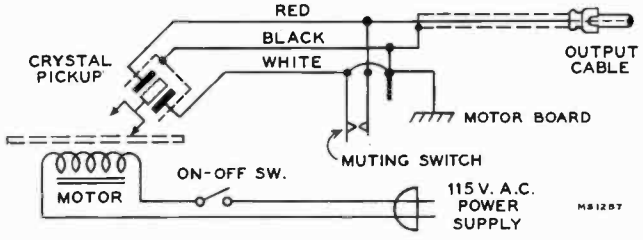
Dimensions (overall)

Height 8⅜" Width 13½" Depth 13¼"

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



Controls



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).

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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	Foot—Rubber 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

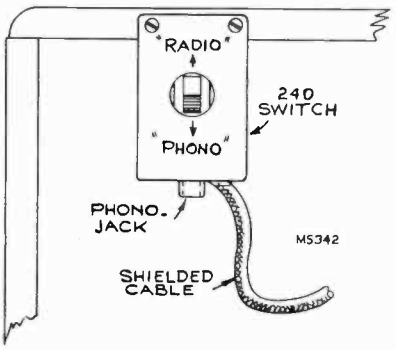
Methods of connecting the Record Changer Attachment to various types of audio systems are given in the accompanying text and illustrations. The data given requires that an RCA Type No. 240X1 (Formerly Stock No. 240) Radio-Phono switch be used for switching from radio to phonograph, as desired. For ease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

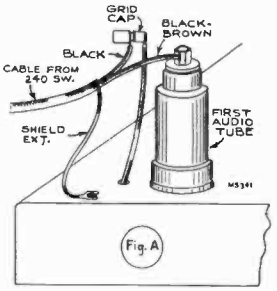
Fasten the bracket to the cabinet in such a position that the switch may be easily reached. For wooden cabinets, a suggested place is the upper rear edge of the cabinet. If the radio has a plastic cabinet, the bracket may be fastened to the chassis by self-tapping screws or soldering. **In the case of 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.

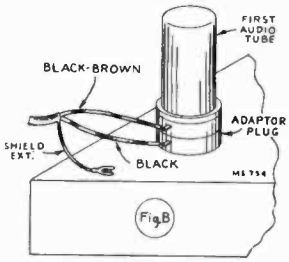


Connect the braided shield extension to the radio chassis by either soldering or placing the spade lug under a mounting screw.

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.



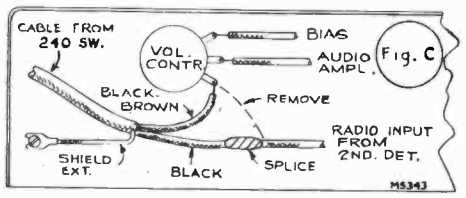


For receivers in which the 1st-audio tube has a top grid cap—see Fig. A:

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.
3. 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.
5. 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 1st-audio tube is type 6SQ7, 6SR7, 12SQ7 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 1st-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.
2. 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-1 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 for instruments not having a phono jack.

RCA VICTOR

A-C Operated Radio Receiver

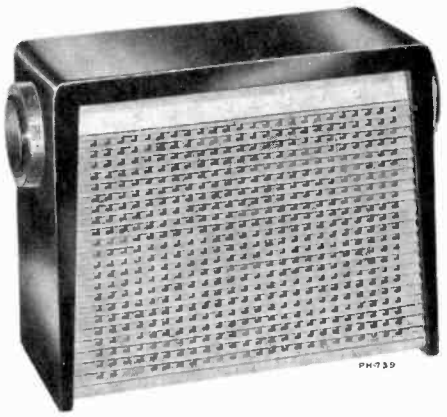
Models 2-R-51, 2-R-52, 2-R-51A, 2-R-52A

Chassis No. RC-1119

SERVICE DATA

—1952 No. 13—

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



2R51
Black & Gray

2R52
Tan & Ivory

SPECIFICATIONS

Tuning Range ..... 540-1600 kc
Intermediate Frequency ..... 455 kc
Tube Complement:
(1) RCA 12BE6 ..... Converter
(2) RCA 6BJ6 ..... I.F. Amplifier
(3) RCA 12AV6 ..... Det.-AVC-A.F. Amp.
(4) RCA 6AK6 ..... Output
RCA Stock No. 77292 ..... Rectifier
Dial Lamp (1) ..... Type No. 51, 6-8 volts, 0.2 amp.
Power Supply Rating:
115 volts a.c., 60 cycles ..... 18 watts

CAUTION:—DO NOT OPERATE ON D.C.

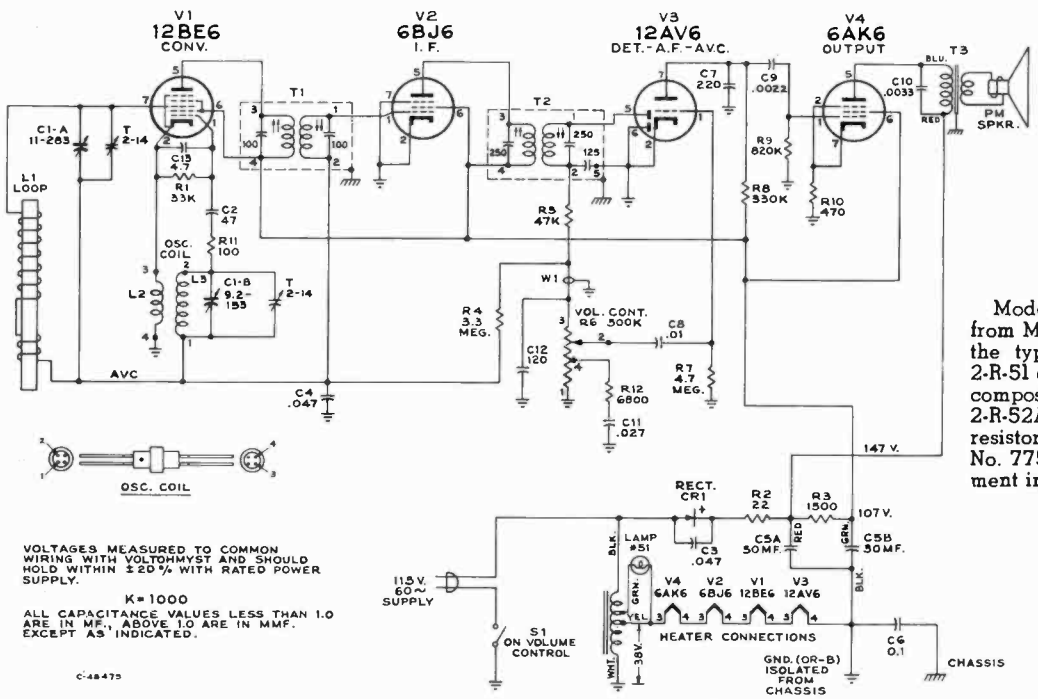
Loudspeaker:
Size and type ..... 4 x 6 in. P.M.
Voice Coil impedance ..... 3.2 ohms at 400 cycles

Power Output:
Undistorted ..... 0.30 watts
Maximum ..... 0.45 watts

Tuning Drive Ratio ..... 1 to 1 (Direct Drive)

Weight ..... 4 lbs.

Cabinet Dimensions:
Height...5⅝" Width...8⅜" Depth...3⅝"

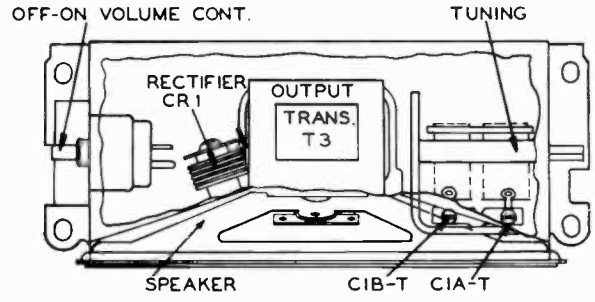


Schematic Diagram

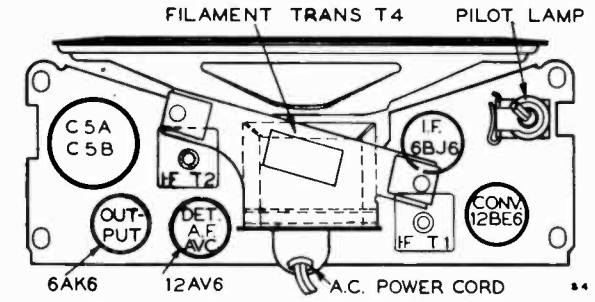
Models 2-R-51A and 2-R-52A differ from Models 2-R-51 and 2-R-52 only in the type of resistor used for R2. In 2-R-51 and 2-R-52 the resistor is a fixed composition type. In 2-R-51A and 2-R-52A it is a fuse type wire wound resistor. The fuse type resistor (Stock No. 77571) should be used for replacement in all models.

2-R-51, 2-R-52

Top View



Tube and Trimmer Locations



Bottom View

CRITICAL LEAD DRESS

1. Oscillator coil should be centered in space provided and have at least ¼ inch between winding and chassis.
2. 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.
4. 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.

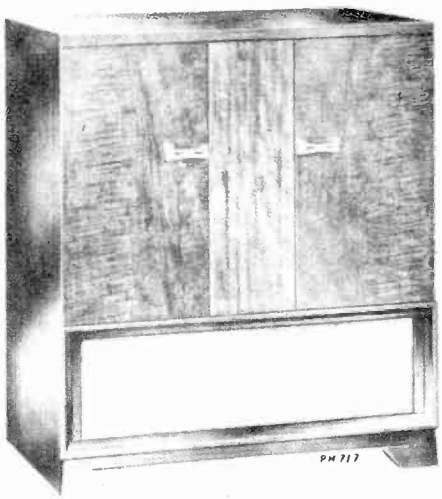
Output Meter—Connect meter across speaker voice coil. Turn volume control to maximum.

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	455 kc	Quiet-point 1600 kc end of dial	T2 (top and bottom) 2nd I-F. trans.
2	Stator of C1A through .01 mfd.			T1 (top and bottom 1st I-F trans.
3	Short wire placed near loop to radiate signal	1620 kc	Min. cap.	osc. trimmer C1B-T
4		1400 kc	1400 kc signal	ant. trimmer C1A-T
5		Repeat steps 3 and 4		

REPLACEMENT PARTS

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1119
77438	Antenna—Ferrite rod antenna complete with windings L1
77440	Capacitor—Variable tuning capacitor C1A, C1B
77471	Capacitor—Ceramic, 4.7 mmf. C13
75609	Capacitor—Ceramic, 47 mmf. C2
76347	Capacitor—Ceramic, 120 mmf. C12
75611	Capacitor—Ceramic, 220 mmf. C7
77443	Capacitor—Electrolytic comprising 1 section of 50 mfd., 150 volts and 1 section of 30 mfd., 150 volts C5A, C5B
77446	Capacitor—Tubular, paper, .0022 mfd., 400 volts C9
77447	Capacitor—Tubular, paper, .0033 mfd., 400 volts C10
77424	Capacitor—Tubular, paper, .01 mfd., 200 volts C8
77448	Capacitor—Tubular, paper, .027 mfd., 200 volts C11
77422	Capacitor—Tubular, paper, .047 mfd., 400 volts C4
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts C3
77423	Capacitor—Tubular, paper, 0.1 mfd., 400 volts C6
73935	Clip—Mounting clip for I.F. transformer
77450	Coil—Oscillator coil L2, L3
77442	Control—Volume control and power switch R6, S1
70392	Cord—Power cord and plug
77439	Cover—Insulating cover for chassis
74838	Grommet—Power cord strain relief (1 set)
77405	Insulator—Bakelite insulator for variable tuning capacitor
77444	Nut—Speed nut for output transformer mounting screws
28452	Plate—Bakelite mounting plate for electrolytic
77292	Rectifier—Selenium rectifier CR1
77571	Resistor—Wire wound, fuse type, 22 ohms, 0.4 amps R2
	Resistor—Fixed, composition:—
503110	100 ohms, ±10%, ½ watt R11
503147	470 ohms, ±10%, ½ watt R10
523215	1500 ohms, ±10%, 2 watts R3
503268	6800 ohms, ±10%, ½ watt R12
503333	33,000 ohms, ±10%, ½ watt R1
503347	47,000 ohms, ±10%, ½ watt R5
503433	330,000 ohms, ±10%, ½ watt R8
503482	820,000 ohms, ±10%, ½ watt R9
503533	3 3 megohm, ±10%, ½ watt R4
503547	4.7 megohm, ±10%, ½ watt R7
76723	Socket—Lamp socket
75780	Socket—Tube socket, 7 pin, miniature saddle-mounted
77441	Transformer—Filament transformer 117 volts AC T4
77445	Transformer—Output transformer T3
77416	Transformer—1st I.F. transformer complete with adjustable cores T1
77417	Transformer—2nd I.F. transformer complete with adjustable cores T2
77420	Washer—Shoulder washer (nylon) for mounting variable tuning capacitor
	SPEAKER ASSEMBLIES 922258-7
77451	Speaker—4" x 6" P.M. speaker complete with cone and voice coil (3.2 ohms)
	MISCELLANEOUS
77457	Case—Polystyrene case—black & beige—complete with speaker baffle and screen assemblies less bottom cover for Model 2R51
77465	Case—Polystyrene case—tan & ivory—complete with speaker baffle and screen assemblies less bottom cover for Model 2R52
77456	Clip—Spring clip to mount station selector pointer
77458	Cover—Bottom cover—beige—for Model 2R51
77466	Cover—Bottom cover—ivory—for Model 2R52
77453	Dial—Dial knob—black & gold—for Model 2R51
77464	Dial—Dial knob—tan & gold—for Model 2R52
77452	Knob—Volume control and power switch knob—black & gold—for Model 2R51
77463	Knob—Volume control and power switch knob—tan & gold—for Model 2R52
11765	Lamp—Pilot lamp—Mazda 51
77455	Pointer—Station selector pointer
77454	Screw—#8-32 x ⅜" cross recessed truss head machine screw for fastening bottom cover
76783	Shield—Pilot lamp shield
74734	Spring—Spring clip for volume control knob or dial knob

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



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

RCA VICTOR

Radio Phonograph Combination

Model 2-S-7

Chassis No. RC-1117D

SERVICE DATA

—1953 No. 1—

PREPARED BY RCA SERVICE CO., INC.
FOR
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 ..... Detector—A.F. Amplifier
4. RCA 6AQ6 ..... Phase Inverter
5. RCA 35C5 } Push Pull Output
6. RCA 35C5 }

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.

Loudspeaker

Size and type ..... 8" P.M.
Voice coil impedance ..... 3.2 ohms at 400 cycles

Power Output

At 10% distortion ..... 2.0 watts
Maximum ..... 2.9 watts

Cabinet Dimensions

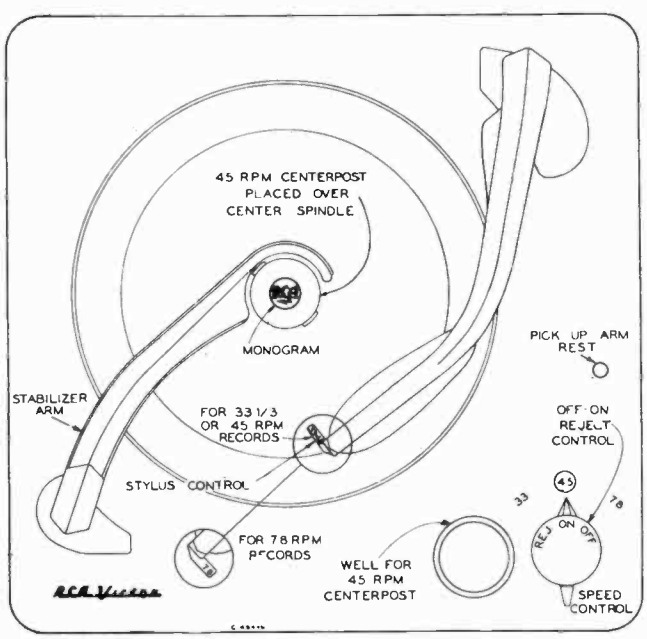
Height 32¼" Width 28½" Depth 19⅛"

Tuning Drive Ratio ..... 14¼:1 (7⅛ turns of knob)

Record Changer (930409-5, or -10)

Turntable speed ..... 33⅓, 45 or 78 r.p.m.
Record capacity ..... up to fourteen 7 inch RCA type
or twelve 10 inch
or ten 12 inch
or ten 10 in. and 12 in. intermixed.
Pickup (Stock No. 75475) ..... Crystal with replaceable styli.

Weight ..... 66 lbs. net



Record Changer Controls

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).

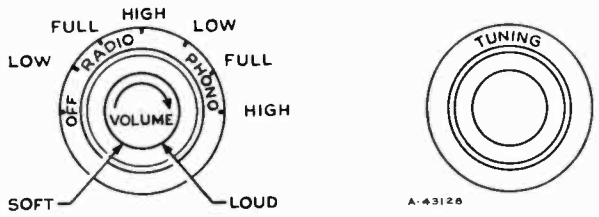
The outer control (double ended lever) is the speed control. It has three normal positions, "33", "45", "78" to select the turntable speed desired and a neutral position (midway between "45" and "78"). The control should be turned to this neutral position if the changer is not expected to be in use for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

The stylus control has two normal positions (right and left) and one shipping position (lever pointing up). When playing 33⅓ 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.

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.

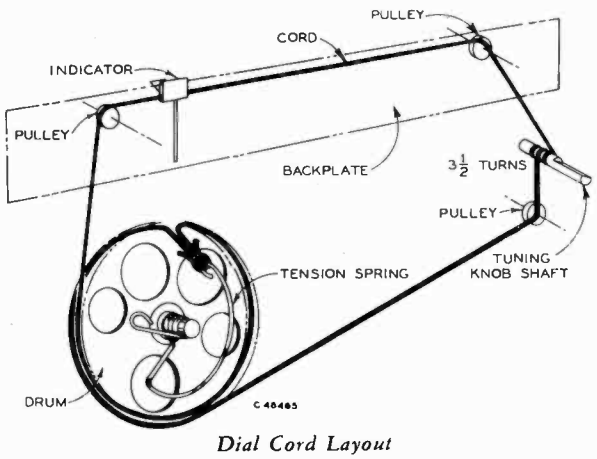
2-S-7



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.



Dial Cord Layout

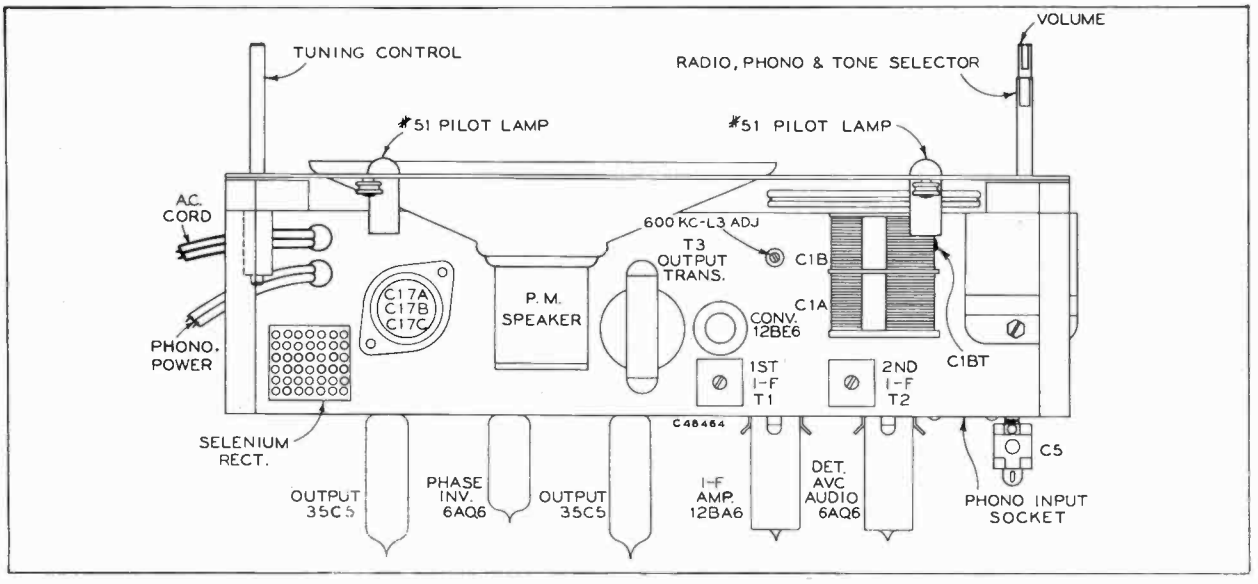
Alignment Procedure

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

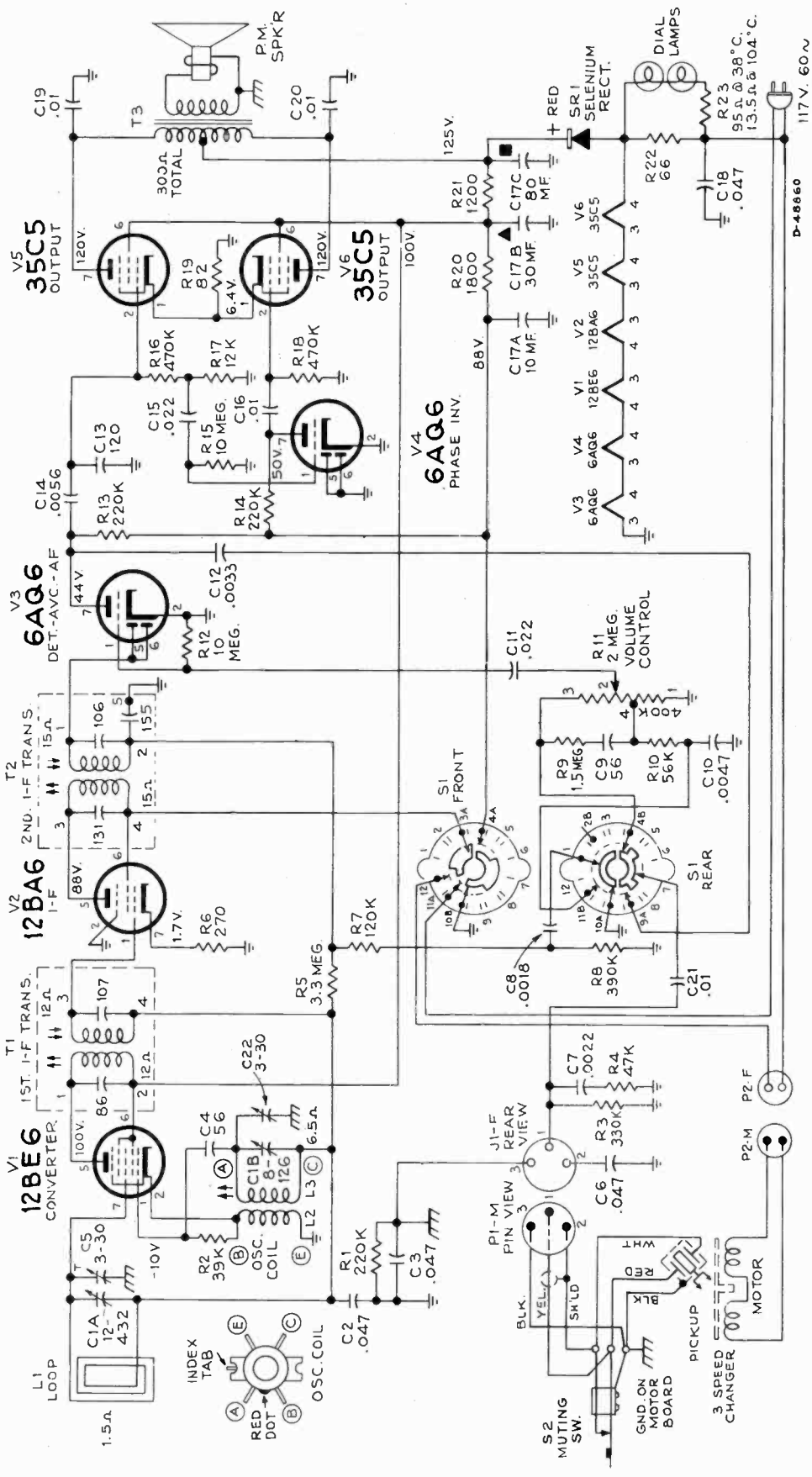
Test Oscillator.—Connect low side of test oscillator to common wiring in series with a .1 mf. capacitor. If the test oscillator is a.c. operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common wiring at the electrolytic capacitor. Keep the oscillator output low 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 following for max. output
1	I.F. grid, in series with .1 mfd.	455 kc	Quiet point 1,600 kc end of dial	Pri. & Sec. 2nd I.F. transformer
2	Converter grid in series with .1 mfd.			Pri. & Sec. 1st I.F. transformer
NOTE.—ANTENNA LOOP MUST BE IN CABINET FOR THE FOLLOWING				
3	Short wire placed near loop for radiated signal	1,620 kc	Extreme R. H. end (gang open)	C22 (osc.)
4		1,400 kc	1,400 kc	C5 (ant.)
5		600 kc	600 kc Signal	L3 (Rock Gang)
6	Repeat steps 3, 4 & 5 if necessary			

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



Tube and Trimmer Locations



Schematic Diagram—Chassis RC-1117C

REPLACEMENT PARTS

STOCK No.	PART DESCRIPTION
	CHASSIS ASSEMBLIES RC1117D
76876	Antenna—Antenna loop and back cover, L1
76867	Capacitor—Variable tuning capacitor, C1A, C1B
76872	Capacitor—Adjustable trimmer, 2.5—30 mmf., C5, C22
77116	Capacitor—Fixed, ceramic, insulated, temp. coef.—-3300, 56 mmf., ±20%, 500 volts DC, C4
	Capacitor—Fixed, ceramic, insulated, high K type—
93603	56 mmf., ±10%, 500 volts, C9
76347	120 mmf., ±20%, 500 volts, C13
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, C17A, C17B, C17C
	Capacitor—Fixed, tubular, paper:
73851	.0018 mfd., 1600 volts, C8, C21
73595	.0022 mfd., 600 volts, C7
73795	.0033 mfd., 400 volts, C12
73920	.0047 mfd., 400 volts, C10
73788	.0056 mfd., 400 volts, C14
73561	.01 mfd., 400 volts, C16, C19, C20
73562	.022 mfd., 400 volts, C11, C15
73553	.047 mfd., 400 volts, C2, C3, C6
75071	Capacitor—Fixed, tubular, moulded paper: .047 mfd., 400 volts, C18
73935	Clip—Mounting clip for I.F. transformer
78586	Coil—Oscillator coil complete with adjustable core L2, L3
36422	Connector—Phono input connector, J1
77114	Connector—Single contact male connector for loop lead
75474	Connector—Single contact male connector for speaker cable
30868	Connector—2 contact female connector for motor cable, P2
76874	Control—Volume control, R11
72953	Cord—250' Drive Cord Reel (approx. 54" overall req'd)
73690	Cord—Power cord and plug
74838	Grommet—Power cord strain relief (1 set)
72283	Grommet—Rubber grommet for mounting variable capacitor
11765	Lamp—Dial lamp—Mazda 51
28452	Plate—Bakelite mounting plate for electrolytic
77926	Plate—Dial back plate complete less dial
77378	Pointer—Station selector pointer
76871	Rectifier—Selenium rectifier, SR1
73072	Resistor—Normal value 95 ohms, @ 38°C with negative temperature coefficient, R23
77379	Resistor—Wire wound, 66 ohms, 5 watts, R22
	Resistors—Fixed, composition:
503082	82 ohms, ±10%, ½ watt, R19
503127	270 ohms, ±10%, ½ watt, R6
513212	1200 ohms, ±10%, 1 watt, R21
503218	1800 ohms, ±10%, ½ watt, R20
503312	12,000 ohms, ±10%, ½ watt, R17
503339	39,000 ohms, ±10%, ½ watt, R2
503347	47,000 ohms, ±10%, ½ watt, R4
503356	56,000 ohms, ±10%, ½ watt, R10
503412	120,000 ohms, ±10%, ½ watt, R7
503422	220,000 ohms, ±10%, ½ watt, R1, R13, R14
503433	330,000 ohms, ±10%, ½ watt, R3
503439	390,000 ohms, ±10%, ½ watt, R8
503447	470,000 ohms, ±10%, ½ watt, R16, R18
503515	1.5 megohm, ±10%, ½ watt, R9
503533	3.3 megohm, ±10%, ½ watt, R5
503610	10 megohm, ±10%, ½ watt, R12, R15
76869	Shaft—Tuning knob shaft
76870	Shield—Tube shield
74697	Socket—Dial lamp socket
77115	Socket—Tube socket, 7 pin, miniature, moulded
51955	Socket—Tube socket, 7 pin, miniature, moulded saddle-mounted
76368	Spring—Drive cord spring
76873	Switch—Function switch less volume control, S1
77122	Transformer—Output transformer, T3
74918	Transformer—First I.F. transformer complete with adjustable cores, T1
73037	Transformer—Second I.F. transformer complete with adjustable cores, T2
33726	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLIES 92586-4W RL10504 RMA-274
75024	Cone—Cone and voice coil (3.2 ohms)
74664	Speaker—8" P.M. speaker complete with cone and voice coil (3.2 ohms)
	MISCELLANEOUS
71892	Catch—Bullet catch and strike
70142	Clamp—Dial clamp (1 set)
X3351	Cloth—Grille cloth for blonde mahogany instruments
X3350	Cloth—Grille cloth for mahogany or walnut instruments
30870	Connector—2 contact male connector for motor cable, P2
74192	Connector—3 contact male connector for pickup cable, P1
77898	Decal—Control function decal for blonde mahogany instruments
77897	Decal—Control function decal for mahogany or walnut instruments
74273	Decal—"Victrola" decal
77889	Dial—Glass dial scale
74205	Escutcheon—Dial scale escutcheon less dial
74838	Grommet—Power cord strain relief (1 set)
77402	Handle—Pullout handle for record changer mechanism
74308	Hinge—Door hinge (1 set)
77892	Knob—Function switch knob—beige—for blonde mahogany instruments (outer)
77891	Knob—Function switch knob—maroon—for mahogany or walnut instruments (outer)
77382	Knob—Tuning control knob—beige—for blonde mahogany instruments (inner)
77386	Knob—Tuning control knob—beige—for blonde mahogany instruments (outer)
75945	Knob—Tuning control knob—maroon—for mahogany or walnut instruments (inner)
77385	Knob—Tuning control knob—maroon—for mahogany or walnut instruments (outer)
75464	Knob—Volume control knob—beige for blonde mahogany instruments (inner)
74963	Knob—Volume control knob—maroon—for mahogany or walnut instruments (inner)
77894	Pan—Record changer mounting pan—beige—for blonde mahogany instruments
77893	Pan—Record changer mounting pan—plum—for mahogany or walnut instruments
76421	Pin—Slide mechanism stop pin
77896	Pull—Door pull
74113	Screw—#8-32 x 1" trimit head screw for door pull
77895	Slide—Mounting pan slide mechanism
76422	Spring—Retaining spring for slide mechanism stop pin
30330	Spring—Retaining spring for knobs 74963 and 75464
76837	Spring—Retaining spring for knobs 75945, 77382, 77385, 77386, 77891, 77892
72936	Stop—Door stop

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

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

RCA VICTOR

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

Specifications

Tuning Range

Standard Broadcast (AM)	540-1600 kc.
Frequency Modulation (FM)	88-108 mc.
Intermediate Frequency (AM)	455 kc.
Intermediate Frequency (FM)	10.7 mc.

Tube Complement

Tube Used	Function
Radio Chassis RC1111	
(1) RCA 6CB6	R-F Amplifier
(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 Det.-AVC-A-F Amplifier
Audio Chassis RS141	
(1) RCA 6C4	Phase Inverter
(2) RCA 6V6GT	Audio Output
(3) RCA 6V6GT	Audio Output
(4) RCA 5Y3GT	Rectifier

Lamps

Dial (2)	#51, 6-8 volts, 0.2 amp.
Jewel (1)	#51, 6-8 volts, 0.2 amp.

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

Audio Power Output Rating

Radio	undistorted 8 watts, maximum 9 watts
Phonograph	undistorted 10 watts, maximum 12 watts

Loudspeaker (92569-12W)

Size and Type	12 inch P.M.
Voice Coil Impedance	3.2 ohms at 400 cycles

Tuning Drive Ratio ..... 9:1 (4½ turns of knob)

Net Weight ..... 96 lbs.

Dimensions (overall)

Height ... 35½ in. Width ... 35 in. Depth ... 23 in.

Record Changer (930409-5, or -10)

Turntable Speed	33⅓, 45 or 78 r.p.m.
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

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.
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.

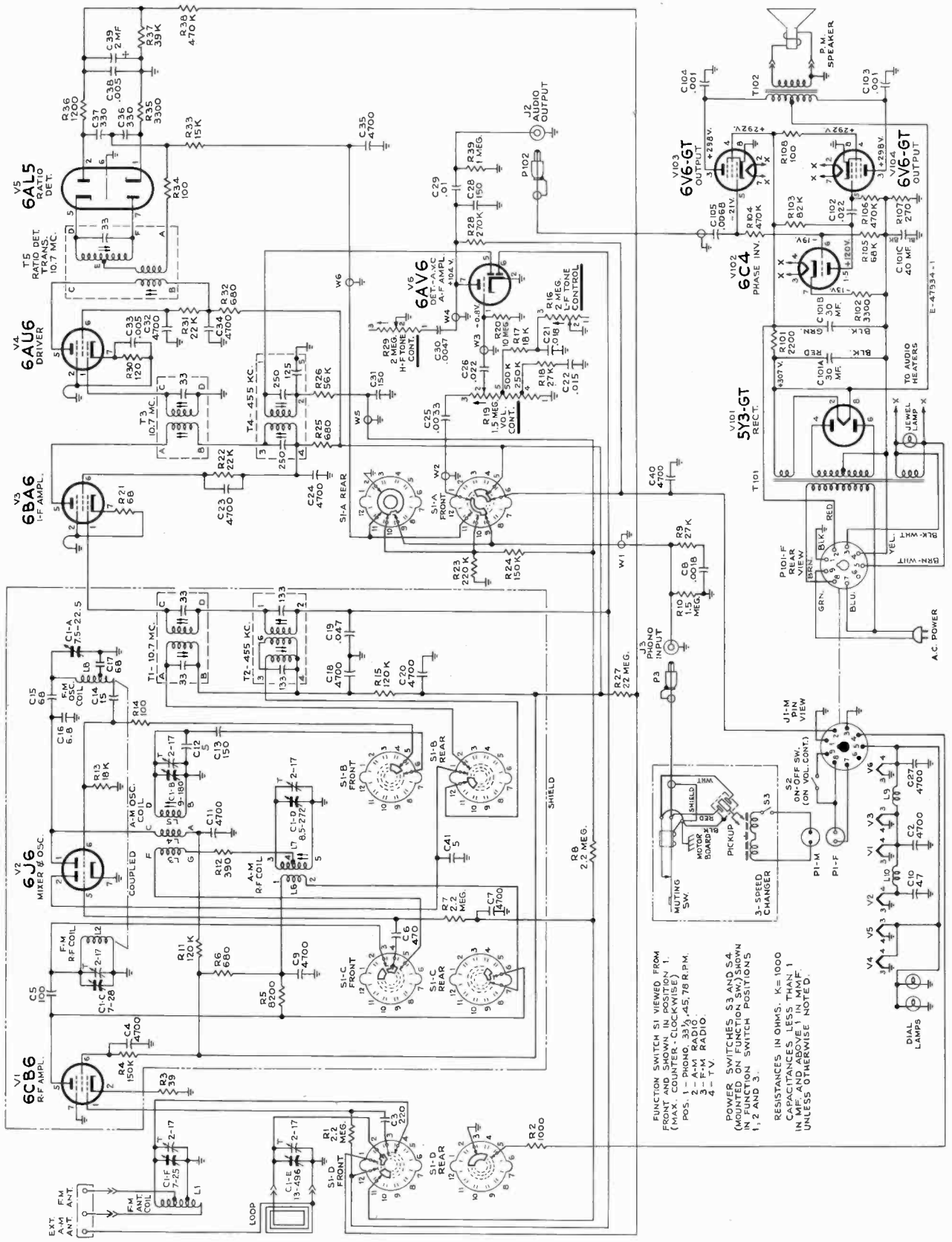
B. Audio amplifier input from any one of three channels.

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.



Complete Schematic Diagram—Chassis RC1111 and RS141

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. Connections 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.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure 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.

AM Alignment

Ⓐ RANGE 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. (mod.)	Quiet point at low freq. end	T4 bottom† core (sec.). T4 top core (pri.).
2	To stator of C1-E			T2 top† core (sec.). T2 bottom core (pri.).
Ⓒ	PERFORM FM ALIGNMENT BEFORE PROCEEDING			
3	Short wire placed near loop for radiated signal	1620 kc. (mod.)	1620 kc.	C1B-T (osc.).
4		1400 kc. (mod.)	1400 kc.	C1D-T (ant.). C1E-T (rf.).
5		600 kc. (mod.)	600 kc.	L5 (osc.) with 10,000 ohm resistor from RF stator to gnd. (rocking gang)
6				L7 (RF) with the 10,000 ohms removed.
7	Repeat steps 4, 5 and 6 until no improvement in sensitivity is obtained.			

Oscillator frequency is above signal frequency on both AM and FM.
Ⓐ Ⓑ Ⓒ encircled letters indicate recommended alignment sequence.

FM Alignment

FUNCTION SWITCH IN FM POSITION—VOLUME CONTROL MAXIMUM Ⓑ

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mfd. capacitor C39 and the common lead to chassis. Adjust sig. gen. output to provide approx. −4 v. indication during alignment.			
2	Pin #1 of 6AU6 (V4) in series with .01 mf.	10.7 mc AM modulated	—	Top of driver trans. T5 for max. d-c voltage
3				†Bottom of driver trans. T5 for min. audio output
4	Repeat steps 2 and 3			
5	Thru 470 ohms to C1-F. Connect gnd. end of cable close to V2 cathode ground on r-f shelf	10.7 mc	88 mc	*Top (sec.) & bottom (pri.) cores of T3 *Top (sec.) & bottom (pri.) cores of T1
6	To FM antenna terminals thru 120 ohms in each side of line	90 mc	90 mc	L8 (osc.)
7		106 mc	106 mc Signal	C1-F trimmer (ant.) and C1-C trimmer (r. f.)
8		90 mc	90 mc Signal	L1 (ant.) and L2 (r. f.)
9	Repeat steps 6, 7 and 8			
10	Connect a sweep generator to the antenna terminals thru 120 ohms in each side of line. Connect an oscilloscope to junction of R33 and C35 to check response and linearity of FM band. Peak to peak separation should not be less than 180 kc.			

†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.

*Use a 680 ohm resistor to load the plate winding while the grid winding 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 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 I.F. cores can be determined by starting the core all the way out. The first peak obtained is the correct one.

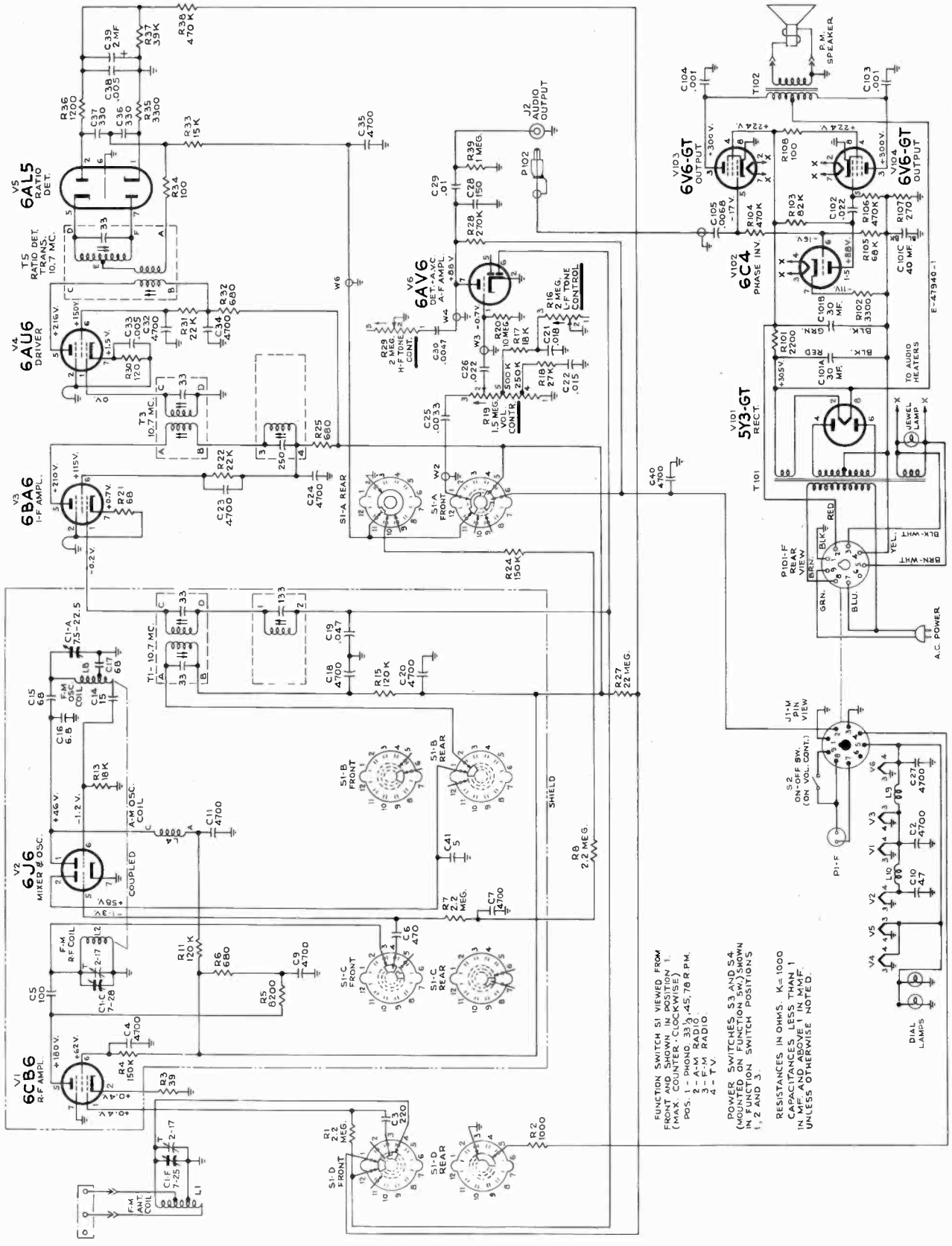
Tube Socket Voltages

Tube Type and Function	Tube Element	Pin No.	AM	FM	Phono
V1 6CB6	Plate	5	215	180	—
	Screen	6	74	62	—
R-F Amp.	Cathode	2	0.4	0.4	—
	Grid	1	−0.8	0.4	—
V2 6J6	Plate	2	55	58	—
	Grid	5	−1.2	−1.3	—
Osc. and	Plate	1	43	46	—
Mixer	Grid	6	−2.0	−1.2	—
V3 6BA6	Plate	5	210	210	—
	Screen	6	126	115	—
I-F Amp.	Cathode	7	0.9	0.7	—
	Grid	1	−0.8	−0.2	—
V4 6AU6	Plate	5	216	216	—
	Screen	6	150	150	—
Driver	Cathode	7	1.5	1.5	—
	Grid	1	0	0	—
V5 6AL5	—	—	—	—	—
Ratio Det.	—	—	—	—	—
V6 6AV6					
Audio	Plate	7	88	88	104
Amp.	Grid	1	−0.7	−0.7	−0.8
6C4	Plate	5	87.5	88	120
Phase	Cathode	7	−11	−11	−13
Inverter	Grid	6	−16	−16	−19
6V6GT	Plate	3	300	300	298
	Screen	4	224	224	292
Audio	Cathode	8	0	0	0
Output	Grid	5	−17	−17	−21
5Y3GT Rectifier	Fil.	8	305	305	307

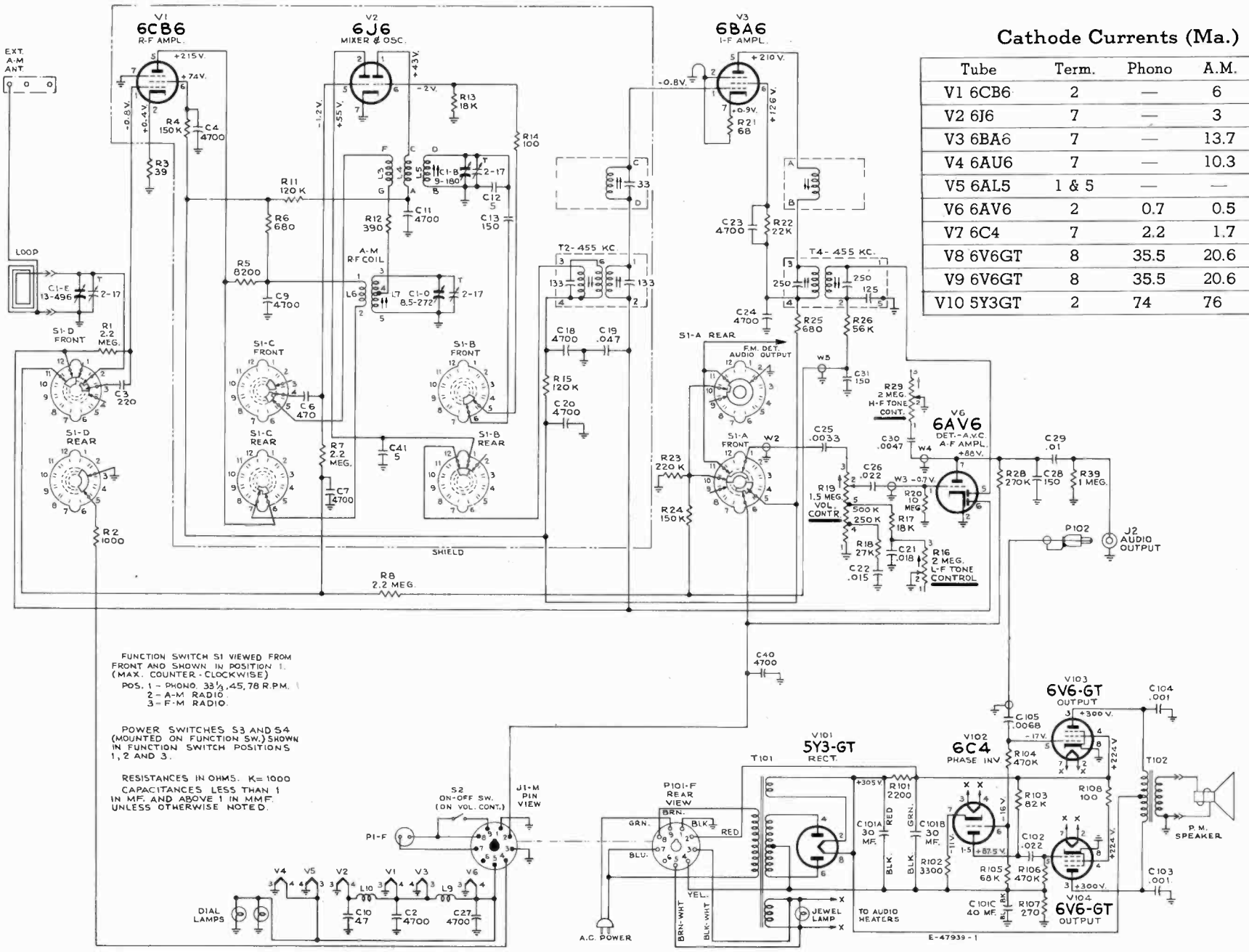
Voltages measured with VoltOhmyst and should hold within ±20% with rated line voltage. Tuning condenser closed—no signal input.

Critical Lead Dress

1. The 1st F.M. I.F. plate lead should be dressed away from the R.F. plate.
2. Dress the 1st A.M. I.F. plate lead to S-2 wafer away from the A.M. R.F. coil.
3. 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.
4. Dress A.C. power switch wires away from all audio components.
5. Dress C-26 down toward base between terminal board and side apron.
6. C-18 bypass should ground as close to the R.F. Shelf ground strap as practicable.
7. Dress C-25 away from arm of volume control.
8. All leads, from the R.F. shelf, leaving through the shields must be kept as short as possible so as to minimize F.M. oscillator radiation.
9. Dress A.C. leads in the RS141 chassis away from audio input leads and components.
10. Dress all leads away from R1 in the RS141 chassis.
11. All leads for F.M. should be kept short especially on the R.F. shelf.



Simplified Schematic Diagram—"FM" Position

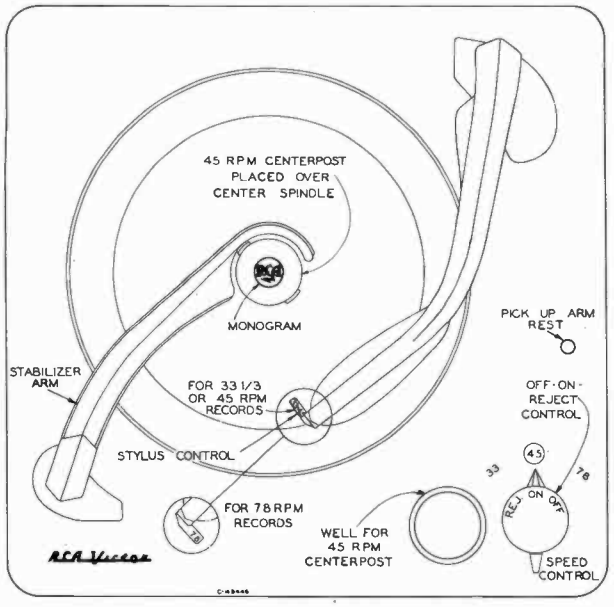


Cathode Currents (Ma.)

Tube	Term.	Phono	A.M.	F.M.
V1 6CB6	2	—	6	6
V2 6J6	7	—	3	3
V3 6BA6	7	—	13.7	13.5
V4 6AU6	7	—	10.3	10.6
V5 6AL5	1 & 5	—	—	—
V6 6AV6	2	0.7	0.5	0.5
V7 6C4	7	2.2	1.7	17.1
V8 6V6GT	8	35.5	20.6	21.1
V9 6V6GT	8	35.5	20.6	21.1
V10 5Y3GT	2	74	76	77.5

Simplified Schematic Diagram—"AM" Position

Record Changer



Controls

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 33⅓ 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.

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.

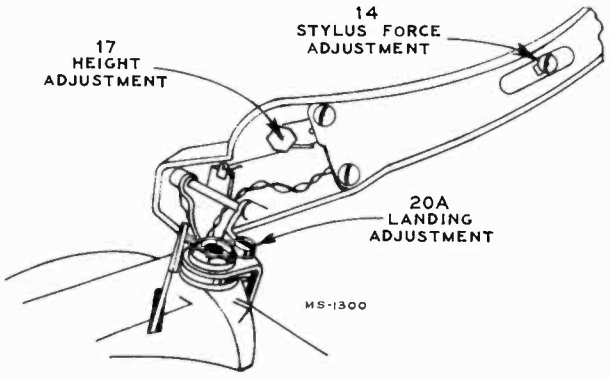
Pickup Arm Height Adjustment

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 1⅜" 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.



Adjustments

Tripping

The tripping method used in this mechanism is a velocity method. Velocity tripping is effective between 4¾" and 3¼" diameters, when the stylus moves inward ⅛" or more per revolution of the turntable. No adjustment is required.

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

Roll-Out Mechanism

Record Changer Mounting

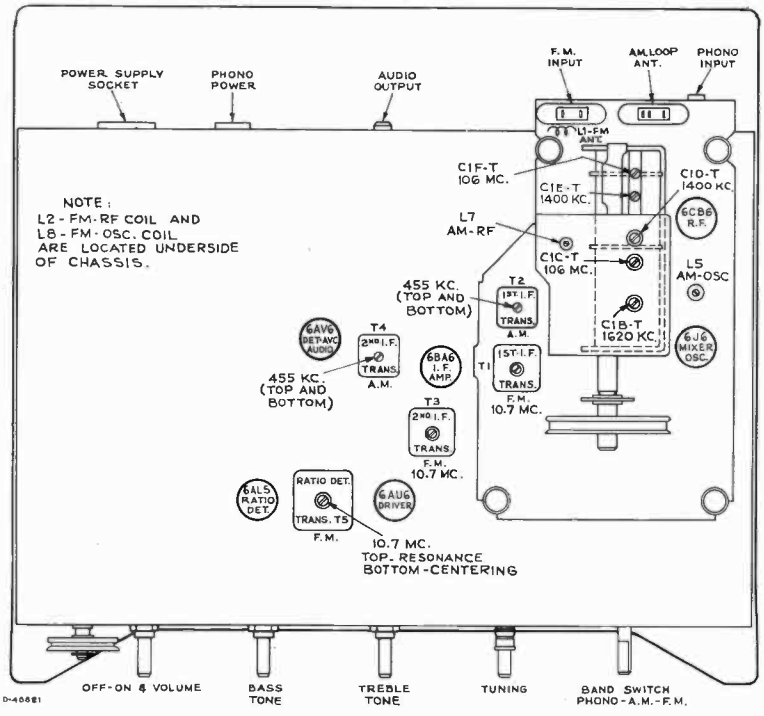
The record-changer is mounted in a roll-out carriage. The changer mechanism is mounted on springs and should be free floating.

Roll-out Carriage Removal

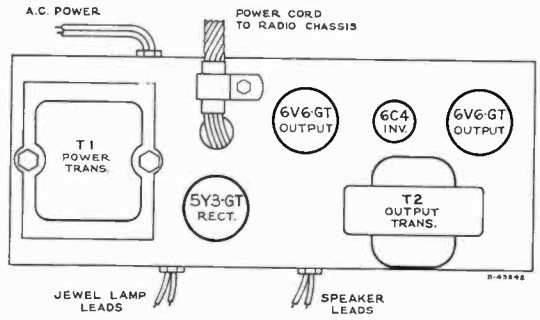
Roll-out carriage has two stop pins, (one at the back end of each slide) held in place by retaining spring. To remove roll-out carriage, it is first necessary to pull the retaining springs out of the slides with a pair of long nose pliers, the stop pins are then easily removed. The roll-out carriage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

Roll-out Carriage Travel

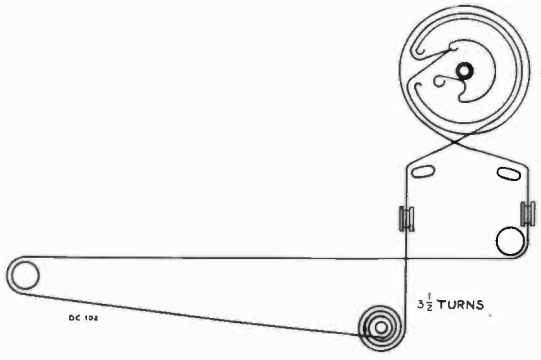
The roll-out carriage has a normal movement limitation of approximately 10 inches. If it does not have this amount of movement, it may be due to an obstruction or from slippage or creeping of the balls of the slide mechanism. Travel restriction due to slippage or creeping of balls in the slide mechanism 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.



RC1111 Chassis—Tube and Trimmer Locations



RS141—Audio Amplifier Chassis



Dial Cord Drive

Replacement Parts

STOCK NO.	PART DESCRIPTION
	CHASSIS ASSEMBLIES RC 1111
77308	Capacitor—Variable tuning capacitor (C1-A, C1-B, C1-C, C1-D, C1-E, C1-F)
75613	Capacitor—Ceramic, 5 mmf. (C12, C41)
77352	Capacitor—Ceramic, 6.8 mmf. (C16)
39044	Capacitor—Ceramic, 15 mmf. (C14)
76348	Capacitor—Ceramic, 47 mmf. (C10)
75612	Capacitor—Ceramic, 68 mmf. (C15, C17)
39396	Capacitor—Ceramic, 100 mmf. (C5)
75614	Capacitor—Ceramic, 150 mmf. (C13, C28, C31)
75611	Capacitor—Ceramic, 220 mmf. (C3)
39640	Capacitor—Mica, 330 mmf. (C36, C37)
39644	Capacitor—Mica, 470 mmf. (C6)
73473	Capacitor—Ceramic, 4700 mmf. (C2, C4, C7, C9, C11, C18, C20, C23, C24, C27, C32, C34, C35, C40)
73747	Capacitor—Electrolytic 2 mfd., 50 volts (C39)
77468	Capacitor—Tubular, paper, .0018 mfd., 600 volts (C8)
73795	Capacitor—Tubular, paper, .0038 mfd., 600 volts (C25)
73920	Capacitor—Tubular, paper, .0047 mfd., 600 volts (C30)
72490	Capacitor—Tubular, paper, .005 mfd., 200 volts (C33, C38)
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts (C29)
73797	Capacitor—Tubular, paper, .015 mfd., 600 volts (C22)
77469	Capacitor—Tubular, paper, .018 mfd., 200 volts (C21)
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts (C26)
73558	Capacitor—Tubular, paper, .047 mfd., 200 volts (C19)
73935	Clip—Mounting clip for I.F. transformer for 75558 & 76328
77313	Coil—Antenna coil—FM (L1)
71942	Coil—Filament choke coil (L9, L10)
75569	Coil—Oscillator coil—AM—complete with adjustable core (L3, L4, L5)
77315	Coil—Oscillator coil—FM (L8)
77305	Coil—R.F. coil—AM—complete with adjustable core (L6, L7)
77314	Coil—R.F. coil—FM (L2)
75543	Connector—2 contact female connector for phono power cable (P1)
74879	Connector—2 contact female connector for antenna leads
75062	Connector—9 contact male connector for power input (J1)
35787	Connector—Single contact female connector for audio cable (J2)
33742	Connector—Single contact female connector for phono cable (J3)
75562	Control—Tone control—H.F. (R29)
75561	Control—Tone control—L.H. (R16)
75537	Control—Volume control and power switch (R19, S2)
72953	Cord—250' Drive Cord Reel (approx. 57" overall req'd)
75564	Coupling—Spring coupling for function switch extension shaft
74839	Fastener—Push fastener to fasten RF shelf (4 req'd)
16058	Grommet—Rubber grommet for mounting RF shelf (4 req'd)
75548	Grommet—Rubber grommet for mounting slides (4 req'd)
11765	Lamp—Dial lamp—Mazda 51
77311	Latch—Bottom cover latch
77486	Nut—Speed nut for latch adjustment screw
76421	Pin—Slide mechanism stop pin
72602	Pulley—Drive cord pulley
35641	Pulley—Drive cord pulley—1⅜" dia.
	Resistor—Fixed, composition:—
503039	39 ohms, ±10%, ½ watt (R3)
503068	68 ohms, ±10%, ½ watt (R21)
503110	100 ohms, ±10%, ½ watt (R14, R34)
503112	120 ohms, ±10%, ½ watt (R30)
503139	390 ohms, ±10%, ½ watt (R12)
503168	680 ohms, ±10%, ½ watt (R6, R25, R32)
503210	1000 ohms, ±10%, ½ watt (R2)
502212	1200 ohms, ±5%, ½ watt (R36)
502233	3300 ohms, ±5%, ½ watt (R35)

Replacement Parts (Continued)

STOCK NO.	PART DESCRIPTION
503282	8200 ohms, ±10%, ½ watt (R5)
503315	15,000 ohms, ±10%, ½ watt (R33)
503318	18,000 ohms, ±10%, ½ watt (R13, R17)
503322	22,000 ohms, ±10%, ½ watt (R22, R31)
503327	27,000 ohms, ±10%, ½ watt (R9, R18)
503339	39,000 ohms, ±10%, ½ watt (R37)
503356	56,000 ohms, ±10%, ½ watt (R26)
503412	120,000 ohms, ±10%, ½ watt (R11, R15)
503415	150,000 ohms, ±10%, ½ watt (R4, R24)
503422	220,000 ohms, ±10%, ½ watt (R23)
503427	270,000 ohms, ±10%, ½ watt (R28)
503447	470,000 ohms, ±10%, ½ watt (R38)
503510	1 megohm, ±10%, ½ watt (R39)
503515	1.5 megohm, ±10%, ½ watt (R10)
503522	2.2 megohm, ±10%, ½ watt (R1, R7, R8)
503610	10 megohm, ±10%, ½ watt (R20)
504622	22 megohm, ±20%, ½ watt (R27)
77303	Shaft—Extension shaft for function switch
75540	Shaft—Tuning knob shaft
73584	Shield—Tube shield for V1, V6
75192	Shield—Tube shield for V2
77310	Slide—Slide mechanism (2 req'd)
31364	Socket—Dial lamp socket
74179	Socket—Tube socket, 7 contact, miniature, wafer for V1, V3, V4, V5
73117	Socket—Tube socket, 7 contact, miniature, wafer for V6
77306	Socket—Tube socket, 7 pin, moulded, saddle-mounted for V2
77312	Spring—Actuating spring for bottom cover latch
76332	Spring—Drive cord spring
75563	Spring—Retaining spring for function switch extension shaft
76422	Spring—Retaining spring for slide mechanism stop pin
77304	Support—Polystyrene support for FM oscillator coil complete with mounting bracket
77307	Switch—Function switch (S1)
75559	Transformer—1st. I.F. transformer—FM—complete with adjustable cores (T1)
75558	Transformer—1st. I.F. transformer—AM—complete with adjustable cores (T2)
76328	Transformer—2nd. I.F. transformer—AM—complete with adjustable cores (T4)
75560	Transformer—2nd. I.F. transformer—FM—complete with adjustable cores (T3)
73743	Transformer—Ratio detector transformer complete with adjustable core (T5)
33726	Washer—"C" washer for tuning knob shaft or drive cord pulley
	ROLLOUT MECHANISM ASSEMBLIES
77319	Bracket—Dial lamp socket bracket—L.H.
77318	Bracket—Dial lamp socket bracket—R.H.
77320	Dial—Polystyrene dial scale
77321	Escutcheon—Dial scale escutcheon less dial
77317	Frame—Plastic mounting frame—light brown—for chassis and record changer for blonde mahogany instruments
77316	Frame—Plastic mounting frame—maroon—for chassis and record changer for mahogany or walnut instruments
77322	Pointer—Station selector pointer
	AMPLIFIER ASSEMBLIES RS 141
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 (C101A, C101B, C101C)
75643	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 1000 volts (C103, C104)
73789	Capacitor—Tubular, paper, .0068 mfd., 400 volts (C105)
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts (C102)
72583	Cable—Shielded audio cable complete with pin plug (Includes P102)
75064	Connector—9 contact female connector for power input cable (P101)
73690	Cord—Power cord and plug
74838	Grommet—Power cord strain relief (1 set)
72776	Pin—Contact pin for speaker lead (2 req'd)
73637	Resistor—Wire wound, 2200 ohms, 5 watts (R101)
	Resistor—Fixed, composition:—
503110	100 ohms, ±10%, ½ watt (R108)
522127	270 ohms, ±5%, 2 watts (R107)
502233	3300 ohms, ±5%, ½ watt (R102)
503368	68,000 ohms, ±10%, ½ watt (R105)
503382	82,000 ohms, ±10%, ½ watt (R103)
503447	470,000 ohms, ±10%, ½ watt (R104, R106)
31364	Socket—Pilot lamp socket
31251	Socket—Tube socket, octal, wafer
73117	Socket—Tube socket, 7 pin, miniature, wafer
77323	Transformer—Output transformer (T102)
75566	Transformer—Power transformer, 117 volt, 60 cycle (T101)
	SPEAKER ASSEMBLIES 92569-12W RMA—274
75682	Cone—Cone and voice coil (3.2 ohms)
76093	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms) 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 description of part required.
	MISCELLANEOUS
77332	Antenna—Antenna loop—less cable
74649	Antenna—F.M. antenna
77327	Back—Back—light brown—for chassis and changer rollout assembly for blonde mahogany instruments
77326	Back—Back—maroon—for chassis and changer rollout assembly for mahogany or walnut instruments
77325	Back—Cabinet back
75707	Board—Antenna terminal board
71599	Bracket—Pilot lamp bracket
72437	Cable—Shielded pickup cable complete with pin plug
13103	Cap—Pilot lamp cap (Jewel)
71892	Catch—Bullet catch and strike for cabinet doors
X3222	Cloth—Grille cloth for blonde mahogany instruments
X3130	Cloth—Grille cloth for mahogany or walnut instruments
30870	Connector—2 contact male connector for record changer power cable
74882	Connector—2 contact male connector for antenna loop cable
74752	Connector—2 contact male connector for antenna lead
71984	Decal—"RCA Victor" decal
74273	Decal—"Victrola" decal
37396	Grommet—Rubber grommet for speaker mounting
74308	Hinge—Cabinet door hinge (1 set)
77330	Knob—Function switch knob—maroon
77331	Knob—Function switch knob—tan
77328	Knob—Tuning control, tone control or volume control and power switch knob—maroon
77329	Knob—Tuning control, tone control or volume control and power switch knob—tan
11765	Lamp—Pilot lamp—Mazda 51
73634	Nut—Speed nut for speaker mounting screws
77335	Plate—Back plate for lower door pull (2 req'd)
77334	Pull—Cabinet door pull—lower (2 req'd)
77333	Pull—Cabinet door pull—upper—(4 req'd)
75623	Screw—#8-32 x ⅝" trimit head screw for upper door pull
74113	Screw—#8-32 x 1" trimit head screw for lower door pull
74734	Spring—Spring clip for knobs
75902	Spring—Suspension spring for main cable
72936	Stop—Cabinet door stop

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

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

RCA VICTOR

Radio Phonograph Combination

Model 2US7

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

SERVICE DATA

—1952 No. 3—

PREPARED BY RCA SERVICE CO., INC.
FOR
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 ..... Detector—A.F. Amplifier
4. RCA 6AQ6 ..... Phase Inverter
5. RCA 35C5 } Push Pull Output
6. RCA 35C5 }

A selenium rectifier Stock #76871 is used.

Power Supply Rating

1. 115 volts A.C., 60 cycles (uses 930409-5 or -10 Changer) ..... 45 watts
2. 115 volts A.C., 50 cycles (uses 930409-11 Changer) ..... 45 watts

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

Loudspeaker

Size and type ..... 5" x 7" P.M.
Voice coil impedance ..... 3.2 ohms at 400 cycles

Power Output

Undistorted ..... 2.0 watts
Maximum ..... 2.4 watts

Cabinet Dimensions

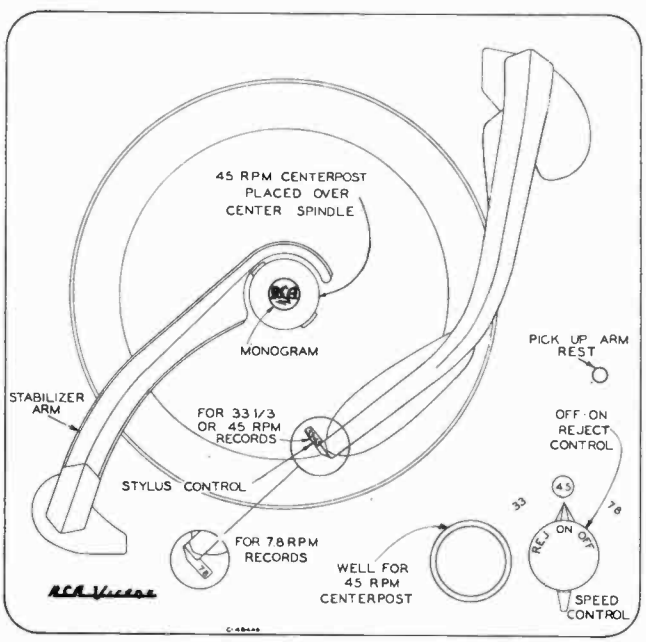
Height 10" Width 16¾" Depth 20¾"

Tuning Drive Ratio ..... 14¼:1 (7⅛ turns of knob)

Record Changer (930409-5, -10 or -11)

Turntable speed ..... 33⅓, 45 or 78 r.p.m.
Record capacity ..... up to fourteen 7 inch RCA type
or twelve 10 inch
or ten 12 inch
or ten 10 in. and 12 in. intermixed.
Pickup (Stock No. 75475) ..Crystal with replaceable styli.

Weight ..... 26 lbs. net



Record Changer Controls

RECORD CHANGER CONTROLS

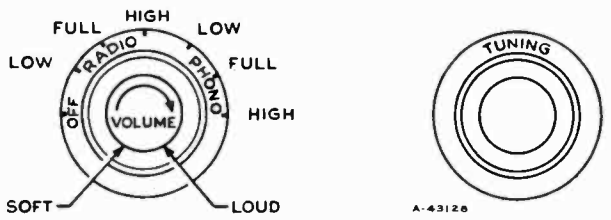
The record changer has a dual control on the motorboard and a stylus selector control on the pickup arm. The inner control (circular knob) is the OFF-ON-REJECT control. Turning this knob to the center position energizes the motor and starts the turntable, when turned to the right (clockwise) it starts 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 33⅓ 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.

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.

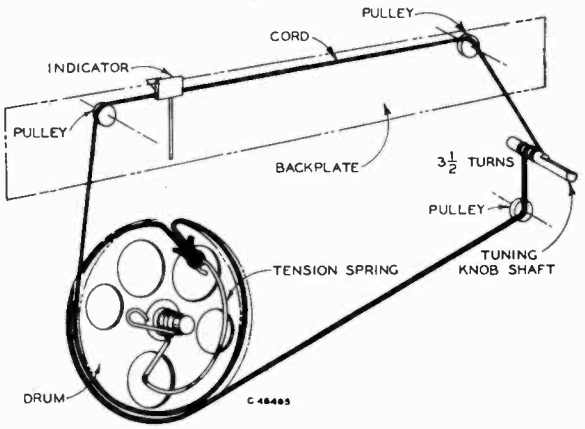


Radio Controls

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 ¼ 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.

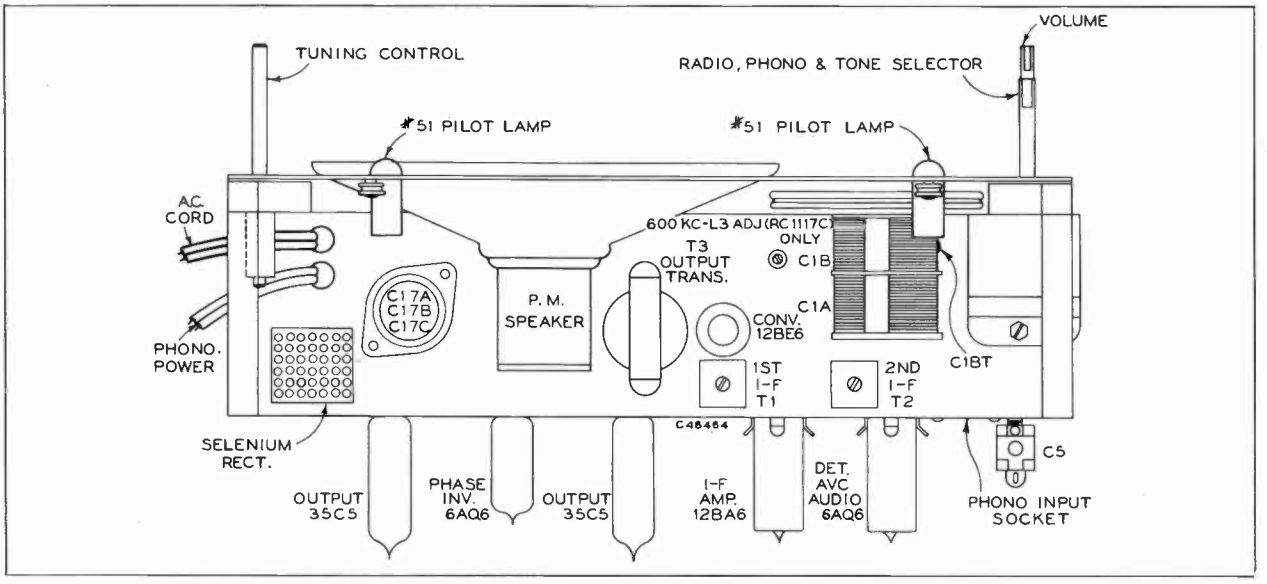
Test Oscillator.—Connect low side of test oscillator to common wiring in series with a .1 mf. capacitor. If the test oscillator is a.c. operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common wiring at the electrolytic capacitor. Keep the oscillator output low 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 following for max. output
1	I.F. grid, in series with .1 mfd.	455 kc	Quiet point 1,600 kc end of dial	Pri. & Sec. 2nd I.F. transformer
2	Converter grid in series with .1 mfd.			Pri. & Sec. 1st I.F. transformer
NOTE.—ANTENNA LOOP AND RECORD CHANGER MUST BE IN CABINET FOR THE FOLLOWING				
3	Short wire placed near loop for radiated signal	1,620 kc	Extreme R. H. end (gang open)	C1B-T (osc.)
4		1,400 kc	1,400 kc	C5 (ant.)
5		600 kc	600 kc Signal	L3 (Rock Gang)
6	Repeat steps 3, 4 & 5 if necessary			

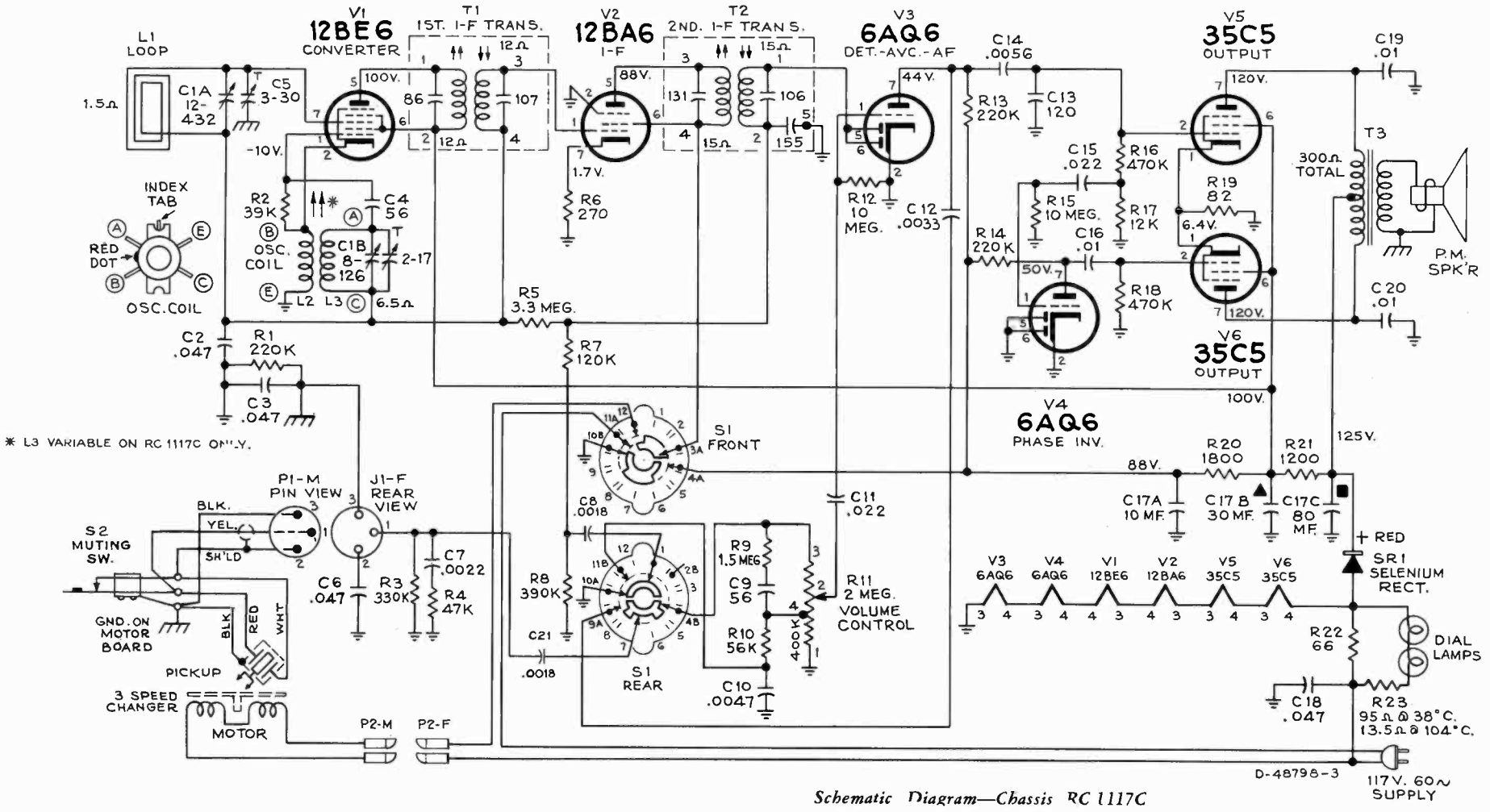
Critical Lead Dress

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

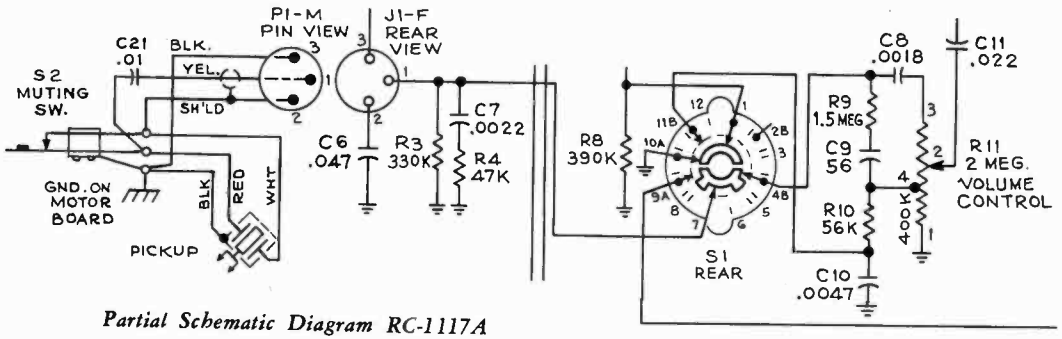
Dial Pointer Adjustment.—Rotate tuning condenser fully counterclockwise (plates fully meshed). Adjust indicator pointer so that it is $3\frac{15}{16}$" from the left hand edge of the dial back plate.



Tube and Trimmer Locations



Schematic Diagram—Chassis RC 1117C



Partial Schematic Diagram RC-1117A

FUNCTION SW. S1 VIEWED FROM FRONT, AND SHOWN IN POSITION NO. 1 (MAX. COUNTER CLOCKWISE).

POS. 1 – OFF.
2 – RADIO - MIN. HIGHS
3 – » - NORMAL
4 – » - MAX. HIGHS
5 – PHONO - MIN. HIGHS
6 – » - NORMAL
7 – » - MAX. HIGHS

K = 1000
RESISTANCES IN OHMS.
CAPACITANCES LESS THAN 1 IN MF. AND ABOVE 1 IN MMF. UNLESS OTHERWISE NOTED.

INDICATES CHASSIS GROUND.

INDICATES COMMON WIRING INSULATED FROM CHASSIS.

REPLACEMENT PARTS

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC1117A, RC1117C
76867	Capacitor—Variable tuning capacitor complete with drive drum, C1A, C1B
93603	Capacitor—Ceramic, 56 mmf., C9
77116	Capacitor—Ceramic, 56 mmf., C4
76347	Capacitor—Ceramic, 120 mmf., C13
76872	Capacitor—Adjustable trimmer, 2.5—30 mmf., C5
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, C17A, C17B, C17C
73851	Capacitor—Tubular, paper, .0018 mfd., 1600 volts, C8, C21 (RC1117C only)
73595	Capacitor—Tubular, paper, .0022 mfd., 600 volts, C7
73795	Capacitor—Tubular, paper, .0033 mfd., 400 volts, C12
73920	Capacitor—Tubular, paper, .0047 mfd., 600 volts, C10
73788	Capacitor—Tubular, paper, .0056 mfd., 400 volts, C14
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts, C16, C19, C20
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts, C11, C15
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts, C2, C3, C6
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts, C18
76866	Coil—Oscillator coil without adjustable core L2, L3
78586	Coil—Oscillator coil with adjustable core L2, L3
74192	Connector—3 contact male connector for shielded pickup cable, P1
77114	Connector—Single contact male connector for loop lead
76874	Control—Volume control, R11
72953	Cord—250' Drive Cord Reel (approx. 54" required)
70392	Cord—Power cord and plug
74838	Grommet—Power cord strain relief (1 set)
72283	Grommet—Rubber grommet to mount variable tuning capacitor (3 req'd)
11765	Lamp—Dial lamp—Mazda 51
28452	Plate—Bakelite mounting plate for electrolytic
76865	Plate—Dial back plate complete with three (3) pulleys less dial
76868	Pointer—Station selector pointer
76871	Rectifier—Selenium rectifier, SR1
73038	Resistor—Wire wound, 66 ohms, 5 watts, R22
73072	Resistor—Normal value, 95 ohms, @ 38°C with negative temperature coefficient R23
	Resistor—Fixed, composition:
503082	82 ohms, ±10%, ½ watt, R19
503127	270 ohms, ±10%, ½ watt, R6
513212	1200 ohms, ±10%, 1 watt, R21
503218	1800 ohms, ±10%, ½ watt, R20
503312	12,000 ohms, ±10%, ½ watt, R17
503339	39,000 ohms, ±10%, ½ watt, R2
503347	47,000 ohms, ±10%, ½ watt, R4
503356	56,000 ohms, ±10%, ½ watt, R10
503412	120,000 ohms, ±10%, ½ watt, R7
504422	220,000 ohms, ±20%, ½ watt, R1, R13, R14
503433	330,000 ohms, ±10%, ½ watt, R3
503439	390,000 ohms, ±10%, ½ watt, R8
503447	470,000 ohms, ±10%, ½ watt, R16
504447	470,000 ohms, ±20%, ½ watt, R18
503515	1.5 megohm, ±10%, ½ watt, R9
504533	3.3 megohm, ±20%, ½ watt, R5
504610	10 megohm, ±20%, ½ watt, R12, R15
76869	Shaft—Tuning knob shaft
76870	Shield—Tube shield for V1, V2, V3
74697	Socket—Dial lamp socket
51955	Socket—Tube socket, 7 pin, miniature, moulded, saddle-mounted
77115	Socket—Tube socket, 7 pin, miniature, moulded
76368	Spring—Drive cord spring
76873	Switch—Function switch less volume control, S1
77113	Terminal—Phono lead assembly terminal (knife) disconnect type)
74918	Transformer—First I.F. transformer complete with adjustable cores, T1
73037	Transformer—Second I.F. transformer complete with adjustable cores, T2
77122	Transformer—Output transformer, T3
33726	Washer—"C" washer for tuning knob shaft (2 req'd)
	SPEAKER ASSEMBLIES
76875	Speaker—5" x 7" P.M. speaker complete with cone and voice coil (3.2 ohms)
	MISCELLANEOUS
76876	Back—Cabinet back and antenna loop assembly (L1)
77350	Cable—Cable and Capacitor assembly (includes C21) (For RC1117A only)
74273	Decal—"Victrola" decal
76877	Dial—Polystyrene dial scale
76588	Emblem—"RCA Victor" emblem
74225	Escutcheon—Dial escutcheon less dial
76878	Escutcheon—Function switch escutcheon
76879	Escutcheon—Tuning control escutcheon
76895	Foot—Rubber foot (4 req'd)
72692	Hinge—Cabinet lid hinge
76882	Knob—Function switch knob—light gray
76881	Knob—Tuning control knob—(inner) light gray
76883	Knob—Tuning control knob (outer)—light gray
76880	Knob—Volume control knob—light gray
71095	Nut—Speed nut to fasten dial escutcheon
72765	Nut—Speed nut to fasten function switch or tuning control escutcheon
76894	Nut—#10-32 spring nut for mounting stud
30330	Spring—Retaining spring for volume control knob
14270	Spring—Retaining spring for tuning control or function switch knobs
76893	Stud—#10-32 x 1¾" special stud to mount changer in cabinet (2 req'd)
71824	Stud—Stud and screw (1 set) for cabinet lid hinge
77221	Support—Lid Support

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

RCA VICTOR

AC-DC Radio Receiver

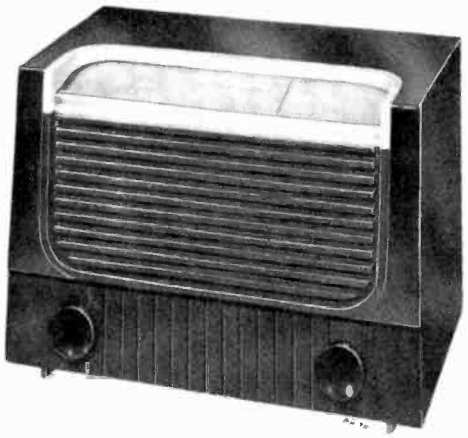
Models 2X61, 2X62

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.



Model 2X61 Maroon *Model 2X62 Ivory*

SPECIFICATIONS

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

Tube Complement

(1) RCA 12SK7 ..... R.F. Amplifier
(2) RCA 12SA7 ..... Converter
(3) RCA 12SK7 ..... I.F. Amplifier
(4) RCA 12SQ7 ..... Det.-A.V.C.-A.F. Amp.
(5) RCA 35L6GT ..... Output
(6) RCA 35Z5GT ..... Rectifier

Power Supply Rating
115 volts d. c. or 50 to 60 cycles a. c. ..... 35 watts

Dial Lamp ..... 2 Mazda type 1490, 3.2 volts, 0.15 amp.

Loudspeaker
Size and type ..... 4-in. P.M.
Voice coil impedance ..... 3.2 ohms at 400 cycles

Power Output
Undistorted ..... 0.85 watt
Maximum ..... 1.15 watts

Tuning Drive Ratio ..... 8.5 to 1 (4¼ turns of knob)
Weight ..... 8 lbs.

Cabinet Dimensions
Height ....8⅝" Width ....11¾" Depth ....7½"

REPLACEMENT PARTS

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1080C—Model 2X61 RC 1080D—Model 2X62	503112	120 ohms, ±10%, ½ watt, R4, R11
77143	Antenna—Antenna loop and back cover assembly—maroon—for Model 2X61	503118	180 ohms, ±10%, ½ watt, R1
77144	Antenna—Antenna loop and back cover assembly—ivory—for Model 2X62	503127	270 ohms, ±10%, ½ watt, R15
77143	Back—Cabinet back cover and antenna loop assembly—maroon—for Model 2X61	513212	1200 ohms, ±10%, 1 watt, R12
77144	Back—Cabinet back cover and antenna loop assembly—ivory—for Model 2X62	503312	12,000 ohms, ±10%, ½ watt, R2
77145	Capacitor—Variable tuning capacitor complete with drive drum, C1, C2, C3, C4, C5, C6	503322	22,000 ohms, ±10%, ½ watt, R3
39042	Capacitor—Ceramic, 47 mmf., C8	503356	56,000 ohms, ±10%, ½ watt, R7
71924	Capacitor—Ceramic, 56 mmf., C9	503410	100,000 ohms, ±10%, ½ watt, R16
73501	Capacitor—Ceramic, 150 mmf., C12, C13	503422	220,000 ohms, ±10%, ½ watt, R5, R6
73473	Capacitor—Ceramic, 4700 mmf., C20	503447	470,000 ohms, ±10%, ½ watt, R10
74662	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd., 150 volts, C19A, C19B	503522	2.2 megohm, ±10%, ½ watt, R8
73595	Capacitor—Tubular, paper, .0022 mfd., 600 volts, C14	503547	4.7 megohm, ±10%, ½ watt, R9
73797	Capacitor—Tubular, paper, .015 mfd., 600 volts, C16	74691	Shaft—Tuning knob shaft
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts, C15	74697	Socket—Dial lamp socket
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts, C17, C18	54414	Socket—Tube socket
73551	Capacitor—Tubular, paper, 0.1 mfd., 400 volts, C10, C11	76368	Spring—Drive cord spring
73794	Capacitor—Tubular, paper, 0.22 mfd., 400 volts, C21	33634	Switch—"Radio-Phono" switch, S2
73935	Clip—Mounting clip for I.F. transformer	73036	Transformer—First I.F. transformer complete with adjustable cores, T1
74693	Coil—Oscillator coil complete with adjustable cores, L3, L4	73037	Transformer—Second I.F. transformer complete with adjustable cores, T2
73677	Coil—R.F. coil complete with adjustable cores, L1, L2	73976	Transformer—Output transformer, T3
35787	Connector—Phono input connector	35969	Washer—"C" washer for tuning knob shaft
75474	Connector—Single contact male connector for output transformer leads (2 req'd)		SPEAKER ASSEMBLIES 971495-3
38410	Control—Volume control and power switch, R14, S1	76391	Speaker—4" P.M. speaker complete with cone and voice coil (3.2 ohms)
72953	Cord—Drive cord (approx. 50" overall)		MISCELLANEOUS
70392	Cord—Power cord and plug	Y2445	Cabinet—Plastic cabinet—maroon—complete with dial escutcheon for Model 2X61
73693	Grommet—Power cord strain relief (1 set)	Y2446	Cabinet—Plastic cabinet — ivory — complete with dial escutcheon for Model 2X62
72283	Grommet—Rubber grommet for mounting tuning capacitor	77146	Dial—Polystyrene dial scale
77142	Pointer—Station selector pointer	77241	Escutcheon—Dial escutcheon
72602	Pulley—Drive cord pulley	74931	Knob—Control knob—maroon—for Model 2X61
	Resistor—Fixed, composition:—	72645	Knob—Control knob—ivory—for Model 2X62
514033	33 ohms, ±20%, 1 watt, R13	71116	Lamp—Dial lamp—Mazda 1490
		74301	Screw—#8 x ⅜" binder head screw (cross recessed) for mounting dial
		30900	Spring—Retaining spring for knobs

† 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

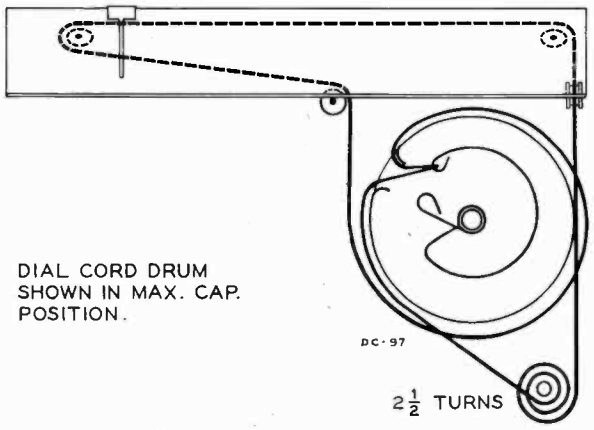
Cathode Ray Alignment is the preferable method. Connections for the oscilloscope are shown on the schematic diagram.

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

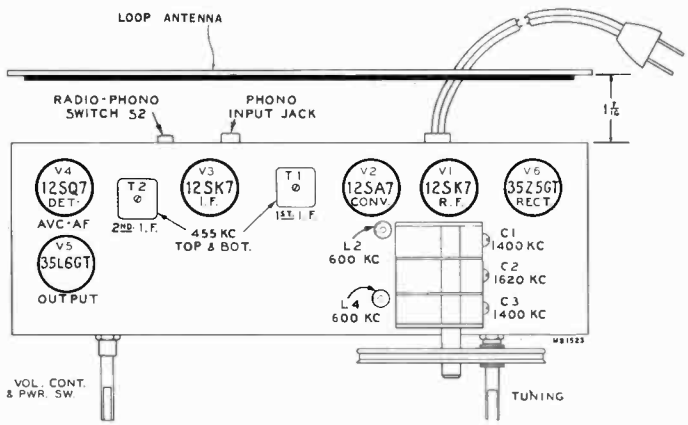
Test Oscillator.—Connect low side of test oscillator to common wiring in series with a .1 mf. capacitor. If the test oscillator is a. c. operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common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

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 near 600 kc	Top and bottom cores of T2
2	Pin No. 8 of 12SA7 (V2 conv.)			Top and bottom cores of T1
3	"External Antenna" terminal through 100 mmf. capacitor	1620 kc	Gang open	C6 Osc.
4		1400 kc	1400 kc signal	C5 R.F. C4 Ant.
5		Shunt C5 with 22,000 ohm resistor		
		600 kc	600 kc	L4 Osc. (Rock gang)
6		Remove 22,000 ohm resistor from C5		
		600 kc	600 kc	L2 R.F.
7		Repeat steps 4, 5 and 6		

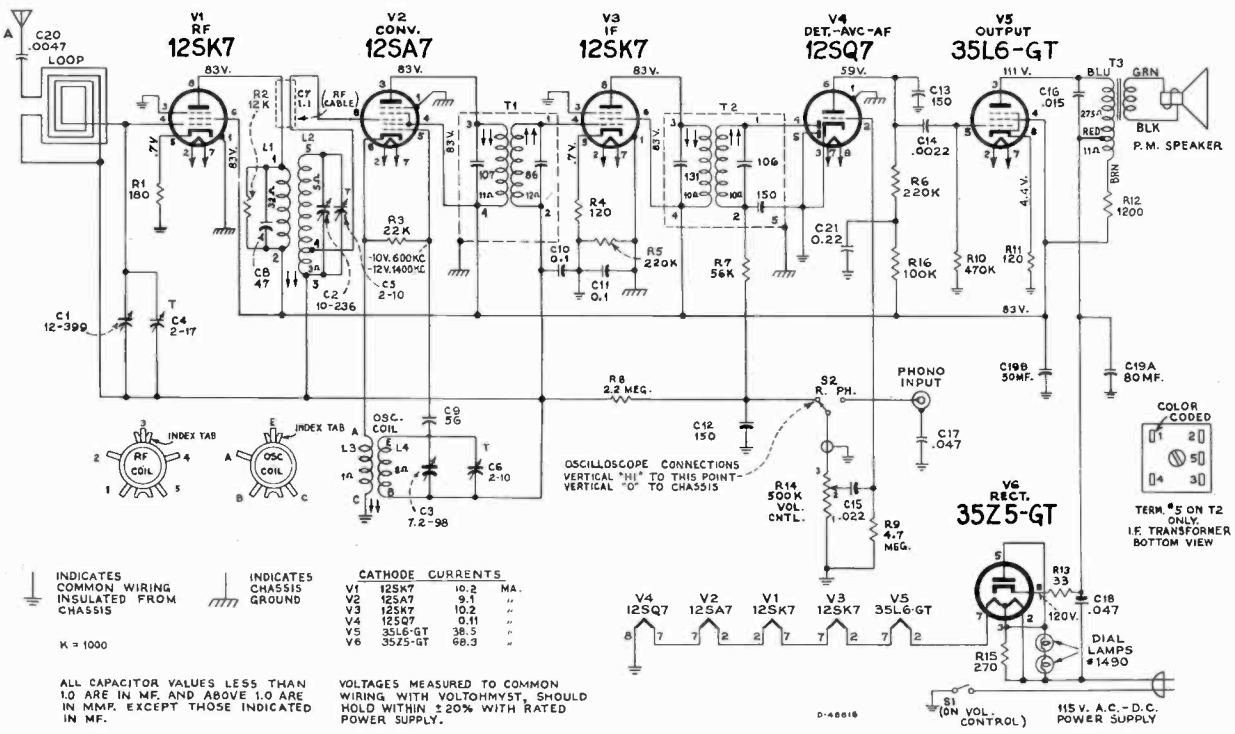
The position of the loop antenna in relation to the chassis affects adjustment of C4. The correct position is indicated on the illustration "Tube and Trimmer Locations."



Dial Indicator and Drive Mechanism



Tube and Trimmer Locations



Schematic Diagram

RCA VICTOR

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 Broadcast ("A" Band) ..... 540-1600 kc
Short Wave ("C" Band) ..... 5.8-18.0 mc

Intermediate Frequency ..... 455 kc

Tube Complement

(1) RCA 12BA6 ..... R. F. Amplifier
(2) RCA 12BE6 ..... Converter
(3) RCA 12BA6 ..... I. F. Amplifier
(4) RCA 12SQ7 ..... Det. - A.F. - A.V.C.
(5) RCA 35L6GT ..... Output
(6) RCA 35Z5 ..... Rectifier

Dial Lamp ..... 2 Type 1490, 3.2 volts, 0.15 amp.

Power Supply Rating

115 volts, D.C. or 50 to 60 cycles, A.C. ..... 35 watts

Loudspeaker

Type 971495-9W ..... 4 in. P.M.
V. C. Impedance ..... 3.2 ohms at 400 cycles

Power Output

Undistorted ..... 0.85 watts
Maximum ..... 1.2 watts

Weight ..... 8 lbs.

Cabinet Dimensions

Height...8⅝ in. Width...11¾ in. Depth...7½ in.

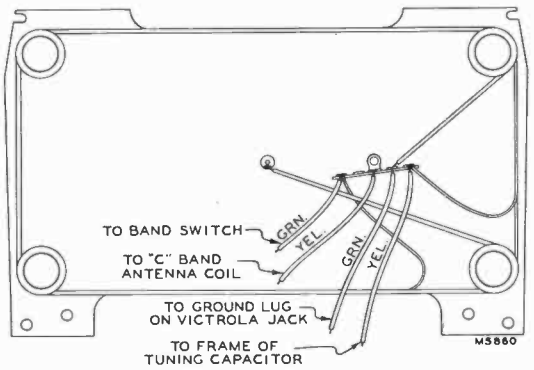
Tuning Drive Ratio ..... 11:1 (5½ turns of knob)

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

Operating Instructions

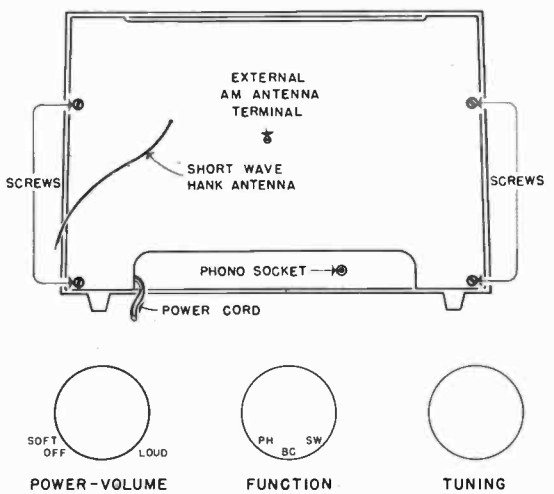
Radio—Turn power on with POWER-VOLUME control and set about half-way for volume. Set the FUNCTION Control for the type of program desired and allow 30 to 40 second warm-up period when the dial will be fully illuminated.

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.

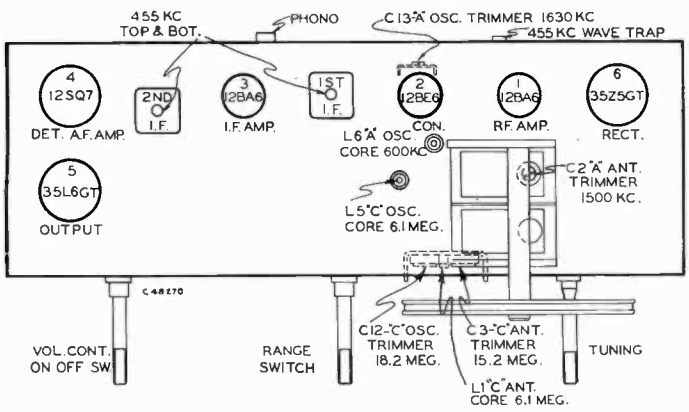


Loop Antenna Leads

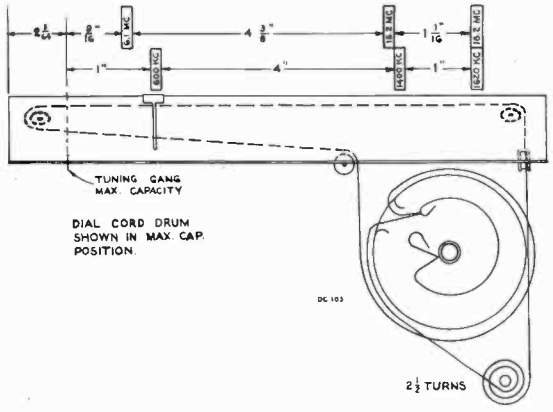
Phonograph Operation—Plug in record changer attachment to phono socket on lower chassis apron. Set FUNCTION switch to "PH" (phono) position. Adjust VOLUME control for listening requirements.



Radio Controls



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.	455 kc.	"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.				*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	(Radiated signal) short piece of wire placed near ant.	1620 kc.	"A"	1620 kc. (Cap. min.)	C-13 "A" Osc.
5		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 Term. board through 47 mfd. Low side to loop primary terminal	18.2 mc.	"C"	18.2 mc. (Min. cap.)	**C-12 "C" Osc.
9		15.2 mc.		15.2 mc.	***†C-3 "C" Ant.
10		6.1 mc.		6.1 mc.	††L-5 "C" Osc. L-1 "C" Ant.
11	Repeat 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.

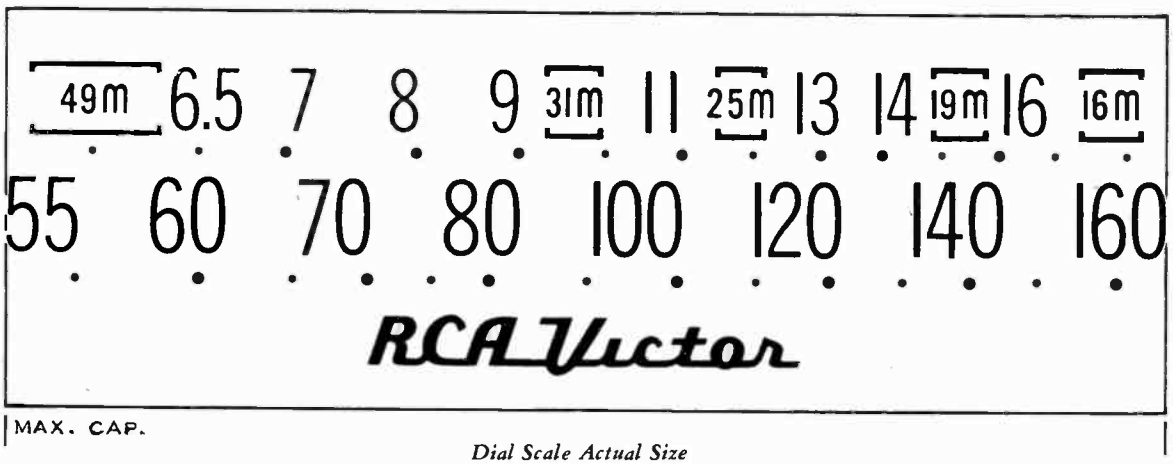
***Two peaks should be found, use one having highest capacity.
Note: Check for image frequences.

†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.

††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.

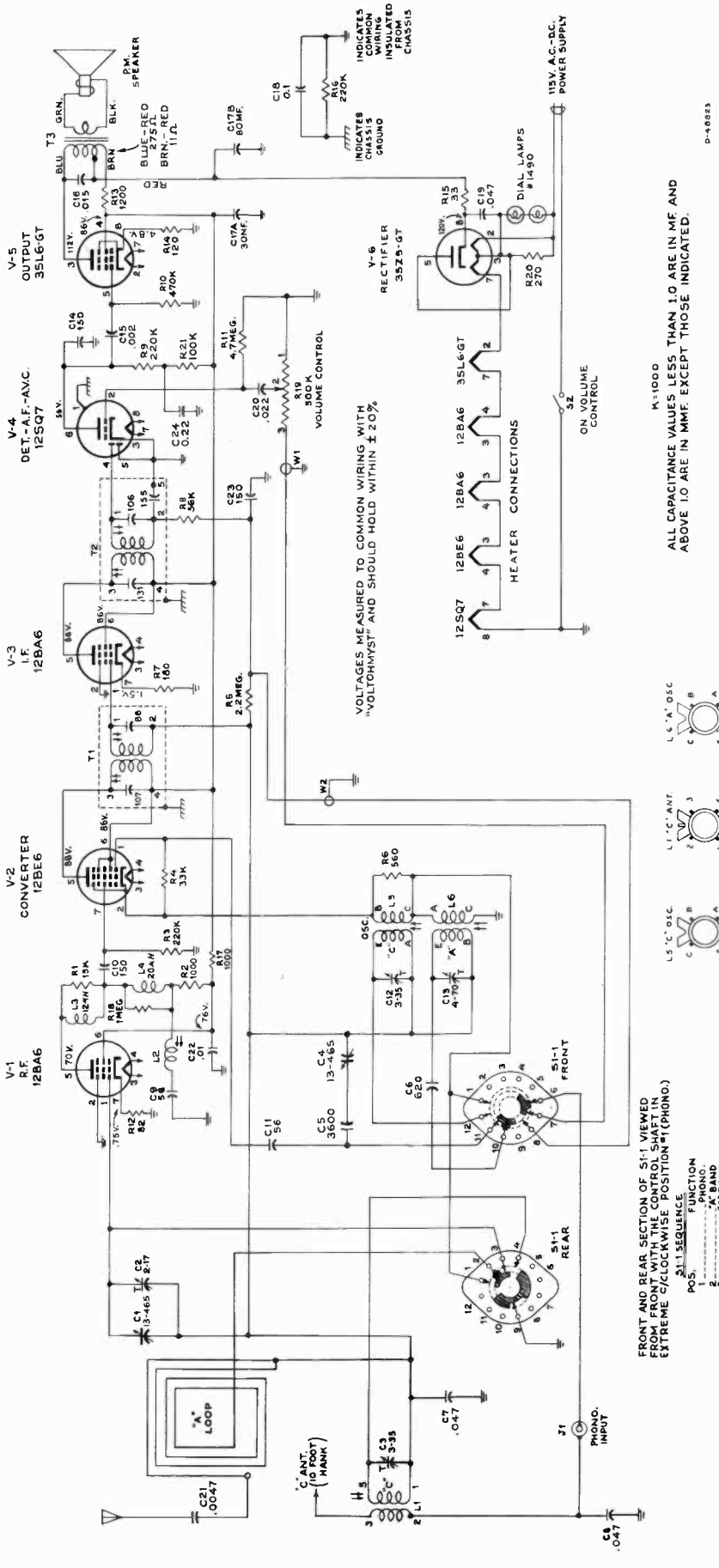
Output Meter Alignment—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.



Dial Scale Actual Size

CRITICAL LEAD DRESS

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



Schematic Diagram—Chassis RC1085B

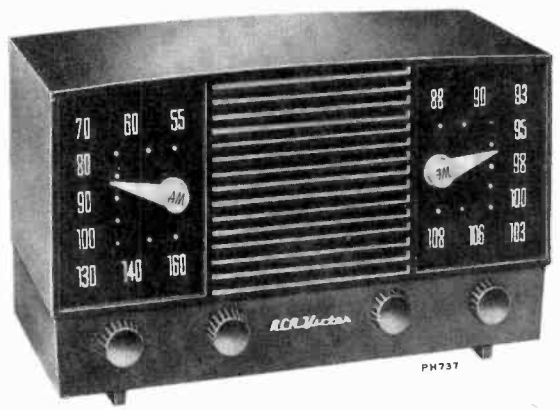
Replacement Parts

STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLIES RC-1085B
77217	Antenna—Antenna loop and back cover—maroon
77217	Back—Cabinet back cover and antenna loop assembly —maroon
71042	Button—Plug button for trimmer adjustment hole
77216	Capacitor—Variable tuning capacitor complete with drive drum C1, C2, C4
74924	Capacitor—Mica trimmer, dual 3-35 mmf. C3, C12
74923	Capacitor—Mica trimmer, 4-70 mmf. C13
71924	Capacitor—Ceramic, 56 mmf. C9, C11
73501	Capacitor—Ceramic, 150 mmf. C10, C14, C23
38831	Capacitor—Mica, 620 mmf. C6
39665	Capacitor—Mica, 3600 mmf. C5
73473	Capacitor—Ceramic, 4700 mmf. C21
72312	Capacitor—Electrolytic comprising 1 section of 30 mfd., 150 volts and 1 section of 80 mfd., 150 volts C17A, C17B
73595	Capacitor—Tubular, paper, .0022 mfd., 600 volts ... C15
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts C22
73797	Capacitor—Tubular, paper, .015 mfd., 600 volts C16
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts C20
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts C7, C8, C19
73551	Capacitor—Tubular, paper, 0.1 mfd., 400 volts C18
73794	Capacitor—Tubular, paper, 0.22 mfd., 400 volts C24
73935	Clip—Mounting clip for I.F. transformer
74927	Coil—Antenna coil—"C" band L1
74925	Coil—Oscillator coil—"A" band—complete with adjustable core L6
74926	Coil—Oscillator coil—"C" band—complete with adjustable core L5
74930	Coil—Peaking coil (12 muh.) L3, R1
72618	Coil—Peaking coil (20 muh.) L4, R18
74928	Coil—Series wavetrap coil (455 KC) complete with adjustable core L2
35787	Connector—Phono input connector J1
75474	Connector—Single contact male connector for output transformer leads (2 req'd.)
38410	Control—Volume control and power switch R19, S2
72953	Cord—250' Drive Cord Reel (approx. 50" req'd.)
70392	Cord—Power cord and plug
74838	Grommet—Power cord strain relief (1 set)
33139	Grommet—Rubber grommet for chassis base
16058	Grommet—Rubber grommet for mounting tuning capacitor
70980	Lead—Antenna lead—"C" band
77142	Pointer—Station selector pointer

STOCK NO.	DESCRIPTION
	Resistor—Fixed, composition:—
514033	33 ohms, ±20%, 1 watt R15
503082	82 ohms, ±10%, ½ watt R12
503112	120 ohms, ±10%, ½ watt R14
503118	180 ohms, ±10%, ½ watt R7
503127	270 ohms, ±10%, ½ watt R20
503156	560 ohms, ±10%, ½ watt R6
503210	1000 ohms, ±10%, ½ watt R2, R17
513212	1200 ohms, ±10%, 1 watt R13
503333	33,000 ohms, ±10%, ½ watt R4
503356	56,000 ohms, ±10%, ½ watt R8
503410	100,000 ohms, ±10%, ½ watt R21
503422	220,000 ohms, ±10%, ½ watt R3, R9, R16
503447	470,000 ohms, ±10%, ½ watt R10
504522	2.2 megohm, ±20%, ½ watt R5
504547	4.7 megohm, ±20%, ½ watt R11
74922	Shaft—Tuning knob shaft
74697	Socket—Dial lamp socket
73117	Socket—Tube socket, 7 pin, miniature for V1, V2, V3
54414	Socket—Tube socket, octal, saddle-mounted for V4, V5, V6
76368	Spring—Drive cord spring
74921	Switch—Selector switch S1
74918	Transformer—First I.F. transformer complete with adjustable cores T1
73037	Transformer—Second I.F. transformer complete with adjustable cores T2
73976	Transformer—Output transformer T3
35969	Washer—"C" washer for tuning knob shaft
	SPEAKER ASSEMBLIES 971495-9W
77218	Speaker—4" P.M. speaker complete with cone and voice coil (3.2 ohms)
	MISCELLANEOUS
Y2447	Cabinet—Plastic cabinet—maroon—complete with dial escutcheon
77220	Dial—Polystyrene dial scale
77241	Escutcheon—Dial escutcheon
75761	Grommet—Rubber grommet for mounting speaker (4 req'd.)
77219	Knob—Selector switch knob—maroon
74931	Knob—Tuning control or volume control and power switch knob—maroon
71116	Lamp—Dial lamp—Mazda 1490
74301	Screw—#8 x ⅜" cross recessed binder head screw for mounting dial
30900	Spring—Retaining spring for knobs

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

RCA VICTOR



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

TUNING RANGE

Standard Broadcast (AM)	540-1600 kc
Frequency Modulation (FM)	88-108 mc
Intermediate Frequency (AM)	455 kc
Intermediate Frequency (FM)	10.7 mc

TUBE COMPLEMENT

(1) RCA 6BJ6	R.F. Amplifier
(2) RCA 19X8	Mixer-Oscillator
(3) RCA 12BA6	I.F. Amplifier
(4) RCA 12AU6	FM I.F. Amplifier
(5) RCA 12AU6	FM I.F. Amplifier
(6) RCA 12AL5	F.M. Detector
(7) RCA 12AV6	AM Det.-AVC-Audio
(8) RCA 35C5	Audio Output
RCA Stock No. 77519	Selenium Rectifier

POWER SUPPLY RATING

115 volts, 50-60 cycles, or 115 volts d.c. ..... 35 watts

LOUDSPEAKER

Size and Type	5¼" P.M.
Voice Coil Impedance	3.2 ohms

AUDIO POWER OUTPUT

Undistorted	1.0 watt
Maximum	1.3 watts

TUNING DRIVE RATIO ..... 9:1 (4½ turns of knob)

NET WEIGHT ..... 8 lbs.

DIMENSIONS (Overall)

Height ..... 8⅛" Width ..... 13 9/16" Depth ..... 7¾"

CIRCUIT DESCRIPTION

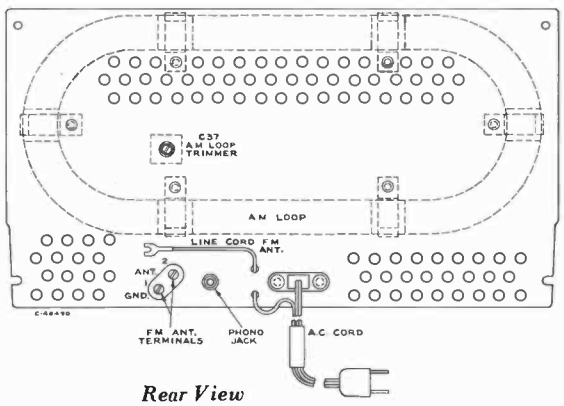
This instrument, an AM-FM table radio, has eight tubes, plus selenium rectifier. Individual dials are provided for AM and FM bands. RF circuits, contained on a two tube sub-chassis, include RF amplification for both bands and a combination mixer-oscillator circuit. The input circuit to the FM RF stage is broad-banded, 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

OPERATING INSTRUCTIONS

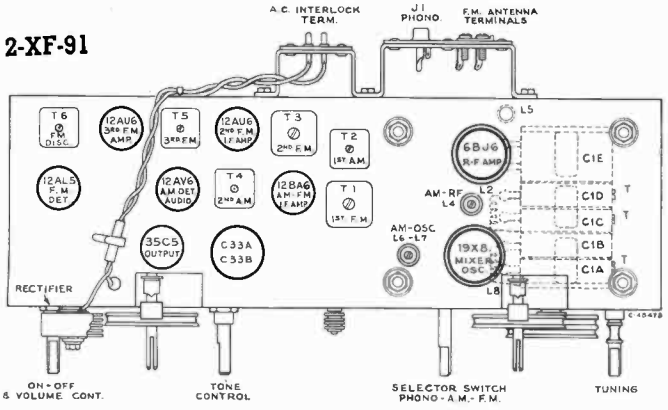
RADIO — Turn OFF-VOLUME control about half-way in a clockwise direction to turn receiver ON and provide for medium VOLUME. Allow a short warm-up period. Set FUNCTION control at desired service — AM or FM. Rotate TUNING control to move the pointers to the desired AM or FM frequency. Do not touch the pointers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

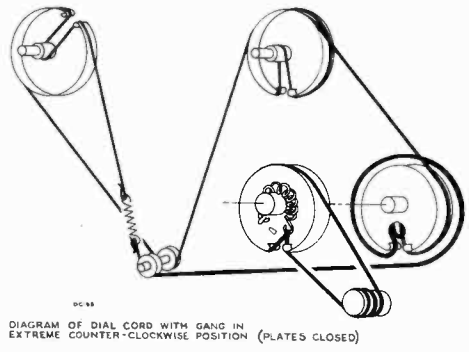


Rear View

2-XF-91



Tube and Trimmer Locations



Dial and Drive Cord Drive

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 Socket Voltages

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

Rectifier output should be approximately 139 volts, 70 ma.

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. (mod.)	Quiet point at high freq. end	T4 bottom core (sec.) T4 top core (pri.)
2	Tap lug 4 on AM RF coil			T2 bottom core (sec.) T2 top core (pri.)
3	Short wire placed near loop for radiated signal	1620 kc. (mod.)	1620 kc.	C1A-T (osc.)
4		1400 kc. (mod.)	1400 kc.	C37 (ant.) C1C-T (rf.)
5		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

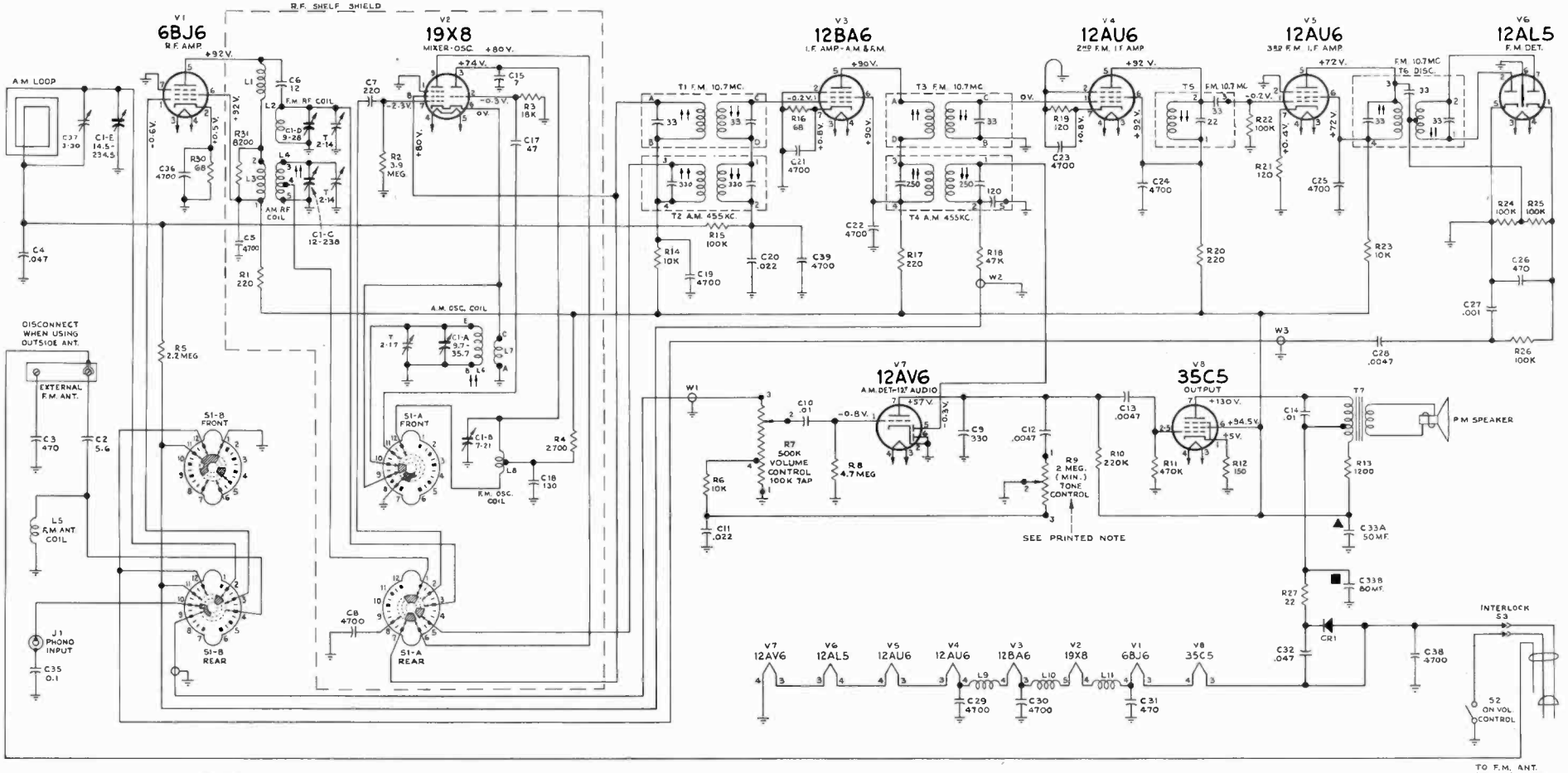
Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Pin No. 1 of V5-12AU6	10.7 mc.	Quiet point at low frequency end	T6 top core for zero d.c. (across C26) T6 bottom core for maximum d.c. (junction of R24 and R25)
2	Pin No. 1 of V4-12AU6			†T5 top core
3	Pin No. 1 of V3-12BA6			T3 top core †*T3 bottom core
4	C1D Stator			T1 top core †*T1 bottom core
5	FM Ant. terminals thru 270 ohm resistor	90 mc.	90 mc.	†FM osc. L8
6		106 mc.	106 mc.	†FM R.F. C1D-T
7		90 mc.	90 mc.	†FM R.F. L2
8		Repeat 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 ¼ 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

CRITICAL LEAD DRESS

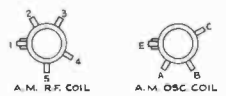
1. All FM IF Transformer grid and plate leads should be short and direct as possible and kept low, near chassis.
2. C26 leads should be kept as short as possible.
3. C32 leads should be kept as short as possible.
4. R24 and R25 leads should be kept as short as possible on T6 terminal 6 side.
5. C27 should ground in hole near terminal 5 of V6 with short leads.
6. AM oscillator coil should not be tilted over toward function switch when wrapping short bus leads to switch.
7. Keep leads V5 pin 5, to T6 term 1, as short as possible and low near chassis.
8. Dress C28 down on chassis and against terminal board. Run filament lead between V5 and V6 on side of V6 socket opposite C28.
9. All ceramic button 4700 uuf condensers should have leads as short as possible.
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.
11. RF plate choke L1, should be dressed at least ⅛" away from AM R.F. coil L4 and at least ⅛" from shield.
12. Mixer grid condenser C7 should be dressed away from FM oscillator gang stator terminal and away from leads connecting to terminals 8 and 9 of V2 socket.
13. Filament chokes L10 and L11 should be raised a minimum of 1/16" above chassis.
14. Use varnished tubing only on choke and coupling cond. leads coming through shield partition slot.
15. Condenser C2 should have lead on antenna terminal end 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.
17. Oscillator grid condenser C17 should have short leads and be dressed away from filament choke L10.
18. Leads from loop terminal to chassis terminal board should have a minimum of three twists.



NOTES:

FRONT AND REAR SECTIONS OF FUNCTION SWITCH S1-A AND S1-B ARE VIEWED FROM FRONT WITH THE SWITCH SHAFT IN EXTREME COUNTER-CLOCKWISE POSITION #1 (PHONO)

POSITION	FUNCTION
1	PHONO
2	A.M.
3	F.M.

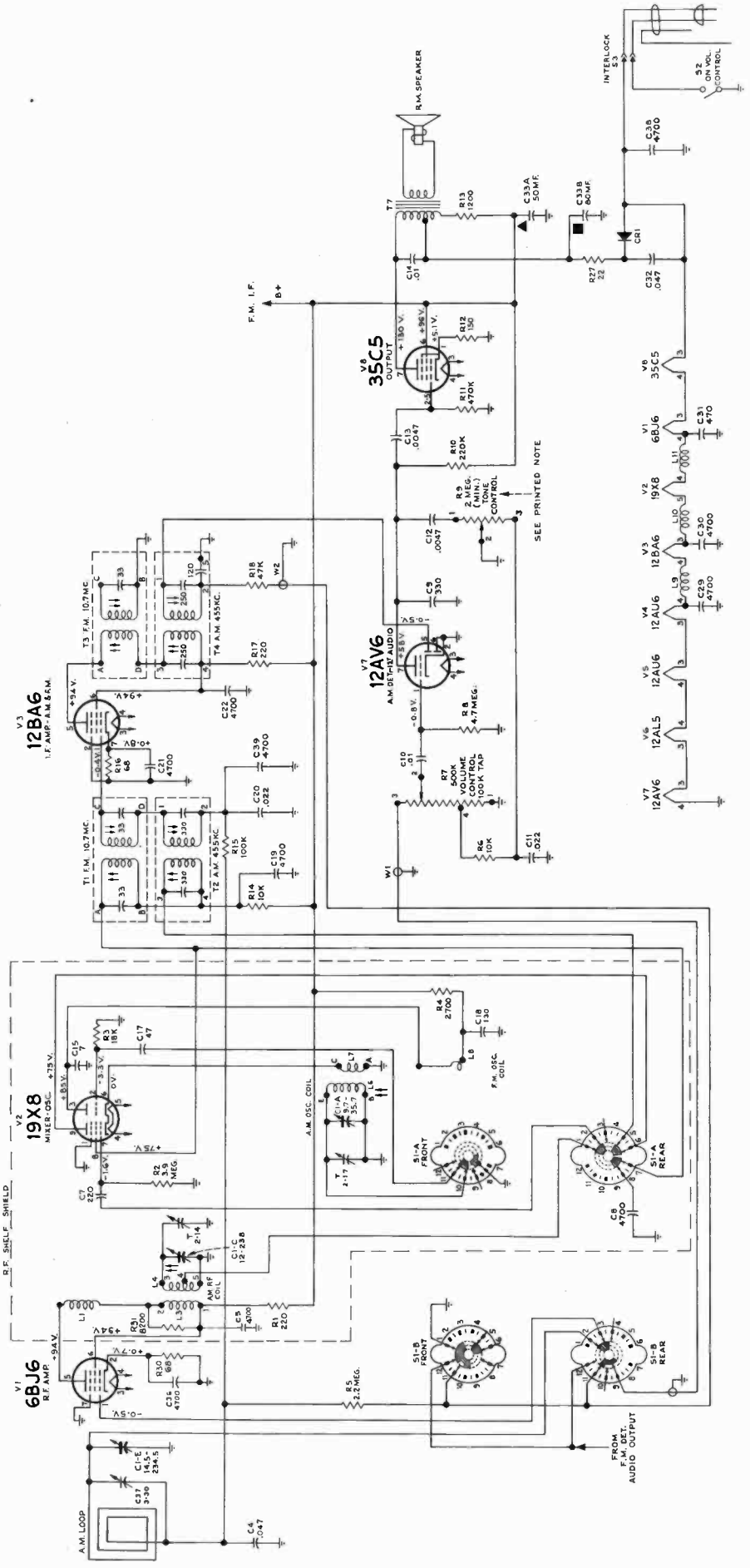


K = 1000

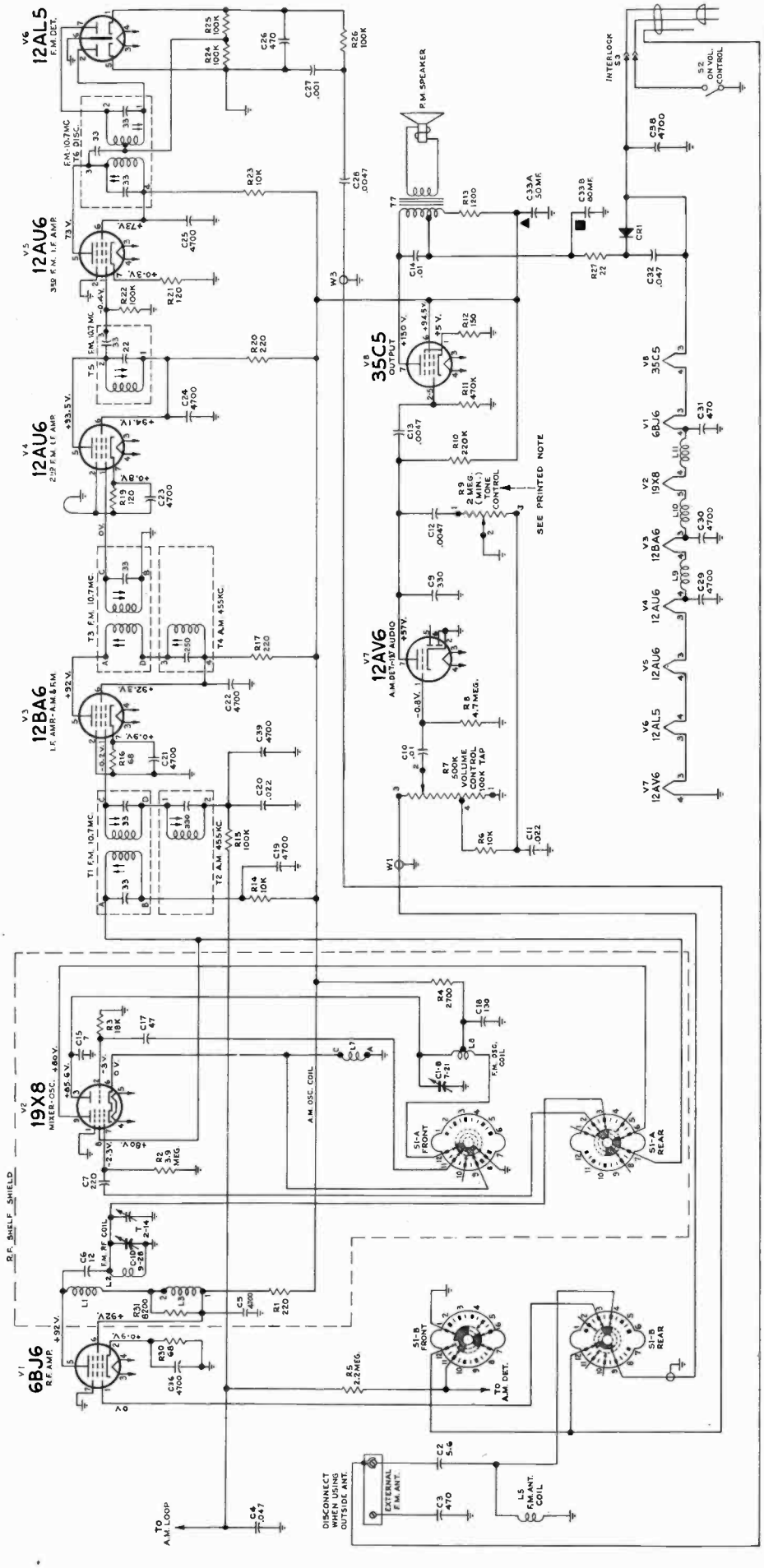
ALL RESISTANCE VALUES IN OHMS AND ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF. AND ABOVE 1.0 IN MMF. UNLESS OTHERWISE NOTED.

Acceptable value of R9 may be 2 to 50 megohms.

Schematic Circuit Diagram—Chassis No. RC1121



Simplified Schematic—"AM" Position



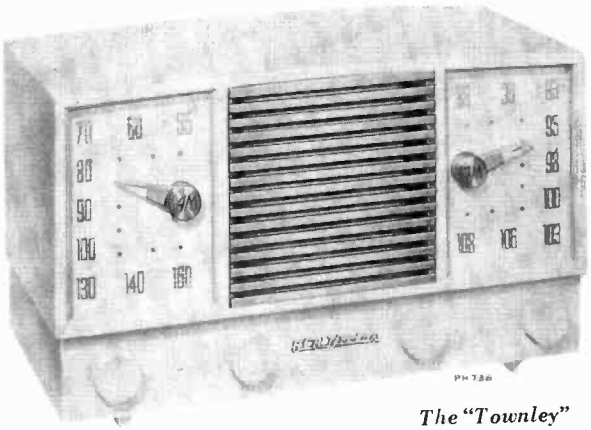
Simplified Schematic—"FM" Position

REPLACEMENT PARTS

STOCK No.	PART DESCRIPTION
	CHASSIS ASSEMBLIES
	RC1121
77520	Bushing—Laminated bushing (⅝" long with shoulder) for station selector pointer pulley and shaft assembly.
77522	Capacitor—Variable tuning capacitor (C1A, C1B, C1C, C1D, C1E, C1A-T, C1C-T, C1D-T)
70997	Capacitor—Fixed, ceramic, non-insulated, 5.6 mmf., ±1 mmf., 500 volts D.C. Temp. coef. = 0 (C2)
77530	Capacitor—Fixed, ceramic, non-insulated, 7 mmf., ±.5 mmf., 500 volts D.C. Temp. coef. = 80 (C15)
33380	Capacitor—Fixed, ceramic, non-insulated, 12 mmf., ±5%, 500 volts D.C. Temp. coef. = 0 (C6)
77531	Capacitor—Fixed, ceramic, non-insulated, 47 mmf., ±10%, 500 volts D.C. Temp. coef. = 0 (C17)
77532	Capacitor—Fixed, ceramic, non-insulated, 130 mmf., ±2½%, 500 volts D.C. Temp. coef. = −750 (C18)
39636	Capacitor—Fixed, mica, 220 mmf., 500 volts D.C. (C7)
75792	Capacitor—Fixed, ceramic, insulated, 330 mmf., ±20%, 500 volts D.C. High K (C9)
76992	Capacitor—Fixed, mica, 470 mmf., 300 volts D.C. (C26, C31)
39644	Capacitor—Fixed, mica, 470 mmf., 500 volts D.C. (C3)
73473	Capacitor—Fixed, ceramic, 4700 mmf., +100%, −0%, 500 volts D.C. High K disc (C5, C8, C19, C21, C22, C23, C24, C25, C29, C30, C36, C38, C39)
73520	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C33A, C33B)
77533	Capacitor—Fixed, miniature, tubular, paper, .001 mfd., 200 volts D.C. (C27)
73920	Capacitor—Fixed, tubular, paper, .0047 mfd., 600 volts (C12, C13, C28)
73561	Capacitor—Fixed, tubular, paper, .01 mfd., 400 volts (C10)
73594	Capacitor—Fixed, tubular, paper, .01 mfd., 600 volts (C14)
73562	Capacitor—Fixed, tubular, paper, .022 mfd., 400 volts (C11)
73558	Capacitor—Fixed, tubular, paper, .047 mfd., 200 volts (C4)
75071	Capacitor—Fixed, tubular, moulded, .047 mfd., 400 volts (C32)
73551	Capacitor—Fixed, tubular, paper, 0.1 mfd., 400 volts (C35)
73935	Clip—Mounting clip for I.F. transformers
77538	Coil—Antenna coil—F.M. (L5)
77534	Coil—Choke coil (L1)
77535	Coil—Choke coil (L9, L10, L11)
77526	Coil—Oscillator coil—A.M.—complete with adjustable core (L6, L7)
77537	Coil—Oscillator coil—F.M. (L8)
77525	Coil—RF coil—A.M.—complete with adjustable core (L3, L4)
77536	Coil—RF coil—F.M. (L2)
77528	Connector—Combination phono input connector and antenna terminal board (J1)
75474	Connector—Single contact male connector for speaker lead
77529	Connector—Two (2) contact male connector for power cord
77516	Control—Tone control (R9)
77515	Control—Volume control and power switch (R7, S2)
72953	250' Dial Cord Reel—Dial cord (approx. 49" overall required) Drive cord (approx. 11" overall required)
77523	Drum—Variable tuning capacitor drive drum and hub
16058	Grommet—Rubber grommet for mounting RF shelf (4 required)
77521	Nut—Speednut for station selector pointer pulley and shaft bushing
72602	Pulley—Idler pulley for indicator cord (2 required)
77510	Pulley—Pulley and shaft (split) for station selector pointers
77519	Rectifier—Selenium rectifier, 100 MA (CR1)
76346	Resistor—Wire wound, 1200 ohms, 4 watts (R13)
	Resistor—Fixed, composition:
503022	22 ohms, ±10%, ½ watt (R27)
503068	68 ohms, ±10%, ½ watt (R16, R30)
503112	120 ohms, ±10%, ½ watt (R19, R21)
503115	150 ohms, ±10%, ½ watt (R12)
503122	220 ohms, ±10%, ½ watt (R1, R17, R20)
503227	2700 ohms, ±10%, ½ watt (R4)
503282	8200 ohms, ±10%, ½ watt (R31)
503310	10,000 ohms, ±10%, ½ watt (R6, R14, R23)
503318	18,000 ohms, ±10%, ½ watt (R3)
503347	47,000 ohms, ±10%, ½ watt (R18)
502410	100,000 ohms, ±5%, ½ watt (R24, R25)
503410	100,000 ohms, ±10%, ½ watt (R15, R22, R26)
503422	220,000 ohms, ±10%, ½ watt (R10)
503447	470,000 ohms, ±10%, ½ watt (R11)
503522	2.2 megohm, ±10%, ½ watt (R5)
503539	3.9 megohm, ±10%, ½ watt (R2)
503547	4.7 megohm, ±10%, ½ watt (R8)
77527	Shaft—Tuning knob shaft
75192	Shield—Tube shield for V1
76331	Shield—Tube shield for V2
77087	Socket—Tube socket, 7 pin, miniature, moulded, saddle mounted for V1
76336	Socket—Tube socket, 9 pin, miniature, moulded, saddle mounted for V2
73117	Socket—Tube socket, 7 pin, miniature, wafer for V3, V4, V5, V6, V7, V8
31970	Spring—Dial cord spring
31418	Spring—Drive cord spring
77524	Switch—Function switch (S1)
77517	Transformer—Output transformer (T7)
77511	Transformer—Ratio detector transformer—complete with adjustable cores (T6)
76335	Transformer—First I.F. transformer—A.M.—complete with adjustable cores (T2)
77514	Transformer—First I.F. transformer—F.M.—complete with adjustable cores (T1)
76328	Transformer—Second I.F. transformer—A.M.—complete with adjustable cores (T4)
77513	Transformer—Second I.F. transformer—F.M.—complete with adjustable cores (T3)
77512	Transformer—Third I.F. transformer—F.M.—complete with adjustable cores (T5)
33726	Washer—"C" washer for station selector pointer pulley and shaft or tuning knob shaft
34373	Washer—"C" washer to fasten idler pulleys
	SPEAKER ASSEMBLIES
	971933-1
77539	Speaker—5¼" P.M. speaker complete with cone and voice coil (3.2 ohms)
	MISCELLANEOUS
77543	Antenna—Antenna loop and back assembly complete with power cord (includes C37)
77543	Back—Cabinet back complete with loop, capacitor and power cord (includes C37)
Y2467	Cabinet—Maroon plastic cabinet less "RCA Victor" emblem and function decal
77544	Capacitor—Adjustable, mica trimmer, 3-30 mmf. (C37)
77545	Cord—Power cord and plugs
77542	Decal—Control function decal
77033	Emblem—"RCA Victor" emblem
77548	Knob—Function switch knob
77547	Knob—Tuning control, tone control or volume control and power switch knob
73203	Nut—Speednut to fasten "RCA Victor" emblem to cabinet.
77541	Pointer—Station selector pointer—A.M.
77540	Pointer—Station selector pointer—F.M.
73992	Retainer—Knob retainer (knob to cabinet)
76837	Spring—Retaining spring for knobs (knob to shaft)

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

RCA VICTOR



The "Townley"

2-XF-931
Maroon

2-XF-932
Ivory

2-XF-933
Green

2-XF-934
Red

2-XF-935
Beige

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

TUNING RANGE

Standard Broadcast (AM)	540-1600 kc
Frequency Modulation (FM)	88-108 mc
Intermediate Frequency (AM)	455 kc
Intermediate Frequency (FM)	10.7 mc

TUBE COMPLEMENT

(1) RCA 6BJ6	R.F. Amplifier
(2) RCA 19X8	Mixer-Oscillator
(3) RCA 12BA6	I.F. Amplifier
(4) RCA 12AU6	FM I.F. Amplifier
(5) RCA 12AU6	FM I.F. Amplifier
(6) RCA 12AL5	F.M. Detector
(7) RCA 12AV6	AM Det.-AVC-Audio
(8) RCA 35C5	Audio Output
RCA Stock No. 77519	Selenium Rectifier

POWER SUPPLY RATING

115 volts, 50-60 cycles ..... 35 watts

CAUTION: DO NOT OPERATE ON D.C.

DIAL LAMPS ..... 2 No. 47, 6-8 volts, 0.15 amp.

LOUDSPEAKER

Size and Type	5¼" P.M.
Voice Coil Impedance	3.2 ohms

AUDIO POWER OUTPUT

Undistorted	1.0 watt
Maximum	1.3 watts

TUNING DRIVE RATIO ..... 9:1 (4½ turns of knob)

NET WEIGHT ..... 8 lbs.

DIMENSIONS (Overall)

Height ..... 8⅛" Width ..... 13 9/16" Depth ..... 7¾"

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 mixer-oscillator circuit. The input circuit to the FM RF stage is broad-banded, 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.

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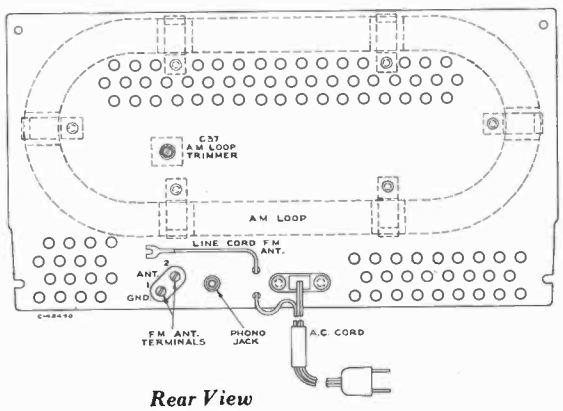
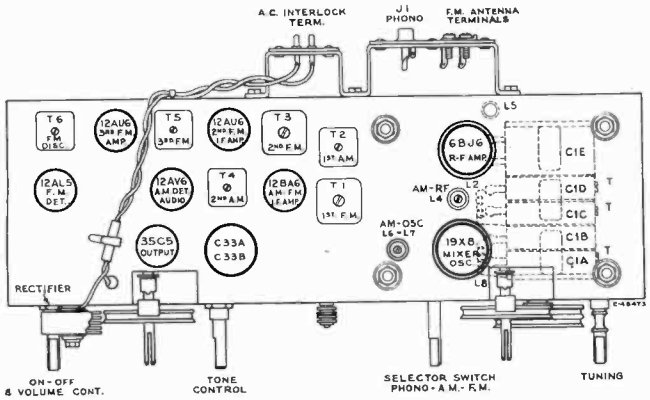


Rear View



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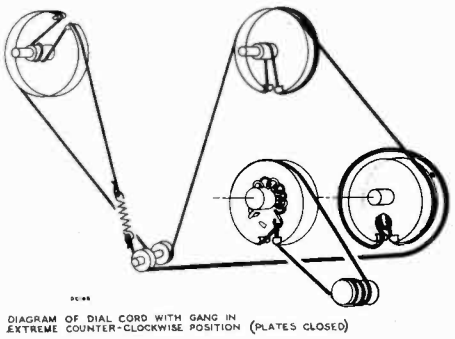

Dial and Drive Cord Drive

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	Grid	1	−0.5	0	−0.6
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	Screen	8	75	80	80
Mixer	Cathode	6	0	0	0
	Grid	7	−1.6	−2.3	−2.3
Osc.	Plate	3	85	85.6	74
	Grid	2	−3.3	−3	−0.3
V3 12BA6	Plate	5	94	92	90
	Screen	6	94	92.3	90
I.F. Amp.	Cathode	7	0.8	0.9	0.8
	Grid	1	−0.4	−0.2	−0.2
V4 12AU6	Plate	5	95	93.5	92
	Screen	6	95	94.1	92
2nd I.F.	Cathode	7	0.8	0.8	0.8
Amp. (F.M.)	Grid	1	0	0	0
V5 12AU6	Plate	5	74	73	72
	Screen	6	74	73	72
3rd I.F.	Cathode	7	0.3	0.3	0.4
Amp. (F.M.)	Grid	1	−0.2	−0.4	−0.2
V6 12AL5	Plate	2	—	—	—
	Cathode	5	—	—	—
F.M. Det.	Plate	7	—	—	—
	Cathode	1	—	—	—
V7 12AV6	Plate	7	58	57	57
A.M. Det.	Grid	1	−0.8	−0.8	−0.8
Audio Amp.	Plate (Diode)	5	−0.5	−0.3	−0.3
V8 35C5	Plate	7	130	130	130
Audio	Screen	6	96	94.5	94.5
Output	Cathode	1	5.1	5.0	5.0
	Grid	2-5	—	—	—

Rectifier output should be approximately 139 volts, 70 ma.

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. (mod.)	Quiet point at high freq. end	T4 bottom core (sec.) T4 top core (pri.)
2	Tap lug 4 on AM RF coil			T2 bottom core (sec.) T2 top core (pri.)
3	Short wire placed near loop for radiated signal	1620 kc. (mod.)	1620 kc.	C1A-T (osc.)
4		1400 kc. (mod.)	1400 kc.	C37 (ant.) C1C-T (rf.)
5		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

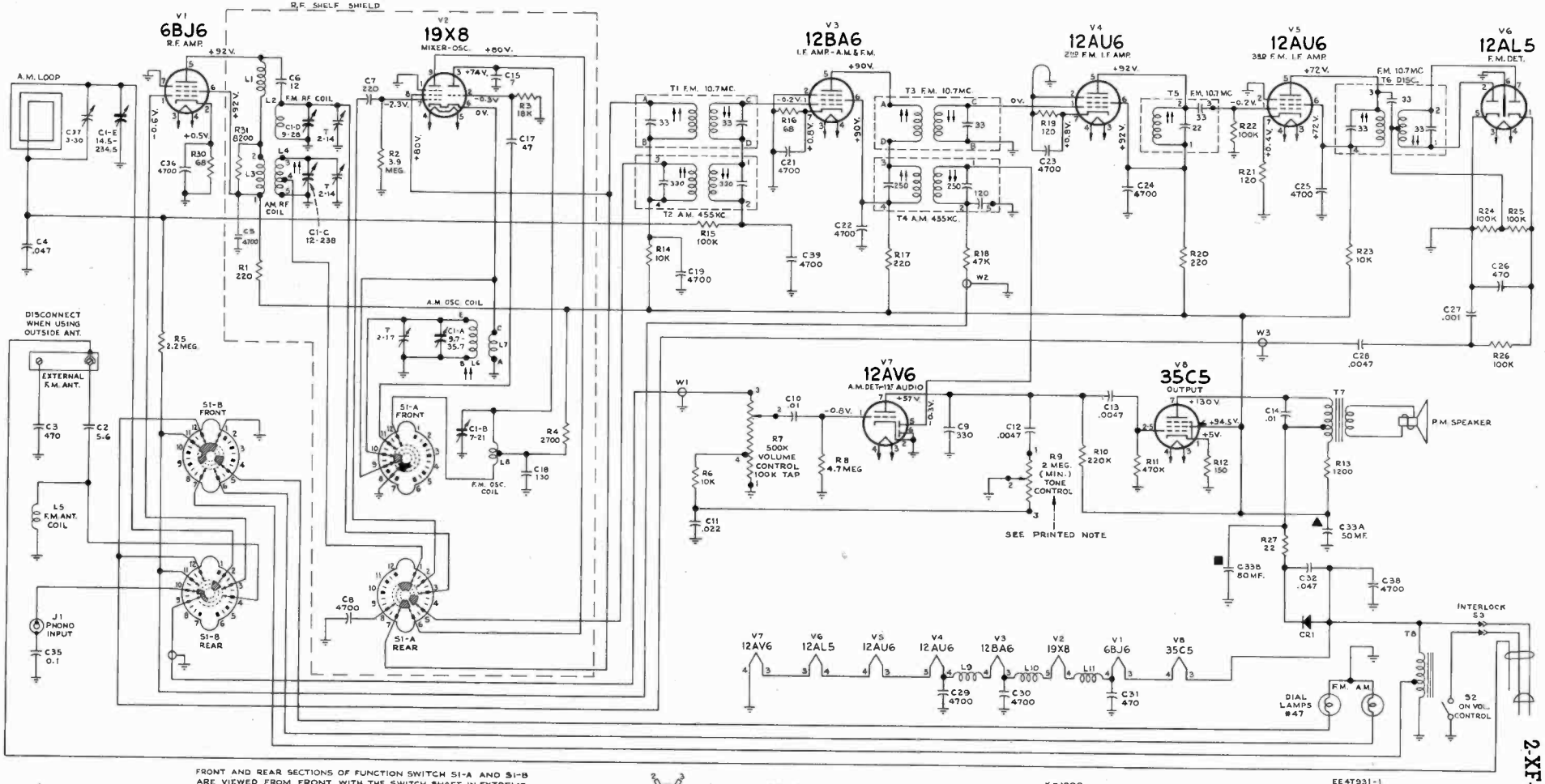
FUNCTION SWITCH IN FM POSITION—VOLUME CONTROL MINIMUM—TONE CONTROL CENTER

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	10.7 mc.	Quiet point at low frequency end	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			†T5 top core
3	Pin No. 1 of V3-12BA6			T3 top core †*T3 bottom core
4	C1D Stator			T1 top core †*T1 bottom core
5	FM Ant. terminals thru 270 ohm resistor	90 mc.	90 mc.	†FM osc. L8
6		106 mc.	106 mc.	†FM R.F. C1D-T
7		90 mc.	90 mc.	†FM R.F. L2
8		Repeat 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 ¼ 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

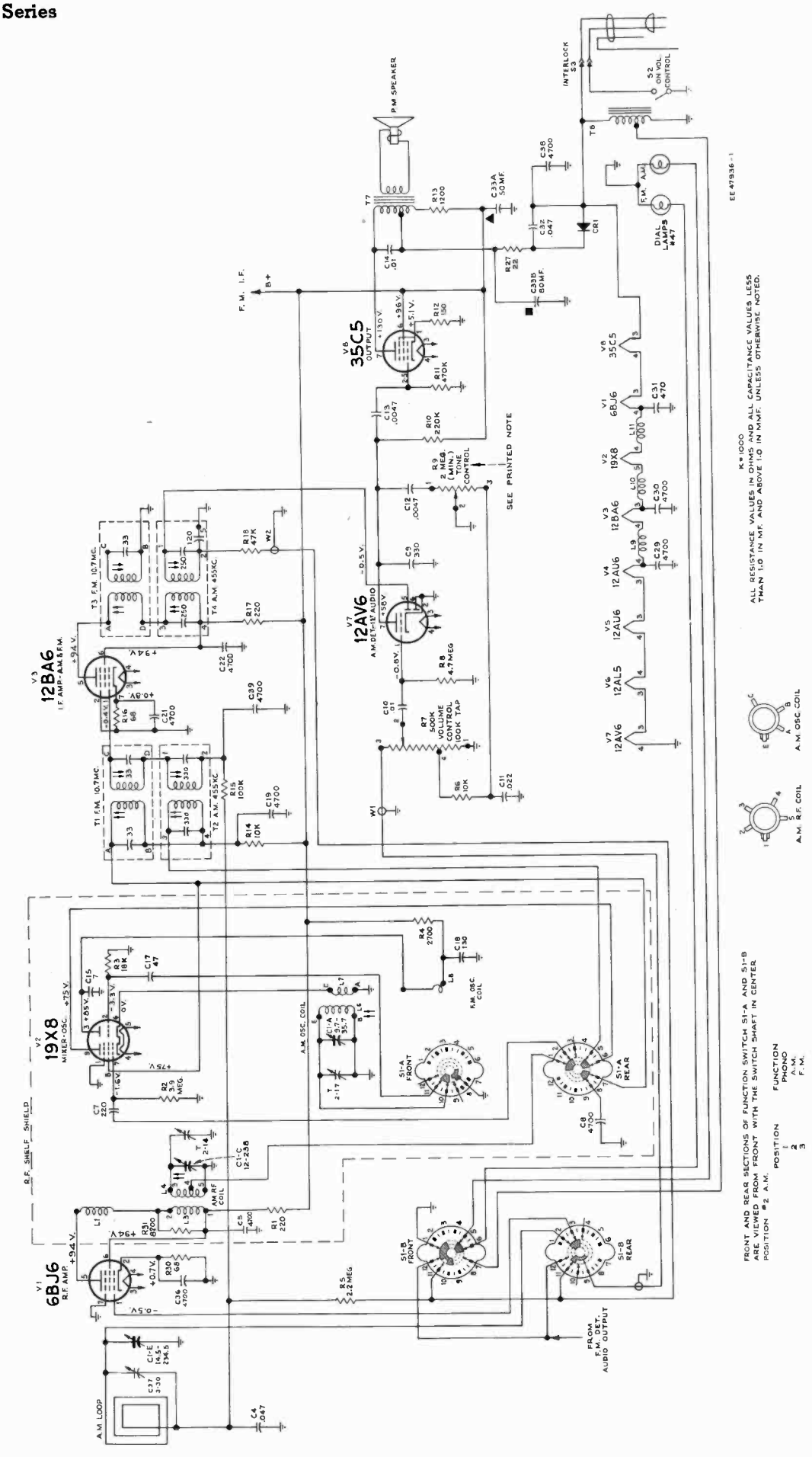
CRITICAL LEAD DRESS

1. All FM IF Transformer grid and plate leads should be short and direct as possible and kept low, near chassis.
2. C26 leads should be kept as short as possible.
3. C32 leads should be kept as short as possible.
4. R24 and R25 leads should be kept as short as possible on T6 terminal 6 side.
5. C27 should ground in hole near terminal 5 of V6 with short leads.
6. AM oscillator coil should not be tilted over toward function switch when wrapping short bus leads to switch.
7. Keep leads V5 pin 5, to T6 term 1, as short as possible and low near chassis.
8. Dress C28 down on chassis and against terminal board. Run filament lead between V5 and V6 on side of V6 socket opposite C28.
9. All ceramic button 4700 uuf condensers should have leads as short as possible.
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.
11. RF plate choke L1, should be dressed at least 1/8" away from AM R.F. coil L4 and at least 1/8" from shield.
12. Mixer grid condenser C7 should be dressed away from FM oscillator gang stator terminal and away from leads connecting to terminals 8 and 9 of V2 socket.
13. Filament chokes L10 and L11 should be raised a minimum of 1/16" above chassis.
14. Use varnished tubing only on choke and coupling cond. leads coming through shield partition slot.
15. Condenser C2 should have lead on antenna terminal end 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.
17. Oscillator grid condenser C17 should have short leads and be dressed away from filament choke L10.
18. Leads from loop terminal to chassis terminal board should have a minimum of three twists.

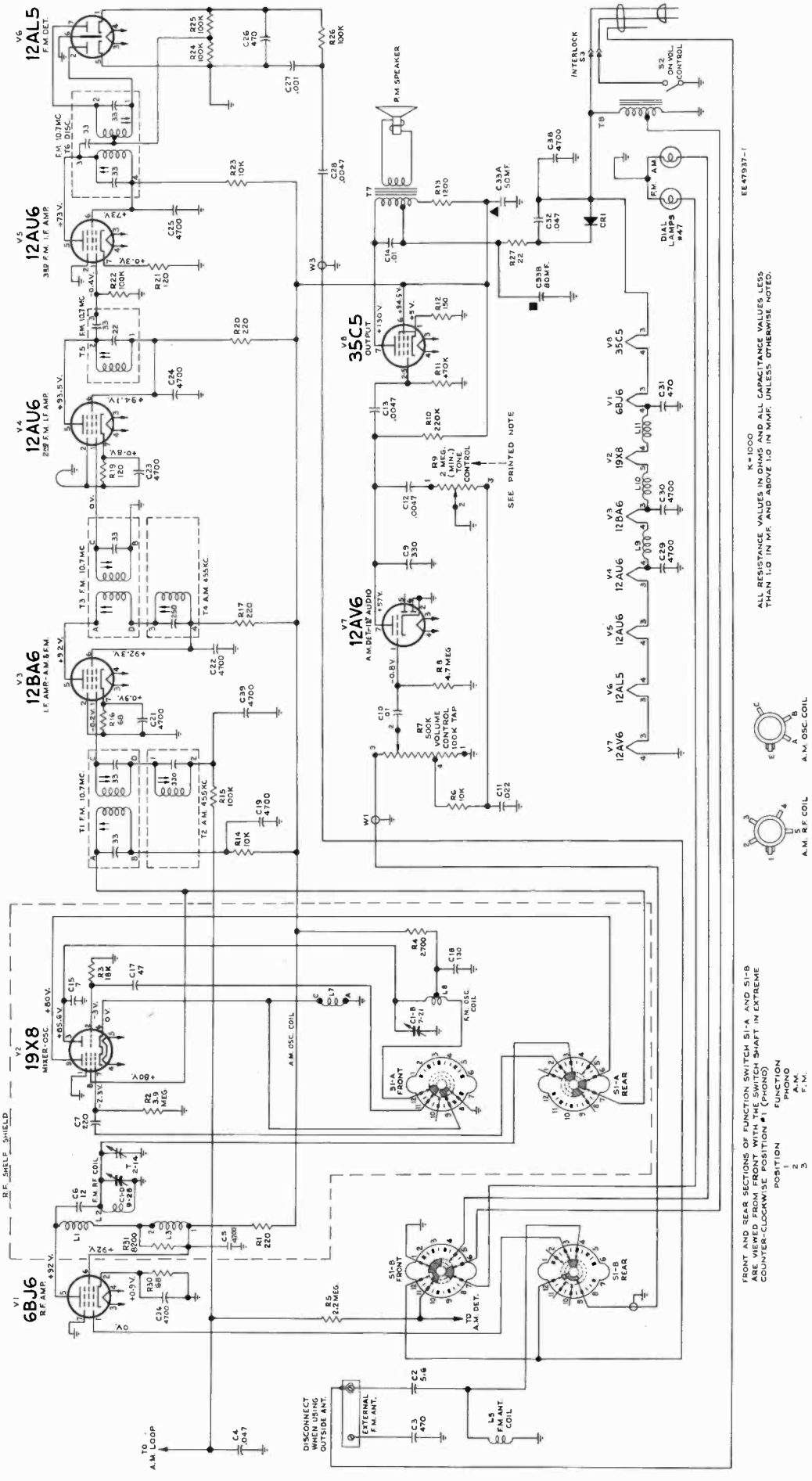


Acceptable value of R9 may be 2 to 50 megohms.

Schematic Circuit Diagram—Chassis No. RC1121A



Simplified Schematic—"AM" Position



Simplified Schematic—"FM" Position

STOCK No.	PART DESCRIPTION
	CHASSIS ASSEMBLIES
	RC-1121A
77520	Bushing—Laminated bushing (⅝" long with shoulder) for station selector pointer pulley and shaft assembly.
77522	Capacitor—Variable tuning capacitor (C1A, C1B, C1C, C1D, C1E, C1A-T, C1C-T, C1D-T)
70997	Capacitor—Fixed, ceramic, non-insulated, 5.6 mmf., ±1 mmf., 500 volts D.C. Temp. coef. = 0 (C2)
77530	Capacitor—Fixed, ceramic, non-insulated, 7 mmf., ±.5 mmf., 500 volts D.C. Temp. coef. = 80 (C15)
33380	Capacitor—Fixed, ceramic, non-insulated, 12 mmf., ±5%, 500 volts D.C. Temp. coef. = 0 (C6)
77531	Capacitor—Fixed, ceramic, non-insulated, 47 mmf., ±10%, 500 volts D.C. Temp. coef. = 0 (C17)
77532	Capacitor—Fixed, ceramic, non-insulated, 130 mmf., ±2½%, 500 volts D.C. Temp. coef. = −750 (C18)
39636	Capacitor—Fixed, mica, 220 mmf., 500 volts D.C. (C7)
75792	Capacitor—Fixed, ceramic, insulated, 330 mmf., ±20%, 500 volts D.C. High K (C9)
76992	Capacitor—Fixed, mica, 470 mmf., 300 volts D.C. (C26, C31)
39644	Capacitor—Fixed, mica, 470 mmf., 500 volts D.C. (C3)
73473	Capacitor—Fixed, ceramic, 4700 mmf., +100%, −0%, 500 volts D.C. High K disc (C5, C8, C19, C21, C22, C23, C24, C25, C29, C30, C36, C38, C39)
73520	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C33A, C33B)
77533	Capacitor—Fixed, miniature, tubular, paper, .001 mfd., 200 volts D.C. (C27)
73920	Capacitor—Fixed, tubular, paper, .0047 mfd., 600 volts (C12, C13, C28)
73561	Capacitor—Fixed, tubular, paper, .01 mfd., 400 volts (C10)
73594	Capacitor—Fixed, tubular, paper, .01 mfd., 600 volts (C14)
73562	Capacitor—Fixed, tubular, paper, .022 mfd., 400 volts (C11)
73558	Capacitor—Fixed, tubular, paper, .047 mfd., 200 volts (C4)
75071	Capacitor—Fixed, tubular, moulded, .047 mfd., 400 volts (C32)
73551	Capacitor—Fixed, tubular, paper, 0.1 mfd., 400 volts (C35)
73935	Clip—Mounting clip for I.F. transformers
77538	Coil—Antenna coil—F.M. (L5)
77534	Coil—Choke coil (L1)
77535	Coil—Choke coil (L9, L10, L11)
77526	Coil—Oscillator coil—A.M.—complete with adjustable core (L6, L7)
77537	Coil—Oscillator coil—F.M. (L8)
77525	Coil—RF coil—A.M.—complete with adjustable core (L3, L4)
77536	Coil—RF coil—F.M. (L2)
77528	Connector—Combination phono input connector and antenna terminal board (J1)
75474	Connector—Single contact male connector for speaker lead
77529	Connector—Two (2) contact male connector for power cord
77516	Control—Tone control (R9)
77515	Control—Volume control and power switch (R7, S2)
72953	250' Dial Cord Reel—Dial cord (approx. 49" overall required) Drive cord (approx. 11" overall required)
77523	Drum—Variable tuning capacitor drive drum and hub
16058	Grommet—Rubber grommet for mounting RF shelf (4 required)
31480	Lamp—Dial lamp (Mazda 47)
77521	Nut—Speednut for station selector pointer pulley and shaft bushing
72602	Pulley—Idler pulley for indicator cord (2 required)
77510	Pulley—Pulley and shaft (split) for station selector pointers
77519	Rectifier—Selenium rectifier, 100 MA (CR1)
76346	Resistor—Wire wound, 1200 ohms, 4 watts (R13)
	Resistor—Fixed, composition:
503022	22 ohms, ±10%, ½ watt (R27)
503068	68 ohms, ±10%, ½ watt (R16, R30)
503112	120 ohms, ±10%, ½ watt (R19, R21)
503115	150 ohms, ±10%, ½ watt (R12)
503122	220 ohms, ±10%, ½ watt (R1, R17, R20)
503227	2700 ohms, ±10%, ½ watt (R4)
503282	8200 ohms, ±10%, ½ watt (R31)
503310	10,000 ohms, ±10%, ½ watt (R6, R14, R23)
503318	18,000 ohms, ±10%, ½ watt (R3)
503347	47,000 ohms, ±10%, ½ watt (R18)
502410	100,000 ohms, ±5%, ½ watt (R24, R25)
503410	100,000 ohms, ±10%, ½ watt (R15, R22, R26)
503422	220,000 ohms, ±10%, ½ watt (R10)
503447	470,000 ohms, ±10%, ½ watt (R11)
503522	2.2 megohm, ±10%, ½ watt (R5)
503539	3.9 megohm, ±10%, ½ watt (R2)
503547	4.7 megohm, ±10%, ½ watt (R8)

STOCK No.	PART DESCRIPTION
77527	Shaft—Tuning knob shaft
75192	Shield—Tube shield for V1
76331	Shield—Tube shield for V2
77566	Socket—Dial lamp socket
77087	Socket—Tube socket, 7 pin, miniature, moulded, saddle mounted for V1
76336	Socket—Tube socket, 9 pin, miniature, moulded, saddle mounted for V2
73117	Socket—Tube socket, 7 pin, miniature, wafer for V3, V4, V5, V6, V7, V8
31970	Spring—Dial cord spring
31418	Spring—Drive cord spring
77524	Switch—Function switch (S1)
77666	Transformer—Filament transformer, 117 volt A.C. input
77517	Transformer—Output transformer (T7)
77511	Transformer—Ratio detector transformer — complete with adjustable cores (T6)
76335	Transformer—First I.F. transformer—A.M.—complete with adjustable cores (T2)
77514	Transformer—First I.F. transformer—F.M.—complete with adjustable cores (T1)
76328	Transformer—Second I.F. transformer—A.M.—complete with adjustable cores (T4)
77513	Transformer—Second I.F. transformer—F.M.—complete with adjustable cores (T3)
77512	Transformer—Third I.F. transformer—F.M.—complete with adjustable cores (T5)
33726	Washer—"C" washer for station selector pointer pulley and shaft or tuning knob shaft
34373	Washer—"C" washer to fasten idler pulleys
	SPEAKER ASSEMBLIES
	971933-1
77539	Speaker—5¼" P.M. speaker complete with cone and voice coil (3.2 ohms)
	MISCELLANEOUS
77543	Antenna—Antenna loop and back cover complete with power cord (includes C37)
77543	Back—Cabinet back complete with loop, capacitor and power cord (includes C37)
Y2468	Cabinet—Maroon plastic cabinet less "RCA Victor" emblem and function decal for Model 2-XF-931
Y2469	Cabinet—Ivory plastic cabinet less "RCA Victor" emblem and function decal for Model 2-XF-932
Y2470	Cabinet—Green plastic cabinet less "RCA Victor" emblem and function decal for Model 2-XF-933
Y2471	Cabinet—Red plastic cabinet less "RCA Victor" emblem and function decal for Model 2-XF-934
Y2472	Cabinet—Beige plastic cabinet less "RCA Victor" emblem and function decal for Model 2-XF-935
77559	Cap—Station selector pointer cap—A.M.
77558	Cap—Station selector pointer cap—F.M.
77544	Capacitor—Adjustable, mica trimmer, 3-30 mmf. (C37)
77545	Cord—Power cord and plugs
77542	Decal—Control function decal
77033	Emblem—"RCA Victor" emblem
77560	Grille—Metal grille
77548	Knob—Function switch knob—maroon—for Model 2-XF-931
77550	Knob—Function switch knob — ivory — for Model 2-XF-932
77552	Knob—Function switch knob — green — for Model 2-XF-933
77556	Knob—Function switch knob — red — for Model 2-XF-934
77554	Knob—Function control knob — beige — for Model 2-XF-935
77547	Knob—Tuning control, tone control or volume control and power switch knob—maroon—for Model 2-XF-931
77549	Knob—Tuning control, tone control or volume control and power switch knob—ivory—for Model 2-XF-932
77551	Knob—Tuning control, tone control or volume control and power switch knob—green—for Model 2-XF-933
77555	Knob—Tuning control, tone control or volume control and power switch knob—red—for Model 2-XF-934
77553	Knob—Tuning control, tone control or volume control and power switch knob—beige—for Model 2-XF-935
73203	Nut—Speed nut to fasten "RCA Victor" emblem to cabinet
77563	Pad—Cork and rubber pad (1/32" x 3/16" x 3/16") for mounting metal grille to cabinet
77557	Pointer—Station selector pointer
73992	Retainer—Knob retainer (knob to cabinet)
76837	Spring—Retaining spring for knobs (knob to shaft)
77561	Window—Polystyrene window for L.H. side of cabinet
77562	Window—Polystyrene window for R.H. side of 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.
FOR
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 ..... 80 watts

Power Output
Undistorted ..... 10 watts Maximum ..... 11 watts

Loudspeaker
Size and type ..... 12 inch P.M.
Voice coil impedance ..... 3.2 ohms @ 400 cycles

Pilot Lamp ..... Mazda #51, 6-8 volts, .2 amp.

Weight ..... 43 lbs. net

Cabinet Dimensions (overall)
Height ... 17⅞" Width ... 21½" Depth ... 19⅞"

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.

Manual
Record capacity ..... 1 record
Type of records ..... up to 12 inch diameter
Pickup (Stock No. 75475) ..... dual stylus crystal
Turntable speed ..... 33⅓ or 78 r.p.m.

RP-190A-1 Record Changer:

The record changer will play up to fourteen 45 r.p.m. records having a 1½ 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.

Manual Turntable:

The manual turntable will play one 33⅓ 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.

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 pre-determined "maximum."

Adjusting "Maximum" Volume Level:

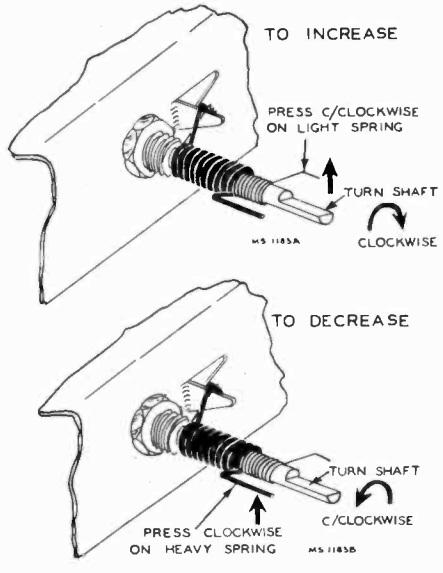
With the instrument operating, remove the volume control knob. Note the extending ends of two coil springs (one light and one heavy) on the volume control shaft.

TO INCREASE

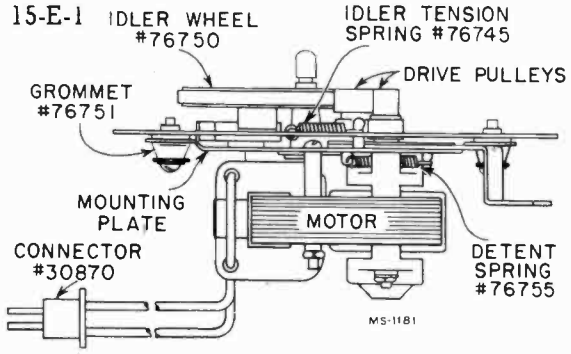
Turn control fully clockwise and then, with end of a pencil or similar item, press counterclockwise on the end of the LIGHT spring. Rotate control shaft clockwise until desired level is reached. Release pressure on the spring and replace knob.

TO DECREASE

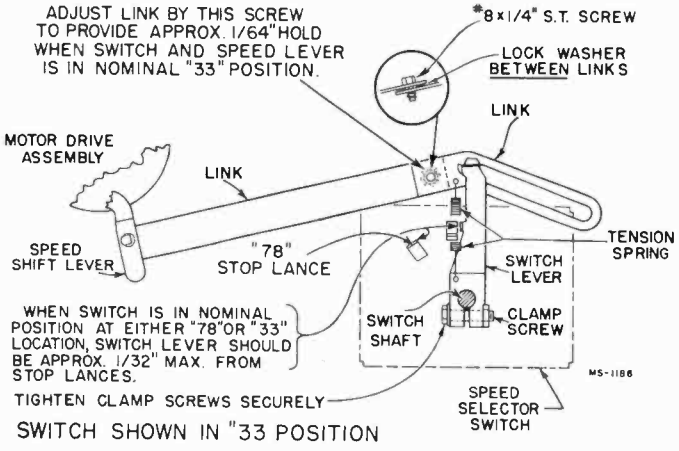
Turn control fully clockwise and then, with the end of a pencil or similar item, press clockwise on the end of the HEAVY spring. Rotate control counterclockwise to a very low level. Increase volume to desired level as described above.



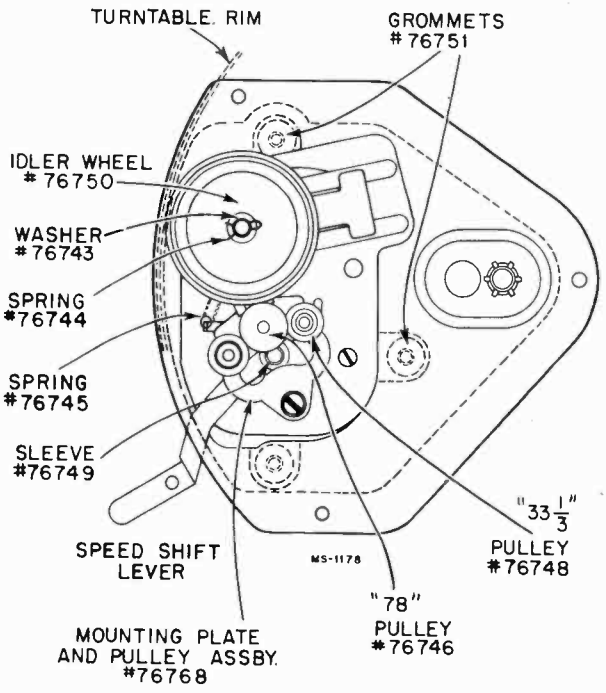
15-E, 15-E-1

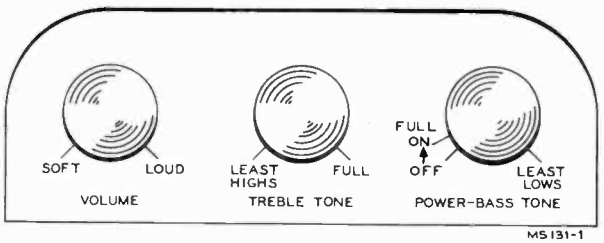


Manual Motorboard — Motor Assembly

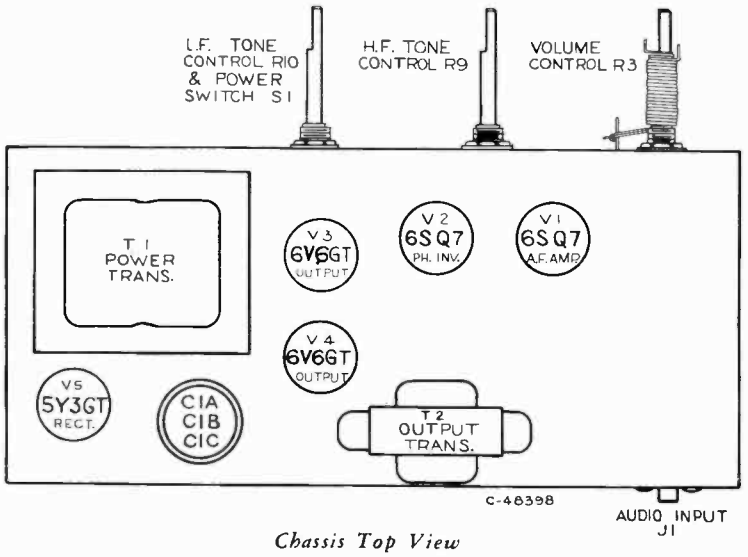


Speed Control Lever Assembly

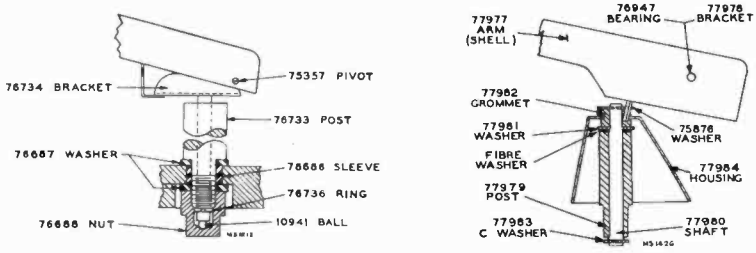




Controls



Chassis Top View



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

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 allowing 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

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

MODIFICATION

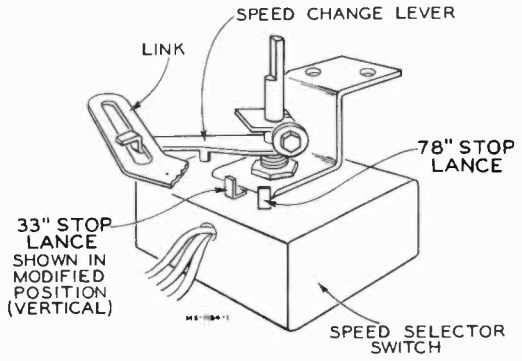
Although designed and assembled for 3-speed operation, provision is made for modification of this instrument for 33 and 45 rpm performance only. To eliminate the use of the 78 SPEED control and 78 stylus, proceed as follows:

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.

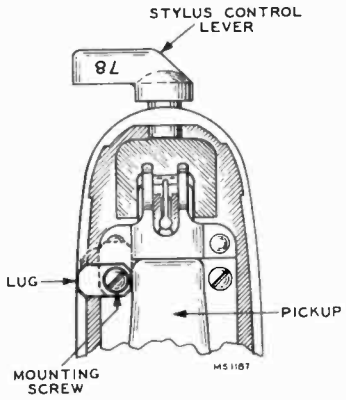


Replace top panel (rubber supporting grommets must be in place) and the hex head screw and washer.
NOTE: It is important that screw be tightened until top panel can be lifted approximately 1/16 inch only. The board should float freely on its mounts; there must be no restriction of movement.

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 —

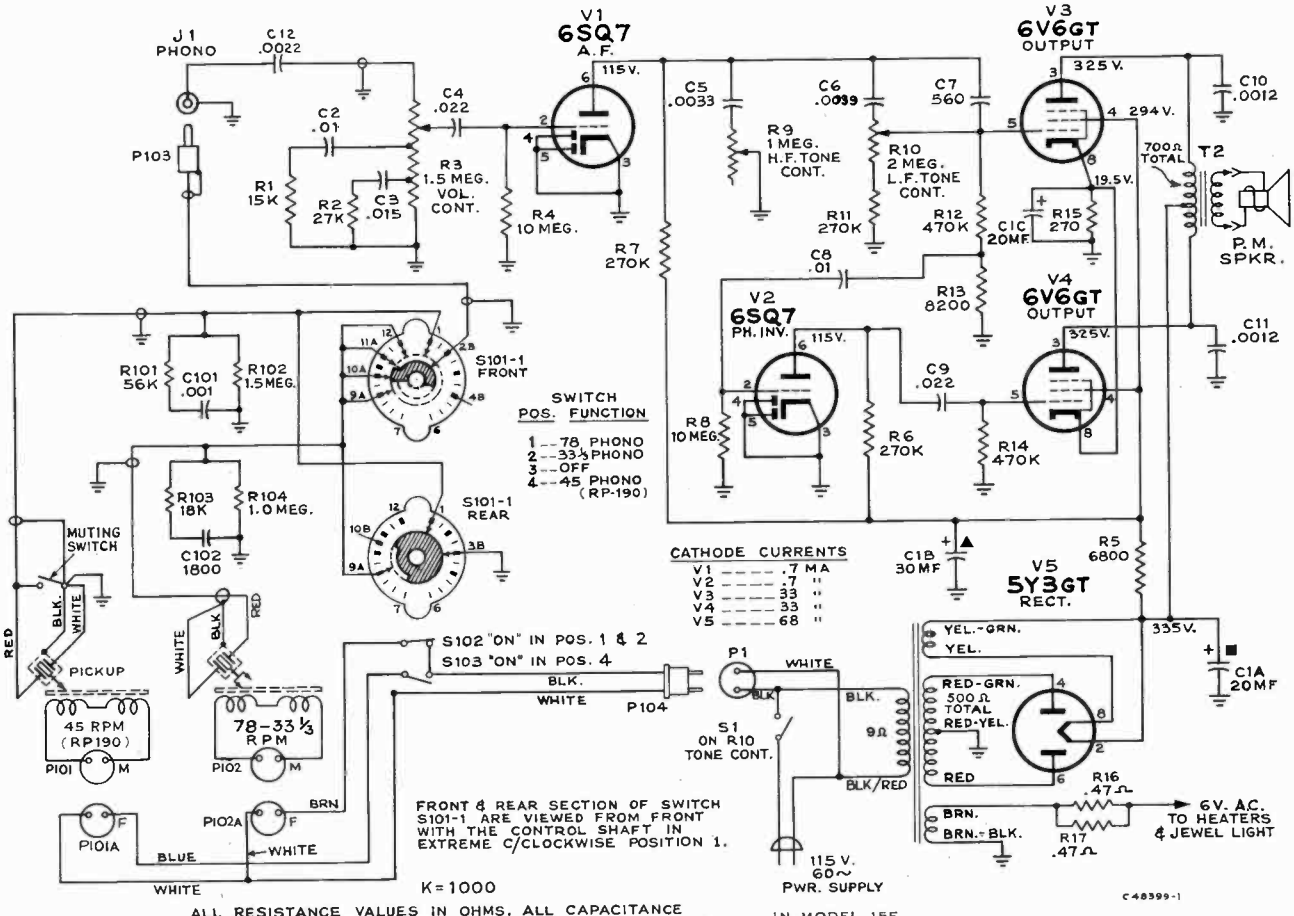
With lever in 33 position, loosen left holding screw just enough to turn lug to the position shown below and tighten screw. This will prevent the 78 stylus from being turned for use.



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*.

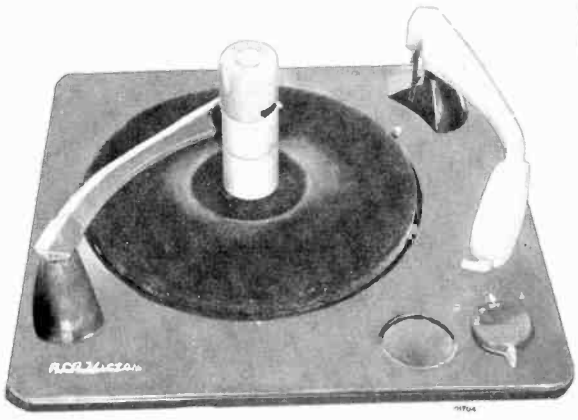


Schematic Diagram

Replacement Parts

STOCK No.	DESCRIPTION
	TWO SPEED MANUAL TURNTABLE
	Pickup Arm Assembly 15-E
76731	Arm—Pickup arm shell—less cartridge, mount, and cable
76734	Bracket—Pickup arm mounting bracket complete with pivot pin and counterbalance spring
76737	Cable—3 wire pickup arm cable complete with connectors
76738	Knob—Stylus selector knob complete with screw
76732	Mount—Pickup mount and swivel assembly
74230	Nut—#00-112 nut and washer to mount stylus
75475	Pickup—Dual stylus pickup crystal cartridge complete with two stylus
75366	Pin—Pivot pin for counterbalance spring
75357	Pivot—Pickup arm pivot (2 req'd)
76733	Post—Pickup arm pivot post and stop pin
76736	Ring—Retaining ring for pickup arm mounting bracket
71097	Screw—#4 x ¼" self tapping screw for pickup mount and swivel (4 req'd)
76735	Spring—Counterbalance spring
75497	Stylus—Osmium tip stylus for 78 RPM (not coded)
75496	Stylus—Osmium tip stylus for 33⅓ RPM (coded red)
	Pickup & Arm Assemblies 15-E-1
77977	Arm—Pickup arm shell (plastic)
76947	Bearing—Pickup arm mounting bracket pivot bearing
77978	Bracket—Pickup arm mounting bracket
75810	Bracket—Pickup arm weight adjustment bracket (slide)
78227	Cable—Three wire cable complete with connectors
77982	Grommet—Rubber grommet for pickup arm post
76738	Knob—Stylus selector knob
74230	Nut—#00-112 nut and washer to mount stylus
77779	Pickup—Crystal pickup complete with two (2) styli
77979	Post—Pickup arm pivot post
76898	Screw—#2-56 x 3/16" headless set screw for stylus selector knob
76899	Screw—#6-32 x ⅛" round head screw for pickup arm weight adjustment bracket
76948	Screw—Pickup arm mounting bracket pivot screw
77980	Shaft—Pickup arm pivot shaft
75809	Spring—Pickup arm counterbalance spring
75497	Stylus—Osmium tip stylus (.003 r. uncoded) for 78 r.p.m.
77899	Stylus—Sapphire tip stylus (.001 r. coded red) for 33⅓ r.p.m.
77976	Swivel—Pickup cartridge mount and swivel assembly
77983	Washer—"C" washer for lower end of pickup arm pivot shaft
75876	Washer—"C" washer for upper end of pickup arm post and shaft
77981	Washer—Metal washer for pickup arm post and shaft
	Motor and Turntable Assembly
30870	Connector—2 contact male connector for motor leads
76751	Grommet—Rubber grommet to mount motor (3 req'd)
76753	Motor—117 volt 60 cycle complete with mounting plate—less #76768 plate and idler wheel
76768	Plate—Speed control pulley mounting plate complete with pulleys
76746	Pulley—78 RPM pulley
76748	Pulley—33⅓ RPM pulley
76749	Sleeve—Spring sleeve for motor shaft
76755	Spring—Detent spring (below motor mounting plate)
76744	Spring—Hairpin spring to retain idler wheel
76745	Spring—Idler wheel tension spring (above motor mounting plate)
76752	Turntable—Finished turntable (9" dia.)
76743	Washer—Flat fibre washer for idler wheel
35969	Washer—"C" washer to retain turntable on shaft
76750	Wheel—Idler wheel
	45 R.P.M. AUTOMATIC RECORD CHANGER
	RP 190A-1
	Same as listed for RP 190-2a in RP 190 Series Service Data except for the omission of the on-off switch and switch housing
	AMPLIFIER ASSEMBLIES
	RS139A
76685	Capacitor—Ceramic, 560 mmf. C7
71976	Capacitor—Electrolytic comprising 1 section of 20 mfd., 450 volts, 1 section of 30 mfd., 350 volts and 1 section of 20 mfd., 25 volts C1A, C1B, C1C
73850	Capacitor—Tubular, paper, oil impregnated, .0012 mfd., 1000 volts C10, C11
73595	Capacitor—Tubular, paper, .0022 mfd., 600 volts C12
73795	Capacitor—Tubular, paper, .0033 mfd., 600 volts C5
73796	Capacitor—Tubular, paper, .0039 mfd., 600 volts C6
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts C2, C8
73797	Capacitor—Tubular, paper, .015 mfd., 600 volts C3
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts C4, C9
35787	Connector—Phono input connector (socket) J1
72776	Connector—Single contact male connector for speaker leads (2 req'd)
30868	Connector—2 contact female connector for motor power .. P1
38405	Control—H.F. tone control R9
38402	Control—L.F. tone control and power switch R10, S1
71980	Control—Volume control—less stop R3
74838	Grommet—Power cord strain relief (1 set)
76684	Resistor—Wire wound, 0.47 ohms, 1 watt R16, R17
	Resistors—Fixed, composition:—
523127	270 ohms, ±10%, 2 watts R15
523268	6800 ohms, ±10%, 2 watts R5
503282	8200 ohms, ±10%, ½ watt R13
503315	15,000 ohms, ±10%, ½ watt R1
503327	27,000 ohms, ±10%, ½ watt R2
503427	270,000 ohms, ±10%, ½ watt R6, R7, R11
503447	470,000 ohms, ±10%, ½ watt R12, R14
504610	10 megohm, ±20%, ½ watt R4, R8
31364	Socket—pilot lamp socket
54414	Socket—Tube socket
71979	Stop—Volume control adjustable stop (two springs)
76695	Transformer—Output transformer T2
75566	Transformer—Power transformer, 117 volt 60 cycle T1
	FUNCTION SWITCH ASSEMBLY
72437	Cable—Shielded audio cable complete with pin plug (switch to amplifier) P103
74850	Capacitor—Ceramic, 1800 mmf. C102
75643	Capacitor—Tubular, paper, .001 mf., 1000 volts C101
30868	Connector—Two contact female connector for motor cables P101A, P102A
30870	Connector—Two contact male connector for motor power cable P104
76693	Lever—Speed change lever (mounted on switch shaft)
	Resistors—Fixed composition:
503318	18,000 ohms, ±10%, ½ watt R103
503356	56,000 ohms, ±10%, ½ watt R101
503510	1.0 megohm, ±10%, ½ watt R104
503515	1.5 megohm, ±10%, ½ watt R102
76694	Switch—Function switch—less speed change lever S101, S102, S103
	SPEAKER ASSEMBLIES
	971494-2W RL111B1
	RMA274
75023	Cap—Dust cap
76296	Cone—Cone and voice coil (3.2 ohms)
76389	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)
	SPEAKER ASSEMBLIES
	92569-12W RL111A1
	RMA 274
13867	Cap—Dust cap
75682	Cone—Cone and voice coil (3.2 ohms)
76093	Speaker—12" P.M. speaker complete with cone and voice coil
	NOTE:—If stamping on speaker instrument does not agree with above speaker number, order replacement parts by referring to model number stamped on speaker and full description of part required.
	MISCELLANEOUS
X3240	Baffle—Baffle board and grille cloth
10941	Ball—Steel ball (⅛" dia.) for pickup arm mounting
71599	Bracket—Pilot lamp bracket
13103	Cap—Pilot lamp cap
72113	Foot—Rubber foot (4 req'd)
75097	Grommet—Rubber grommet for mounting 45 RPM changer (3 req'd)
72856	Grommet—Rubber grommet for motor board (4 req'd)
77984	Housing—Pickup arm pivot shaft housing (15-E-1 only)
74979	Knob—Selector switch knob—tan
72118	Knob—Tone control or volume control knob—brown
11765	Lamp—Pilot lamp—Mazda 51
76692	Link—Motor speed change link (bent-end section only)
76691	Link—Motor speed change link (slotted section only)
76688	Nut—Pickup arm pivot shaft bearing nut (15-E only)
73634	Nut—Speed nut for speaker mounting screws (4 req'd)
76689	Rest—Pickup arm rest (for 33⅓-78 RPM arm)
76686	Sleeve—Rubber sleeve (39/64 O.D. x 7/16" I.D. x 11/32") for pickup arm pivot post (15-E only)
14270	Spring—Retaining spring for knob 74057
30900	Spring—Retaining spring for knob 72118
76690	Spring—Speed change link and lever tension spring
76687	Washer—Rubber washer (13/16" O.D. x 7/16" I.D. x ⅛") for pickup arm pivot post (2 req'd)

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



RCA VICTOR

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.

SPECIFICATIONS

Turntable speed ..... 33⅓, 45 or 78 r.p.m.
Record capacity ..... Up to 14 seven-inch or
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 cycle 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 21T242.
930409-11	115 v. 50 cycle motor convertible to 60 cycles. Crystal pickup Stock No. 75475 or 77779. Used in Model 2US7.

INDEX

CONTROLS

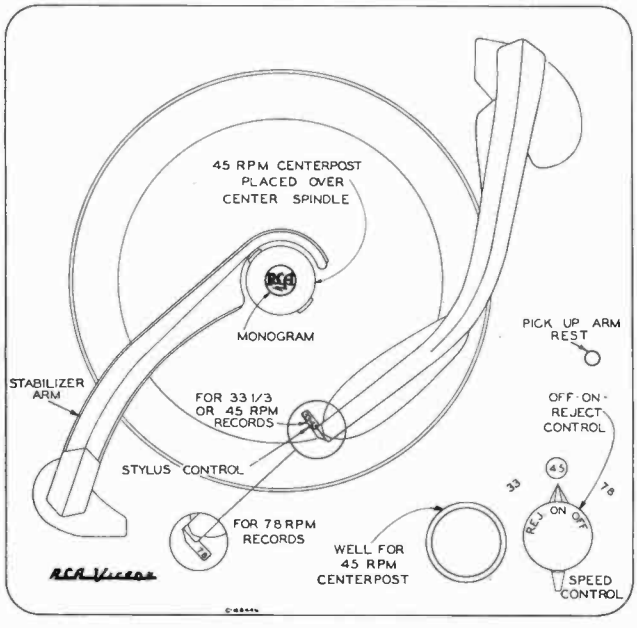
The record changer has a dual control on the motorboard and a stylus selector control on the pickup arm. The inner control (circular knob) is the OFF-ON-REJECT control. Turning this knob to the center position energizes the motor and starts the turntable, when turned to the right (clockwise) it starts 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 33⅓ 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.

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.



Controls

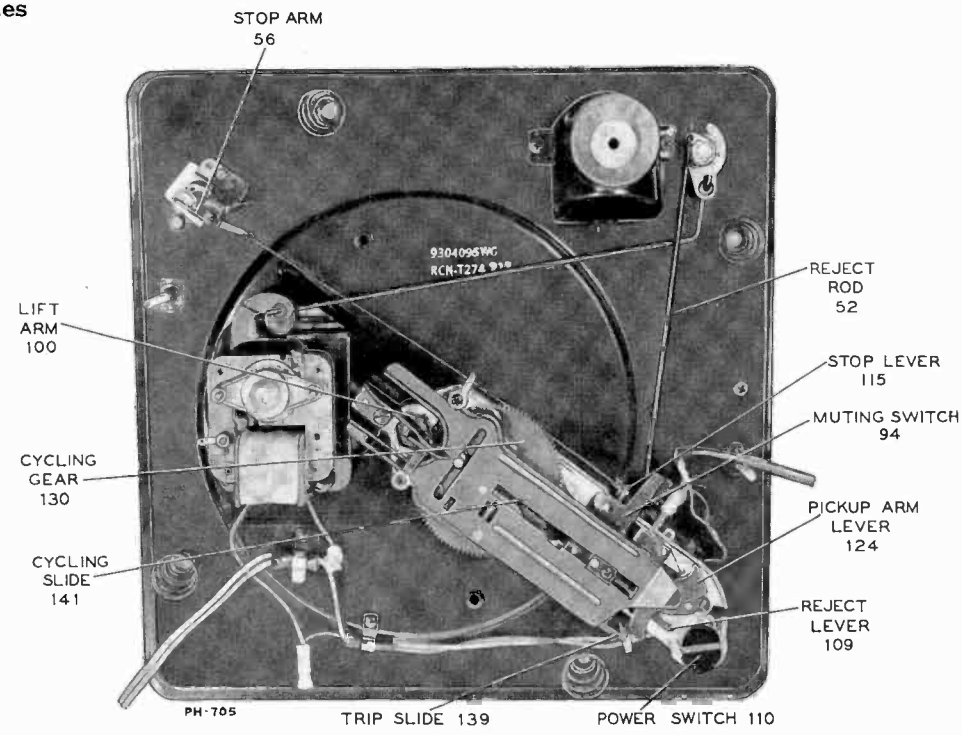


Figure 1—Bottom View

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.
2. 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 45-33⅓ 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 "A" or Type "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.

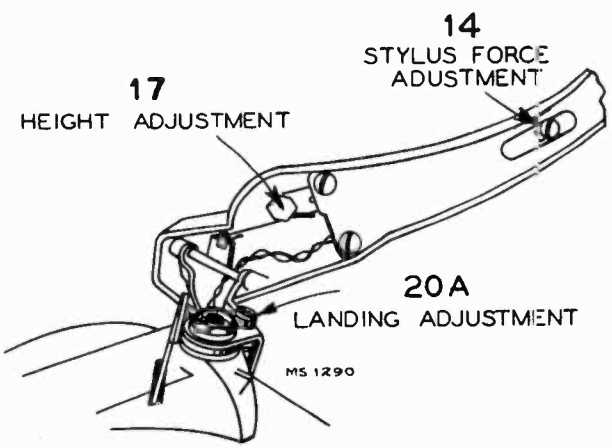


Figure 2—Adjustments

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 1⅜" 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 combination of velocity and fixed diameter. Velocity tripping is effective between 4¾" and 3¼" diameters, when the stylus moves inward ⅛" or more per revolution of the turntable. No adjustment is required.

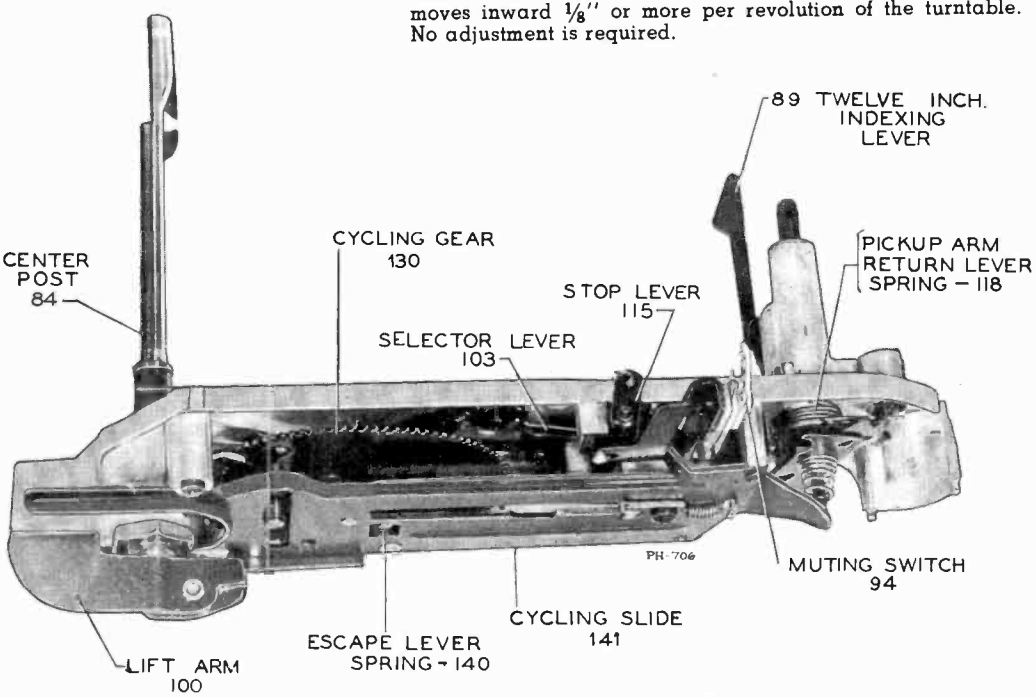


Figure 3—Slide Assembly (Complete)

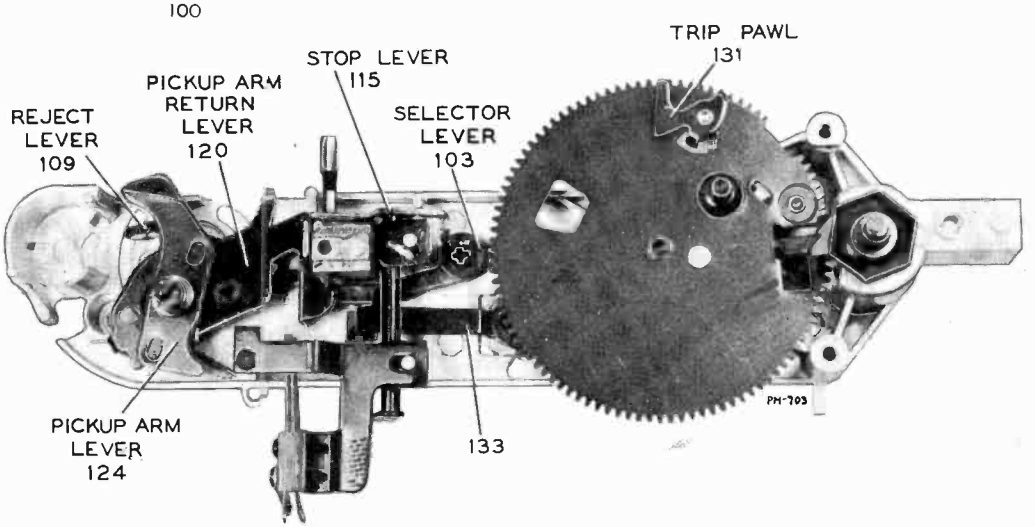


Figure 4—Slide Assembly (View with Slide Removed)

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

1. 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.

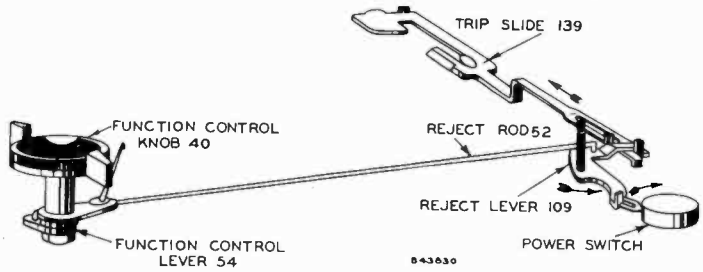


Figure 5

CYCLING STARTS

1. 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.

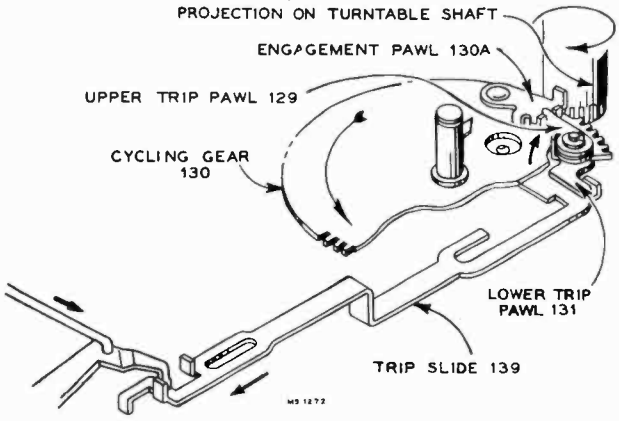


Figure 6

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.
2. 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.

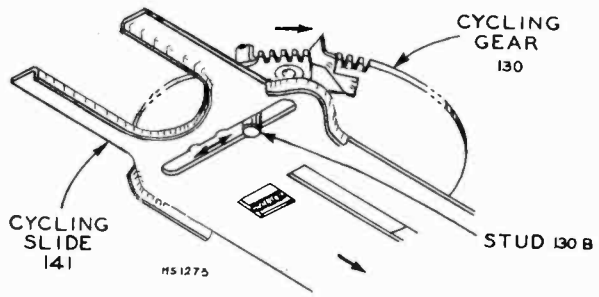


Figure 7

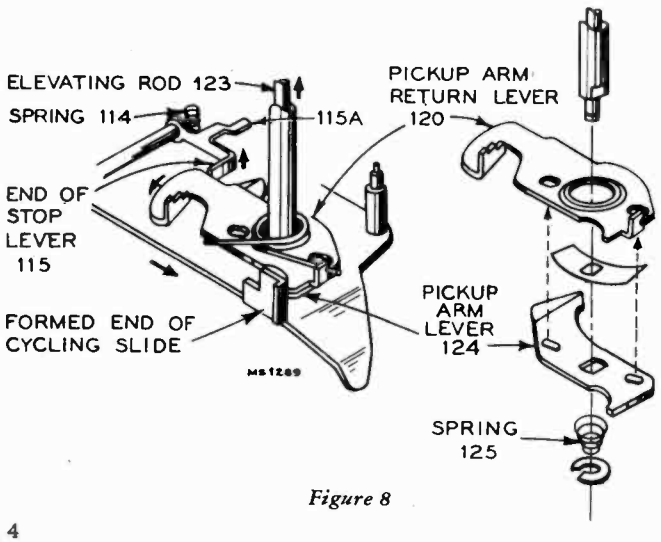


Figure 8

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

1. 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 it 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 tension 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 edge 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.

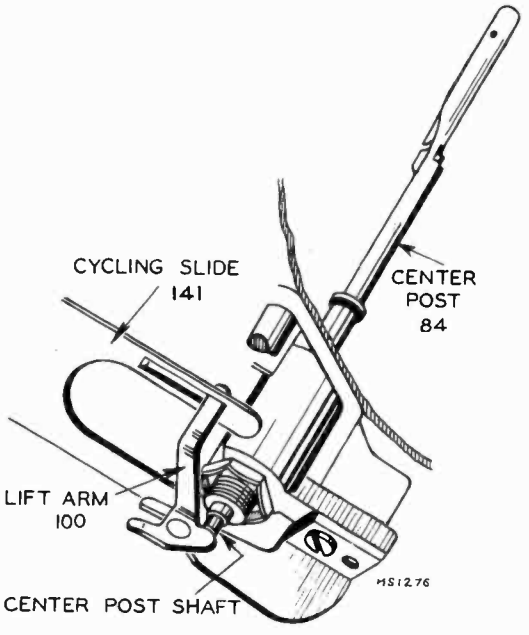


Figure 9

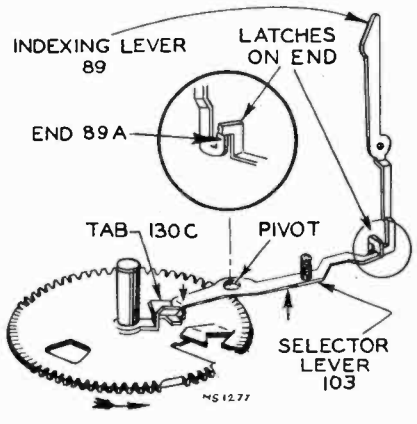


Figure 10

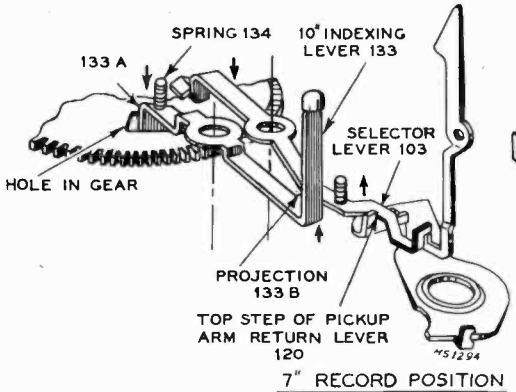


Figure 11

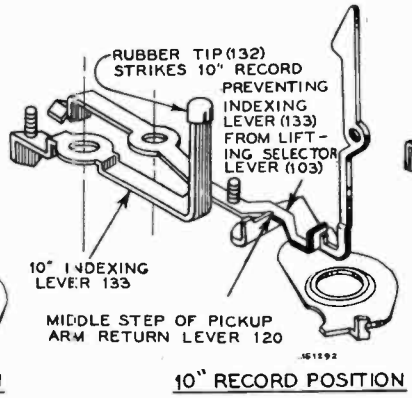


Figure 12

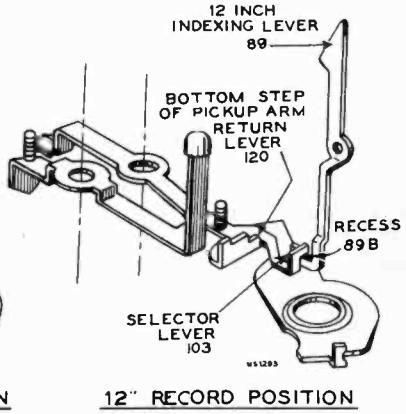


Figure 13

PICKUP MOVES IN FOR LANDING

1. 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.

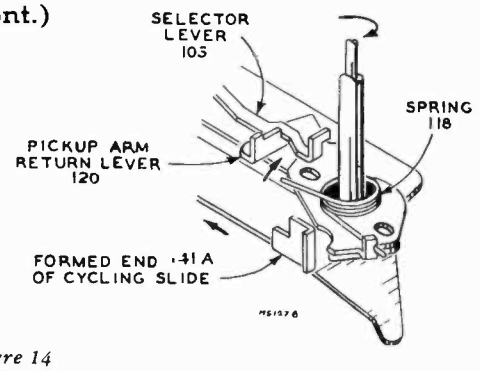


Figure 14

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 re-engagement 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.

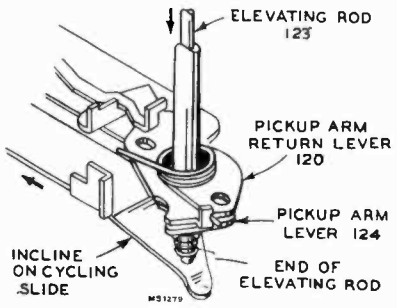


Figure 15

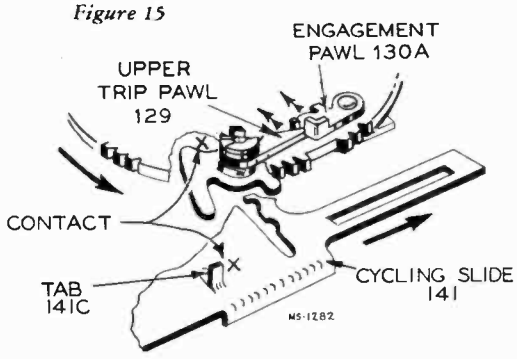


Figure 16

RECORD PLAYS

1. 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.

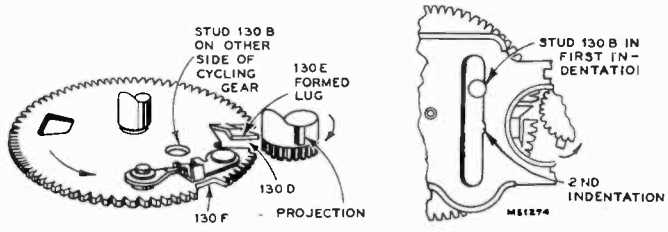
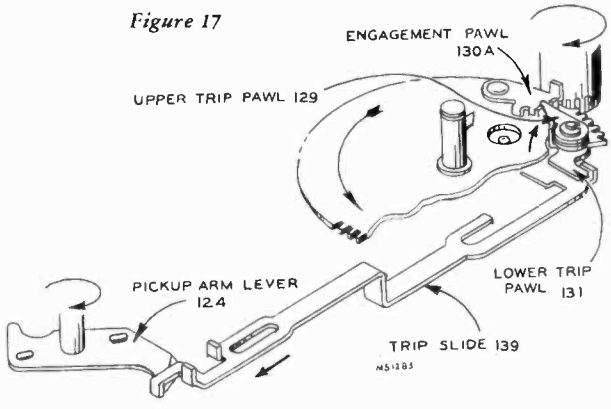


Figure 17



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.

1. 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.

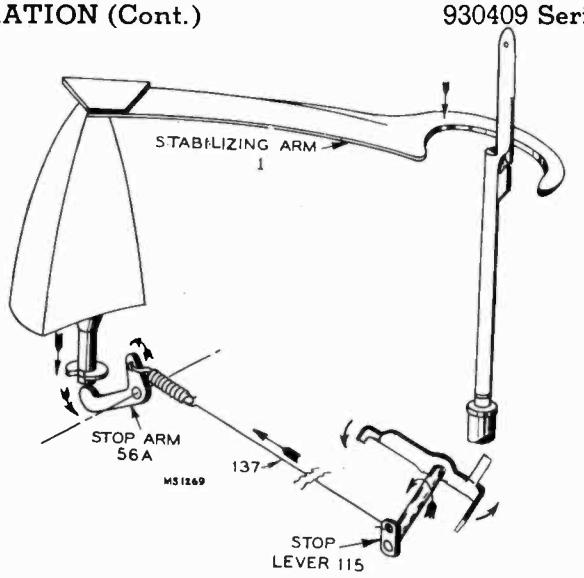


Figure 19

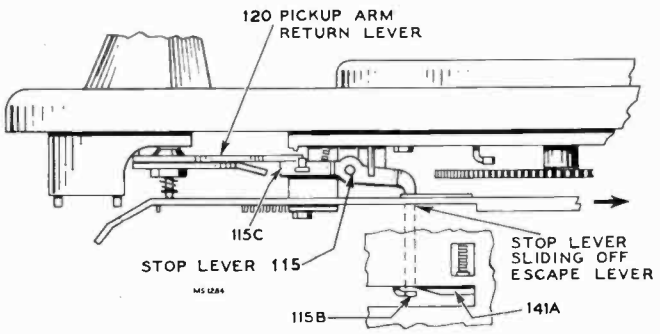


Figure 20

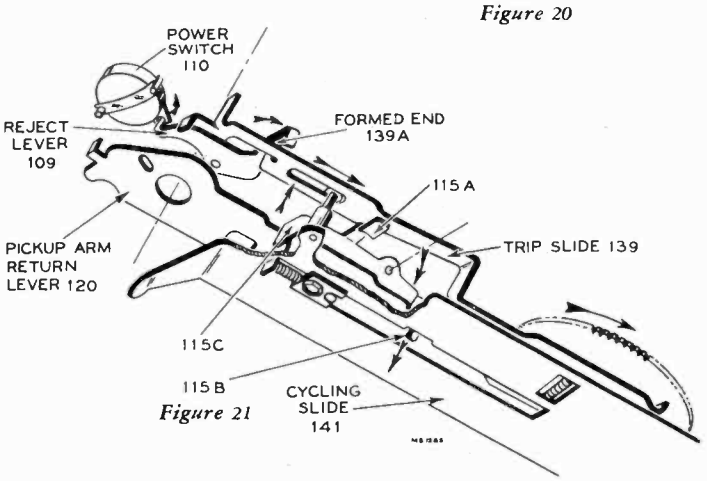


Figure 21

45 R.P.M. CENTERPOST

For playing of 45 r.p.m. records which have a 1½ inch center hole, the 45 r.p.m. centerpost is placed over the ¼ inch centerpost. The push-off finger (84A), which is part of the ¼ 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 are retracted. A formed spring (28) returns the shelves to the extended position.

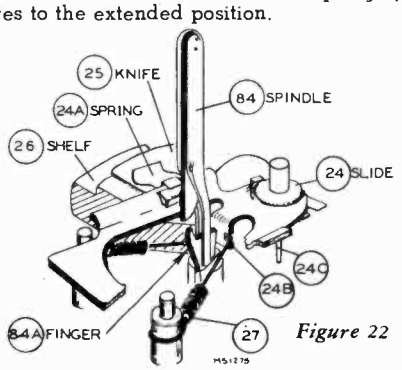


Figure 22

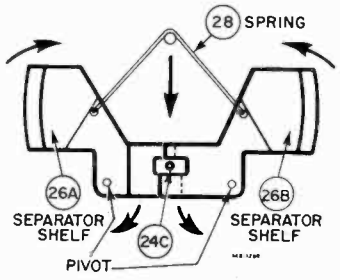


Figure 23

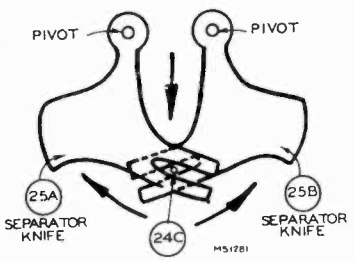


Figure 24

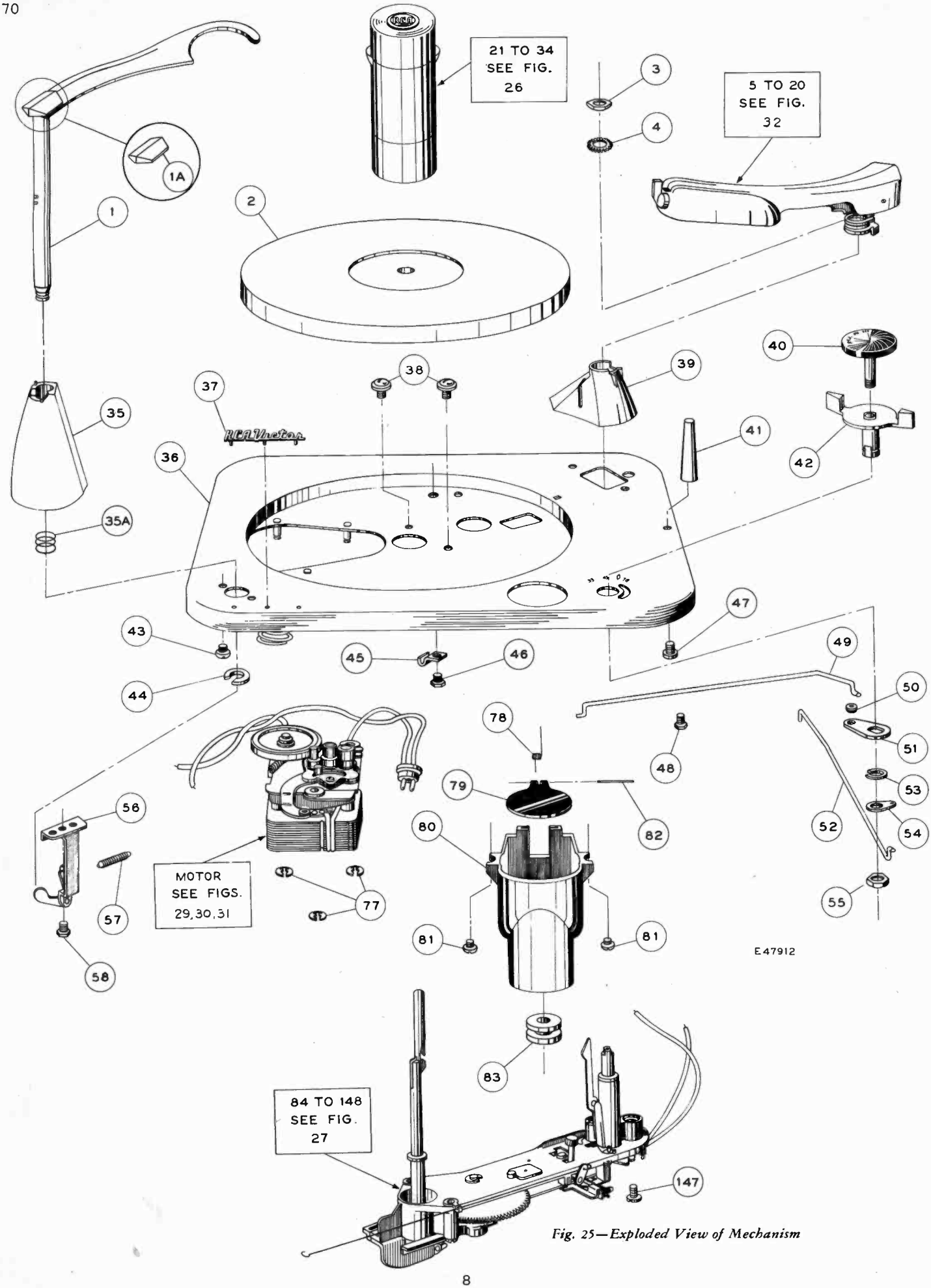


Fig. 25—Exploded View of Mechanism

ILL. NO.	STOCK NO.	DESCRIPTION
1	76913	Stabilizer—Record stabilizer—plum—complete with plastic cap for 930409-3, -4, -5, -6, -9 and -11
1	76914	Stabilizer—Record stabilizer—beige—complete with plastic cap for 930409-10
1A	75804	Cap—Plastic cap—maroon—for record stabilizer for 930409-3, -4, -5, -6, -9 and -11
1A	75805	Cap—Plastic cap—beige—for record stabilizer for 930409-10
2	77118	Turntable—Turntable and hub assembly—maroon flock.
2	77119	Turntable—Turntable and hub assembly—tan flock—for 930409-10
3	76905	Nut—1/4—28 hex nut (jam) for pickup arm bracket
4	———	Lockwasher—1/4 external type lockwasher for pickup arm shaft
35	76941	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
36	———	Motorboard—Motorboard—complete
37	74782	Emblem—"RCA Victor" emblem
38	———	Screw—#10-24 x 3/8" binding head machine screw and internal lockwasher
39	75829	Housing—Pickup arm pivot shaft housing—plum—for 930409-3, -4, -5, -6, -9 and -11
39	75873	Housing—Pickup arm pivot shaft housing—beige—for 930409-10
40	76915	Knob—Reject control knob and shaft—maroon—for 930409-3, -4, -5, -6, -9 and -11
40	76916	Knob—Reject control knob and shaft—beige—for 930409-10
41	75827	Rest—Pickup arm rest (maroon) for 930409-3, -4, -5, -6, -9 and -11
41	75828	Rest—Pickup arm rest (beige) for 930409-10
42	76937	Knob—Motor speed control knob and shaft
43	———	Screw—#6-32 x 1/4" hex head screw
44	75385	Washer—"C" washer to mount record stabilizer
45	———	Clamp—Cable clamp
46	———	Screw—Screw for mounting cable clamp
47	75830	Screw—#10 x 1/2 cross recessed pan head screw to mount pickup arm rest
48	———	Screw—#6-32 x 1/4" hex head screw
49	76920	Rod—Motor speed control rod
50	77229	Grommet—Rubber grommet for motor speed control rod
51	76918	Lever—Motor speed control lever
52	76919	Rod—"On-Off"—"Reject" rod
53	75825	Washer—"C" washer for motor speed control knob and shaft
54	76917	Lever—Switch control lever
55	77227	Nut—Pal nut for reject control knob and shaft
56	76927	Arm—Stop arm assembly
57	76926	Spring—Return spring (coil type) for stop arm (1/8" I.D. x 19/32)
58	———	Screw—6-32 x 5/16" cross recessed round head screw
77	75876	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—45 r.p.m. centerpost housing well—less lid and rubber bumper
81	———	Screw—#10-32 x 3/16" cross recess pan head screw to mount 45 r.p.m. centerpost housing
82	76924	Pin—Hinge pin for 45 r.p.m. centerpost housing lid
83	76940	Bumper—45 r.p.m. centerpost housing rubber bumper
147	———	Screw—#10-24 x 3/8" binding head machine screw and internal lockwasher
		45 RPM CENTERPOST ASSEMBLY
—	76945	Centerpost—45 r.p.m. centerpost complete
21	76928	Cap—Nose cap
22	76930	Spring—Nose spring (formed)
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	76932	Knife—Record separator knife (1 set)
26	76931	Shelf—Record support shelf (1 set)
27	76934	Spring—Slider return spring (coil type—2 in 1)
28	76935	Spring—Shelf return spring (formed)
29	———	Body—Spindle body assembly
30	76936	Screw—#4-40 x 7/8" fillister head screw for nose cap
31	———	Rotor—Die-cast rotor
32	76954	Spring—Rotor lift spring (coil) (1.168" O.D. x 1"—4-5 turns)
33	———	Lift—Rotor lift
34	76929	Bearing—Bottom bearing

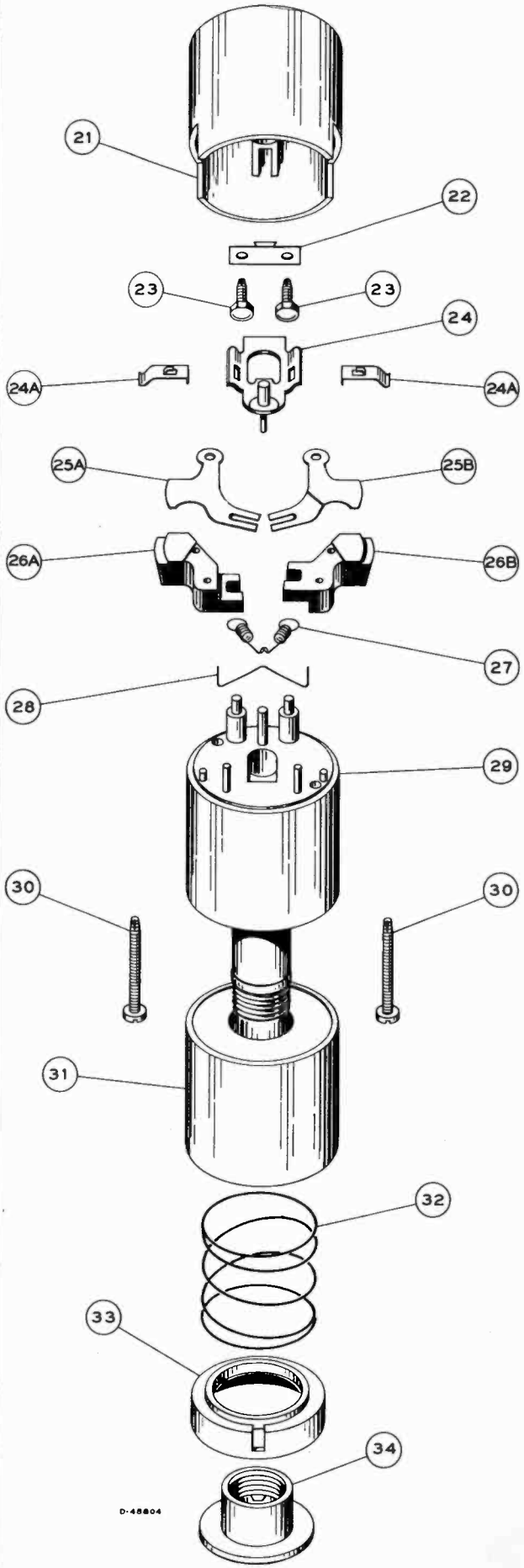
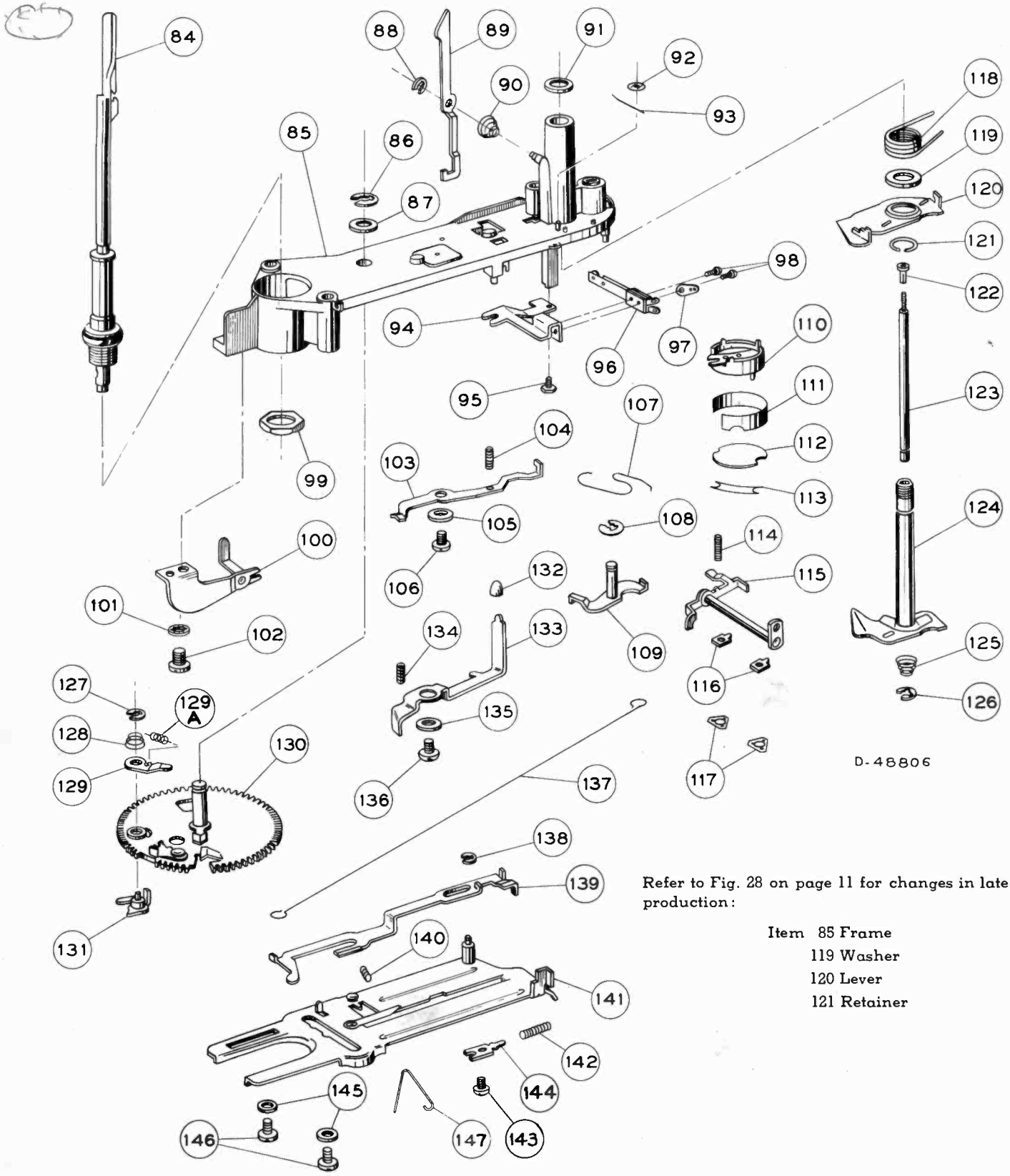


Fig. 26—45 r.p.m. Centerpost Assembly



Refer to Fig. 28 on page 11 for changes in late production:

Item 85 Frame
119 Washer
120 Lever
121 Retainer

Fig. 27—Slide Assembly

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.

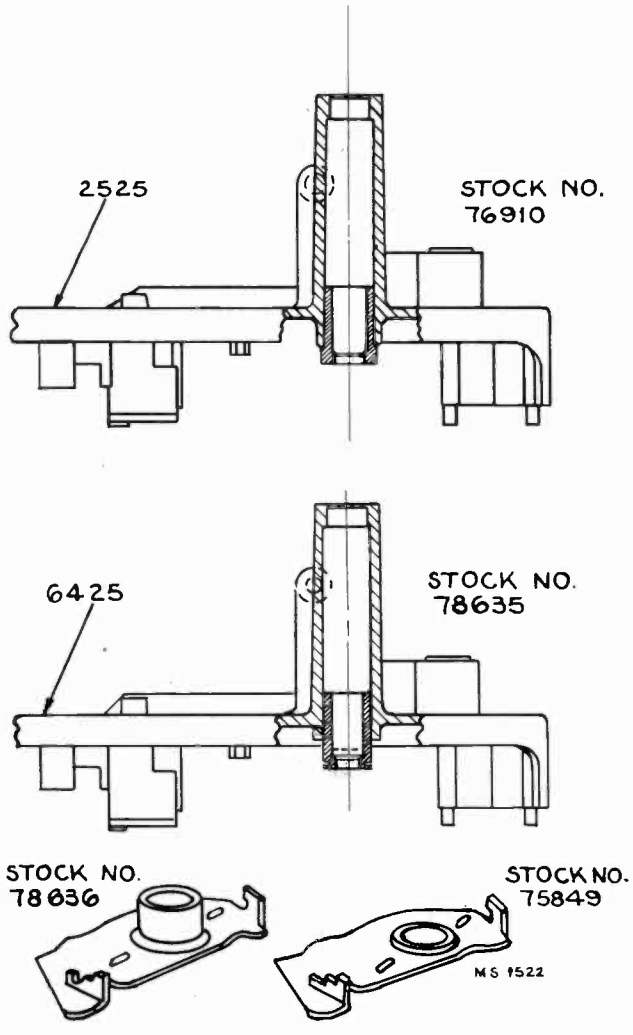


Fig. 28—Alternate Slide Plate Frame

ILL. NO.	STOCK NO.	DESCRIPTION
		SLIDE ASSEMBLIES
84	76904	Centerpost—33⅓-78 r.p.m. centerpost complete with bearing
85	76910	Frame—Main frame—(die-cast)
86	75373	Washer—"C" washer for mounting cycling gear
87	75845	Washer—Fibre washer for mounting cycling gear
88	75397	Washer—"C" washer for 12" indexing lever
89	75844	Lever—12" record indexing lever
90	76309	Spring—12" record indexing lever spring
91	76903	Washer—Pickup thrust washer (fibre)
92	75841	Nut—Speed nut for 12" indexing lever return spring
93	75842	Spring—12" indexing lever return spring (formed)
94	———	Bracket—Muting switch bracket
95	———	Screw—#4-40 x ¼" hex head (indented) thread cutting screw to mount muting switch assembly
96	77191	Switch—Muting switch—less mounting bracket
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—½-20 pal nut for mounting 33⅓-78 r.p.m. spindle
100	75864	Arm—Lift arm
101	———	Screw—#10-24 x ⅜" binding head machine screw and internal lockwasher
102	———	Screw—#10-24 x ⅜" binding head machine screw and internal lockwasher
103	75859	Lever—Landing selector lever
104	75860	Spring—Return spring (coil type) for landing selector lever (.110" O.D. x ⅜"—14 turns)
105	———	Washer—Metal washer (steel) (1/32" x 7/16" O.D. x .140)
106	———	Screw—#6-32 x ¼" hex head screw
107	76312	Spring—Reject spring (special)
108	75392	Washer—"C" washer for mounting reject lever
109	75856	Lever—Reject lever
110 111 112	75857	Switch—"On-Off" switch complete with insulating strip (111) and cover (112)
113	76908	Retainer—Switch cover retainer (flat)
114	76314	Spring—Return spring (coil type) (.125" O.D. x 7/16"—14 turns)
115	76313	Lever—Stop lever
116	77258	Strip—Bearing strip for stop lever shaft
117	76912	Nut—Speed nut for mounting stop lever bearing shafts
118	76944	Spring—Pickup arm return lever spring (coil) (.593" O.D.—3½ turns)
119	75848	Washer—Fibre washer for pickup arm pivot shaft
120	75849	Lever—Pickup arm return lever
121	75850	Retainer—Retaining ring for pickup arm return lever
122	76952	Nut—Elevating rod adjustment nut
123	76951	Rod—Elevating rod
124	76946	Shaft—Pickup arm pivot shaft and lever
125	76906	Spring—Thrust spring (conical) for elevating rod
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 engagement 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 ¼" 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 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 (brass) for cycling slide
146	———	Screw—#6-32 x ¼" 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 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	—	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	▲	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	Sleeve—Spring 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 alternates for the above listed motors. See page 13.

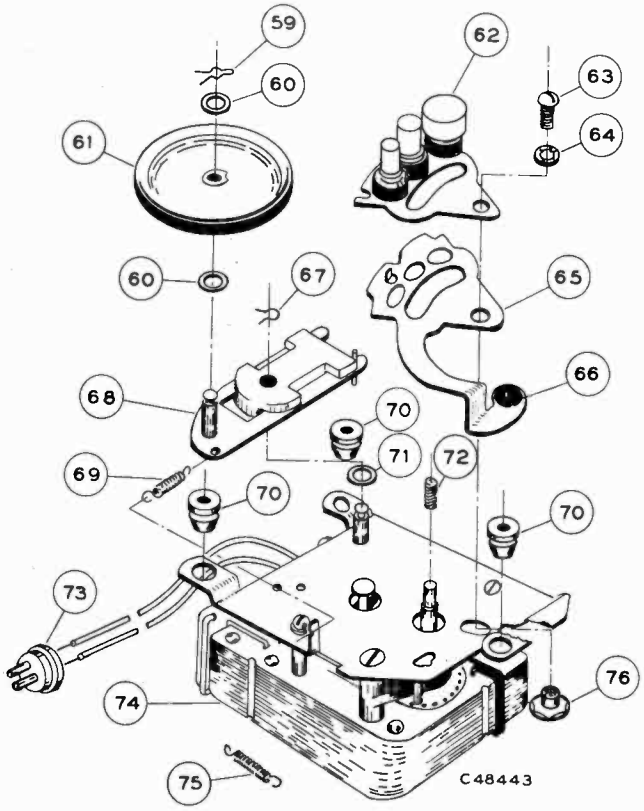


Fig. 29—Assembly of Motors Stamped 5046, 5047, 5355 and 5432

"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).
3. Remove motor (held by three "C" washers) (Item 77) from changer and disengage the speed shift linkage rod (Item 49).

Transfer of Usable Parts

1. Transfer rubber mounting grommets (Item 70) from old plate to new plate.
2. 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

1. Engage speed shift linkage rod, and re-assemble motor to changer.
2. 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.

ILL. NO.	STOCK NO.	DESCRIPTION
		MOTOR ASSEMBLIES Stamped: 5685—for 930409-9 5686—for 930409-5 & -10 5687—for 930409-11
1	76750	Wheel—Idler wheel
2	75433	Washer—Fibre washer
3	76744	Retainer—Idler wheel retainer (hairpin spring)
4	78645	Support—Idler wheel support
5	78646	Retainer—Support retainer (hairpin spring)
6	78647	Washer—Bearing washer
7	78648	Link—Idler wheel support link
8	.....	Spacer—Metal spacer for link mounting
9	78374	Spring—Idler wheel tension spring
10	.....	Screw—Screw for mounting plate
11	.....	Lockwasher—Lockwasher for mounting plate
12	76751	Grommet—Rubber grommet for motor mounting
13	30870	Plug—Two (2) prong male plug
14	76755	Spring—Detent spring
15	77134	Collar—Speed shift lever collar (nut)
16	78371	Plate—Mounting plate assembly includes items 4, 5, 6, 7, 8, and 9
17	76749	Sleeve—Spring sleeve pulley for 60 cycle operation of #5685, #5686 and #5687
17	77686	Sleeve—Spring sleeve pulley for 50 cycle operation of #5685 and #5687
18	77685	Lever—Speed shift lever
19	77229	Grommet—Rubber grommet for shift lever
20	77132	Plate—Speed pulley mounting plate with 3 pulleys
20A	76748	Pulley—33 1/3 r.p.m. speed pulley
20B	76747	Pulley—45 r.p.m. speed pulley
20C	76746	Pulley—78 r.p.m. speed pulley
20D	75428	Washer—Felt washer
20E	75427	Retainer—Retainer for speed pulleys
21	—	Screw—Screw for mounting pulley plate
22	—	Lockwasher—Lockwasher for pulley plate
	460A001	Motor—Motor assembly (#5685) COMPLETE for 230 volts, 50 cycles
	78372	Motor—Motor assembly (#5686) with mounting plate and idler support—LESS idler wheel, speed shift lever and pulley mounting plate for 115 volts, 60 cycles.
	78373	Motor—Motor assembly (#5687) COMPLETE for 115 volts, 50 cycles.

ILL. NO.	STOCK NO.	DESCRIPTION
		MOTOR ASSEMBLIES Stamped 4638—for 930409-3,-5,-6,-10 and -11
1	78508	Wheel—Idler wheel with fibre washer
2	78509	Washer—Fibre washer
3	78510	Washer—Felt washer
4	78511	Washer—"C" washer
5	78512	Spring—Idler spring
6	.....	Screw—Holddown plate mounting screw
7	.....	Lockwasher—Holddown plate mounting screw lockwasher
8	78513	Plate—Holddown plate
9	78514	Grommet—Motor mounting grommet
10	78515	Washer—Blued steel washer
11	78516	Plate—Idler plate assembly
12	78517	Link—Idler link
13	78518	Arm—Pulley plate latch arm
14	78519	Spring—Pulley latch spring
15	78520	Spring—Shifter latch spring
16	78521	Lever—Latch arm lever
17	78522	Sleeve—Spring sleeve pulley for 60 cycle operation
17	78523	Sleeve—Spring sleeve pulley for 50 cycle operation
18	78524	Plate—Speed pulley mounting plate-less pulleys
18A	78525	Pulley—33 1/3 r.p.m. pulley
18B	78526	Pulley—45 r.p.m. pulley
18C	78527	Pulley—78 r.p.m. pulley
18D	78528	Washer—Speed pulley fibre washer
19	78529	Lever—Speed shift lever
20	78530	Grommet—Speed shift lever grommet
21	30870	Plug—2 prong male plug
	78531	Motor—Motor assembly COMPLETE—less mounting grommets and plug—for 115 volts, 60 cycles.
		MOTOR ASSEMBLIES Motor Stamped: 5191—for 930409-4 Order by description

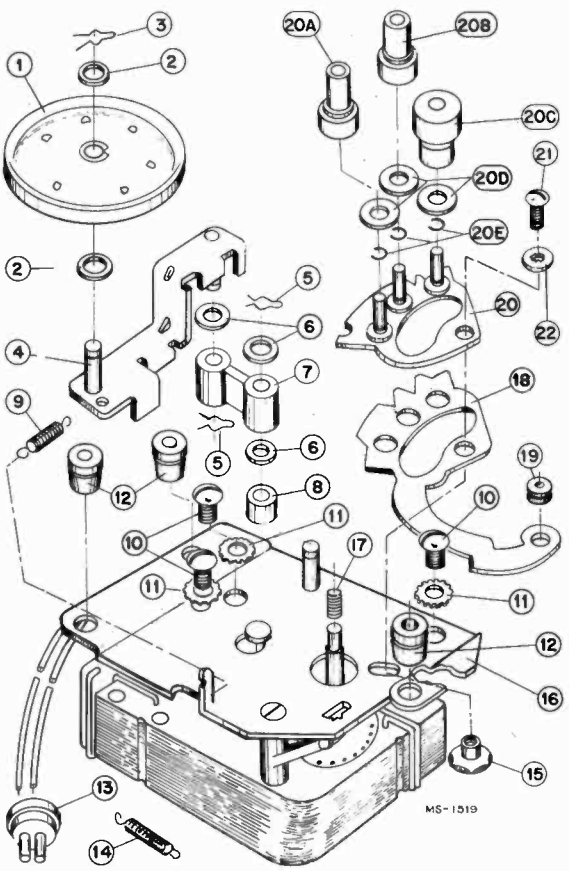


Fig. 30— Assembly of Motors Stamped 5685, 5686 and 5687

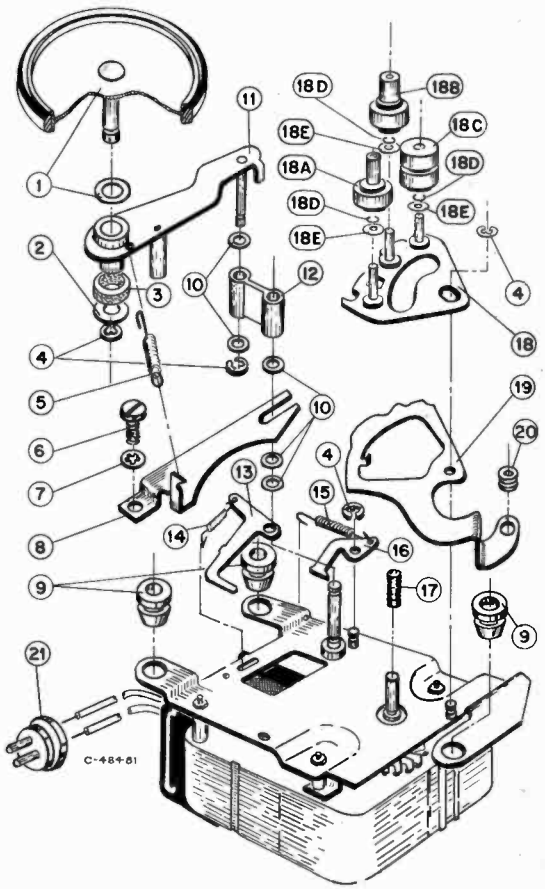
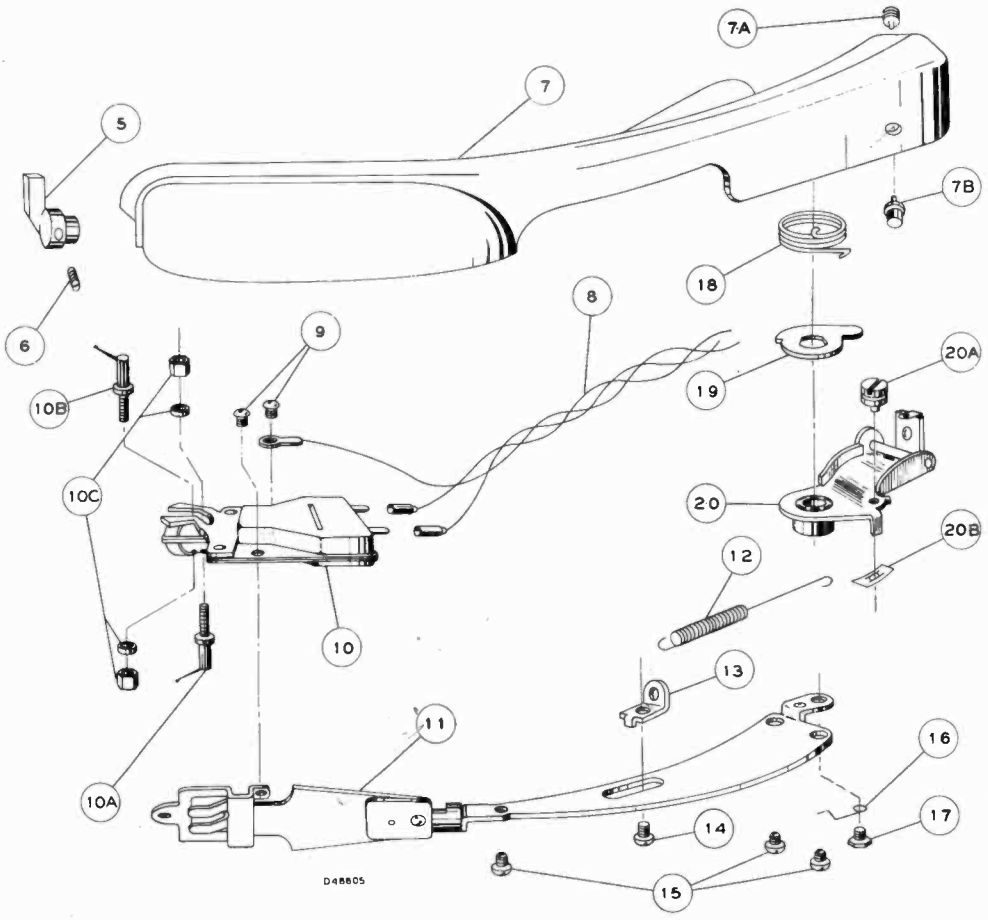


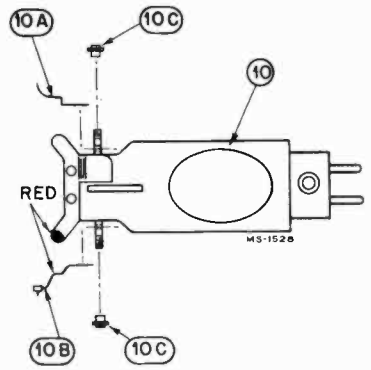
Fig. 31— Assembly of Motor Stamped 4638

930409 Series REPLACEMENT PARTS (Cont.)

ILL. NO.	STOCK NO.	DESCRIPTION
		PICKUP ASSEMBLIES For 930409-3 and 930409-9
10	S-5652	Pickup—Ceramic pickup complete with two styli —for 930409-3
10	75044	Pickup—Crystal pickup complete with two styli —for 930409-9
10A	75046	Stylus—Osmium tip stylus and holder (.003" r., uncoded) for 78 r.p.m.
10B	75045	Stylus—Osmium tip stylus and holder (.001" r., coded red) for 45-33⅓ r.p.m.
10C	75274	Nut—Knurled nut to mount stylus
		PICKUP ASSEMBLIES For 930409-4 and 930409-6
10	162A001	Pickup—Ceramic pickup complete with two styli
10A	490B001	Stylus—Osmium tip stylus (.003" r., uncoded) for 78 r.p.m.
10B	490A001	Stylus—Osmium tip stylus (.001" r., coded red) for 45-33⅓ r.p.m.
		PICKUP ASSEMBLIES For 930409-5, 930409-10 and 930409-11
10	75475	Pickup—Crystal pickup complete with two osmium styli
10	77779	Pickup—Crystal pickup complete with one osmium stylus and one sapphire stylus
10A	75497	Stylus—Osmium tip stylus (.003" r., uncoded) for 78 r.p.m.
10B	75496	Stylus—Osmium tip stylus (.001" r., coded red) for 45-33 1/3 r.p.m.
10B	77899	Stylus—Sapphire tip stylus (.001" r., coded red) for 45-33 1/3 r.p.m.
10C	74230	Nut—#00-112 nut and washer to mount stylus
		PICKUP ARM ASSEMBLIES
5	76902	Knob—Stylus selector knob less screw
6	76898	Screw—#2-56 x 3/16" headless set screw for stylus selector knob
7	76949	Arm—Pickup arm shell (plastic) for 930409-5, -10 and -11
7	100A001	Arm—Pickup arm shell (plastic) for 930409-3, -4, -6 and -9
7A	76948	Screw—Pickup arm mounting bracket pivot screw
7B	76947	Bearing—Pickup arm mounting bracket pivot bearing
8	75808	Cable—Three (3) wire pickup cable complete with connectors for 930409-5, -10 and -11
8	163A001	Cable—Three (3) wire pickup cable complete with connectors for 930409-3, -4, -6 and -9
9	———	Screw—#4-40 x ⅛" fillister head screw to mount pickup cartridge
11	76957	Swivel—Pickup cartridge mount and swivel assembly for 930409-5, -10 and -11
11	130A001	Swivel—Pickup cartridge mount and swivel assembly for 930409-3, -4, -6 and -9
12	75809	Spring—Pickup arm counterbalance spring
13	75810	Bracket—Pickup arm weight adjustment bracket (slide)
14	76899	Screw—#6-32 x ⅛" round head screw for pickup arm weight adjustment bracket
15	76896	Screw—#4 x ¼" binding head sheet metal screw to mount swivel assembly in arm
16	75812	Spring—Lock spring (coil type) for height adjustment screw
17	75813	Screw—Height adjustment screw (hex head—#5-40 thread)
18	76943	Spring—Tension spring (coil) for landing adjustment stud
19	76911	Cam—Landing adjustment cam
20	76907	Bracket—Pickup arm mounting bracket complete with pin
20A	75816	Stud—Landing adjustment stud (eccentric)
20B	75818	Nut—Speed nut for landing adjustment stud

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS





Pickup Stock No. S-5652

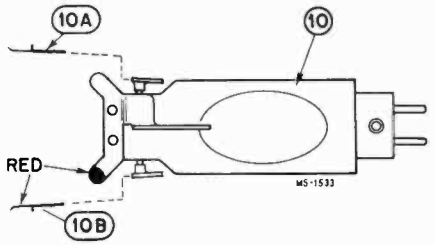


Fig. 32—Pickup Arm Assembly for 930409-5 and -10

Pickup Stock No. 162A001

RCA VICTOR

TELEVISION RECEIVERS MODELS 17T150, 17T151, 17T163

Chassis No. KCS66C

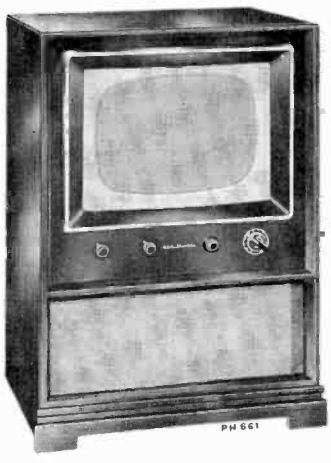
— Mfr. No. 274 —

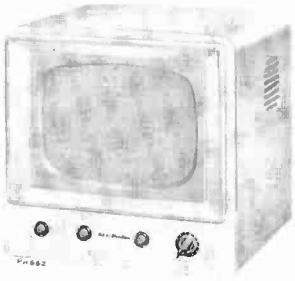
SERVICE DATA

—1952 No. T1—

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

Model 17T150 "Colby"
Mahogany Finish Metal





Model 17T151 "Glenside"
Mahogany Grained Metal

Model 17T163 "Crafton"
Walnut, Mahogany, Limed Oak

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 FREQUENCY RANGE

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

Picture I-F Carrier Frequency . . . . . 45.75 mc.
Sound I-F Carrier Frequency . . . . . 41.25 mc. and 4.5 mc.

VIDEO RESPONSE . . . . . To 4 mc.

SWEEP DEFLECTION . . . . . Magnetic

FOCUS . . . . . Magnetic

POWER SUPPLY RATING
KCS66C . . . . . 115 volts, 60 cycles, 190 watts

AUDIO POWER OUTPUT RATING
KCS66C . . . . . 5.0 watts max.

CHASSIS DESIGNATIONS
KCS66C . . . . . In Models 17T150, 17T151 & 17T163

LOUDSPEAKERS
Model 17T150 . . . . . (971614-1) 4"x6" PM Dynamic, 3.2 ohms
Models 17T151 & 17T163 . (971490-2) 8" PM Dynamic, 3.2 ohms

WEIGHT Model	Chassis with Tubes in cabinet	Shipping Weight
17T150	88 lbs.	103 lbs.
17T151	88 lbs.	103 lbs.
17T163	95 lbs.	115 lbs.

RECEIVER ANTENNA INPUT IMPEDANCE

Choice: 300 ohms balanced or 72 ohms unbalanced.

RCA TUBE COMPLEMENT

	Tube Used	Function
(1)	RCA 6BQ7	R-F Amplifier
(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
(6)	RCA 6CB6	4th Picture I-F Amplifier
(7)	RCA 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	1st Audio Amplifier
(12)	RCA 6AQ5	Audio Output
(13)	RCA 6CB6	AGC Amplifier
(14)	RCA 6SN7GT	Sync Separator
(15)	RCA 6SN7GT	Vert Sync Amplifier and Vert Sweep Osc.
(16)	RCA 6AQ5	Vertical Sweep Output
(17)	RCA 6SN7GT	Horizontal Sync Amplifier
(18)	RCA 6SN7GT	Horizontal Sweep 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

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	41.25 mc. and 4.5 mc.

VIDEO RESPONSE	To 4 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

OPERATING CONTROLS (front Panel)

Channel Selector Fine Tuning	Dual Control Knobs
Picture Brightness	Dual Control Knobs
Picture Horizontal Hold Picture Vertical Hold	Dual Control Knobs
Sound Volume and On-Off Switch Tone Control and Phono Switch	Dual Control Knobs

NON-OPERATING CONTROLS (not including r-f and i-f adjustments)

Picture Centering	top chassis adjustment
Width	rear chassis adjustment
Height	rear chassis adjustment
Horizontal Linearity	rear chassis screwdriver adjustment
Vertical Linearity	rear 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 Range	rear chassis adjustment
Focus	top chassis adjustment
Ion Trap Magnet	top chassis adjustment
Deflection Coil	top chassis wing nut adjustment
AGC Control	rear chassis adjustment

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.

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.

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.

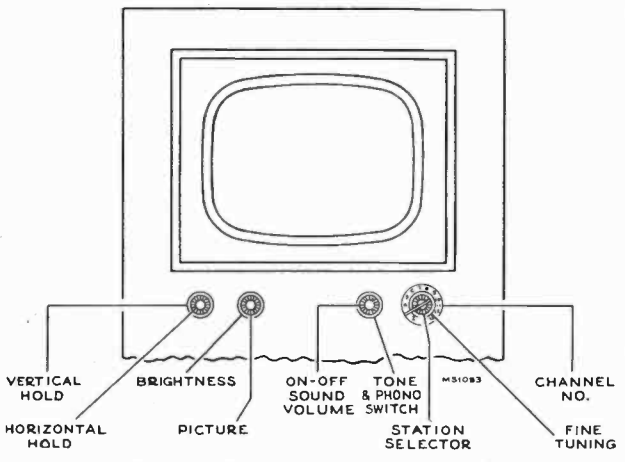


Figure 1—Receiver Operating Controls

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".

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.

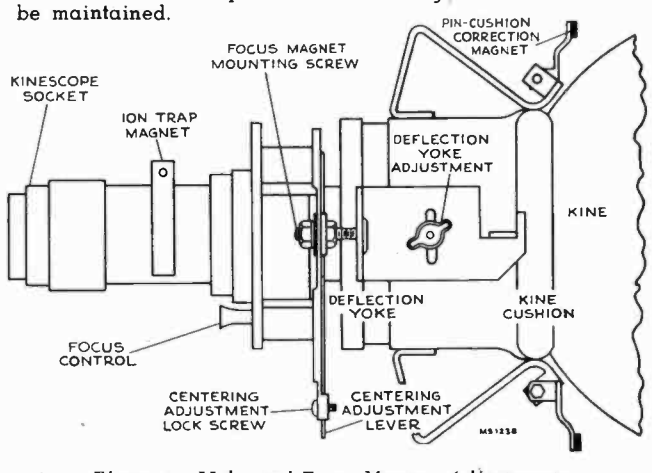


Figure 2—Yoke and Focus Magnet Adjustments

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 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 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

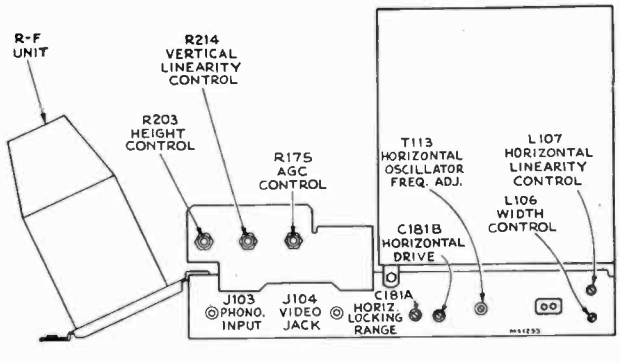


Figure 3—Rear Chassis Adjustments

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 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 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 C181B 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 counter-clockwise 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 (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. 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.

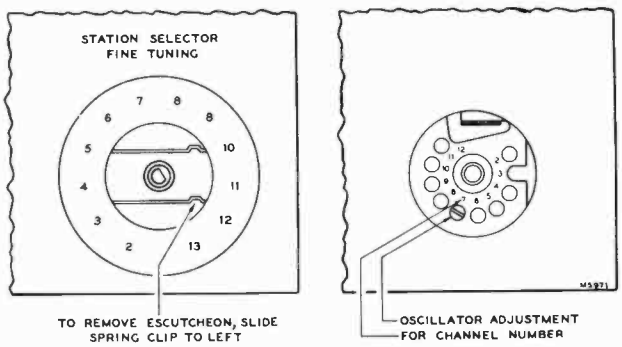


Figure 4—R-F Oscillator Adjustments

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.

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.

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 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.

17T150, 17T151, 17T163 **CHASSIS TOP VIEW**

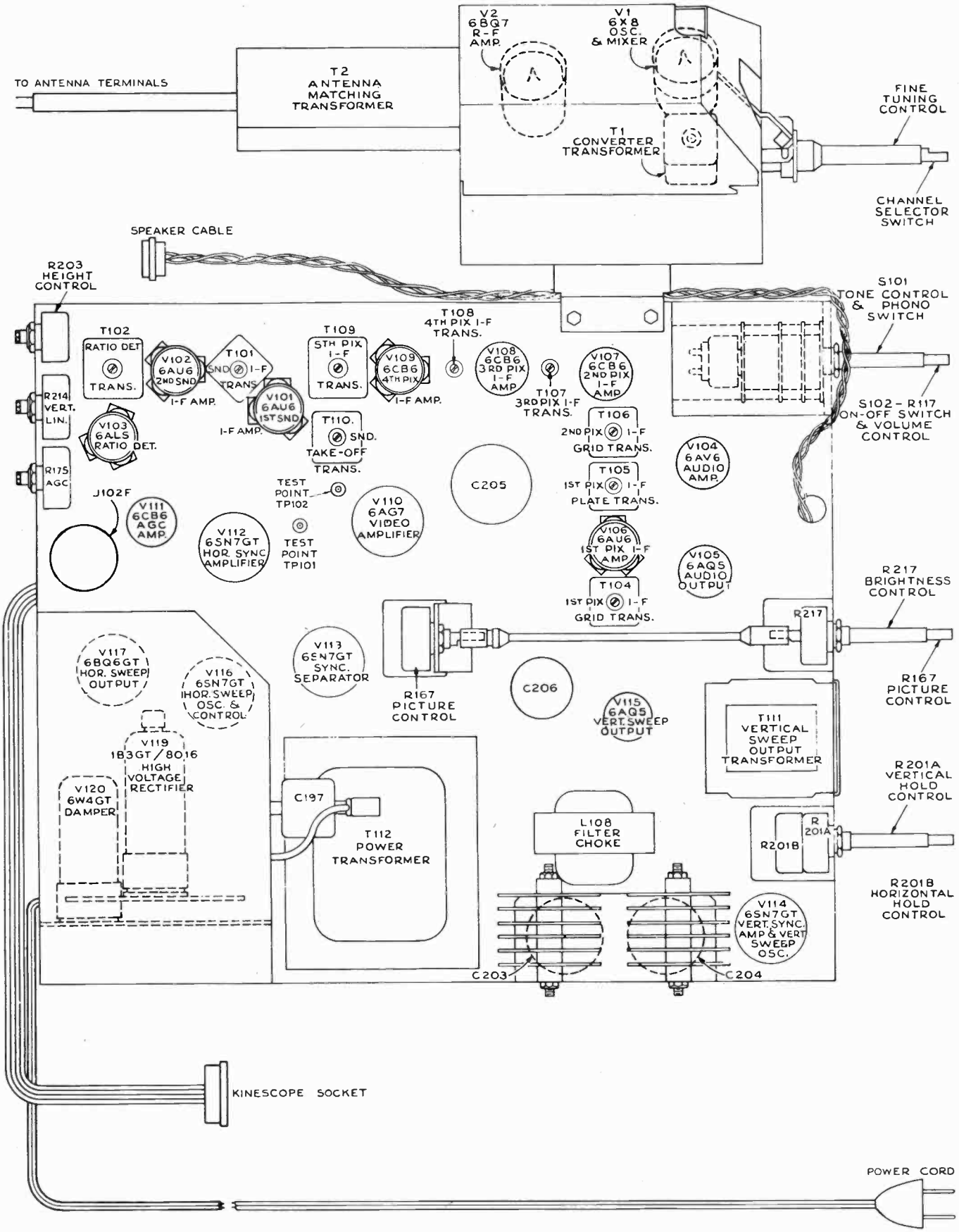


Figure 5—Chassis Top View

CHASSIS BOTTOM VIEW 17T150, 17T151, 17T163

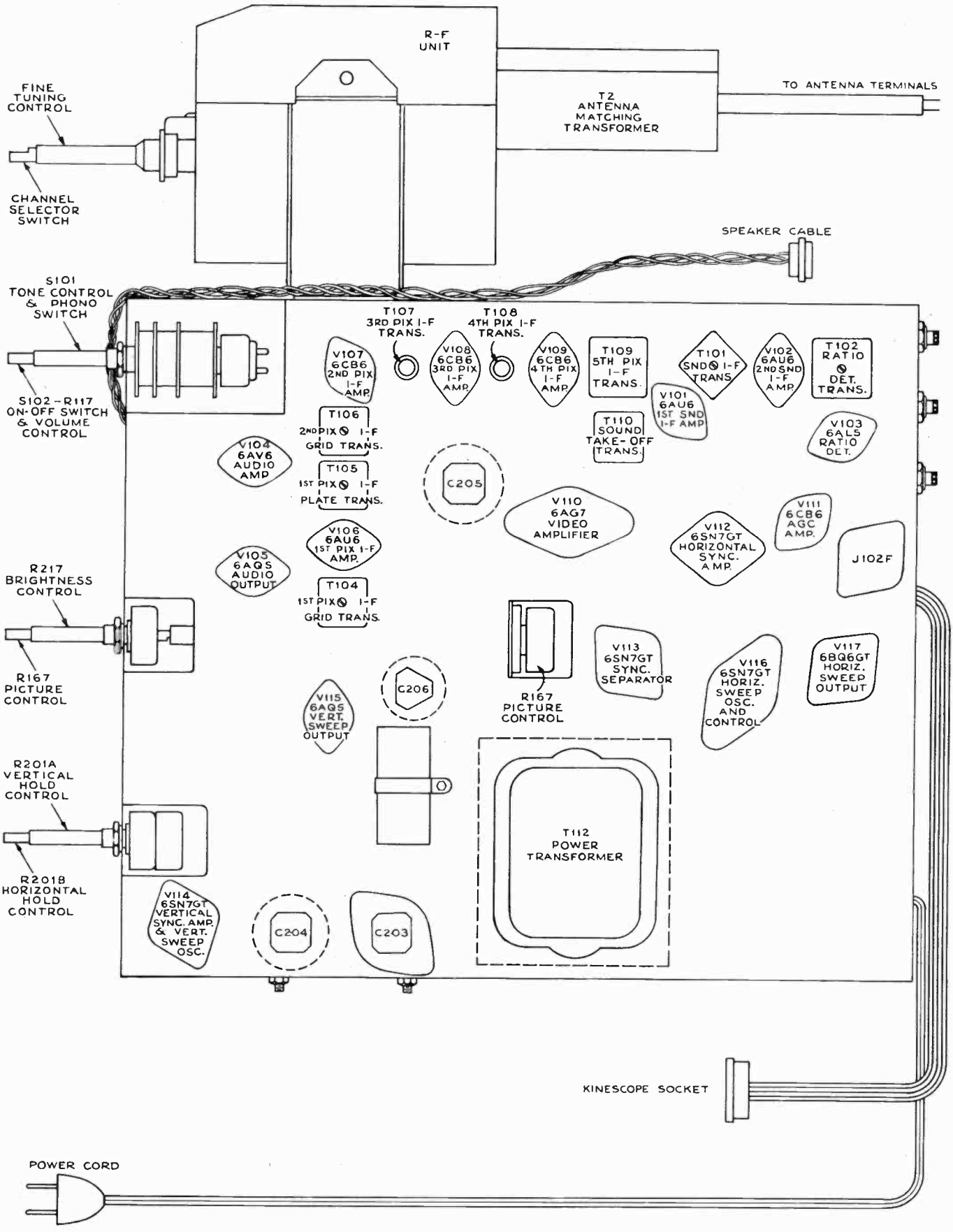


Figure 6—Chassis Bottom View

17T150, 17T151, 17T163 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 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	123
6	83.25	87.75	129
7	175.25	179.75	221
8	181.25	185.75	227
9	187.25	191.75	233
10	193.25	197.75	239
11	199.25	203.75	245
12	205.25	209.75	251
13	211.25	215.75	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.

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
(2) R-F Unit
(3) Ratio Detector
(4) Sound I-F Trans.
(5) Sound Take-Off Trans.
(6) Picture I-F Traps
(7) Picture I-F Trans.
(8) Sweep Alignment of I-F
(9) Horizontal Oscillator
(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 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 ½ 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 the T1 core for maximum inductance (core turned counter-clockwise). 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. 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% 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 C1 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 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 generatcr 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 C1 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 C1 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 C1 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 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 C1 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

Channel Number	Picture Carrier Freq. Mc.	Sound Carrier Freq. Mc.	Receiver R-F Osc. Freq. Mc.	Channel Oscillator Adjustment
2	55.25	59.75	101	L1
3	61.25	65.75	107	L2
4	67.25	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	191.75	233	L8
10	193.25	197.75	239	L9
11	199.25	203.75	245	L10
12	205.25	209.75	251	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 T104.

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 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 T102 bottom core for minimum output on the oscilloscope. Repeat the 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 indication on the oscilloscope.

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 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 T104.

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 R143 and R144.

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 1 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 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 most receivers, C221 is variable and is provided as a band width adjustment. Preset C221 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 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 T1 top and T104 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 TP102.

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 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 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 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.

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 C181A slightly clockwise. If less than 2 bors 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 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.

17T150, 17T151, 17T163 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
	ANTENNA MATCHING UNIT ALIGNMENT									
1	Do not adjust this unit unless fairly certain that it requires adjustment. Disconnect lead from L58 to S5. 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.									
2	Antenna terminals	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 terminals loosely		Antenna terminals through pad	45 to 54 mc.	"	—	Scope a xtal probe to gnd.	Connect 300 ohms from L58 to gnd.	L61 and L62 to obtain response of Fig. 12	Fig. 7 Fig. 11 Fig. 12
	R-F UNIT ALIGNMENT									
5	If unit is completely out of adjustment, preset all adjustments to center of range with following exceptions. Set C18 so that head is 3/8" above chassis. Set T1 max. counterclockwise. Set C11 1/4 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 clockwise from mechanical center of its range for all oscillator adjustments.									
6	Grid, pin 7 of V2 through 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. indication 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 channel 8	C1 for beat on het. freq. meter	Fig. 7
8	Antenna terminals loosely	181.25 and 185.75	Antenna terminals through pad	Channel 8	Not used	—	TP1. Gain to maximum	"	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 channel 6	L5 for beat on het. freq. meter	Fig. 8
10	Antenna terminals loosely	83.25 and 87.75	Antenna terminals 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. Connect "VoltOhmyst" to TP1	C8 for —3.5 volts on meter	Fig. 7
12	Antenna terminals loosely	83.25 and 87.75	Antenna terminals through pad	Channel 6	Not used	—	TP1. Gain to maximum	R-F unit on channel 6	Check response. Readjust 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 channel 8	C1 for beat on het. freq. meter	Fig. 7
14	Antenna terminals loosely	181.25 and 185.75	Antenna terminals through pad	Channel 8	Not used	—	TP1. Gain to maximum	"	Check response adjust C9, C11, C15 and C18 if necessary	Fig. 7
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.									
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. Overshoot L46 slightly and adjust C1 for beat.	Fig. 7
17	Antenna terminals loosely	211.25 215.75	Antenna terminals 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	"	Channel 11	"	—	"	Rec. on channel 11	"	Fig. 13
20	"	193.25 197.75	"	Channel 10	"	—	"	Rec. on channel 10	"	Fig. 13
21	"	187.25 191.75	"	Channel 9	"	—	"	Rec. on channel 9	"	Fig. 13
22	"	181.25 185.75	"	Channel 8	"	—	"	Rec. on channel 8	"	Fig. 13
23	"	175.25 179.75	"	Channel 7	"	—	"	Rec. on channel 7	"	Fig. 13
24	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 yet maintain correct response on channel 8.									
25	Repeat step 13. If the oscillator is off frequency overshoot the adjustment of C1 and correct by adjusting L46.									
26	Repeat steps 16 through 25 until all adjustments are obtained.									
27	Not used	—	Not used	—	Loosely to r-f unit oscillator	129 mc.	Not used	Rec. on channel 6	L5 for beat on het. freq. meter	Fig. 7
28	Antenna terminals loosely	83.25 87.75	Antenna terminals through pad	Channel 6	Not used	—	TP1. Gain to maximum	Rec. on channel 6 "VoltOhmyst" on TP1	Check to see that response is correct and —3.0 volts of osc. injection is present	Fig. 7 Fig. 13
29	"	77.25 81.75	"	Channel 5	"	—	"	Rec. on channel 5	"	Fig. 13
30	"	67.25 71.75	"	Channel 4	"	—	"	Rec. on channel 4	"	Fig. 13
31	"	61.25 65.75	"	Channel 3	"	—	"	Rec. on channel 3	"	Fig. 13

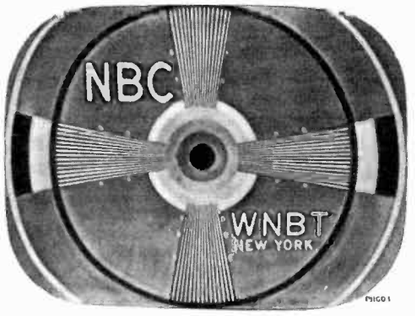


Figure 20—Normal Picture

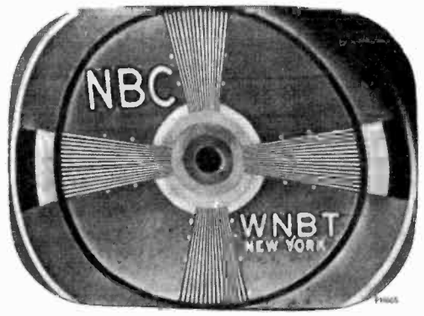


Figure 21—Focus Magnet and Ion Trap Magnet Misadjusted

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

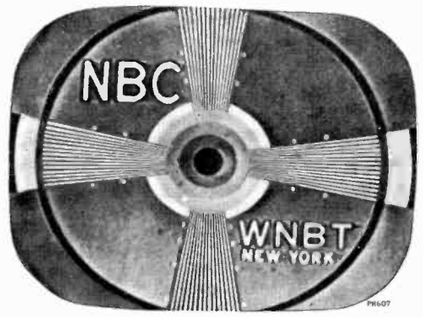


Figure 23—Width Control Misadjusted

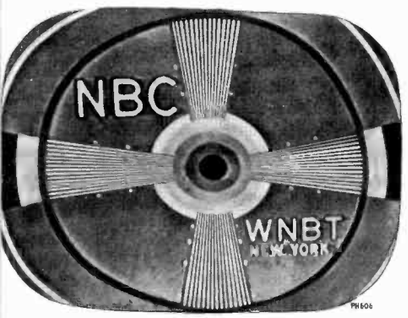


Figure 24—Horizontal Drive Control Misadjusted

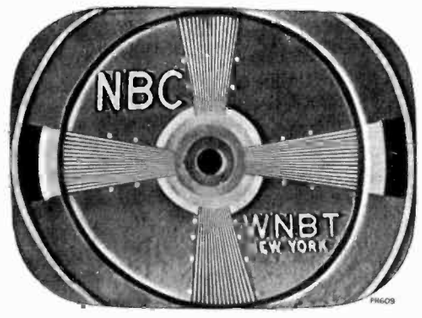


Figure 25—Transients

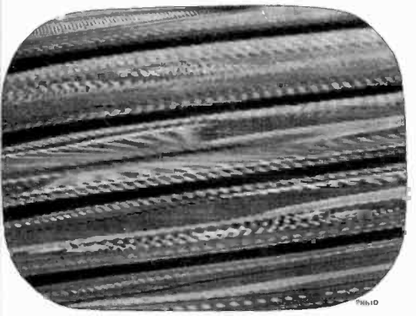


Figure 26—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position—Just Before Pulling Into Sync

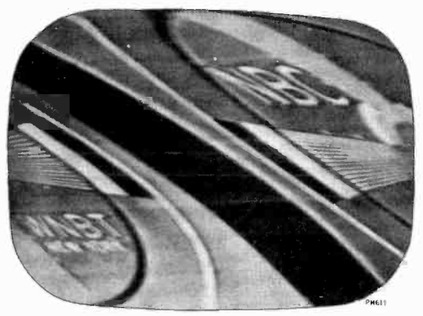


Figure 27—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position

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) T111 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 T111 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.

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) 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) 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.

(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.

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 JITTER:

(1) AGC control R175 misadjusted.

(2) If regular sections at the left picture are displaced change V117.

ALIGNMENT TABLE

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	"	55.25 59.75	"	Channel 2	"	—	"	Rec. on channel 2	"	Fig. 13
33	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 max. amplitude of response between carrier markers.									
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.									
35	Not used	—	Not used	—	Loosely coupled to r-f oscillator	257 mc.	TP1. Gain to maximum	Rec. on channel 13	C1 for beat on het. freq. meter	Fig. 7
36	"	—	"	—	"	251 mc.	"	Rec. on channel 12	L11 as above	Fig. 7
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	L1 as above	Fig. 7
47	Repeat steps 35 through 46 as a check. On completion, remove 39 ohm resistor and reconnect link to terminals A and B of T104.									
	RATIO DETECTOR, SOUND I-F AND SOUND TAKE-OFF ALIGNMENT									
48	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 bottom core for min. audio on the oscilloscope.	Fig. 9 Fig. 10
49	"	"	"	—	"	—	"	"VoltOhmyst" to junction R112 and C113. If the meter reads more than ±1.5 volts, adjust C226 for zero on the meter and readjust T102 (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.	1st Sound I-F grid (pin 1, V101)	4.5 mc.	"	—	In series with 10,000 ohms to terminal A, of T101.	Sweep output reduced 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 form (positive and negative).		Fig. 15
52	Sig. Gen. in series 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
	PICTURE I-F AND TRAP ADJUSTMENT									
53	Not used	—	Not used	—	Not used	—	Not used	Connect bias box to junction of R143 and R144 and to gnd. Adjust to give —1.0 v on "VoltOhmyst" at 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.	"	—	"	—	"	"	T105 bot. for min.	Fig. 10
56	"	47.25 mc.	"	—	"	—	"	"	T106 bot. for min.	Fig. 10
57	"	43.7 mc.	"	—	"	—	"	Sig. Gen. output to give —1.0 V d-c at TP102.	T109 for max.	Fig. 7
58	"	45.5 mc.	"	—	"	—	"	"	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 response 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 probe to T105-B and to gnd.	Rec. on chan. 4. Connect 180 ohms from T105-B to junction R135 and C132. Upon completion disconnect scope and shunting 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 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 response shown in Fig. 18. Do not adjust T107 unless absolutely necessary.	Fig. 18

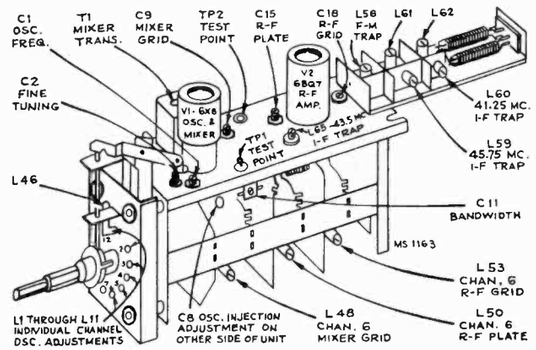


Figure 7—R-F Unit Adjustments

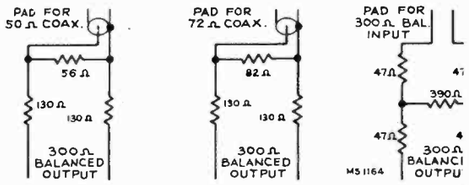


Figure 11—Sweep Attenuator Pads

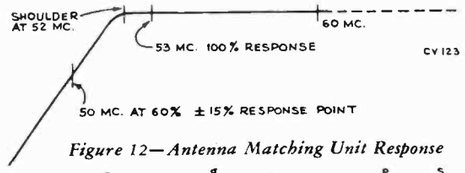


Figure 12—Antenna Matching Unit Response

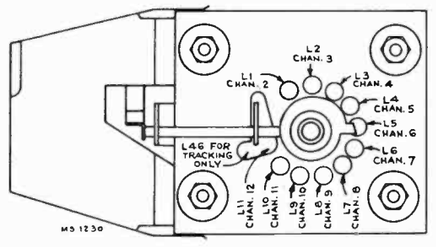


Figure 8—R-F Oscillator Adjustments

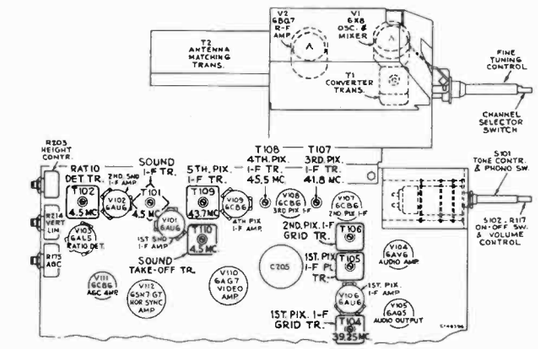


Figure 9—Top Chassis Adjustments

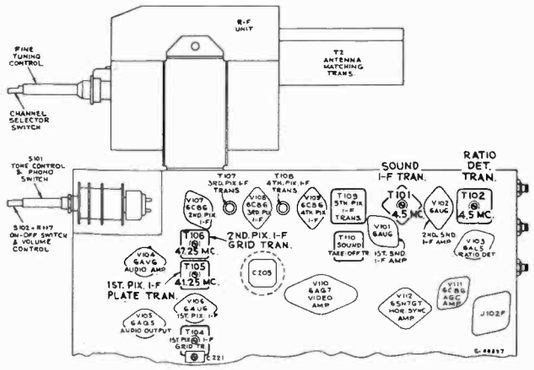


Figure 10—Bottom Chassis Adjustments

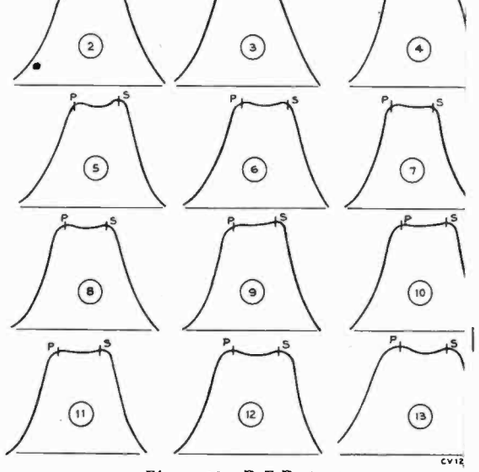


Figure 13—R-F Response

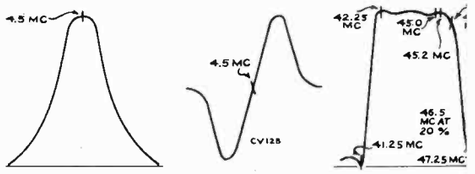


Figure 14 Sound I-F Response

Figure 15 Ratio Det. Response

Figure T105 and Respons

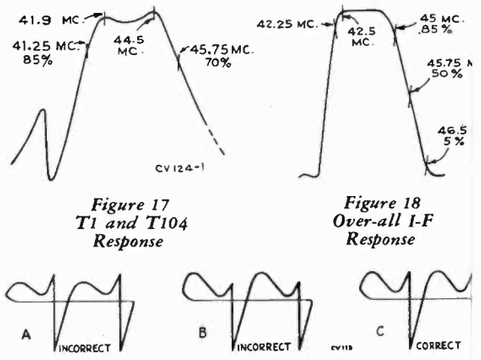


Figure 17 T1 and T104 Response

Figure 18 Over-all I-F Response

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.

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) V120 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 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.

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.

RESPONSE PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

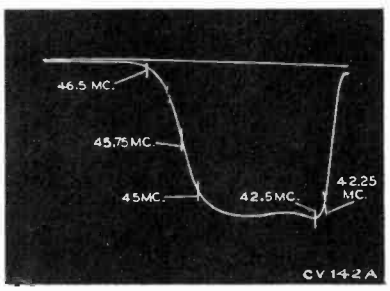


Figure 28—Overall Pix I-F Response

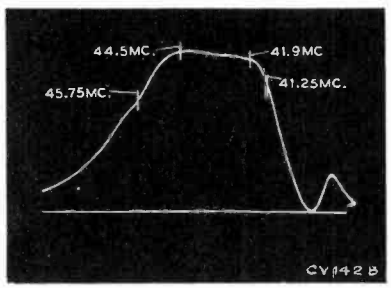


Figure 29—Response of T1-T104 Pix I-F Transformers

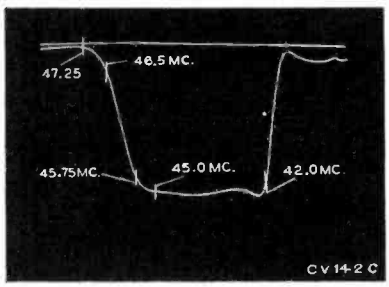


Figure 30—Response of T105-T106 Pix I-F Transformer

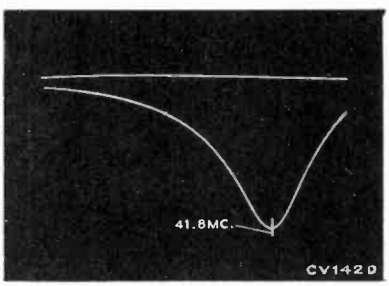


Figure 31—Response of T107 Pix I-F Transformer

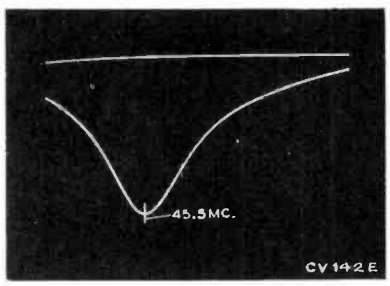


Figure 32—Response of T108 Pix I-F Coil

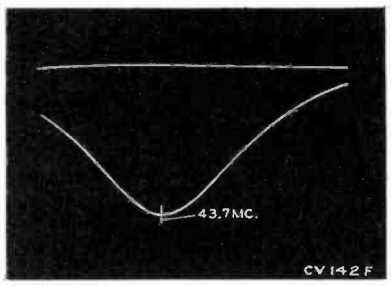


Figure 33—Response of T109 Pix I-F Coil

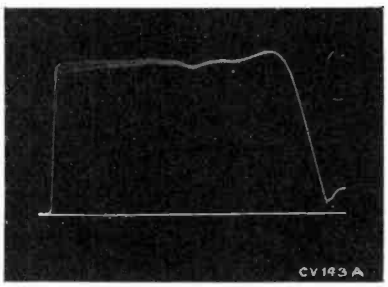


Figure 34—Video Response at Average Contrast

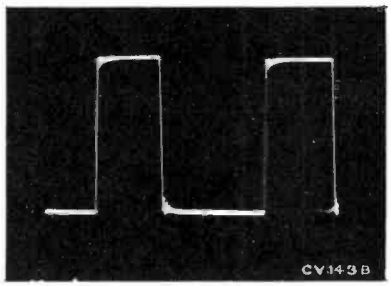


Figure 35—Video Response (100 KC Square Wave)

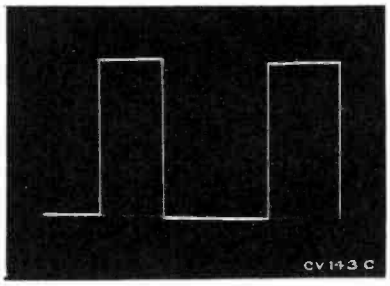
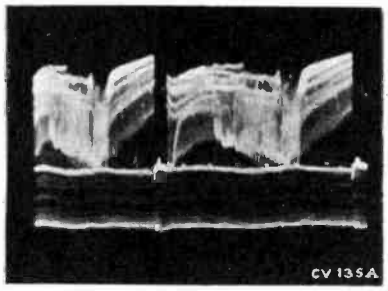


Figure 36—Video Response (60 Cycle Square Wave)

17T150, 17T151, 17T163

WAVEFORM PHOTOGRAPHS

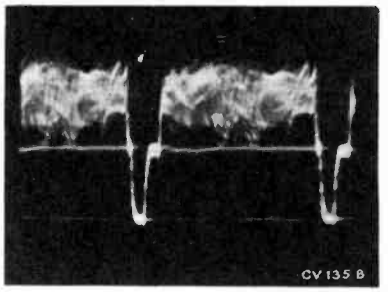
Taken from RCA WO58A Oscilloscope



Grid of 1st Video Amplifier
(Pin 4 of V110) (6AG7)
Voltage Depends on Picture

Figure 37—Vertical (Oscilloscope Synced to ½ of Vertical Sweep Rate) (6.0 Volts PP)

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



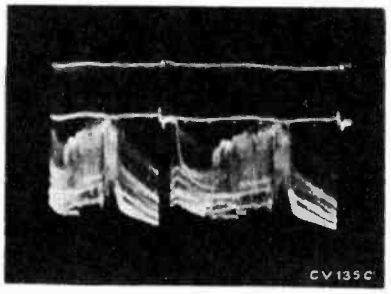
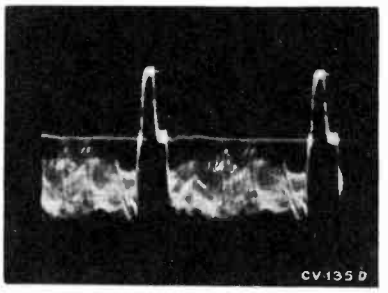
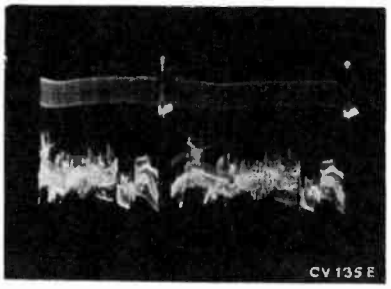


Plate of 1st Video Amplifier
(Pin 8 of V110) (6AG7)
Voltage depends on picture

Figure 39—Vertical (105 Volts PP)

Figure 40—Horizontal (105 Volts PP)

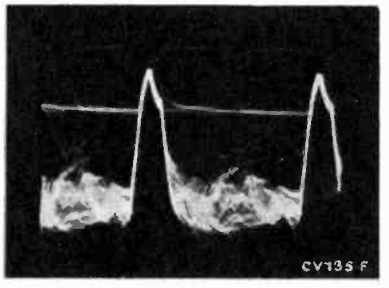




Grid of Sync Separator
(Pin 4 of V113) (6SN7)
Voltage depends on picture

Figure 41—Vertical (30 Volts PP)

Figure 42—Horizontal (30 Volts PP)



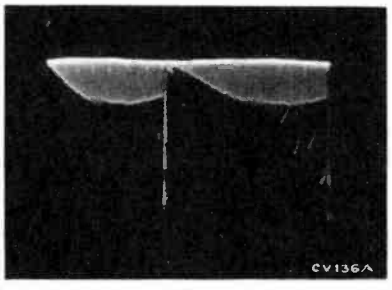
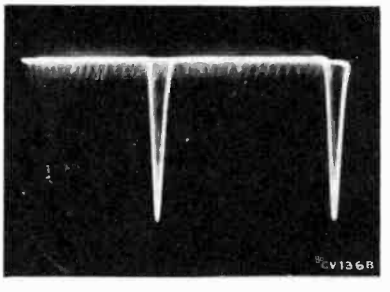
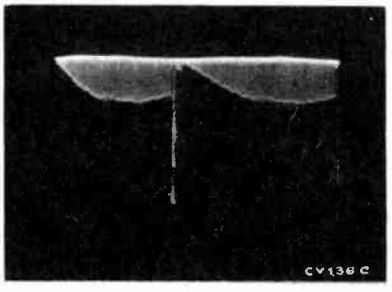


Plate of Sync Separator
(Pin 5 of V113) (6SN7)
(.25 mfd in series with probe)

Figure 43—Vertical (33 Volts PP)

Figure 44—Horizontal (8 Volts PP)

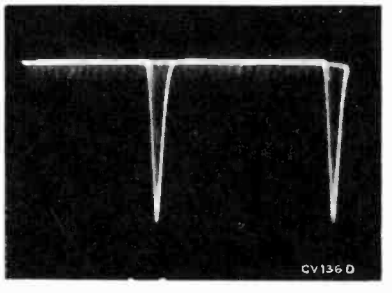




Grid of Vertical Sync Amp.
(Pin 4 of V114A) (6SN7)

Figure 45—Vertical (12 Volts PP)

Figure 46—Horizontal (5 Volts PP)



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

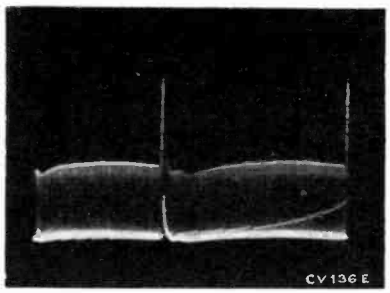
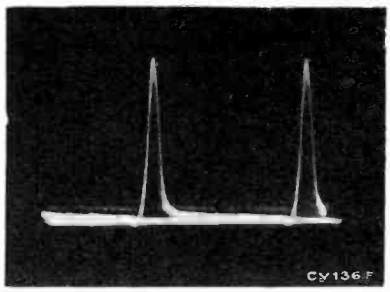


Plate of Vertical Sync Amp.
(Pin 5 of V114A) (6SN7)

Figure 47—Vertical (27 Volts PP)

Figure 48—Horizontal (16 Volts PP)



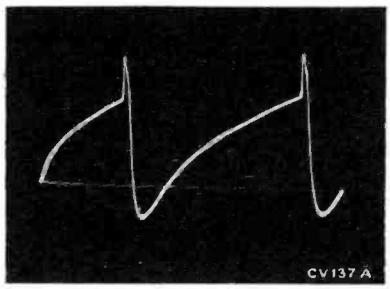
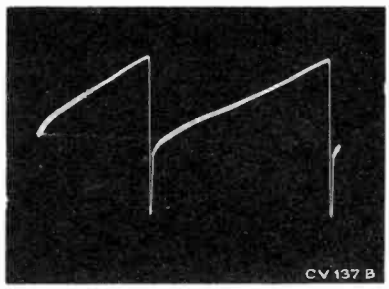


Figure 49—Grid of Vertical Sweep Osc. (Pin 1 of V114B) (6SN7) (25 Volts PP)

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



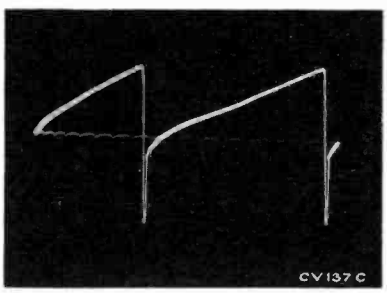
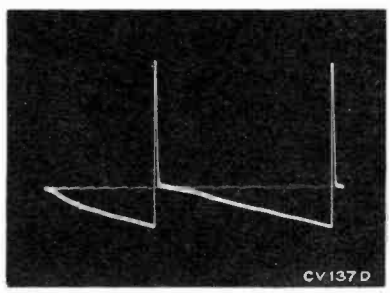
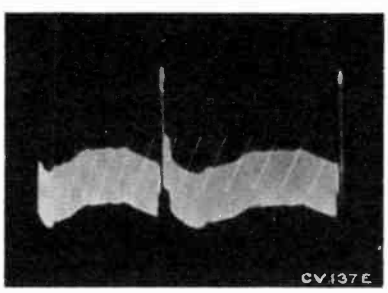


Figure 51—Grid of Vertical Sweep Output (Pin 1 of V115) (6AQ5) (35 Volts PP)

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

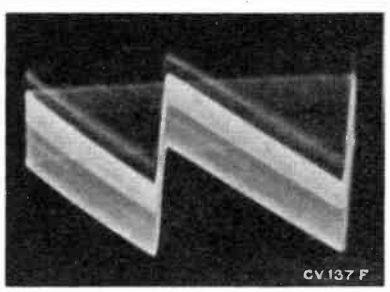


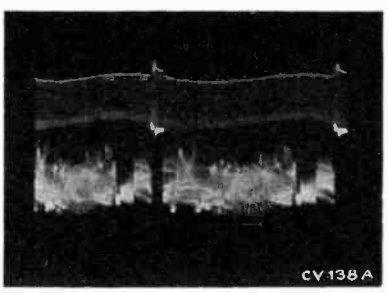


Cathode of Sync Separator (Pin 3 of V113) (6SN7)

Figure 53—Vertical (11 Volts PP)

Figure 54—Horizontal (6 Volts PP)

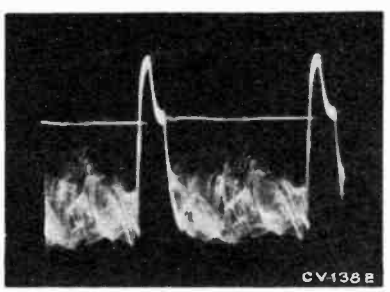




Grid of Sync Separator (Pin 1 of V113) (6SN7)

Figure 55—Vertical (40 Volts PP)

Figure 56—Horizontal (40 Volts PP)



17T150, 17T151, 17T163

WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

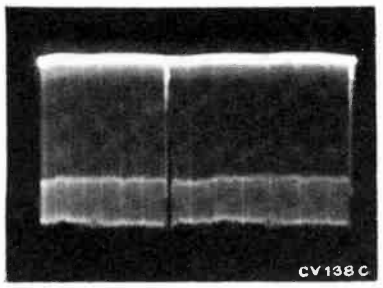
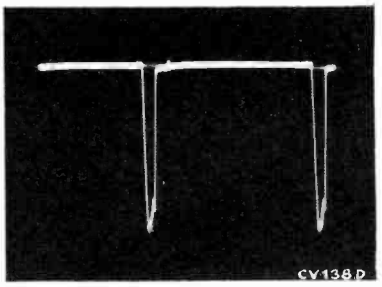
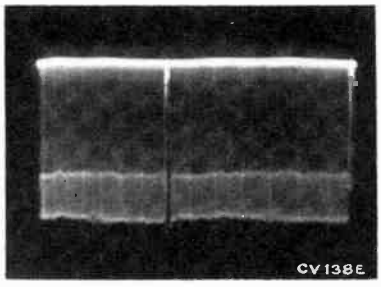


Plate of Sync Separator
(Pin 2 of V113) (6SN7)

Figure 57—Vertical (15 Volts PP)

Figure 58—Horizontal (15 Volts PP)

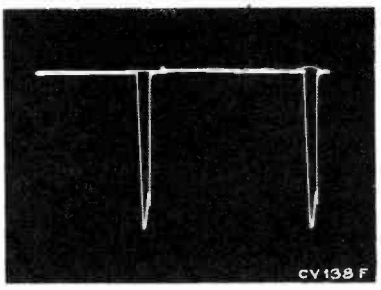




Grid of Hor. Sync Amp.
(Pin 4 of V112) (6SN7)

Figure 59—Vertical (15 Volts PP)

Figure 60—Horizontal (15 Volts PP)



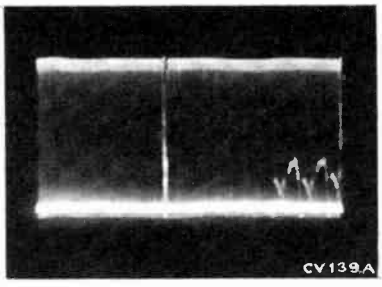
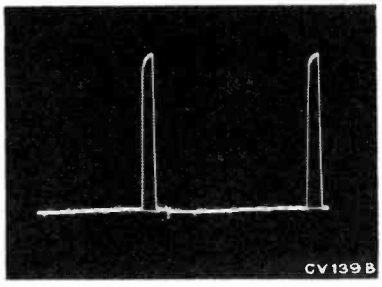
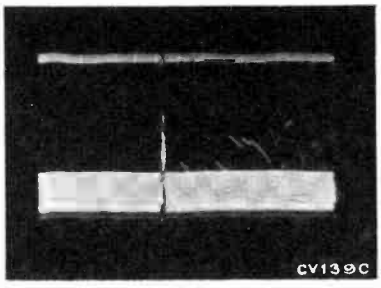


Plate of Hor. Sync Amp.
(Pin 5 of V112) (6SN7)

Figure 61—Vertical (70 Volts PP)

Figure 62—Horizontal (70 Volts PP)

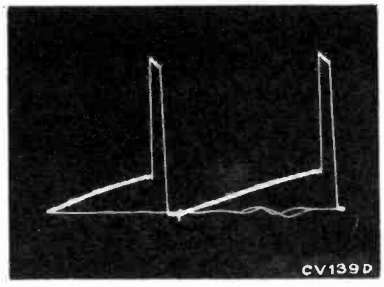


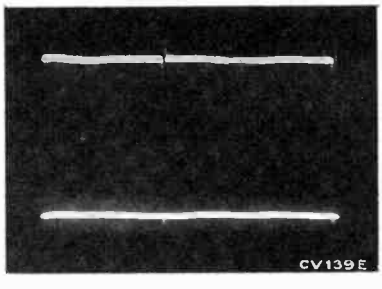


Grid of Hor. Sync Amp.
(Pin 1 of V112) (6SN7)

Figure 63—Vertical (65 Volts PP)

Figure 64—Horizontal (65 Volts PP)

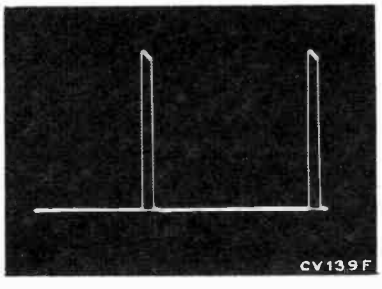




Cathode of Hor. Sync Amp.
(Pin 3 of V112) (6SN7)

Figure 65—Vertical (18 Volts PP)

Figure 66—Horizontal (18 Volts PP)



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

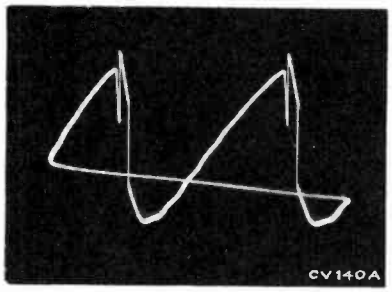
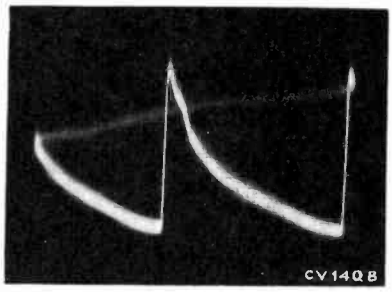


Figure 67—Grid of Horizontal Oscillator Control (Pin 1 of V116) (6SN7GT) (22 Volts PP)

Figure 68—Cathode of Horizontal Oscillator Control (Pin 3 of V116) (6SN7GT) (1.3 Volts PP)



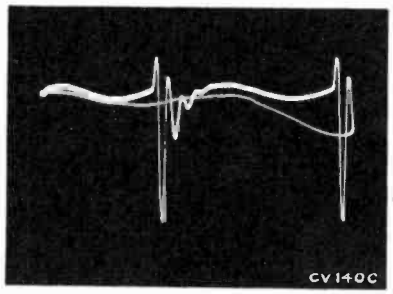
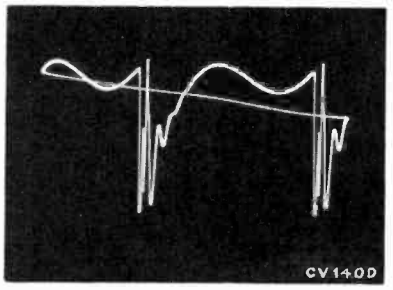


Figure 69—Grid of Horizontal Oscillator (Pin 4 of V116) (6SN7GT) (390 Volts PP)

Figure 70—Plate of Horizontal Oscillator (Pin 5 of V116) (6SN7GT) (140 Volts PP)



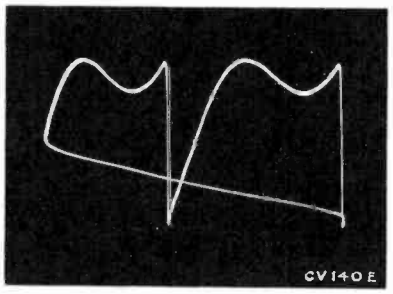
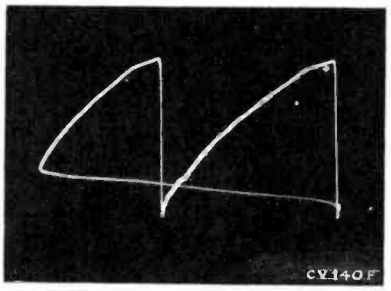


Figure 71—Terminal "C" of T113 (120 Volts PP)

Figure 72—Grid of Horizontal Output Tube (Pin 5 of V117) (6BQ6) (95 Volts PP)



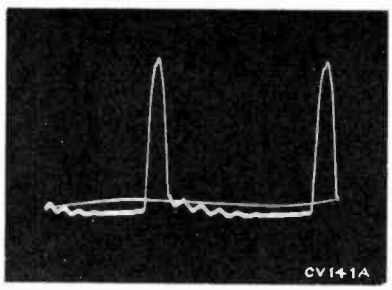
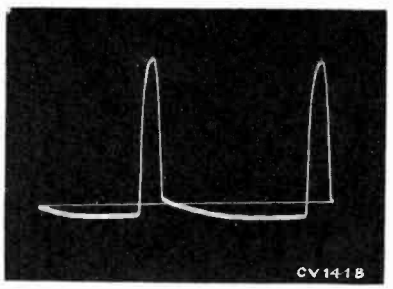


Figure 73—Plate of Horizontal Output (Approx. 4000 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V117 to Ground)

Figure 74—Cathode of Damper (Pin 3 of V120) (6W4GT) (2300 Volts PP)



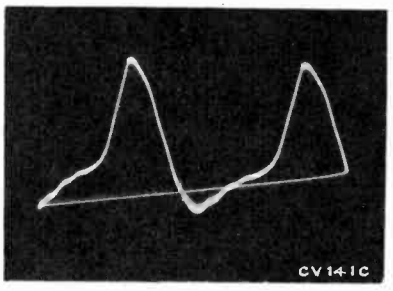
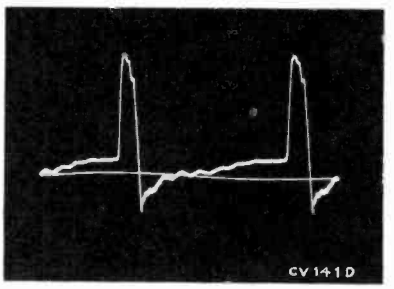


Figure 75—Plate of Damper (Pin 5 of V120) (6W4GT) (180 Volts PP)

Figure 76—Plate of AGC Amplifier (Pin 5 of V111) (6CB6) (600 Volts PP)



17T150, 17T151, 17T163 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.

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V1	6X8	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
V1	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	6BQ7	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
V101	6AU6	1st 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.
V104	6AV6	1st 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
V106	6AU6	1st 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	
V108	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	
V109	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

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.

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V112	6SN7GT	Hor. Sync Amplifier	5000 Mu. V. Signal	2	150	—	—	3	1.2	1	-38.0	
			No Signal	2	143	—	—	3	0.68	1	*-18	*Unreliable measurement point. Voltage depends on noise.
			5000 Mu. V. Signal	5	77	—	—	6	0	4	-1.3	
			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	
			No Signal	2	263	—	—	3	*90	1	*80	*Unreliable measurement points. Voltage depends on noise.
V113	6SN7GT	Vert. Sync Separator	5000 Mu. V. Signal	5	450	—	—	6	125	4	100	
			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. hold control. Voltages shown are synced pix adjustment.
			No Signal	2	*53	—	—	3	0	1	*-14.1	
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	
V116	6SN7GT	Horizontal Osc. Control	5000 Mu. V. 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
V116	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 Pulse Present
			No Signal	Cap	*	4	168	8	18.5	5	-15.0	
V119	1B3GT /8016	H. V. Rectifier	5000 Mu. V. Signal	Cap	*	—	—	2 & 7	13,500	—	—	*High Voltage Pulse Present
			No Signal	Cap	*	—	—	2 & 7	13,200	—	—	
V120	6W4GT	Damper	5000 Mu. V. Signal	5	266	—	—	3	*	—	—	*High Voltage Pulse Present
			No Signal	5	261	—	—	3	*	—	—	
V121	17QP4	Kinescope	5000 Mu. V. Signal	Cone	13,500	10	475	11	140	2	90	At average Brightness
			No Signal	Cone	13,200	10	470	11	135	2	90	

R-F UNIT WIRING DIAGRAM

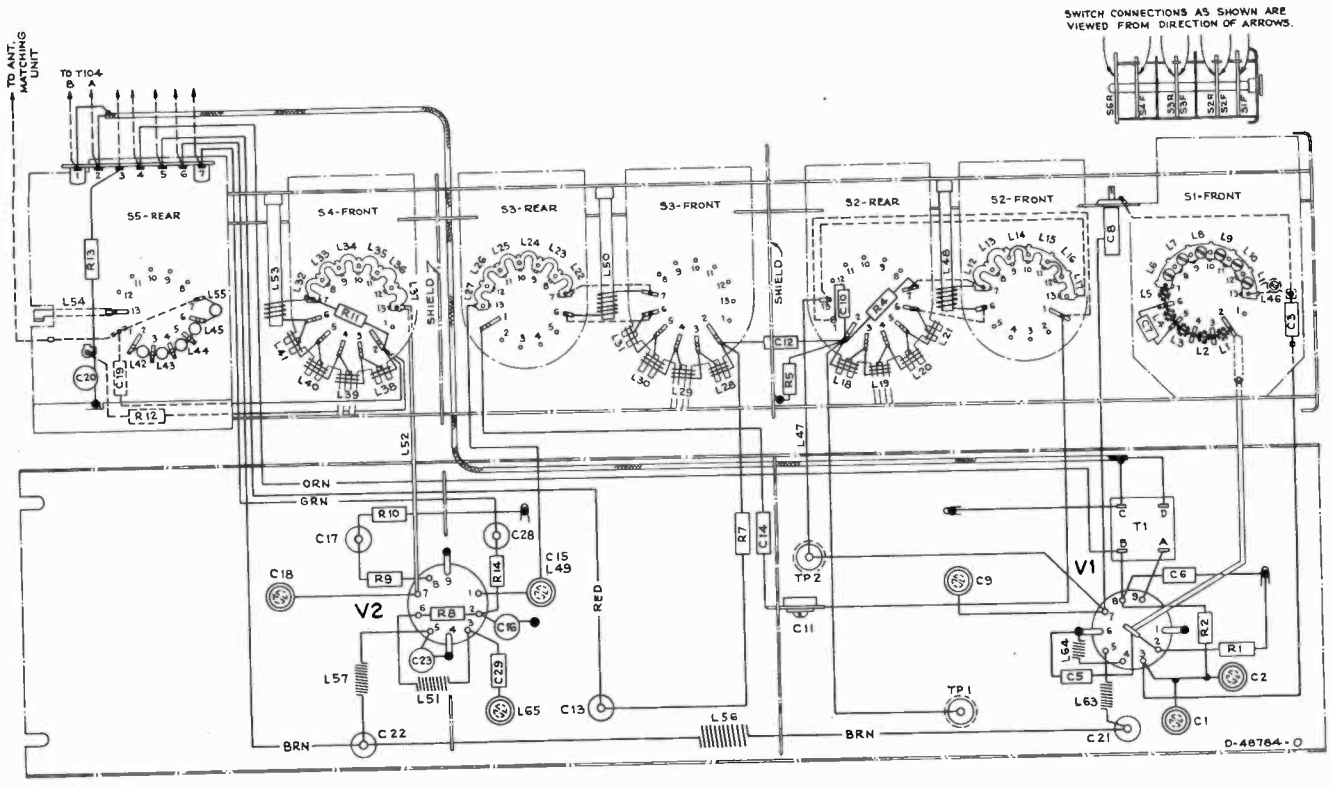


Figure 77—R-F Unit Wiring Diagram

CRITICAL LEAD DRESS:

1. Keep all wiring in the pix i-f, sound i-f and video circuits as short as possible.
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 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.
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 V107, V108 and V109 independently of the socket center pin. Use ground lances proved 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 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.
13. 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 V111 to the terminal board under the high voltage cage should be routed between V117 socket and the rear apron.
18. 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.
22. Dress all leads in the high voltage compartment away from each other and away from the high voltage transformer.

17T150, 17T151, 17T163 REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
76141	Magnet—Ion trap magnet (P.M. type)
76633	Magnet—Pin cushion correction magnet complete with support arm
76728	Nut—Speed nut for trimmer capacitor 76800
18469	Plate—Bakelite mounting plate for electrolytic 75220
76464	Plate—Hi-voltage plate—bakelite—complete with tube socket and corona ring
76675	Rectifier—Picture detector crystal rectifier (CR101)
76452	Rectifier—Selenium rectifier (SR101, SR102)
76796	Resistor—Wire wound, 5.1 ohms, ⅓ watt (R241)
76639	Resistor—Wire wound, 180 ohms, 2 watts (R234)
76465	Resistor—Wire wound, 330 ohms, 1 watt (R122, R123)
76469	Resistor—Wire wound, 2500 ohms, 10 watts (R131)
76390	Resistor—Wire wound, 5600 ohms, 5 watts (R151)
76638	Resistor—Wire wound, 6000 ohms, 6 watts (R163)
	Resistor—Fixed, composition:—
502043	43 ohms, ±5%, ½ watt (R159)
30732	47 ohms, ±5%, ½ watt (R109)
504047	47 ohms, ±20%, ½ watt (R233)
502056	56 ohms, ±5%, ½ watt (R138)
34763	68 ohms, ±5%, ½ watt (R105, R146)
13961	82 ohms, ±5%, ½ watt (R101)
502110	100 ohms, ±5%, ½ watt (R130)
504110	100 ohms, ±20%, ½ watt (R126, R133)
503118	180 ohms, ±10%, ½ watt (R152)
503133	330 ohms, ±10%, ½ watt (R160)
503147	470 ohms, ±10%, ½ watt (R215)
504147	470 ohms, ±20%, ½ watt (R177)
513147	470 ohms, ±10%, 1 watt (R246)
513156	560 ohms, ±10%, 1 watt (R253)
34766	1000 ohms, ±5%, ½ watt (R111)
503210	1000 ohms, ±10%, ½ watt (R135, R137, R142, R153, R180)
504210	1000 ohms, ±20%, ½ watt (R103, R108, R125, R140, R148, R156)
30731	1200 ohms, ±5%, ½ watt (R110)
503212	1200 ohms, ±10%, ½ watt (R183)
503222	2200 ohms, ±10%, ½ watt (R168)
504233	3300 ohms, ±20%, ½ watt (R259)
30694	3900 ohms, ±5%, ½ watt (R157)
503239	3900 ohms, ±10%, ½ watt (R228)
503247	4700 ohms, ±10%, ½ watt (R162)
504247	4700 ohms, ±20%, ½ watt (R147)
503256	5600 ohms, ±10%, ½ watt (R164)
14659	6800 ohms, ±5%, ½ watt (R114, R115, R141)
503268	6800 ohms, ±10%, ½ watt (R158, R176)
513268	6800 ohms, ±10%, 1 watt (R155)
523268	6800 ohms, ±10%, 2 watts (R235)
502282	8200 ohms, ±5%, ½ watt (R229)
503282	8200 ohms, ±10%, ½ watt (R165, R196, R197, R212)
503310	10,000 ohms, ±10%, ½ watt (R208)
504310	10,000 ohms, ±20%, ½ watt (R172)
503312	12,000 ohms, ±10%, ½ watt (R178, R181)
503315	15,000 ohms, ±10%, ½ watt (R258)
523315	15,000 ohms, ±10%, 2 watts (R173)
503318	18,000 ohms, ±10%, ½ watt (R106, R113, R271)
523318	18,000 ohms, ±10%, 2 watts (R161)
503322	22,000 ohms, ±10%, ½ watt (R118, R195)
71989	22,000 ohms, ±5%, 1 watt (R210, R211)
513322	22,000 ohms, ±10%, 1 watt (R227)
503327	27,000 ohms, ±10%, ½ watt (R102, R119)
513327	27,000 ohms, ±10%, 1 watt (R184)
503333	33,000 ohms, ±10%, ½ watt (R273)
513333	33,000 ohms, ±10%, 1 watt (R169)
503339	39,000 ohms, ±10%, ½ watt (R112, R194)
503347	47,000 ohms, ±10%, ½ watt (R104, R191, R265, R267)
513347	47,000 ohms, ±10%, 1 watt (R132, R139, R269)
502356	56,000 ohms, ±5%, ½ watt (R149)
503356	56,000 ohms, ±10%, ½ watt (R187, R236, R256)
513356	56,000 ohms, ±10%, 1 watt (R107)
503368	68,000 ohms, ±10%, ½ watt (R128, R143)
504368	68,000 ohms, ±20%, ½ watt (R198, R205)
513368	68,000 ohms, ±10%, 1 watt (R226)
8064	82,000 ohms, ±5%, ½ watt (R144)
512382	82,000 ohms, ±5%, 1 watt (R231)
513382	82,000 ohms, ±10%, 1 watt (R225)
503410	100,000 ohms, ±10%, ½ watt (R129, R206, R220, R268)
504410	100,000 ohms, ±20%, ½ watt (R136)
30180	120,000 ohms, ±5%, ½ watt (R209)
503412	120,000 ohms, ±10%, ½ watt (R190, R242, R245)
503415	150,000 ohms, ±10%, ½ watt (R145, R150, R186, R221)
504415	150,000 ohms, ±20%, ½ watt (R170, R217)
512415	150,000 ohms, ±5%, 1 watt (R230)
503418	180,000 ohms, ±10%, ½ watt (R257)
503422	220,000 ohms, ±10%, ½ watt (R185, R219)
503427	270,000 ohms, ±10%, ½ watt (R193)
503433	330,000 ohms, ±10%, ½ watt (R120, R222)
512433	330,000 ohms, ±5%, 1 watt (R224)
503447	470,000 ohms, ±10%, ½ watt (R199, R232, R264)
504447	470,000 ohms, ±20%, ½ watt (R121, R263)
503456	560,000 ohms, ±10%, ½ watt (R202, R270)
30562	680,000 ohms, ±5%, ½ watt (R127)
503482	820,000 ohms, ±10%, ½ watt (R200, R204, R223)
503510	1 megohm, ±10%, ½ watt (R189)
504510	1 megohm, ±20%, ½ watt (R182)
503512	1.2 megohm, ±10%, ½ watt (R171)
503515	1.5megohm, ±10%, ½ watt (R192)
11769	1.8 megohm, ±5%, ½ watt (R266)
504522	2.2 megohm, ±20%, ½ watt (R207, R213)
503539	3.9 megohm, ±10%, ½ watt (R179)
503556	5.6 megohm, ±10%, ½ watt (R166)
503582	8.2 megohm, ±10%, ½ watt (R255)
504610	10 megohm, ±20%, ½ watt (R116)
71456	Screw—#8-32 x 7/16" wing screw to mount deflection yoke
76455	Shaft—Connecting shaft (nylon) for picture and brightness controls
73584	Shield—Tube shield
71508	Socket—Tube socket for 1B3GT/8016
50367	Socket—Tube socket, 6 pin, moulded, saddle mounted
73117	Socket—Tube socket, 7 pin, wafer, miniature
73115	Socket—Tube socket, 7 pin, moulded, miniature, plate mounted
75222	Socket—Tube socket, octal, ceramic, plate mounted
76453	Socket—Tube socket, octal, moulded bakelite, plate mounted
31251	Socket—Tube socket, octal, wafer
75718	Socket—Channel indicator lamp socket and lead
74834	Socket—Kinescope socket
75173	Stud—Adjustable stud for trimmer capacitor 76800
76636	Stud—Adjusting stud complete with guard for focus magnet
76428	Support—Bakelite support only—part of hi-voltage shield
76446	Switch—Tone control and phono switch (S101)
76795	Transformer—Hi-voltage transformer (T114)
76440	Transformer—Horizontal oscillator transformer complete with adjustable cores (T113)
76429	Transformer—Power transformer, 115 volts, 60 cycle (T112)
76439	Transformer—Ratio detector transformer complete with adjustable cores (T102, C108, C109)
76438	Transformer—Sound i-f transformer complete with adjustable cores (T101, C103, C104)
76437	Transformer—Sound take-off transformer complete with adjustable cores (T110, C148)
76431	Transformer—Vertical output transformer (T111)
76432	Transformer—First pix i-f grid transformer complete with adjustable cores (T104, C121, R124)
76434	Transformer—First pix i-f plate transformer complete with adjustable cores (T105, C130, C131, R134)
76435	Transformer—Second pix i-f grid transformer complete with adjustable core (T106, C133)
76433	Transformer—Third or fourth pix i-f transformer (T107, T108)
76436	Transformer—Fifth pix i-f transformer (T109, C145, C147, CR101, L102, R154)
76482	Trap—4.5 mc trap (L114, C137)
76616	Yoke—Deflection yoke complete with 6 contact male connector (L109, L110, L111, L112, C199, R243, R244, R262, P102)

17T150, 17T151, 17T163 REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLY 971614-1W RL100D3 RMA-274 For Model 17T150
5039	Connector—4 contact male connector for speaker (J101)
76834	Speaker—4" x 6" P.M. speaker complete with cone and voice coil less transformer and connector
76156	Transformer—output transformer (T103)
	SPEAKER ASSEMBLY 971490-2W RL105E8 RMA-274 For Models 17T151, 17T163
75024	Cone—Cone and voice coil assembly (3.2 ohms)
5039	Connector—4 prong male connector for speaker (J101)
75022	Speaker—8" P.M. speaker complete with cone and voice coil (3.2 ohms) less transformer and plug
75520	Transformer—Output transformer (T103)
	SPEAKER ASSEMBLIES 971490 2R RMA285 For Models 17T151, 17T163
77129	Cone—Cone and voice coil
	Note:—If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	7CB8 CABINET BASE For use with Model 17T150, 17T151
X3249	Pull—Door pull—mahogany finish—for maroon bases
X3250	Pull—Door pull—blonde finish—for mahogany bases
	MISCELLANEOUS
76805	Back—Cabinet back complete with power cord and terminal board for Models 17T150, 17T151
76827	Back—Cabinet back complete with power cord for Model 17T163
76184	Board—"Antenna" terminal board
76811	Bracket—Hanger bracket for deflection yoke hood for Models 17T150, 17T151
76812	Bracket—Hanger bracket for deflection yoke hood for Model 17T163
76814	Bracket—Stiffening bracket for kinescope cradle (2 req'd) for Models 17T150, 17T151
76829	Bracket—Stiffening bracket for kinescope bracket (2 req'd) for Model 17T163
76823	Clip—Spring clip for spacing ground braid
X3128	Cloth—Grille cloth for Models 17T150, 17T151
X3222	Cloth—Grille cloth for oak instruments for Model 17T163
X3248	Cloth—Grille cloth for mahogany or walnut instruments for Model 17T163
39153	Connector—4 contact male connector for antenna cable
75474	Connector—Single contact male connector for antenna cable (2 req'd)
71457	Cord—Power cord and plug
76818	Cushion—Rubber cushion (1/16" x 1" x ⅝" x ¼") for kinescope and cradle support (4 req'd)
76807	Cushion—Vinylite cushion (formed) for picture opening
76511	Decal—Control panel function decal for maroon, mahogany or walnut instruments
76512	Decal—Control panel function decal for blonde or oak instruments
75456	Escutcheon—Channel marker escutcheon—gold
74889	Foot—Felt foot for cabinet (4 req'd) for Models 17T150, 17T151
76806	Glass—Safety glass
76595	Knob—Brightness control or vertical hold control knob—maroon (outer)
76596	Knob—Brightness control or vertical hold control knob—beige (outer)
76593	Knob—Channel selector knob—maroon (inner)
76594	Knob—Channel selector knob—beige (inner)
76591	Knob—Fine tuning control knob—maroon (outer)
76592	Knob—Fine tuning control knob—beige (outer)
74963	Knob—Picture control, horizontal hold control or volume control and power switch knob—maroon (inner)
75464	Knob—Picture control, horizontal hold control or volume control and power switch knob—beige (inner)
76597	Knob—Tone control and phono switch knob—maroon (outer)
76598	Knob—Tone control and phono switch knob—beige (outer)
11765	Lamp—Channel marker escutcheon—lamp—Mazda 51
75459	Mask—Channel marker escutcheon light mask—burgundy
76589	Mask—Channel marker escutcheon light mask—medium dark beige
76822	Nut—Speed nut to lock flexible straps
71455	Nut—#8-32 wing nut to fasten deflection yoke hood to hanger bracket
76177	Nut—#10-32 special nut for deflection yoke hood support rods (2 req'd)
76819	Pad—Rubber pad (channel) for flexible straps (2 req'd)
76825	Pad—Rubber pad (channel) mounted on cradle support to cushion kinescope
76824	Panel—Metal front panel for mahogany or walnut instruments for Model 17T163
76826	Panel—Metal front panel for oak instruments for Model 17T163
76828	Plate—Plate complete with weld bolts for kinescope cradle lower support for Model 17T163
76816	Retainer—Safety glass retainer (2 req'd)
76809	Rod—"L" shape threaded rod to support deflection yoke hood assembly (2 req'd) for Models 17T150, 17T151
76810	Rod—"L" shape threaded rod to support deflection yoke hood assembly (2 req'd) for Model 17T163
76821	Screw—#10 x 1⅜" hex head tapping screw to lock flexible straps
76808	Sleeve—Polyethylene sleeve for insulating high voltage lead—on R.H. support rod
73643	Spring—Channel marker escutcheon spring clip
76820	Spring—Formed spring for safety glass retainers (4 req'd)
30330	Spring—Retaining spring for knobs 74963 and 75464
14270	Spring—Retaining spring for knobs 76593, 76594, 76595, 76596, 76597, 76598
72845	Spring—Retaining spring for knobs 76591 and 76592
36580	Spring—Suspension spring (coil type) for ground braid
76813	Strap—Flexible steel strap to secure kinescope
76817	Support—Cradle support for kinescope
76815	Support—Lower support for kinescope cradle support
75457	Washer—Felt washer—dark brown—between knob and channel marker escutcheon
75500	Washer—Felt washer for cabinet back mounting screws
75458	Washer—Felt washer—beige—between knob and channel marker escutcheon
76836	Washer—Cellulose washer—gold—for knobs

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.

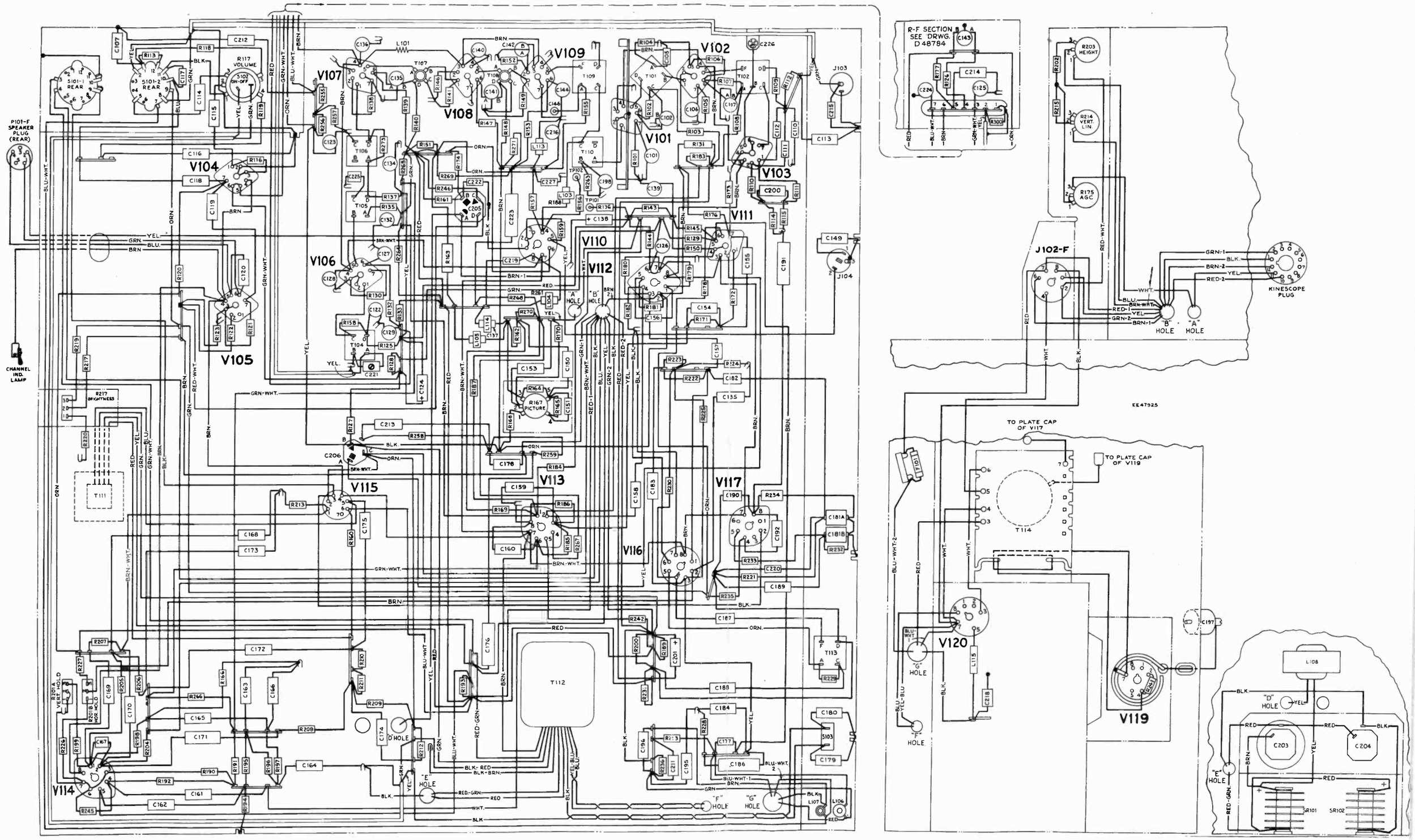
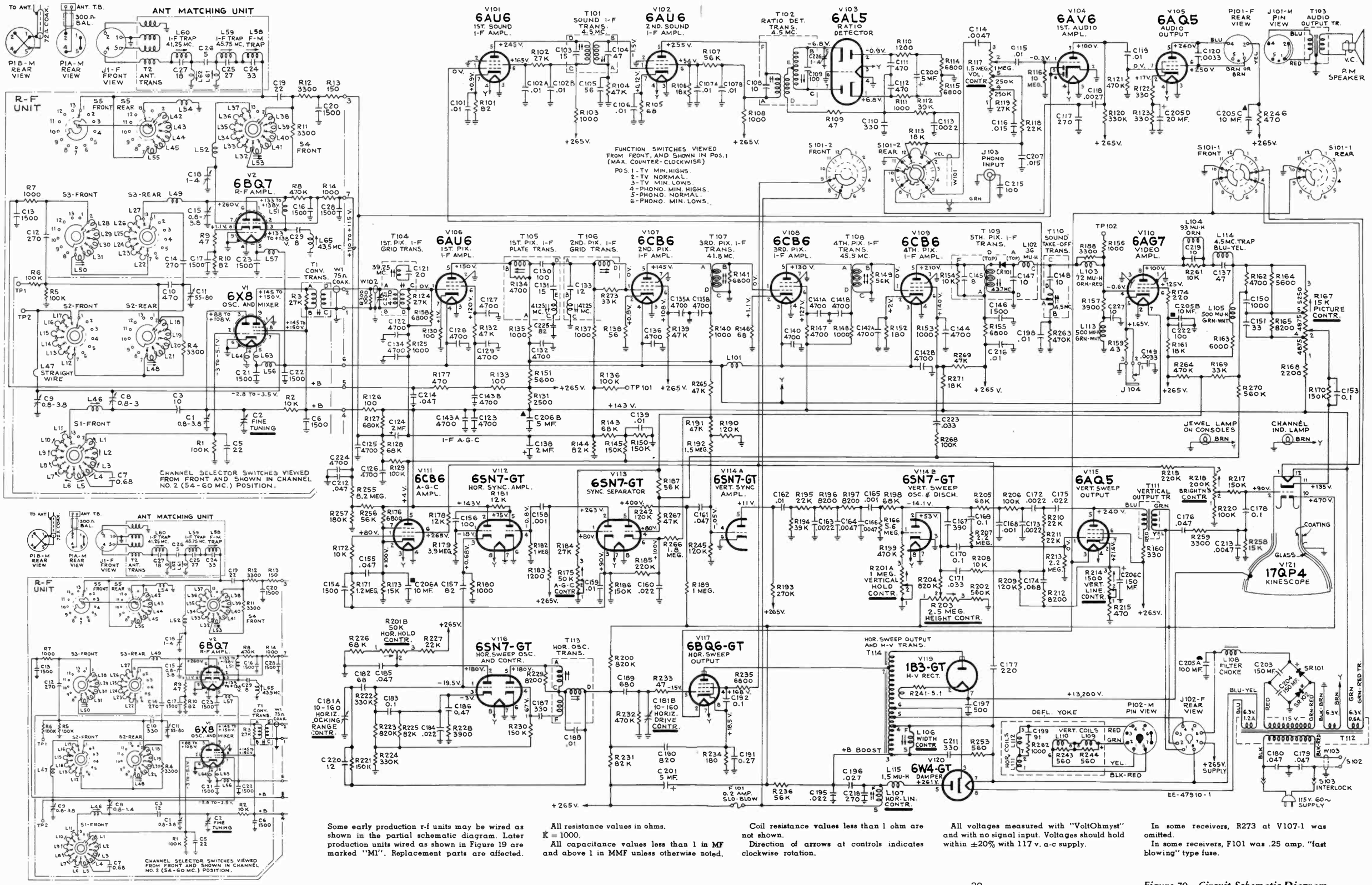


Figure 78—Chassis Wiring Diagram

CIRCUIT SCHEMATIC DIAGRAM



Some early production r-f units may be wired as shown in the partial schematic diagram. Later production units wired as shown in Figure 19 are marked "M1". Replacement parts are affected.

All resistance values in ohms.
K = 1000.
All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted.

Coil resistance values less than 1 ohm are not shown.
Direction of arrows at controls indicates clockwise rotation.

All voltages measured with "VoltOhmyst" and with no signal input. Voltages should hold within ±20% with 117 v. a-c supply.

In some receivers, R273 at V107-1 was omitted.
In some receivers, F101 was .25 amp. "fast blowing" type fuse.

Figure 79—Circuit Schematic Diagram

STOCK No.	DESCRIPTION
	R-F UNIT ASSEMBLIES
	KRK11
76539	Board—Antenna matching transformer terminal board less coils L58, L59, L60 and less capacitors C24, C25, C26, C27
76531	Board—Terminal board, 5 contact and ground
76522	Bracket—Vertical bracket for holding r-f OSC and mixer tube (6X8) shield (early production)
76845	Bracket—Vertical bracket for holding oscillator-mixer tube shield (production marked "M1")
75186	Capacitor—Ceramic, variable, for fine tuning—plunger type (C2)
93056	Capacitor—Ceramic, 5 mmf. (C26)
70597	Capacitor—Ceramic, 8 mmf. (C29)
55326	Capacitor—Ceramic, 10 mmf. (C3) (production marked "M1")
76550	Capacitor—Ceramic, 12 mmf. (C3) (early production)
54207	Capacitor—Ceramic, 18 mmf. (C27)
76557	Capacitor—Ceramic, 22 mmf. (C19)
76558	Capacitor—Ceramic, 22 mmf. (C5)
70935	Capacitor—Ceramic, 27 mmf. (C25)
76739	Capacitor—Ceramic, 33 mmf. (C24)
76527	Capacitor—Mica trimmer, 55-80 mmf. (C11)
75199	Capacitor—Ceramic, 270 mmf. (C12, C14)
76552	Capacitor—Ceramic, 330 mmf. (C10) (early production)
75198	Capacitor—Ceramic, 470 mmf. (C10) (production marked "M1")
75166	Capacitor—Ceramic, 1500 mmf. (stand-off) (C13, C17, C21, C22, C28)
73748	Capacitor—Ceramic, 1500 mmf. (C16, C20, C23)
75610	Capacitor—Ceramic, 1500 mmf. (C6)
71088	Capacitor—Ceramic, 0.68 mmf. (C7)
75184	Capacitor—Ceramic, adjustable, 0.75-4 mmf. complete with adjusting stud (C1, C9)
76545	Capacitor—Tubular, steatite, adjustable 0.8-2.25 mmf. (C8) (early production)
76781	Capacitor—Tubular, steatite, adjustable 0.8-1.4 mmf. (C8) (production marked "M1")
76532	Capacitor—Adjustable trimmer, steatite, 1.0-4.0 mmf. (C18)
76143	Clip—Tubular, clip for mounting stand-off capacitors
73591	Coil—Antenna matching coil (2 req'd)
76560	Coil—Channel #13 converter coil (L47) (early production)
73477	Coil—Choke coil (L57)
76763	Coil—Filament choke coil (L63, L64)
76562	Coil—R-F amplifier coupling coil (L51)
76537	Coil—Shunt coil complete with adjustable core (L61)
76538	Coil—Shunt coil complete with adjustable core (L62)
76529	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L49, C15)
76559	Connector—Oscillator grid connector
38853	Connector—4 contact female connector—part of antenna matching transformer
76460	Contact—Test point contact
75187	Core—Adjustable core for fine tuning capacitor
76543	Core—Adjusting core for FM trap
76521	Detent—Detent mechanism and fibre shaft
73453	Form—Coil form for coils L48, L50 & L53
76524	Link—Link assembly for fine tuning
	Resistor—Fixed, composition:—
503047	47 ohms, ±10%, ½ watt (R9)
503082	82 ohms, ±10%, ½ watt (R10)
504115	150 ohms, ±20%, ½ watt (R13)
504210	1000 ohms, ±20%, ½ watt (R7, R14)
503233	3300 ohms, ±10%, ½ watt (R4, R11, R12)
504310	10,000 ohms, ±20%, ½ watt (R2)
504410	100,000 ohms, ±20%, ½ watt (R1, R5, R6)
504447	470,000 ohms, ±20%, ½ watt (R8)
14343	Retainer—Fine tuning shaft retaining ring
75164	Rod—Actuating plunger rod (fibre) for fine tuning link
76547	Screw—#4-40 x ¼" adjusting screw for coils L6, L7, L8, L9, L10, L11
76548	Screw—#4-40 x 5/16" adjusting screw for coils L1, L2, L3, L4, L46
76549	Screw—#4-40 x ⅜" adjusting screw for coil L5
76519	Shaft—Channel selector shaft and plate
76134	Shaft—Fine tuning shaft and cam
76518	Shield—Front shield complete with shaft bushing and bracket
76534	Shield—Tube shield (plain) for V2 (also V1 in "M1" production)
76533	Shield—Tube shield (lead coated) for V1 (early production)
76336	Socket—Tube socket, 9 pin, miniature, bakelite, saddle mounted
76530	Socket—Tube socket, 9 pin, miniature, ceramic, saddle mounted
75191	Spacer—Insulating spacer for front plate (4 req'd)
75163	Spring—Friction spring (formed) for fine tuning cam
30340	Spring—Hairpin spring for fine tuning link
76523	Spring—Retaining spring for oscillator mixer tube shield (early production)
75068	Spring—Retaining spring for oscillator mixer tube shield (production marked "M1")
73457	Spring—Return spring for fine tuning control
76554	Stator—Antenna stator complete with rotor, coils, capacitor and resistor (S5, L42, L43, L44, L45, L54, L55, C20)
76551	Stator—Converter stator complete with rotor, coils, capacitors and resistors (S2, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L48, C10, C12, R4, R5, R6) (early production)
76780	Stator—Converter stator complete with rotor, coils, capacitors and resistors (S2, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L48, C10, C12, R4, R5, R6) (production marked "M1")
76546	Stator—Oscillator stator complete with rotor, coils, and capacitor (S1, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L46) (early production)
76779	Stator—Oscillator stator complete with rotor, coils, and capacitor (S1, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L46) (production marked "M1")
76556	Stator—R-F grid stator complete with rotor, coils and resistors (S4, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L53, C19, R11, R12)
76553	Stator—R-F plate stator complete with rotor, coils, capacitor and resistor (S3, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L50, C14, R7)
76561	Strap—Channel #13 r-f grid strap (L52)
76526	Strip—Coil segment mounting strip—L.H. lower
76544	Strip—Coil segment mounting strip—L.H. upper—less trimmer
76525	Strip—Coil segment mounting strip—R.H. center
75446	Stud—Capacitor stud—brass—#4-40 x 13/16" with 3/64" screw driver slot for trimmer coil L49, C15 uncoded and coded "ER"
75447	Stud—Capacitor stud—brass—#4-40 x 13/16" with 3/64" screw driver slot for trimmer coil L49, C15 coded numerically and "Hi Q"
76740	Stud—#6-32 x 1" adjusting stud for capacitor No. 76545 (early production)
75173	Stud—#6-32 x 13/16" adjusting stud for capacitor No. 76781 (production marked "M1")
76536	Transformer—Antenna matching transformer complete (T2, C24, C25, C26, C27, L58, L59, L60, L61, L62, J1)
76528	Transformer—Converter transformer (T1, R3)
76540	Trap—FM trap complete with adjustable core (L58)
76535	Trap—I-F trap (L65)
76542	Trap—I-F trap (41.25 MC) complete with core (L60)
76541	Trap—I-F trap (45.75 MC) complete with core (L59)
75190	Washer—Insulating washer (neoprene) for mounting capacitor on coil strip

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES
	KCS-66C
76456	Bracket—Channel indicator lamp bracket
76454	Bracket—Mounting bracket complete with insulator for picture control
76800	Capacitor—Adjustable trimmer, steatite, 1.-4. mmf. (C226)
71496	Capacitor—Adjustable, 4-70 mmf. (C221)
31709	Capacitor—Ceramic, 10 mmf. (C219, C227)
75217	Capacitor—Mica trimmer, dual 10-160 mmf. (C181A, C181B)
33380	Capacitor—Ceramic, 12 mmf. (C220)
38868	Capacitor—Ceramic, 33 mmf. (C151)
71924	Capacitor—Ceramic, 56 mmf. (C105)
76475	Capacitor—Mica, 68 mmf. (C182)
71514	Capacitor—Ceramic, 82 mmf. (C225)
76474	Capacitor—Mica, 82 mmf. (C157)
39396	Capacitor—Ceramic, 100 mmf. (C156, C215)
75437	Capacitor—Ceramic, 100 mmf. (C222)
76673	Capacitor—Ceramic, 220 mmf. (C177)
47617	Capacitor—Ceramic, 270 mmf. (C117)
73091	Capacitor—Mica, 270 mmf. (C218)
76473	Capacitor—Mica, 330 mmf. (C110)
76476	Capacitor—Mica, 330 mmf. (C187, C211)
73094	Capacitor—Mica, 390 mmf. (C167)
39644	Capacitor—Mica, 470 mmf. (C111, C112)
76461	Capacitor—Ceramic, 500 mmf., 20,000 volts (C197)
76477	Capacitor—Mica, 820 mmf. (C190)
75166	Capacitor—Ceramic, 1500 mmf. (stand-off) (C146)
73473	Capacitor—Ceramic, 4700 mmf. (C122, C123, C125, C126, C127, C128, C129, C132, C134, C136, C140, C144, C224)
76470	Capacitor—Ceramic, dual 4700 mmf. (C135A, C135B, C141A, C141B, C142A, C142B, C143A, C143B)
73960	Capacitor—Ceramic, 10,000 mmf. (C101, C106, C139, C198, C216)
75877	Capacitor—Ceramic, dual 10,000 mmf. (C102A, C102B, C107A, C107B)
76742	Capacitor—Electrolytic, 2 mfd., 10 volts (C124, C138)
74521	Capacitor—Electrolytic, 5 mfd., 50 volts (C200)
28417	Capacitor—Electrolytic, 5 mfd., 450 volts (C201)
75218	Capacitor—Electrolytic comprising 1 section of 10 mfd., 350 volts, 1 section of 5 mfd., 350 volts and 1 section of 150 mfd., 50 volts (C206A, C206B, C206C)
76451	Capacitor—Electrolytic comprising 1 section of 100 mfd., 350 volts, 2 sections of 10 mfd., 350 volts and 1 section of 20 mfd., 50 volts (C205A, C205B, C205C, C205D)
75220	Capacitor—Electrolytic, 150 mfd., 200 volts (C203, C204)
76479	Capacitor—Tubular, moulded paper, oil impregnated, .00068 mfd., 600 volts (C189)
75643	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 1000 volts (C150, C158, C165, C168)
73598	Capacitor—Tubular, paper, oil impregnated, .0015 mfd., 600 volts (C154)
73595	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 600 volts (C113, C163, C173)
73803	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 1000 volts (C172)
73599	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 600 volts (C118)
73795	Capacitor—Tubular, paper, oil impregnated, .0033 mfd., 600 volts (C120, C149)
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C114, C164, C166, C213)
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 400 volts (C115, C119, C159, C162)
73594	Capacitor—Tubular, moulded paper, oil impregnated, .01 mfd., 600 volts (C188)
73797	Capacitor—Tubular, paper, oil impregnated, .015 mfd., 600 volts (C116, C207)
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 400 volts (C160, C184)
73798	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 600 volts (C175)
73810	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 1000 volts (C195)
73811	Capacitor—Tubular, paper, oil impregnated, .027 mfd., 1000 volts (C196)
73552	Capacitor—Tubular, paper, oil impregnated, .033 mfd., 400 volts (C223)
73596	Capacitor—Tubular, paper, oil impregnated, .033 mfd., 600 volts (C171)
73558	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 200 volts (C155)
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C212)
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts (C179, C180)
73592	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 600 volts (C161, C185, C214)
73597	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 1000 volts (C176)
73792	Capacitor—Tubular, paper, oil impregnated, .068 mfd., 200 volts (C174)
73784	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 200 volts (C153, C169)
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C178, C183)
73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C170, C192)
73786	Capacitor—Tubular, paper, oil impregnated, 0.27 mfd., 200 volts (C191)
73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C186)
76498	Choke—Filter choke (L108)
73477	Coil—Choke coil (L101)
76640	Coil—Choke coil (1.5 muh) (L115)
76442	Coil—Horizontal linearity coil complete with adjustable core (L107)
76646	Coil—Peaking coil (72 muh) (L103, R188)
72619	Coil—Peaking coil (93 muh) (L104, R261)
75252	Coil—Peaking coil (500 muh) (L105, L113)
76441	Coil—Width coil complete with adjustable core (L106)
74594	Connector—2 contact male connector for power cord
5040	Connector—4 contact female connector for speaker cable (P101)
75542	Connector—6 contact male connector—part of deflection yoke (P102)
50367	Connector—6 contact female connector for deflection yoke leads (J102)
76804	Connector—Anode connector for kinescope
35787	Connector—Phono input connector (J103)
76457	Connector—Second anode lead connector mounted on hi-voltage capacitor
76460	Contact—Test point contact
76447	Control—AGC control (R175)
76444	Control Brightness control (R218)
76448	Control—Height control (R203)
76443	Control—Horizontal and vertical hold control (R201A, R201B)
76445	Control—Picture control (R167)
76449	Control—Vertical linearity control (R214)
76171	Control—Volume control and power switch (R117, S102)
	Crystal—See Rectifier, Crystal Rectifier
74956	Cushion—Rubber cushion for deflection yoke hood
74839	Fastener—Push fastener for mounting tube sockets
76801	Fuse—0.2 amp., 250 volts
76459	Grommet—Rubber grommet for 2nd. anode lead exit
37396	Grommet—Rubber grommet for mounting tube sockets
76830	Hood—Deflection yoke hood less cushions
75482	Jack—Video jack (J104)
76480	Lead—Anode lead complete with eyelet
76168	Magnet—Focus magnet complete with adjustable plate and stud

RCA VICTOR

TELEVISION RECEIVERS
MODELS 17T200, 17T201, 17T202, 17T211, 17T220

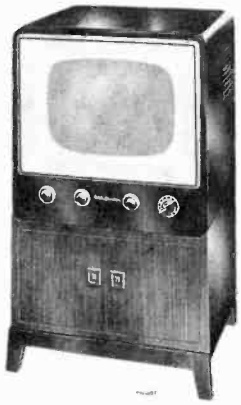
Chassis No. KCS72, KCS72M1 or KCS72M2

—Mfr. No. 274—

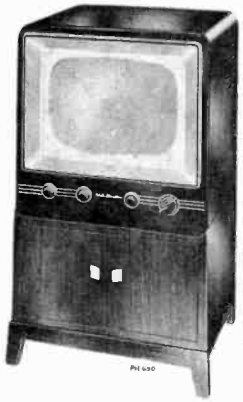
SERVICE DATA

—1952 No. T2—

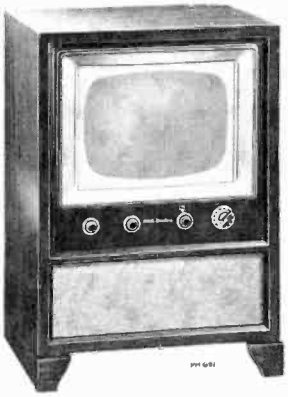
PREPARED BY RCA SERVICE CO., INC.
FOR
RADIO CORPORATION OF AMERICA
RCA DIVISION
CAMDEN, N. J., U. S. A.



Model 17T200 "Shelly"
Ebony
Model 17T201 "Hadley"
Maroon
(Shown on base)



Model 17T202 "Kentwood"
Mahogany, Grained
(Shown on base)



Model 17T211 "Ashton"
Walnut, Mahogany, Blonde

Model 17T220 "Albury"
Walnut, Mahogany

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 unit 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

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
...971636-1 5" PM Dynamic, 3.2 ohms
In Models 17T211 & 17T220
...(971490-3) 8" PM Dynamic, 3.2 ohms

WEIGHT AND DIMENSIONS

Model	Net Weight	Shipping Weight	Width Inches	Height Inches	Depth Inches
17T200	88 lbs.	103 lbs.	21½	22	21⅜
17T201	88 lbs.	103 lbs.	21½	22	21⅜
17T202	88 lbs.	103 lbs.	21½	22	21⅜
17T211	95 lbs.	116 lbs.	24½	35¼	21¾
17T220	106 lbs.	130 lbs.	23¾	35¼	23¾

RECEIVER ANTENNA INPUT IMPEDANCE
Choice: 300 ohms balanced or 72 ohms unbalanced.

RCA TUBE COMPLEMENT

	Tube Used	Function
(1)	RCA 6CB6	R-F Amplifier
(2)	RCA 6J6	R-F Oscillator and Mixer
(3)	RCA 6CB6	1st Picture I-F Amplifier
(4)	RCA 6CB6	2nd Picture I-F Amplifier
(5)	RCA 6CB6	3rd Picture I-F Amplifier
(6)	RCA 12AU7	Picture 2nd Detector and Vert. Sync. Sep.
(7)	RCA 6CL6 (6AC7) (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	1st 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 17QP4	Kinescope
(22)	RCA 5U4G	Rectifier
(23)	RCA 5Y3GT	Rectifier

*(See Figure 67)

ELECTRICAL AND MECHANICAL SPECIFICATIONS
(Continued)

PICTURE INTERMEDIATE FREQUENCIES

Picture I-F Carrier Frequency	25.50 mc.
Adjacent Channel Sound Trap	27.00 mc.

SOUND INTERMEDIATE FREQUENCIES

Sound I-F 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

OPERATING CONTROLS (Front Panel)

Channel Selector, Fine Tuning	Dual Control Knobs
Picture Brightness	Dual Control Knobs
Picture Horizontal Hold, Picture Vertical Hold	Dual Control Knobs
Sound Volume and On-Off Switch, TV Tone & Phono Switch	Dual Control Knobs

NON-OPERATING CONTROLS (not including r-f and i-f adjustments)

Picture Centering	top chassis adjustment
Width	rear chassis adjustment
Height	rear chassis adjustment
Horizontal Linearity	rear chassis screwdriver adjustment
Vertical Linearity	rear chassis adjustment
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 Coil	top chassis wing nut adjustment
AGC Control	rear chassis adjustment

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.

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.

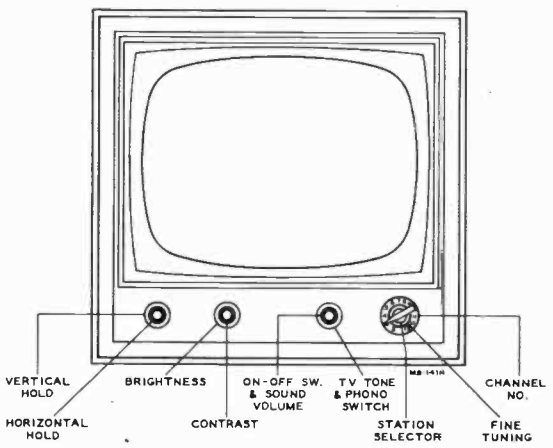


Figure 1—Receiver Operating Controls

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".

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.

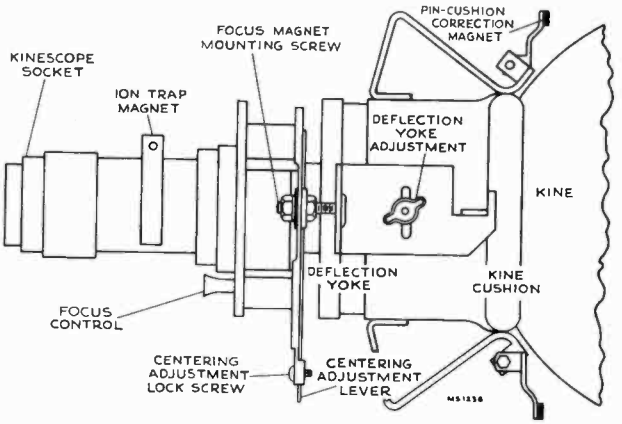


Figure 2—Yoke and Focus Magnet Adjustments

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 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 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

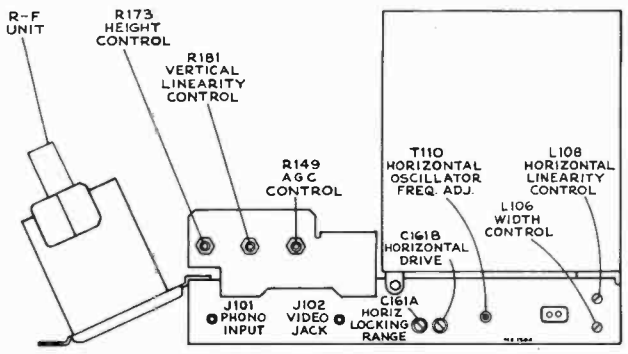


Figure 3—Rear Chassis Adjustments

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 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 C161A slightly clockwise. If less than 2 bars are present, adjust C161A 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 counter-clockwise 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 (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.

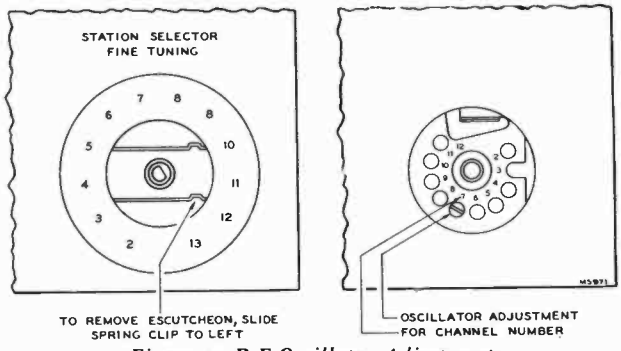


Figure 4—R-F Oscillator Adjustments

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 R149 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 L203 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.

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.

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.

17T200, 17T201, 17T202,
17T211, 17T220

CHASSIS TOP VIEW

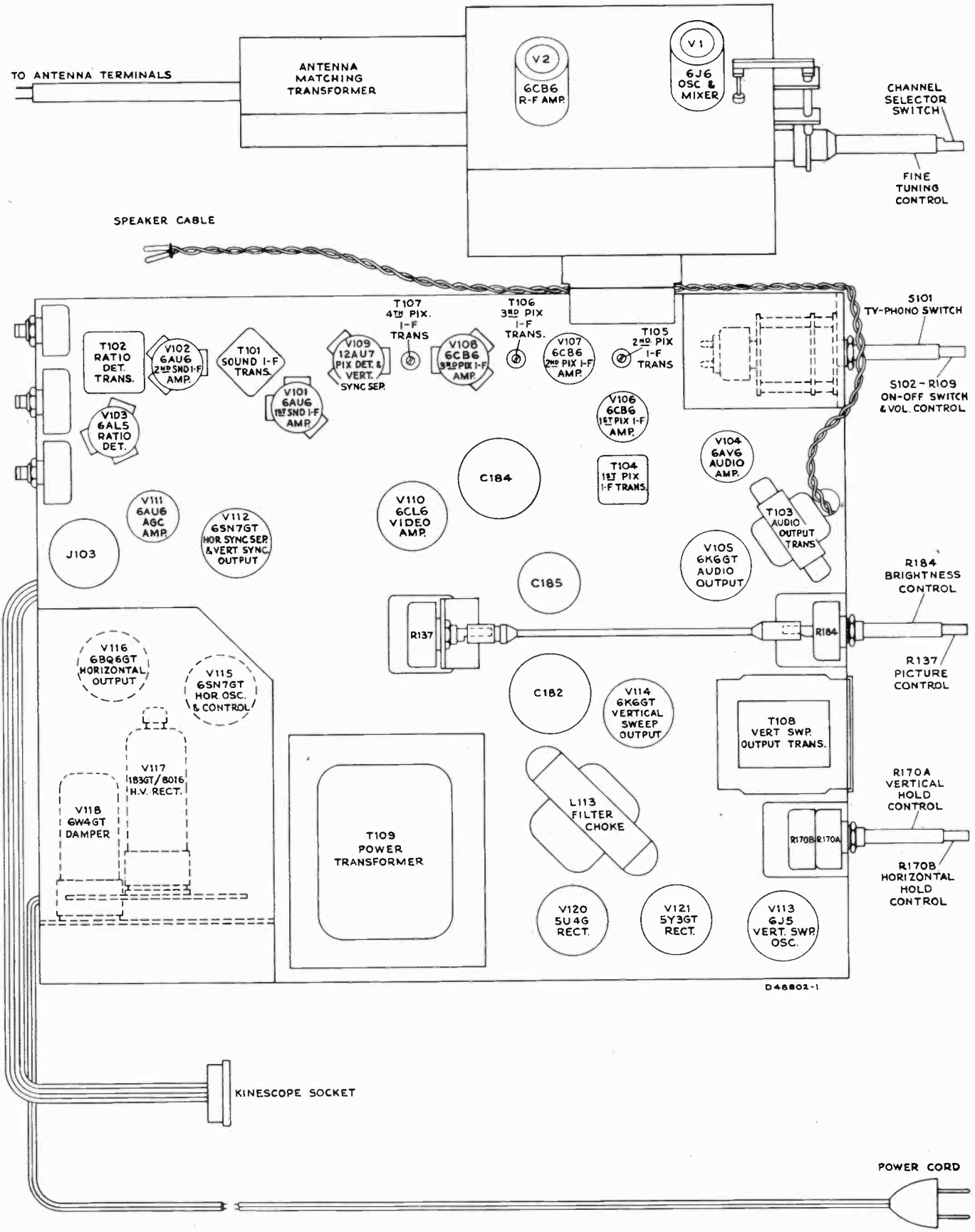


Figure 5—Chassis Top View

CHASSIS BOTTOM VIEW

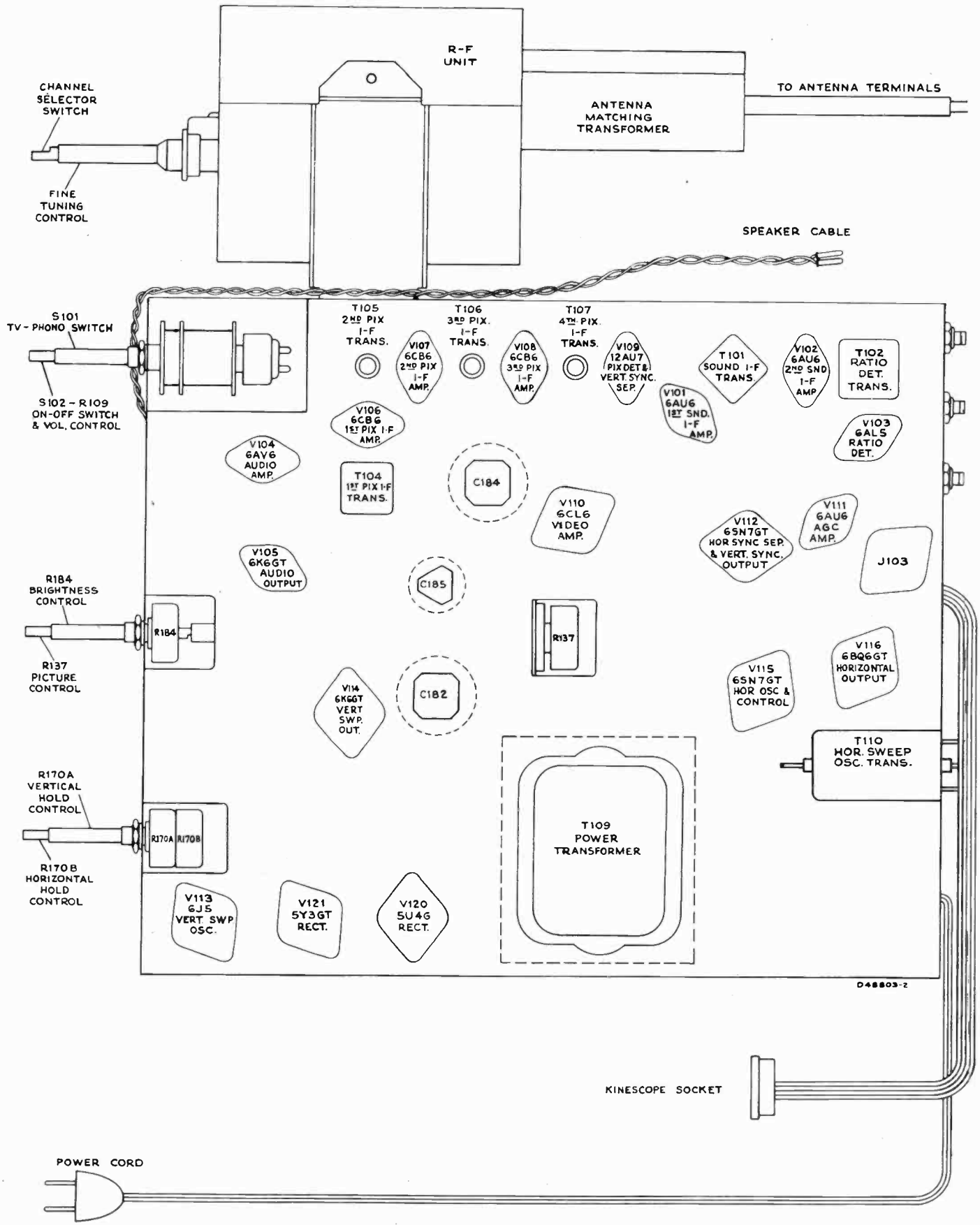


Figure 6—Chassis Bottom View

17T200, 17T201, 17T202, 17T211, 17T220

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

Channel Number	Picture Carrier Freq. Mc.	Sound Carrier Freq. Mc.
2	55.25	59.75
3	61.25	65.75
4	67.25	71.75
5	77.25	81.75
6	83.25	87.75
7	175.25	179.75
8	181.25	185.75
9	187.25	191.75
10	193.25	197.75
11	199.25	203.75
12	205.25	209.75
13	211.25	215.75

(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
(4) Sweep of picture i-f
(5) Ratio detector alignment
(6) Sound i-f alignment
(7) 4.5 Mc Trap Adjustment
(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 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 C1 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 TP1 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.

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 TP1.

Adjust C7 for —3.0 volts at the test point.

Retouch L42, L45 and L49 for proper response if necessary. If necessary, retouch C11 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 C1 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 C1 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 C11.

Check the oscillator injection voltage at the test point TP1. 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 C1 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 Freq. Mc.	Sound Carrier Freq. Mc.	Receiver R-F Osc. Freq. Mc.	Channel Oscillator Adjustment
2	55.25	59.75	80.750	L1
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	193.25	197.75	218.750	L9
11	199.25	203.75	224.750	L10
12	205.25	209.75	230.750	L11
13	211.25	215.75	236.750	C1

Switch to channel 8 and observe the response.

Adjust T1 clockwise while watching the change in response. When T1 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 T1 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 R142 and R143.

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 R142 and R143. 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 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.

Adjust the signal generator output to give 3 volts on the "VoltOhmyst" as the final adjustment is made.

(1) 24.25 mc.—T107
(2) 25.5 mc.—T106
(3) 22.75 mc.—T105

PICTURE I-F TRAP ADJUSTMENT.—With the same connections as above, tune the generator to 27.00 mc. and adjust the T104 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 T1 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 C115 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 "VoltOhmyst".

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 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 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 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 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 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 C161A slightly clockwise. If less than 2 bars are present, adjust C161A 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.

17T200, 17T201, 17T202, 17T211, 17T220

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 UNIT ALIGNMENT									
1	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 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.									
2	Not used		Not used		Loosely coupled to r-f oscillator	236.75 MC.	Not used	Fine tuning 30 degrees clockwise from mechanical center of its range. Receiver on channel 13.	C1 for an audible beat on het. freq. meter	Fig. 7
3	"		"				Connect "Volt-Ohmyst" to terminal 3 of the r-f unit terminal board	Turn AGC control fully clockwise. Connect bias box to terminal 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)	Sweeping channel 8	Not used	—	Not used	Rec. on chan. 8. Connect oscilloscope to TP1. Adjust C9, C11, C16 and C22 for correct curve shape, frequency and band width. C22 is adjusted to give max. amplitude between markers. C9 affects tilt and C16 affects the frequency of response. C11 affects the response band width.		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. Adjust L42, L45 and L49 for proper response. L42 is adjusted to give max. amplitude between markers. L45 primarily affects tilt and L49 primarily affects freq. of response. If necessary, retouch C11 for proper width.		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 steps until the specified conditions are obtained.									
9	Not used		Not used	—	Loosely coupled to r-f oscillator	206.75		Rec. on chan. 8	C1 for audible beat on het. freq. meter	Fig. 7
10	Antenna terminal (loosely)	181.25 185.75	Antenna terminals (see text for precaution)	Sweeping channel 8	Not used	—	Not used	Rec. on chan. 8. Readjust C9, C16 and C22 for correct curve shape, frequency and band width. Readjust C11 only if necessary.		Fig. 7 Fig. 11 (8)
11	"	211.25 215.75	"	Sweeping channel 13	Not used	—	Not used	Rec. on chan. 13. Adjust L52 for max. amplitude between markers, overshoot a little more than required to reach max. response. Adjust C22 to regain max. amplitude of response.		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 C1.	Fig. 7 Fig. 8
13	"	205.25 209.75	Antenna terminals (see text for precaution)	channel 12	Not used	—	Connect "Volt-Ohmyst" to r-f unit test point TP1	Rec. on chan. 12	Check to see that response is correct and —3.0 volts of osc. injection is present	Fig. 11
14	"	199.25 203.75		channel 11	"	—	"	Rec. on chan. 11	"	Fig. 11 (11)
15	"	193.25 197.75	"	channel 10	"	—	"	Rec. on chan. 10	"	Fig. 11 (10)
16	"	187.25 191.75	"	channel 9	"	—	"	Rec. on chan. 9	"	Fig. 11 (9)
17	"	181.25 185.75	"	channel 8	"	—	"	Rec. on chan. 8	"	Fig. 11 (8)
18	"	175.25 179.75	"	channel 7	"	—	"	Rec. on chan. 7	"	Fig. 11 (7)
19	If the response of any channel (steps 13 through 18) is below 80% at either marker, repeat step 10 and adjust C9, C11, C16 and C22 as necessary to pull response up on the low channel yet maintain correct response on channel 8. 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.									
20	Repeat step 9. If the oscillator is off frequency overshoot the adjustment of C1 and correct by adjusting L43.									
21	Repeat steps 13 through 20 until all requirements are obtained.									
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 necessary readjust L42, L45 and L49. It should not be necessary to touch C11.		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. If necessary adjust C7 to give —3 volts. If C7 is adjusted, switch to channel 8, and readjust C9 for proper response then repeat step 23.		Fig. 7 Fig. 11
25	Antenna terminals (loosely)	77.25 81.75	Antenna terminals (see text for precaution)	channel 5	"	—	"	Rec. on chan. 5	Check to see that response is correct and —3.0 volts of osc. injection is present	Fig. 11 (5)

ALIGNMENT TABLE

STEP No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT HETERODYNE FREQ. METER	HET. FREQ. METER MC.	CONNECT "VOLTOHMYST" TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
26	Antenna terminals (loosely)	67.25 71.75	Ant. terminals (see text for precaution)	channel 4	Not used	—	Connect "Volt-Ohmyst" to the r-f unit test point TP1	Rec. on chan. 4	Check to see that response is correct and —3.0 volts of osc. injection is present	Fig. 11 (4)
27	"	61.25 65.75	"	channel 3	"	—	"	Rec. on chan. 3	"	Fig. 11 (3)
28	"	55.25 59.75	"	channel 2	"	—	"	Rec. on chan. 2	"	Fig. 11 (2)
29	Likewise check channels 7 through 13, as outlined in steps 18 back through 13, stopping on channel 13 for next step.									
30	Antenna terminals	215.75	Not used	—	Loosely coupled to r-f oscillator	236.75	Not used	Fine tuning 30 degrees clockwise from mechanical center of its range. Receiver on channel 13	C1 for zero beat on het. freq. meter	Fig. 7
31	"	209.75	"	—	"	230.75	"	Rec. on chan. 12	L11 as above	Fig. 8
32	"	203.75	"	—	"	224.75	"	Rec. on chan. 11	L10 as above	Fig. 8
33	"	197.75	"	—	"	218.75	"	Rec. on chan. 10	L9 as above	Fig. 8
34	"	191.75	"	—	"	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	"	—	"	200.75	"	Rec. on chan. 7	L6 as above	Fig. 8
37	"	87.75	"	—	"	108.75	"	Rec. on chan. 6	L5 as above	Fig. 8
38	"	81.75	"	—	"	102.75	"	Rec. on chan. 5	L4 as above	Fig. 8
39	"	71.75	"	—	"	92.75	"	Rec. on chan. 4	L3 as above	Fig. 8
40	"	65.75	"	—	"	86.75	"	Rec. on chan. 3	L2 as above	Fig. 8
41	"	59.75	"	—	"	80.75	"	Rec. on chan. 2	L1 as above	Fig. 8
42	Repeat steps 30 through 41 as a check.									
43	Antenna terminals	181.25 185.75	Antenna terminals	Sweeping channel 8	Not used	—		Rec. on chan. 8 Oscilloscope at test point TP1. Adjust T1 clockwise. When properly adjusted, curve will be slightly wider with a slightly deeper valley in top.		Fig. 11 (8)
44	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.									
45	Remove 39 ohm resistor and reconnect link from T101 to terminal 2 of r-f unit terminal board.									

PICTURE I-F AND TRAP ADJUSTMENT

STEP No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT OSCILLOSCOPE TO	CONNECT "VOLTOHMYST" TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
46	Not used		Not used	—	Not used	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	"		"	—	"	Test point TP1	Connect bias box to TP1 and to ground	"	Fig. 7
48	Mixer grid test point TP2 in series with 1500 mmf.	24.25	"	—	"	Pin 2 of V110 and to ground	Bias boxes connected as above	T107 (top) for max.	Fig. 15
49	"	25.5	"	—	"	"	"	T106 (top) for max.	Fig. 15
50	"	22.75	"	—	"	"	"	T105 (top) for max.	Fig. 15
51	"	27.00	"	—	"	"	"	T104 (top) for min.	Fig. 15
52	Connected loosely to diode probe	Various See Fig. 13	Mixer grid test point TP2 in series with 1500 mmf.	20 to 28 mc	Scope diode probe to pin 5 of V106 and to grd. Connect a 180 ohm resistor from pin 5 of V106 to pin A of T105	Junction of R142 & R143	Shunt terminals A and B of T106 and T107 with 330 ohms. Bias boxes connected as above. .3v p-p on scope	Set C115 to min. Adjust T1 top and T104 bot. for max. gain with 25.5 mc. at 70%. C115 for 22.5 at 70%	Fig. 7 Fig. 16
53	Connected loosely to grid of 1st pix i-f. Adjust for small marker indication	Various See Fig. 14	"	"	Connect scope to pin 2 of V110. Remove shunt & diode probe used above		Remove shunts from T106 & T107	Retouch T105, T106 and T107 to obtain response shown in Fig. 13	Fig. 13

RATIO DETECTOR, SOUND I-F AND 4.5 MC TRAP ALIGNMENT

STEP No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT OSCILLOSCOPE TO	CONNECT "VOLTOHMYST" TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
54	Grid 1st Snd. I-F (pin 1, V101) or WR39B or C connect to grid 3rd pix I-F (pin 1, V108)	25.50mc. mod. by 4.5 mc.	Not used	—	Not used	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 junction R106 and C108. Adjust T102 bottom core for zero DC on meter. Repeat steps 54 and 55 until all conditions are satisfied.		Fig. 15 Fig. 16
56	Sig. Gen. to 1st Snd. I-F grid	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 series with 1000 ohms to pin 2 of V109	4.5 mc. mod. 30% with 400 cy.	"	—	Diode probe to pin 6 of V110	Not used	Short pin 1 of V108 to ground	Adjust L103 for minimum output on oscilloscope	Fig. 15

ALIGNMENT DATA

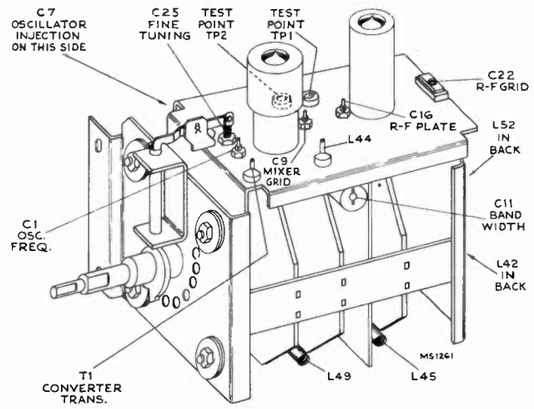


Figure 7—R-F Unit Adjustments

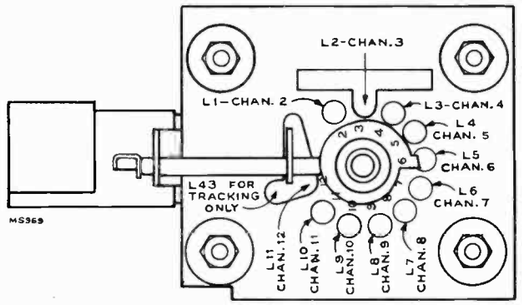


Figure 8—R-F Oscillator Adjustments

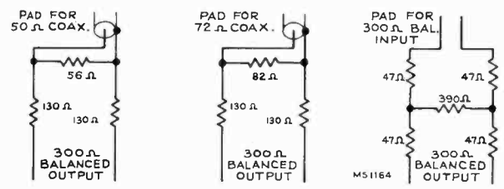


Figure 9—Sweep Attenuator Pads

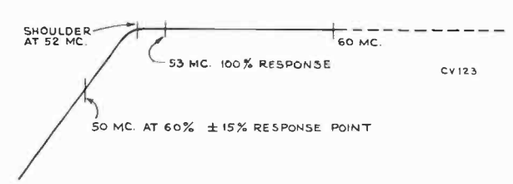


Figure 10—Antenna Matching Unit Response

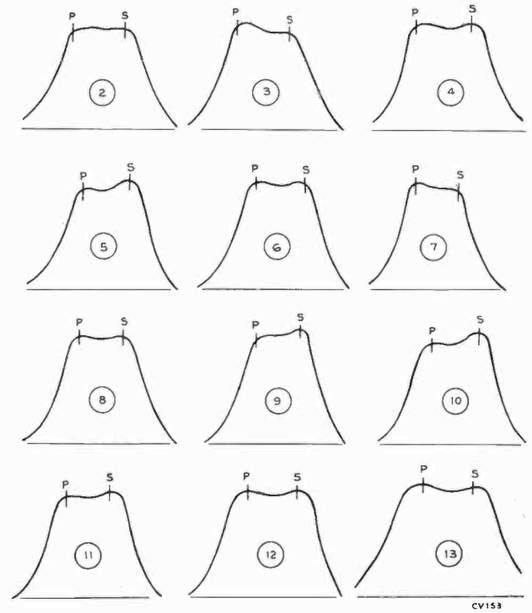


Figure 11—R-F Response

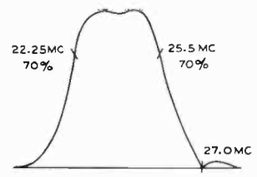


Figure 12 T1 and T104 Response

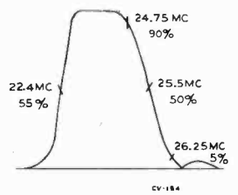


Figure 13 Over-all I-F Response

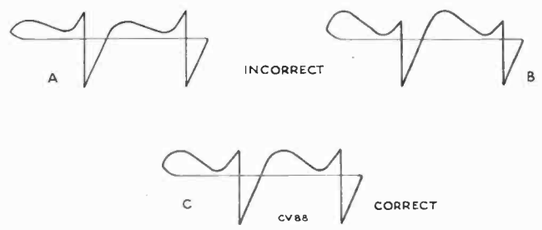


Figure 14—Horizontal Oscillator Wave Forms

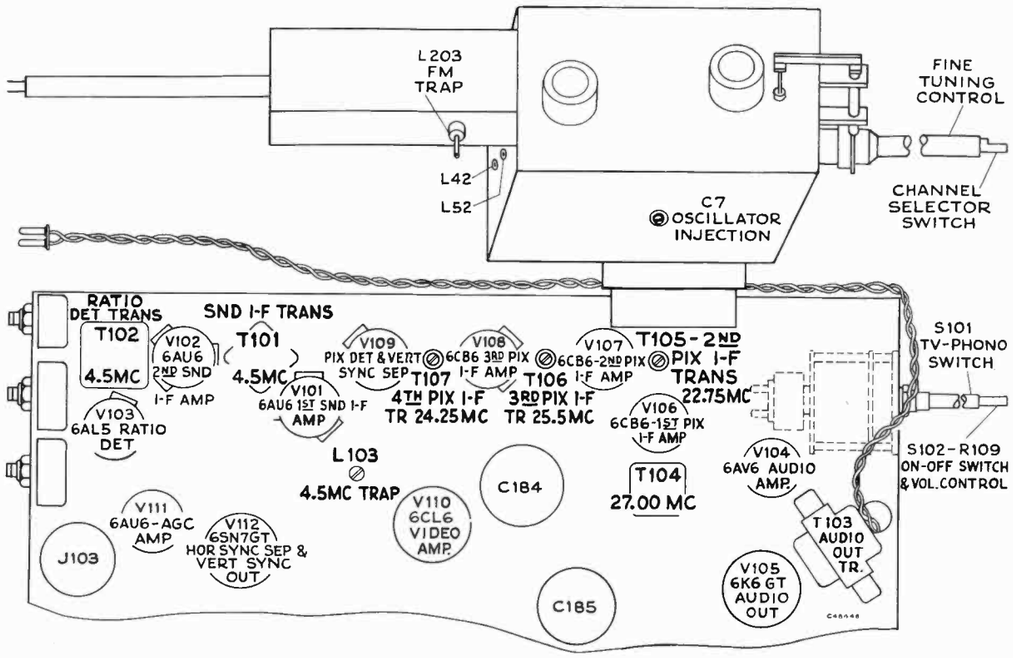


Figure 15—Top Chassis Adjustments

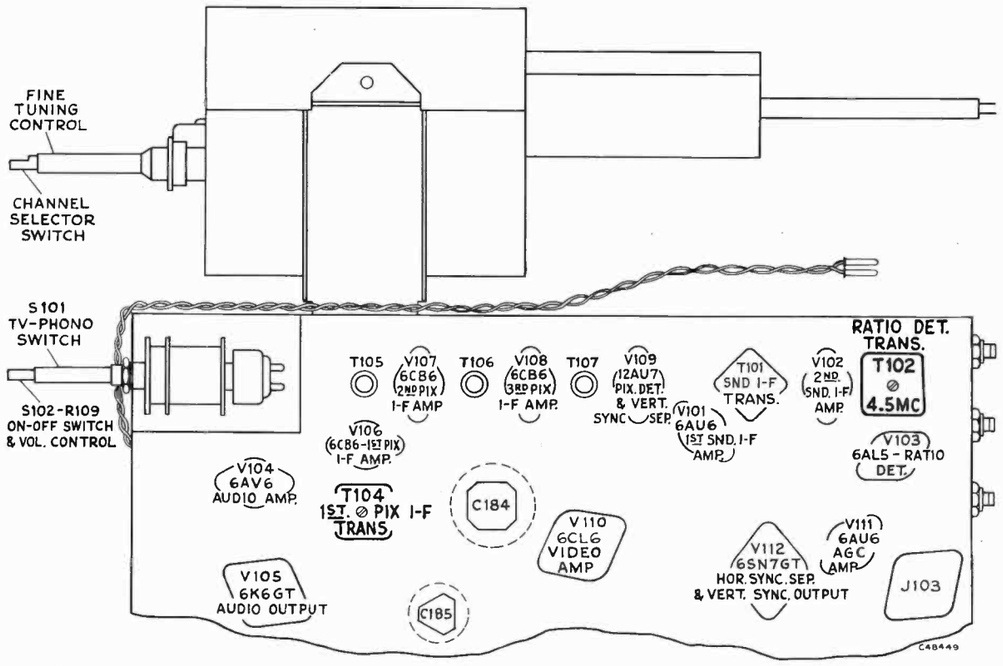


Figure 16—Bottom Chassis Adjustments

Figure 17—Normal Picture

Figure 18—Focus Magnet and Ion Trap Magnet Misadjusted

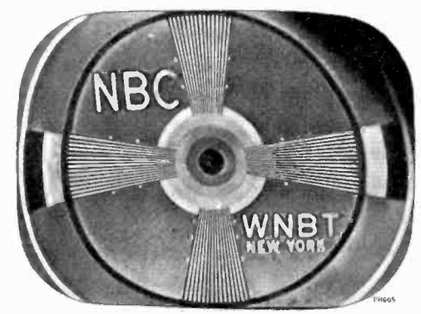
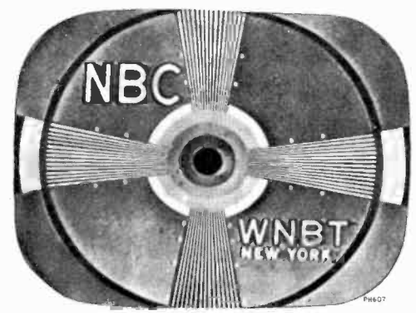


Figure 19—Horizontal Linearity Control Misadjusted (Picture Cramped in Middle)

Figure 20—Width Control Misadjusted



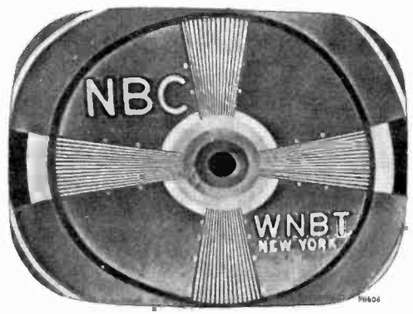
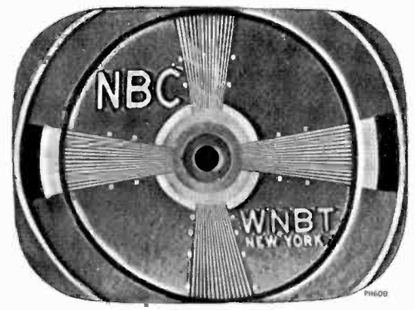


Figure 21—Horizontal Drive Control Misadjusted

Figure 22—Transients



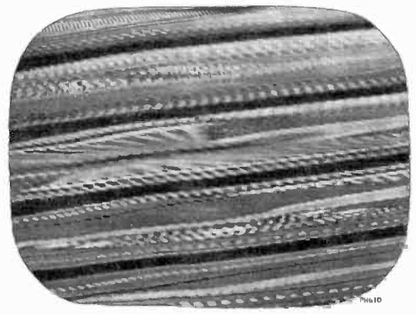
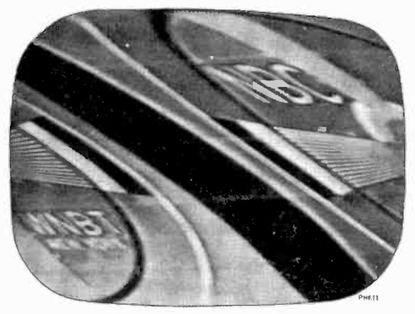


Figure 23—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position—Just Before Pulling Into Sync

Figure 24—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position



SERVICE SUGGESTIONS 17T200, 17T201, 17T202, 17T211, 17T220

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 1B3GT circuit. Either the T111 high voltage winding is open, the 1B3GT 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:

(1) 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, 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:

(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, 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.

17T200, 17T201, 17T202,
17T211, 17T220

RESPONSE AND WAVE FORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

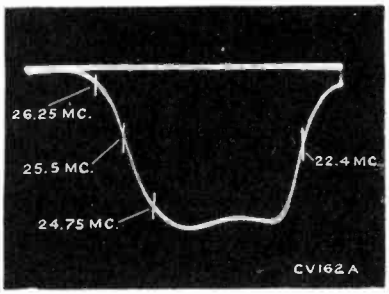


Figure 25—Overall Pix I-F Response

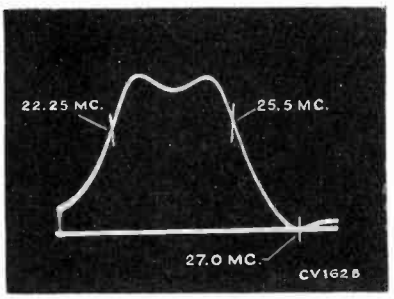


Figure 26—Response of T1-T104 Pix I-F Transformers

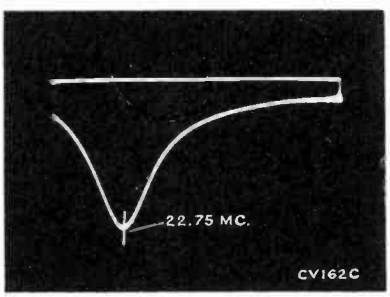


Figure 27—Response of T105 Pix I-F Transformer

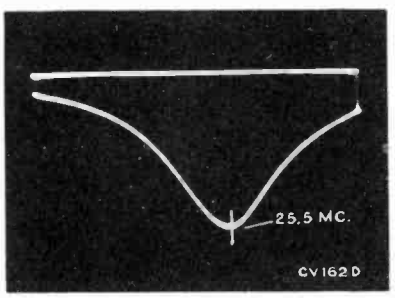


Figure 28—Response of T106 Pix I-F Transformer

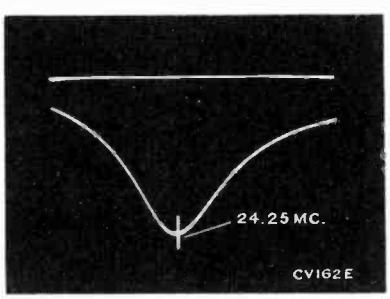


Figure 29—Response of T107 Pix I-F Transformer

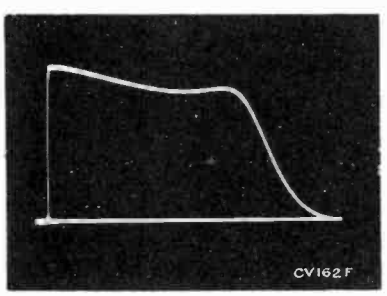
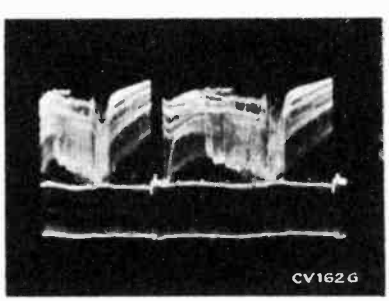


Figure 30—Video Response at Average Contrast



Grid of Video Amplifier (Pin 2 of V110) (6CL6) Voltage Depends on Picture

Figure 31—Vertical (Oscilloscope Synced to ½ of Vertical Sweep Rate) (1.5 Volts PP)

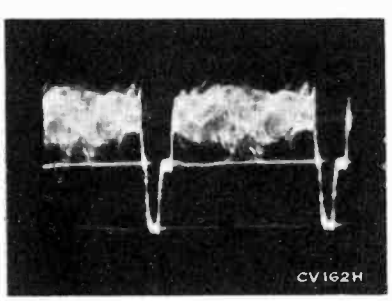


Figure 32—Horizontal (Oscilloscope Synced to ½ of Horizontal Sweep Rate) (1.5 Volts PP)

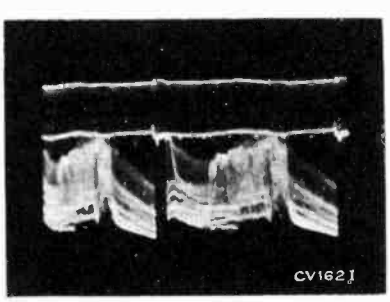


Plate of Video Amplifier (Pin 6 of V110) (6CL6)

Voltage depends on picture

Figure 33—Vertical (85 Volts PP)

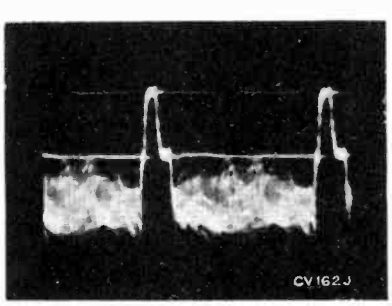
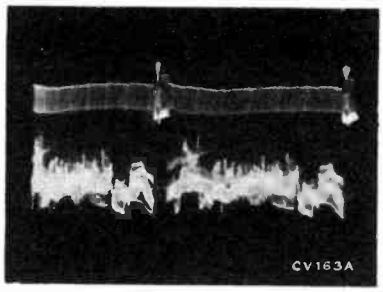


Figure 34—Horizontal (85 Volts PP)

WAVEFORM PHOTOGRAPHS

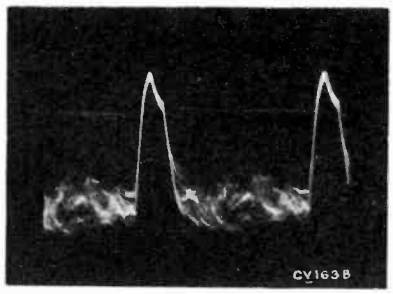
Taken from RCA WO58A Oscilloscope

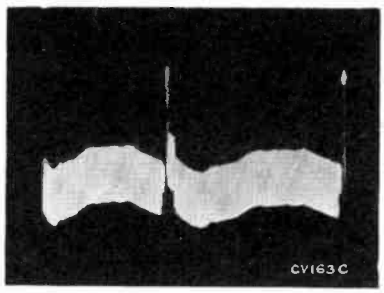


Grid of Horizontal Sync Separator
(Pin 1 of V112A) (6SN7)
Voltage depends on picture

Figure 35—Vertical (85 Volts PP)

Figure 36—Horizontal (85 Volts PP)

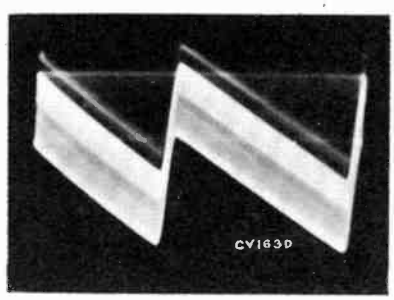




Cathode of Horizontal Sync Sep.
(Pin 3 of V112A) (6SN7)

Figure 37—Vertical (7.5 Volts PP)

Figure 38—Horizontal (5 Volts PP)



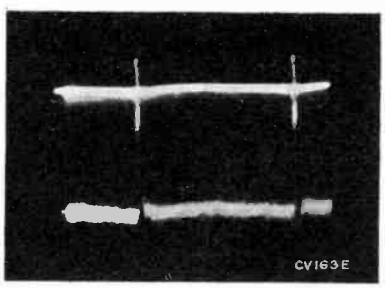
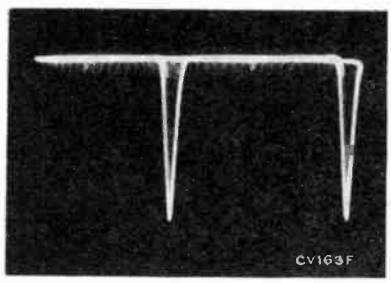
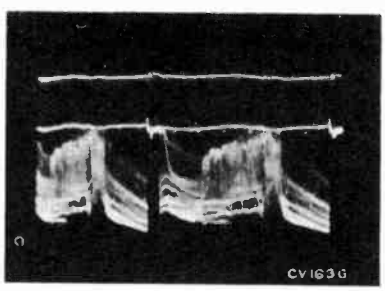


Plate of Horizontal Sync Separator
(Pin 2 of V112A) (6SN7)

Figure 39—Vertical (45 Volts PP)

Figure 40—Horizontal (45 Volts PP)

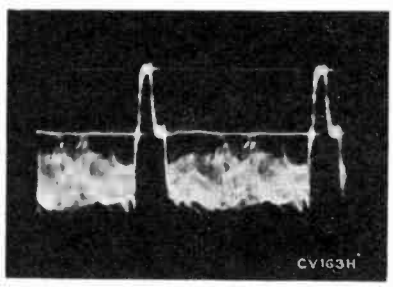




Grid of Vertical Sync Sep.
(Pin 7 of V109B) (12AU7)

Figure 41—Vertical (55 Volts PP)

Figure 42—Horizontal (55 Volts PP)



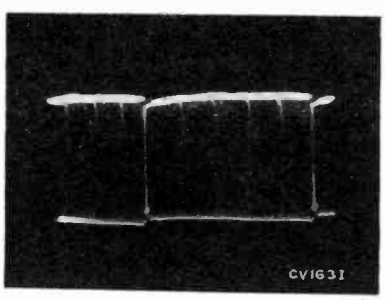
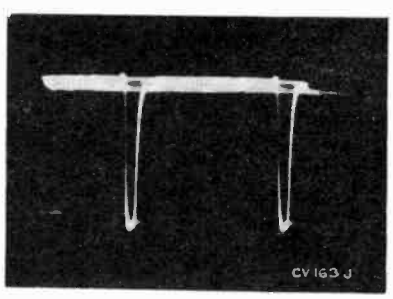


Plate of Vertical Sync Sep.
(Pin 6 of V109B) (12AU7)

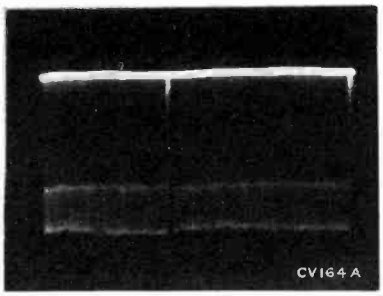
Figure 43—Vertical (65 Volts PP)

Figure 44—Horizontal (65 Volts PP)



WAVEFORM PHOTOGRAPHS

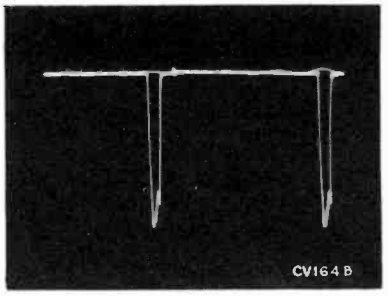
Taken from RCA WO58A Oscilloscope



Grid of Sync Output
(Pin 4 V112B) (6SN7)

Figure 45—Vertical (40 Volts PP)

Figure 46—Horizontal (40 Volts PP)



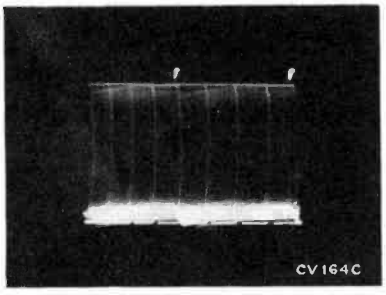
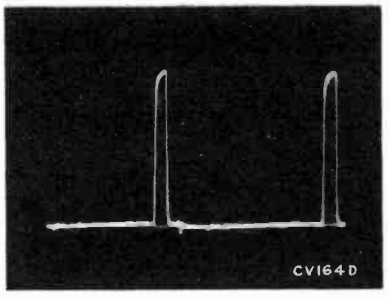


Plate of Sync Output
(Pin 5 of V112) (6SN7)

Figure 47—Vertical (47 Volts PP)

Figure 48—Horizontal (47 Volts PP)



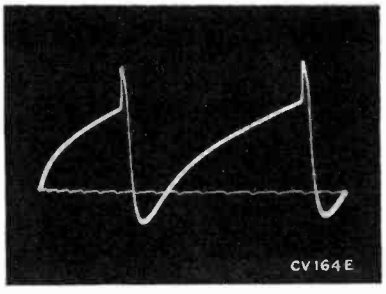
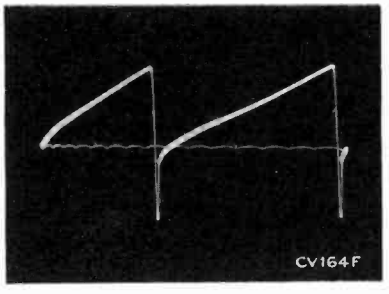


Figure 49—Grid of Vertical Sweep Osc. (Pin 5 of V113) (6J5) (30 Volts PP)

Figure 50—Plate of Vertical Sweep Osc. (Pin 3 of V113) (100 Volts PP)



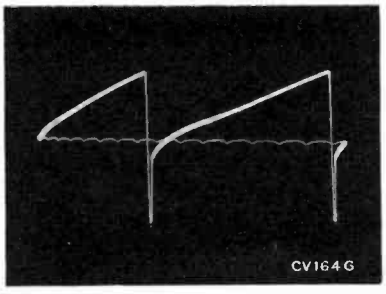
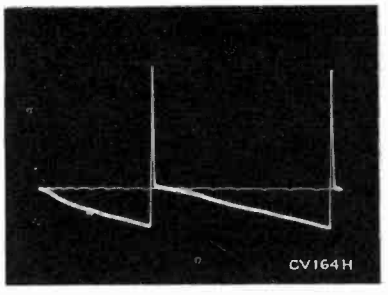
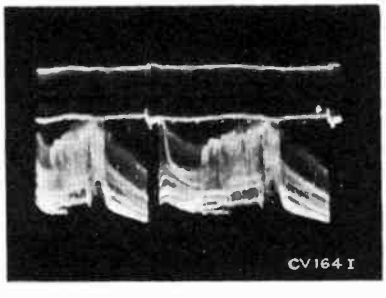


Figure 51—Grid of Vertical Sweep Output (Pin 5 of V114) (6K6) (100 Volts PP)

Figure 52—Plate of Vertical Sweep Output (Pin 3 of V114) (6K6) (715 Volts PP)



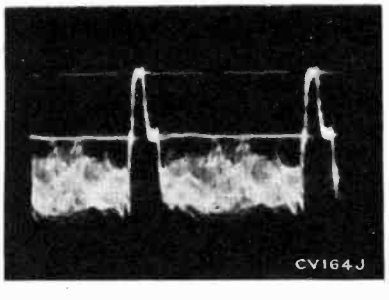


Cathode of Kinescope
(Pin 11 of V119) (17QP4)

Voltage depends on picture

Figure 53—Vertical

Figure 54—Horizontal



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

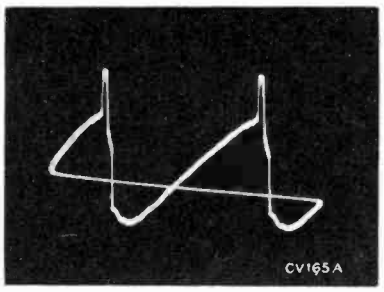


Figure 55—Grid of Horizontal Oscillator Control (Pin 1 of V115) (6SN7GT) (19 Volts PP)

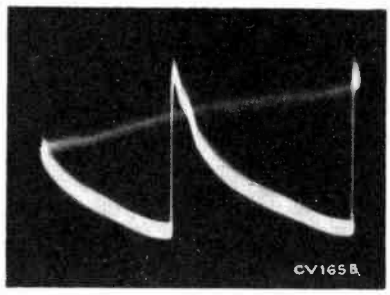


Figure 56—Cathode of Horizontal Oscillator Control (Pin 3 of V115) (6SN7GT) (1.2 Volts PP)

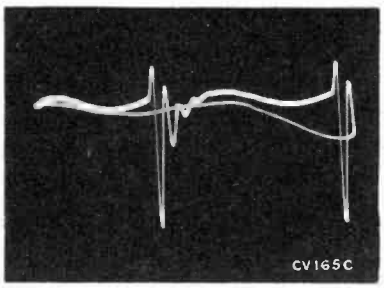


Figure 57—Grid of Horizontal Oscillator (Pin 4 of V115) (6SN7GT) (330 Volts PP)

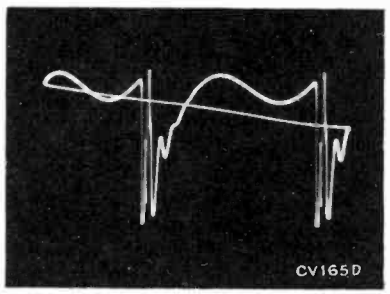


Figure 58—Plate of Horizontal Oscillator (Pin 5 of V115) (6SN7GT) (140 Volts PP)

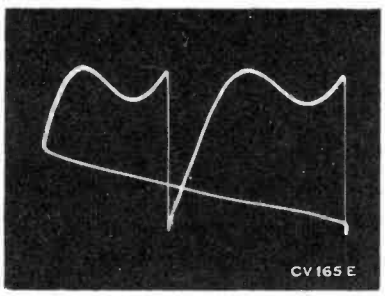


Figure 59—Terminal "C" of T110 (150 Volts PP)

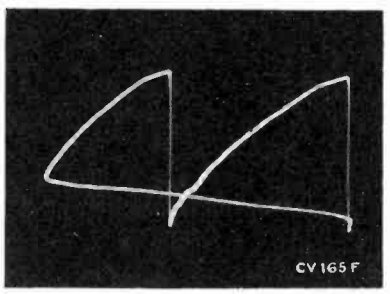


Figure 60—Grid of Horizontal Output Tube (Pin 5 of V116) (6BQ6) (90 Volts PP)

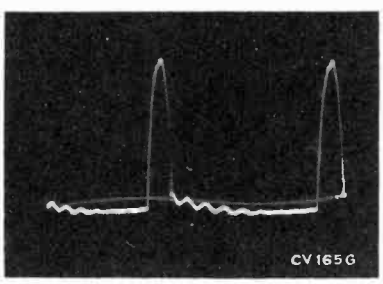


Figure 61—Plate of Horizontal Output (Approx. 4000 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V116 to Ground)

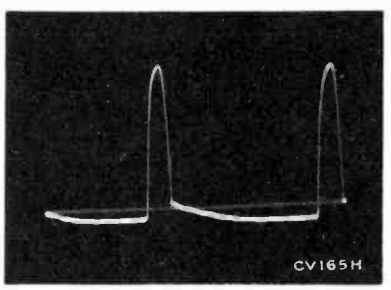


Figure 62—Cathode of Damper (Pin 3 of V118) (6W4GT) (2350 Volts PP)

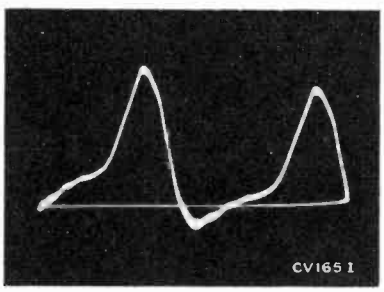


Figure 63—Plate of Damper (Pin 5 of V118) (6W4GT) (160 Volts PP)

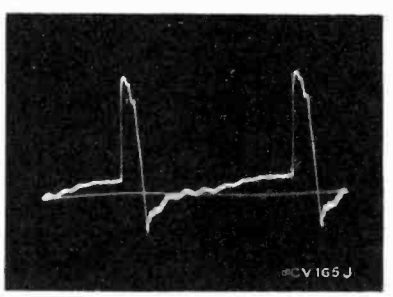


Figure 64—Plate of AGC Amplifier (Pin 5 of V111) (6AU6) (560 Volts PP)

17T200, 17T201, 17T202,
17T211, 17T220

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 No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V1	6J6	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
V1	6J6	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	
V101	6AU6	1st 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.
V103	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	1st 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	1st Pix. I-F Amplifier	15000 Mu. V. Signal	5	246	6	258	2	<0.1	1	—8.6	
			No Signal	5	108	6	108	2	0.7	1	*—0.2	*Unreliable measuring point. Make measurement at T104-B
V107	6CB6	2nd Pix. I-F Amplifier	15000 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	
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

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V110	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	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
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	Cap	*	—	—	2 & 7	14,000	—	—	*High Voltage Pulse Present
			No Signal	Cap	*	—	—	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	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	—	—	

17T200, 17T201, 17T202,
17T211, 17T220

R-F UNIT WIRING DIAGRAM

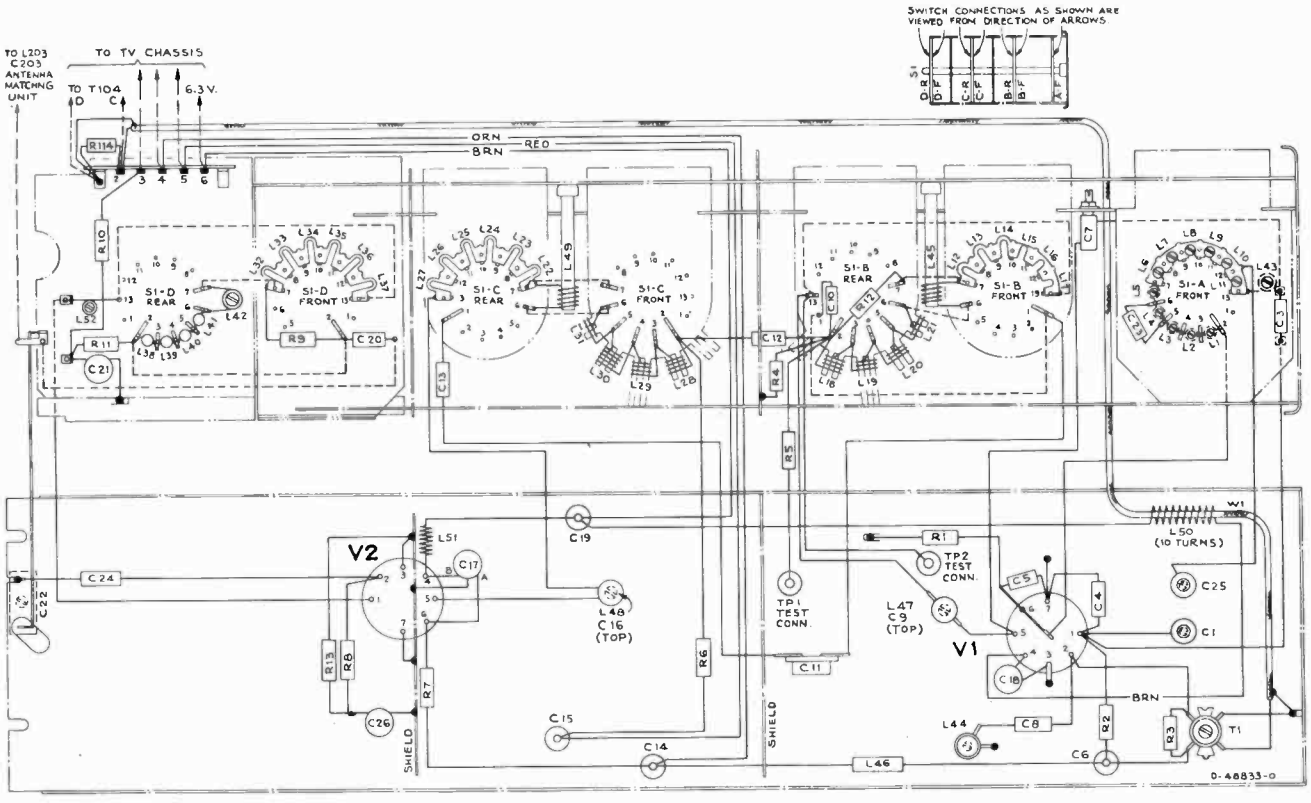


Figure 65—R-F Unit Wiring Diagram

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 C118, C120, C122, C124, C126, R114, R121 and R123 as short and direct as possible.
3. Do not run any leads under C115 trimmer capacitor.
4. Dress C118 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 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.
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.

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
76633	Magnet—Pin cushion correction magnet complete with support arm
76464	Plate—Hi-voltage plate (bakelite) assembly complete with tube socket and corona ring
76796	Resistor—Wire wound, 5.1 ohms, 1/3 watt (R205)
76639	Resistor—Wire wound, 180 ohms, 2 watts (R202)
76988	Resistor—Wire wound, 820 ohms, 1 watt (R113)
76469	Resistor—Wire wound, 2500 ohms, 10 watts (R115)
76989	Resistor—Wire wound, 4650 ohms, 7 watts (R116)
	Resistor—Fixed, composition:—
503033	33 ohms, ±10%, ½ watt (R130)
502039	39 ohms, ±5%, ½ watt (R122)
502047	47 ohms, ±5%, ½ watt (R119)
503047	47 ohms, ±10%, ½ watt (R105)
504047	47 ohms, ±20%, ½ watt (R201)
503082	82 ohms, ±10%, ½ watt (R101)
502118	180 ohms, ±5%, ½ watt (R125)
503139	390 ohms, ±10%, ½ Watt (R182)
503147	470 ohms, ±10%, ½ watt (R114)
513156	560 ohms, ±10%, 1 watt (R207)
504210	1000 ohms, ±20%, ½ watt (R102, R118, R120, R124, R127)
503222	2200 ohms, ±10%, ½ watt (R104, R212)
523222	2200 ohms, ±10%, 2 watts (R131)
504233	3300 ohms, ±20%, ½ watt (R211)
523223	3300 ohms, ±10%, 2 watts (R131)
502239	3900 ohms, ±5%, ½ watt (R129, R164)
503239	3900 ohms, ±10%, ½ watt (R194)
503256	5600 ohms, ±10%, ½ watt (R138)
523268	6800 ohms, ±10%, 2 watts (R203)
503282	8200 ohms, ±10%, ½ watt (R176, R179)
513282	8200 ohms, ±10%, 1 watt (R165)
502310	10,000 ohms, ±5%, ½ watt (R107, R108, R123)
504310	10,000 ohms, ±20%, ½ watt (R152)
502312	12,000 ohms, ±5%, ½ watt (R121)
503312	12,000 ohms, ±10%, ½ watt (R145)
523312	12,000 ohms, ±10%, 2 watts (R135)
503315	15,000 ohms, ±10%, ½ watt (R153)
503318	18,000 ohms, ±10%, ½ watt (R128, R158, R166, R196)
523318	18,000 ohms, ±10%, 2 watts (R133)
503322	22,000 ohms, ±10%, ½ watt (R167, R217)
513322	22,000 ohms, ±10%, 1 watt (R193)
503327	27,000 ohms, ±10%, ½ watt (R215)
513327	27,000 ohms, ±10%, 1 watt (R218)
513333	33,000 ohms, ±10%, 1 watt (R214)
503339	39,000 ohms, ±10%, ½ watt (R106, R142)
513339	39,000 ohms, ±10%, 1 watt (R132)
503347	47,000 ohms, ±10%, ½ watt (R160)
504347	47,000 ohms, ±20%, ½ watt (R144)
512347	47,000 ohms, ±5%, 1 watt (R148)
513347	47,000 ohms, ±10%, 1 watt (R132)
503356	56,000 ohms, ±10%, ½ watt (R146, R185, R204)
512356	56,000 ohms, ±5%, 1 watt (R178)
503368	68,000 ohms, ±10%, ½ watt (R219)
513368	68,000 ohms, ±10%, 1 watt (R192)
513382	82,000 ohms, ±10%, 1 watt (R191)
504410	100,000 ohms, ±20%, ½ watt (R213)
513410	100,000 ohms, ±10%, 1 watt (R175)
30180	120,000 ohms, ±5%, ½ watt (R143)
503415	150,000 ohms, ±10%, ½ watt (R174, R183, R187)
504415	150,000 ohms, ±20%, ½ watt (R139)
512415	150,000 ohms, ±5%, 1 watt (R195)
502418	180,000 ohms, ±5%, ½ watt (R141)
502427	270,000 ohms, ±5%, ½ watt (R177)
503427	270,000 ohms, ±10%, ½ watt (R157)
503433	330,000 ohms, ±10%, ½ watt (R111, R188)
512433	330,000 ohms, ±5%, 1 watt (R190)
503439	390,000 ohms, ±10%, ½ watt (R168)
503447	470,000 ohms, ±10%, ½ watt (R150, R200)
504447	470,000 ohms, ±20%, ½ watt (R112, R147)
503456	560,000 ohms, ±10%, ½ watt (R148, R171)
503468	680,000 ohms, ±10%, ½ watt (R154, R161)
503482	820,000 ohms, ±10%, ½ watt (R189, R199)
503510	1 megohm, ±10%, ½ watt (R155)
502511	1.1 megohm, ±5%, ½ watt (R136)
503512	1.2 megohm, ±10%, ½ watt (R180)
503515	1.5 megohm, ±10%, ½ watt (R172)
11769	1.8 megohm, ±5%, ½ watt (R140)
39063	1.8 megohm, ±5%, 1 watt (R197)
503522	2.2 megohm, ±10%, ½ watt (R126, R159)
504610	10 megohm, ±20%, ½ watt (R110)
71456	Screw—#8-32 x 7/16" wing screw to mount deflection yoke
76455	Shaft—Connecting shaft (nylon) for picture and brightness controls
73584	Shield—Tube shield for V101, V102, V103, V108
76972	Shield—Tube shield for V109
75718	Socket—Channel indicator lamp socket and leads
74834	Socket—Kinescope socket
31251	Socket—Tube socket, octal, wafer for V105, V110, V112, V113, V116, V120, V121 for KCS72 (KCS72 uses 6AC7 for V110)
71508	Socket—Tube socket, 6 pin, moulded—for V117
50367	Socket—Tube socket, 6 pin, moulded, saddle mounted for V118
73117	Socket—Tube socket, 7 pin, wafer miniature for V101, V102, V103, V104, V106, V107, V108, V111
76453	Socket—Tube socket, octal, moulded, saddle-mounted for V110 for KCS72-M1 (KCS72-M1 uses 6AG7 for V110)
50367	Socket—Tube socket, 8 pin, moulded saddle-mounted for V114
72627	Socket—Tube socket, 8 pin, steatite saddle mounted for V115
76971	Socket—Tube socket, 9 pin, wafer miniature for V109
77470	Socket—Tube socket, 9 pin, miniature, wafer for V110 for KCS72-M2 (KCS72-M2 uses 6CL6 for V110)
76636	Stud—Adjusting stud complete with guard for focus magnet
77011	Switch—Tone control and phono switch less volume control and power switch (S101)
76463	Terminal—Screw type grounding terminal
76977	Transformer—Antenna matching transformer complete (T200, C200, C201, C202, C203, L200, L201, L202, L203, J200)
76795	Transformer—Hi-voltage transformer (T111)
76440	Transformer—Horizontal oscillator transformer complete with adjustable cores (T110)
76982	Transformer—Output transformer (T103)
76984	Transformer—Power transformer, 117 volts 60 cycle (T109)
77112	Transformer—Ratio detector transformer (T102, C105)
76981	Transformer—Sound i-f transformer complete with adjustable core (T101, C102, C103, R103)
76978	Transformer—Vertical output transformer (T108)
76979	Transformer—First pix, i-f transformer complete with adjustable cores (T104, C116, R117)
76980	Transformer—Second, third or fourth pix i-f transformer complete with adjustable core (T105, T106, T107)
75449	Trap—FM trap complete with adjustable core and stud (L203, C203)
75242	Trap—I-F trap (L200, L201, C200, C201)
76983	Trap—4.5 MC trap (L103, C128)
76616	Yoke—Deflection yoke complete with 6 contact male connector (L109, L110, L111, L112, C181, P103, R208, R209, R210)
	SPEAKER ASSEMBLIES 971636-1W RL-101C5 RMA-274 (For Models 17T200, 17T201 & 17T202)
77000	Speaker—5" P.M. speaker complete with cone and voice coil (3.2 ohms)

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES 971490-3W RL-105E6 RMA-274 (For Models 17T211 & 17T220)
75024	Cone—Cone and voice coil (3.2 ohms)
75022	Speaker—8" P.M. speaker complete with cone and voice coil (3.2 ohms) 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 description of part required.
	MISCELLANEOUS
77189	Back—Cabinet back complete for Models 17T200, 17T201, 17T202
77190	Back—Cabinet back complete for Models 17T211, 17T220
76184	Board—"Antenna" terminal board.
76811	Bracket—Hanger bracket for deflection yoke hood for Models 17T200, 17T201, 17T202
77001	Bracket—Hanger bracket for deflection yoke hood for Model 17T211
76812	Bracket—Hanger bracket for deflection yoke hood for Model 17T220
76814	Bracket—Stiffening bracket for kinescope cradle (4 req'd) for Models 17T200, 17T201, 17T202
76829	Bracket—Stiffening bracket for kinescope cradle for Models 17T211, 17T220
71892	Catch—Bullet catch and strike for Model 17T220
76823	Clip—Spring clip for spacing ground braid
X3128	Cloth—Grille cloth for Models 17T201, 17T202
X3199	Cloth—Grille cloth for mahogany cabinet for Model 17T211
X1756	Cloth—Grille cloth for mahogany and walnut instruments for Model 17T220
75474	Connector—Single contact male connector for antenna cable (2 req'd)
39153	Connector—4 contact male connector for antenna cable
71457	Cord—Power cord and plug
76818	Cushion—Rubber cushion (1/16" x 1" x 5/8" x 1/4") for kinescope and cradle support (4 req'd)
77014	Decal—Control panel function decal for mahogany or walnut instruments for Models 17T201, 17T202, 17T211 & 17T220
71984	Decal—Trade mark decal for Model 17T220
77012	Emblem—"RCA Victor" emblem for Models 17T202, 17T211, 17T220
75456	Escutcheon—Channel marker escutcheon—gold
74889	Foot—Felt foot (4 req'd) for Models 17T200, 17T201 & 17T202
76806	Glass—Safety glass
74308	Hinge—Cabinet door hinge (1 set) for Model 17T220
76595	Knob—Brightness control or vertical hold control knob—maroon—(outer)
76593	Knob—Channel selector knob—maroon—(inner)
76591	Knob—Fine tuning control knob—maroon—(outer)
74963	Knob—Picture control, horizontal hold control or volume control and power switch knob—maroon—(inner)
76597	Knob—Tone control and phono switch knob—maroon—(outer)
76596	Knob—Brightness control or vertical hold control knob—beige—(outer)
76594	Knob—Channel selector knob—beige—(inner)
76592	Knob—Fine tuning control knob—beige—(outer)
75464	Knob—Picture control, horizontal hold control or volume control and power switch knob—beige—(inner)
76598	Knob—Tone control and phono switch knob—maroon—(outer)
77264	Knob—Brightness control or vertical hold control knob—ebony—(outer)
77261	Knob—Channel selector knob—ebony—(inner)
77262	Knob—Fine tuning control knob—ebony—(outer)
77265	Knob—Picture control, horizontal hold control or volume control and power switch knob—ebony—(inner)
77263	Knob—Tone control and phono switch knob—ebony—(outer)
11765	Lamp—Channel marker escutcheon lamp—Mazda #51
75459	Mask—Channel marker escutcheon light mask—burgundy
76589	Mask—Channel marker escutcheon light mask—beige
77267	Mask—Channel marker escutcheon light mask—ebony
76177	Nut—#10-32 special nut for deflection yoke hood support rods (2 req'd)
76822	Nut—Speed nut to lock flexible straps for kinescope
77013	Nut—Speed nut for fastening "RCA Victor" emblem on metal panel for Models 17T202, 17T211 & 17T220
73634	Nut—Speed nut for speaker mounting screws for Model 17T211
76825	Pad—Rubber pad (channel) mounted on cradle support to cushion Kinescope
76819	Pad—Rubber pad (channel) for flexible straps (2 req'd)
77005	Panel—Metal front panel for mahogany or walnut instruments for Models 17T211 & 17T220
77260	Panel—Metal front panel for blonde instruments for Model 17T211
77187	Pull—Door pull for television compartment doors for Model 17T220
77188	Pull—Door pull for false door (2 req'd) for Model 17T220
77002	Retainer—Safety glass retainer (2 req'd) for maroon, mahogany grain, mahogany or walnut instruments
76816	Retainer—Safety glass retainer (2 req'd) for blonde instruments
76809	Rod—"L" shape threaded rod to support deflection yoke hood assembly (2 req'd) for Models 17T200, 17T201 & 17T202
76810	Rod—"L" shape threaded rod to support deflection yoke hood assembly (2 req'd) for Models 17T211 & 17T220
76632	Screw—#8 x 5/8" hex head screw for mounting front panel or hanger bracket for Models 17T211 & 17T220
74113	Screw—#8-32 x 1" trimit head screw for door pull for Model 17T220
76821	Screw—#10 x 1 3/8" hex head screw to lock flexible straps for kinescope
76808	Sleeve—Polyethylene sleeve for insulating high voltage lead—on support rod
73643	Spring—Channel marker escutcheon spring clip
76820	Spring—Formed spring for safety glass retainers
77006	Spring—Retaining spring for deflection yoke hood support rods
30330	Spring—Retaining spring for knobs 74963, 75464, 77265
72845	Spring—Retaining spring for knobs 76591, 76592, 77262
76837	Spring—Retaining spring for knobs 76593, 76594, 76595, 76596, 76597, 76598, 77261, 77264, 77263
74936	Spring—Suspension spring for kinescope socket leads
36580	Spring—Suspension spring (coil) for ground braid
72936	Stop—Cabinet door stop for Model 17T220
76813	Strap—Flexible steel strap to secure kinescope
76600	Strap—Ground strap (.005" x ½" soft copper strip) for Models 17T211 & 17T220
77003	Support—Cradle support for kinescope
76836	Washer—Cellulose washer—gold—for knobs
75457	Washer—Felt washer—dark brown—between knob and channel marker escutcheon
75458	Washer—Felt washer—beige—between knob and channel marker escutcheon
77266	Washer—Felt washer—ebony—between knob and channel marker escutcheon
75500	Washer—Felt washer for cabinet back mounting screws

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

CHASSIS WIRING DIAGRAM

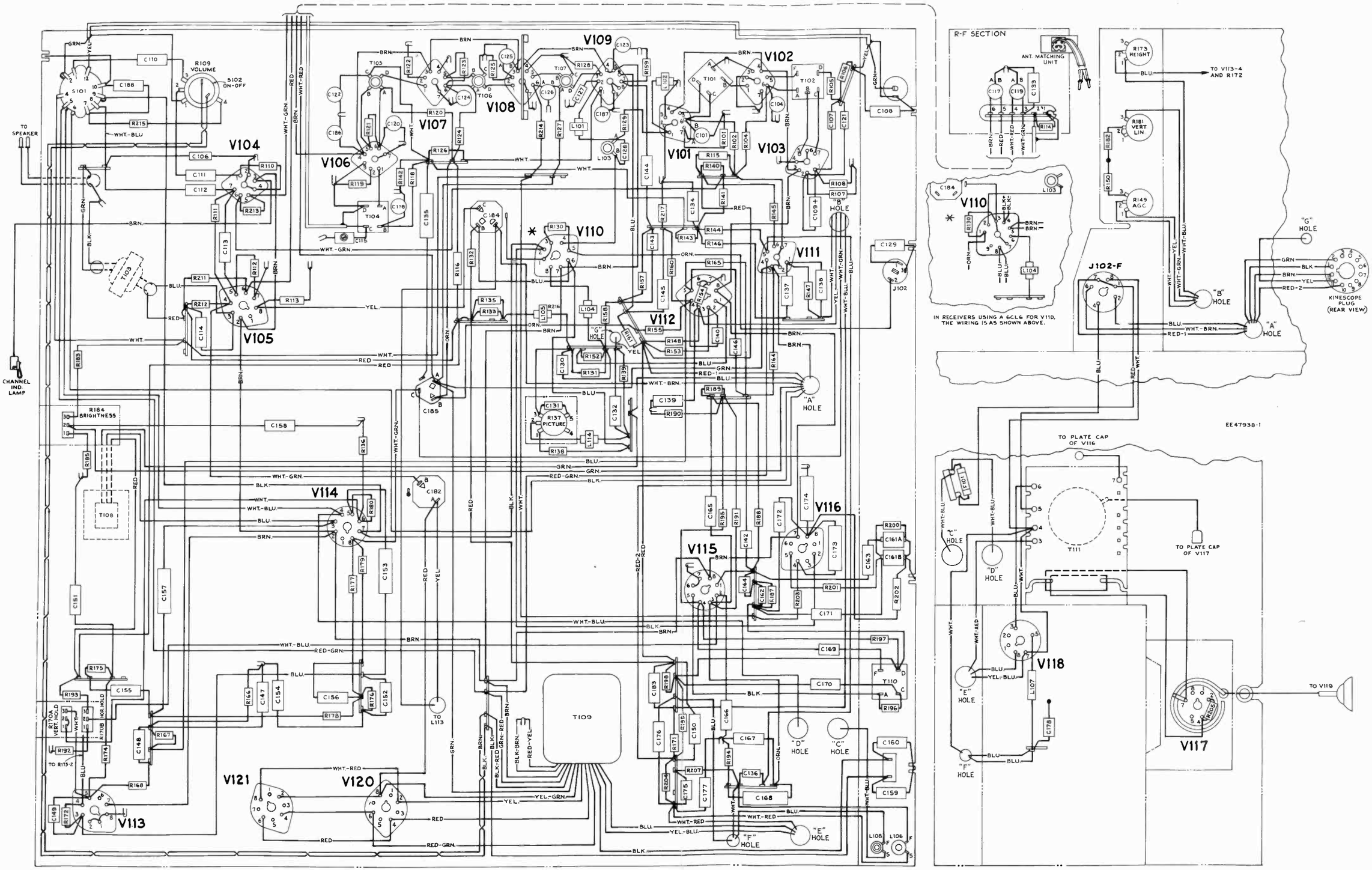
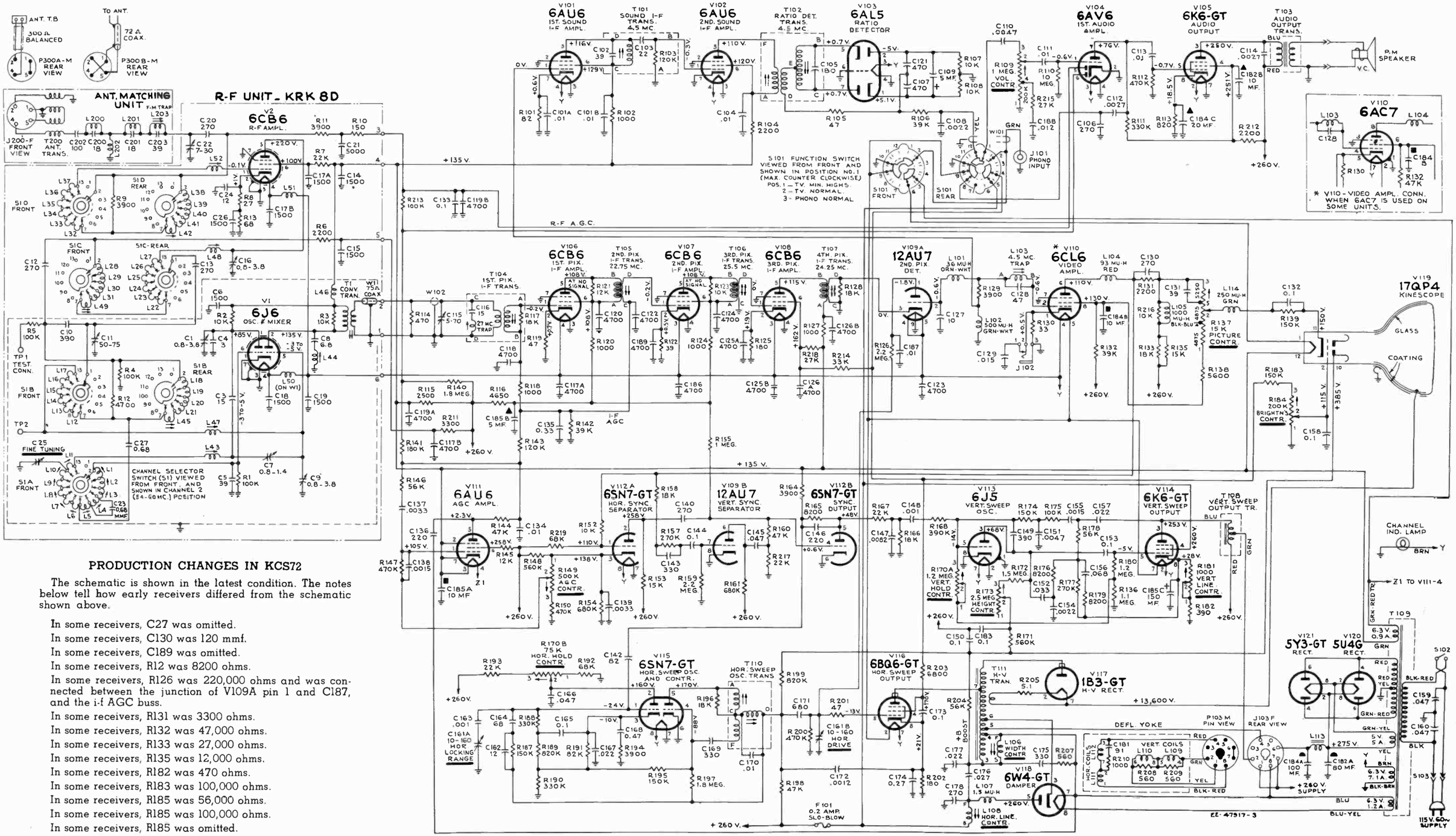


Figure 66—Chassis Wiring Diagram

CIRCUIT SCHEMATIC DIAGRAM KCS72M2



PRODUCTION CHANGES IN KCS72

The schematic is shown in the latest condition. The notes below tell how early receivers differed from the schematic shown above.

In some receivers, C27 was omitted.

In some receivers, C130 was 120 mmf.

In some receivers, C189 was omitted.

In some receivers, R12 was 8200 ohms.

In some receivers, R126 was 220,000 ohms and was connected between the junction of V109A pin 1 and C187, and the i-f AGC buss.

In some receivers, R131 was 3300 ohms.

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.

In some receivers, R183 was 100,000 ohms.

In some receivers, R185 was 56,000 ohms.

In some receivers, R185 was 100,000 ohms.

In some receivers, R185 was omitted.

In some receivers, R218 was omitted.

In some receivers, R219 was omitted.

In some receivers, V119-10 was connected to the junction of R171 and C183.

All resistance values in ohms. K = 1000.

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 ±20% with 117 v. a-c supply.

* In KCS72 V110 was a 6AC7.
In KCS72M1 V110 was a 6AG7 (same pin connections as 6AC7).

Figure 67—Circuit Schematic Diagram

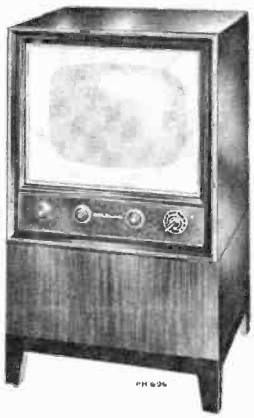
REPLACEMENT PARTS

STOCK No.	DESCRIPTION
	R-F UNIT ASSEMBLIES
	KRK8D
75188	Board—Terminal board, 5 contact and ground
76845	Bracket—Vertical bracket for holding oscillator tube shield
75201	Cable—75 ohm coax cable (7¼") complete with coil (W1, L50)
76965	Capacitor—Ceramic, variable for fine tuning—plunger type (C25)
71088	Capacitor—Headed Lead, 0.68 mmf. (C27)
76968	Capacitor—Ceramic, 3 mmf. (C4)
75200	Capacitor—Ceramic, 12 mmf. (C24)
45465	Capacitor—Ceramic, 15 mmf. (C3)
75196	Capacitor—Ceramic, 39 mmf. (C5)
75199	Capacitor—Ceramic, 270 mmf. (C12, C13, C20)
75641	Capacitor—Ceramic, 390 mmf. (C10)
75166	Capacitor—Ceramic, 1500 mmf. (C6, C14, C15, C19)
73748	Capacitor—Ceramic, 1500 mmf. (C18, C26)
75089	Capacitor—Ceramic, dual 1500 mmf. (C17A, C17B)
73473	Capacitor—Ceramic, 5000 mmf. (C21)
75172	Capacitor—Tubular, steatite, a djustable, 0.65 - 1.2 mmf. (C7)
71504	Capacitor—Ceramic, 0.68 mmf. (C23)
75184	Capacitor—Ceramic, adjustable, 0.75 - 4 mmf., complete with adjusting stud (C1)
75197	Capacitor—Ceramic, 6.8 mmf. (C8)
75189	Capacitor—Adjustable, 7-30 mmf. (C22)
75174	Capacitor—Ceramic, trimmer, 50-75 mmf. (C11)
76143	Clip—Tubular clip for mounting stand-off capacitors
73477	Coil—Choke coil (L51)
75202	Coil—Choke coil, .56 muh (L46)
75185	Coil—Converter plate loading coil (L44)
75182	Coil—Trimmer coil (1½ turns) with adjustable inductance core and capacitor stud (screw adjustment) for converter section (C9, L47)
75183	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L48, C16)
76460	Contact—Test point contact
76966	Core—Adjustable core for fine tuning capacitor
75162	Detent—Detent mechanism and fibre shaft
73453	Form—Coil form for L45, L49
75165	Link—Link assembly for fine tuning
76518	Plate—Front plate and shaft bearing
	Resistor—Fixed, composition:—
503027	27 ohms, ±10%, ½ watt (R8)
503068	68 ohms, ±10%, ½ watt (R13)
504115	150 ohms, ±20%, ½ watt (R10)
503222	2200 ohms, ±10%, ½ watt (R6)
503239	3900 ohms, ±10%, ½ watt (R9, R11)
503247	4700 ohms, ±10%, ½ watt (R12)
502310	1000 ohms, ±5%, ½ watt (R3)
504310	10,000 ohms, ±20%, ½ watt (R2)
503322	22,000 ohms, ±10%, ½ watt (R7)
504410	100,000 ohms, ±20%, ½ watt (R1, R4, R5)
14343	Retainer—Fine tuning shaft retaining ring
75164	Rod—Actuating plunger rod (fibre) for fine tuning link
71476	Screw—#4-40 x ¼" adjusting screw for L6, L7, L8, L9, L10, L11
75177	Screw—#4-40 x ⅜" adjusting screw for L1, L2, L3, L4, L43
75176	Screw—#4-40 x 7/16" adjusting screw for L5
73640	Screw—#4-40 x 7/16" adjusting screw for L52
74575	Screw—#4-40 x .359" adjusting screw for L42
76519	Shaft—Channel selector shaft and plate
76134	Shaft—Fine tuning shaft and cam
76962	Shield—Oscillator and converter sections shield—snap-on type
76967	Shield—Tube shield for V1, V2
75088	Socket—Tube socket, 7 contact, miniature, ceramic, saddle-mounted
75191	Spacer—Insulating spacer for front plate
75163	Spring—Friction spring (formed) for fine tuning cam
30340	Spring—Hair pin spring for fine tuning link
74578	Spring—Retaining spring for adjusting screws
76961	Spring—Retaining spring for oscillator tube shield
73457	Spring—Return spring for fine tuning control
75180	Stator—Antenna stator complete with rotor, coils, capacitors (C20, C21) and resistors (R9, R10, R11) (S1-4, C20, C21, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L52, R9, R10, R11)
77459	Stator—Converter stator complete with rotor, coils, capacitors and resistors (S1-2, C10, C12, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L45, R4, R5, R12)
76963	Stator—Oscillator section stator complete with rotor, segment, coils, adjusting screws and capacitors C3, C23 (S1-1, C3, C23, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L43)
76964	Stator—R-F amplifier stator complete with rotor, coils, capacitors (C13) and resistor (R6) (S1-3, C13, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L49, R6)
75170	Strip—Coil segment mounting strip—L.H. lower
75171	Strip—Coil segment mounting strip—L.H. upper—less trimmer C7
75169	Strip—Coil segment mounting strip—R.H. center
75446	Stud—Capacitor stud—brass—#4-40 x 3/16" with 3/64" screw driver slot for trimmer coils L47, L48 and capacitor C1 uncoded and coded "ER"
75447	Stud—Capacitor stud—brass—#4-40 x 3/16" with 3/64" screw driver slot for trimmer coils L47, L48 and capacitor C1 coded numerically and "Hi-Q"
75173	Stud—#6-32 x 13/16" adjusting stud for trimmer C7
75181	Transformer—Converter transformer (T1)
75607	Washer—Insulating washer (hex)
75190	Washer—Insulating washer (neoprene) for trimmer C7
	CHASSIS ASSEMBLIES
	KCS72
76456	Bracket—Channel indicator lamp bracket
76454	Bracket—Mounting bracket complete with insulator for picture control
71496	Capacitor—Adjustable, mica, 5-70 mmf. (C115)
33098	Capacitor—Ceramic, 10 mmf. (C127)
33380	Capacitor—Ceramic, 12 mmf. (C162)
75450	Capacitor—Ceramic, 39 mmf. (C203)
73664	Capacitor—Ceramic, 39 mmf. (C131)
76475	Capacitor—Mica, 68 mmf. (C164)
76474	Capacitor—Mica, 82 mmf. (C142)
75437	Capacitor—Ceramic, 100 mmf. (C202)

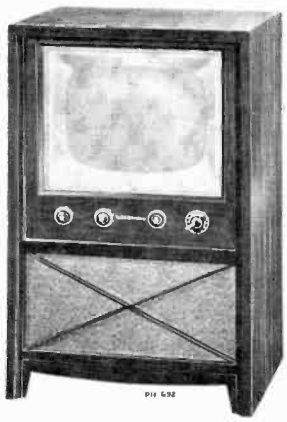
REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
76673	Capacitor—Ceramic, 220 mmf. (C136)
75248	Capacitor—Mica, 220 mmf. (C146)
47617	Capacitor—Ceramic, 270 mmf. (C106)
39638	Capacitor—Mica, 270 mmf. (C130)
73091	Capacitor—Mica, 270 mmf. (C140, C178)
76476	Capacitor—Mica, 330 mmf. (C169, C175)
39640	Capacitor—Mica, 330 mmf. (C143)
73094	Capacitor—Mica, 390 mmf. (C149)
39644	Capacitor—Mica, 470 mmf. (C107, C121)
76990	Capacitor—Ceramic, dual 4700 mmf. (C117A, C117B, C119A, C119B, C125A, C125B, C126A, C126B)
73473	Capacitor—Ceramic, 4700 mmf. (C118, C120, C122, C123, C124, C186, C189)
73960	Capacitor—Ceramic, 10,000 mmf. (C104, C187)
76991	Capacitor—Ceramic, dual 10,000 mmf. (C101A, C101B)
74521	Capacitor—Electrolytic, 5 mfd., 50 volts (C109)
75218	Capacitor—Electrolytic, comprising 1 section of 10 mfd., 350 volts, 1 section of 5 mfd., 350 volts and 1 section of 150 mfd., 50 volts (C185A, C185B, C185C)
75217	Capacitor—Mica trimmer, dual 10-160 mmf. (C161A, C161B)
76987	Capacitor—Electrolytic, comprising 1 section of 80 mfd., 400 volts and 1 section of 10 mfd., 350 volts (C182A, C182B)
76970	Capacitor—Electrolytic comprising 1 section of 100 mfd., 400 volts, 1 section of 10 mfd., 350 volts and 1 section of 20 mfd., 50 volts (C184A, C184B, C184C)
76479	Capacitor—Tubular, moulded paper, oil impregnated, .00068 mfd., 600 volts (C171)
75643	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 1000 volts (C148, C163)
76995	Capacitor—Tubular, moulded paper, oil impregnated, .0012 mfd., 600 volts (C172)
76508	Capacitor—Tubular, paper, oil impregnated, .0015 mfd., 600 volts (C138)
77123	Capacitor—Tubular, moulded paper, oil impregnated, .0015 mfd., 1000 volts (C155)
73595	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 600 volts (C108, C154)
73599	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 600 volts (C112)
73818	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 1600 volts (C114)
73795	Capacitor—Tubular, paper, oil impregnated, .0033 mfd., 600 volts (C137, C139)
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C110, C151)
73808	Capacitor—Tubular, paper, oil impregnated, .0082 mfd., 1000 volts (C147)
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 400 volts (C111, C113, C134)
73594	Capacitor—Tubular, moulded paper, oil impregnated, .01 mfd., 600 volts (C170)
74938	Capacitor—Tubular, paper, oil impregnated, .012 mfd., 200 volts (C188)
73797	Capacitor—Tubular, paper, oil impregnated, .015 mfd., 600 volts (C129)
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 400 volts (C167)
73798	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 600 volts (C157)
73810	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 1000 volts (C177)
73811	Capacitor—Tubular, paper, oil impregnated, .027 mfd., 1000 volts (C176)
73596	Capacitor—Tubular, paper, oil impregnated, .033 mfd., 1000 volts (C152)
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C145, C166)
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts (C159, C160)
73792	Capacitor—Tubular, paper, oil impregnated, .068 mfd., 400 volts (C156)
73784	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 200 volts (C132, C133)
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C144, C150, C158, C165, C183)
73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C153, C173)
73786	Capacitor—Tubular, paper, oil impregnated, 0.27 mfd., 200 volts (C174)
76994	Capacitor—Tubular, paper, oil impregnated, 0.33 mfd., 200 volts (C135)
73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C168)
76498	Choke—Filter choke (L113)
73591	Coil—Antenna matching coil (2 req'd) (Part of T200)
75241	Coil—Antenna shunt coil (L202)
76442	Coil—Horizontal linearity coil complete with adjustable core (L108)
76441	Coil—Width coil complete with adjustable core (L106)
76640	Coil—Peaking coil (1.5 muh) (L107)
76011	Coil—Peaking coil (36 muh) (L101)
71527	Coil—Peaking coil (93 muh) (L104)
71526	Coil—Peaking coil (250 muh) (L114)
75252	Coil—Peaking coil (500 muh) (L102)
77124	Coil—Peaking coil (1000 muh) (L105, R216)
71789	Connector—Anode lead connector complete
35787	Connector—Phono input connector (J101)
75474	Connector—Single contact male connector for speaker cable
75482	Connector—Video connector (J102)
74594	Connector—2 contact male connector for power cord
38853	Connector—4 contact female connector for antenna transformer (J200)
50367	Connector—6 contact female connector for yoke lead (J103)
75542	Connector—6 contact male connector—part of deflection yoke (P103)
76975	Control—AGC control (R149)
76444	Control—Brightness control (R184)
76448	Control—Height control (R173)
76974	Control—Horizontal and vertical hold control (R170A, R170B)
76445	Control—Picture control (R137)
76976	Control—Vertical linearity control (R181)
77010	Control—Volume control and power switch (R109, S102)
71498	Core—Adjustable core and stud for FM trap 75449
76986	Cover—Back cover for hi-voltage compartment
76985	Cover—Side cover for hi-voltage compartment
74956	Cushion—Rubber cushion for deflection yoke hood
74839	Fastener—Push fastener for mounting tube socket 76453
73600	Fuse—0.25 amps., 250 volts (F101)
37396	Grommet—Rubber grommet for mounting tube socket 76453
76459	Grommet—Rubber grommet for 2nd. anode lead exit
76830	Hood—Deflection yoke hood less rubber cushions
76168	Magnet—Focus magnet
76141	Magnet—Ion trap magnet (P.M. type)

RCA VICTOR



Model 17T250DE
"Brett"
Walnut, Mahogany
Shown on Base



Model 17T261DE
"Ainsworth"
Walnut, Mahogany, Blonde

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" 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 FREQUENCY RANGE

All 12 television channels, 54 mc. to 88 mc., 174 mc. to 216 mc.
Picture I-F Carrier Frequency.....45.75 mc.
Sound I-F Carrier Frequency.....41.25 mc. and 4.5 mc.

VIDEO RESPONSE.....To 4 mc.

SWEEP DEFLECTION.....Magnetic

FOCUS.....Magnetic

POWER SUPPLY RATING

KCS74.....115 volts, 60 cycles, 190 watts

AUDIO POWER OUTPUT RATING

KCS74.....5.0 watts max.

CHASSIS DESIGNATIONS

KCS74 or KCS74M1.....In Models 17T250DE and 17T261DE
*KCS74 (V110-6CL6)-KCS74M1 (V110-6AG7)

LOUDSPEAKERS

Model 17T250DE.....(971490-3) 8" PM Dynamic, 3.2 ohms
Model 17T261DE.....(92569-12) 12" PM Dynamic, 3.2 ohms

WEIGHT

Model	Shipping Weight	Width Inches	Height Inches	Depth Inches
17T250DE	88 lbs.	105 lbs.	21⅜	22⅝	22¾
17T261DE	102 lbs.	126 lbs.	24	37¼	23¼

RECEIVER ANTENNA INPUT IMPEDANCE

Choice: 300 ohms balanced or 72 ohms unbalanced.

RCA TUBE COMPLEMENT

	Tube Used	Function
(1)	RCA 6BQ7	R-F Amplifier
(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
(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	1st Audio Amplifier
(12)	RCA 6AQ5	Audio Output
(13)	RCA 6CB6	AGC Amplifier
(14)	RCA 6SN7GT	Sync Separator
(15)	RCA 6SN7GT	Vert. Sync Amplifier and Vert. Sweep Osc.
(16)	RCA 6AQ5	Vertical Sweep Output
(17)	RCA 6SN7GT	Horizontal Sync Amplifier
(18)	RCA 6SN7GT	Horizontal Sweep 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)

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	41.25 mc. and 4.5 mc.
VIDEO RESPONSE	To 4 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

OPERATING CONTROLS (Front Panel)

Channel Selector, Fine Tuning	Dual Control Knobs
Picture Brightness	Dual Control Knobs
Picture Horizontal Hold, Picture Vertical Hold	Dual Control Knobs
Sound Volume and On-Off Switch, Tone Control and Phono Switch	Dual Control Knobs

NON-OPERATING CONTROLS (not including r-f and i-f adjustments)

Picture Centering	top chassis adjustment
Width	rear chassis adjustment
Height	rear chassis adjustment
Horizontal Linearity	rear chassis screwdriver adjustment
Vertical Linearity	rear chassis adjustment
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 Coil	top chassis wing nut adjustment
AGC Control	rear chassis adjustment

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.

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.

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 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.

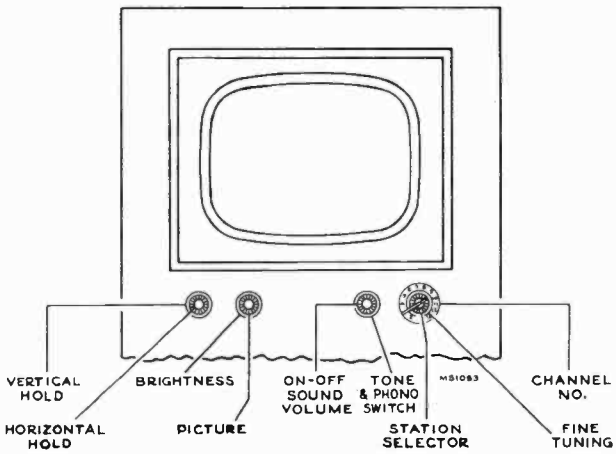


Figure 1—Receiver Operating Controls

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 tone switch to a "PH" position.

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.

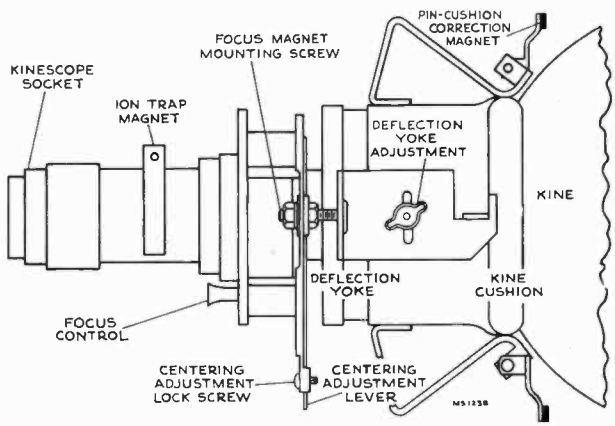


Figure 2—Yoke and Focus Magnet Adjustments

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 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

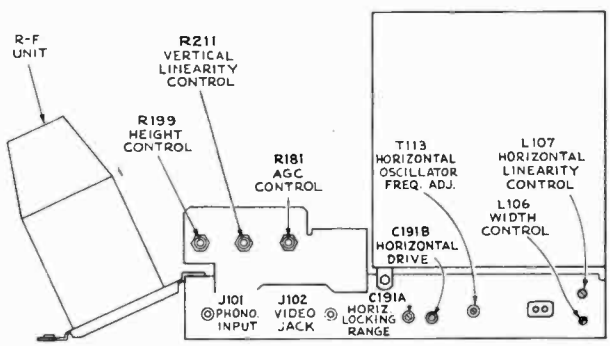


Figure 3—Rear Chassis Adjustments

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 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 C191B 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 counter-clockwise 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 re-adjustment 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.

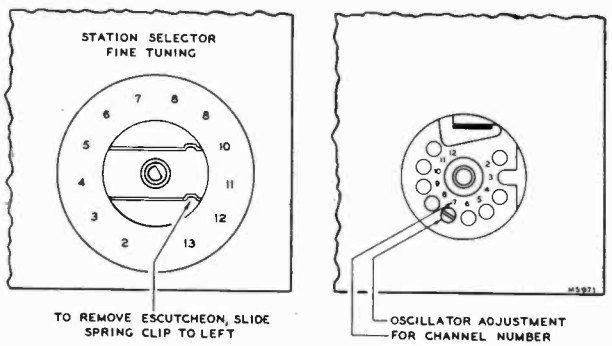


Figure 4—R-F Oscillator Adjustments

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.

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 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.

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.

CHASSIS TOP VIEW

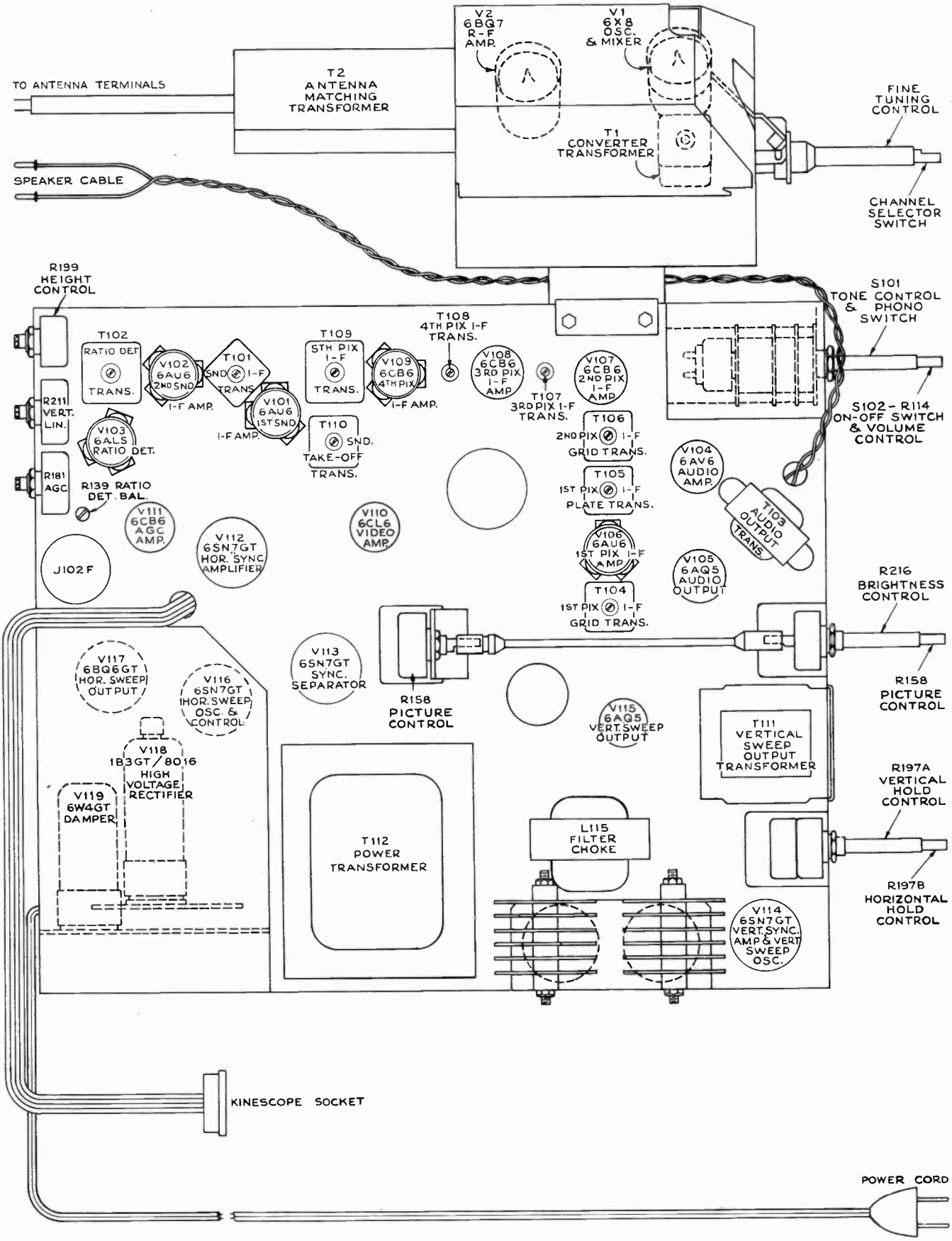


Figure 5—Chassis Top View

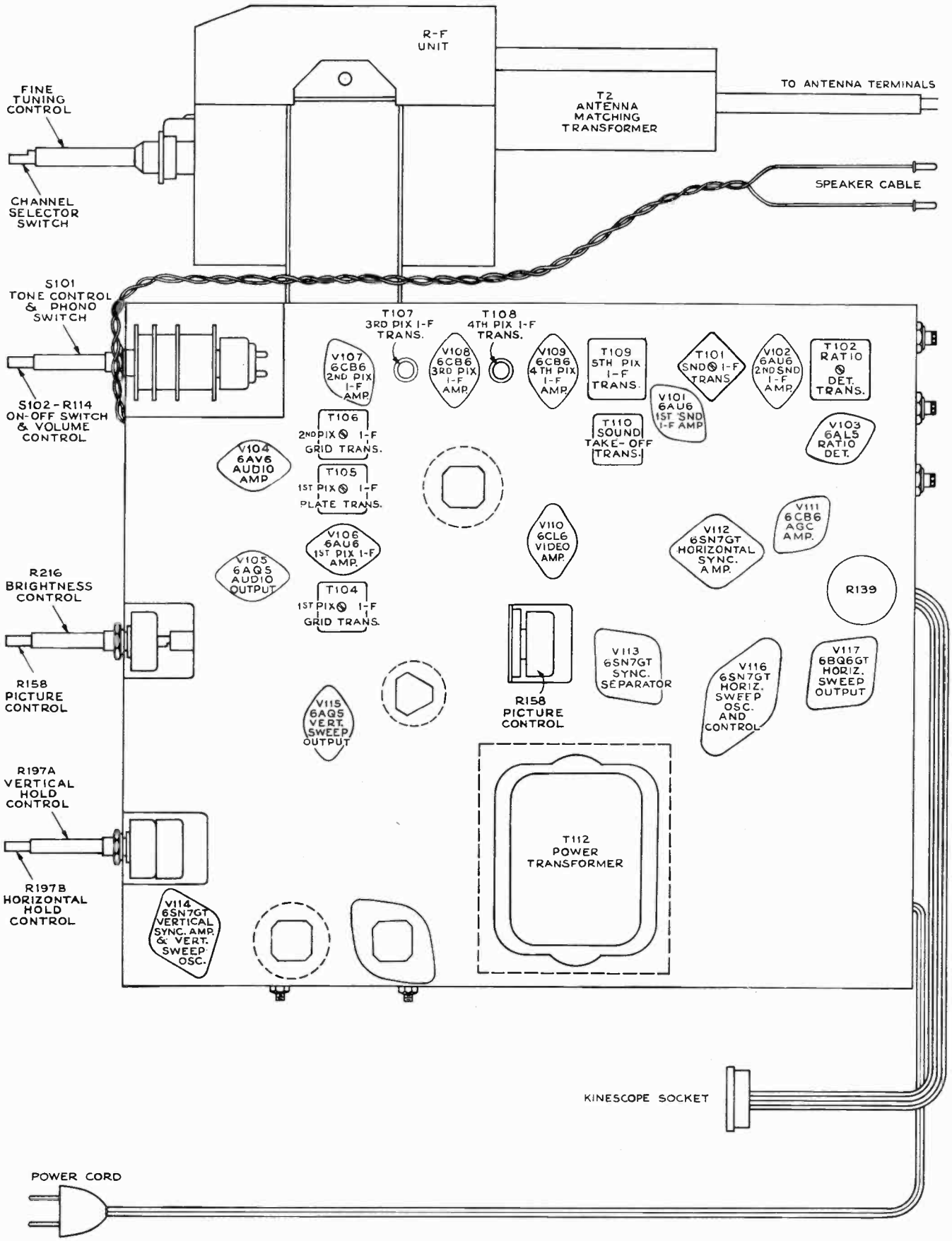


Figure 6—Chassis Bottom View

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	123
6	83.25	87.75	129
7	175.25	179.75	221
8	181.25	185.75	227
9	187.25	191.75	233
10	193.25	197.75	239
11	199.25	203.75	245
12	205.25	209.75	251
13	211.25	215.75	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
(2) R-F Unit
(3) Ratio Detector
(4) Sound I-F Trans.
(5) Sound Take-Off Trans.
(6) Picture I-F Traps
(7) Picture I-F Trans.
(8) Sweep Alignment of I-F
(9) Horizontal Oscillator
(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 ½ 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.

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 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 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	101	L1
3	61.25	65.75	107	L2
4	67.25	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	191.75	233	L8
10	193.25	197.75	239	L9
11	199.25	203.75	245	L10
12	205.25	209.75	251	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 T104.

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 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 "VoltOhmyst."

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 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 pin 2 of V110 with −1.0 volt of i-f bias at the junction of R193 and R194.

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 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 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 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.

C122 is variable and is provided as a band width adjustment. Preset C122 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.

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 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 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.

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.

17T250DE, 17T261DE 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	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
	ANTENNA MATCHING UNIT ALIGNMENT									
1	Do not adjust this unit unless fairly certain that it requires adjustment. Disconnect lead from L58 to S5. 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.									
2	Antenna terminals	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 terminals loosely		Antenna terminals through pad	45 to 54 mc.	"	—	Scope a xtal probe to gnd.	Connect 300 ohms from L58 to gnd.	L61 and L62 to obtain response of Fig. 12	Fig. 7 Fig. 11 Fig. 12
	R-F UNIT ALIGNMENT									
5	If unit is completely out of adjustment, preset all adjustments to center of range with following exceptions. Set C18 so that head is ⅜" above chassis. Set T1 max. counterclockwise. Set C11 ¼ 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 clockwise from mechanical center of its range for all oscillator adjustments.									
6	Grid, pin 7 of V2 through 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. indication 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 channel 8	C1 for beat on het. freq. meter	Fig. 7
8	Antenna terminals loosely	181.25 and 185.75	Antenna terminals through pad	Channel 8	Not used	—	TP1. Gain to maximum	"	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 channel 6	L5 for beat on het. freq. meter	Fig. 8
10	Antenna terminals loosely	83.25 and 87.75	Antenna terminals 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. Connect "VoltOhmyst" to TP1	C8 for —3.5 volts on meter	Fig. 7
12	Antenna terminals loosely	83.25 and 87.75	Antenna terminals through pad	Channel 6	Not used	—	TP1. Gain to maximum	R-F unit on channel 6	Check response. Readjust 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 channel 8	C1 for beat on het. freq. meter	Fig. 7
14	Antenna terminals loosely	181.25 and 185.75	Antenna terminals through pad	Channel 8	Not used	—	TP1. Gain to maximum	"	Check response adjust C9, C11, C15 and C18 if necessary	Fig. 7
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.									
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. Overshoot L46 slightly and adjust C1 for beat.	Fig. 7
17	Antenna terminals loosely	211.25 215.75	Antenna terminals 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	"	Channel 11	"	—	"	Rec. on channel 11	"	Fig. 13
20	"	193.25 197.75	"	Channel 10	"	—	"	Rec. on channel 10	"	Fig. 13
21	"	187.25 191.75	"	Channel 9	"	—	"	Rec. on channel 9	"	Fig. 13
22	"	181.25 185.75	"	Channel 8	"	—	"	Rec. on channel 8	"	Fig. 13
23	"	175.25 179.75	"	Channel 7	"	—	"	Rec. on channel 7	"	Fig. 13
24	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 yet maintain correct response on channel 8.									
25	Repeat step 13. If the oscillator is off frequency overshoot the adjustment of C1 and correct by adjusting L46.									
26	Repeat steps 16 through 25 until all adjustments are obtained.									
27	Not used	—	Not used	—	Loosely to r-f unit oscillator	129 mc.	Not used	Rec. on channel 6	L5 for beat on het. freq. meter	Fig. 7
28	Antenna terminals loosely	83.25 87.75	Antenna terminals through pad	Channel 6	Not used	—	TP1. Gain to maximum	Rec. on channel 6 "VoltOhmyst" on TP1	Check to see that response is correct and —3.0 volts of osc. injection is present	Fig. 7 Fig. 13
29	"	77.25 81.75	"	Channel 5	"	—	"	Rec. on channel 5	"	Fig. 13
30	"	67.25 71.75	"	Channel 4	"	—	"	Rec. on channel 4	"	Fig. 13
31	"	61.25 65.75	"	Channel 3	"	—	"	Rec. on channel 3	"	Fig. 13

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	"	55.25 59.75	"	Channel 2	"	—	"	Rec. on channel 2	"	Fig. 13
33	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 max. amplitude of response between carrier markers.									
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.									
35	Not used	—	Not used	—	Loosely coupled to r-f oscillator	257 mc.	TP1. Gain to maximum	Rec. on channel 13	C1 for beat on het. freq. meter	Fig. 7
36	"	—	"	—	"	251 mc.	"	Rec. on channel 12	L11 as above	Fig. 7
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	L1 as above	Fig. 7
47	Repeat steps 35 through 46 as a check. On completion, remove 39 ohm resistor and reconnect link to terminals A and B of T104.									
	RATIO DETECTOR, SOUND I-F AND SOUND TAKE-OFF ALIGNMENT									
48	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 bottom core for min. audio on the oscilloscope.	Fig. 9 Fig. 10
49	"	"	"	—	"	—	"	"VoltOhmyst" to junction R112 and C113. If the meter reads more than ±1.5 volts, adjust C226 for zero on the meter and readjust T102 (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.	1st Sound I-F grid (pin 1, V101)	4.5 mc.	"	—	In series with 10,000 ohms to terminal A, of T101.	Sweep output reduced 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 form (positive and negative).		Fig. 15
52	Sig. Gen. in series 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
	PICTURE I-F AND TRAP ADJUSTMENT									
53	Not used	—	Not used	—	Not used	—	Not used	Connect bias box to junction of R143 and R144 and to gnd. Adjust to give —1.0 v on "VoltOhmyst" at 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.	"	—	"	—	"	"	T105 bot. for min.	Fig. 10
56	"	47.25 mc.	"	—	"	—	"	"	T106 bot. for min.	Fig. 10
57	"	43.7 mc.	"	—	"	—	"	Sig. Gen. output to give —1.0 V d-c at TP102.	T109 for max.	Fig. 7
58	"	45.5 mc.	"	—	"	—	"	"	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 response 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 probe to T105-B and to gnd.	Rec. on chan. 4. Connect 180 ohms from T105-B to junction R135 and C132. Upon completion disconnect scope and shunting 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 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 response shown in Fig. 18. Do not adjust T107 unless absolutely necessary.	Fig. 18

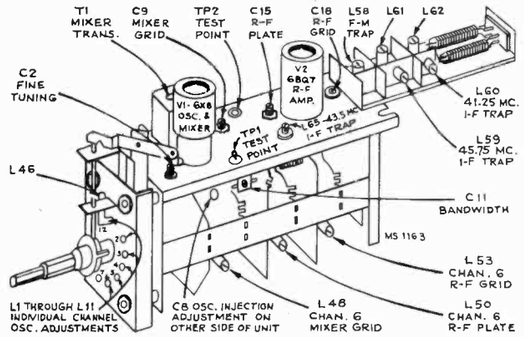


Figure 7—R-F Unit Adjustments

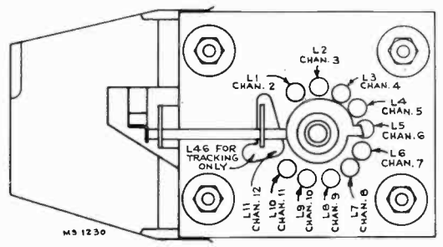


Figure 8—R-F Oscillator Adjustments

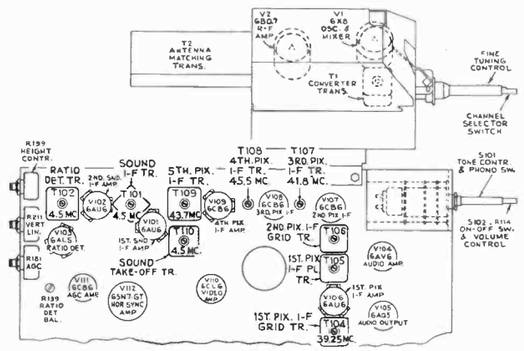


Figure 9—Top Chassis Adjustments

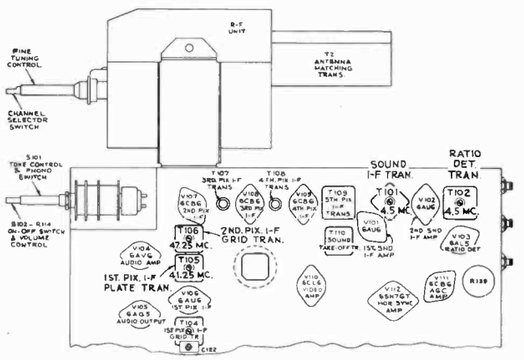


Figure 10—Bottom Chassis Adjustments

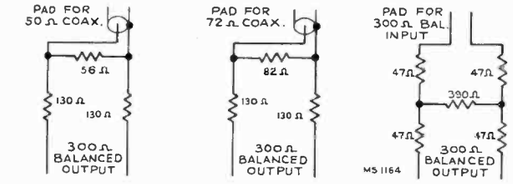


Figure 11—Sweep Attenuator Pads

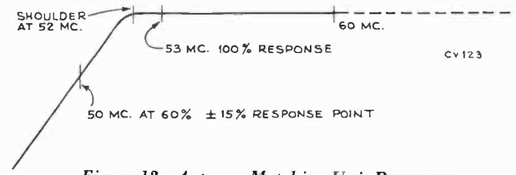


Figure 12—Antenna Matching Unit Response

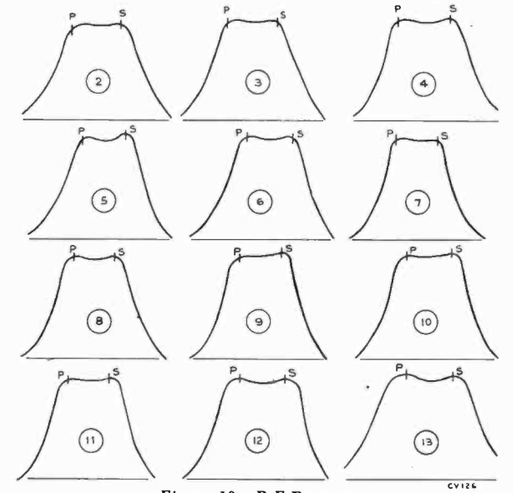


Figure 13—R-F Response

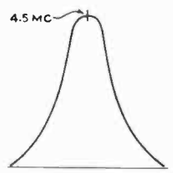


Figure 14 Sound I-F Response

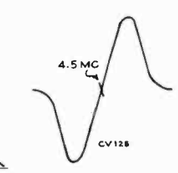


Figure 15 Ratio Det. Response

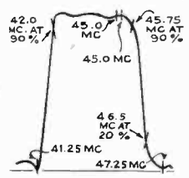


Figure 16 T105 and T106 Response

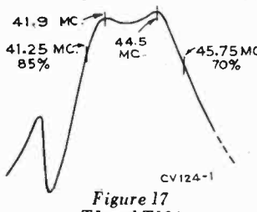


Figure 17 T1 and T104 Response

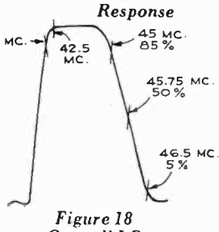


Figure 18 Over-all I-F Response

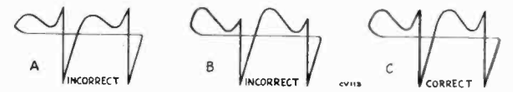


Figure 19—Horizontal Oscillator Waveforms

TEST PATTERN PHOTOGRAPHS

Figure 20—Normal Picture

Figure 21—Focus Magnet and Ion Trap Magnet Misadjusted

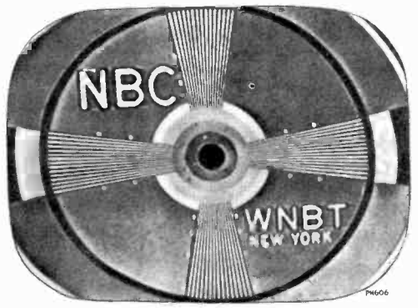


Figure 22—Horizontal Linearity Control Misadjusted (Picture Cramped in Middle)

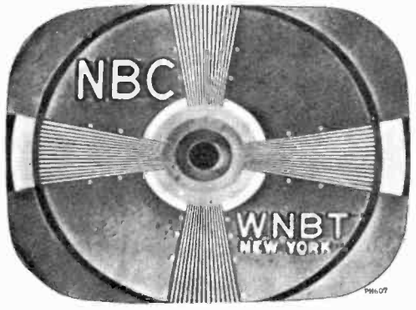


Figure 23—Width Control Misadjusted

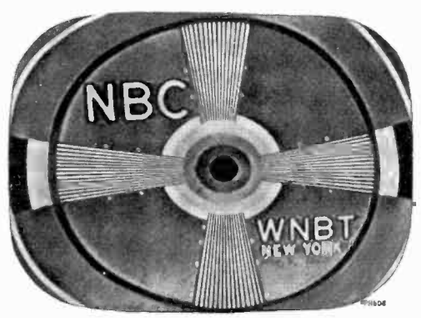


Figure 24—Horizontal Drive Control Misadjusted

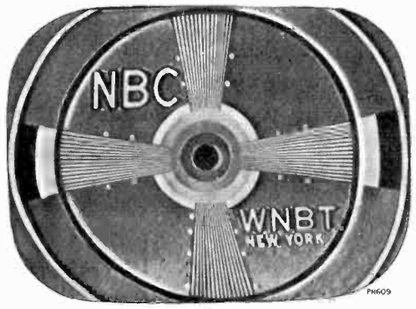


Figure 25—Transients

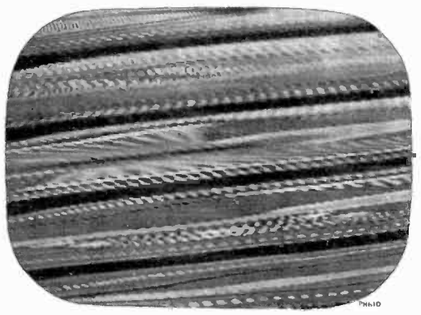


Figure 26—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position—Just Before Pulling Into Sync

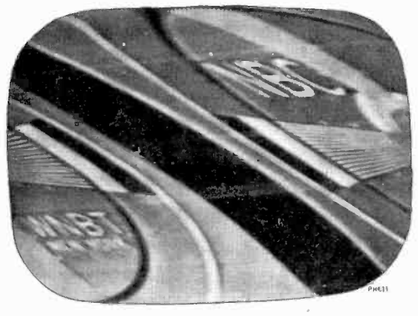


Figure 27—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position

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 or its filament circuit is open.

(4) V110 circuit inoperative—Refer to schematic and waveform chart.

(5) Damper tube (V119) inoperative.

(6) Defective kinescope.

(7) R216 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 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 T111 defective.

(3) V114B defective—check voltage and waveforms on grid and plate.

(4) C176, C180, C181, C178, C177 or C182 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 V119.

(2) T114 or L107 defective.

(3) C205 or C206 defective.

WRINKLES ON SIDE OF RASTER:

(1) C208 defective.

(2) Defective yoke.

PICTURE OUT OF SYNC HORIZONTALLY:

(1) T113 incorrectly tuned.

(2) R226, R227 or R197B 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) 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 R181 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.

(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) C163, C191A, C190, C194, C195, C197, C196, C198 or C199 defective.

(5) If horizontal speed is completely off and cannot be adjusted check R226, R227, R197B, R228, R229, R230 and R232.

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 JITTER:

(1) AGC control R181 misadjusted.

(2) If regular sections at the left picture are displaced change V117.

(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 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 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.

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.

RESPONSE PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

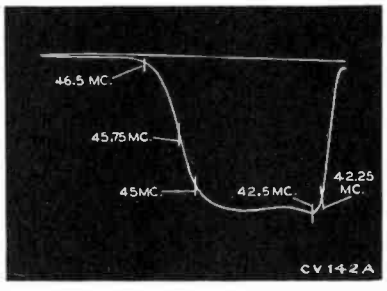


Figure 28—Overall Pix I-F Response

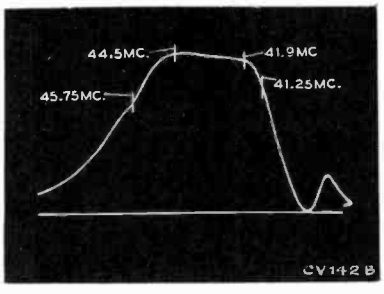


Figure 29—Response of T1-T104 Pix I-F Transformers

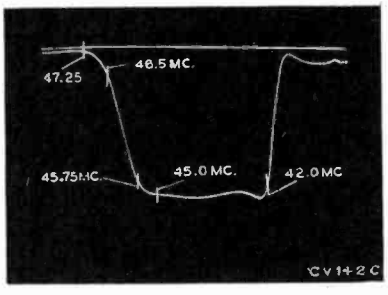


Figure 30—Response of T105-T106 Pix I-F Transformer

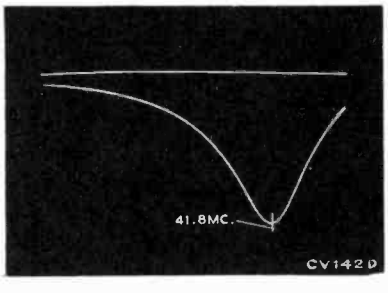


Figure 31—Response of T107 Pix I-F Transformer

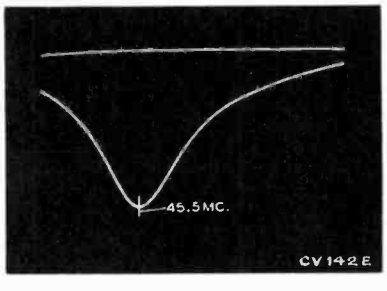


Figure 32—Response of T108 Pix I-F Coil

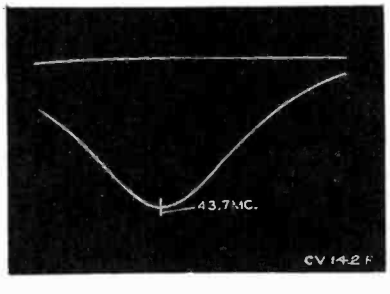


Figure 33—Response of T109 Pix I-F Coil

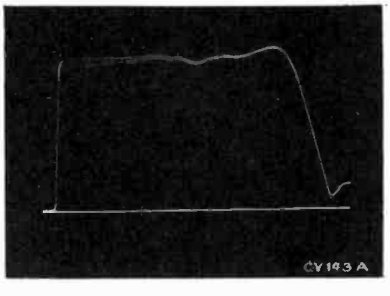


Figure 34—Video Response at Average Contrast

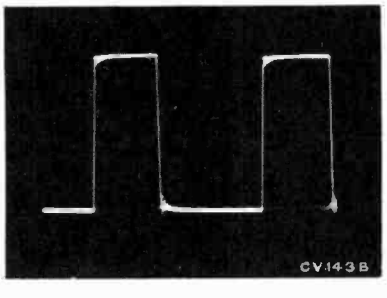


Figure 35—Video Response (100 KC Square Wave)

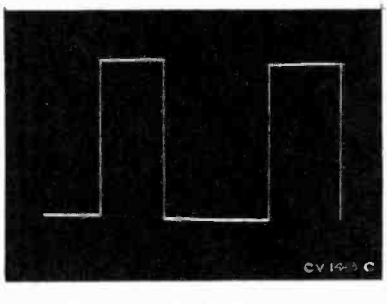
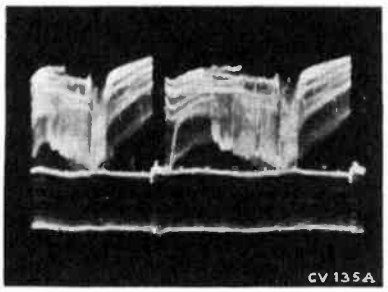


Figure 36—Video Response (60 Cycle Square Wave)

WAVEFORM PHOTOGRAPHS

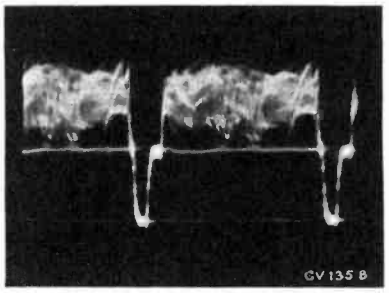
Taken from RCA WO58A Oscilloscope



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)



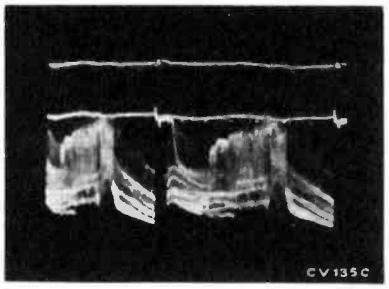
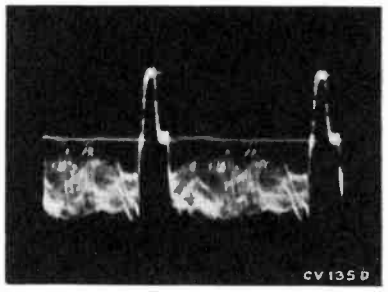


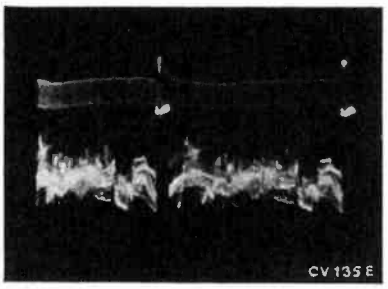
Plate of Video Amplifier
(Pin 6 of V110) (6CL6)
(Pin 8 of V110) (6AG7)

Voltage depends on picture

Figure 39—Vertical (105 Volts PP)

Figure 40—Horizontal (105 Volts PP)



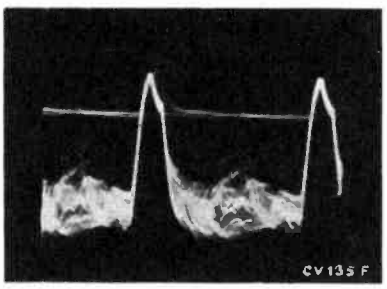


Grid of Sync Separator
(Pin 4 of V113) (6SN7)

Voltage depends on picture

Figure 41—Vertical (30 Volts PP)

Figure 42—Horizontal (30 Volts PP)



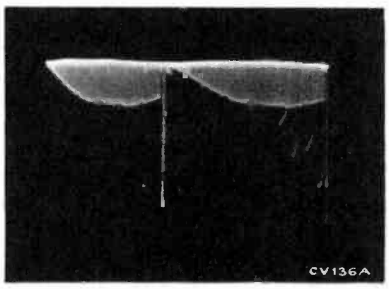
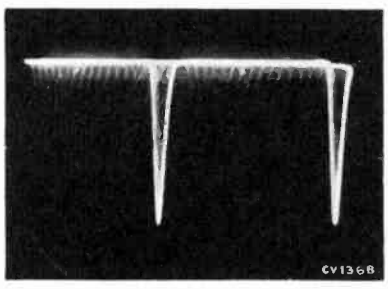


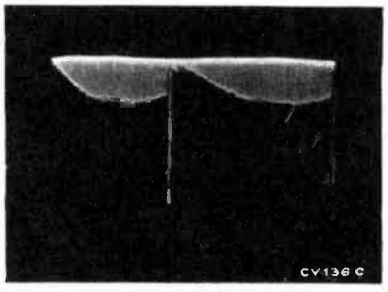
Plate of Sync Separator
(Pin 5 of V113) (6SN7)

Voltage depends on picture

Figure 43—Vertical (33 Volts PP)

Figure 44—Horizontal (8 Volts PP)

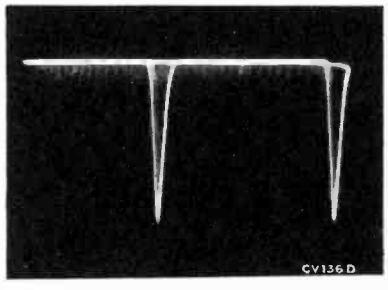




Grid of Vertical Sync Amp.
(Pin 4 of V114A) (6SN7)

Figure 45—Vertical (12 Volts PP)

Figure 46—Horizontal (5 Volts PP)



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

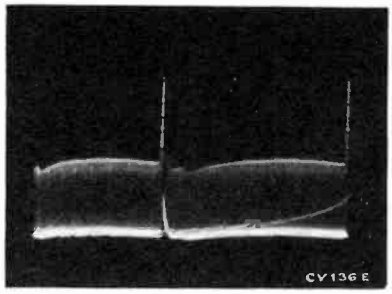
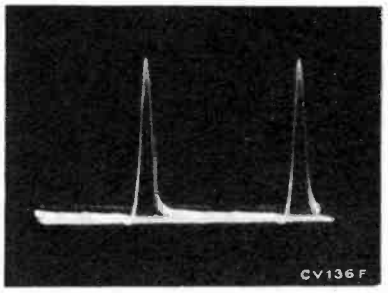


Plate of Vertical Sync Amp. (Pin 5 of V114A) (6SN7)

Figure 47—Vertical (27 Volts PP)

Figure 48—Horizontal (16 Volts PP)



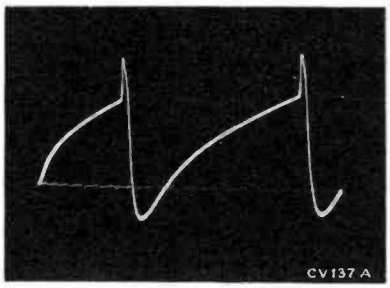
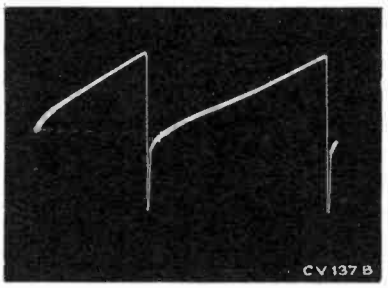


Figure 49—Grid of Vertical Sweep Osc. (Pin 1 of V114B) (6SN7) (25 Volts PP)

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



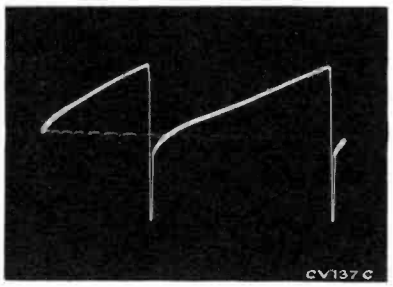
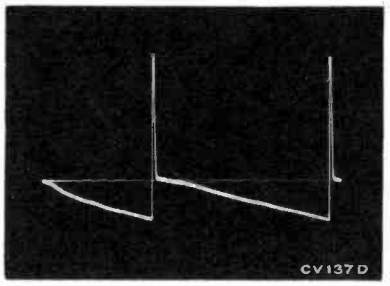
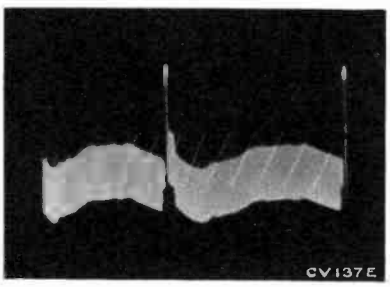


Figure 51—Grid of Vertical Sweep Output (Pin 1 of V115) (6AQ5) (35 Volts PP)

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

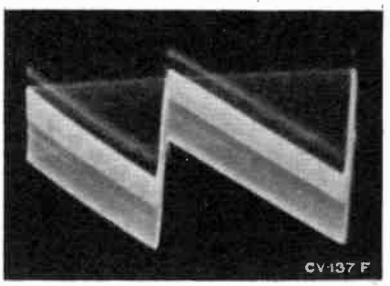


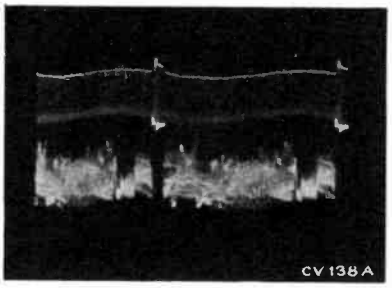


Cathode of Sync Separator (Pin 3 of V113) (6SN7)

Figure 53—Vertical (11 Volts PP)

Figure 54—Horizontal (6 Volts PP)

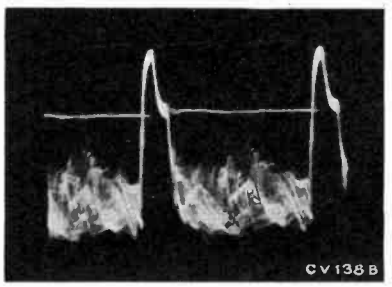




Grid of Sync Separator (Pin 1 of V113) (6SN7)

Figure 55—Vertical (40 Volts PP)

Figure 56—Horizontal (40 Volts PP)



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

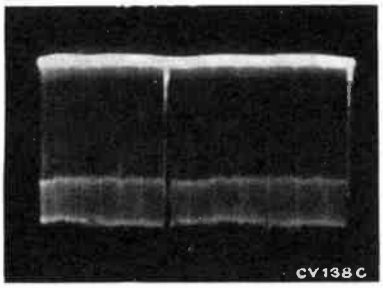
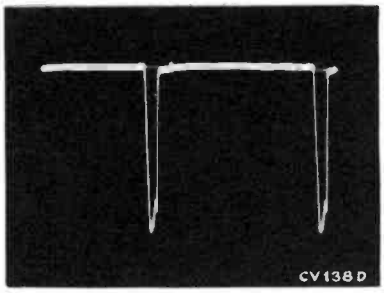
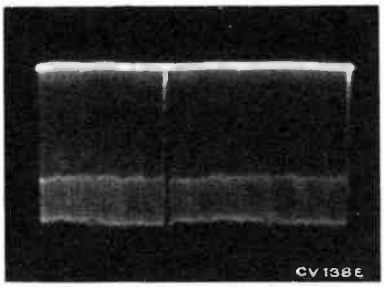


Plate of Sync Separator
(Pin 2 of V113)

Figure 57—Vertical (15 Volts PP)

Figure 58—Horizontal (15 Volts PP)

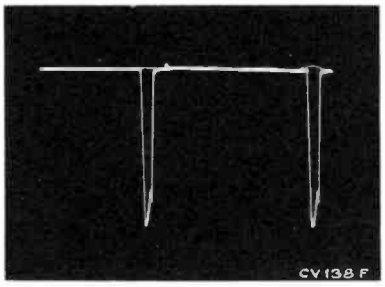




Grid of Hor Sync Amp
(Pin 4 of V112) (6SN7)

Figure 59—Vertical (15 Volts PP)

Figure 60—Horizontal (15 Volts PP)



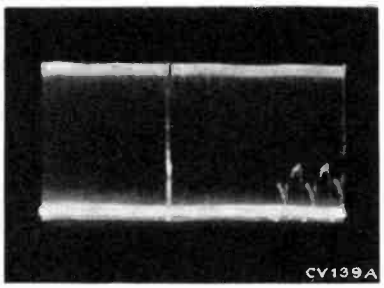
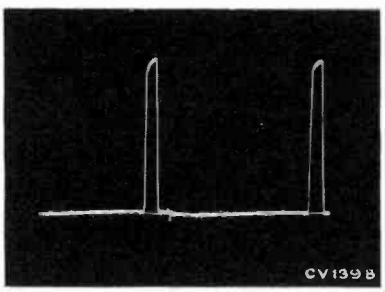
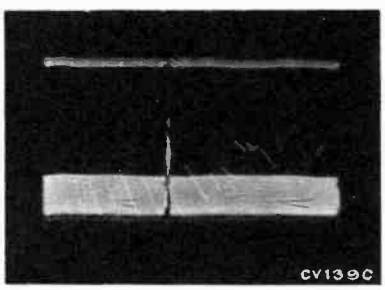


Plate of Hor Sync Amp
(Pin 5 of V112) (6SN7)

Figure 61—Vertical (70 Volts PP)

Figure 62—Horizontal (70 Volts PP)

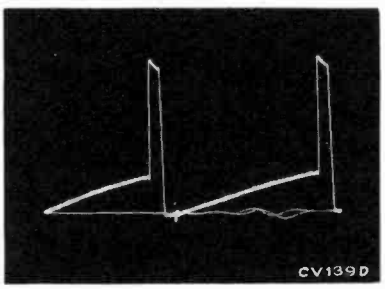


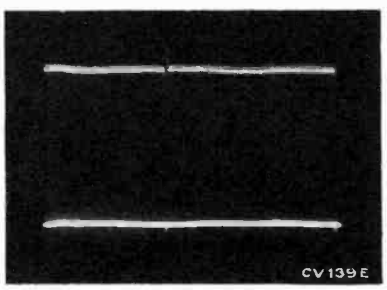


Grid of Hor Sync Amp
(Pin 1 of V112) (6SN7)

Figure 63—Vertical (65 Volts PP)

Figure 64—Horizontal (65 Volts PP)

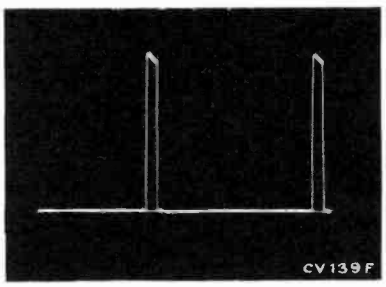




Cathode of Hor Sync Amp
(Pin 3 of V112) (6SN7)

Figure 65—Vertical (18 Volts PP)

Figure 66—Horizontal (18 Volts PP)



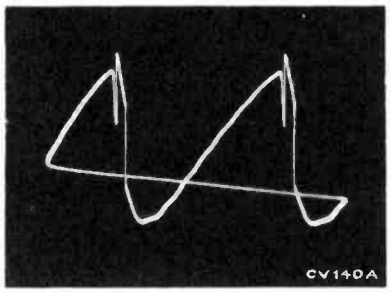
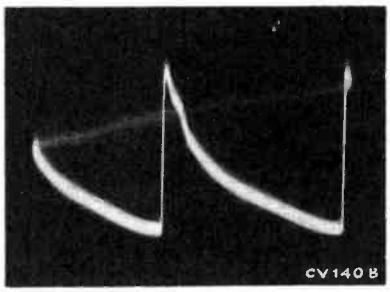


Figure 67—Grid of Horizontal Oscillator Control (22 Volts PP) (Pin 1 of V116) (6SN7GT)

Figure 68—Cathode of Horizontal Oscillator Control (1.3 Volts PP) (Pin 3 of V116) (6SN7GT)



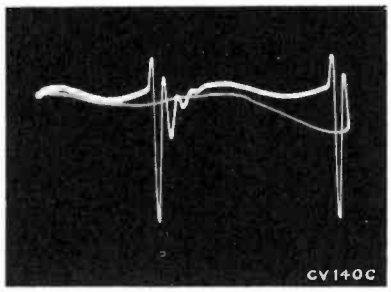
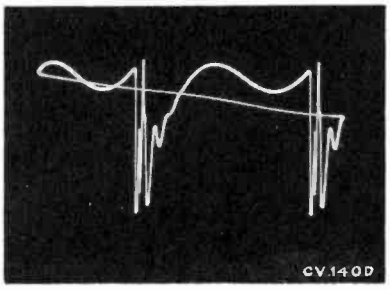


Figure 69—Grid of Horizontal Oscillator (390 Volts PP) (Pin 4 of V116) (6SN7GT)

Figure 70—Plate of Horizontal Oscillator (140 Volts PP) (Pin 5 of V116) (6SN7GT)



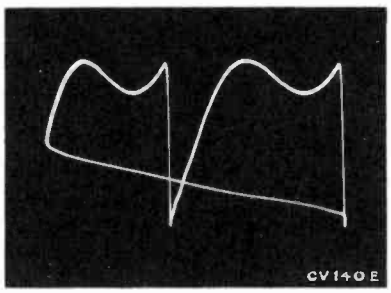
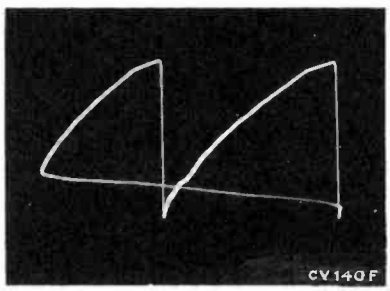


Figure 71—Terminal "C" of T114 (120 Volts PP)

Figure 72—Grid of Horizontal Output Tube (95 Volts PP) (Pin 5 of V117) (6BQ6)



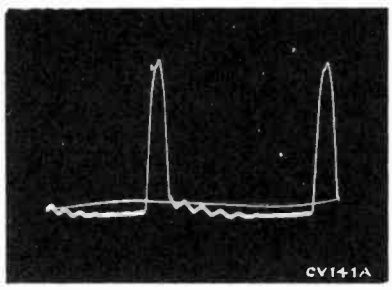
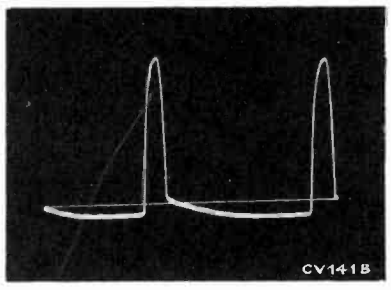


Figure 73—Plate of Horizontal Output (Approx. 4000 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V117 to Ground)

Figure 74—Cathode of Damper (2300 Volts PP) (Pin 3 of V119) (6W4GT)



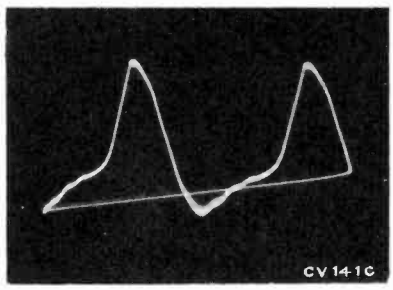
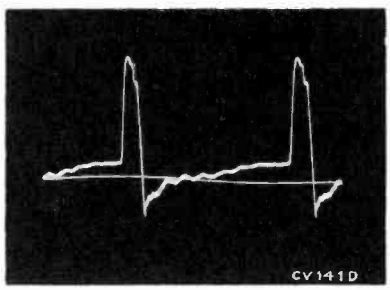


Figure 75—Plate of Damper (180 Volts PP) (Pin 5 of V119) (6W4GT)

Figure 76—Plate of AGC Amplifier (Pin 5 of V111) (6CB6) (600 Volts PP)



17T250DE, 17T261DE — 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.

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V1	6X8	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
V1	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	6BQ7	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
V101	6AU6	1st 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	
V102	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.
V104	6AV6	1st 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	At 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
V106	6AU6	1st 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.
V107	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	
V109	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	
V110	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
V111	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

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.

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V112	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.
V113	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.
V113	6SN7GT	Vert. Sync. Separator	5000 Mu. V. Signal	5	115	—	—	6	0	4	–58	
			No Signal	5	59	—	—	6	0	4	–11	
V114A	6SN7GT	Vert. Sync. Amplifier	5000 Mu. V. Signal	5	45	—	—	6	0	4	0.03	
			No Signal	5	43	—	—	6	0	4	0	
V114B	6SN7GT	Vertical Oscillator	5000 Mu. V. Signal	2	*72	—	—	3	0	1	*–15.3	*Depends on setting of Vert. hold control. Voltages shown are synced pix adjustment.
			No Signal	2	*70	—	—	3	0	1	*–15	
V115	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	
V116	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
V116	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
V117	6BQ6GT	Horizontal Output	5000 Mu. V. Signal	Cap	*	4	190	8	19.2	5	–16	*High Voltage Pulse Present
			No Signal	Cap	*	4	190	8	19.2	5	–15.3	
V118	1B3GT /8016	H. V. Rectifier	5000 Mu. V. Signal	Cap	*	—	—	2 & 7	15,150	—	—	*High Voltage Pulse Present
			No Signal	Cap	*	—	—	2 & 7	15,300	—	—	
V119	6W4GT	Damper	5000 Mu. V. Signal	5	287	—	—	3	*	—	—	*High Voltage Pulse Present
			No Signal	5	280	—	—	3	*	—	—	
V120	17QP4	Kinescope	5000 Mu. V. Signal	Cone	15,150	10	568	11	178	2	117	At average Brightness
			No Signal	Cone	15,300	10	560	11	151	2	101	

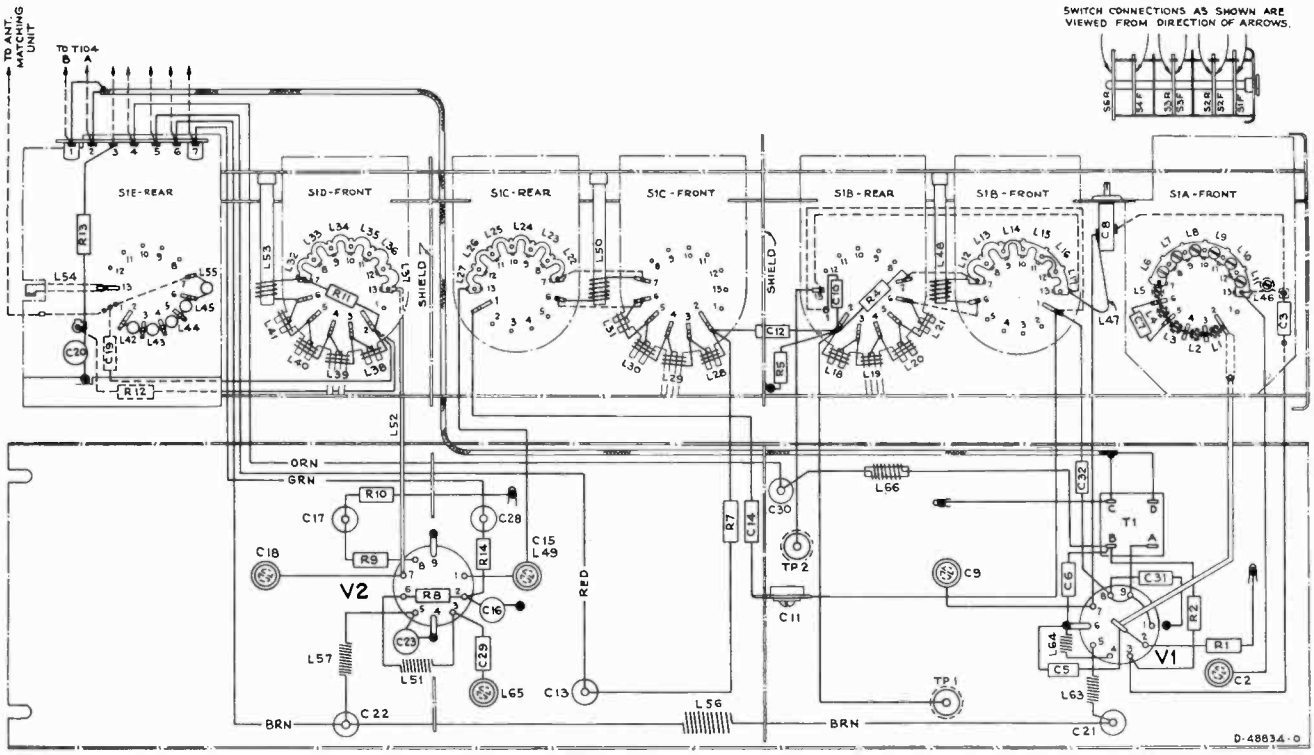


Figure 77—R-F Unit Wiring Diagram

CRITICAL LEAD DRESS

1. Keep all wiring in the pix i-f, sound i-f and video circuits as short as possible.
2. Keep the leads on C110, C111, C112, R108, R139, R150, R111, R109, R110 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 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.
7. Keep the bus wire from T109-A to C144 (plug in capacitor) short and direct.
8. 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.
10. Dress C155 and R160 (kine cathode) up in the air above the terminal board.
11. Keep the leads connected to T113-C and T113-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 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 R113 close to the chassis with leads as short as possible.
16. 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.
18. Dress all 2 watt resistors away from each other and all other wires and components.
19. Dress all wires away from damper tube V119.
20. 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.

STOCK No.	DESCRIPTION
76642	Resistor—Wire wound, 6750 ohms, 10 watts (R156)
	Resistor—Fixed, composition:
503047	47 ohms, ±10%, ½ watt (R108, R154, R233)
502056	56 ohms, ±5%, ½ watt (R134)
34763	68 ohms, ±5%, ½ watt (R140)
502082	82 ohms, ±5%, ½ watt (R101)
502110	100 ohms, ±5%, ½ watt (R126)
503110	100 ohms, ±10%, ½ watt (R122, R129)
503118	180 ohms, ±10%, ½ watt (R144)
503122	220 ohms, ±10%, ½ watt (R153)
503133	330 ohms, ±10%, ½ watt (R213)
503147	470 ohms, ±10%, ½ watt (R123)
513147	470 ohms, ±10%, 1 watt (R120, R212)
503168	680 ohms, ±10%, ½ watt (R157)
502210	1000 ohms, ±5%, ½ watt (R150)
503210	1000 ohms, ±10%, ½ watt (R107, R121, R125, R131, R133, R137, R142, R145, R175)
503212	1200 ohms, ±10%, ½ watt (R178)
503222	2200 ohms, ±10%, ½ watt (R159)
523222	2200 ohms, ±10%, 2 watts (R164)
503233	3300 ohms, ±10%, ½ watt (R218)
513233	3300 ohms, ±10%, 1 watt (R102)
502239	3900 ohms, ±5%, ½ watt (R151)
503239	3900 ohms, ±10%, ½ watt (R225)
513247	4700 ohms, ±10%, 1 watt (R155)
502256	5600 ohms, ±5%, ½ watt (R136)
503256	5600 ohms, ±10%, ½ watt (R172)
14659	6800 ohms, ±5%, ½ watt (R109, R110)
513268	6800 ohms, ±10%, 1 watt (R147)
503282	8200 ohms, ±10%, ½ watt (R210)
503310	10,000 ohms, ±10%, ½ watt (R115, R205)
513310	10,000 ohms, ±10%, 1 watt (R141)
523310	10,000 ohms, ±10%, 2 watts (R236)
503312	12,000 ohms, ±10%, ½ watt (R171, R173)
513312	12,000 ohms, ±10%, 1 watt (R176)
503315	15,000 ohms, ±10%, ½ watt (R219)
503318	18,000 ohms, ±10%, ½ watt (R105, R184, R190, R228)
513322	22,000 ohms, ±10%, 1 watt (R227)
503333	33,000 ohms, ±10%, ½ watt (R132, R183, R192)
503339	39,000 ohms, ±10%, ½ watt (R111)
513339	39,000 ohms, ±10%, 1 watt (R180)
512343	43,000 ohms, ±5%, 1 watt (R209)
30787	47,000 ohms, ±5%, ½ watt (R193)
503347	47,000 ohms, ±10%, ½ watt (R103, R169)
513347	47,000 ohms, ±10%, 1 watt (R127, R135, R191, R232)
502356	56,000 ohms, ±5%, ½ watt (R143)
523356	56,000 ohms, ±10%, 2 watts (R106)
503368	68,000 ohms, ±10%, ½ watt (R195, R201, R202)
513368	68,000 ohms, ±10%, 1 watt (R226)
513382	82,000 ohms, ±10%, 1 watt (R224)
503410	100,000 ohms, ±10%, ½ watt (R203, R217)
512410	100,000 ohms, ±5%, 1 watt (R230)
30180	120,000 ohms, ±5%, ½ watt (R206)
503415	150,000 ohms, ±10%, ½ watt (R160, R179, R215, R220)
3046	200,000 ohms, ±5%, ½ watt (R194)
503422	220,000 ohms, ±10%, ½ watt (R214)
502427	270,000 ohms, ±5%, ½ watt (R162)
503427	270,000 ohms, ±10%, ½ watt (R185)
503433	330,000 ohms, ±10%, ½ watt (R116, R221)
512433	330,000 ohms, ±5%, 1 watt (R223)
503439	390,000 ohms, ±10%, ½ watt (R196)
503447	470,000 ohms, ±10%, ½ watt (R117, R148, R168, R234)
503456	560,000 ohms, ±10%, ½ watt (R198)
503482	820,000 ohms, ±10%, ½ watt (R188, R200, R222, R231)
503510	1 megohm, ±10%, ½ watt (R177)
11769	1.8 megohm, ±5%, ½ watt (R161)
39063	1.8 megohm, ±5%, 1 watt (R229)
503522	2.2 megohm, ±10%, ½ watt (R189, R204, R207)
503539	3.9 megohm, ±10%, ½ watt (R174)
503582	8.2 megohm, ±10%, ½ watt (R163)
503610	10 megohm, ±10%, ½ watt (R113)
71456	Screw—No. 8-32 x 7/16" wing screw for mounting deflection yoke
76455	Shaft—Connecting shaft (nylon) for picture and brightness controls
73584	Shield—Tube shield for V101, V102, V103, V106, V107, V109
75718	Socket—Channel indicator lamp socket
74834	Socket—Kinescope socket
75222	Socket—Tube socket, octal, ceramic, plate mounted for V116
31251	Socket—Tube socket, octal, wafer, for V112, V113, V114, V117
50367	Socket—Tube socket, 6 pin, moulded, saddle-mounted for V119
71508	Socket—Tube socket, 6 pin, moulded for V118
73117	Socket—Tube socket, 7 pin, wafer, miniature, for V101, V102, V103, V104, V105, V106, V107, V108, V109, V111
73115	Socket—Tube socket, 7 pin, moulded, miniature, plate-mounted for V115
76453	Socket—Tube socket, octal, moulded, saddle-mounted for V110 (6AG7) for KCS47M1
76971	Socket—Tube socket, 9 pin, wafer, miniature, for V110 (6CL6) for KCS74
76636	Stud—Adjusting stud complete with guard for focus magnet
76428	Support—Bakelite support only—part of hi-voltage shield
77215	Switch—Tone control and phono switch (S101)
76463	Terminal—Screw type grounding terminal
77198	Transformer—First pix i-f grid transformer complete with adjustable cores (T104, C125, R124)
77197	Transformer—First pix i-f plate transformer complete with adjustable cores (T105, C132, C133, R130)
76435	Transformer—Second pix i-f grid transformer complete with adjustable core (T106, C134)
76433	Transformer—Third or fourth pix i-f transformer (T107, T108)
76436	Transformer—Fifth pix i-f transformer (T109, C143, C146, L102, R146, CR101)
76795	Transformer—Hi-voltage transformer (T114)
76440	Transformer—Horizontal oscillator transformer complete with adjustable cores (T113)
76997	Transformer—Output transformer (T103)
76429	Transformer—Power transformer, 117 volt, 60 cycle (T112)
76438	Transformer—Sound i-f transformer complete with adjustable cores (T101, C103, C104)
76437	Transformer—Sound take-off transformer complete with adjustable cores (T110, C147)
76439	Transformer—Ratio detector transformer complete with adjustable cores (T102, C108, C109)
76431	Transformer—Vertical output transformer (T111)
77225	Trap—4.5 MC trap (L105, C149)
76616	Yoke—Deflection yoke complete with 6 contact male connector (L111, L112, L113, L114, C208, P103, R239, R240, R241)
	SPEAKER ASSEMBLIES 971490-3W RL-105E6 RMA-274 (For Model 17T250DE)
75024	Cone—Cone and voice coil (3.2 ohms)
75022	Speaker—8" P.M. speaker complete with cone and voice coil (3.2 ohms)

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES 92569-12W RL-111A1 RMA-274 (For Model 17T261DE)
75682	Cone—Cone and voice coil (3.2 ohms)
76389	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)
	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 description of part required.
	MISCELLANEOUS
77213	Back—Cabinet back complete with terminal board and power cord for Model 17T250DE
77214	Back—Cabinet back complete with power cord for Model 17T261DE
76184	Board—Antenna terminal board
76590	Bracket—Hanger bracket for deflection yoke hood assembly
77028	Bracket—Support bracket ("L" shape) for kinescope masking panel (2 required)
76599	Bracket—"U" shape bracket for deflection yoke hood support rod
77029	Clip—Retaining clip (top or bottom) for safety glass retainer
77030	Clip—Retaining clip (sides) for safety glass retainer
X1756	Cloth—Grille cloth for mahogany or walnut instruments for Model 17T250DE
X3222	Cloth—Grille cloth for blonde mahogany instruments for Model 17T261DE
X3199	Cloth—Grille cloth for mahogany or walnut instruments for Model 17T261DE
75474	Connector—Single contact male connector for antenna cable
39153	Connector—4 contact male connector for antenna cable
71457	Cord—Power cord and plug
77031	Cushion—Adhesive cushion (sponge rubber—⅜" dia.) for masking panel
76698	Cushion—Rubber cushion for kinescope masking panel support bracket
77034	Decal—Control function decal for mahogany or walnut instruments
76512	Decal—Control function decal for blonde mahogany instruments
77244	Emblem—"Deluxe" emblem for mahogany or walnut instruments for Model 17T250DE
77245	Emblem—"Deluxe" emblem for blonde instruments for Model 17T250DE
77487	Emblem—"Deluxe" emblem for Model 17T261DE
77012	Emblem—"RCA Victor" emblem
75456	Escutcheon—Channel marker escutcheon
72113	Foot—Rubber foot (4 required) for Model 17T250DE
77026	Glass—Safety glass
37396	Grommet—Rubber grommet for mounting speaker for Model 17T261DE
76596	Knob—Brightness control or vertical hold control knob—beige—for blonde mahogany instruments (outer)
76595	Knob—Brightness control or vertical hold control knob—maroon—for mahogany or walnut instruments (outer)
76594	Knob—Channel selector knob—beige—for blonde mahogany instruments (inner)
76593	Knob—Channel selector knob—maroon—for mahogany or walnut instruments (inner)
76592	Knob—Fine tuning control knob—beige—for blonde mahogany instruments (outer)
76591	Knob—Fine tuning control knob—maroon—for mahogany or walnut instruments (outer)
74963	Knob—Picture control, horizontal hold control or volume control and power switch knob—maroon—for mahogany or walnut instruments (inner)
75464	Knob—Picture control, horizontal hold control or volume control and power switch knob—beige—for blonde mahogany instruments (inner)
76598	Knob—Tone control and phono switch knob—beige—for blonde mahogany instruments (outer)
76597	Knob—Tone control and phono switch knob—maroon—for mahogany or walnut instruments (outer)
11765	Lamp—Channel marker escutcheon lamp—Mazda 51
76589	Mask—Channel marker escutcheon light mask—beige—for blonde mahogany instruments
75459	Mask—Channel marker escutcheon light mask—burgundy—for mahogany or walnut instruments
77022	Mask—Polystyrene masking panel
77013	Nut—Speednut for fastening "RCA Victor" emblem to cabinet (3 required)
73634	Nut—Speednut for speaker mounting screws for Model 17T261DE
76177	Nut—No. 10-32 special nut for deflection yoke hood support rods
76601	Pad—Kinescope edge support pad (2 required)
77027	Retainer—Safety glass retainer
77024	Rod—"L" shape threaded rod to support deflection yoke hood assembly
76632	Screw—No. 8 x ⅝" hex head wood screw for mounting hanger bracket
76808	Sleeve—Polyethylene sleeve for insulating high voltage lead—on support rod
73643	Spring—Channel marker escutcheon spring clip
76020	Spring—Formed spring for glass retainer clips (6 required)
77025	Spring—Formed spring for kinescope masking panel
77006	Spring—Retaining spring (coil) for deflection yoke hood support rod nut
30330	Spring—Retaining spring for knobs 74963, 75464
72845	Spring—Retaining spring for knobs 76591, 76592
76837	Spring—Retaining spring for knobs 76593, 76594, 76595, 76596, 76597, 76598
77032	Spring—Suspension spring clip (formed) for ground braid
36580	Spring—Suspension spring (coil) for ground braid
76600	Strap—Grounding strap (upper strip—½" x 18")
77023	Washer—Cellulose washer—gold—for knobs
75500	Washer—Felt washer for masking panel or cabinet back mounting screws
75458	Washer—Felt washer—beige—between knob and channel marker escutcheon for blonde mahogany instruments
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.

CHASSIS WIRING DIAGRAM KCS74, KCS74M1

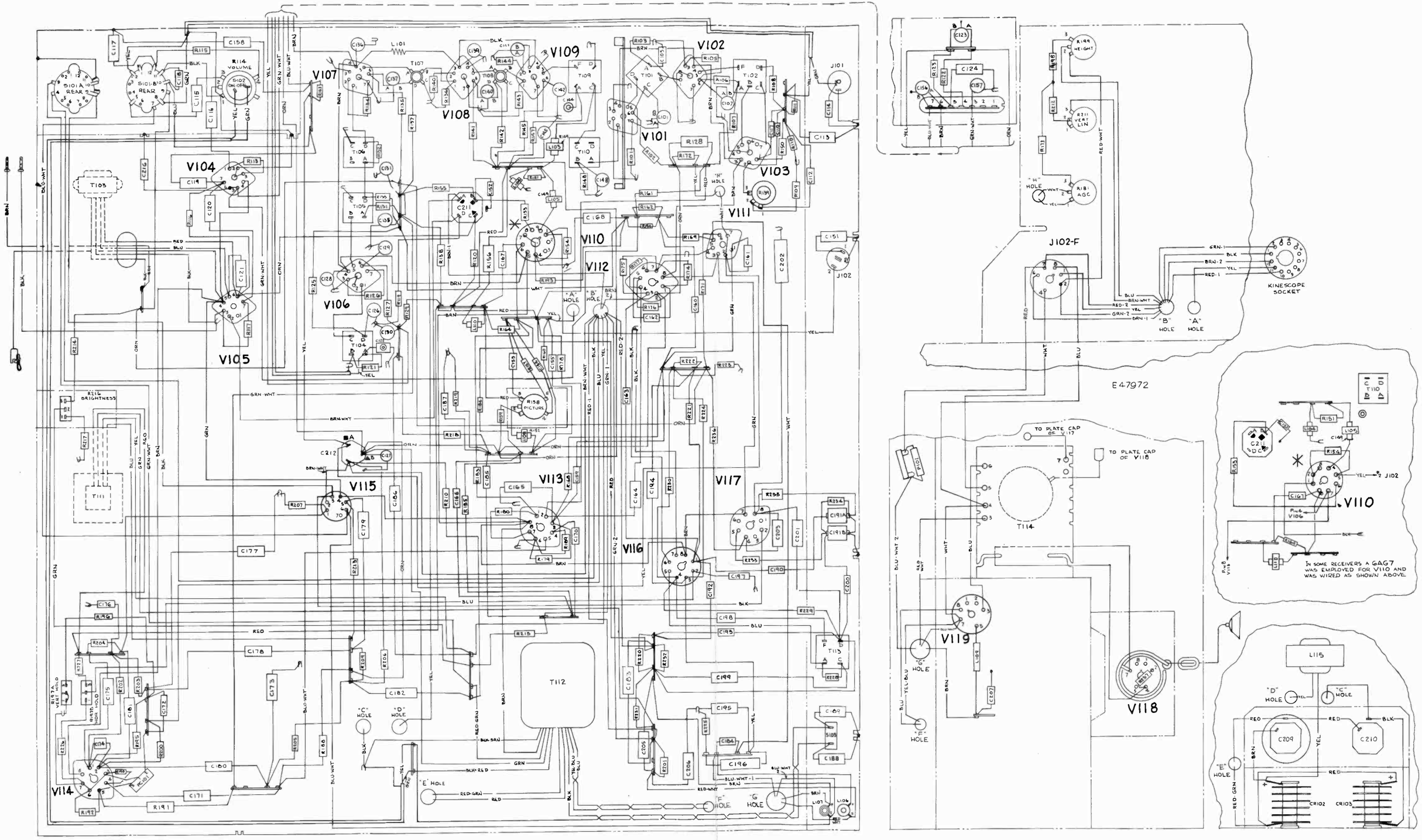
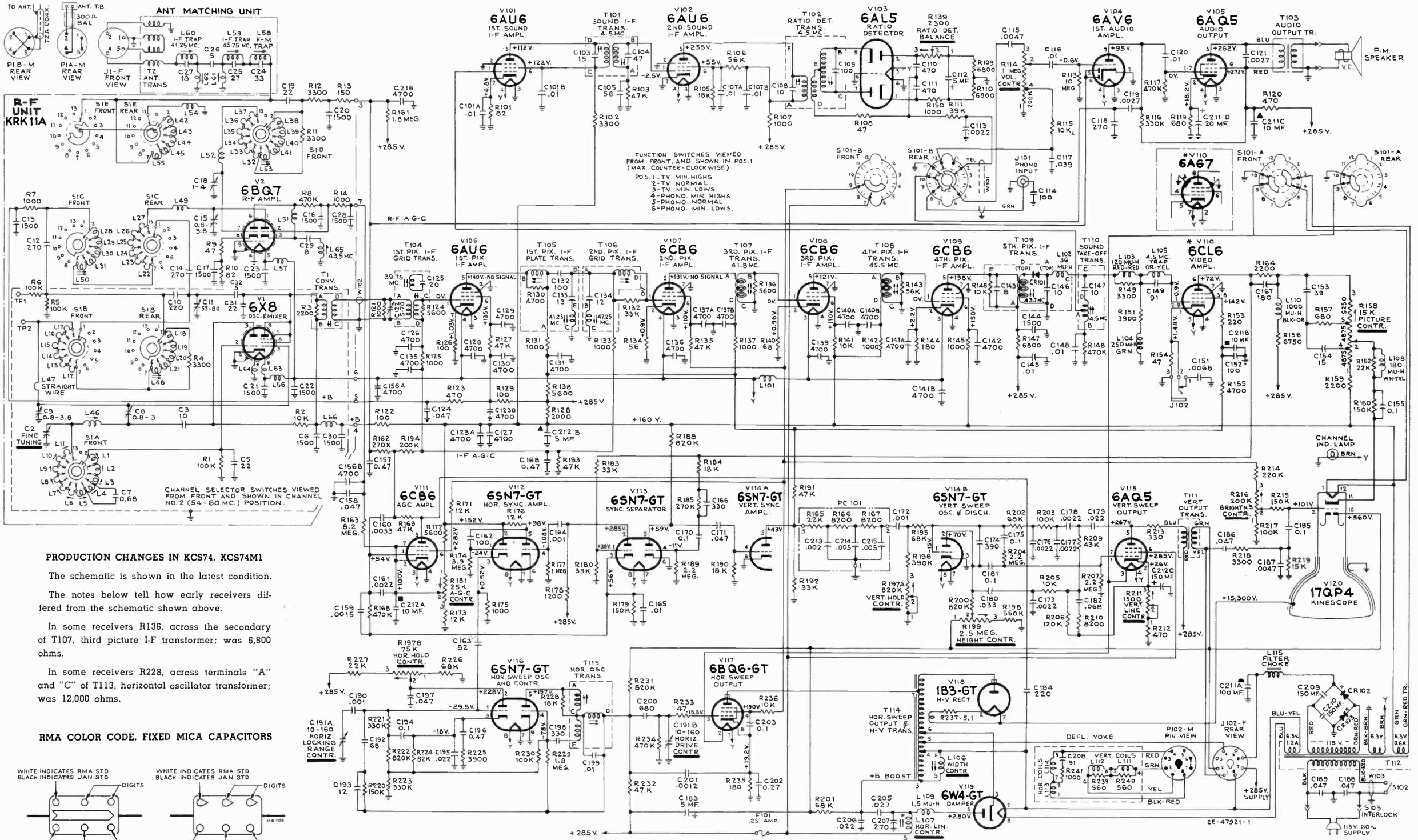


Figure 78—Chassis Wiring Diagram, KCS74, KCS74M1

KCS74 CIRCUIT SCHEMATIC DIAGRAM (*KCS74M1)



PRODUCTION CHANGES IN KCS74, KCS74M1

The schematic is shown in the latest condition.

The notes below tell how early receivers differed from the schematic shown above.

In some receivers R136, across the secondary of T107, third picture I-F transformer; was 6,800 ohms.

In some receivers R228, across terminals "A" and "C" of T113, horizontal oscillator transformer; was 12,000 ohms.

RMA COLOR CODE, FIXED MICA CAPACITORS

All resistance values in ohms. K = 1000. 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 ±20% with 117 v. a-c supply.

* In some receivers, a 6AG7 tube was employed in place of the 6CL6 video amplifier and was connected as shown in inset above

Figure 79—Circuit Schematic Diagram

STOCK No.	DESCRIPTION
	R-F UNIT ASSEMBLIES KRK11A
76539	Board—Antenna matching transformer terminal board less coils L58, L59, L60 and less capacitors C24, C25, C26, C27
76531	Board—Terminal board, 5 contact and ground
76845	Bracket—Vertical bracket for holding V1 tube shield
76965	Capacitor—Ceramic, variable, for fine tuning—plunger type (C2)
93056	Capacitor—Ceramic, 5 mmf. (C26, C32)
70597	Capacitor—Ceramic, 8 mmf. (C29)
55326	Capacitor—Ceramic, 10 mmf. (C3)
54207	Capacitor—Ceramic, 18 mmf. (C27)
76557	Capacitor—Ceramic, 22 mmf. (C19, C31)
76558	Capacitor—Ceramic, 22 mmf. (C5)
70935	Capacitor—Ceramic, 27 mmf. (C25)
76739	Capacitor—Ceramic, 33 mmf. (C24)
77460	Capacitor—Ceramic, 220 mmf. (C10)
75199	Capacitor—Ceramic, 270 mmf. (C12, C14)
75166	Capacitor—Ceramic, 1500 mmf. (stand-off) (C13, C17, C21, C22, C28, C30)
75610	Capacitor—Ceramic, 1500 mmf. (C6)
73748	Capacitor—Ceramic, 1500 mmf. (C16, C20, C23)
71088	Capacitor—Ceramic, 0.68 mmf. (C7)
77151	Capacitor—Tubular, steatite, adjustable, 0.8-3.0 mmf. (C8)
75184	Capacitor—Ceramic, adjustable, 0.80-3.8 mmf, complete with adjusting stud (C9)
76532	Capacitor—Adjustable trimmer, steatite, 1.-4. mmf. (C18)
76527	Capacitor—Mica trimmer, 55-80 mmf. (C11)
76143	Clip—Tubular clip for mounting stand-off capacitors
73591	Coil—Antenna matching coil (2 required)
73477	Coil—Choke coil (L57)
76763	Coil—Filament choke coil (L63, L64)
77206	Coil—Filament choke coil (L56)
76562	Coil—R-F amplifier coupling coil (L51)
77153	Coil—R-F choke coil (L66)
76537	Coil—Shunt coil complete with adjustable core (L61)
76538	Coil—Shunt coil complete with adjustable core (L62)
76529	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L49, C15)
38853	Connector—4 contact female connector—part of matching transformer (J1)
76559	Connector—Oscillator grid connector
76460	Contact—Test point contact
77202	Core—Adjustable core for fine tuning capacitor
76543	Core—Adjusting core for FM trap
76521	Detent—Detent mechanism and fibre shaft
73453	Form—Coil form for coils L48, L50, L53
77203	Link—Link assembly for fine tuning
76728	Nut—Speednut for mounting adjustable trimmer 76532
	Resistor—Fixed, composition:
503047	47 ohms, ±10%, ½ watt (R9)
503082	82 ohms, ±10%, ½ watt (R10)
503115	150 ohms, ±10%, ½ watt (R13)
503210	1000 ohms, ±10%, ½ watt (R7, R14)
503233	3300 ohms, ±10%, ½ watt (R4, R11, R12)
503247	4700 ohms, ±10%, ½ watt (R2)
503410	100,000 ohms, ±10%, ½ watt (R1, R5, R6)
503447	470,000 ohms, ±10%, ½ watt (R8)
14343	Retainer—Fine tuning shaft retaining ring
75164	Rod—Actuating plunger rod (fibre) for fine tuning link
76547	Screw—No. 4-40 x ¼" adjusting screw for coils L6, L7, L8, L9, L10, L11
76549	Screw—No. 4-40 x ⅜" adjusting screw for coil L5
76548	Screw—No. 4-40 x 5/16" adjusting screw for coils L1, L2, L3, L4, L46
76519	Shaft—Channel selector shaft and plate
76134	Shaft—Fine tuning shaft and cam
77147	Shield—Front shield complete with shaft bushing and bracket
76534	Shield—Tube shield
76530	Socket—Tube socket, 9 pin, miniature, ceramic, saddle-mounted for V1
76336	Socket—Tube socket, 9 pin, miniature, bakelite, saddle-mounted for V2
77149	Spacer—Metal spacer for front plate
75163	Spring—Friction spring (formed) for fine tuning cam
30340	Spring—Hairpin spring for fine tuning link
75068	Spring—Retaining spring for tube shield
77204	Spring—Return spring for fine tuning control
76554	Stator—Antenna stator complete with rotor, coils, capacitors and resistor (S5, C20, L42, L43, L44, L45, L54, L55, R13)
77353	Stator—Convertor stator complete with rotor, coils, capacitor and resistors (S2, C10, C12, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L47, L48, R4, R5, R6)
77205	Stator—Oscillator stator complete with rotor, coils and capacitors (S1, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L46)
76553	Stator—R-F plate stator complete with rotor, coils, capacitor and resistor (S3, C14, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L50, R7)
76556	Stator—R-F grid stator complete with rotor, coils, capacitor and resistors (S4, C19, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L53, R11, R12)
76561	Strap—Channel No. 13 r-f grid strap (L52)
76525	Strip—Coil segment mounting strip—RH center
76526	Strip—Coil segment mounting strip—LH lower
76544	Strip—Coil segment mounting strip — LH upper — less trimmer
75446	Stud—Capacitor stud for trimmer coil L49, C15 (uncoded and coded "ER")
75447	Stud—Capacitor stud for trimmer coil L49, C15 (coded numerically and "Hi Q")
76740	Stud—No. 6-32 x 1" adjusting stud for adjustable capacitor
77152	Terminal—Terminal for mounting C8 trimmer
76536	Transformer—Antenna matching transformer complete (T2, C24, C25, C26, C27, L58, L59, L60, L61, L62, J1)
77148	Transformer—Convertor transformer (T1, R3)
76540	Trap—FM trap complete with adjustable core (L58)
76535	Trap—I-F trap (L65)
76542	Trap—I-F trap (41.25 MC) complete with core (L60)
76541	Trap—I-F trap (45.75 MC) complete with core (L59)
75190	Washer—Insulating washer (neoprene) for adjustable capacitor
	CHASSIS ASSEMBLIES KCS74
76456	Bracket—Channel indicator lamp bracket
76454	Bracket—Mounting bracket complete with insulator for picture control
71496	Capacitor—Adjustable trimmer, 5-70 mmf. (C122)
75217	Capacitor—Mica trimmer, dual 10-160 mmf. (C191A, C191B)
33380	Capacitor—Ceramic, 12 mmf. (C193)
39044	Capacitor—Ceramic, 15 mmf. (C154)
73664	Capacitor—Ceramic, 39 mmf. (C153)
71924	Capacitor—Ceramic, 56 mmf. (C105)
76475	Capacitor—Mica, 68 mmf. (C192)
76474	Capacitor—Mica, 82 mmf. (C163)
39396	Capacitor—Ceramic, 100 mmf. (C114, C162)
75437	Capacitor—Ceramic, 100 mmf. (C152)
51416	Capacitor—Mica, 180 mmf. (C167)

STOCK No.	DESCRIPTION
76673	Capacitor—Ceramic, 220 mmf. (C184)
73091	Capacitor—Mica, 270 mmf. (C207)
47617	Capacitor—Ceramic, 270 mmf. (C118)
39640	Capacitor—Mica, 330 mmf. (C166)
76476	Capacitor—Mica, 330 mmf. (C198)
73094	Capacitor—Mica, 390 mmf. (C174)
54003	Capacitor—Mica, 470 mmf. (C110, C111)
75166	Capacitor—Ceramic, 1500 mmf. (stand-off) (C144)
73473	Capacitor—Ceramic, 4700 mmf. (C126, C127, C128, C129, C130, C131, C135, C136, C139, C142, C216)
76470	Capacitor—Ceramic, dual, 4700 mmf. (C123A, C123B, C137A, C137B, C140A, C140B, C141A, C141B, C156A, C156B)
73960	Capacitor—Ceramic, 10,000 mmf. (C145, C148)
75877	Capacitor—Ceramic, dual, 10,000 mmf. (C101A, C101B, C107A, C107B)
74521	Capacitor—Electrolytic, 5 mfd., 50 volts (C112)
28417	Capacitor—Electrolytic, 5 mfd., 450 volts (C183)
75218	Capacitor—Electrolytic, comprising 1 section of 10 mfd., 350 volts, 1 section of 5 mfd., 350 volts and 1 section of 150 mfd., 50 volts (C212A, C212B, C212C)
76451	Capacitor—Electrolytic, comprising 1 section of 100 mfd., 350 volts, 2 sections of 10 mfd., 350 volts and 1 section of 20 mfd., 50 volts (C211A, C211B, C211C, C211D)
75220	Capacitor—Electrolytic, 150 mfd., 200 volts (C209, C210)
76479	Capacitor—Tubular, moulded, oil impregnated, .00068 mfd., 600 volts (C200)
75249	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 600 volts (C164, C172, C190)
76995	Capacitor—Tubular, moulded, oil impregnated, .0012 mfd., 600 volts (C201)
73802	Capacitor—Tubular, paper, oil impregnated, .0015 mfd., 600 volts (C159)
73595	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 600 volts (C113, C161, C173, C176, C177, C178)
73599	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 600 volts (C119)
73818	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 1600 volts (C121)
73795	Capacitor—Tubular, paper, oil impregnated, .0033 mfd., 600 volts (C160)
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C115, C187)
73789	Capacitor—Tubular, paper, oil impregnated, .0068 mfd., 400 volts (C151)
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 400 volts (C116, C120, C165)
73594	Capacitor—Tubular, moulded, oil impregnated, .01 mfd., 600 volts (C199)
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 400 volts (C195)
73798	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 600 volts (C179)
73810	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 1000 volts (C206)
73811	Capacitor—Tubular, paper, oil impregnated, .027 mfd., 1000 volts (C205)
73596	Capacitor—Tubular, paper, oil impregnated, .033 mfd., 1000 volts (C180)
73790	Capacitor—Tubular, paper, oil impregnated, .039 mfd., 400 volts (C117)
73558	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 200 volts (C171)
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C158, C197)
75071	Capacitor—Tubular, moulded, .047 mfd., 400 volts (C188, C189)
73592	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 600 volts (C124)
73597	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 1000 volts (C186)
73792	Capacitor—Tubular, paper, oil impregnated, .068 mfd., 400 volts (C182)
73784	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 200 volts (C155, C175)
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C170, C185, C194)
73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C181, C203)
73786	Capacitor—Tubular, paper, oil impregnated, 0.27 mfd., 200 volts (C202)
73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C157, C168, C196)
76498	Choke—Filter choke (L115)
76143	Clip—Tubular clip to mount stand-off capacitor
73477	Coil—Choke coil (L101)
76442	Coil—Horizontal linearity coil complete with adjustable core (L107)
76441	Coil—Width coil complete with adjustable core (L106)
76640	Coil—R-F choke coil (1.5 muh) (L109)
77195	Coil—Peaking coil (120 muh) (L103, R149)
76647	Coil—Peaking coil (180 muh) (L108, R152)
71526	Coil—Peaking coil (250 muh) (L104)
77194	Coil—Peaking coil (1000 muh) (L110)
71789	Connector—Anode connector
35787	Connector—Phono input connector (J101)
75474	Connector—Single contact male connector for speaker cable (2 required)
75482	Connector—Video connector (J102)
74594	Connector—2 contact male connector for power cord
50367	Connector—6 contact female connector for yoke leads (J103)
75542	Connector—6 contact male connector—part of deflection yoke (P103)
77200	Control—AGC control (R181)
76444	Control—Brightness control (R216)
76448	Control—Height control (R199)
77201	Control—Horizontal and vertical hold control (R197A, R197B)
76445	Control—Picture control (R158)
77199	Control—Ratio detector balance control (R139)
76449	Control—Vertical linearity control (R211)
77010	Control—Volume control and power switch (R114, S102)
76986	Cover—Back cover for hi-voltage compartment
76985	Cover—Side cover for hi-voltage compartment
74956	Cushion—Rubber cushion for deflection yoke hood
74839	Fastener—Push fastener for mounting tube socket for V116 and tube socket 76453
73600	Fuse—0.25 amps. (F101)
76459	Grommet—Rubber grommet for 2nd anode lead exit
37396	Grommet—Rubber grommet for mounting tube socket for V116 and tube socket 76453
76830	Hood—Deflection yoke hood less rubber cushions
76168	Magnet—Focus magnet
76141	Magnet—Ion trap magnet (P.M. type)
76633	Magnet—Pin cushion correction magnet complete with support arm
18469	Plate—Bakelite mounting plate for electrolytic 75220
76464	Plate—Hi-voltage plate—bakelite—complete with tube socket and corona ring
77196	Printed 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, R166, R167)
76675	Rectifier—Picture detector crystal rectifier (CR101)
76452	Rectifier—Selenium rectifier (CR102, CR103)
76796	Resistor—Wire wound, 5.1 ohms, 1/3 watt (R237)
76639	Resistor—Wire wound, 180 ohms, 2 watts (R235)
77193	Resistor—Wire wound, 680 ohms, 1 watt (R119)
34473	Resistor—Wire wound, 2000 ohms, 10 watts (R128)
76390	Resistor—Wire wound, 5600 ohms, 5 watts (R138)

RCA VICTOR

TELEVISION RECEIVERS—MODELS

21T159, 21T159DE, 21T165, 21T166DE, 21T174DE, 21T175DE, 21T176, 21T177, 21T178, 21T178DE, 21T179, 21T179DE

Chassis Nos. KCS68C, KCS68E or KCS68F

— Mfr. No. 274 —

SERVICE DATA

— 1951 No. T8 —

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

Models 21T159, 21T159DE, "Selfridge" Walnut, Mahogany, Limed Oak

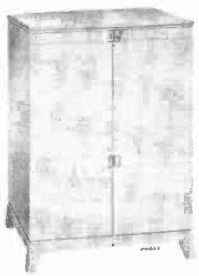
Model 21T165 "Meredith" Walnut, Mahogany, Limed Oak

Model 21T166DE "Farmington" Walnut, Mahogany, Blond Mahogany

Model 21T174DE "Bancroft" Walnut, Mahogany, Limed Oak

Model 21T175DE "Benton" Walnut, Mahogany, Limed Oak

Model 21T176 "Suffolk" Walnut, Mahogany, Limed Oak



Model 21T177 "Donley" Walnut, Mahogany, Limed Oak

Models 21T178, 21T178DE, "Rockingham" Walnut, Mahogany

Models 21T179, 21T179DE "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.

Picture I-F Carrier Frequency ..... 45.75 mc.

Sound I-F Carrier Frequency ..... 41.25 mc. and 4.5 mc.

POWER SUPPLY RATING ..... 115 volts, 60 cycles, 300 watts

AUDIO POWER OUTPUT RATING ..... 5.0 watts max.

CHASSIS DESIGNATIONS

KCS68C ..... In Models 21T176, 21T177, 21T178, 21T179

KCS68E ..... In Models 21T159, 21T165

KCS68F ..... In Models 21T159DE, 21T166DE, 21T174DE, 21T175DE, 21T178DE, 21T179DE

Model	Chassis with Tubes in Cabinet Weight	Shipping Weight
21T159, 21T159DE	104 lbs.	125 lbs.
21T165	111 lbs.	149 lbs.
21T166DE	120 lbs.	152 lbs.
21T174DE	140 lbs.	172 lbs.
21T175DE	152 lbs.	184 lbs.
21T176	128 lbs.	159 lbs.
21T177	143 lbs.	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.

RCA TUBE COMPLEMENT

	Tube Used	Function
(1)	RCA 6BQ7	R-F Amplifier
(2)	RCA 6X8	R-F Oscillator and Mixer
(3)	RCA 6AU6	1st Picture I-F Amplifier
(4)	RCA 6BC6	2nd Picture I-F Amplifier
(5)	RCA 6CB6	3rd Picture I-F Amplifier
(6)	RCA 6CB6	4th Picture I-F Amplifier
(7)	RCA 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	1st Audio Amplifier
(12)	RCA 6AQ5	Audio Output
(13)	RCA 6CB6	AGC Amplifier
(14)	RCA 6SN7GT	Sync Separator
(15)	RCA 6SN7GT	Vert Sync Amplifier and Vert Sweep Osc.
(16)	RCA 6AQ5	Vertical Sweep Output
(17)	RCA 6SN7GT	Horizontal Sync Amplifier
(18)	RCA 6SN7GT	Horizontal Sweep Oscillator and Control
(19)	RCA 6CD6G	Horizontal Sweep Output
(20)	RCA 6W4GT (2 tubes)	Dampers
(21)	RCA 1B3-GT/8016	High Voltage Rectifier
(22)	RCA 5U4G (2 tubes)	Rectifiers
(23)	RCA 21AP4	Kinescope

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

ELECTRICAL AND MECHANICAL SPECIFICATIONS (Continued)

LOUDSPEAKERS

Models 21T159, 21T159DE (971490-2) 8" PM dynamic, 3.2 ohms
Models 21T165, 21T166DE, 21T174DE, 21T175DE, 21T178DE, 21T179DE (92561-14W) 12" PM Dynamic, 3.2 ohms
Models 21T176, 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 Frequency	41.25 mc. and 4.5 mc.

VIDEO RESPONSE	To 4 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

OPERATING CONTROLS (Front Panel)

Channel Selector, Fine Tuning	Dual Control Knobs
Picture, Brightness	Dual Control Knobs
Picture Horizontal Hold, Picture Vertical Hold	Dual Control Knobs
Sound Volume and On-Off Switch, Tone Control and Phono Switch	Dual Control Knobs

NON-OPERATING CONTROLS (not including r-f and i-f adjustments)

Picture Centering	top chassis adjustment
Width	rear chassis adjustment
Height	rear chassis adjustment
Horizontal Linearity	rear chassis screwdriver adjustment
Vertical Linearity	rear 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 Range	rear chassis adjustment
Focus	top chassis adjustment
Ion Trap Magnet	top chassis adjustment
Deflection Coil	top chassis wing nut adjustment
AGC Control	rear chassis adjustment

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 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.

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.

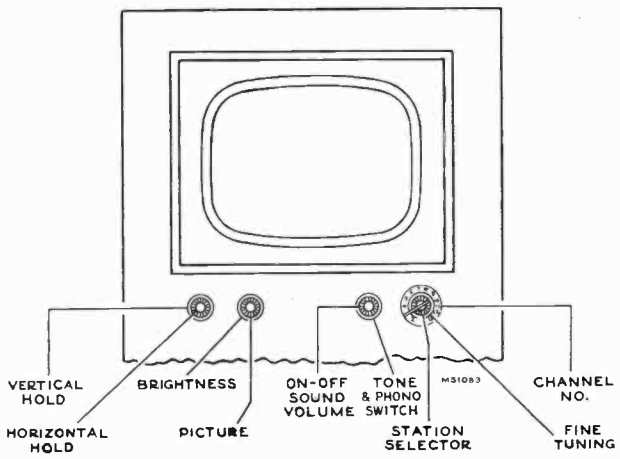


Figure 1—Receiver Operating Controls

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."

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.

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."

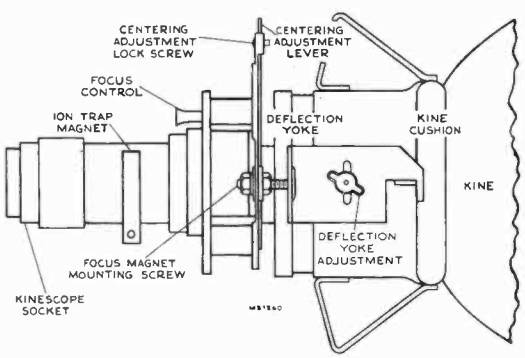


Figure 2—Ion Trap and Centering Magnet Adjustments

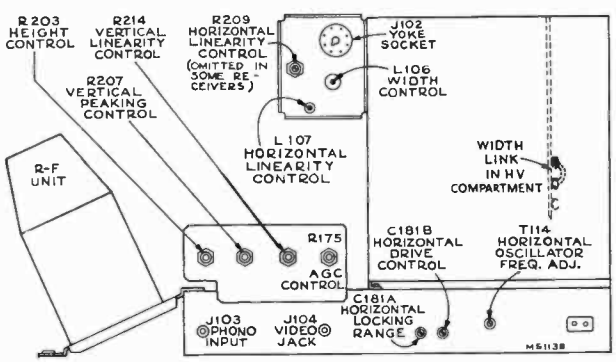


Figure 3—Rear Chassis Adjustments

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

INSTALLATION INSTRUCTIONS

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 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 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.

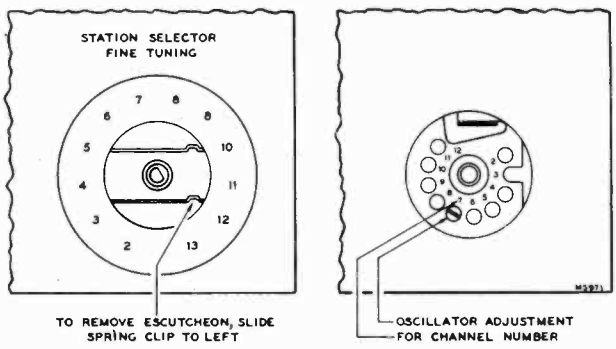


Figure 4—R-F Oscillator Adjustments

INSTALLATION INSTRUCTIONS

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 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.

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

CHASSIS TOP VIEW

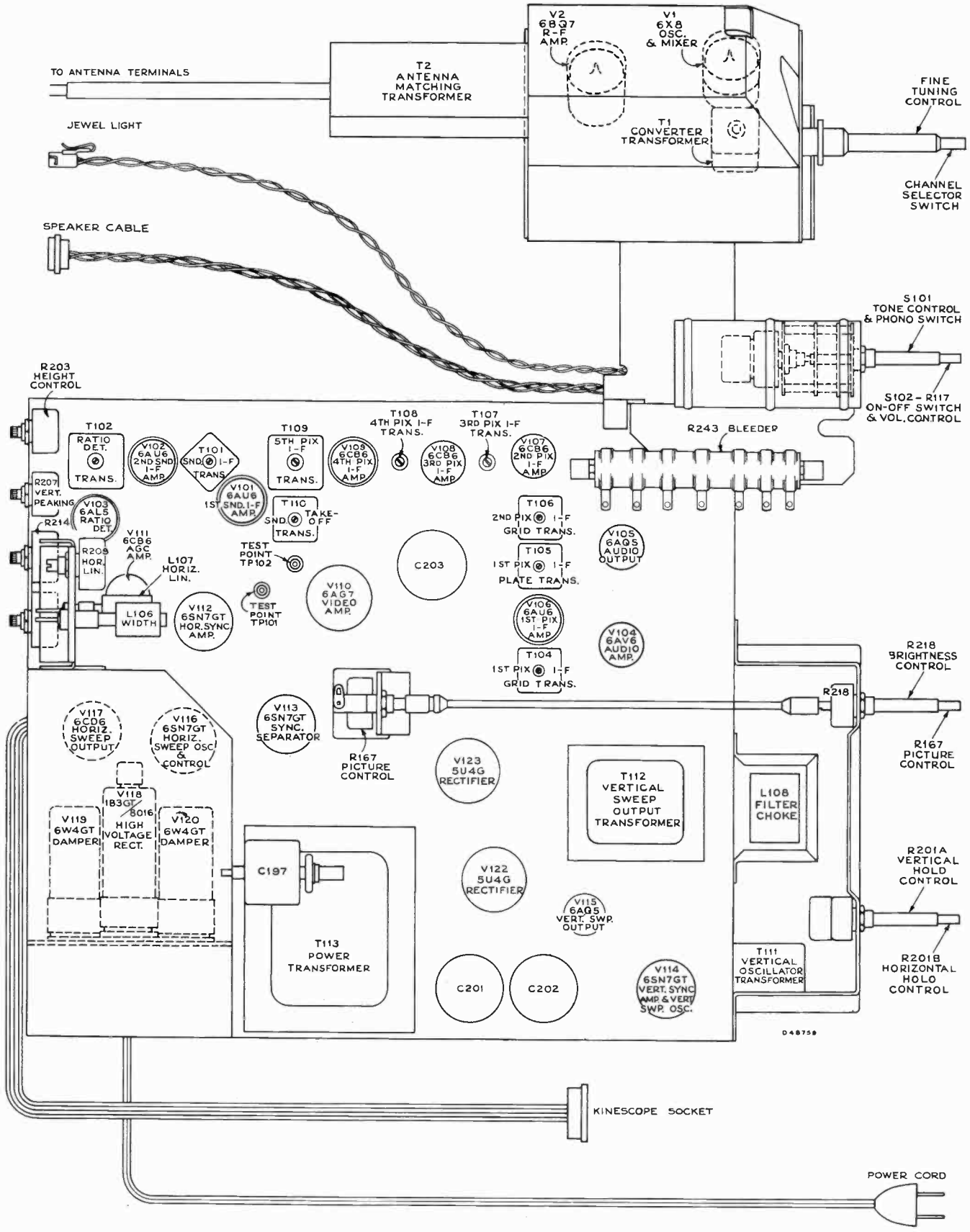


Figure 5—Chassis Top View

CHASSIS BOTTOM VIEW

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

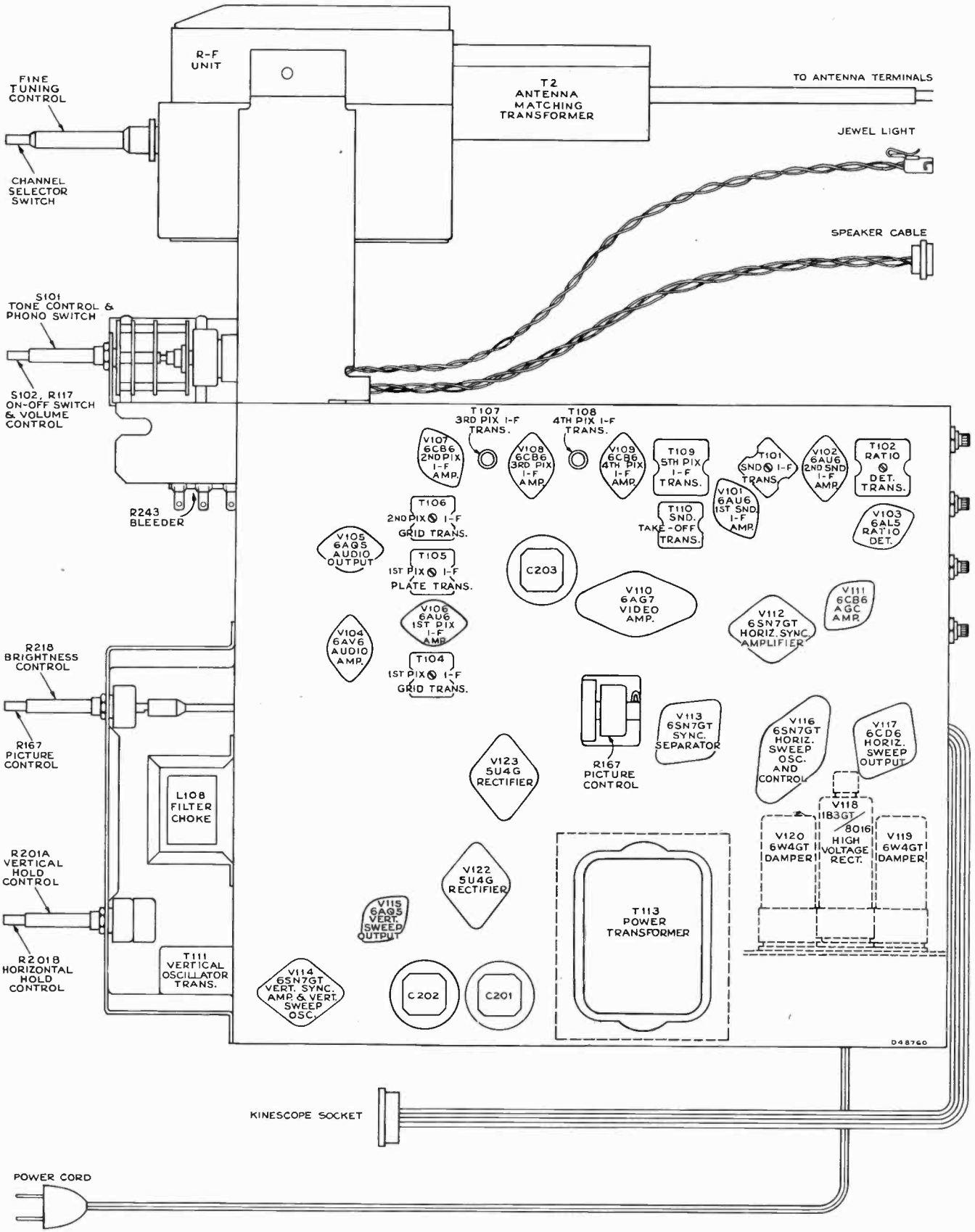


Figure 6—Chassis Bottom View

21T159, 21T159DE, 21T165 21T166DE, 21T174DE, 21T175DE 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

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.

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	81.25	123
6	83.25	87.75	129
7	175.25	179.75	221
8	181.25	185.75	227
9	187.25	191.75	233
10	193.25	197.75	239
11	199.25	203.75	245
12	205.25	209.75	251
13	211.25	215.75	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
(2) R-F Unit
(3) Ratio Detector
(4) Sound I-F Trans.
(5) Sound Take-Off Trans.
(6) Picture I-F Traps
(7) Picture I-F Trans.
(8) Sweep Alignment of I-F
(9) Horizontal Oscillator
(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 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 ½ 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 L58 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.

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 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, 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 C1 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 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 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 C1 or C2 was 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 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.

21T159, 21T159DE, 21T165 21T166DE, 21T174DE, 21T175DE 21T176, 21T177, 21T178 21T178DE, 21T179, 21T179DE

ALIGNMENT PROCEDURE

Channel Number	Picture Carrier Freq. Mc.	Sound Carrier Freq. Mc.	Receiver R-F Osc. Freq. Mc.	Channel Oscillator Adjustment
2	55.25	59.75	101	L1
3	61.25	65.75	107	L2
4	67.25	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	191.75	233	L8
10	193.25	197.75	239	L9
11	199.25	203.75	245	L10
12	205.25	209.75	251	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 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 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 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 "VoltOhmyst." 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.	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 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.

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.

Adjust 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 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 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.

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

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
	ANTENNA MATCHING UNIT ALIGNMENT									
1	Do not adjust this unit unless fairly certain that it requires adjustment. Disconnect lead from L58 to S1E. 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.									
2	Antenna terminals	45.75 mc. 30% mod.	Not used	—	Not used	—	Pin 4, V110 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 terminals loosely	—	Antenna terminals through pad	45 to 54 mc.	"	—	Scope a xtal probe to gnd.	Connect 300 ohms from L58 to gnd.	L61 and L62 to obtain response of Fig. 12	Fig. 7 Fig. 11 Fig. 12
	R-F UNIT ALIGNMENT									
5	If unit is completely out of adjustment, preset all adjustments to center of range with following exceptions. Set C18 so that head is 3/8" above chassis. Set C11 1/4 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 clockwise from mechanical center of its range for all oscillator adjustments.									
6	Grid, pin 7 of V2 through 1500 mmf.	43.5 mc. 30% mod.	Not used	—	Not used	—	TP1. Gain to maximum	Set r-f unit on channel 2	L6S for min. indication 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 channel 8	C1-KRK11, or C2-KRK-11A for beat on freq. meter	Fig. 7
8	Antenna terminals loosely	181.25 and 185.75	Antenna terminals through pad	Channel 8	Not used	—	TP1. Gain to maximum	R-F unit on channel 8 Set T1 max. counterclockwise	C9, C11, C15 and C18 for response shown in 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 channel 6	L5 for beat on het. freq. meter	Fig. 8
10	Antenna terminals loosely	83.25 and 87.75	Antenna terminals 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. Connect "VoltOhmyst" to TP1	C8 for −3.5 volts on meter	Fig. 7
12	Antenna terminals loosely	83.25 and 87.75	Antenna terminals through pad	Channel 6	Not used	—	TP1. Gain to maximum	R-F unit on channel 6	Check response. Readjust 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 channel 8	C1-KRK11, or C2-KRK-11A for beat on freq. meter	Fig. 7
14	Antenna terminals loosely	181.25 and 185.75	Antenna terminals through pad	Channel 8	Not used	—	TP1. Gain to maximum	"	Check response adjust C9 C11, C15 and C18 if necessary	Fig. 7
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.									
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. Overshoot L46 slightly and adjust C1-KRK11 or C2-KRK-11A for beat	Fig. 7
17	Antenna terminals loosely	211.25 215.75	Antenna terminals 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	"	Channel 11	"	—	"	Rec. on channel 11	"	Fig. 13
20	"	193.25 197.75	"	Channel 10	"	—	"	Rec. on channel 10	"	Fig. 13
21	"	187.25 191.75	"	Channel 9	"	—	"	Rec. on channel 9	"	Fig. 13
22	"	181.25 185.75	"	Channel 8	"	—	"	Rec. on channel 8	"	Fig. 13
23	"	175.25 179.75	"	Channel 7	"	—	"	Rec. on channel 7	"	Fig. 13
24	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 yet maintain correct response on channel 8.									
25	Repeat step 13. If the oscillator is off frequency overshoot the adjustment of C1 in KRK11 or C2 in KRK11A and correct by adjusting L46.									
26	Repeat steps 16 through 25 until all adjustments are obtained.									
27	Not used	—	Not used	—	Loosely to r-f unit oscillator	129 mc.	Not used	Rec. on channel 6	L5 for beat on het. freq. meter	Fig. 7
28	Antenna terminals loosely	55.25 59.75	Antenna terminals through pad	Channel 2	Not used	—	TP1. Gain to maximum	Rec. on channel 2	Adjust T1 core clockwise to a point at which channel 2 response does not change	Fig. 7
29	"	83.25 87.75	"	Channel 6	Not used	—	"	Rec. on channel 6. "VoltOhmyst" on TP1	Check to see that response is correct and −3.0 volts of osc. injection is present	Fig. 7 Fig. 13
30	"	77.25 81.75	"	Channel 5	"	—	"	Rec. on channel 5	"	Fig. 13
31	"	67.25 71.75	"	Channel 4	"	—	"	Rec. on channel 4	"	Fig. 13

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

TEST PATTERN PHOTOGRAPHS

Figure 20—Normal Picture

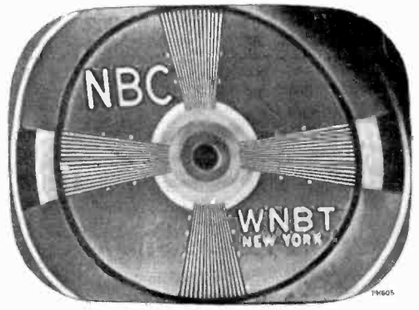


Figure 21—Focus Magnet and Ion Trap Magnet Misadjusted

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

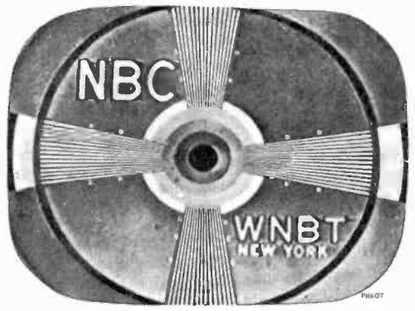


Figure 23—Width Control Misadjusted

Figure 24—Horizontal Drive Control Misadjusted

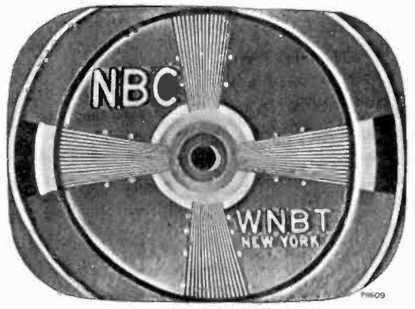


Figure 25—Transients

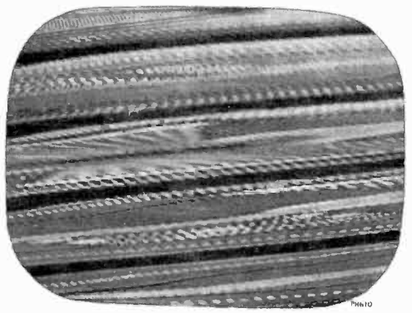


Figure 26—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position—Just Before Pulling Into Sync

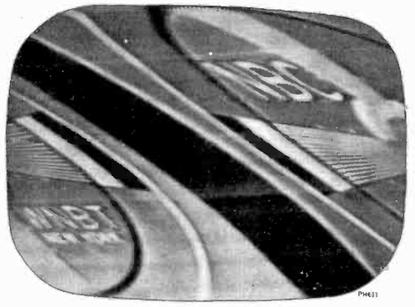


Figure 27—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

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 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) 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) 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.

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 waveforms.
(3) T114 defective.
(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 JITTER:
(1) AGC control R175 misadjusted.
(2) If regular sections at the left picture are displaced change V117.
(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 V117.

LIGHT VERTICAL LINE ON LEFT OF PICTURE:
(1) C193 defective.
(2) V119 or V120 defective.

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 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.
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

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	"	55.25 59.75	"	Channel 2	"	—	"	Rec. on channel 2	"	Fig. 13
34	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 max. amplitude of response between carrier markers.									
35	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.									
36	Not used	—	Not used	—	Loosely coupled to r-f oscillator	257 mc.	TP1. Gain to maximum	Rec. on channel 13	C1-KRK11 or C2-KRK-11A for beat on het. freq. meter	Fig. 7
37	"	—	"	—	"	251 mc.	"	Rec. on channel 12	L11 as above	Fig. 7
38	"	—	"	—	"	245 mc.	"	Rec. on channel 11	L10 as above	Fig. 7
39	"	—	"	—	"	239 mc.	"	Rec. on channel 10	L9 as above	Fig. 7
40	"	—	"	—	"	233 mc.	"	Rec. on channel 9	L8 as above	Fig. 7
41	"	—	"	—	"	227 mc.	"	Rec. on channel 8	L7 as above	Fig. 7
42	"	—	"	—	"	221 mc.	"	Rec. on channel 7	L6 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	"	—	"	—	"	101 mc.	"	Rec. on channel 2	L1 as above	Fig. 7
48	Repeat steps 35 through 46 as a check. On completion, remove 39 ohm resistor and reconnect link to terminals A and B of T104.									
	RATIO DETECTOR, SOUND I-F AND SOUND TAKE-OFF ALIGNMENT									
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 bottom core for min. audio on the oscilloscope.	Fig. 9 Fig. 10
50	"	"	"	—	"	—	"	"VoltOhmyst" to junction R112 and C113. If the meter reads more than ± 1.5 volts, adjust C226 for zero on the meter and readjust T102 (bot.) for min. output on scope. Repeat steps 48 and 49 until all conditions are satisfied.		Fig. 9 Fig. 10
51	Sig. Gen. to 1st Snd. I-F	4.5 mc.	1st Sound I-F grid (pin 1, V101)	4.5 mc.	"	—	In series with 10,000 ohms to terminal A, of T101	Sweep output reduced 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
52	"	"	"	"	"	—	Junction of R112 and C113	Check for symmetrical response wave-form (positive and negative).		Fig. 15
53	Sig. Gen. in series 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
	PICTURE I-F AND TRAP ADJUSTMENT									
54	Not used	—	Not used	—	Not used	—	Not used	Connect bias box and "VoltOhmyst" to junction of R143 and R144 and to gnd. Adjust bias box to give −1.0 v on "VoltOhmyst".		
55	Sig. Gen. across T104 A and B	39.25 mc.	"	—	"	—	"	"VoltOhmyst" to pin 4, V110. Gen. output to give −1.0 volt d-c.	T104 top core to give min. d-c on meter.	Fig. 9
56	"	41.25 mc.	"	—	"	—	"	"	T105 bot. for min.	Fig. 10
57	"	47.25 mc.	"	—	"	—	"	"	T106 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.	"	—	"	—	"	"	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 mmf.	40 to 48 mc.	"	—	To pin 4 of V110	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 response shown in in Fig. 16.	Fig. 9 Fig. 16
62	Connected loosely to diode probe	Various See Fig. 17	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. Connect 180 ohms from T105-B to junction R135 and C132. Upon completion disconnect scope and shunting 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
63	Connected loosely to grid of 1st pix i-f	Various See Fig. 18	"	"	"	—	Connect scope to pin 4 of V110	"VoltOhmyst" to pin 4, V110. 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 response shown in Fig. 18. Do not adjust T107 unless absolutely necessary.	Fig. 18

ALIGNMENT DATA

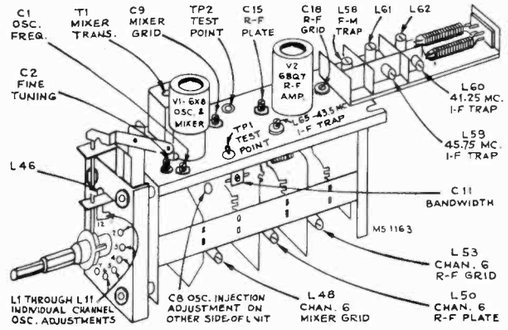


Figure 7—R-F Unit Adjustments

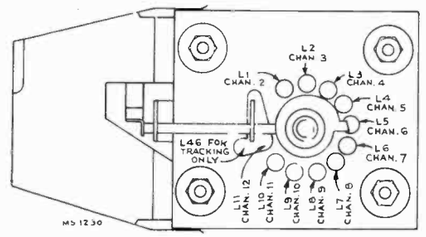


Figure 8—R-F Oscillator Adjustments

Figure 9—Top Chassis Adjustments

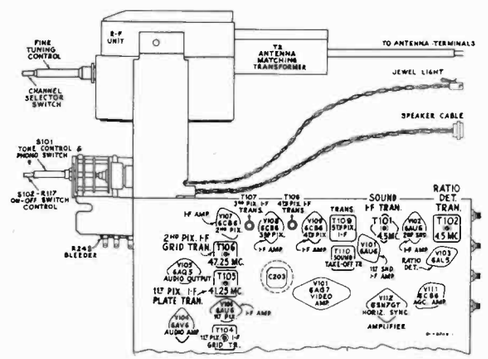


Figure 10—Bottom Chassis Adjustments

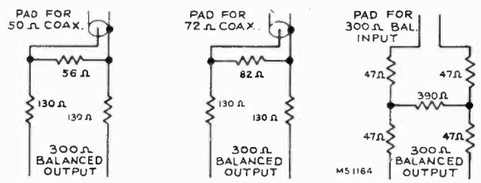


Figure 11—Sweep Attenuator Pads

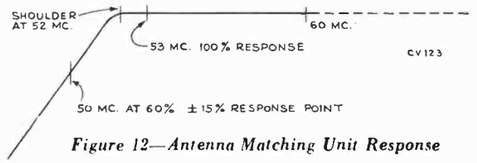


Figure 12—Antenna Matching Unit Response

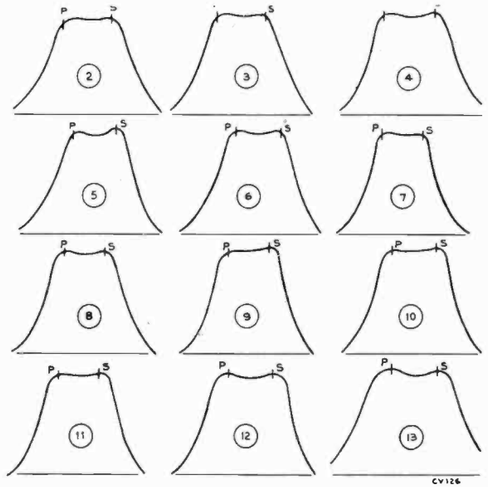


Figure 13—R-F Response

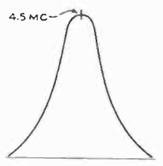


Figure 14 Sound I-F Response

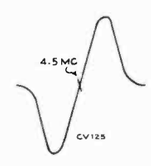


Figure 15 Ratio Det. Response

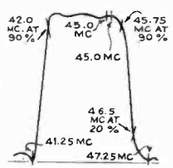


Figure 16 T105 and T106 Response

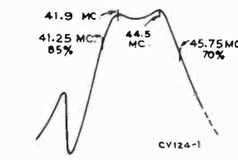


Figure 17 T1 and T104 Response

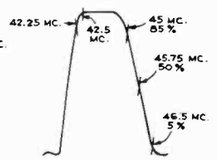


Figure 18 Over-all I-F Response

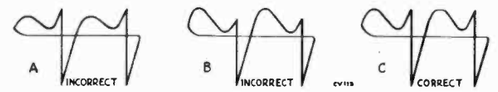


Figure 19—Horizontal Oscillator Waveforms

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.
13. 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 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.
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. 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.

RESPONSE PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

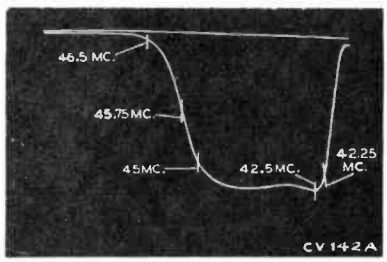


Figure 28—Overall Pix I-F Response

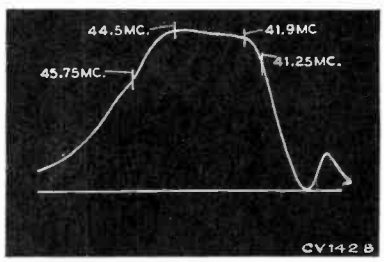


Figure 29—Response of T1-T104 Pix I-F Transformers

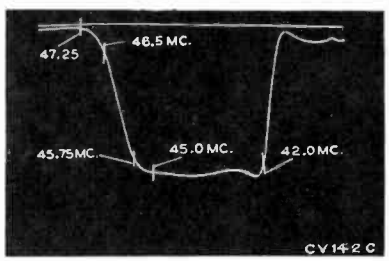


Figure 30—Response of T105-T106 Pix I-F Transformer

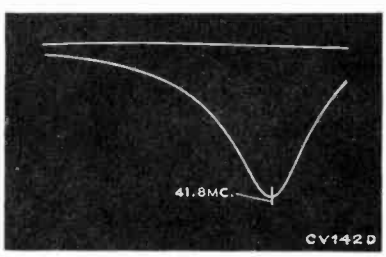


Figure 31—Response of T107 Pix I-F Transformer

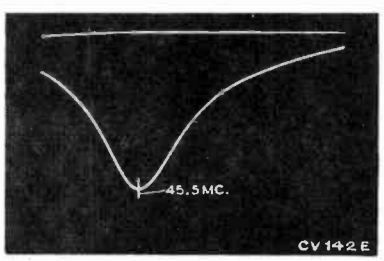


Figure 32—Response of T108 Pix I-F Coil

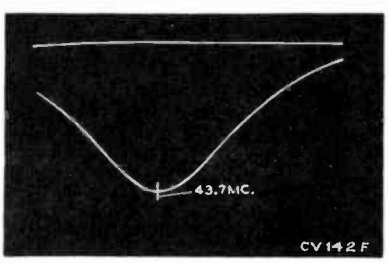


Figure 33—Response of T109 Pix I-F Coil

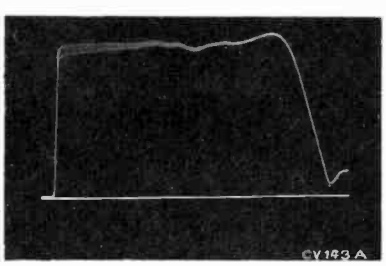


Figure 34—Video Response at Average Contrast

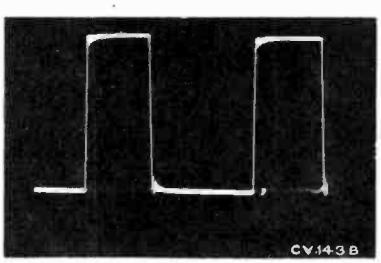


Figure 35—Video Response (100 KC Square Wave)

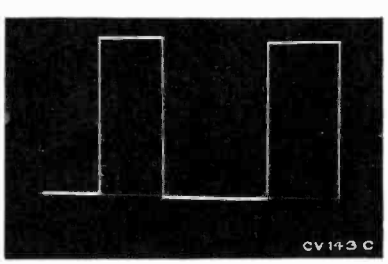
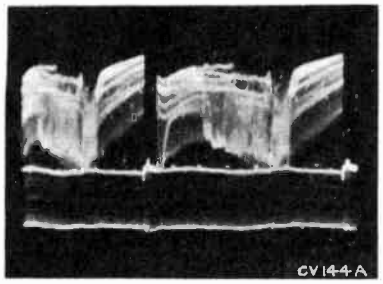


Figure 36—Video Response (60 Cycle Square Wave)

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

WAVEFORM PHOTOGRAPHS

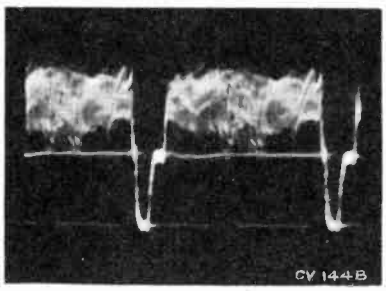
Taken from RCA WO58A Oscilloscope



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 Volts PP)



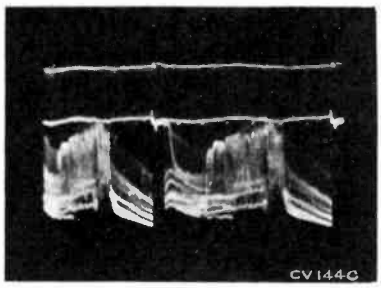
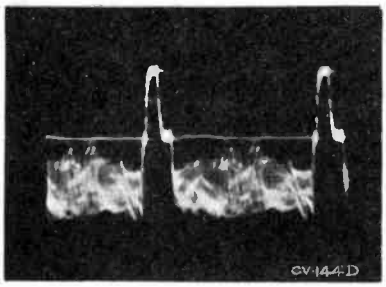


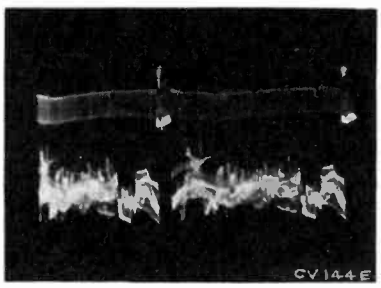
Plate of 1st Video Amplifier (Pin 8 of V110) (6AG7)

Voltage depends on picture

Figure 39—Vertical (110 Volts PP)

Figure 40—Horizontal (110 Volts PP)



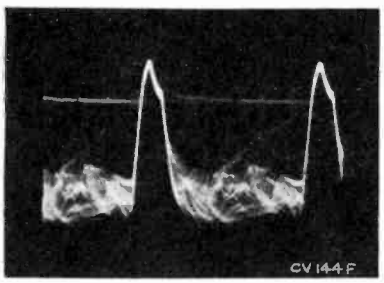


Grid of Sync Separator (Pin 4 of V113) (6SN7)

Voltage depends on picture

Figure 41—Vertical (75 Volts PP)

Figure 42—Horizontal (75 Volts PP)



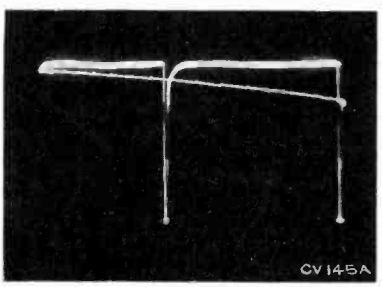
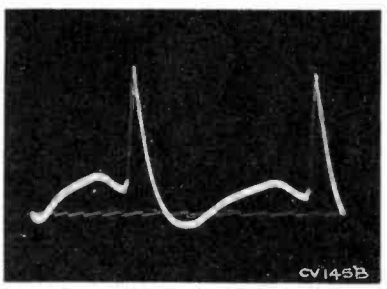


Figure 43—Plate of Sync Separator (Pin 5 of V113) (6SN7) (35 Volts PP) Voltage depends on picture

Figure 44—Cathode of Sync Separator (Pin 6 of V113) (6SN7) (10 Volts PP)



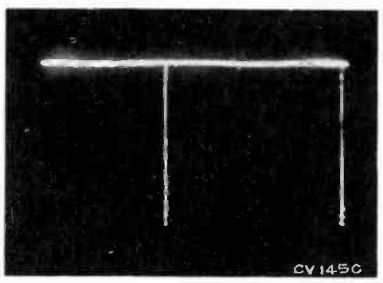
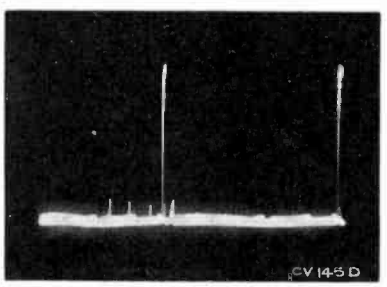


Figure 45—Grid of Vert. Sync Amplifier (Pin 4 of V114A) (6SN7) (12 Volts PP)

Figure 46—Plate of Vert Sync Amplifier (Pin 5 of V114A) (6SN7) (100 Volts PP)



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

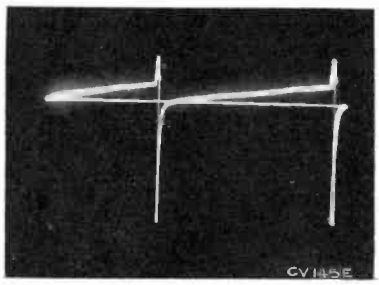


Figure 47—Grid of Vertical Oscillator (Pin 1 of V114B) (6SN7) (135 Volts PP)

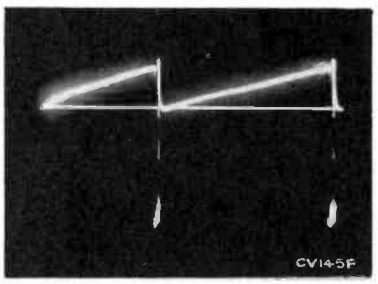


Figure 48—Plate of Vertical Oscillator (Pin 2 of V114B) (6SN7) (105 Volts PP)

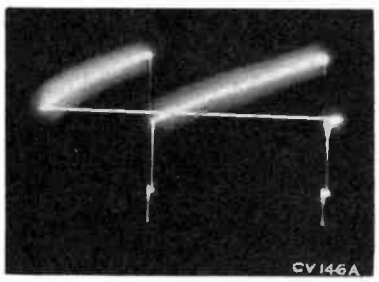


Figure 49—Grid of Vertical Output (105 Volts PP) (Pin 1 of V115) (6AQ5)

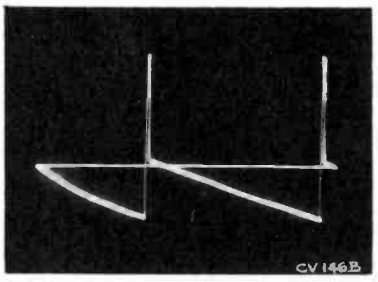


Figure 50—Plate of Vertical Output (900 Volts PP) (Pin 5 of V115) (6AQ5)

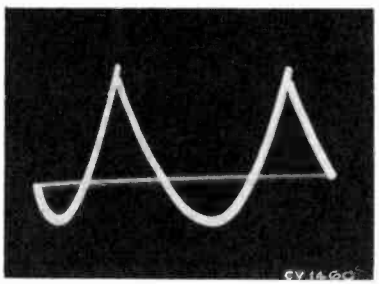


Figure 51—Cathode of Vertical Output (1.0 Volts PP) (Pin 2 of V115) (6AQ5)

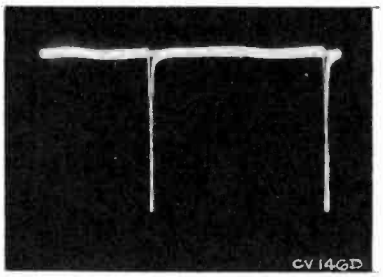
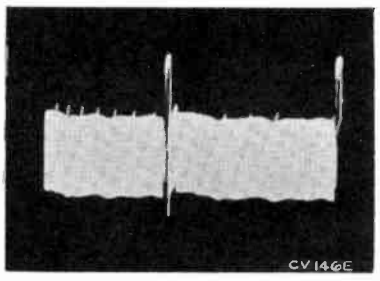


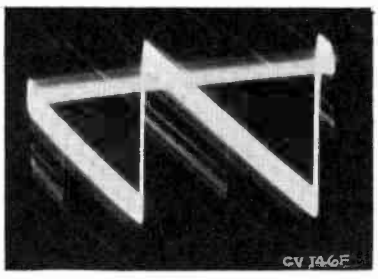
Figure 52—Grid of Kinescope (Pin 2 of V121) (12 Volts PP)

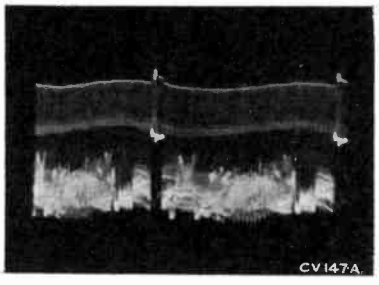


Cathode of Sync Separator (Pin 3 of V113) (6SN7)

Figure 53—Vertical (15 Volts PP)

Figure 54—Horizontal (8 Volts PP)

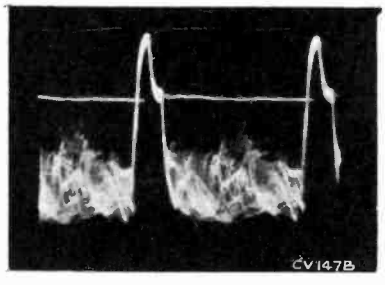




Grid of Sync Separator (Pin 1 of V113) (6SN7)

Figure 55—Vertical (110 Volts PP)

Figure 56—Horizontal (110 Volts PP)



21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

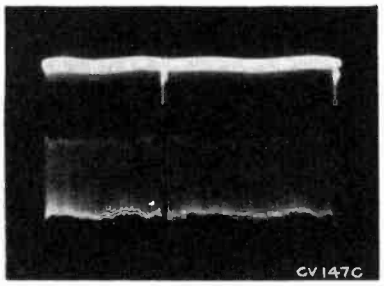
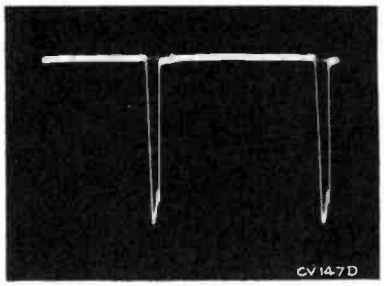
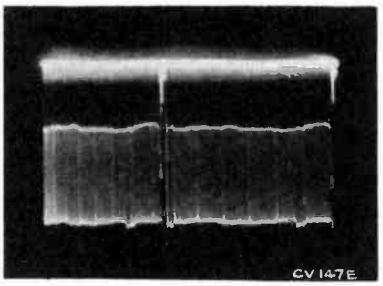


Plate of Sync Separator
(Pin 2 of V113)

Figure 57—Vertical (30 Volts PP)

Figure 58—Horizontal (30 Volts PP)

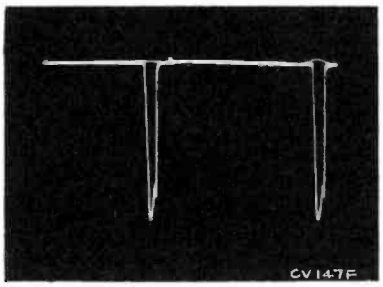




Grid of Hor Sync Amp
(Pin 4 of V112) (6SN7)

Figure 59—Vertical (30 Volts PP)

Figure 60—Horizontal (30 Volts PP)



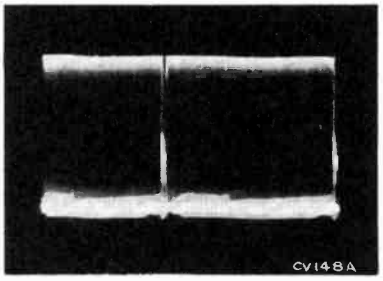
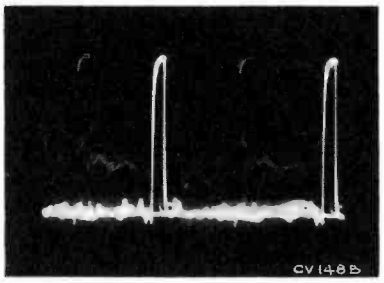
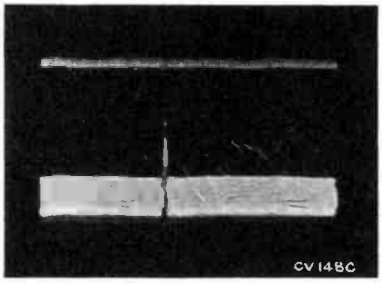


Plate of Hor Sync Amp
(Pin 5 of V112) (6SN7)

Figure 61—Vertical (85 Volts PP)

Figure 62—Horizontal (85 Volts PP)

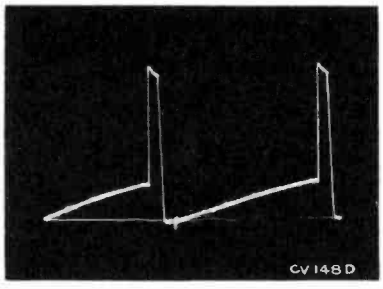


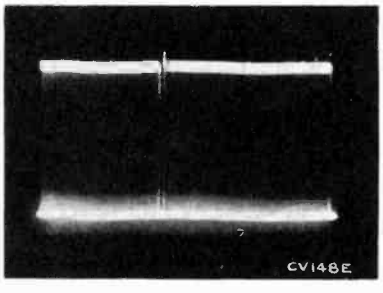


Grid of Hor Sync Amp
(Pin 1 of V112) (6SN7)

Figure 63—Vertical (75 Volts PP)

Figure 64—Horizontal (75 Volts PP)

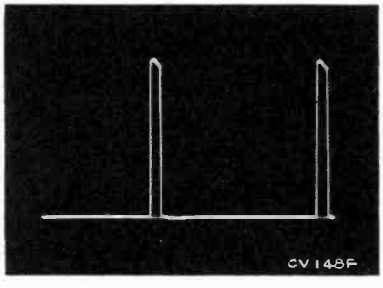




Cathode of Hor Sync Amp
(Pin 3 of V112) (6SN7)

Figure 65—Vertical (18 Volts PP)

Figure 66—Horizontal (18 Volts PP)



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

**21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE**

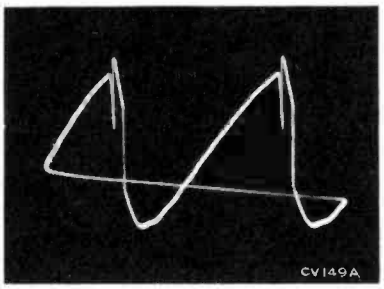
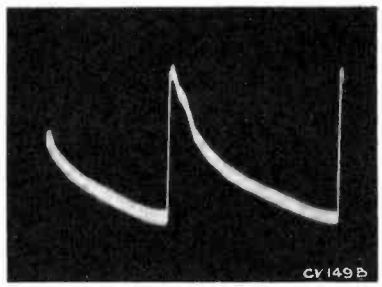


Figure 67—Grid of Horizontal Oscillator Control (25 Volts PP) (Pin 1 of V116) (6SN7GT)

Figure 68—Cathode of Horizontal Oscillator Control (13 Volts PP) (Pin 3 of V116) (6SN7GT)



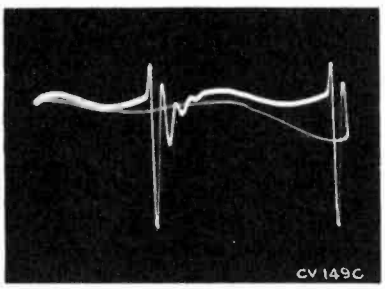
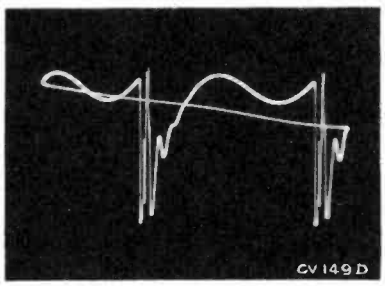


Figure 69—Grid of Horizontal Oscillator (550 Volts PP) (Pin 4 of V11o) (6SN7GT)

Figure 70—Plate of Horizontal Oscillator (290 Volts PP) (Pin 5 of V116) (6SN7GT)



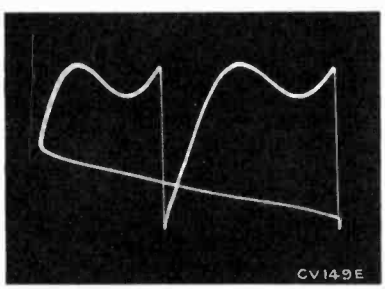
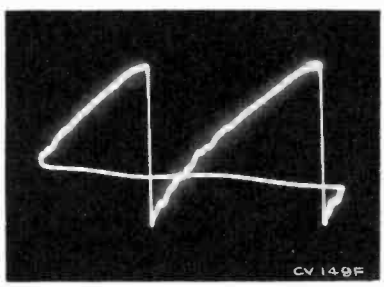


Figure 71—Terminal "C" of T114 (150 Volts PP)

Figure 72—Grid of Horizontal Output Tube (140 Volts PP) (Pin 5 of V117) (6CD6G)



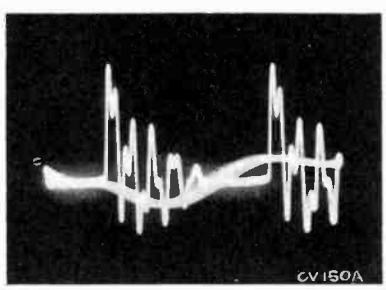
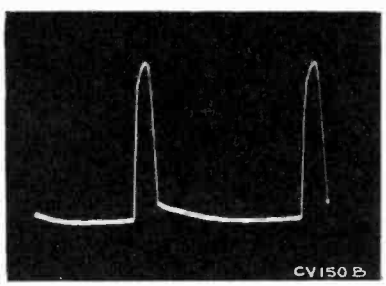


Figure 73—Plate of Horizontal Output (Approx. 5400 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V117 to Ground)

Figure 74—Cathode of Damper (2300 Volts PP) (Pin 3 of V119) (6W4GT)



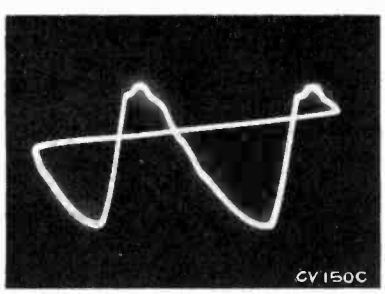
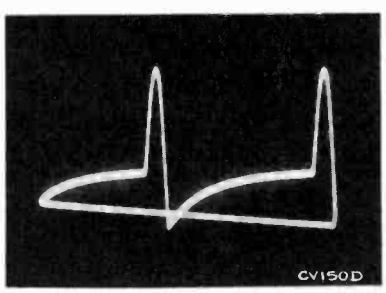


Figure 75—Plate of Damper (100 Volts PP) (Pin 5 of V119) (6W4GT)

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

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 No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		I Plate (ma.)	I Screen (ma.)	Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts			
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	—	—	
V1	6X8	R-F Oscillator	5000 Mu. V. Signal	3	95	—	—	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
V101	6AU6	1st 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	
V102	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	—	—	—	—	
			No Signal	7	0	—	—	1	8.0	—	—	—	—	
V104	6AV6	1st Audio Amplifier	5000 Mu. V. Signal	7	90	—	—	2	0	1	−0.7	0.45	—	At min. volume
			No Signal	7	86	—	—	2	0	1	−0.7	0.45	—	
V105	6AQ5	Audio Output	5000 Mu. V. Signal	5	350	6	360	2	150	7	116	30.0	2.0	At min. volume
			No Signal	5	346	6	356	2	145	7	114	30.0	2.0	
V106	6AU6	1st 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	
V107	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	
V109	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	
V110	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

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

Tube No.	Tube Type	Function	Operating Condition	E. Plate Pin No.	E. Plate Volts	E. Screen Pin No.	E. Screen Volts	E. Cathode Pin No.	E. Cathode Volts	E. Grid Pin No.	E. Grid Volts	I Plate (ma.)	I Screen (ma.)	Notes on 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 normal operation
			No Signal	5	4.5	6	218	2	135	1	118	0	0	
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	—	
V114A	6SN7GT	Vert. Sync Amplifier	5000 Mu. V. Signal	5	7.0	—	—	6	0	4	–0.2	0.6	—	
			No Signal	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	1	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 counter-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 Adjustment
			No Signal	5	256	—	—	6	0	4	*–94	2.0	—	
V117	6CD6G	Horizontal Output	5000 Mu. V. Signal	Cap	*	8	165	3	12.5	5	–30	110	15.0	*High Voltage Pulse Present
			No Signal	Cap	*	8	165	3	12.5	5	–30	110	15.0	
V118	1B3GT /8016	H. V. Rectifier	5000 Mu. V. Signal	Cap	*	—	—	2 & 7	16,000	—	—	0.2	—	*High Voltage Pulse Present
			No Signal	Cap	*	—	—	2 & 7	16,400	—	—	0.2	—	
V119 V120	6W4GT	Dampers	5000 Mu. V. Signal	5	355	—	—	3	*	—	—	57	—	*High Voltage Pulse Present
			No Signal	5	353	—	—	3	*	—	—	57	—	
V121	21AP4	Kinescope	5000 Mu. V. Signal	Cone	16,000	10	555	11	140	2	82	0.2	—	At average Brightness
			No Signal	Cone	16,400	10	550	11	132	2	76	0.2	—	
V122 V123	5U4G	Rectifiers	5000 Mu. V. Signal	4 & 6	388	—	—	2 & 8	389	—	—	*139	—	Per Tube
			No Signal	4 & 6	386	—	—	2 & 8	387	—	—	*145	—	

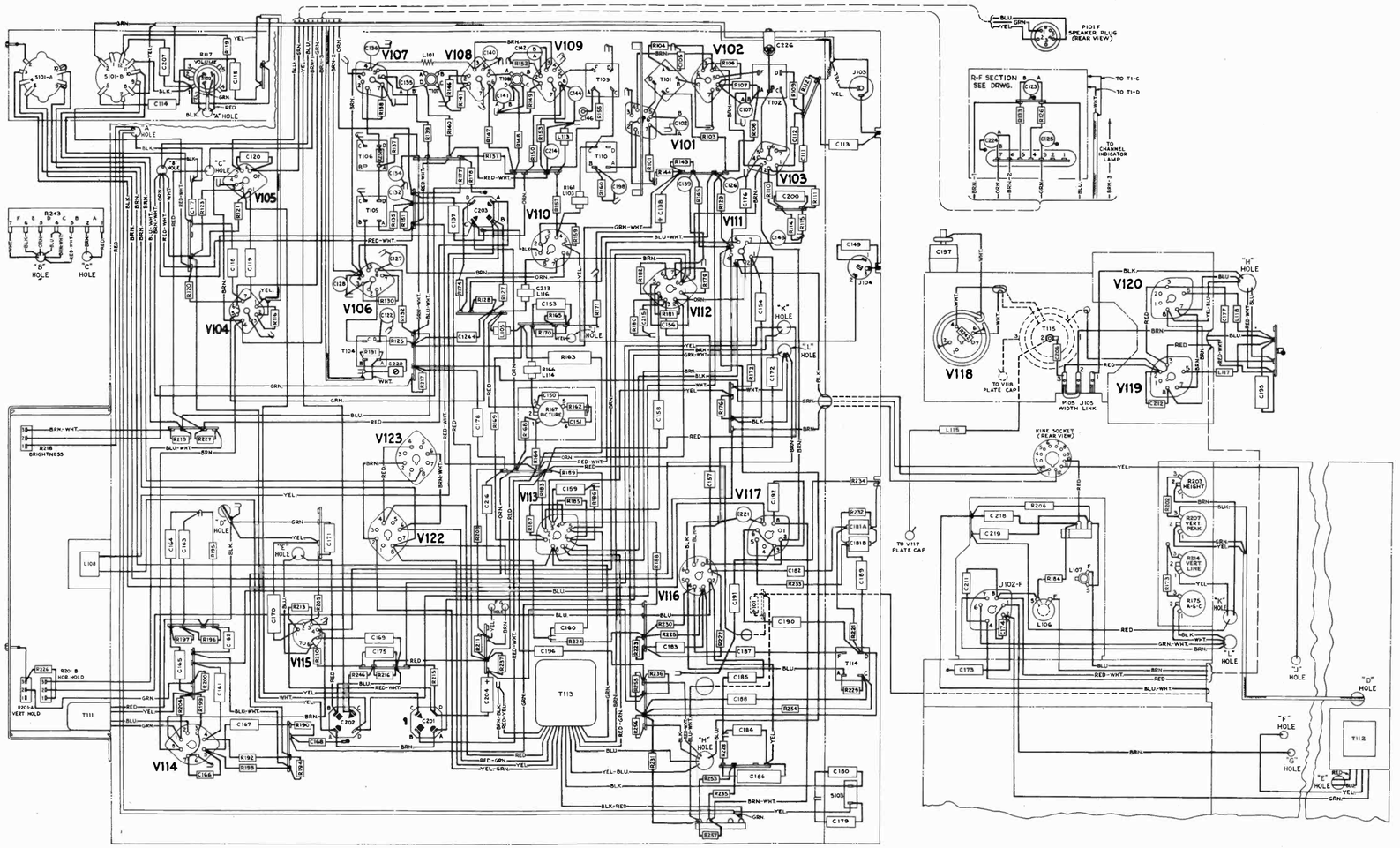


Figure 77—Chassis Wiring Diagram, KCS68F

21T159, 21T165
21T176, 21T177
21T178, 21T179

CHASSIS WIRING DIAGRAM, KCS68C, KCS68E

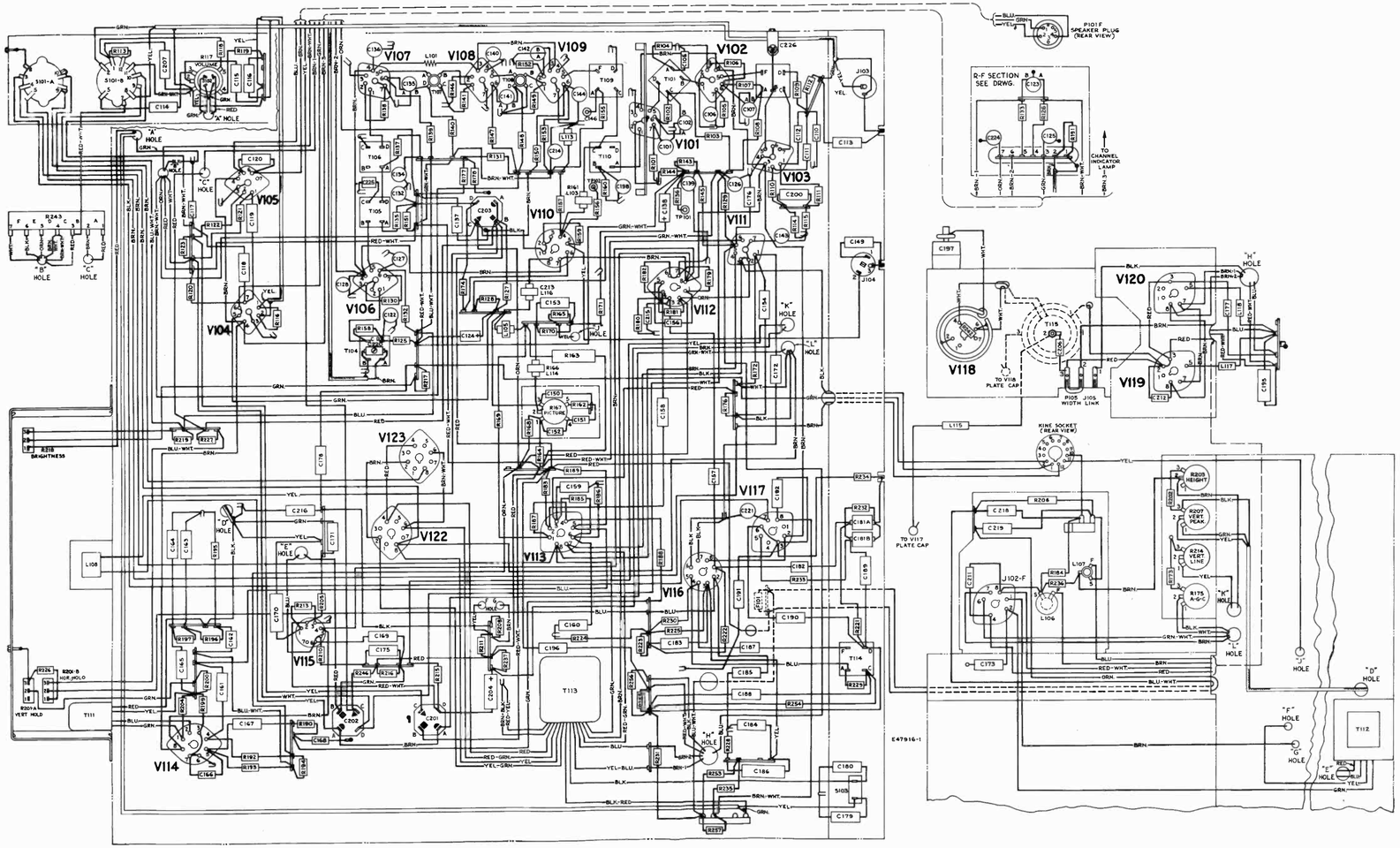


Figure 78—Chassis Wiring Diagram, KCS68C, KCS68E

21T159, 21T159DE, 21T165
21T166DE, 21T174DE, 21T175DE
21T176, 21T177, 21T178
21T178DE, 21T179, 21T179DE

R-F UNIT WIRING DIAGRAMS

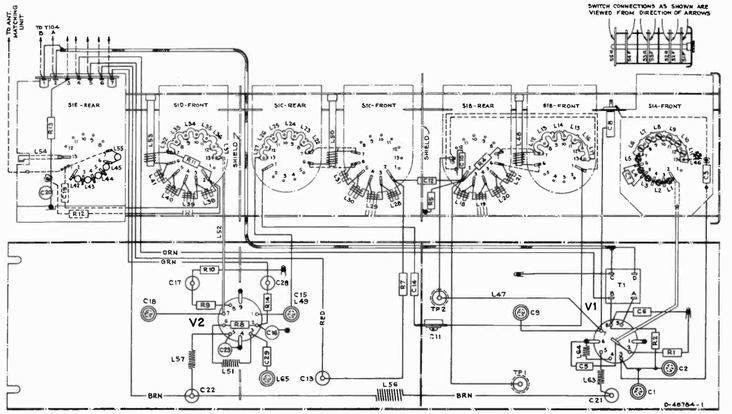


Figure 79—KRK11 R-F Unit Wiring Diagram

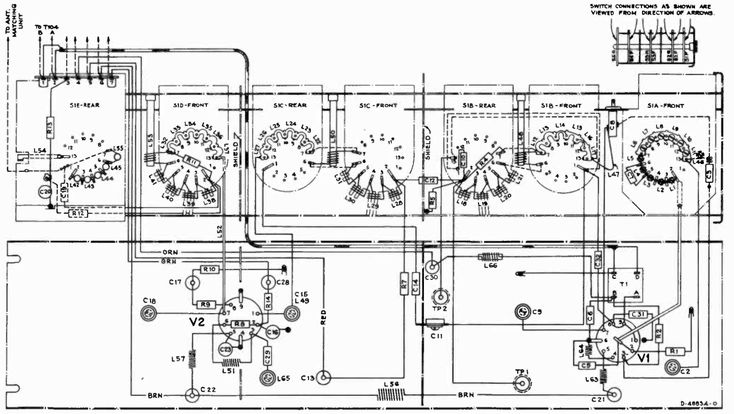
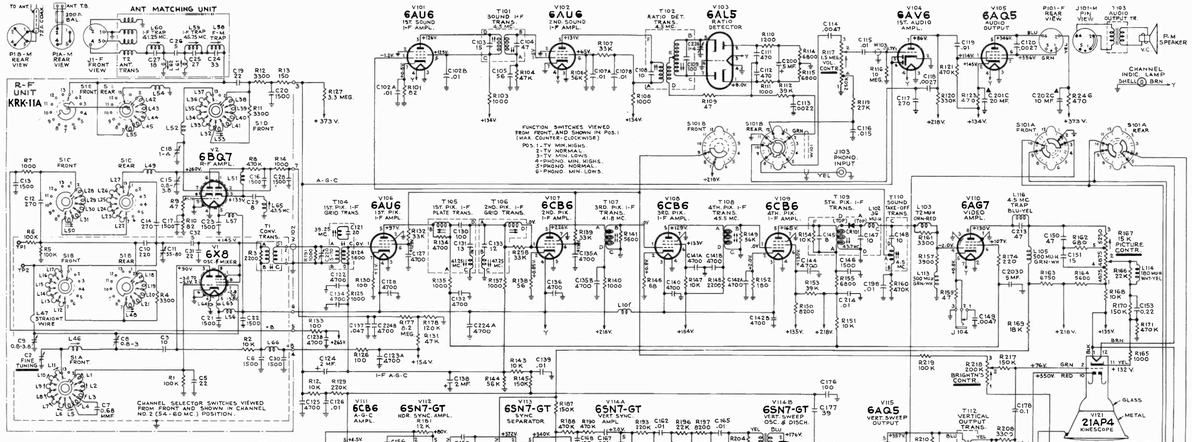


Figure 80—KRK11A R-F Unit Wiring Diagram

CIRCUIT SCHEMATIC DIAGRAM, KCS68F

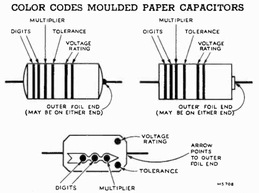
21T159DE, 21T166DE
21T174DE, 21T175DE
21T178DE, 21T179DE



PRODUCTION CHANGES IN KCS68F

The schematic is shown in the latest condition.
The notes below tell how early receivers differed from the schematic shown above.
In some receivers R114 was 6800 ohms.
In some receivers R215 was 1000 ohms.

COLOR CODES MOULDED PAPER CAPACITORS



The schematic is shown in the latest condition at the time of printing.

All resistance value in ohms. K = 1000.

All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted.

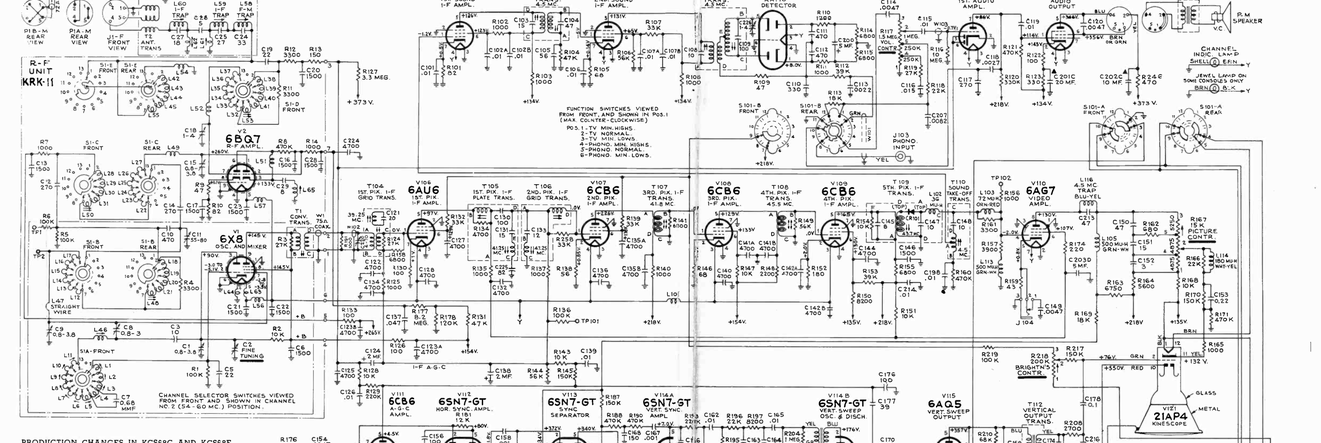
Direction of arrows at controls indicates clockwise tolaion.

All voltages measured with "VoltOhmyst" and with no signal input. Voltages should hold within ±20% with 117 v. a-c supply.

Figure 81—Circuit Schematic Diagram, KCS68F

21T159, 21T165
21T176, 21T177
21T178, 21T179

CIRCUIT SCHEMATIC DIAGRAM, KCS68C, KCS68E



PRODUCTION CHANGES IN KCS68C AND KCS68E

The schematic is shown in the latest condition. The notes below tell how early receivers differed from the schematic shown above.
In some receivers a 1 mmf. capacitor C was connected to ground and C225 was omitted.
In some receivers the selector trimmer C226 was omitted.
In some receivers C195 at damper plate was .082 mfd.
In some receivers R186 at V113-3 was 5.6 meg.
In some receivers R188 at V113-4 was 1 meg. and R190 and C168 were omitted.
In some receivers, fourth pix i-f screen resistor R153 was 33K and R150 was omitted.
In some receivers C120 at V105-5 was .0033 mfd.
In some receivers R163 at V121-1 was omitted.
In some receivers video peaking coil L113 was Grn-Orange and was shunted by a 680 ohm resistor R174.
In some receivers video peaking coil L105 was 250 Muh and was coded Grn.
In some receivers C221 at V117-7 was omitted.
In some receivers a 1000 megohm bleeder resistor was connected from V118-2 to ground.
In some receivers R176 at the AGC control was 33K.
In some receivers R191 across T104 link was omitted.
In some receivers C220 across T104 link was 27 mmf. and was not adjustable.
In some receivers a 5 mfd. capacitor C222 was connected between brightness control R218-3 and ground.
In some receivers S102-1 was omitted and brightness control R218-1 was connected to ground.
In some receivers fourth pix i-f loading resistor R154 may be any value between 3600 to 10K.
In some receivers R174 at V110-24 was omitted.
In some receivers F101 was a .25 amp. quick blow type fuse.
In some receivers C196 and C219 were connected to the junction of F101 and R253.
In some receivers a 270 mmf. capacitor C217 was connected from the junction of R251 and F101 to ground.
In early production r-f units, C110 was 330 mmf., C8 was 0.8 — 1.4 mmf., C3 was 12 mmf. and L49 was shown as a coil. TP2 was connected at the junction of L47 and C9. Early production r-f units are unmarked. Late production 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.

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 ±20% with 117 v. a-c supply.

Figure 82—Circuit Schematic Diagram, KCS68C, KCS68E

REPLACEMENT PARTS

STOCK No.	DESCRIPTION
	RF UNIT ASSEMBLIES KRK11, KRK11A
76539	Board—Antenna matching transformer terminal board less coils L58, L59, L60 and less capacitors C24, C25, C26, C27
76531	Board—Terminal board, 5 contact and ground
76522	Bracket—Vertical bracket for holding 6X8 tube shield (early production KRK11)
76845	Bracket—Vertical bracket for holding 6X8 tube shield (production marked "M1" or KRK11A)
75186	Capacitor—Ceramic, variable for fine tuning—plunger type (KRK11)
76965	Capacitor—Ceramic, variable for fine tuning—plunger type (C2) (KRK11A)
93056	Capacitor—Ceramic, 5 mmf. (C26) (C32, KRK11A)
70597	Capacitor—Ceramic, 8 mmf. (C29)
55326	Capacitor—Ceramic, 10 mmf. (C3) (production marked "M1" or KRK11A)
76550	Capacitor—Ceramic, 12 mmf. (C3) (early production KRK11)
54207	Capacitor—Ceramic, 18 mmf. (C27)
76557	Capacitor—Ceramic, 22 mmf. (C19) (C31, KRK11A)
76558	Capacitor—Ceramic, 22 mmf. (C5)
70935	Capacitor—Ceramic, 27 mmf. (C25)
76739	Capacitor—Ceramic, 33 mmf. (C24)
76527	Capacitor—Mica trimmer, 55-80 mmf. (C11)
77460	Capacitor—Ceramic, 220 mmf. (C10) (KRK11A)
75199	Capacitor—Ceramic, 270 mmf. (C12, C14)
76552	Capacitor—Ceramic, 330 mmf. (C10) (early production KRK11)
75198	Capacitor—Ceramic, 470 mmf. (C10) (production marked "M1" KRK11)
75166	Capacitor—Ceramic, 1500 mmf. (stand-off) (C13, C17, C21, C22, C28)
73748	Capacitor—Ceramic, 1500 mmf. (C16, C20, C23)
75610	Capacitor—Ceramic, 1500 mmf. (C6)
71088	Capacitor—Ceramic, 0.68 mmf. (C7)
75184	Capacitor—Ceramic, adjustable, 0.75-4 mmf., complete with adjusting stud (C1, C9)
76545	Capacitor—Tubular, steatite, adjustable, 0.8—2.25 mmf. (C8) (early production KRK11)
76781	Capacitor—Tubular, steatite, adjustable 0.8—2.25 mmf. (C8) (production marked "M1" KRK11)
77151	Capacitor—Tubular, steatite, adjustable, 0.8—3.0 mmf. (C8) (KRK11A)
76532	Capacitor—Adjustable trimmer, steatite, 1.0—4.0 mmf. (C18)
76143	Clip—Tubular clip for mounting stand-off capacitors
73591	Coil—Antenna matching coil (2 req'd)
76560	Coil—Channel #13 converter coil (L47) (early production KRK11)
73477	Coil—Choke coil (L57)
76763	Coil—Filament choke coil (L63, L64)
77206	Coil—Filament choke coil (L56) (KRK11A)
76562	Coil—R-F amplifier coupling coil (L51)
77153	Coil—R-F choke coil (L66) (KRK11A)
76537	Coil—Shunt coil complete with adjustable core (L61)
76538	Coil—Shunt coil complete with adjustable core (L62)
76529	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L49, C15)
76559	Connector—Oscillator grid connector
38853	Connector—4 contact female connector—part of antenna matching transformer
76460	Contact—Test point contact
75187	Core—Adjustable core for fine tuning capacitor, KRK11
77202	Core—Adjustable core for fine tuning capacitor (KRK11A)
76543	Core—Adjusting core for FM trap
76521	Detent—Detent mechanism and fibre shaft
73453	Form—Coil form for coils L48, L50 & L53
76524	Link—Link assembly for fine tuning, KRK11
77203	Link—Link assembly for fine tuning (KRK11A)
76728	Nut—Speednut for mounting adjustable trimmer 76532 (KRK11A)
	Resistor—Fixed, compositions:—
503047	47 ohms, ± 10%, ½ watt (R9)
503082	82 ohms, ± 10%, ½ watt (R10)
504115	150 ohms, ± 20%, ½ watt (R13)
504210	1000 ohms, ± 20%, ½ watt (R7, R14)
503233	3300 ohms, ± 10%, ½ watt (R4, R11, R12)
503247	4700 ohms, ±10%, ½ watt (R2 for KRK11A)
504310	10,000 ohms, ±20%, ½ watt (R2 for KRK11)
504410	100,000 ohms, ± 20%, ½ watt (R1, R5, R6)
504447	470,000 ohms, ±20%, ½ watt (R8)
14343	Retainer—Fine tuning shaft retaining ring
75164	Rod—Actuating plunger rod (fibre) for fine tuning link
76547	Screw—#4-40 x ¼" adjusting screw for coils L6, L7, L8, L9, L10, L11
76548	Screw—#4-40 x 5/16" adjusting screw for coils L1, L2, L3, L4, L46
76549	Screw—#4-40 x ⅜" adjusting screw for coil L5
76519	Shaft—Channel selector shaft and plate
76134	Shaft—Fine tuning shaft and cam
76518	Shield—Front shield complete with shaft bushing and bracket (KRK11)
77147	Shield—Front shield complete with shaft bushing and bracket, KRK11A
76534	Shield—Tube shield for V2 (also V1 in M1 production)
76533	Shield—Tube shield (lead coated) for V1 (early production KRK11)
76336	Socket—Tube socket, 9 pin, miniature, bakelite, saddle mounted
76530	Socket—Tube socket, 9 pin, miniature, ceramic, saddle mounted
75191	Spacer—Insulating spacer for front plate (4 req'd)
77149	Spacer—Metal spacer for front plate, KRK11A
75163	Spring—Friction spring (formed) for fine tuning cam
30340	Spring—Hairpin spring for fine tuning link
76523	Spring—Retaining spring for 6X8 tube shield (early production KRK11)
75068	Spring—Retaining spring for oscillator-mixer tube shield (production marked "M1" and KRK11A)
73457	Spring—Return spring for fine tuning control, KRK11
77204	Spring—Return spring for fine tuning control, KRK11A
76554	Stator—Antenna stator complete with rotor, coils, capacitor and resistor (S1E, L42, L43, L44, L45, L54, L55, C20)
76551	Stator—Converter stator complete with rotor, coils, capacitors and resistors (S1B, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L48, C10, C12, R4, R5, R6 (early production KRK11)
76780	Stator—Converter stator complete with rotor, coils, capacitors and resistors (S1B, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L48, C10, C12, R4, R5, R6) (production marked "M1" KRK11)
77353	Stator—Converter stator complete with rotor, coils, capacitors and resistors (S1B, C10, C12, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L47, L48, R4, R5, R6) (KRK11A)
76546	Stator—Oscillator stator complete with rotor, coils and capacitor (S1A, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L46) (early production KRK11)
76779	Stator—Oscillator stator complete with rotor, coils, and capacitor (S1A, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L46) (production marked "M1" KRK11)
77205	Stator—Oscillator stator complete with rotor, coils and capacitors (S1A, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L46) (KRK11A)
76556	Stator—R-F grid stator complete with rotor, coils and resistors (S1D, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L53, C19, R11, R12)
76553	Stator—R-F plate stator complete with rotor, coils, capacitor and resistor (S1C, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L50, C14, R7)
76561	Strap—Channel #13 r-f grid strap (L52)
76526	Strip—Coil segment mounting strip—L.H. lower
76544	Strip—Coil segment mounting strip—L.H. upper—less trimmer
76525	Strip—Coil segment mounting strip—R.H. center
75446	Stud—Capacitor stud—brass—#4-40 x 13/16" with 3/64" screw driver slot for trimmer coil L49, C15 uncoded and coded "ER"
75447	Stud—Capacitor stud—brass—#4-40 x 13/16" with 3/64" screw driver slot for trimmer coil L49, C15 coded numerically and "Hi Q"
76740	Stud—#6-32 x 1" adjusting stud for capacitor No. 76545 (early production KRK11)
77152	Terminal—Terminal for mounting C8 trimmer KRK11A
76536	Transformer—Antenna matching transformer complete (T2, C24, C25, C26, C27, L58, L59, L60, L61, L62, J1)
76528	Transformer—Converter transformer (KRK11)
77148	Transformer—Converter transformer T1, R3 (KRK11A)
76540	Trap—FM trap complete with adjustable core (L58)
76535	Trap—I-F trap (L65)
76542	Trap—I-F trap (41.25 mc.) complete with core (L60)
76541	Trap—I-F trap (45.75 mc.) complete with core (L59)
75190	Washer—Insulating washer (neoprene) for mounting capacitor on coil strip

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES KCS 68C in Models 21T176, 21T177, 21T178, 21T179 KCS 68E in Models 21T159, 21T165 KCS68F in Models 21T159DE, 21T166DE, 21T174DE, 21T175DE, 21T178DE, 21T179DE
76456	Bracket—Channel indicator lamp bracket
76490	Bracket—Mounting bracket complete with insulator for picture control
12118	Cap—6CD6 tube connector cap
76800	Capacitor—Adjustable trimmer steatite 1-4 mmf. (C226)
76507	Capacitor—Ceramic, 3 mmf. (C152)
71496	Capacitor—Adjustable, 5-70 mmf. (C220)
75217	Capacitor—Mica trimmer, dual 10-160 mmf. (C181A, C181B)
39044	Capacitor—Ceramic, 15 mmf. (C151)
76577	Capacitor—Ceramic, 33 mmf. (C206)
76574	Capacitor—Ceramic, 39 mmf. (C177)
39042	Capacitor—Ceramic, 47 mmf. (C150)
71924	Capacitor—Ceramic, 56 mmf. (C105)
76474	Capacitor—Mica, 82 mmf. (C157, C182)
71514	Capacitor—Ceramic, 82 mmf. (C225)
39396	Capacitor—Ceramic, 100 mmf. (C156, C166)
76578	Capacitor—Mica, 100 mmf. (C176)
76576	Capacitor—Ceramic, 150 mmf. (C212)
44202	Capacitor—Ceramic, 150 mmf. (C168, C215)
76576	Capacitor—Ceramic, 150 mmf., 2000 volts (C212) (KCS68F)
76575	Capacitor—Ceramic, 180 mmf. (C211)
47617	Capacitor—Ceramic, 270 mmf. (C117)
76579	Capacitor—Mica, 270 mmf. (C187)
76473	Capacitor—Mica, 330 mmf. (C110)
54003	Capacitor—Mica, 470 mmf. (C111, C112)
76488	Capacitor—Ceramic, 500 mmf., 30,000 volts (C197)
75166	Capacitor—Ceramic, 1500 mmf. (stand-off) (C146)
73748	Capacitor—Ceramic, 1500 mmf. (C221)
73473	Capacitor—Ceramic, 4700 mmf. (C122, C125, C127, C128, C132, C134, C136, C140, C147, C224)
76470	Capacitor—Ceramic, dual 4700 mmf. (C123A, C123B, C135A, C135B, C141A, C141B, C142A, C142B)
73960	Capacitor—Ceramic, 10,000 mmf. (C101, C106, C126, C139, C143, C198, C214)
75877	Capacitor—Ceramic, dual 10,000 mmf. (C102A, C102B, C107A, C107B)
76742	Capacitor—Electrolytic, 2 mfd., 10 volts (C124, C138)
74521	Capacitor—Electrolytic, 5 mfd., 50 volts (C200)
28417	Capacitor—Electrolytic, 5 mfd., 450 volts (C204)
75510	Capacitor—Electrolytic, comprising 2 sections of 35 mfd., 450 volts, 1 section of 10 mfd., 450 volts and 1 section of 5 mfd., 450 volts (C203A, C203B, C203C, C203D)
76485	Capacitor—Electrolytic, comprising 2 sections of 35 mfd., 450 volts, 1 section of 10 mfd., 450 volts and 1 section of 10 mfd., 200 volts (C202A, C202B, C202C, C202D)
76486	Capacitor—Electrolytic, comprising 1 section of 35 mfd., 450 volts, 1 section of 25 mfd., 450 volts, 1 section of 20 mfd., 200 volts, and 1 section of 100 mfd., 50 volts (C201A, C201B, C201C, C201D)
75643	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 600 volts (C158, C161, C167)
73801	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 1000 volts (C189)
76508	Capacitor—Tubular, moulded, oil impregnated, .0015 mfd., 600 volts (C190)
73595	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 600 volts (C113, C163)
73803	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 1000 volts (C169)
73599	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 600 volts (C118)
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C114, C120, C149, C154, C164)
73808	Capacitor—Tubular, paper, oil impregnated, .0082 mfd., 600 volts (C207)
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 400 volts (C115, C119, C159, C162, C218)
73594	Capacitor—Tubular, moulded, oil impregnated, .01 mfd., 600 volts (C165, C188)
73797	Capacitor—Tubular, paper, oil impregnated, .015 mfd., 600 volts (C116)
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 400 volts (C160, C174, C175, C184)
73798	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 600 volts (C216)
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C137, C183)
75071	Capacitor—Tubular, moulded, .047 mfd., 400 volts (C179, C180)
73592	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 600 volts (C155, C171, C185, C192)
73815	Capacitor—Tubular, paper, oil impregnated, .068 mfd., 1000 volts (C195, C196)
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C172, C178)
73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C173)
73794	Capacitor—Tubular, paper, oil impregnated, 0.22 mfd., 400 volts (C153)
74957	Capacitor—Tubular, paper, oil impregnated, 0.22 mfd., 600 volts (C170)
73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C186, C191, C219)
76498	Choke—Filter choke (L108)
76143	Clip—Tubular clip for mounting stand-off capacitor #75166
73477	Coil—Choke coil (L101)
76672	Coil—Filament winding only for hi-voltage transformer
76483	Coil—Horizontal linearity coil complete with adjustable core (L107)
76484	Coil—Width coil complete with adjustable core (L106)
76646	Coil—Peaking coil (72 muh) (L103, R161)
76647	Coil—Peaking coil (180 muh) (L114, R166)
75252	Coil—Peaking coil (500 muh) (L105, L113)
76640	Coil—R-F choke coil (1.5 muh) (L117, L118)
76510	Coil—R-F choke coil (4.7 muh) (L115)
35787	Connector—Phono input connector (J103)
76863	Connector—Anode connector complete with terminal and contact
76457	Connector—2nd anode lead connector—mounted on hi-voltage capacitor
74594	Connector—2 contact male connector for power cord
5040	Connector—4 contact female connector for speaker cable (P101)
50367	Connector—6 contact female connector for yoke leads (J102)
75542	Connector—6 contact male connector—part of deflection yoke (P102)
75517	Contact—Anode connector contact only
76460	Contact—Test point contact
76447	Control—AGC control (R175)
76444	Control—Brightness control (R218)
76448	Control—Height control (R203)
76443	Control—Horizontal and vertical hold control (R201A, R201B) (KCS68C, KCS68E)
77201	Control—Horizontal and vertical hold control (R201A, R201B) (KCS68F)
76445	Control—Picture control (R167)
76449	Control—Vertical linearity control (R214)
76803	Control—Volume control and power switch (R117, S102) (KCS68C, KCS68E)
77223	Control—Volume control and power switch (R117, S102) (KCS68F)
76497	Control—Vertical peaking control (R207)
77136	Cover—Back cover for hi-voltage compartment
76985	Cover—Side cover for hi-voltage compartment
74956	Cushion—Rubber cushion for deflection yoke hood (2 req'd)
74839	Fastener—Push fastener for mounting tube sockets
73600	Fuse—0.25 amp., 250 volts (F101)
37396	Grommet—Rubber grommet for mounting tube sockets
76459	Grommet—Rubber grommet for 2nd anode lead exit
76654	Hood—Deflection yoke hood less rubber cushions (KCS68C, KCS68E)
77035	Hood—Deflection yoke hood less rubber cushions (KCS68F)
75482	Jack—Video jack (J104)
76480	Lead—Anode lead complete with eyelet
76652	Magnet—Focus magnet complete (screw driver adjustment type)
76141	Magnet—Ion trap magnet (P.M. type)
76728	Nut—Speednut for mounting trimmer capacitor C226
76500	Plate—Hi-voltage plate (bakelite) complete less transformer socket and lead
76649	Radiator—Heat dissipating radiator for 6CD6 tube
76675	Rectifier—Picture detector crystal rectifier (CR101)
76468	Resistor—Wire wound, 1.5 ohms, 1/3 watt (R242)
74015	Resistor—Wire wound, 100 ohms, 2 watts (R234)

STOCK No.	DESCRIPTION
76682	Resistor—Wire wound, 200 ohms, 5 watts (R206)
76465	Resistor—Wire wound, 330 ohms, 1 watt (R123) (KCS68C, KCS68E)
76642	Resistor—Wire wound, 6750 ohms, 10 watts (R163)
76499	Resistor—Wire wound comprising (R243A, R243B, R243C, R243D, R243E, R243F): 1 section of 950 ohms, 16 watts 1 section of 450 ohms, 6 watts 1 section of 1500 ohms, 5 watts 1 section of 1200 ohms, 1 watt 1 section of 10,000 ohms, 5 watts, and 1 section of 7000 ohms, 5 watts
	Resistor—Fixed, composition:
502043	43 ohms, ± 5%, ½ watt (R159) (KCS68C, KCS68E)
503047	47 ohms, ± 10%, ½ watt (R109, R159, R233)
502056	56 ohms, ± 5%, ½ watt (R138)
34763	68 ohms, ± 5%, ½ watt (R105, R146)
502082	82 ohms, ± 5%, ½ watt (R101)
502110	100 ohms, ± 5%, ½ watt (R130)
503110	100 ohms, ± 10%, ½ watt (R122, R126, R133)
503118	180 ohms, ± 10%, ½ watt (R152)
503122	220 ohms, ± 10%, ½ watt (R174)
503147	470 ohms, ± 10%, ½ watt (R216) (KCS68F)
513147	470 ohms, ± 10%, 1 watt (R123, R246)
503156	560 ohms, ± 10%, ½ watt (R216) (KCS68C, KCS68E)
503168	680 ohms, ± 10%, ½ watt (R162)
503182	820 ohms, ± 10%, ½ watt (R180)
502210	1000 ohms, ± 5%, ½ watt (R111)
503210	1000 ohms, ± 10%, ½ watt (R102, R103, R108, R125, R135, R137, R140, R156, R165, R191)
513210	1000 ohms, ± 10%, 1 watt (R215 for KCS68C, KCS68E)
502212	1200 ohms, ± 5%, ½ watt (R110)
503212	1200 ohms, ± 10%, ½ watt (R183)
513212	1200 ohms, ±10%, 1 watt (R215 for KCS68F)
503222	2200 ohms, ± 10%, ½ watt (R148)
503227	2700 ohms, ± 10%, ½ watt (R208) (KCS68C, KCS68E)
503233	3300 ohms, ± 10%, ½ watt (R208) (KCS68F)
502237	3900 ohms, ± 5%, ½ watt (R157)
502256	5600 ohms, ±5%, ½ watt (R141 for KCS68F)
503239	3900 ohms, ± 10%, ½ watt (R228)
513256	5600 ohms, ± 10%, 1 watt (R164)
14659	6800 ohms, ±5%, ½ watt (R114, R115, R141 for KCS68C and KCS68E; R114, R115 for KCS68F)
503268	6800 ohms, ± 10%, ½ watt (R158) (KCS68C, KCS68E)
513268	6800 ohms, ± 10%, 1 watt (R155)
502282	8200 ohms, ± 5%, ½ watt (R141) (KCS68C, KCS68E)
503282	8200 ohms, ± 10%, ½ watt (R150, R197)
523282	8200 ohms, ± 10%, 2 watts (R235, R253)
503310	10,000 ohms, ±10%, ½ watt (R128, R143, R147, R205, R211, R229)
513310	10,000 ohms, ±10%, 1 watt (R168) (KCS68F)
523310	10,000 ohms, ± 10%, 2 watts (R151)
513312	12,000 ohms, ± 10%, 1 watt (R181)
503318	18,000 ohms, ± 10%, ½ watt (R113, R169, R254)
503322	22,000 ohms, ± 10%, ½ watt (R118, R194, R195, R196)
503327	27,000 ohms, ± 10%, ½ watt (R119, R176)
503333	33,000 ohms, ± 10%, ½ watt (R107, R132, R139, R258)
503339	39,000 ohms, ± 10%, ½ watt (R112, R153)
503347	47,000 ohms, ± 10%, ½ watt (R104, R131)
513347	47,000 ohms, ± 10%, 1 watt (R227) (KCS68F)
502356	56,000 ohms, ± 10%, ½ watt (R144, R149)
503356	56,000 ohms, ± 10%, ½ watt (R106)
513356	56,000 ohms, ± 10%, 1 watt (R226, R231)
512368	68,000 ohms, ± 5%, 1 watt (R210, R230)
513368	68,000 ohms, ± 10%, 1 watt (R225, R227)
513382	82,000 ohms, ± 10%, 1 watt (R226, R257)
502410	100,000 ohms, ± 5%, ½ watt (R173)
503410	100,000 ohms, ± 10%, ½ watt (R219)
504410	100,000 ohms, ± 20%, ½ watt (R136) (KCS68C, KCS68E)
503412	120,000 ohms, ± 10%, ½ watt (R178)
503415	150,000 ohms, ± 10%, ½ watt (R145, R170, R172, R187, R217, R221, R236)
512415	150,000 ohms, ± 5%, 1 watt (R224)
502422	220,000 ohms, ± 5%, ½ watt (R129)
503422	220,000 ohms, ± 10%, ½ watt (R185, R193, R237)
503427	270,000 ohms, ± 10%, ½ watt (R184)
503433	330,000 ohms, ± 10%, ½ watt (R120, R222) (R256, KCS68F)
503439	390,000 ohms, ± 10%, ½ watt (R255) (R256, KCS68C, KCS68E)
503447	470,000 ohms, ± 10%, ½ watt (R121, R160, R171, R188, R190)
503468	680,000 ohms, ± 10%, ½ watt (R189)
503482	820,000 ohms, ± 10%, ½ watt (R200 in KSC68F) (R202, R223)
503510	1 megohm, ± 10%, ½ watt (R182, R202, R204, R232)
503515	1.5 megohm, ± 10%, ½ watt (R192)
503533	3.3 megohm, ± 10%, ½ watt (R213)
512533	3.3 megohm, ± 5%, 1 watt (R127)
503539	3.9 megohm, ± 10%, ½ watt (R179)
503582	8.2 megohm, ± 10%, ½ watt (R177, R186)
503610	10 megohm, ± 10%, ½ watt (R199) (KCS68C, KCS68E)
503610	10 megohm, ± 10%, ½ watt (R116)
76650	Ring—Anchoring ring for radiator hold-down spring
71456	Screw—#8-32 x 7/16" wing screw to mount deflection yoke
76487	Shaft—Connecting shaft—nylon—for picture and brightness controls
73584	Shield—Tube shield
76741	Shield—Tube shield for vertical oscillator, V114
75718	Socket—Channel indicator lamp socket
74834	Socket—Kinescope socket
31364	Socket—Pilot light socket
73249	Socket—Tube socket, octal, ceramic, plate mounted
76453	Socket—Tube socket, octal, moulded bakelite, plate mounted
31251	Socket—Tube socket, octal, wafer
71508	Socket—Tube socket, 6 contact, moulded bakelite
50367	Socket—Tube socket, 6 pin, moulded, saddle mounted
71494	Socket—Tube socket, 7 pin, moulded, saddle mounted, miniature
73117	Socket—Tube socket, 7 pin, wafer, miniature
76651	Spring—Springs for securing 6CD6 radiator (3 req'd)
76636	Stud—Adjusting stud complete with guard for focus magnet
75173	Stud—Adjusting stud for trimmer capacitor
76428	Support—Bakelite support only—part of hi-voltage shield
76493	Switch—Tone control and phono switch (S101)
77222	Switch—Tone control and phono switch less volume control and power switch (S101)
76463	Terminal—Screw type grounding terminal
76501	Transformer—Hi-voltage transformer less filament winding (T115)
76440	Transformer—Horizontal oscillator transformer complete with adjustable cores (T114)
76495	Transformer—Power transformer, 115 volt, 60 cycle (T113)
76439	Transformer—Ratio detector transformer complete with adjustable cores (T102, C108, C109)
76438	Transformer—Sound i-f transformer complete with adjustable cores (T101, C103, C104)
76437	Transformer—Sound take-off transformer complete with adjustable cores (T110, C148)
76494	Transformer—Vertical output transformer (T112)
74144	Transformer—Vertical oscillator transformer (T111)
76432	Transformer—First pix i-f grid transformer complete with adjustable cores (T104, C121, R124) (KCS68C, KCS68E)
77198	Transformer—1st pix i-f grid transformer complete with adjustable cores (T104, C121, R124) (KCS68F)
76434	Transformer—First pix i-f plate transformer complete with adjustable cores (T105, C130, C131, R134) (KCS68C, KCS68E)
77197	Transformer—1st pix i-f plate transformer complete with adjustable cores (T105, C130, C131, R134) (KCS68F)
76435	Transformer—Second pix i-f grid transformer complete with adjustable cores (T106, C133)
76433	Transformer—Third or fourth pix i-f transformer (T107, T108)
76436	Transformer—Fifth pix i-f transformer (T109, C145, C147, CR101, L102, R154)
76482	Trap—4.5 mc. trap (L116, C213)
76653	Yoke—Deflection yoke complete with 6 contact male connector (L109, L110, L111, L112, C193, C199, C205, P102)
	SPEAKER ASSEMBLIES 971490-2W, RL 105C18 For Models 21T159, 21T159DE
75024	Cone—Cone and voice coil (3.2 ohms)
5039	Connector—4 prong male plug for speaker (J101)
75022	Speaker—8" P.M. speaker complete with cone and voice coil (3.2 ohms) less transformer and plug
75520	Transformer—Output transformer (T103)
	SPEAKER ASSEMBLIES 971490-2 R For Models 21T159, 21T159DE
77129	Cone—Cone and voice coil
	SPEAKER ASSEMBLIES 92569-14-W, RL-111A11
75682	Cone—Cone and voice coil (3.2 ohms)
5039	Connector—4 contact male connector
76833	Speaker—12" P.M. speaker complete with cone and voice coil less transformer and plug
75520	Transformer—Output transformer
	SPEAKER ASSEMBLIES 971494-1 W, RL 111 B2
76296	Cone—Cone and voice coil (3.2 ohms)
5039	Connector—4 contact male connector (J101)
76389	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms) less transformer and plug
75520	Transformer—Output transformer (T103)

STOCK No.	DESCRIPTION
	21CB9 CABINET BASE (For use with Model 21T159)
X3251	Pull—Door pull
	MISCELLANEOUS
76794	Back—Cabinet back complete with power cord for Model 21T159
77254	Back—Cabinet back complete with power cord and terminal board for Model 21T159DE
76655	Back—Cabinet back complete with power cord for Models 21T165, 21T176, 21T177, 21T178, 21T179
77253	Back—Cabinet back complete with power cord for Models 21T174DE, 21T178DE, 21T179DE
76184	Board—Antenna terminal board
76629	Bracket—Hanger bracket from cabinet top panel to deflection yoke hood
76697	Bracket—Masking panel support bracket (2 req'd)
71599	Bracket—Pilot lamp bracket
76599	Bracket—"U" shape bracket for holding "L" shape support rods (2 req'd)
76699	Bumper—Rubber bumper for kinescope (as req'd)
13103	Cap—Pilot lamp cap
71892	Catch—Bullet catch and strike for doors
77047	Clip—Ornamental clip (metal) for grille bars for Model 21T174DE
X1917	Cloth—Grille cloth for mahogany or walnut instruments for Model 21T159
X1918	Cloth—Grille cloth for oak instruments for Model 21T159
X1756	Cloth—Grille cloth for mahogany or walnut instruments for Model 21T159DE
X3222	Cloth—Grille cloth for blonde mahogany instruments for Models 21T166DE, 21T174DE, or for oak instruments for Models 21T165, 21T175DE, 21T177
X3089	Cloth—Grille cloth for oak instruments for Model 21T176
X3199	Cloth—Grille cloth for mahogany or walnut instruments for Models 21T165, 21T176, 21T177, 21T178, 21T179, 21T166DE, 21T174DE, 21T175DE, 21T178DE, 21T179DE or for maple instruments for Models 21T179, 21T179DE
75474	Connector—Single contact male connector for antenna cable (2 req'd)
39153	Connector—4 contact male connector for antenna cable
71457	Cord—Power cord and plug
76631	Cushion—Rubber cushion for dust sealing the kinescope
76627	Cushion—Rubber cushion for safety glass (4 req'd)
76698	Cushion—Rubber cushion for masking panel support bracket (2 req'd)
76566	Decal—Control function decal for mahogany or walnut instruments
76567	Decal—Control function decal for blonde mahogany, oak or maple instruments
77043	Decal—Control function decal for mahogany, walnut or maple instruments
71984	Decal—Trade mark decal
77243	Decal—"His Master's Voice" decal for Model 21T179DE
71984	Decal—"RCA Victor" decal for Models 21T174DE, 21T175DE, 21T178DE, 21T179DE
74809	Emblem—"RCA Victor" emblem
77245	Emblem—"Deluxe" emblem for blond or maple instruments for Models 21T159DE, 21T179DE
77244	Emblem—"Deluxe" emblem for mahogany or walnut instruments for Models 21T159DE, 21T179DE
77487	Emblem—"Deluxe" emblem for Models 21T166DE, 21T174DE, 21T175DE, 21T178DE
77033	Emblem—"RCA Victor" emblem for Model 21T179DE
77012	Emblem—"RCA Victor" for Models 21T159DE, 21T174DE, 21T178DE
75456	Escutcheon—Channel marker escutcheon
72113	Foot—Rubber foot for Model 21T159 cabinet (4 req'd)
76622	Glass—Safety glass
37396	Grommet—Rubber grommet for mounting speaker (3 req'd)
74308	Hinge—Cabinet door hinge (1 set)
76595	Knob—Brightness control or vertical hold control knob—maroon—for mahogany or walnut instruments (outer)
76625	Knob—Brightness control or vertical hold control—tan—for maple instruments (outer)
76596	Knob—Brightness control or vertical hold control knob—beige—for oak instruments (outer)
76593	Knob—Channel selector knob—maroon—for mahogany or walnut instruments (inner)
76624	Knob—Channel selector knob—tan—for maple instruments (inner)
76594	Knob—Channel selector knob—beige—for oak instruments (inner)
76591	Knob—Fine tuning control knob—maroon—for mahogany or walnut instruments (outer)
76623	Knob—Fine tuning control knob—tan—for maple instruments (outer)
76592	Knob—Fine tuning control knob—beige—for oak instruments (outer)
74963	Knob—Picture control, horizontal hold control or volume control and power switch knob—maroon—for mahogany or walnut instruments (inner)
74001	Knob—Picture control, horizontal hold control or volume control and power switch knob—tan—for maple instruments (inner)
75464	Knob—Picture control, horizontal hold control or volume control and power switch knob—beige—for oak instruments (inner)
76597	Knob—Tone control and phono switch knob—maroon—for mahogany or walnut instruments (outer)
76626	Knob—Tone control and phono switch knob—tan—for maple instruments (outer)
76598	Knob—Tone control and phono switch knob—beige—for oak instruments (outer)
11765	Lamp—Channel marker escutcheon or pilot lamp—Mazda #51
75459	Mask—Channel marker escutcheon—light mask—burgundy—for mahogany or walnut instruments
76589	Mask—Channel marker escutcheon—light mask—medium dark beige—for oak or maple instruments
76696	Mask—Polystyrene masking panel for kinescope
77247	Medallion—Phonograph and dog medallion for maple instruments, Model 21T179DE
77246	Medallion—Phonograph and dog medallion for mahogany or walnut instruments, Model 21T179DE
76728	Nut—Speed nut for trimmer capacitor C226
73634	Nut—Speed nut for speaker mounting screws
71455	Nut—#8-32 wing nut to mount yoke hood to hanger bracket
76177	Nut—#10-32 special nut for deflection yoke hood support rod (2 req'd)
77013	Nut—Speednut for fastening "RCA Victor" emblem, "Deluxe" emblem, or medallion ornaments to cabinet
76601	Pad—Kinescope edge support pad (4 req'd)
76570	Plate—Back plate for center door pull for Model 21T178
76645	Pull—Door pull (2 req'd) for mahogany or walnut Model 21T176
77046	Pull—Door pull for Model 21T174DE
77044	Pull—Door pulls (1 set) for upper doors for Model 21T179DE
77045	Pull—Door pulls for lower doors for Model 21T179DE
76756	Pull—Door pull (2 req'd) for oak Model 21T176
76571	Pull—Door pull for Model 21T177
76569	Pull—Center door pull for Model 21T178 (2 req'd)
76568	Pull—Upper door pull for Model 21T178 (4 req'd)
76198	Pull—Door pull for lower door for Model 21T179
76196	Pull—Door pull for upper L.H. door for Model 21T179
76197	Pull—Door pull for upper R.H. door for Model 21T179
76628	Rod—"L" shape threaded rod to support deflection yoke hood assembly (2 req'd)
76632	Screw—#8 x ⅝" self tapping hex head wood screw to mount kinescope panel (12 req'd) or hanger bracket (2 req'd)
74279	Screw—#8-32 x ⅞" trimit head screw for Model 21T176 door pulls for Model 12T179 upper door pulls
74269	Screw—#8-32 x ¾" trimit head screw for upper door pull for Model 21T178
74113	Screw—#8-32 x 1" trimit head screw for door pull for Model 21T177
74307	Screw—#8-32 x 1⅛" trimit head screw for center door pull for Model 21T178
75626	Screw—#8-32 x 1¼" trimit head screw for door pull for lower doors for Model 21T179
76630	Spring—Formed spring for kinescope masking panel (6 req'd)
30330	Spring—Retaining spring for knobs #74001, 74963 & 75464
72845	Spring—Retaining spring for knobs #76591, 76592 & 76623
77006	Spring—Retaining spring for deflection yoke hood support rod nut
14270	Spring—Retaining spring for knobs #76593, 76594, 76595, 76596, 76597, 76598, 76623, 76624, 76625 & 76626
73643	Spring—Spring clip for channel marker escutcheon
76837	Spring—Retaining spring for knobs #76593, 76594, 76595, 76596, 76597, 76598, 76624, 76625, 76626
74936	Spring—Spring for kinescope socket leads
72936	Stop—Cabinet door stop
76600	Strap—Grounding strap (copper strip—½" x 18" long)
75457	Washer—Felt washer—dark brown—between knob and channel marker escutcheon for mahogany or walnut instruments
75523	Washer—Felt washer—tan—between knob and channel marker escutcheon for maple instruments
75458	Washer—Felt washer—beige—between knob and channel marker escutcheon for oak instruments
75500	Washer—Felt washer for cabinet back mounting screws (4 req'd)
76836	Washer—Cellulose washer—gold—for knobs for Models 21T159, 21T165, 21T176, 21T177, 21T178, 21T179
77023	Washer—Cellulose washer—gold—for knobs for Models 21T159DE, 21T174DE, 21T178DE, 21T179DE

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.

RCA VICTOR

Model 21-T-197DE "Sunderland"
Mahogany

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.
FOR
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.

A three speed record changer is provided to play 33⅓, 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 . . . . . 45.75 mc.
Sound Carrier Frequency . . . . . 41.25 mc.

RADIO TUNING RANGE

Broadcast . . . . . 540-1,600 kc.
Frequency Modulation . . . . . 88-108 mc.
Intermediate Frequency—AM . . . . . 455 kc.
Intermediate Frequency—FM . . . . . 10.7 mc.

POWER SUPPLY RATING

115 volts, 60 cycles, 410 watts max.

AUDIO POWER OUTPUT RATING . . . . . 10 watts max.

CHASSIS DESIGNATIONS

Television Chassis KCS68H
Radio Chassis RC1111A
Audio Chassis RS141A
Record Changer 930409-5
Refer to Service Data 930409 for record changer information

LOUDSPEAKER—92569-12 . . . . . 12 inch PM Dynamic
Voice Coil Impedance . . . . . 3.2 ohms at 400 cycles

WEIGHT

Chassis with Tubes in Cabinet . . . . . 222 lbs.
Shipping Weight . . . . . 281 lbs.

DIMENSIONS (inches)	Width	Height	Depth
Cabinet (outside)	43⅜	39⅛	27⅞

RECEIVER ANTENNA INPUT IMPEDANCE

Choice: 300 ohms balanced or 72 ohms unbalanced.

RCA TUBE COMPLEMENT

	Tube Used	Television Chassis	Function
(1)	RCA 6BQ7		R-F Amplifier
(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
(6)	RCA 6CB6		4th Picture I-F Amplifier
(7)	RCA 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		1st 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
(19)	RCA 6W4GT (2 tubes)		Dampers
(20)	RCA 1B3-GT/8016		High Voltage Rectifier
(21)	RCA 5U4G (2 tubes)		Rectifiers
(22)	RCA 21AP4		Kinescope
	Radio Chassis RC1111A		
(1)	RCA 6CB6		R-F Amplifier
(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

21-T-197DE

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	41.25 mc. and 4.5 mc.

VIDEO RESPONSE	To 4 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

OPERATING CONTROLS (Front Panel)

Channel Selector, Fine Tuning	Dual Control Knobs
Picture Brightness	Dual Control Knobs
Picture Horizontal Hold, Picture Vertical Hold	Dual Control Knobs
Sound Volume and On-Off Switch, Tone Control	Dual Control Knobs

NON-OPERATING CONTROLS (not including r-f and i-f adjustments)

Picture Centering	top chassis adjustment
Width	rear screwdriver chassis adjustment
Height	rear chassis adjustment
Horizontal Linearity	rear chassis screwdriver adjustment
Vertical Linearity	rear 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 Range	rear chassis adjustment
Focus	top chassis adjustment
Ion Trap Magnet	top chassis adjustment
Deflection Coil	top chassis wing nut adjustment
AGC Control	rear chassis adjustment

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 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.

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 CHANNEL SELECTOR to the desired channel.

4. Adjust the FINE TUNING 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 HORIZONTAL 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.

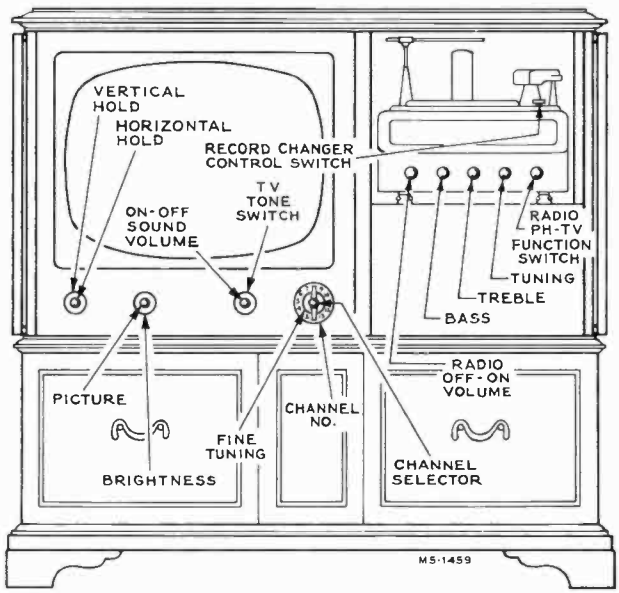


Figure 1—Receiver Operating Controls

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 adjustment 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 TUNING 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 PROCEDURE 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 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.

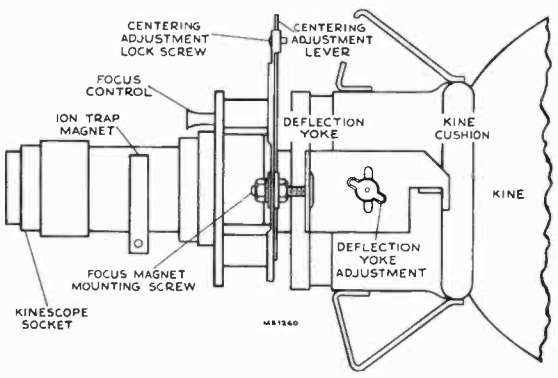


Figure 2—Ion Trap and Centering Magnet Adjustments

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 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 "Focus Magnet Adjustment."

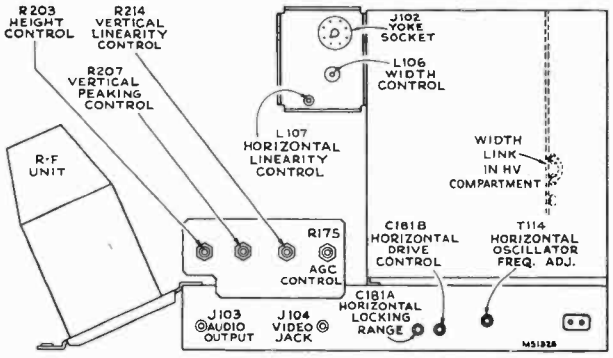


Figure 3—Rear Chassis Adjustments

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 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. 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 L106 in approximately mid position.

C.—Set the linearity control coil L107 near minimum inductance (counter-clockwise).

D.—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 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 adjust-

ments 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.

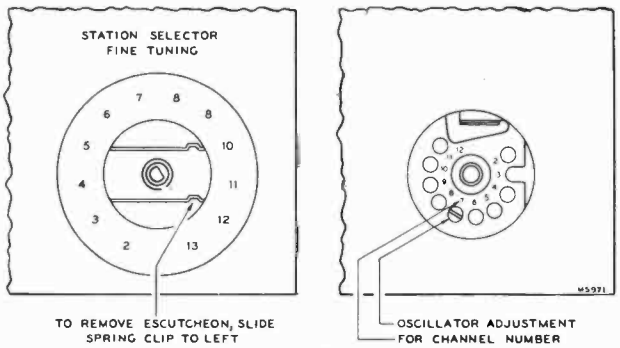


Figure 4—R-F Oscillator Adjustments

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.

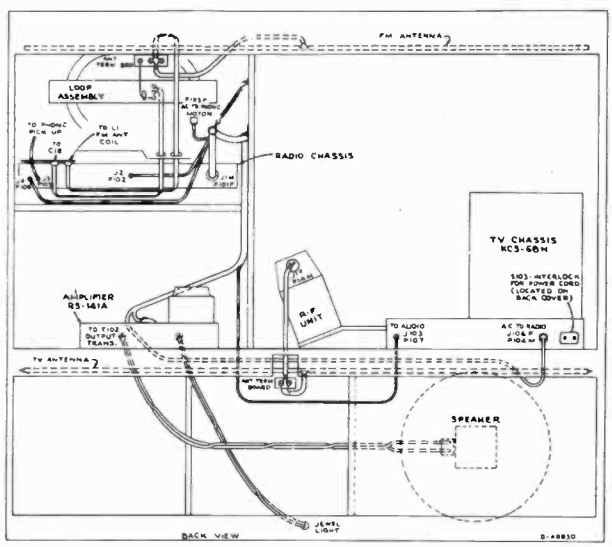


Figure 5—Instrument Cable Diagram

21-T-197DE

CHASSIS TOP VIEW

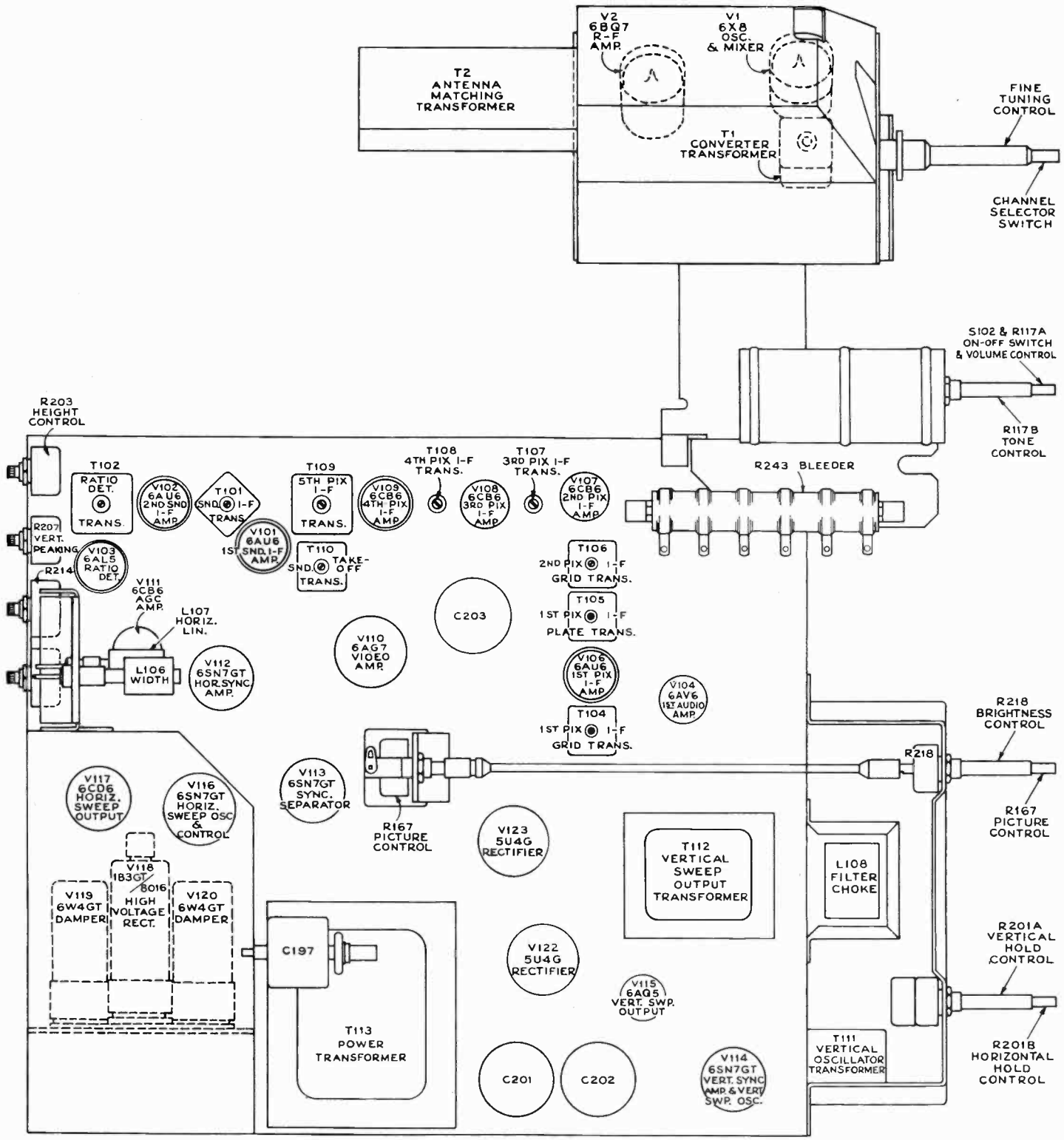


Figure 6—Chassis Top View

CHASSIS BOTTOM VIEW

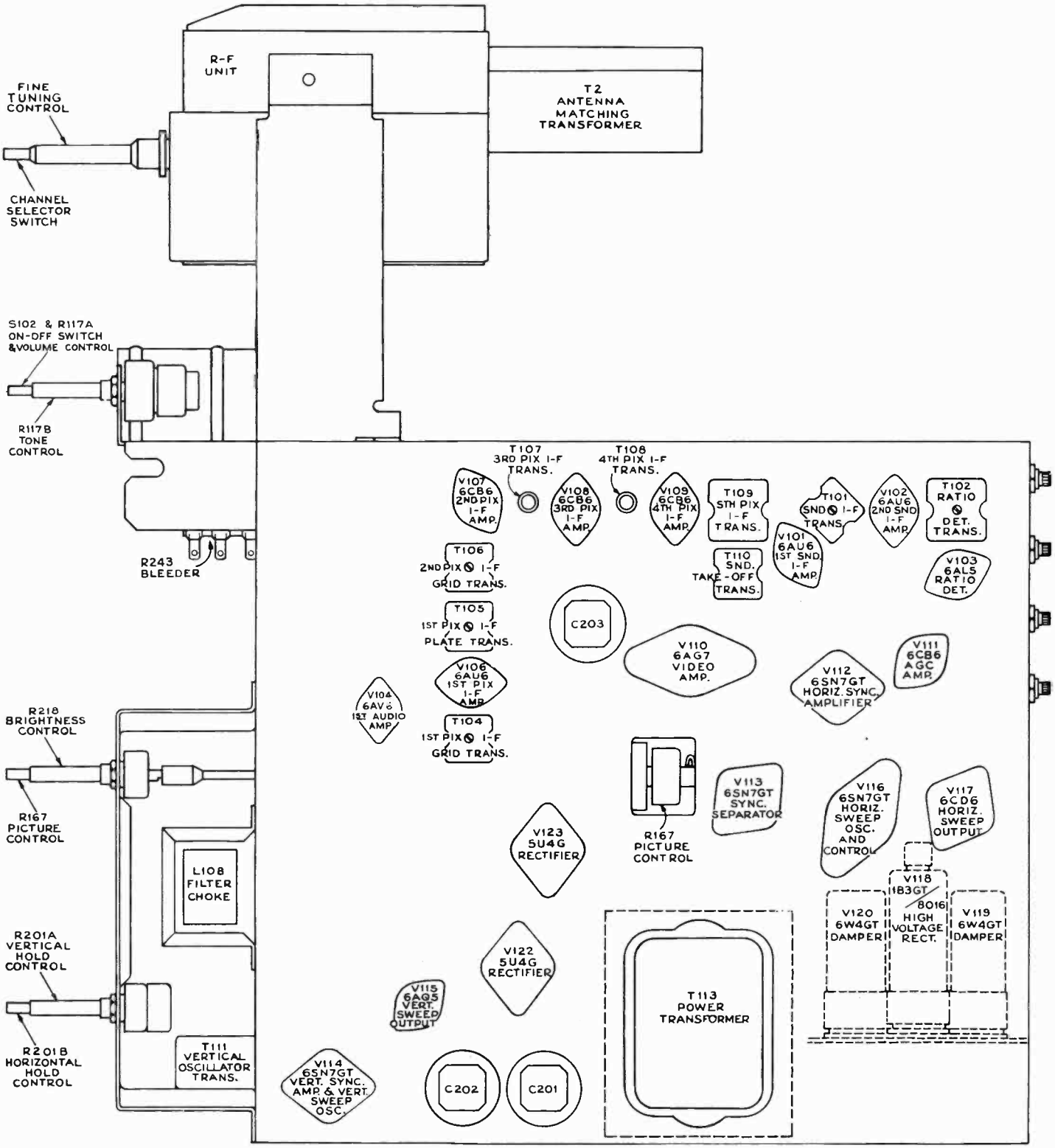
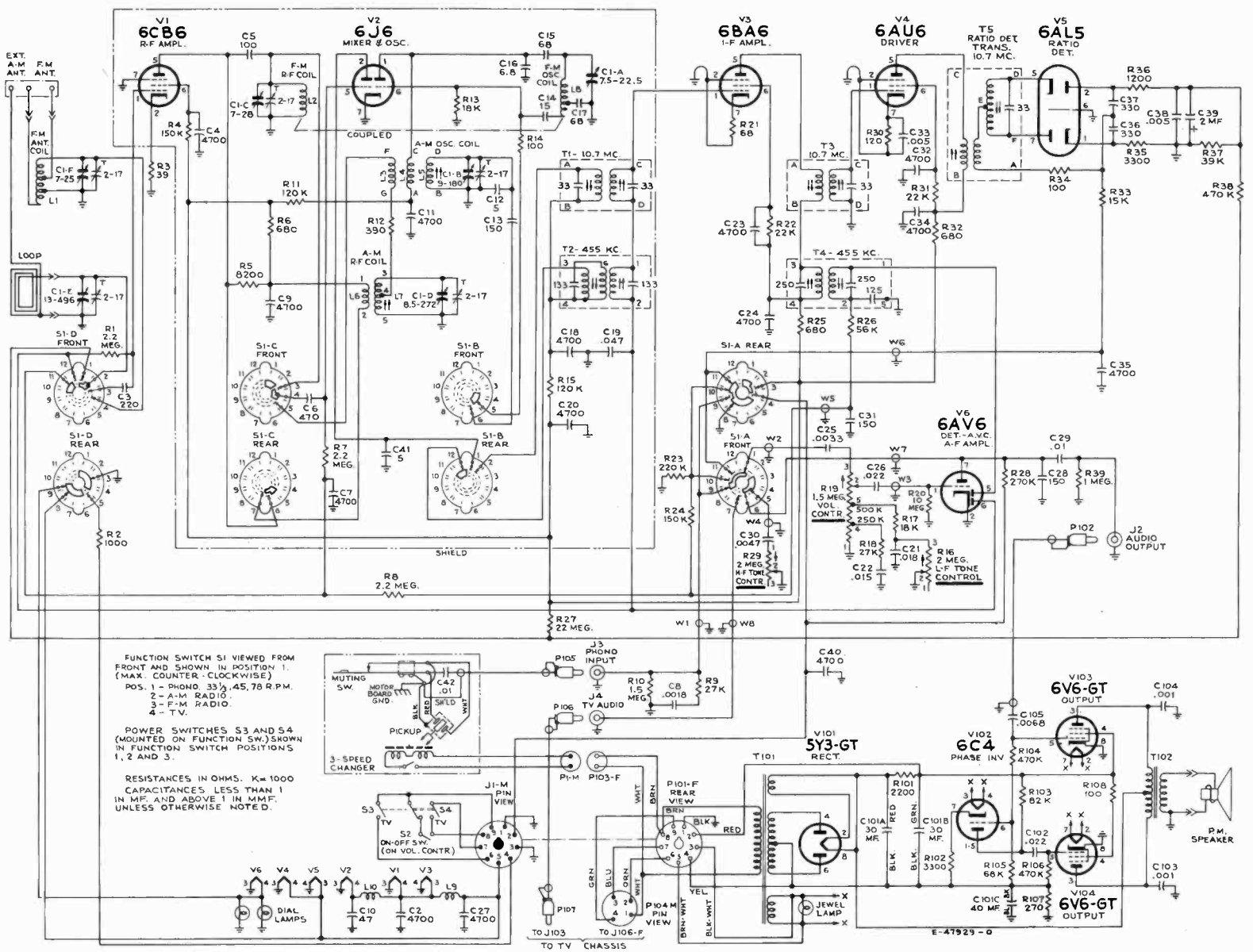


Figure 7—Chassis Bottom View

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. Voltages should hold within ±20% with 117 v. a-c supply.

Tube	Pin No.	AM	FM	Phono.
V1	5	215	180	—
6CB6	6	74	62	—
R-F	2	0.4	0.4	—
Amp	1	—0.8	0.4	—
V2	2	55	58	—
6J6	5	—1.2	—1.3	—
Osc &	1	43	46	—
Mixer	6	—1.2	—1.2	—
V3	5	210	210	—
6BA6	6	126	115	—
I-F	7	0.9	0.7	—
Amp	1	—0.8	—0.2	—
V4	5	216	216	—
6AU6	6	150	150	—
Driver	7	1.5	1.5	—
	1	0	0	—
V5 6AL5 Ratio Det.	—	—	—	—
V6	7	88	88	104
6AV6	1	—0.7	—0.7	—0.8
Audio Amp				
V102	5	88	88	120
6C4	7	—11	—11	—13
Phase Invert.	6	—16	—16	—19
V103 & V104	3	300	300	298
6V6GT	4	224	224	292
Audio	8	0	0	0
Output	9	—17	—17	—21
V101 5Y3GT Rect.	8	305	305	307



CRITICAL LEAD DRESS

1. The 1st FM i-f plate lead should be dressed away from the r-f amp plate.
2. Dress the 1st AM i-f plate lead to the S2 wafer away from the AM r-f coil.
3. Dress the a-c power switch wires away from all audio components.
4. 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.
8. All leads from the r-f shelf leaving through the shields must be kept as short as possible.
9. All leads for FM should be kept short especially on the r-f shelf.
10. Dress the a-c leads in the RS141 chassis away from the audio input leads and components.
11. Dress all leads away from R101 in RS141.

Figure 8—Radio Schematic Diagram

All resistance values in ohms. K = 1000.

All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted.

Direction of arrows at controls indicates clockwise rotation.

RADIO ALIGNMENT PROCEDURE 21-T-197DE

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. 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	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. T5 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 necessary making final adjustment with input set to give approx. —4.0 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 terminals 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.				
12	Connect a scope to junct. R33 and C35. Check response and linearity. Peak 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 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	External radiating loop and couple loosely to receiver loop.	1,620 kc.	AM	Min. capacity	*Osc. C1-BT for maximum output.
14		1,400 kc.	AM	Tune to signal	*C1-DT and C1-ET for max. output.
15		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.
17	Repeat steps 13, 14, 15 and 16 until 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.

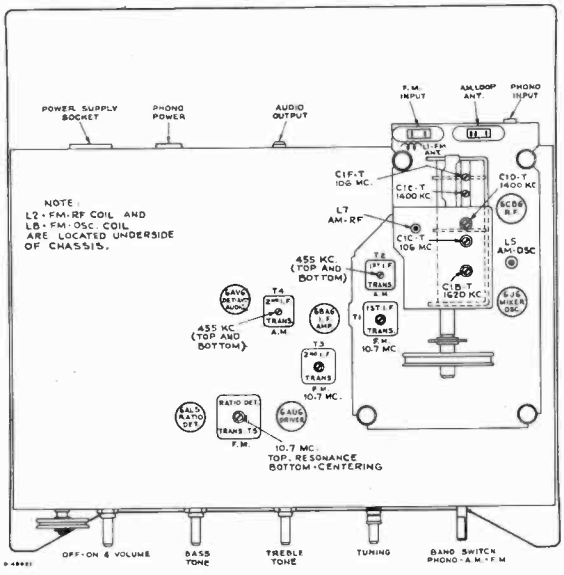


Figure 9—Radio Top View

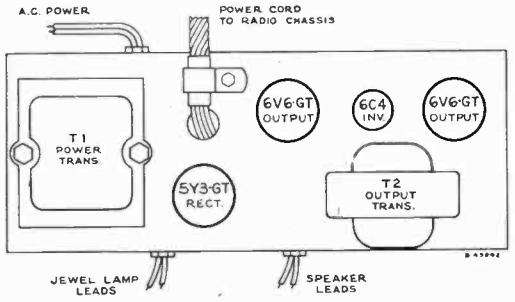


Figure 10—Audio Chassis Top View

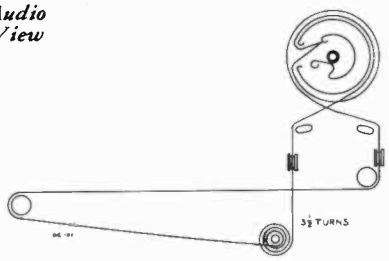


Figure 11—Dial Cord

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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.

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		I Plate (ma.)	I Screen (ma.)	Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts			
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	—	—	
V1	6X8	R-F Oscillator	5000 Mu. V. Signal	3	95	—	—	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
V101	6AU6	1st 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	
V102	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	—	—	—	—	
			No Signal	7	0	—	—	1	8.0	—	—	—	—	
V104	6AV6	1st Audio Amplifier	5000 Mu. V. Signal	7	90	—	—	2	0	1	—0.7	0.45	—	At min. volume
			No Signal	7	86	—	—	2	0	1	—0.7	0.45	—	
V106	6AU6	1st 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	
V107	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	
V109	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	
V110	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
V111	6CB6	AGC Amplifier	5000 Mu. V. Signal	5	—27	6	238	2	152	1	155	0.1	3.4	AGC control set for normal operation
			No Signal	5	4.5	6	218	2	135	1	118	0	0	

TELEVISION VOLTAGE CHART

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		I Plate (ma.)	I Screen (ma.)	Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts			
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	153	<0.1	—	
			No Signal	5	340	—	—	6	160	4	130	<0.1	—	
V114A	6SN7GT	Vert. Sync Amplifier	5000 Mu. V. Signal	5	7.0	—	—	6	0	4	—0.2	0.6	—	
			No Signal	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	1	0	17.3	1.2	
			No Signal	5	357	6	357	2	29	1	0	17.3	1.2	
V116	6SN7GT	Horizontal Osc. Control	5000 Mu. V. Signal	2	145	—	—	3	—18	1	—42	0.4	—	Hor. hold counter-clockwise
			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	—	
V116	6SN7GT	Horizontal Oscillator	5000 Mu. V. Signal	5	258	—	—	6	0	4	*—91	2.0	—	* Depends on Oscillator Adjustment
			No Signal	5	256	—	—	6	0	4	*—94	2.0	—	
V117	6CD6G	Horizontal Output	5000 Mu. V. Signal	Cap	*	8	165	3	12.5	5	—30	110	15.0	*High Voltage Pulse Present
			No Signal	Cap	*	8	165	3	12.5	5	—30	110	15.0	
V118	1B3GT /8016	H. V. Rectifier	5000 Mu. V. Signal	Cap	*	—	—	2& 7	16,000	—	—	0.2	—	*High Voltage Pulse Present
			No Signal	Cap	*	—	—	2&7	16,400	—	—	0.2	—	
V119 V120	6W4GT	Dampers	5000 Mu. V. Signal	5	355	—	—	3	*	—	—	57	—	*High Voltage Pulse Present
			No Signal	5	353	—	—	3	*	—	—	57	—	
V121	21AP4	Kinescope	5000 Mu. V. Signal	Cone	16,000	10	555	11	140	2	82	0.2	—	At average Brightness
			No Signal	Cone	16,400	10	550	11	132	2	76	0.2	—	
V122 V123	5U4G	Rectifiers	5000 Mu. V. Signal	4&6	388	—	—	2&8	389	—	—	*139	—	* Per Tube
			No Signal	4&6	386	—	—	2&8	387	—	—	*145	—	

21-T-197DE R-F UNIT WIRING DIAGRAM

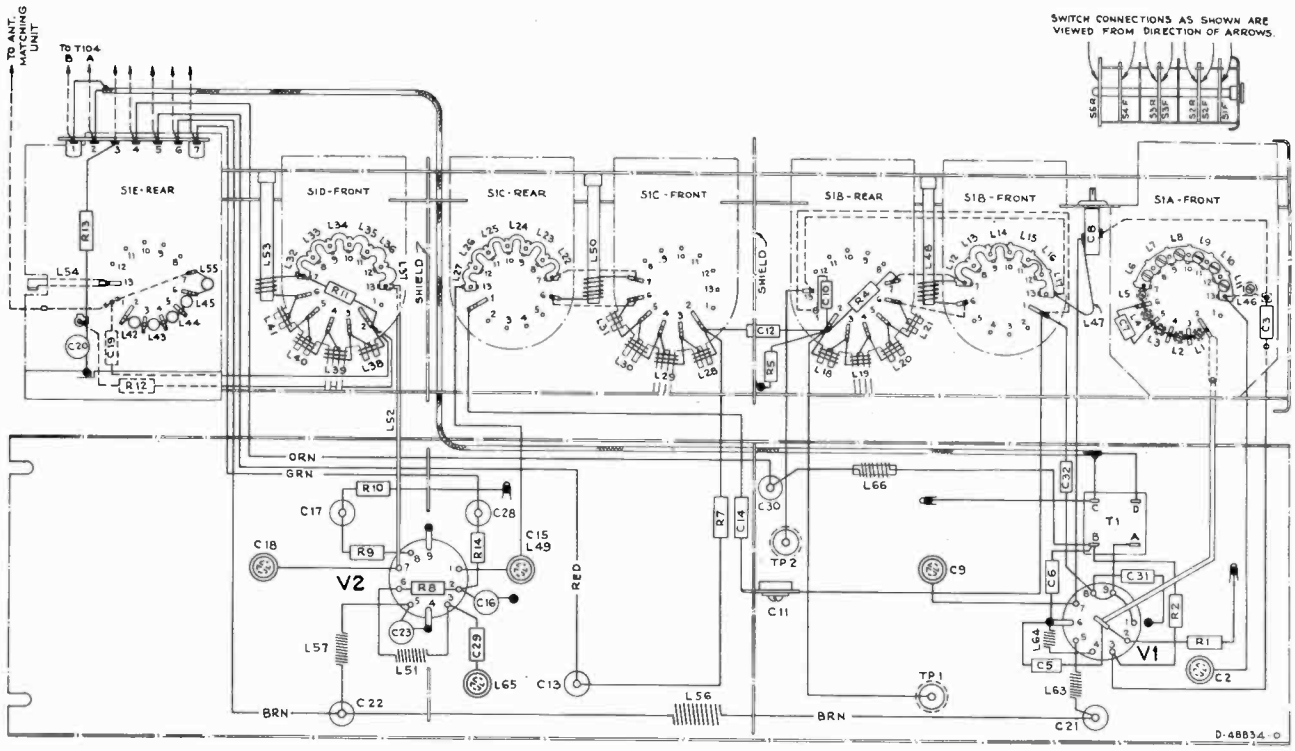


Figure 12—KRK11A R-F Unit Wiring Diagram

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 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.
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 T114-C and T114-D (synchro-guide) 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 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 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 V111 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.

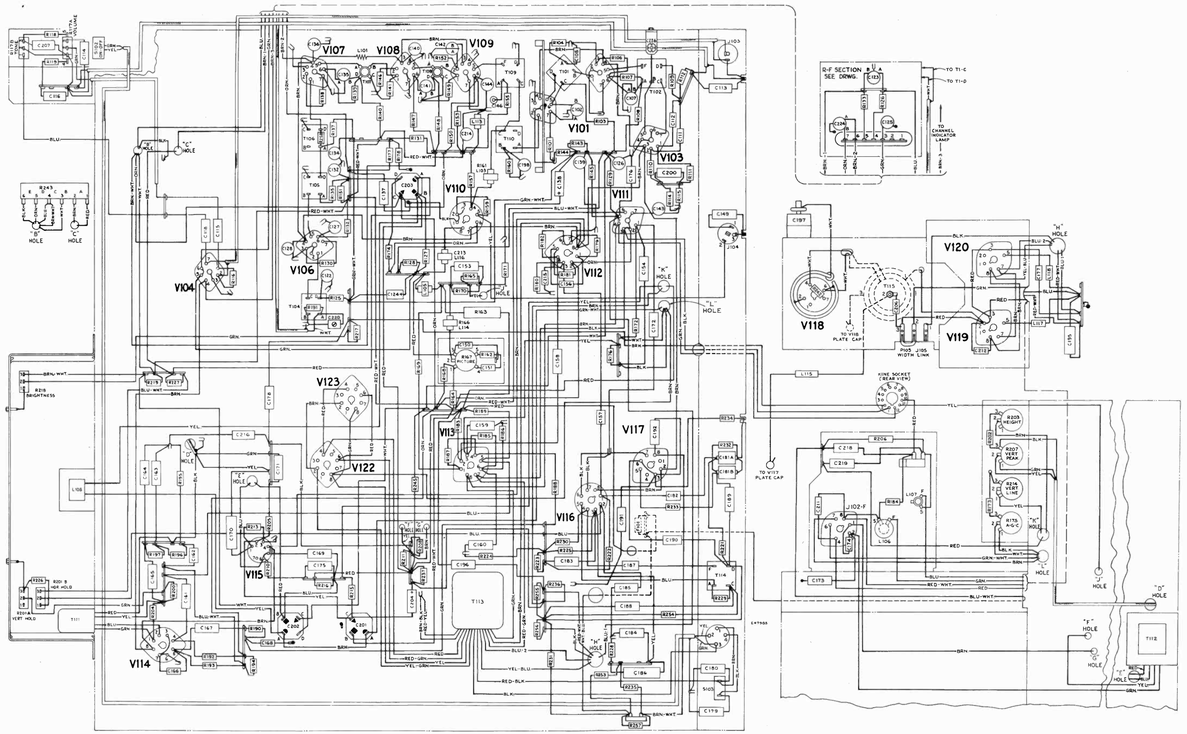


Figure 13—Chassis Wiring Diagram KCS68H

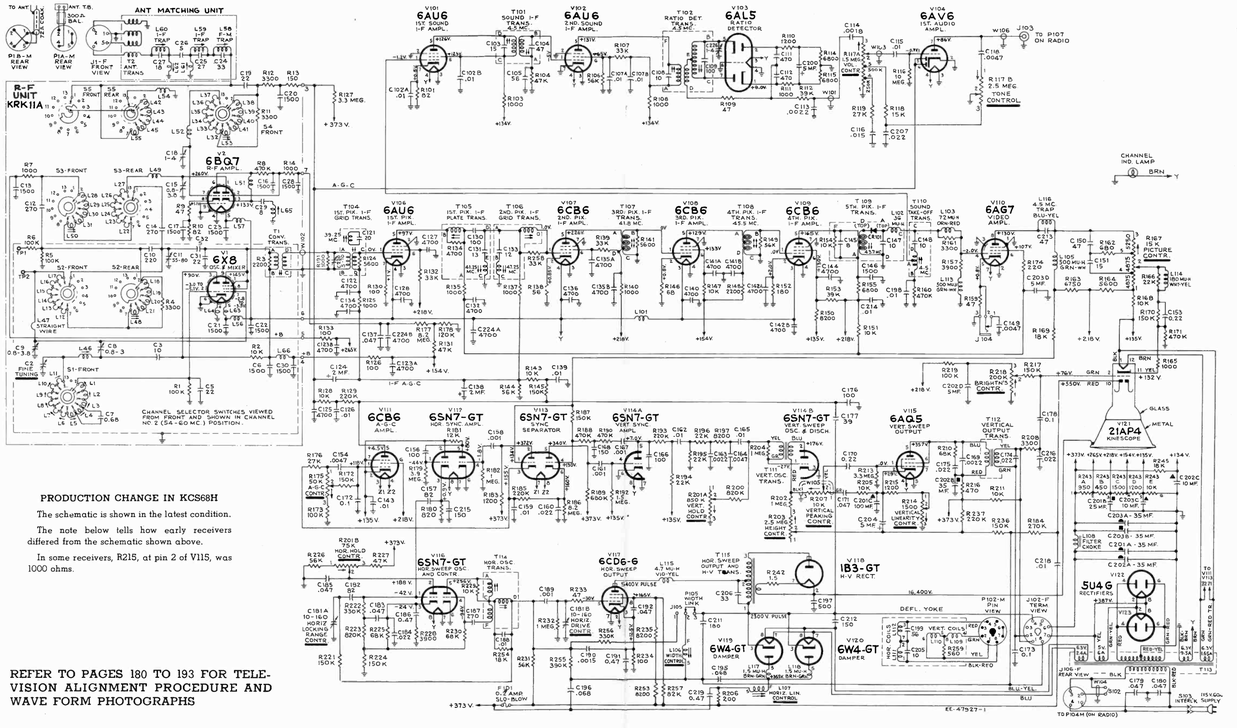


Figure 14—Television Schematic Diagram

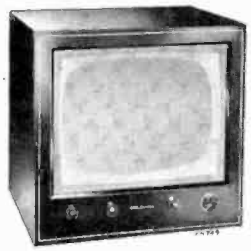
STOCK No.	DESCRIPTION
	R-F UNIT ASSEMBLIES
	KRK11A
76539	Board—Antenna matching transformer terminal board less coils L58, L59, L60 and less capacitors C24, C25, C26, C27
76531	Board—Terminal board, 5 contact and ground
76845	Bracket—Vertical bracket for holding V1 tube shield
76965	Capacitor—Ceramic, variable for fine tuning—plunger type (C2)
93056	Capacitor—Ceramic, 5 mmf. (C26, C32)
70597	Capacitor—Ceramic, 8 mmf. (C29)
55326	Capacitor—Ceramic, 10 mmf. (C3)
54207	Capacitor—Ceramic, 18 mmf. (C27)
76557	Capacitor—Ceramic, 22 mmf. (C19, C31)
76558	Capacitor—Ceramic, 22 mmf. (C5)
70935	Capacitor—Ceramic, 27 mmf. (C25)
76739	Capacitor—Ceramic, 33 mmf. (C24)
77460	Capacitor—Ceramic, 220 mmf. (C10)
75199	Capacitor—Ceramic, 270 mmf. (C12, C14)
75166	Capacitor—Ceramic, 1500 mmf. (stand-off) (C13, C17, C21, C22, C28, C30)
75610	Capacitor—Ceramic, 1500 mmf. (C6)
73748	Capacitor—Ceramic, 1500 mmf. (C16, C20, C23)
71088	Capacitor—Ceramic, 0.68 mmf. (C7)
77151	Capacitor—Tubular, steatite, adjustable, 0.8—3.0 mmf. (C8)
75184	Capacitor—Ceramic, adjustable, 0.80—3.8 mmf. complete with adjusting stud (C9)
76532	Capacitor—Adjustable trimmer, steatite, 1.—4. mmf. (C18)
76527	Capacitor—Mica trimmer, 55-80 mmf. (C11)
76143	Clip—Tubular clip for mounting stand off capacitors
73591	Coil—Antenna matching coil (2 req'd)
73477	Coil—Choke coil (L57)
76763	Coil—Filament choke coil (L63, L64)
77206	Coil—Filament choke coil (L56)
76562	Coil—R-F amplifier coupling coil (L51)
77153	Coil—R-F choke coil (L66)
76537	Coil—Shunt coil complete with adjustable core (L61)
76538	Coil—Shunt coil complete with adjustable core (L62)
76529	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L49, C15)
38853	Connector—4 contact female connector—part of matching transformer (J1)
76559	Connector—Oscillator grid connector
76460	Contact—Test point contact
77202	Core—Adjustable core for fine tuning capacitor
76543	Core—Adjusting core for FM trap
76521	Detent—Detent mechanism and fibre shaft
73453	Form—Coil form for coils L48, L50, L53
77203	Link—Link assembly for fine tuning
76728	Nut—Speednut for mounting adjustable trimmer 76532
	Resistor—Fixed, composition:—
503047	47 ohms, ±10%, ½ watt (R9)
503082	82 ohms, ±10%, ½ watt (R10)
504115	150 ohms, ±20%, ½ watt (R13)
504210	1000 ohms, ±20%, ½ watt (R7, R14)
503233	3300 ohms, ±10%, ½ watt (R4, R11, R12)
503247	4700 ohms, ±10%, ½ watt (R2)
504410	100,000 ohms, ±20%, ½ watt (R1, R5, R6)
504447	470,000 ohms, ±20%, ½ watt (R8)
14343	Retainer—Fine tuning shaft retaining ring
75164	Rod—Actuating plunger rod (fibre) for fine tuning link
76547	Screw—#4-40 x ¼" adjusting screw for coils L6, L7, L8, L9, L10, L11
76549	Screw—#4-40 x ⅜" adjusting screw for coil L5
76548	Screw—#4-40 x 5/16" adjusting screw for coils L1, L2, L3, L4, L46
76519	Shaft—Channel selector shaft and plate
76134	Shaft—Fine tuning shaft and cam
77147	Shield—Front shield complete with shaft bushing and bracket
76534	Shield—Tube shield
76530	Socket—Tube socket, 9 pin, miniature, ceramic, saddle-mounted for V1
76336	Socket—Tube socket, 9 pin, miniature, bakelite, saddle-mounted for V2
77149	Spacer—Metal spacer for front plate
75163	Spring—Friction spring (formed) for fine tuning cam
30340	Spring—Hairpin spring for fine tuning link
75068	Spring—Retaining spring for tube shield
77204	Spring—Return spring for fine tuning control
76554	Stator—Antenna stator complete with rotor, coils, capacitor and resistor (S5, C20, L42, L43, L44, L45, L54, L55, R13)
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, R4, R5, R6)
77205	Stator—Oscillator stator complete with rotor, coils and capacitors (S1, C3, C7, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L46)
76553	Stator—R-F plate stator complete with rotor, coils, capacitor and resistor (S3, C14, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L50, R7)
76556	Stator—R-F stator complete with rotor, coils, capacitor and resistors (S4, C19, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L53, R11, R12)
76561	Strap—Channel #13 r-f grid strap (L52)
76525	Strip—Coil segment mounting strip—RH center
76526	Strip—Coil segment mounting strip—LH lower
76544	Strip—Coil segment mounting strip—LH upper—less trimmer
75446	Stud—Capacitor stud for trimmer coil L49, C15 (uncoded and coded "ER")
75447	Stud—Capacitor stud for trimmer coil L49, C15 (coded numerically and "Hi Q")
76740	Stud—#6-32 x 1" adjusting stud for adjustable capacitor
77152	Terminal—Terminal for mounting C8 trimmer
76536	Transformer—Antenna matching transformer complete (T2, C24, C25, C26, C27, L58, L59, L60, L61, L62, J1)
77148	Transformer—Converter transformer (T1, R3)
76540	Trap—FM trap complete with adjustable core (L58)
76535	Trap—I-F trap (L65)
76542	Trap—I-F trap (41.25 mc) complete with core (L60)
76541	Trap—I-F trap (45.75) complete with core (L59)
75190	Washer—Insulating washer (neoprene) for adjustable capacitor
	TELEVISION CHASSIS ASSEMBLIES
	KCS68H
76456	Bracket—Channel indicator lamp bracket
76490	Bracket—Mounting bracket complete with insulator for picture control
12118	Cap—6CD6 tube connector cap
76800	Capacitor—Adjustable trimmer, steatite, 1-4 mmf. (C226)
71496	Capacitor—Adjustable trimmer, 5-70 mmf. (C220)
75217	Capacitor—Mica, trimmer, dual 10-160 mmf. (C181A, C181B)
39044	Capacitor—Ceramic, 15 mmf. (C151)
76577	Capacitor—Ceramic, 33 mmf., 6000 volts (C206)
76574	Capacitor—Ceramic, 39 mmf. (C177)
39042	Capacitor—Ceramic, 47 mmf. (C150)
71924	Capacitor—Ceramic, 56 mmf. (C105)
76474	Capacitor—Mica, 82 mmf. (C157, C182)
39396	Capacitor—Ceramic, 100 mmf. (C156, C166)
76578	Capacitor—Mica, 100 mmf. (C176)
44202	Capacitor—Ceramic, 150 mmf. (C168, C215)
76576	Capacitor—Ceramic, 150 mmf., 2000 volts (C212)
76575	Capacitor—Ceramic, 180 mmf., 3500 volts (C211)
76579	Capacitor—Mica, 270 mmf. (C187)
54003	Capacitor—Mica, 470 mmf. (C111, C112)
76488	Capacitor—Ceramic, 500 mmf., 30,000 volts (C197)
75166	Capacitor—Ceramic, 1500 mmf., stand-off (C146)
73473	Capacitor—Ceramic, 4700 mmf. (C122, C125, C127, C128, C132, C134, C136, C140, C144)
76470	Capacitor—Ceramic, dual 4700 mmf. (C123A, C123B, C135A, C135B, C141A, C141B, C142A, C142B, C224A, C224B)
75877	Capacitor—Ceramic, dual 10,000 mmf. (C102A, C102B, C107A, C107B)
73960	Capacitor—Ceramic, 10,000 mmf. (C126, C139, C143, C198, C214)
76742	Capacitor—Electrolytic, 2 mfd., 10 volts (C124, C138)
74521	Capacitor—Electrolytic, 5 mfd., 50 volts (C200)
28417	Capacitor—Electrolytic, 5 mfd., 450 volts (C204)
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)
75510	Capacitor—Electrolytic comprising 2 sections of 35 mfd., 450 volts and 1 section of 10 mfd., 450 volts and 1 section of 5 mfd., 450 volts (C202A, C202B, C202C, C202D, C203A, C203B, C203C, C203D)
75643	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 1000 volts (C158, C161, C167, C189)
76508	Capacitor—Tubular, moulded, oil impregnated, .0015 mfd., 600 volts (C190)

STOCK No.	DESCRIPTION
77468	Capacitor—Tubular, paper, oil impregnated, .0018 mfd., 600 volts (C114)
73595	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 600 volts (C113, C163)
73803	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 100 volts (C169)
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C118, C149, C154, C164)
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 400 volts (C115, C159, C162, C218)
73594	Capacitor—Tubular, moulded, oil impregnated, .01 mfd., 600 volts (C165, C188)
73797	Capacitor—Tubular, paper, oil impregnated, .015 mfd., 600 volts (C116)
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 400 volts (C160, C174, C175, C184, C207)
73798	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 600 volts (C216)
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C137, C183, C185)
75071	Capacitor—Tubular, moulded, .047 mfd., 400 volts (C179, C180)
73592	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 600 volts (C171, C192)
73815	Capacitor—Tubular, paper, oil impregnated, .068 mfd., 1000 volts (C195, C196)
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C172, C178)
73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C173)
73794	Capacitor—Tubular, paper, oil impregnated, 0.22 mfd., 400 volts (C153)
74957	Capacitor—Tubular, paper, oil impregnated, 0.22 mfd., 600 volts (C170)
73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C186, C191, C219)
76498	Choke—Filter choke (L108)
76143	Clip—Tubular clip for mounting capacitor 75166
75241	Coil—Antenna shunt coil (L202)
76672	Coil—Filament winding only for hi-voltage transformer (Part of T115)
73477	Coil—Choke coil (L101)
76483	Coil—Horizontal linearity coil complete with adjustable core (L107)
76646	Coil—Peaking coil (72 muh) (L103, R161)
76647	Coil—Peaking coil (180 muh) (L114, R166)
75252	Coil—Peaking coil (500 muh) (L105, L113)
76640	Coil—R-F choke coil (1.5 muh) (L117, L118)
76510	Coil—R-F choke coil (4.7 muh) (L115)
76484	Coil—Width coil complete with adjustable core (L106)
74594	Connector—2 contact male connector for power cord
77475	Connector—4 contact female connector for radio power input cable (J106)
50367	Connector—6 contact female connector for yoke leads (J102)
75542	Connector—6 contact male connector—part of deflection yoke (P102)
76863	Connector—Anode connector complete with terminal and contact
35787	Connector—Audio to radio connector (J103)
76457	Connector—Second anode lead connector—mounted on the hi-voltage capacitor
75482	Connector—Video input connector (J104)
76447	Control—AGC control (R175)
76444	Control—Brightness control (R218)
76448	Control—Height control (R203)
77201	Control—Horizontal and vertical hold control (R201A, R201B)
76445	Control—Picture control (R167)
77473	Control—Tone control, volume control and power switch (R117A, R117B, S102)
76449	Control—Vertical linearity control (R214)
76497	Control—Vertical peaking control (R207)
77136	Cover—Back cover for hi-voltage compartment
76985	Cover—Side cover for hi-voltage compartment
74956	Cushion—Rubber cushion for deflection yoke hood
74839	Fastener—Push fastener for mounting tube sockets
73600	Fuse—0.25 amp., 250 volts (F101)
76459	Grommet—Rubber grommet for 2nd. anode lead exit
37396	Grommet—Rubber grommet for mounting tube sockets
76654	Hood—Deflection yoke hood less rubber cushions
76480	Lead—Anode lead complete with eyelet
76168	Magnet—Focus magnet
76141	Magnet—Ion trap magnet (P.M. type)
76728	Nut—Speednut for mounting trimmer Capacitor C
76500	Plate—Hi-voltage plate (bakelite) complete less transformer, socket and lead
76649	Radiator—Heat dissipating radiator for V117
76675	Rectifier—Picture detector crystal rectifier (CR101)
76468	Resistor—Wire wound, 1.5 ohms, 1/3 watt (R242)
74015	Resistor—Wire wound, 100 ohms, 2 watts (R234)
76682	Resistor—Wire wound, 200 ohms, 5 watts (R206)
77472	Resistor—Wire wound, comprising 1 section of 950 ohms, 16 watts, 1 section of 450 ohms, 6 watts, 1 section of 1500 ohms, 5 watts, 1 section of 1200 ohms, 1 watt and 1 section of 10,000 ohms, 5 watts (R243A, R243B, R243C, R243D, R243E)
76642	Resistor—Wire wound, 6750 ohms, 10 watts (R163)
76265	Resistor—Wire wound, 18,000 ohms, 10 watts (R245)
	Resistor—Fixed, composition:—
503047	47 ohms, ±10%, ½ watt (R109, R159, R233)
502056	56 ohms, ±5%, ½ watt (R138)
34763	68 ohms, ±5%, ½ watt (R146)
502082	82 ohms, ±5%, ½ watt (R101)
502110	100 ohms, ±5%, ½ watt (R130)
503110	100 ohms, ±10%, ½ watt (R126, R133)
503118	180 ohms, ±10%, ½ watt (R152)
503122	220 ohms, ±10%, ½ watt (R174)
503147	470 ohms, ±10%, ½ watt (R216)
503168	680 ohms, ±10%, ½ watt (R162)
503182	820 ohms, ±10%, ½ watt (R180)
502210	1000 ohms, ±5%, ½ watt (R111)
503210	1000 ohms, ±10%, ½ watt (R103, R108, R125, R135, R137, R140, R165, R191)
502212	1200 ohms, ±5%, ½ watt (R110)
513212	1200 ohms, ±10%, 1 watt (R215)
503212	1200 ohms, ±10%, ½ watt (R183)
503222	2200 ohms, ±10%, ½ watt (R148)
503233	3300 ohms, ±10%, ½ watt (R208)
502239	3900 ohms, ±5%, ½ watt (R157)
503239	3900 ohms, ±10%, ½ watt (R228)
502256	5600 ohms, ±5%, ½ watt (R141)
513256	5600 ohms, ±10%, 1 watt (R164)
14659	6800 ohms, ±5%, ½ watt (R114, R115)
513268	6800 ohms, ±10%, 1 watt (R155)
503282	8200 ohms, ±10%, ½ watt (R150, R197)
523282	8200 ohms, ±10%, 2 watts (R235, R253)
503310	10,000 ohms, ±10%, ½ watt (R128, R143, R147, R205, R211, R229)
513310	10,000 ohms, ±10%, 1 watt (R168)
523310	10,000 ohms, ±10%, 2 watts (R151)
513312	12,000 ohms, ±10%, 1 watt (R181)
503315	15,000 ohms, ±10%, ½ watt (R118)
503318	18,000 ohms, ±10%, ½ watt (R169, R254)
503322	22,000 ohms, ±10%, ½ watt (R194, R195, R196)
503327	27,000 ohms, ±10%, ½ watt (R119, R176)
503333	33,000 ohms, ±10%, ½ watt (R107, R132, R139, R258)
503339	39,000 ohms, ±10%, ½ watt (R112, R153)
503347	47,000 ohms, ±10%, ½ watt (R104, R131)
513347	47,000 ohms, ±10%, 1 watt (R227)
502356	56,000 ohms, ±5%, ½ watt (R144, R149)
513356	56,000 ohms, ±10%, 1 watt (R106, R226, R231)
512368	68,000 ohms, ±5%, 1 watt (R230)
513368	68,000 ohms, ±10%, 1 watt (R210, R225)
513382	82,000 ohms, ±10%, 1 watt (R257)
502410	100,000 ohms, ±5%, ½ watt (R173)
503410	100,000 ohms, ±10%, ½ watt (R219)
503412	120,000 ohms, ±10%, ½ watt (R178)
503415	150,000 ohms, ±10%, ½ watt (R145, R170, R172, R187, R217, R221, R236)
512415	150,000 ohms, ±5%, 1 watt (R224)
502422	220,000 ohms, ±5%, ½ watt (R129)
503422	220,000 ohms, ±10%, ½ watt (R185, R193, R237)
503427	270,000 ohms, ±10%, ½ watt (R184)
503433	330,000 ohms, ±10%, ½ watt (R222, R256)
503439	390,000 ohms, ±10%, ½ watt (R255)
503447	470,000 ohms, ±10%, ½ watt (R160, R171, R188, R190)
503468	680,000 ohms, ±10%, ½ watt (R189)
503482	820,000 ohms, ±10%, ½ watt (R200, R223)
503510	1 megohm, ±10%, ½ watt (R182, R202, R204, R232)
503515	1.5 megohm, ±10%, ½ watt (R192)
503533	3.3 megohm, ±10%, ½ watt (R213)
512533	3.3 megohm, ±5%, 1 watt (R127)
503539	3.9 megohm, ±10%, ½ watt (R179)
503582	8.2 megohm, ±10%, ½ watt (R177, R186)
503610	10 megohm, ±10%, ½ watt (R116)
76650	Ring—Anchoring ring for V117 radiator springs
71456	Screw—#8-32 x 7/16" wing screw for mounting deflection yoke
76487	Shaft—Connecting shaft (nylon) for picture and brightness controls
73584	Shield—Tube shield for V101, V102, V103, V106, V107, V111
76741	Shield—Tube shield for V114

STOCK No.	DESCRIPTION
75718	Socket—Channel indicator lamp socket
74834	Socket—Kinescope socket
76453	Socket—Tube socket, octal, moulded, bakelite, plate mounted for V110
73249	Socket—Tube socket, octal, ceramic, plate mounted for V116
31251	Socket—Tube socket, octal, wafer for V112, V113, V114, V117, V122, V123
71508	Socket—Tube socket, 6 contact moulded, bakelite, for V118
50367	Socket—Tube socket, 6 pin, moulded, saddle mounted for V119, V120
71494	Socket—Tube socket, 7 pin, moulded, saddle mounted, miniature for V115
73117	Socket—Tube socket, 7 pin, wafer miniature for V101, V102, V103, V104, V106, V107, V108, V109, V111
76651	Spring—Coil spring for securing V117 radiator (3 req'd)
75173	Stud—Adjusting stud for trimmer capacitor
76636	Stud—Adjusting stud complete with guard for focus magnet
76428	Support—Bakelite support only—part of hi-voltage shield
76463	Terminal—Screw type ground terminal
76501	Transformer—Hi-voltage transformer less filament winding (Part of T115)
76440	Transformer—Horizontal oscillator transformer complete with adjustable cores (T114)
76495	Transformer—Power transformer, 117 volts 60 cycle (T113)
76439	Transformer—Ratio detector transformer complete with adjustable cores (T102, C108, C109)
76438	Transformer—Sound i-f transformer complete with adjustable cores (T101, C103, C104)
76437	Transformer—Sound take-off transformer complete with adjustable core (T110, C148)
74144	Transformer—Vertical oscillator transformer (T111)
76494	Transformer—Vertical output transformer (T112)
77198	Transformer—1st. pix i-f grid transformer complete with adjustable cores (T104, C121, R124)
77197	Transformer—1st. pix i-f plate transformer complete with adjustable cores (T105, C130, C131, R134)
76435	Transformer—2nd. pix i-f grid transformer complete with adjustable cores (T106, C133)
76433	Transformer—3rd. or 4th. pix i-f transformer (T107, T108)
76436	Transformer—5th. pix i-f transformer (T109, C145, C147, L102, P154, CR101)
76482	Trap—4.5 MC trap (L116, C213)
76653	Yoke—Deflection yoke complete with 6 contact male connector (L109, L110, L111, L112, C199, C205, R259, P102)
	RADIO CHASSIS ASSEMBLIES
	RC1111A
77308	Capacitor—Variable tuning capacitor (C1A, C1B, C1C, C1D, C1E, C1F)
75613	Capacitor—Ceramic, 5 mmf. (C12, C41)
77352	Capacitor—Ceramic, 6.8 mmf. (C16)
39044	Capacitor—Ceramic, 15 mmf. (C14)
76348	Capacitor—Ceramic, 47 mmf. (C10)
75612	Capacitor—Ceramic, 68 mmf. (C15, C17)
39396	Capacitor—Ceramic, 100 mmf. (C5)
75614	Capacitor—Ceramic, 150 mmf. (C13, C28, C31)
75611	Capacitor—Ceramic, 220 mmf. (C3)
39640	Capacitor—Mica, 330 mmf. (C36, C37)
39644	Capacitor—Mica, 470 mmf. (C6)
73473	Capacitor—Ceramic, 4700 mmf. (C2, C4, C7, C9, C11, C18, C20, C23, C24, C27, C32, C34, C35, C40)
73747	Capacitor—Electrolytic, 2 mfd., 50 volts (C39)
77468	Capacitor—Tubular, paper, .0018 mfd., 600 volts (C8)
73795	Capacitor—Tubular, paper, .0033 mfd., 600 volts (C25)
73920	Capacitor—Tubular, paper, .0047 mfd., 600 volts (C30)
72490	Capacitor—Tubular, paper, .005 mfd., 200 volts (C33, C38)
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts (C29)
73797	Capacitor—Tubular, paper, .015 mfd., 600 volts (C22)
77469	Capacitor—Tubular, paper, .018 mfd., 200 volts (C21)
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts (C26)
73558	Capacitor—Tubular, paper, .047 mfd., 200 volts (C19)
73935	Clip—Mounting clip for i-f transformer 75558 and 76328
77313	Coil—Antenna coil—FM (L1)
71942	Coil—Filament choke coil (L9, L10)
75569	Coil—Oscillator coil—AM—complete with adjustable core (L3, L4, L5)
77315	Coil—Oscillator coil—FM (L8)
77305	Coil—R-F coil—AM—complete with adjustable core (L6, L7)
77314	Coil—R-F coil—FM (L2)
33514	Connector—Dual single contact female connector for phono or TV audio (J3, J4)
35787	Connector—Single contact female connector for audio cable (J2)
74879	Connector—2 contact female connector for antenna leads
75062	Connector—9 contact male connector for power input (J1)
75562	Control—Tone control—H.F. (R29)
75561	Control—Tone control—L.F. (R16)
75537	Control—Volume control and power switch (R19, S2)
72953	Cord—Drive cord (approx. 57" over-all)
75564	Coupling—Spring coupling for function switch extension shaft
74839	Fastener—Push fastener to fasten RF shelf (4 req'd)
75548	Grommet—Rubber grommet for mounting slides (4 req'd)
16058	Grommet—Rubber grommet for mounting RF shelf (4 req'd)
11765	Lamp—Dial lamp—Mazda 51
77311	Latch—Bottom cover latch
77486	Nut—Speednut for latch adjustment screw
76421	Pin—Slide mechanism stop pin
72602	Pulley—Drive cord pulley
35641	Pulley—Drive cord pulley—1⅜" dia.
	Resistor—Fixed, composition:—
503039	39 ohms, ±10%, ½ watt (R3)
503068	68 ohms, ±10%, ½ watt (R21)
503110	100 ohms, ±10%, ½ watt (R14, R34)
503112	120 ohms, ±10%, ½ watt (R30)
503139	390 ohms, ±10%, ½ watt (R12)
503168	680 ohms, ±10%, ½ watt (R6, R25, R32)
503210	1000 ohms, ±10%, ½ watt (R2)
502212	1200 ohms, ±5%, ½ watt (R36)
502233	3300 ohms, ±5%, ½ watt (R35)
503282	8200 ohms, ±10%, ½ watt (R5)
503315	15,000 ohms, ±10%, ½ watt (R33)
503318	18,000 ohms, ±10%, ½ watt (R13, R17)
503322	22,000 ohms, ±10%, ½ watt (R22, R31)
503327	27,000 ohms, ±10%, ½ watt (R9, R18)
503339	39,000 ohms, ±10%, ½ watt (R37)
503356	56,000 ohms, ½ watt (R26)
503412	120,000 ohms, ±10%, ½ watt (R11, R15)
503415	150,000 ohms, ±10%, ½ watt (R4, R24)
503422	220,000 ohms, ±10%, ½ watt (R23)
503427	270,000 ohms, ±10%, ½ watt (R28)
503447	470,000 ohms, ±10%, ½ watt (R38)
503510	1 megohm, ±10%, ½ watt (R39)
503515	1.5 megohm, ±10%, ½ watt (R10)
503522	2.2 megohm, ±10%, ½ watt (R1, R7, R8)
503610	10 megohm, ±10%, ½ watt (R20)
504622	22 megohm, ±20%, ½ watt (R27)
75540	Shaft—Tuning knob shaft
73584	Shield—Tube shield for V1, V6
75192	Shield—Tube shield for V2
77310	Slide—Slide mechanism (2 req'd)
31364	Socket—Dial lamp socket
74179	Socket—Tube socket, 7 contact, miniature for V1, V3, V4, V5
77306	Socket—Tube socket, 7 pin, moulded, saddle mounted for V2
73117	Socket—Tube socket, 7 contact, miniature wafer for V6
77312	Spring—Actuating spring for bottom cover latch
76332	Spring—Drive cord spring
75563	Spring—Retaining spring for function switch extension shaft
76422	Spring—Retaining spring for slide mechanism stop pin
77304	Support—Polystyrene support for FM oscillator coil complete with mounting bracket
77476	Switch—Function switch (S1, S3, S4)
73743	Transformer—Ratio detector transformer complete with adjustable core (T5)
75558	Transformer—1st. i-f transformer—AM—complete with adjustable cores (T2)
75559	Transformer—1st. i-f transformer—FM—complete with adjustable cores (T1)
76328	Transformer—2nd. i-f transformer—AM—complete with adjustable cores (T4)
75560	Transformer—2nd. i-f transformer—FM—complete with adjustable cores (T3)
33726	Washer—"C" washer for tuning knob shaft or drive cord pulley

STOCK No.	DESCRIPTION
	ROLL-OUT MECHANISM ASSEMBLY
	FOR RADIO CHASSIS RC-1111A
77332	Antenna—Radio antenna loop less cable
77319	Bracket—Dial lamp socket bracket—L.H.
77318	Bracket—Dial lamp socket bracket—R.H.
74882	Connector—2 contact (polarized) male connector for radio antenna cable
77477	Dial—Polystyrene dial scale
77321	Escutcheon—Dial scale escutcheon less dial
77316	Frame—Plastic mounting frame—maroon—for chassis and record changer
77322	Pointer—Station selector pointer
	AUDIO AMPLIFIER ASSEMBLIES
	RS141A
74296	Cable—Shielded audio cable complete with pin plug—part of interconnecting cable
72447	Cable—Shielded audio cable complete with two (2) pin plugs—part of interconnecting cable
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 (C101A, C101B, C101C)
75643	Capacitor—Tubular paper, oil impregnated, .001 mfd., 1000 volts (C103, C104)
73789	Capacitor—Tubular, paper, .0068 mfd., 400 volts (C105)
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts (C102)
30868	Connector—2 contact female connector for phono power—part of interconnecting cable (P103)
77478	Connector—4 contact male connector for radio power input—part of interconnecting cable (P104)
75064	Connector—9 contact female connector for interconnecting cable (P101)
72776	Pin—Contact pin for speaker lead (2 req'd)
73637	Resistor—Wire wound, 2200 ohms, 5 watts (R101)
	Resistor—Fixed, composition:-
503110	100 ohms, ±10%, ½ watt (R108)
522127	270 ohms, ±5%, 2 watts (R107)
502233	3300 ohms, ±5%, ½ watt (R102)
503368	68,000 ohms, ±10%, ½ watt (R105)
503382	82,000 ohms, ±10%, ½ watt (R103)
503447	470,000 ohms, ±10%, ½ watt (R104, R106)
77479	Shell—Shell for 4 contact male connector
31364	Socket—Pilot lamp socket
31251	Socket—Tube socket, octal, wafer
73117	Socket—Tube socket, 7 pin, miniature, wafer
77323	Transformer—Output transformer (T102)
75566	Transformer—Power transformer, 117 volts, 60 cycle (T101)
	SPEAKER ASSEMBLY
	92569-12W
	RL-111A1
	RMA-274
75682	Cone—Cone and voice coil (3.2 ohms)
76093	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)
	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 description of part required.
	MISCELLANEOUS
77480	Back—Television compartment back cover complete with power cord
75707	Board—"A-FM" terminal board
76184	Board—TV antenna terminal board
76629	Bracket—Hanger bracket for deflection yoke hood assembly
76697	Bracket—Masking panel support bracket (2 req'd)
71599	Bracket—Pilot lamp bracket
76599	Bracket—"U" shape bracket for deflection yoke hood support rod
74579	Bumper—Rubber bumper for L.H. upper door
76699	Bumper—Rubber bumper for kinescope (as req'd)
74296	Cable—Shielded pickup cable complete with pin plug
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts
13103	Cap—Pilot lamp cap
71892	Catch—Bullet catch and strike
X3130	Cloth—Grille cloth
30870	Connector—2 contact male connector for motor cable
74752	Connector—2 contact male connector for FM cable
39153	Connector—4 contact male connector for antenna cable
75474	Connector—Single contact male connector for antenna cable (2 req'd)
71457	Cord—Power cord and plug—part of back cover
76698	Cushion—Rubber cushion for masking panel support bracket
76631	Cushion—Rubber cushion for dust sealing the kinescope
76627	Cushion—Rubber cushion for safety glass
77243	Decal—"His Master's Voice" decal
71984	Decal—"RCA Victor" decal
77482	Decal—Television controls function decal
77483	Decal—"UHF" decal
74273	Decal—"Victrola" decal
77244	Emblem—"Deluxe" emblem
77033	Emblem—"RCA Victor" emblem
75456	Escutcheon—Channel marker escutcheon
76622	Glass—Safety glass
37396	Grommet—Rubber grommet for speaker mounting (3 req'd)
73420	Hinge—Butt hinge for L.H. upper door (3 req'd)
74308	Hinge—Door hinge (1 set)
76595	Knob—Brightness control, vertical hold control or television tone control knob—maroon (outer)
74963	Knob—Picture control, horizontal hold control or television volume control and power switch knob—maroon (inner)
77330	Knob—Radio function switch knob—maroon
77328	Knob—Radio tuning control, tone control or volume control and power switch knob—maroon
76593	Knob—Television channel selector knob—maroon (inner)
76591	Knob—Television fine tuning control knob—maroon (outer)
11765	Lamp—Pilot or channel marker escutcheon lamp—Mazda 51
75459	Mask—Channel marker escutcheon light mask—burgundy
76696	Mask—Polystyrene masking panel
77246	Medallion—Phonograph and dog medallion
76177	Nut—#10-32 special nut for deflection yoke hood support rods
76894	Nut—Spring nut for changer mounting screws
73634	Nut—Speed nut for speaker mounting screws
77013	Nut—Speed nut for mounting medallion 77246, emblem 77244 and emblem 77033
76601	Pad—Kinescope edge support pad (4 req'd)
77481	Pull—Door pull—lower (4 req'd)
77348	Pull—Door pull—upper (2 req'd)
76628	Rod—"L" shape threaded rod to support deflection yoke hood assembly
75623	Screw—#8 x ¾" trimit head screw for door pull 77348
74269	Screw—#8 x ¾" trimit head screw for door pull
73643	Spring—Channel marker escutcheon spring clip
76630	Spring—Formed spring for kinescope masking panel
77006	Spring—Retaining spring for deflection yoke hood support rod
30330	Spring—Retaining spring for knob #74963
72845	Spring—Retaining spring for knob #76591
76837	Spring—Retaining spring for knobs #76593 and 76595
74734	Spring—Spring clip for radio knobs #77328 and 77330
74936	Spring—Suspension spring for kinescope socket lead
75902	Spring—Suspension spring for amplifier cable
72936	Stop—Door stop
76600	Strap—Grounding strap (.005" x ½" x 18" soft copper)
76893	Stud—10-32 x 1¾" stud for mounting record changer
77023	Washer—Cellulose washer—gold—for television control knobs
75457	Washer—Felt washer—dark brown—between knob and channel marker escutcheon
75500	Washer—Felt washer for kinescope mask or back cover mounting scerws

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.



Models 21T207, 21T207G
"Crandall" Mahogany

RCA VICTOR

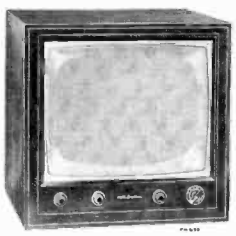
TELEVISION RECEIVERS
MODELS 21T207, 21T207G 21T208, 21T217, 21T218, 21T227, 21T228, 21T229

Chassis No. KCS72A —Mfr. No. 274—

SERVICE DATA

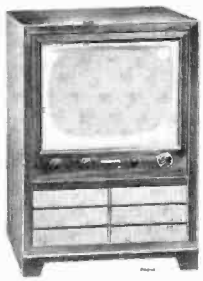
—1952 No. T4—

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

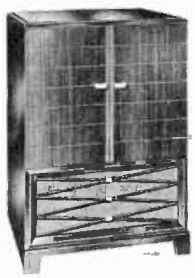


Model 21T208 "Lambert"
Walnut, Mahogany

Model 21T217 "Brookfield"
Walnut, Mahogany

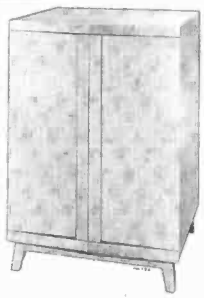


Model 21T218 "Lansford"
Walnut, Mahogany, Blonde



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

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

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)

Model	Net Weight	Shipping Weight	Width	Height	Depth
21T207	94	115	28½	28¼	27½
21T207G	105	126	28⅝	28¼	28⅝
21T208	94	115	25⅛	24¾	25⅛
21T217	104	132	26	39⅜	25⅛
21T218	112	144	27⅝	39¼	24
21T227	130	162	27½	40⅛	27⅛
21T228	132	164	27⅝	39⅝	26⅝
21T229	139	173	27⅛	40	26⅞

RECEIVER ANTENNA INPUT IMPEDANCE

Choice: 300 ohms balanced or 72 ohms unbalanced.

RCA TUBE COMPLEMENT

Tube Used	Function
(1) RCA 6CB6	R-F Amplifier
(2) RCA 6J6	R-F Oscillator and Mixer
(3) RCA 6CB6	1st Picture I-F Amplifier
(4) RCA 6CB6	2nd Picture I-F Amplifier
(5) RCA 6CB6	3rd Picture I-F Amplifier
(6) RCA 12AU7	Picture 2nd Detector and Vert. Sync. Sep.
(7) RCA 6AG7 (6AC7, 6CL6)	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	1st 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
(23) RCA 5Y3GT	Rectifier

ELECTRICAL AND MECHANICAL SPECIFICATIONS

(Continued)

PICTURE INTERMEDIATE FREQUENCIES

Picture Carrier Frequency	25.50 mc.
Adjacent Channel Sound Trap	27.00 mc.

SOUND INTERMEDIATE FREQUENCIES

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

OPERATING CONTROLS (Front Panel)

Channel Selector, Fine Tuning	Dual Control Knobs
Picture Brightness	Dual Control Knobs
Picture Horizontal Hold, Picture Vertical Hold	Dual Control Knobs
Sound Volume and On-Off Switch, TV Tone & Phono Switch	Dual Control Knobs

NON-OPERATING CONTROLS (not including r-f and i-f adjustments)

Picture Centering	top chassis adjustment
Width	rear chassis adjustment
Height	rear chassis adjustment
Horizontal Linearity	rear chassis screwdriver adjustment
Vertical Linearity	rear chassis adjustment
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 Coil	top chassis wing nut adjustment
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 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.

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.

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.

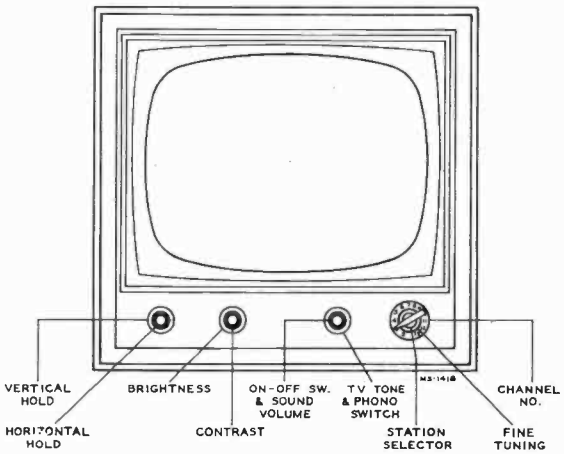


Figure 1—Receiver Operating Controls

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"

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.

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 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 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

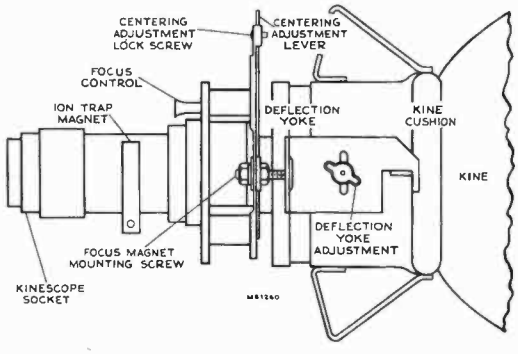


Figure 2—Yoke and Focus Magnet Adjustments

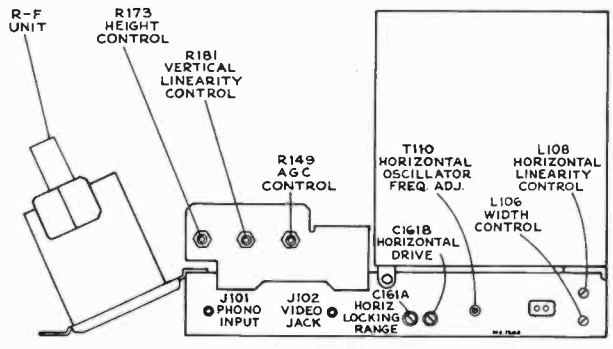


Figure 3—Rear Chassis Adjustments

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 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 C161A slightly clockwise. If less than 2 bars are present, adjust C161A 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 counter-clockwise 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 (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.

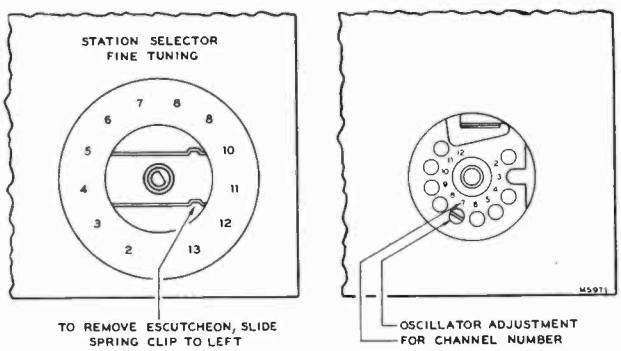


Figure 4—R-F Oscillator Adjustments

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 R149 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 L203 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.

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.

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.

21T207, 21T207G, 21T208, 21T217,
21T218, 21T227, 21T228, 21T229

CHASSIS TOP VIEW

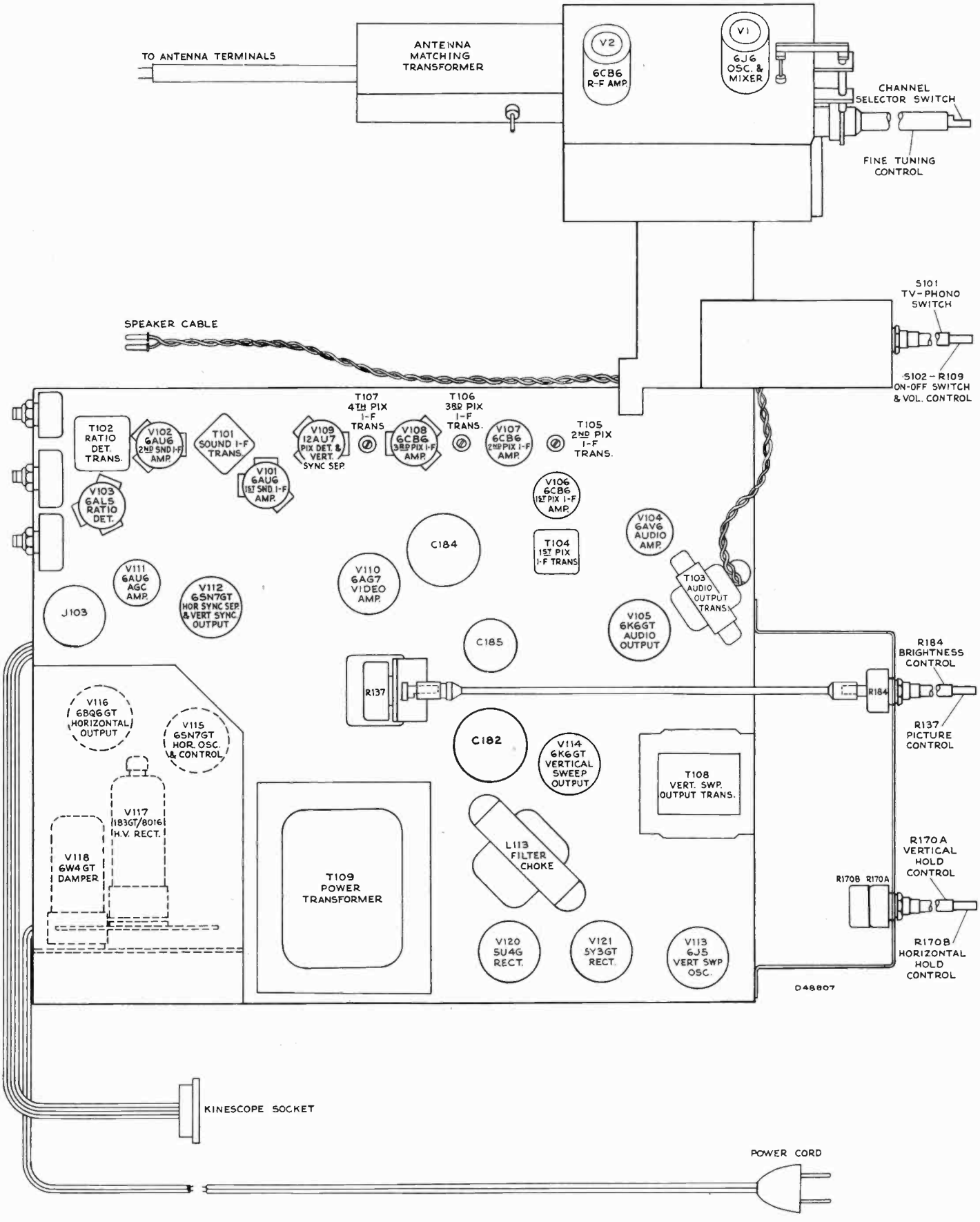


Figure 5—Chassis Top View

CHASSIS BOTTOM VIEW

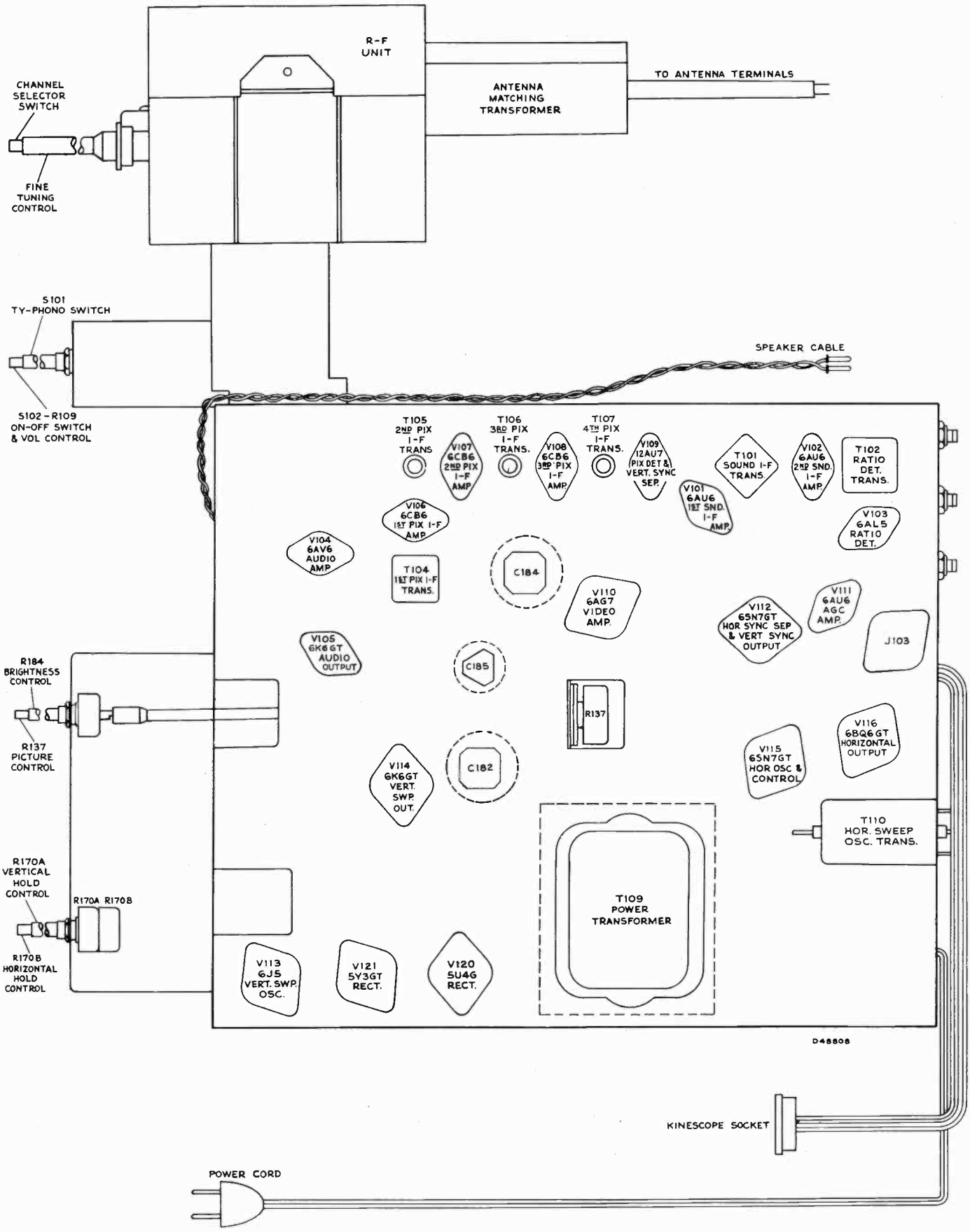


Figure 6—Chassis Bottom View

21T207, 21T207G, 21T208, 21T217,
21T218, 21T227, 21T228, 21T229

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

Channel Number	Picture Carrier Freq. Mc.	Sound Carrier Freq. Mc.
2	55.25	59.75
3	61.25	65.75
4	67.25	71.75
5	77.25	81.75
6	83.25	87.75
7	175.25	179.75
8	181.25	185.75
9	187.25	191.75
10	193.25	197.75
11	199.25	203.75
12	205.25	209.75
13	211.25	215.75

(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
(4) Sweep of picture i-f
(5) Ratio detector alignment
(6) Sound i-f alignment
(7) 4.5 Mc Trap Adjustment
(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 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 C1 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 TP1 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.

ALIGNMENT PROCEDURE

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 TP1.

Adjust C7 for —3.0 volts at the test point.

Retouch L42, L45 and L49 for proper response if necessary. If necessary, retouch C11 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 C1 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 suck-outs 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 C1 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 C11.

Check the oscillator injection voltage at the test point TP1. 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 C1 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 Freq. Mc.	Sound Carrier Freq. Mc.	Receiver R-F Osc. Freq. Mc.	Channel Oscillator Adjustment
2	55.25	59.75	80.750	L1
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	193.25	197.75	218.750	L9
11	199.25	203.75	224.750	L10
12	205.25	209.75	230.750	L11
13	211.25	215.75	236.750	C1

Switch to channel 8 and observe the response.

Adjust T1 clockwise while watching the change in response. When T1 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 T1 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 R142 and R143.

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 R142 and R143. 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.

Adjust the signal generator output to give 3 volts on the "VoltOhmyst" as the final adjustment is made.

(1) 24.25 mc.—T107
(2) 25.5 mc.—T106
(3) 22.75 mc.—T105

PICTURE I-F TRAP ADJUSTMENT.—With the same connections as above, tune the generator to 27.00 mc. and adjust the T104 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 T1 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 C115 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 4 (pin 2 if 6CL6 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 V103.

Tune the T101 top core for maximum d-c on the "VoltOhmyst".

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 R142 and R143.

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.

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 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 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 C161A slightly clockwise. If less than 2 bars are present, adjust C161A 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.

21T207, 21T207G, 21T208, 21T217,
21T218, 21T227, 21T228, 21T229

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 UNIT ALIGNMENT									
1	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 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.									
2	Not used		Not used		Loosely coupled to r-f oscillator	236.75 MC.	Not used	Fine tuning 30 degrees clockwise from mechanical center of its range. Receiver on channel 13.	C1 for an audible beat on het. freq. meter	Fig. 7
3	"		"				Connect "Volt-Ohmyst" to terminal 3 of the r-f unit terminal board	Turn AGC control fully clockwise. Connect bias box to terminal 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)	Sweeping channel 8	Not used	—	Not used	Rec. on chan. 8. Connect oscilloscope to TP1. Adjust C9, C11, C16 and C22 for correct curve shape, frequency and band width. C22 is adjusted to give max. amplitude between markers. C9 affects tilt and C16 affects the frequency of response. C11 affects the response band width.		Fig. 7 Fig. 8
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. Adjust L42, L45 and L49 for proper response. L42 is adjusted to give max. amplitude between markers. L45 primarily affects tilt and L49 primarily affects freq. of response. If necessary, retouch C11 for proper width.		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 above steps until the specified conditions are obtained.									
9	Not used		Not used	—	Loosely coupled to r-f oscillator	206.75		Rec. on chan. 8	C1 for audible beat on het. freq. meter	Fig. 7
10	Antenna terminal (loosely)	181.25 185.75	Antenna terminals (see text for precaution)	Sweeping channel 8	Not used	—	Not used	Rec. on chan. 8. Readjust C9, C16 and C22 for correct curve shape, frequency and band width. Readjust C11 only if necessary.		Fig. 7 Fig. 12 (8)
11	"	211.25 215.75	"	Sweeping channel 13	Not used	—	Not used	Rec. on chan. 13. Adjust L52 for max. amplitude between markers, overshoot a little more than required to reach max. response. Adjust C22 to regain max. amplitude of response.		Fig. 7 Fig. 12 (13)
12	"	215.75	Not used	—	Loosely coupled to r-f oscillator	236.75		Receiver on chan. 13. Adjust L43 for correct channel 13 osc. freq. then overshoot. Reset the osc. to proper freq. by adjustment of C1.		Fig. 7 Fig. 8
13	"	205.25 209.75	Antenna terminals (see text for precaution)	channel 12	Not used	—	Connect "Volt-Ohmyst" to r-f unit test point TP1	Rec. on chan. 12	Check to see that response is correct and —3.0 volts of osc. injection is present	Fig. 8 Fig. 12
14	"	199.25 203.75		channel 11	"	—	"	Rec. on chan. 11	"	Fig. 12 (11)
15	"	193.25 197.75		channel 10	"	—	"	Rec. on chan. 10	"	Fig. 12 (10)
16	"	187.25 191.75		channel 9	"	—	"	Rec. on chan. 9	"	Fig. 12 (9)
17	"	181.25 185.75		channel 8	"	—	"	Rec. on chan. 8	"	Fig. 12 (8)
18	"	175.25 179.75		channel 7	"	—	"	Rec. on chan. 7	"	Fig. 12 (7)
19	If the response of any channel (steps 13 through 18) is below 80% at either marker, repeat step 10 and adjust C9, C11, C16 and C22 as necessary to pull response up on the low channel yet maintain correct response on channel 8. 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.									
20	Repeat step 9. If the oscillator is off frequency overshoot the adjustment of C1 and correct by adjusting L43.									
21	Repeat steps 13 through 20 until all requirements are obtained.									
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	Ant. terminals (see text for precaution)	Sweeping channel 6	Not used	—	Not used	Observe response. If necessary readjust L42, L45 and L49. It should not be necessary to touch C11.		Fig. 7 Fig. 12
24	Not used	—	Not used	—	Not used	—	Connect "Volt-Ohmyst" to the r-f unit test point TP1	Check osc. injection. If necessary adjust C7 to give —3 volts. If C7 is adjusted, switch to channel 8, and readjust C9 for proper response then repeat step 23.		Fig. 7 Fig. 12
25	Antenna terminals (loosely)	77.25 81.75	Ant. terminals (see text for precaution)	channel 5	"	—	"	Rec. on chan. 5	Check to see that response is correct and —3.0 volts of osc. injection is present	Fig. 12 (5)

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229 TOP AND BOTTOM CHASSIS ADJUSTMENTS

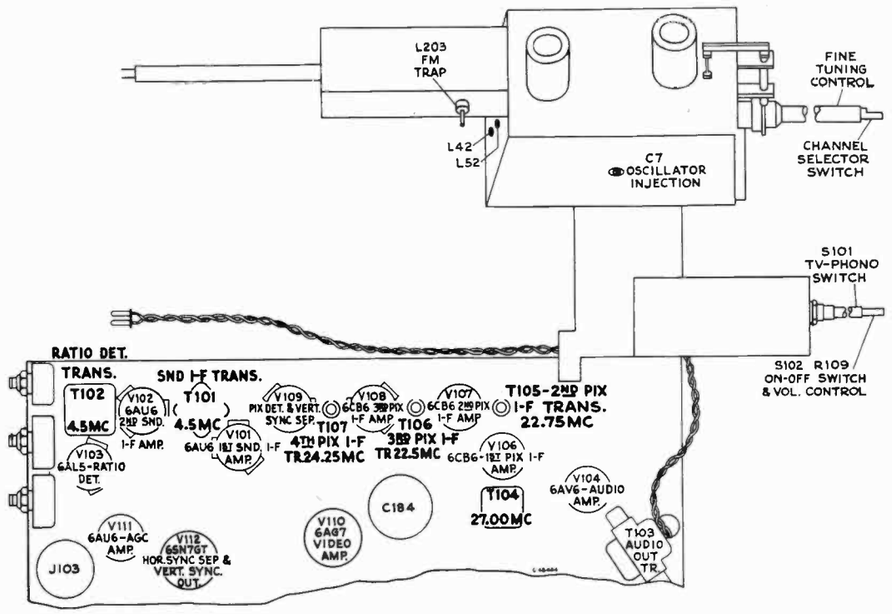


Figure 15—Top Chassis Adjustments

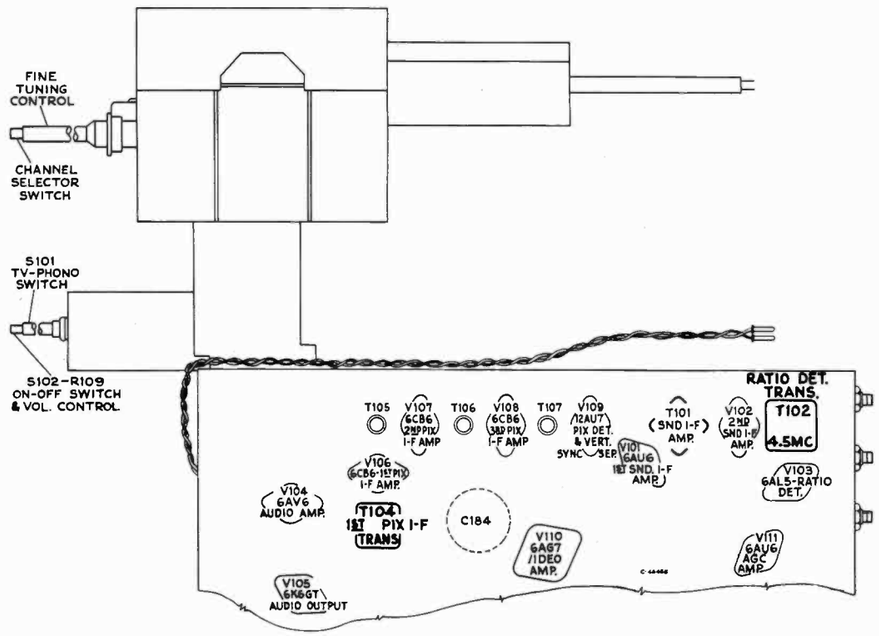


Figure 16—Bottom Chassis Adjustments

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229 TEST PATTERN PHOTOGRAPHS

Figure 17—Normal Picture

Figure 18—Focus Magnet and Ion Trap Magnet Misadjusted

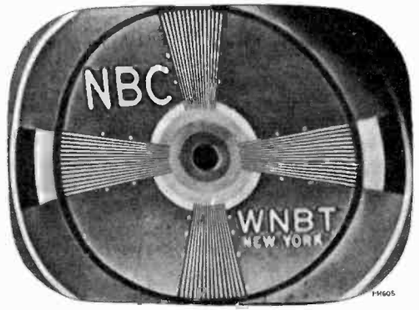
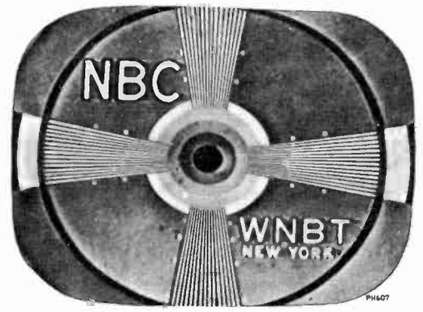


Figure 19—Horizontal Linearity Control Misadjusted (Picture Cramped in Middle)

Figure 20—Width Control Misadjusted



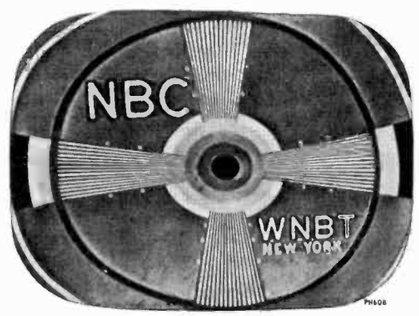
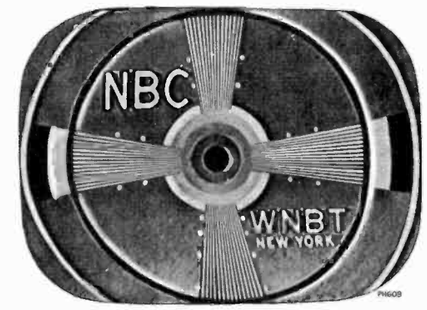


Figure 21—Horizontal Drive Control Misadjusted

Figure 22—Transients



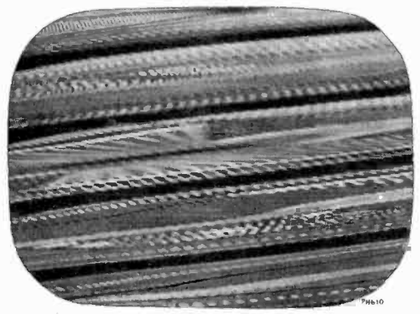
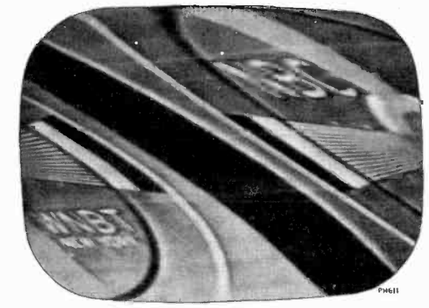


Figure 23—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position—Just Before Pulling Into Sync

Figure 24—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position



ALIGNMENT TABLE

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229

STEP No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT HETERODYNE FREQ. METER	HET. FREQ. METER MC.	CONNECT "VOLTOHMYST" TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
26	Antenna terminals (loosely)	67.25 71.75	Ant. terminals (see text for precaution)	channel 4	Not used	—	Connect "Volt-Ohmyst" to the r-f unit test point TP1	Rec. on chan. 4	Check to see that response is correct and —3.0 volts of osc. injection is present	Fig. 12 (4)
27	"	61.25 65.75	"	channel 3	"	—	"	Rec. on chan. 3	"	Fig. 12 (3)
28	"	55.25 59.75	"	channel 2	"	—	"	Rec. on chan. 2	"	Fig. 12 (2)
29	Likewise check channels 7 through 13, as outlined in steps 18 back through 13, stopping on channel 13 for next step.									
30	Antenna terminals	215.75	Not used	—	Loosely coupled to r-f oscillator	236.75	Not used	Fine tuning 30 degrees clockwise from mechanical center of its range. Receiver on channel 13	C1 for zero beat on het. freq. meter	Fig. 7
31	"	209.75	"	—	"	230.75	"	Rec. on chan. 12	L11 as above	Fig. 8
32	"	203.75	"	—	"	224.75	"	Rec. on chan. 11	L10 as above	Fig. 8
33	"	197.75	"	—	"	218.75	"	Rec. on chan. 10	L9 as above	Fig. 8
34	"	191.75	"	—	"	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	"	—	"	200.75	"	Rec. on chan. 7	L6 as above	Fig. 8
37	"	87.75	"	—	"	108.75	"	Rec. on chan. 6	L5 as above	Fig. 8
38	"	81.75	"	—	"	102.75	"	Rec. on chan. 5	L4 as above	Fig. 8
39	"	71.75	"	—	"	92.75	"	Rec. on chan. 4	L3 as above	Fig. 8
40	"	65.75	"	—	"	86.75	"	Rec. on chan. 3	L2 as above	Fig. 8
41	"	59.75	"	—	"	80.75	"	Rec. on chan. 2	L1 as above	Fig. 8
42	Repeat steps 30 through 41 as a check.									
43	Antenna terminals	181.25 185.75	Antenna terminals	Sweeping channel 8	Not used	—		Rec. on chan. 8. Oscilloscope at test point TP1. Adjust T1 clockwise. When properly adjusted, curve will be slightly wider with a slightly deeper valley in top.		Fig. 12 (8)
44	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.									
45	Remove 39 ohm resistor and reconnect link from T101 to terminal 2 of r-f unit terminal board.									

PICTURE I-F AND TRAP ADJUSTMENT

STEP No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT OSCILLOSCOPE TO	CONNECT "VOLTOHMYST" TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
46	Not used		Not used	—	Not used	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	"		"	—	"	Test point TP1	Connect bias box to TP1 and to ground	"	Fig. 7
48	Mixer grid test point TP2 in series with 1500 mmf.	24.25	"	—	"	Pin 4 of V110 and to ground	Bias boxes connected as above	T107 (top) for max.	Fig. 9
49	"	25.5	"	—	"	"	"	T106 (top) for max.	Fig. 9
50	"	22.75	"	—	"	"	"	T105 (top) for max.	Fig. 9
51	"	27.00	"	—	"	"	"	T104 (top) for min.	Fig. 9
52	Connected loosely to diode probe	Various See Fig. 13	Mixer grid test point TP2 in series with 1500 mmf.	20 to 28 mc	Scope diode probe to pin 5 of V106 and to grd. Connect a 180 ohm resistor from pin 5 of V106 to pin A of T105	Junction of R142 & R143	Shunt terminals A and B of T106 and T107 with 330 ohms. Bias boxes connected as above. .3v p-p on scope	Set C115 to min. Adjust T1 top and T104 bot. for max. gain with 25.5 mc. at 70%. C115 for 22.5 at 70%	Fig. 7 Fig. 10
53	Connected loosely to grid of 1st pix i-f. Adjust for small marker indication.	Various See Fig. 14	"	"	Connect scope to pin 4 of V110. Remove shunt & diode probe used above		Remove shunts from T106 & T107	Retouch T105, T106 and T107 to obtain response shown in Fig. 14	Fig. 14

RATIO DETECTOR, SOUND I-F AND 4.5 MC TRAP ALIGNMENT

54	Grid 1st Snd. I-F (pin 1, V101) or WR39B or C connect to grid 3rd pix I-F (pin 1, V108)	25.50mc. mod. by 4.5 mc.	Not used	—	Not used	Pin 2 of V103	Set signal gen. to give 6V on meter	T102 top core for max. d-c on meter	Fig. 9
55	"	"	"	—	"	"	"VoltOhmyst" to junction R106 and C108. Adjust T102 bottom core for zero DC on meter. Repeat steps 54 and 55 until all conditions are satisfied.		Fig. 9 Fig. 10
56	Sig. Gen. to 1st Snd. I-F grid	4.5 mc.	"	—	"	"	Signal generator output adjusted to provide 6 v on meter	T101 top core for max. DC on meter	Fig. 9
57	Sig. Gen. in series with 1000 ohms to pin 2 of V109	4.5 mc. mod. 30% with 400 cy.	"	—	Diode probe to pin 8 of V110	Not used	Short pin 1 of V108 to ground	Adjust L103 for minimum output on oscilloscope	Fig. 9

ALIGNMENT DATA

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229

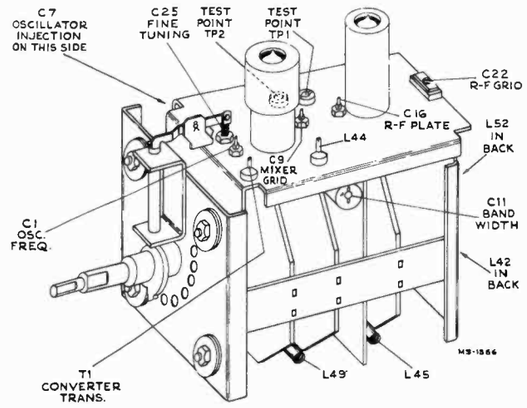


Figure 7—R-F Unit Adjustments

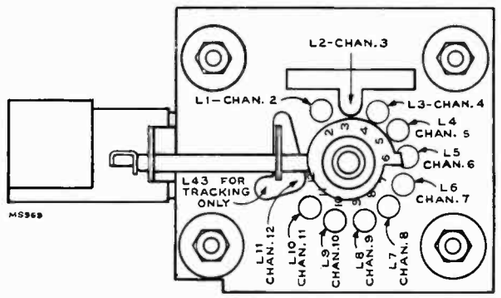


Figure 8—R-F Oscillator Adjustments

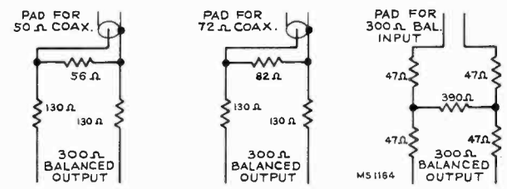


Figure 9—Sweep Attenuator Pads

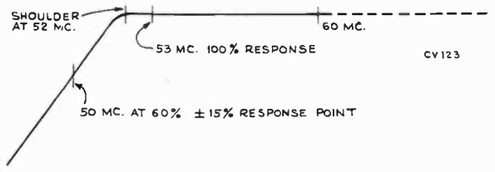


Figure 10—Antenna Matching Unit Response

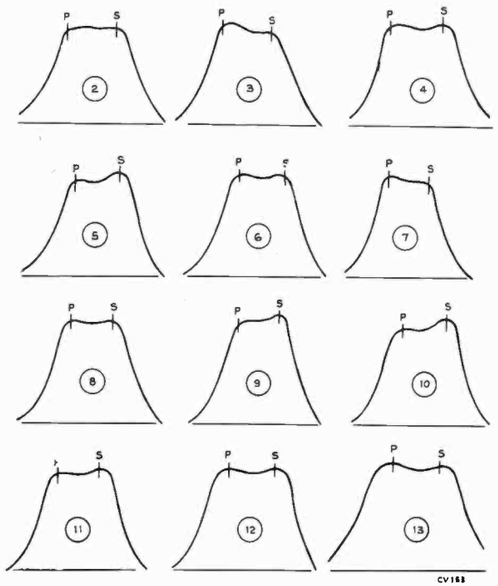


Figure 11—R-F Response

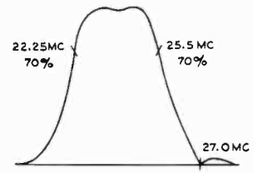


Figure 12
T1 and T104
Response

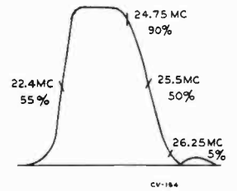


Figure 13
Over-all I-F
Response

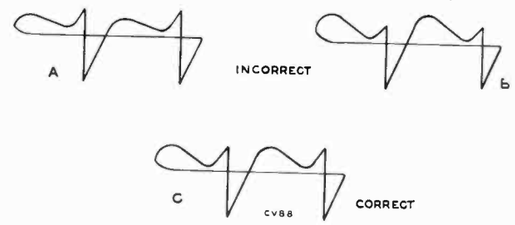


Figure 14—Horizontal Oscillator Wave Forms

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) 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 1B3GT circuit. Either the T111 high voltage winding is open, the 1B3GT 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:

(1) 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, C161A, 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:

(1) Reduce horizontal drive and readjust width and horizontal linearity.
(2) Replace V116.

LIGHT VERTICAL LINE ON LEFT OF PICTURE:

(1) V118 defective.

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229

WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

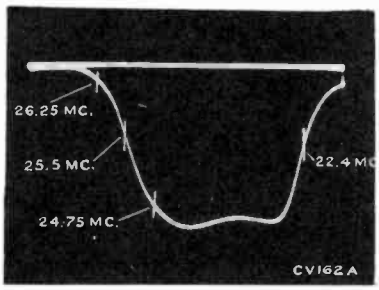


Figure 25—Overall Pix I-F Response

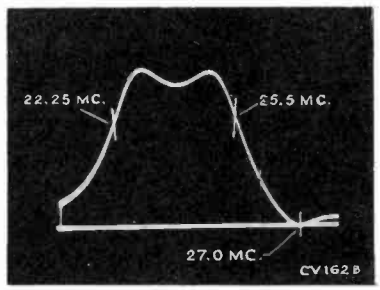


Figure 26—Response of T1-T104 Pix I-F Transformers

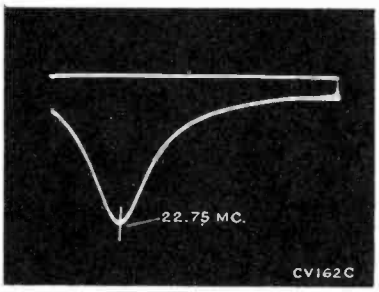


Figure 27—Response of T105 Pix I-F Transformer

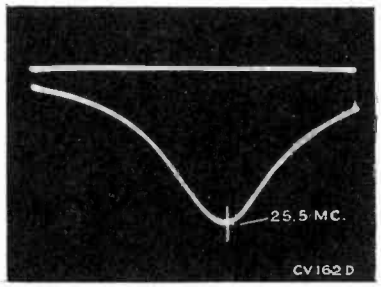


Figure 28—Response of T106 Pix I-F Transformer

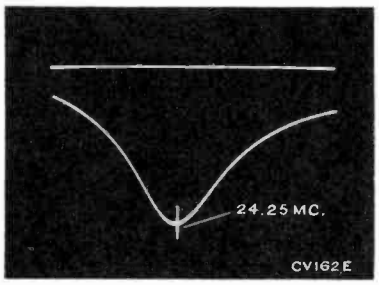


Figure 29—Response of T107 Pix I-F Transformer

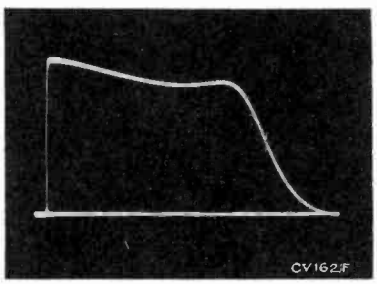
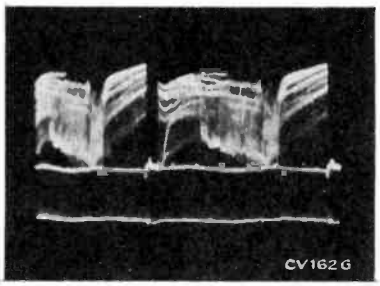


Figure 30—Video Response at Average Contrast



Grid of Video Amplifier (Pin 2 of V110) (6CL6) Voltage Depends on Picture

Figure 31—Vertical (Oscilloscope Synced to ½ of Vertical Sweep Rate) (1.5 Volts PP)

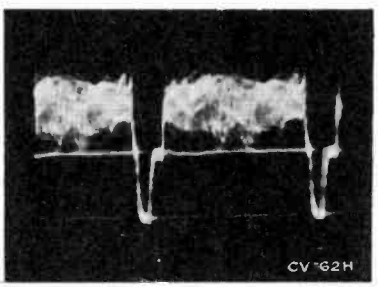


Figure 32—Horizontal (Oscilloscope Synced to ½ of Horizontal Sweep Rate) (1.5 Volts PP)

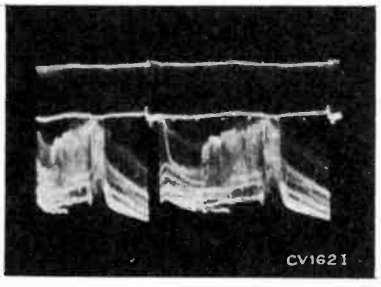


Plate of Video Amplifier (Pin 6 of V110) (6CL6)

Voltage depends on picture

Figure 33—Vertical (85 Volts PP)

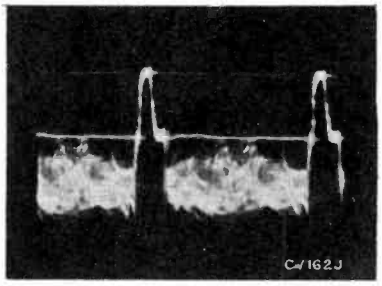
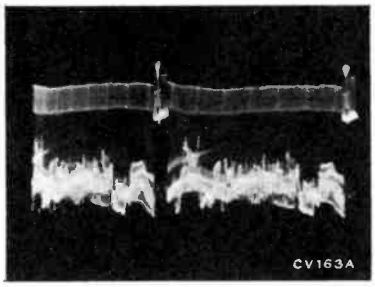


Figure 34—Horizontal (85 Volts PP)

WAVEFORM PHOTOGRAPHS

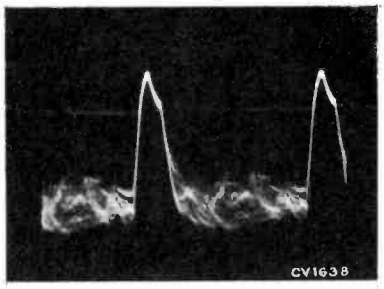
Taken from RCA WO58A Oscilloscope

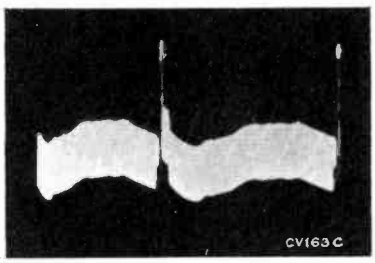


Grid of Horizontal Sync Separator (Pin 1 of V112A) (6SN7) Voltage depends on picture

Figure 35—Vertical (85 Volts PP)

Figure 36—Horizontal (85 Volts PP)

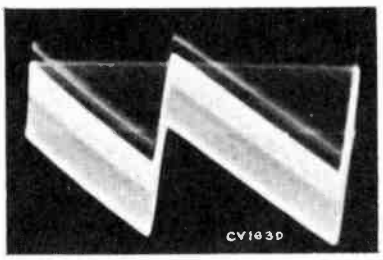




Cathode of Horizontal Sync Sep. (Pin 3 of V112A) (6SN7)

Figure 37—Vertical (7.5 Volts PP)

Figure 38—Horizontal (5 Volts PP)



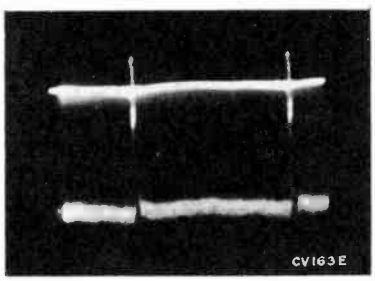
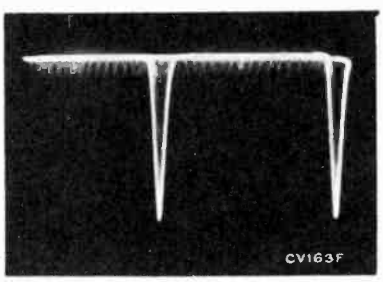
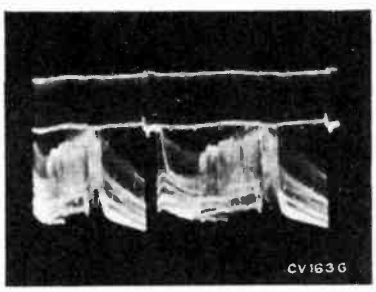


Plate of Horizontal Sync Separator (Pin 2 of V112A) (6SN7)

Figure 39—Vertical (45 Volts PP)

Figure 40—Horizontal (45 Volts PP)

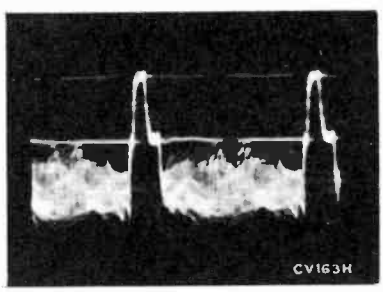




Grid of Vertical Sync Sep. (Pin 7 of V109B) (12AU7)

Figure 41—Vertical (55 Volts PP)

Figure 42—Horizontal (55 Volts PP)



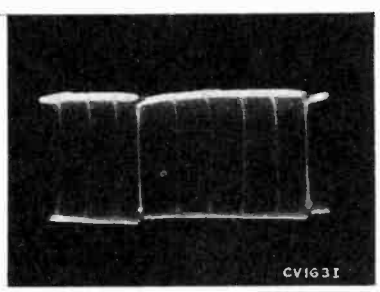
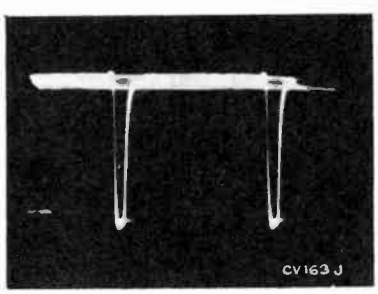


Plate of Vertical Sync Sep. (Pin 6 of V109B) (12AU7)

Figure 43—Vertical (65 Volts PP)

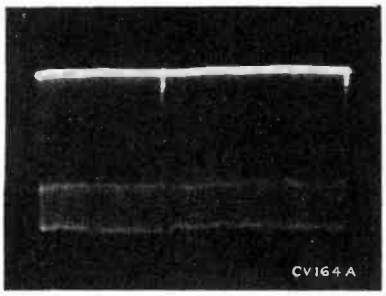
Figure 44—Horizontal (65 Volts PP)



21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229

WAVEFORM PHOTOGRAPHS

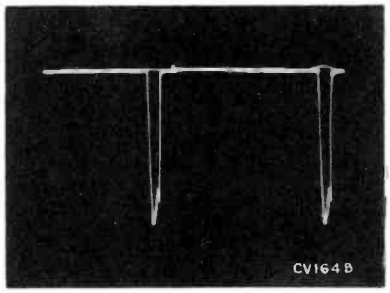
Taken from RCA WO58A Oscilloscope



Grid of Sync Output
(Pin 4 V112B) (6SN7)

Figure 45—Vertical (40 Volts PP)

Figure 46—Horizontal (40 Volts PP)



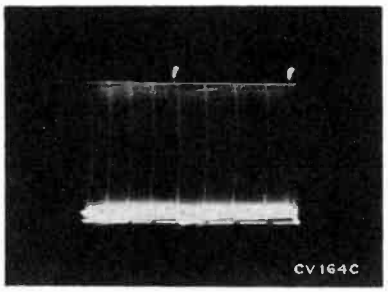
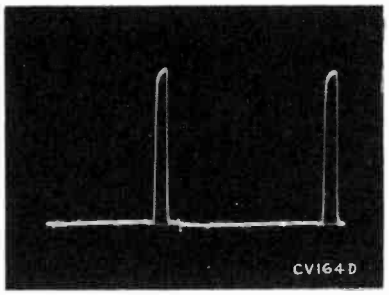


Plate of Sync Output
(Pin 5 of V112) (6SN7)

Figure 47—Vertical (47 Volts PP)

Figure 48—Horizontal (47 Volts PP)



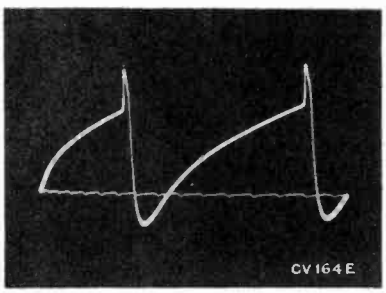
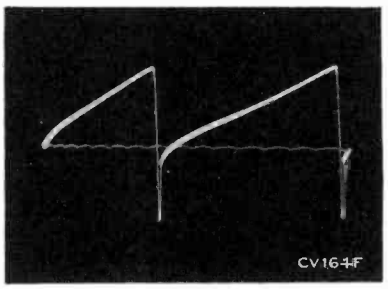


Figure 49—Grid of Vertical Sweep Osc. (Pin 5 of V113) (6J5) (30 Volts PP)

Figure 50—Plate of Vertical Sweep Osc. (Pin 3 of V113) (100 Volts PP)



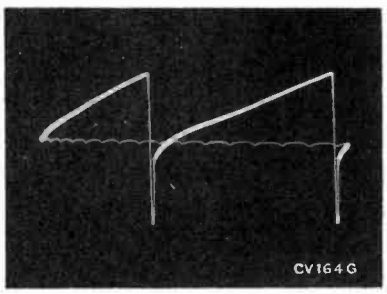
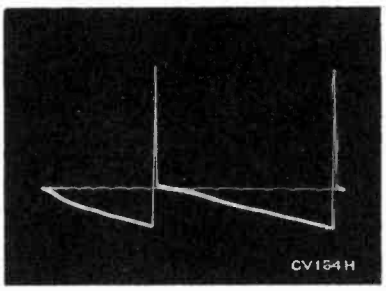
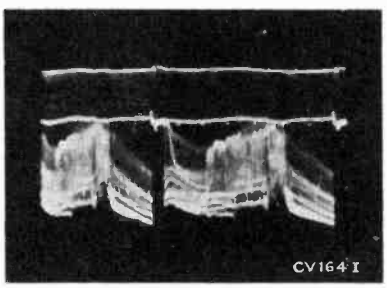


Figure 51—Grid of Vertical Sweep Output (Pin 5 of V114) (6K6) (100 Volts PP)

Figure 52—Plate of Vertical Sweep Output (Pin 3 of V114) (6K6) (715 Volts PP)



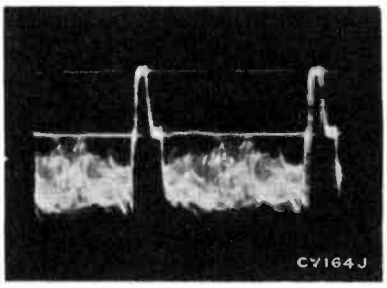


Cathode of Kinescope
(Pin 11 of V119) (17QP4)

Voltage depends on picture

Figure 53—Vertical

Figure 54—Horizontal



WAVEFORM PHOTOGRAPHS

Taken from RCA WO58A Oscilloscope

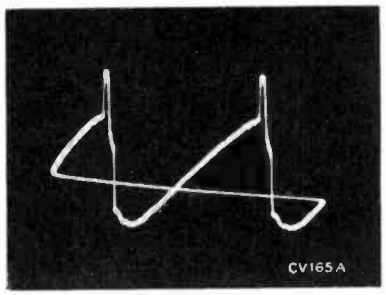


Figure 55—Grid of Horizontal Oscillator Control (Pin 1 of V115) (6SN7GT) (19 Volts PP)

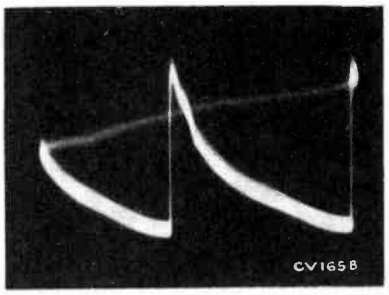


Figure 56—Cathode of Horizontal Oscillator Control (Pin 3 of V115) (6SN7GT) (1.2 Volts PP)

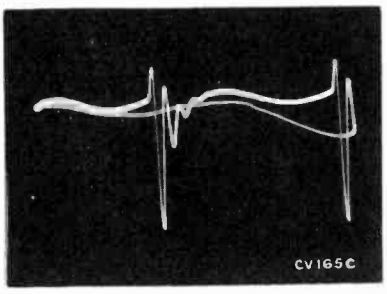


Figure 57—Grid of Horizontal Oscillator (Pin 4 of V115) (6SN7GT) (330 Volts PP)

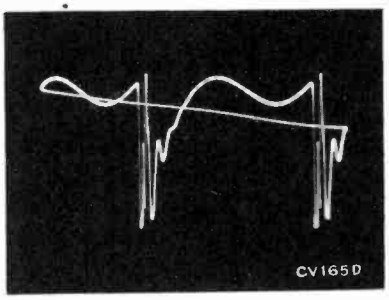


Figure 58—Plate of Horizontal Oscillator (Pin 5 of V115) (6SN7GT) (140 Volts PP)

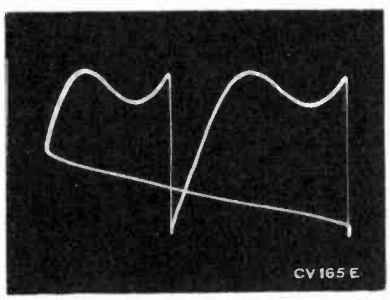


Figure 59—Terminal "C" of T110 (150 Volts PP)

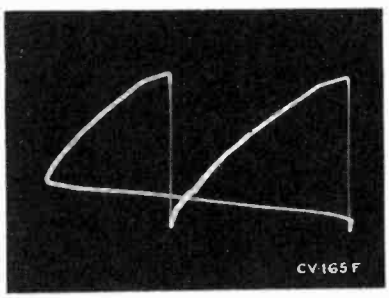


Figure 60—Grid of Horizontal Output Tube (Pin 5 of V116) (6BQ6) (90 Volts PP)

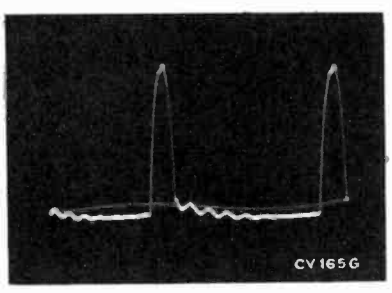


Figure 61—Plate of Horizontal Output (Approx. 4000 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V116 to Ground)

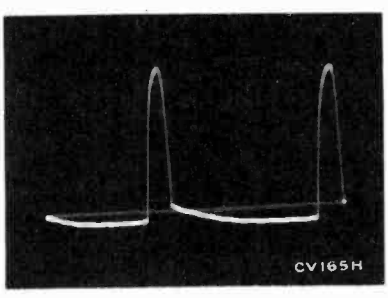


Figure 62—Cathode of Damper (Pin 3 of V118) (6W4GT) (2350 Volts PP)

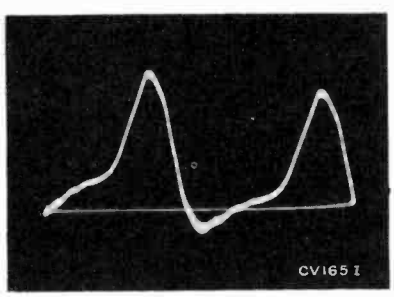


Figure 63—Plate of Damper (Pin 5 of V118) (6W4GT) (160 Volts PP)

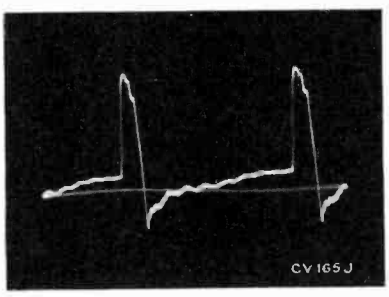


Figure 64—Plate of AGC Amplifier (Pin 5 of V111) (6AU6) (560 Volts PP)

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229

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 No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V1	6J6	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
V1	6J6	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	
V101	6AU6	1st 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.
V103	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	1st 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	1st Pix. I-F Amplifier	15000 Mu. V. Signal	5	246	6	258	2	<0.1	1	—8.6	
			No Signal	5	108	6	108	2	0.7	1	*—0.2	*Unreliable measuring point. Make measurement at T104-B
V107	6CB6	2nd Pix. I-F Amplifier	15000 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	
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

21T207, 21T207G, 21T208, 21T217, 21T218, 21T227, 21T228, 21T229

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V110	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 schematic for pin connections		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
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	Cap	*	—	—	2 & 7	14,000	—	—	*High Voltage Pulse Present
			No Signal	Cap	*	—	—	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	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	—	—	

21T207, 21T207G, 21T208, 21T217,
21T218, 21T227, 21T228, 21T229 **R-F UNIT WIRING DIAGRAM**

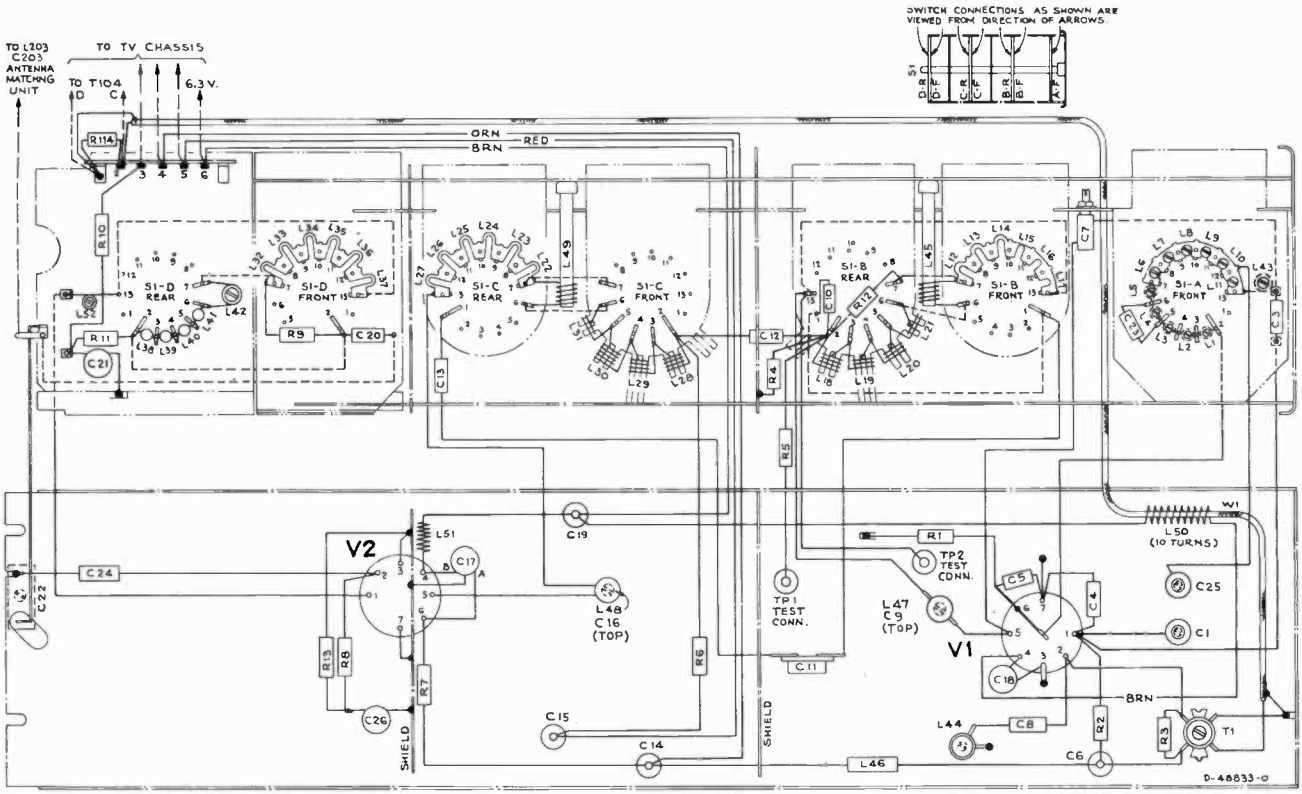


Figure 65—KRK-8D R-F Unit Wiring Diagram

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 C118, C120, C122, C124, C126, R114, R121 and R123 as short and direct as possible.
3. Do not run any leads under C115 trimmer capacitor.
4. Dress C118 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 ¼ 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.
11. 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.
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.

21T207, 21T207G, 21T208, 21T217,
21T218, 21T227, 21T228, 21T229

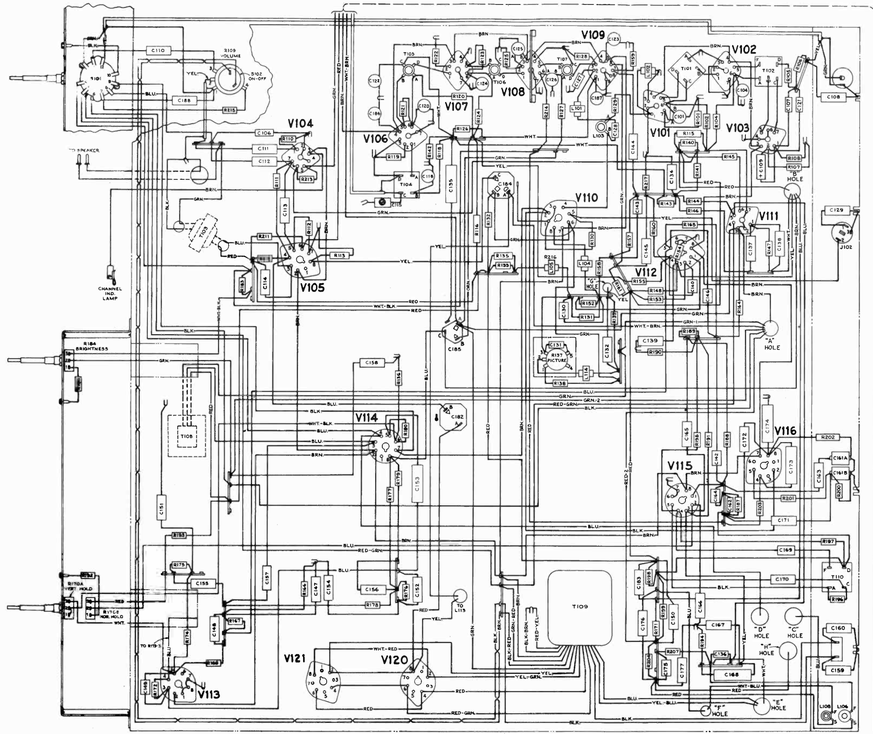
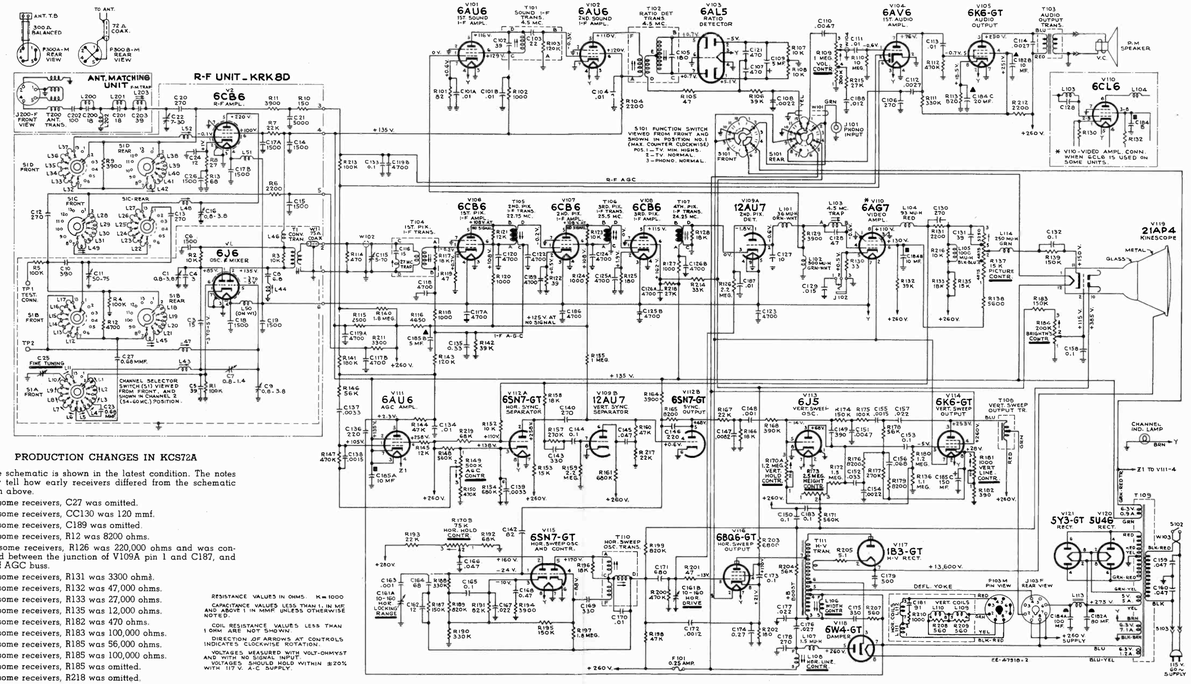


Figure 66—Chassis Wiring Diagram

21T207, 21T207G, 21T208, 21T217,
21T218, 21T227, 21T228, 21T229



PRODUCTION CHANGES IN KCS72A

The schematic is shown in the latest condition. The notes below tell how early receivers differed from the schematic shown above.

In some receivers, C27 was omitted.
In some receivers, CC130 was 120 mmf.
In some receivers, C189 was omitted.
In some receivers, R12 was 8200 ohms.
In some receivers, R126 was 220,000 ohms and was connected between the junction of V109A pin 1 and C187, and the i-f AGC buss.
In some receivers, R131 was 3300 ohms.
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.
In some receivers, R183 was 100,000 ohms.
In some receivers, R185 was 56,000 ohms.
In some receivers, R185 was 100,000 ohms.
In some receivers, R185 was omitted.
In some receivers, R218 was omitted.
In some receivers, R219 was omitted.
In some receivers, V119-10 was connected to the junction of R171 and C183.
In some receivers, V110 used 6AC7 tube.

RESISTANCE VALUES IN OHMS. K = 1000
CAPACITANCE VALUES LESS THAN 1 IN MF AND ABOVE 1 IN MMF UNLESS OTHERWISE NOTED.
COIL RESISTANCE VALUES LESS THAN 1 OHM ARE NOT SHOWN.
DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.
ALL VOLTAGES MEASURED WITH VOLT-OHMYST AND WITH NO SIGNAL INPUT. VOLTAGES SHOULD HOLD WITHIN ±20% WITH 117 V. A.C. SUPPLY.

All resistance values in ohms, K = 1000. KCS72A-M1 chassis uses 6AG7 video amplifier.
KCS72A-M2 chassis uses 6CL6 video amplifier.

All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted. Model 21T207G uses glass Kinescope 21EP4.

Directions of arrows at controls indicates clockwise rotation.

All voltages measured with "Volt-Ohmyst" and with no signal input. Voltages should hold within ±20% with 117 v. a-c supply.

Figure 67—Chassis KCS72A Circuit Schematic Diagram

STOCK No.	DESCRIPTION
	R-F UNIT ASSEMBLIES
	KRK8D
75188	Board—Terminal board, 5 contact and ground
76845	Bracket—Vertical bracket for holding oscillator tube shield
75201	Cable—75 ohm coax cable (7¼") complete with coil (W1, L50)
76965	Capacitor—Ceramic, variable, for fine tuning—plunger type (C2)
71088	Capacitor—Headed lead, 0.68 mmf. (C27)
76968	Capacitor—Ceramic, 3 mmf. (C4)
75200	Capacitor—Ceramic, 12 mmf. (C24)
45465	Capacitor—Ceramic, 15 mmf. (C3)
75196	Capacitor—Ceramic, 39 mmf. (C5)
75199	Capacitor—Ceramic, 270 mmf. (C12, C13, C20)
75641	Capacitor—Ceramic, 390 mmf. (C10)
75166	Capacitor—Ceramic, 1500 mmf. (C6, C14, C15, C19)
73748	Capacitor—Ceramic, 1500 mmf. (C18, C26)
75089	Capacitor—Ceramic, dual 1500 mmf. (C17A, C17B)
73473	Capacitor—Ceramic, dual (C23)
75172	Capacitor—Tubular, steatite, adjustable, 0.65–1.2 mmf. (C7)
71504	Capacitor—Ceramic, 0.68 mmf. (C23)
75184	Capacitor—Ceramic, adjustable, 0.75–4 mmf., complete with adjusting stud (C1)
75197	Capacitor—Ceramic, 6.8 mmf. (C8)
75189	Capacitor—Adjustable, 7-30 mmf. (C22)
75174	Capacitor—Ceramic, trimmer, 50-75 mmf. (C11)
76143	Clip—Tubular clip for mounting standoff capacitors
73477	Coil—Choke coil (L51)
73202	Coil—Choke coil, .56 muh (L46)
75185	Coil—Converter plate loading coil (L44)
78182	Coil—Trimmer coil (1½ turns) with adjustable inductance core and capacitor stud (screw adjustment) for converter section (C9, L47)
75183	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L48, C16)
76460	Contact—Test point contact
76966	Core—Adjustable core for fine tuning capacitor
75162	Detent—Detent mechanism and fibre shaft
73463	Form—Coil form for L45, L49
75165	Link—Link assembly for fine tuning
76518	Plate—Front plate and shaft bearing
	Resistor—Fixed, composition:—
503027	27 ohms, ±10%, ½ watt (R8)
503068	68 ohms, ±10%, ½ watt (R13)
504115	150 ohms, ±20%, ½ watt (R10)
503222	2200 ohms, ±10%, ½ watt (R6)
503239	3900 ohms, ±10%, ½ watt (R9, R11)
503247	4700 ohms, ±10%, ½ watt (R12)
502310	10,000 ohms, ±5%, ½ watt (R3)
504127	10,000 ohms, ±20%, ½ watt (R2)
503322	22,000 ohms, ±10%, ½ watt (R7)
504410	100,000 ohms, ±20%, ½ watt (R1, R4, R5)
14343	Retainer—Fine tuning shaft retaining ring
75164	Rod—Actuating plunger rod (fibre) for fine tuning link
71476	Screw—#4-40 x ¼" adjusting screw for L6, L7, L8, L9, L10, L11
75177	Screw—#4-40 x ⅜" adjusting screw for L1, L2, L3, L4, L43
75176	Screw—#4-40 x 7/16" adjusting screw for L5
73640	Screw—#4-40 x 5/16" adjusting screw for L52
74575	Screw—#4-40 x .359" adjusting screw for L42
76519	Shaft—Channel selector shaft and plate
76134	Shaft—Fine tuning shaft and cam
76962	Shield—Oscillator and converter sections shield—snap-on type
76967	Shield—Tube shield for V1, V2
75088	Socket—Tube socket, 7 contact, miniature, ceramic, saddle-mounted
75191	Spacer—Insulating spacer for front plate
75163	Spring—Friction spring (formed) for fine tuning cam
30340	Spring—Hair pin spring for fine tuning link
74578	Spring—Retaining spring for adjusting screws
76961	Spring—Retaining spring for oscillator tube shield
73457	Spring—Return spring for fine tuning control
75180	Stator—Antenna stator complete with rotor, coils, capacitors (C20, C21) and resistors (R9, R10, R11) (S1-4, L33, L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L52)
77459	Stator—Converter stator complete with rotor, coils, capacitors (C10, C11) and resistors (R4, R5, R12) (S1-2, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L45)
76963	Stator—Oscillator section stator complete with rotor, segment coils, adjusting screws and capacitors C3, C23 (S1-1, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L43)
76964	Stator—R-F amplifier stator complete with rotor, coils, capacitor (C13) and resistor (R6) (S1-3, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L48)
75170	Strip—Coil segment mounting strip—L.H. lower
75171	Strip—Coil segment mounting strip—L.H. upper—less trimmer C7
75169	Strip—Coil segment mounting strip—R.H. center
75446	Stud—Capacitor stud—brass—#4-40 x 3/16" with 3/64" screw driver slot for trimmer coils L47, L48 and capacitor C1 uncoded and coded "LSE"
75447	Stud—Capacitor stud—brass—#4-40 x 3/16" with 3/64" screw driver slot for trimmer coils L47, L48 and capacitor C1 coded numerically as "Hi-Q"
75173	Stud—#6-32 x 13/16" adjusting stud for trimmer C7
75181	Transformer—Converter transformer (T1)
75607	Washer—Insulating washer (hex)
75190	Washer—Insulating washer (neoprene) for trimmer C7
	CHASSIS ASSEMBLIES
	KCS72-A
76456	Bracket—Channel indicator lamp bracket
76454	Bracket—Mounting bracket complete with insulator for picture control
71496	Capacitor—Adjustable, mica, 5-70 mmf. (C115)
33098	Capacitor—Ceramic, 10 mmf. (C127)
33380	Capacitor—Ceramic, 12 mmf. (C162)
75450	Capacitor—Ceramic, 39 mmf. (C203)
73664	Capacitor—Ceramic, 39 mmf. (C131)
76475	Capacitor—Mica, 68 mmf. (C164)
76474	Capacitor—Mica, 82 mmf. (C142)
75437	Capacitor—Ceramic, 100 mmf. (C202)
76673	Capacitor—Ceramic, 220 mmf. (C136)
75248	Capacitor—Mica, 220 mmf. (C146)
47617	Capacitor—Ceramic, 270 mmf. (C106)
39638	Capacitor—Mica, 270 mmf. (C130)
73091	Capacitor—Mica, 270 mmf. (C140, C178)
76476	Capacitor—Mica, 330 mmf. (C169, C175)
39640	Capacitor—Mica, 330 mmf. (C143)
73094	Capacitor—Mica, 390 mmf. (C149)
39644	Capacitor—Mica, 470 mmf. (C107, C121)
76461	Capacitor—Ceramic, 500 mmf., 20,000 volts (C179)

STOCK No.	DESCRIPTION
76990	Capacitor—Ceramic, dual, 4700 mmf. (C117A, C117B, C119A, C119B, C125A, C125B, C126A, C126B)
73473	Capacitor—Ceramic, 4700 mmf. (C118, C120, C122, C123, C124, C186, C189)
73960	Capacitor—Ceramic, 10,000 mmf. (C104, C187)
76991	Capacitor—Ceramic, dual 10,000 mmf. (C101A, C101B)
74521	Capacitor—Electrolytic, 8 mfd., 50 volts (C109)
78218	Capacitor—Electrolytic, comprising 1 section of 10 mfd., 350 volts, 1 section of 5 mfd., 350 volts and 1 section of 150 mfd., 50 volts (C185A, C185B, C185C)
75217	Capacitor—Mica trimmer, dual 10-160 mmf. (C161A, C161B)
76987	Capacitor—Electrolytic, comprising 1 section of 80 mfd., 400 volts and 1 section of 10 mfd., 350 volts (C152A, C152B)
76970	Capacitor—Electrolytic, comprising 1 section of 100 mfd., 400 volts, 1 section of 10 mfd., 350 volts and 1 section of 20 mfd., 50 volts (C184A, C184B, C184C)
76479	Capacitor—Tubular, moulded paper, oil impregnated, .00068 mfd., 600 volts (C171)
75643	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 600 volts (C148, C153)
76995	Capacitor—Tubular, moulded paper, oil impregnated, .0012 mfd., 600 volts (C172)
76508	Capacitor—Tubular, paper, oil impregnated, .0015 mfd., 600 volts (C138)
77123	Capacitor—Tubular, moulded paper, oil impregnated, .0015 mfd., 1000 volts (C155)
73595	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 600 volts (C108, C154)
73599	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 600 volts (C112)
73818	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 1500 volts (C114)
73795	Capacitor—Tubular, paper, oil impregnated, .0033 mfd., 600 volts (C137, C139)
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C110, C151)
73808	Capacitor—Tubular, paper, oil impregnated, .0082 mfd., 1000 volts (C147)
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 600 volts (C111, C113, C134)
73594	Capacitor—Tubular, moulded paper, oil impregnated, .01 mfd., 600 volts (C170)
74938	Capacitor—Tubular, paper, oil impregnated, .012 mfd., 200 volts (C188)
73797	Capacitor—Tubular, paper, oil impregnated, .015 mfd., 600 volts (C129)
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 400 volts (C167)
73798	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 600 volts (C157)
73810	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 1000 volts (C177)
73811	Capacitor—Tubular, paper, oil impregnated, .027 mfd., 600 volts (C176)
73596	Capacitor—Tubular, paper, oil impregnated, .033 mfd., 600 volts (C152)
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C145, C166)
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts (C159, C160)
73792	Capacitor—Tubular, paper, oil impregnated, .068 mfd., 600 volts (C156)
73784	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 200 volts (C132, C133)
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C144, C150, C158, C165, C183)
73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C153, C175)
73786	Capacitor—Tubular, paper, oil impregnated, 0.27 mfd., 200 volts (C124)
76994	Capacitor—Tubular, paper, oil impregnated, 0.33 mfd., 200 volts (C135)
73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C168)
76498	Choke—Filter choke (L113)
73591	Coil—Antenna matching coil (2 req'd) (Part of T200)
75241	Coil—Antenna shunt coil (L202)
76442	Coil—Horizontal linearity coil complete with adjustable core (L108)
76441	Coil—Width coil complete with adjustable core (L106)
76640	Coil—Peaking coil (1.5 muh) (L107)
76011	Coil—Peaking coil (36 muh) (L101)
76011	Coil—Peaking coil (93 muh) (L104)
71526	Coil—Peaking coil (250 muh) (L114)
75252	Coil—Peaking coil (500 muh) (L102)
77124	Coil—Peaking coil (1000 muh) (L105, R216)
76457	Connector—2nd. anode lead connector complete—mounted on hi-voltage capacitor
77008	Connector—Anode connector complete with terminal and contact
77677	Connector—Anode connector for Kinescope (Model 21T207G only)
35787	Connector—Phono input connector (J101)
75474	Connector—Single contact male connector for speaker cable
75482	Connector—Video connector (J102)
74594	Connector—2 contact male connector for power cord
38853	Connector—4 contact female connector for antenna transformer (C202)
50367	Connector—6 contact female connector for yoke lead (J103)
75542	Connector—8 contact male connector—part of deflection yoke (PJ03)
76975	Control—AGC control (R149)
76444	Control—Brightness control (R184)
76448	Control—Height control (R173)
76974	Control—Horizontal and vertical hold control (R170A, R170B)
76445	Control—Picture control (R137)
76976	Control—Vertical linearity control (R181)
77010	Control—Volume control and power switch (R109, S102)
71498	Core—Adjustable core and stud for FM trap 75449
76986	Cover—Back cover for hi-voltage compartment
76985	Cover—Side cover for hi-voltage compartment
74956	Cushion—Rubber cushion for deflection yoke hood
74839	Fastener—Push fastener for mounting tube socket 76453
73600	Fuse—0.25 amp., 250 volts
76459	Grommet—Rubber grommet for 2nd. anode lead exit
37396	Grommet—Rubber grommet for mounting tube socket 76453
77035	Hood—Deflection yoke hood less rubber cushions
76830	Hood—Deflection yoke hood, less rubber cushions (21T207G only)
76480	Lead—Anode lead complete with eyelet
76168	Magnet—Focus magnet
76141	Magnet—Ion trap magnet (P.M. type)
76633	Magnet—Pin cushion correction magnet complete with support arm (Model 21T207G only)
76464	Plate—Hi-voltage plate (bakelite) assembly complete with tube socket and corona ring
76796	Resistor—Wire wound, 5.1 ohms, ½ watt (R205)
76639	Resistor—Wire wound, 180 ohms, 2 watts (R202)
76988	Resistor—Wire wound, 820 ohms, 1 watt (R113)
76469	Resistor—Wire wound, 2500 ohms, 10 watts (R115)
76989	Resistor—Wire wound, 4650 ohms, 7 watts (R116)
	Resistor—Fixed, composition:—
503033	33 ohms, ±10%, ½ watt (R130)
502039	39 ohms, ±5%, ½ watt (R122)
502047	47 ohms, ±5%, ½ watt (R119)
503047	47 ohms, ±10%, ½ watt (R105)
504047	47 ohms, ±20%, ½ watt (R201)
503082	82 ohms, ±10%, ½ watt (R101)
502118	180 ohms, ±5%, ½ watt (R125)
503139	390 ohms, ±10%, ½ watt (R182)

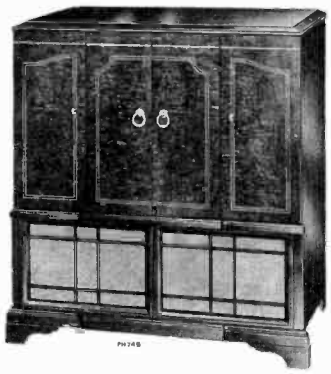
STOCK No.	DESCRIPTION
503147	470 ohms, ±10%, ½ watt (R114)
513196	560 ohms, ±10%, 1 watt (R207)
504210	1000 ohms, ±20%, ½ watt (R102, R118, R120, R124, R127)
503222	2200 ohms, ±10%, ½ watt (R104, R212)
523222	2200 ohms, ±10%, 2 watts (R131)
504233	3300 ohms, ±20%, ½ watt (R211)
502239	3900 ohms, ±5%, ½ watt (R129, R164)
503239	3900 ohms, ±10%, ½ watt (R194)
503256	5600 ohms, ±10%, ½ watt (R138)
523268	6800 ohms, ±10%, 2 watts (R203)
503282	8200 ohms, ±10%, ½ watt (R176, R179)
513282	8200 ohms, ±10%, 1 watt (R165)
502310	10,000 ohms, ±5%, ½ watt (R107, R108, R123)
504310	10,000 ohms, ±20%, ½ watt (R152)
502312	12,000 ohms, ±5%, ½ watt (R121)
503312	12,000 ohms, ±10%, ½ watt (R145)
523315	15,000 ohms, ±10%, 2 watts (R135)
503315	15,000 ohms, ±10%, ½ watt (R153)
503318	18,000 ohms, ±10%, ½ watt (R128, R158, R166, R196)
523318	18,000 ohms, ±10%, 2 watts (R133)
503322	22,000 ohms, ±10%, ½ watt (R167, R217)
513322	22,000 ohms, ±10%, 1 watt (R193)
503327	27,000 ohms, ±10%, ½ watt (R215)
513327	27,000 ohms, ±10%, 1 watt (R218)
513333	33,000 ohms, ±10%, 1 watt (R214)
503339	39,000 ohms, ±10%, ½ watt (R106, R142)
513339	39,000 ohms, ±10%, 1 watt (R132)
503347	47,000 ohms, ±10%, ½ watt (R160)
504347	47,000 ohms, ±20%, ½ watt (R144)
512347	47,000 ohms, ±5%, 1 watt (R188)
503356	56,000 ohms, ±10%, ½ watt (R146, R204)
512356	56,000 ohms, ±5%, 1 watt (R178)
503368	68,000 ohms, ±10%, ½ watt (R219)
513068	68,000 ohms, ±10%, 1 watt (R192)
513382	82,000 ohms, ±10%, 1 watt (R181)
504410	100,000 ohms, ±20%, ½ watt (R213)
513410	100,000 ohms, ±10%, 1 watt (R175)
530180	120,000 ohms, ±5%, ½ watt (R143)
503415	150,000 ohms, ±10%, ½ watt (R174, R183, R187)
504415	150,000 ohms, ±20%, ½ watt (R139)
512415	150,000 ohms, ±5%, 1 watt (R195)
502418	180,000 ohms, ±5%, ½ watt (R141)
502427	270,000 ohms, ±5%, ½ watt (R177)
503427	270,000 ohms, ±10%, ½ watt (R157)
503433	330,000 ohms, ±10%, ½ watt (R111, R188)
512433	330,000 ohms, ±5%, 1 watt (R190)
503439	390,000 ohms, ±10%, ½ watt (R168)
503447	470,000 ohms, ±10%, ½ watt (R150, R200)
504447	470,000 ohms, ±20%, ½ watt (R112, R147)
503456	560,000 ohms, ±10%, ½ watt (R148, R171)
503468	680,000 ohms, ±10%, ½ watt (R154, R161)
503482	820,000 ohms, ±10%, ½ watt (R189, R199)
503510	1 megohm, ±10%, ½ watt (R155)
502511	1.1 megohm, ±5%, ½ watt (R136)
503512	1.2 megohm, ±10%, ½ watt (R180)
503515	1.5 megohm, ±10%, ½ watt (R172)
11769	1.8 megohm, ±5%, ½ watt (R140)
39063	1.8 megohm, ±5%, 1 watt (R197)
503522	2.2 megohm, ±10%, ½ watt (R126, R159)
504610	10 megohm, ±20%, ½ watt (R110)
71456	Screw—#8-32 x 7/16" wing screw to mount deflection yoke
76487	Shaft—Connecting shaft (nylon) for picture and brightness controls
73584	Shield—Tube shield for V101, V102, V103, V108
76972	Shield—Tube shield for V109
75718	Socket—Channel indicator lamp socket and leads
74834	Socket—Kinescope socket
31251	Socket—Tube socket, octal, wafer for V105, V110, V112, V113, V116, V120, V121 (KCS72A2 uses 6AC7 for V110)
76453	Socket—Tube socket, octal, moulded, saddle mounted for V110 for KCS72A1M1 (KCS72A1M1 uses 6AC7 for V110)
71508	Socket—Tube socket, 6 pin, moulded—for V117
50367	Socket—Tube socket, 6 pin, moulded, saddle mounted for V118
73117	Socket—Tube socket, 7 pin, wafer miniature for V101, V102, V103, V104, V106, V107, V111, V114
50367	Socket—Tube socket, 8 pin, moulded saddle-mounted for V114
72627	Socket—Tube socket, 8 pin, steatite saddle mounted for V115
76971	Socket—Tube socket, 9 pin, wafer miniature for V109
76636	Stud—Adjusting stud complete with guard for focus magnet
77011	Switch—Tone control and phono switch less volume control and power switch (S101)
76463	Terminal—Screw type grounding terminal
76977	Transformer—Antenna matching transformer complete (T200, C200, C201, C202, C203, L200, L201, L202, L203, T200)
76795	Transformer—Hi-voltage transformer (T111)
76440	Transformer—Horizontal oscillator transformer complete with adjustable screw (T110)
76997	Transformer—Output transformer (T103)
76984	Transformer—Power transformer, 115 volts 60 cycle (T109)
77112	Transformer—Ratio detector transformer (T102, C105)
76981	Transformer—Sound i-f transformer complete with adjustable core (T104, C182, C183, R182)
76978	Transformer—Vertical output transformer (T108)
76979	Transformer—First pix. i-f transformer complete with adjustable cores (T106, C116, R117)
76980	Transformer—Second, third or fourth pix i-f transformer complete with adjustable core (T105, T106, T107)
75449	Trap—2nd trap complete with adjustable core and stud (L203, C202)
75242	Trap—i-f trap (L200, L201, C200, C201)
76983	Trap—4.5 MC trap (L103, C128)
76616	Yoke—Deflection yoke complete with 6 contact male connector (L109, L110, L111, L112, C181, P103, R208, R209, R210)
	SPEAKER ASSEMBLIES
	971490-3W, RL-105-E6, RMA-274
	(For Models 21T208, 21T217, 21T229)
75024	Cone—Cone and voice coil (3.2 ohms)
75022	Speaker—8" P.M. speaker complete with cone and voice coil (3.2 ohms)
	92569-12W, RL-111-A1, RMA-274
	(For Models 21T218, 21T227, 21T228)
75682	Cone—Cone and voice coil (3.2 ohms)
76389	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)
	971636-1, RMA-274
	(For Models 21T207, 21T207G)
77000	Speaker—5" P.M. speaker complete with cone and voice coil (3.2 ohms)
	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 description of part required.

STOCK No.	DESCRIPTION
	MISCELLANEOUS
77211	Back—Back cover complete with power cord (21T208, 21T217, 21T218, 21T227, 21T228, 21T229)
77679	Back—Back cover complete with power cord and terminal board (Model 21T207G)
77568	Back—Back cover complete with power cord and terminal board (Model 21T207)
76184	Board—Antenna terminal board
76629	Bracket—Hanger bracket for deflection yoke hood for Models 21T218, 21T227, 21T228, 21T229
77009	Bracket—Hanger bracket for deflection yoke hood for Models 21T208, 21T217, 21T207
76697	Bracket—Masking panel support bracket (2 req'd)
76599	Bracket—"U" shape bracket for deflection yoke support rod
77680	Bracket—Mounting bracket for kinescope mounting straps (2 req'd) (Model 21T207G)
76699	Bumper—Rubber bumper for kinescope (as req'd)
71892	Catch—Bullet catch and strike for cabinet doors for Models 21T227, 21T228, 21T229
77018	Clip—Ornamental clip (metal) for wood grille bars for Model 21T227
X1756	Cloth—Grille cloth for mahogany instruments for Models 21T207, 21T208, 21T217 or walnut instruments for Model 21T217
X3199	Cloth—Grille cloth for mahogany or walnut instruments for Models 21T218, 21T227, 21T228, 21T229 or maple instruments for Model 21T229
X3222	Cloth—Grille cloth for blonde mahogany instruments for Models 21T218, 21T227 or for oak instruments for Model 21T229
75474	Connector—Single contact male connector for antenna cable
39153	Connector—4 contact male connector for antenna cable
71457	Cord—Power cord and plug
76698	Cushion—Rubber cushion for masking panel support brackets (2 req'd)
76627	Cushion—Rubber cushion for safety glass
76631	Cushion—Rubber cushion for dust sealing the kinescope
77268	Decal—Control function decal for blonde mahogany, maple, or oak instruments
77015	Decal—Control function decal for mahogany or walnut instruments
71984	Decal—"RCA Victor" decal for Models 21T227, 21T228, 21T229
77012	Emblem—"RCA Victor" emblem
78456	Escutcheon—Channel marker escutcheon
72113	Foot—Rubber foot (4 req'd) for Model 21T208
77684	Gasket—Gasket for kinescope mounting straps (Model (5 req'd)
76622	Glass—Safety glass
37396	Grommet—Rubber grommet for speaker mounting for Models 21T218, 21T227, 21T228
74308	Hinge—Cabinet door hinge (1 set) for Models 21T227, 21T228, 21T229
76596	Knob—Brightness control or vertical hold control knob—beige—for blonde mahogany or oak instruments (outer)
76595	Knob—Brightness control or vertical hold control knob—maroon—for mahogany or walnut instruments (outer)
76625	Knob—Brightness control or vertical hold control knob—tan—for maple instruments (outer)
76594	Knob—Channel selector knob—beige—for blonde mahogany or oak instruments (inner)
76593	Knob—Channel selector knob—maroon—for mahogany or walnut instruments (inner)
76624	Knob—Channel selector knob—tan—for maple instruments (inner)
76592	Knob—Fine tuning control knob—beige—for blonde mahogany or oak instruments (outer)
76591	Knob—Fine tuning control knob—maroon—for mahogany or walnut instruments (outer)
76623	Knob—Fine tuning control knob—tan—for maple instruments (outer)
75464	Knob—Picture control, horizontal hold control or volume control and power switch knob—beige—for blonde mahogany or oak instruments (inner)
74963	Knob—Picture control, horizontal hold control or volume control and power switch knob—maroon—for mahogany or walnut instruments (inner)
74001	Knob—Picture control, horizontal hold control or volume control and power switch knob—tan—for maple instruments (inner)
76598	Knob—Tone control and phono switch knob—beige—for blonde mahogany or oak instruments (outer)
76597	Knob—Tone control and phono switch knob—maroon—for mahogany or walnut instruments (outer)
76626	Knob—Tone control and phono switch knob—tan—for maple instruments (outer)
11765	Lamp—Channel marker escutcheon lamp—Mazda #51
76589	Mask—Channel marker escutcheon light mask—beige—for blonde mahogany, maple or oak instruments
75459	Mask—Channel marker escutcheon light mask—burgundy—for mahogany or walnut instruments
77036	Mask—Polystyrene masking panel for kinescope
77567	Mask—Polystyrene masking panel for kinescope (Model 21T207)
77678	Mask—Polystyrene masking panel (Model 21T207G)
76177	Nut—#10-32 special nut for deflection yoke hood support rods (2 req'd)
77013	Nut—Speednut for fastening emblem to cabinet
73634	Nut—Speednut for speaker mounting screws for Models 21T218, 21T227, 21T228, 21T229
76601	Pad—Kinescope edge support pad (4 req'd)
77016	Pull—Cabinet door pull for Model 21T217
77017	Pull—Cabinet door pull for Model 21T227
77021	Pull—Cabinet door pull for Model 21T228
76628	Rod—"L" shape threaded rod to support deflection yoke hood assembly
77681	Rod—"L" shaped threaded rod for deflection yoke hood assembly (Model 21T207G)
76632	Screw—#8 x ⅜" hex head screw (wood) for kinescope support bracket or basket brackets
74113	Screw—#8-32 x 1" trimit head screw for door pull for Model 21T227
74269	Screw—#8-32 x ¾" trimit head screw for door pull for Instruments
77682	Screw—#12 x 2" hex head Type "A" tapping screw (steel) for fastening kinescope mounting straps (Model 21T207G)
76808	Sleeve—Polyethlene sleeve for insulating hi-voltage lead (Model 21T207G)
73643	Spring—Channel marker escutcheon spring clip
76630	Spring—Formed spring for kinescope masking panel (6 req'd)
77006	Spring—Retaining spring for deflection yoke hood support rod nut
30330	Spring—Retaining spring for knobs #74001, 74963 and 75464
72845	Spring—Retaining spring for knobs #76591, 76592, 76623
76837	Spring—Retaining spring for knobs #76593, 76594, 76595, 76596, 76597, 76598, 76624, 76625 and 76626
74936	Spring—Suspension spring for kinescope socket lead
72936	Stop—Cabinet door stop for Models 21T227, 21T228, 21T229
77675	Strap—Top or bottom mounting strap for mounting kinescope (Model 21T207G)
77023	Washer—Cellulose washer—gold—for knobs
77569	Washer—Cellulose washer—maroon—for knobs (Models 21T207 and 21T207G)
75458	Washer—Felt washer—beige—between knob and channel marker escutcheon for blonde or oak instruments
75457	Washer—Felt washer—dark brown—between knob and channel marker escutcheon for mahogany or walnut instruments
75523	Washer—Felt washer—tan—between knob and channel marker escutcheon for maple instruments
75500	Washer—Felt washer for kinescope masking panel or back cover mounting screws

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

RCA VICTOR

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

GENERAL DESCRIPTION

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

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.

Picture I-F Carrier Frequency . . . . . 25.50 mc.

Sound I-F Carrier Frequency . . . . . 21.00 mc. and 4.5 mc.

VIDEO RESPONSE . . . . . To 3.2 mc.

SWEEP DEFLECTION . . . . . Magnetic

FOCUS . . . . . Magnetic

POWER SUPPLY RATING . . . . . 115 volts, 60 cycles

21-T-242 . . . . . 190 watts max.

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	163 lbs.	207 lbs.
21-T-244	186 lbs.	232 lbs.

RECEIVER ANTENNA INPUT IMPEDANCE
Choice: 300 ohms balanced or 72 ohms unbalanced.

RCA TUBE COMPLEMENT

	Tube Used	Television Chassis	Function
(1)	RCA 6CB6		R-F Amplifier
(2)	RCA 6J6		R-F Oscillator and Mixer
(3)	RCA 6CB6		1st Picture I-F Amplifier
(4)	RCA 6CB6		2nd Picture I-F Amplifier
(5)	RCA 6CB6		3rd Picture I-F Amplifier
(6)	RCA 12AU7		Picture 2nd Detector and Vert. Sync. Sep.
(7)	RCA 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		1st 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		Kinescope
(22)	RCA 5U4G		Rectifier
(23)	RCA 5Y3GT		Rectifier

Radio Chassis RC1111B

(1)	RCA 6CB6	R-F Amplifier
(2)	RCA 6J6	Oscillator and Mixer
(3)	RCA 6BA6	I-F Amplifier
(4)	RCA 6AU6	FM Driver
(5)	RCA 6AL5	Ratio Detector
(6)	RCA 6AV6	AM 2nd Det. and 1st Audio Amp.

RCA TUBE COMPLEMENT

Tube Used	Radio Chassis 1117B	Function
(1) RCA 12BE6		Converter
(2) RCA 12BA6		I-F Amplifier
(3) RCA 6AQ6		2nd Det. and Audio Amp.
(4) RCA 6AQ6		Phase Inverter
(5) RCA 35C5		Audio Output (2 tubes)

Audio Chassis RS141C

(1) RCA 6C4	Phase Inverter
(2) RCA 6V6GT	Audio Output (2 tubes)
(3) RCA 5Y3GT	Rectifier

HORIZONTAL SWEEP FREQUENCY ..... 15,750 cps

VERTICAL SWEEP FREQUENCY ..... 60 cps

FRAME FREQUENCY (Picture Repetition Rate) .. 30 cps

SCANNING ..... Interlaced, 525 line

OPERATING CONTROLS (Front)

Channel Selector, Fine Tuning	Dual Control Knobs
Picture Brightness	Dual Control Knobs
Picture Horizontal Hold, Picture Vertical Hold	Dual Control Knobs
Sound Volume and On-Off Switch, TV Tone Switch	Dual Control Knobs

NON-OPERATING CONTROLS (not including R-F and I-F adjustments)

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 adjustment
Deflection Coil	top chassis wing nut adjustment
AGC Control	rear chassis adjustment

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 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.

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.

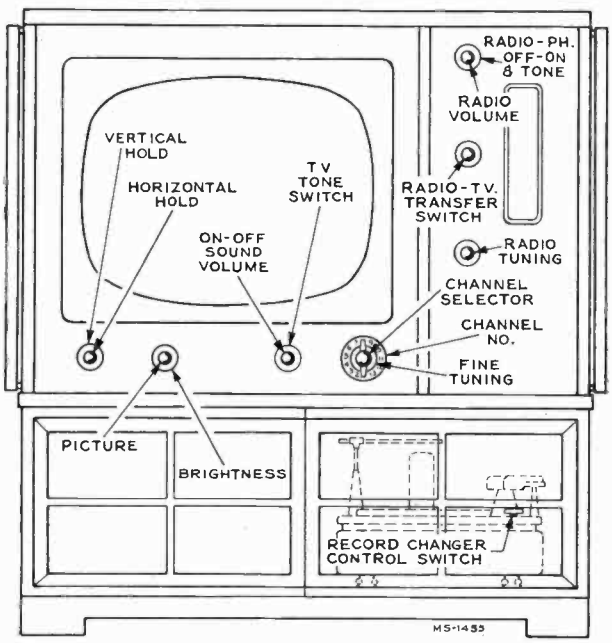


Figure 1—21T242 Operating Controls

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

1. 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.

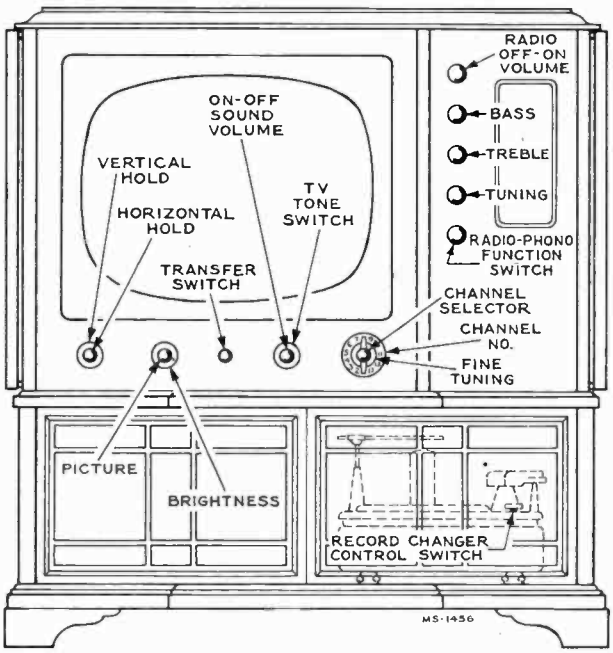


Figure 2—21T244 Operating Controls

REFER TO PAGES 236 TO 249 FOR TELEVISION ALIGNMENT PROCEDURE AND WAVE FORM PHOTOGRAPHS

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.

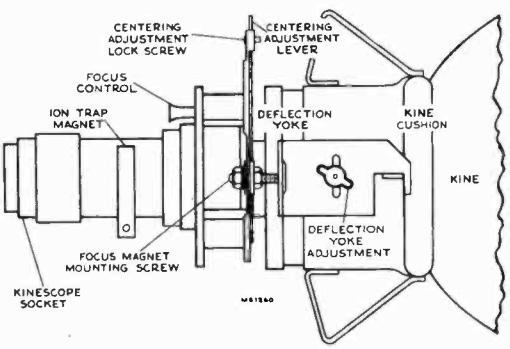


Figure 3—Yoke and Focus Magnet Adjustments

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 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 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

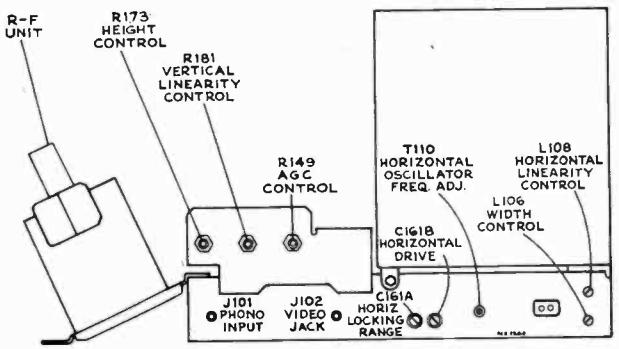


Figure 4—Rear Chassis Adjustments

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 C161A slightly clockwise. If less than 2 bars are present, adjust C161A 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 counter-clockwise 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 (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 5. Adjustment for channel 13 is on top of the chassis.

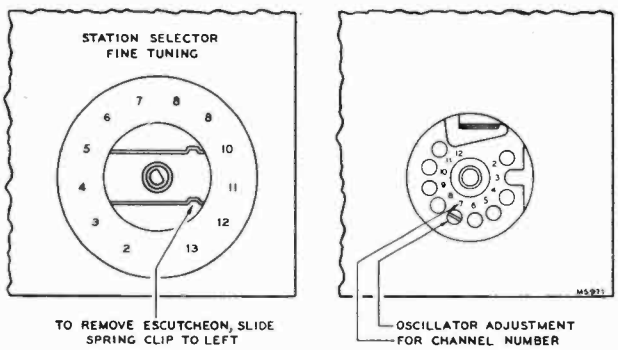


Figure 5—R-F Oscillator Adjustments

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 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 R149 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 L203 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.

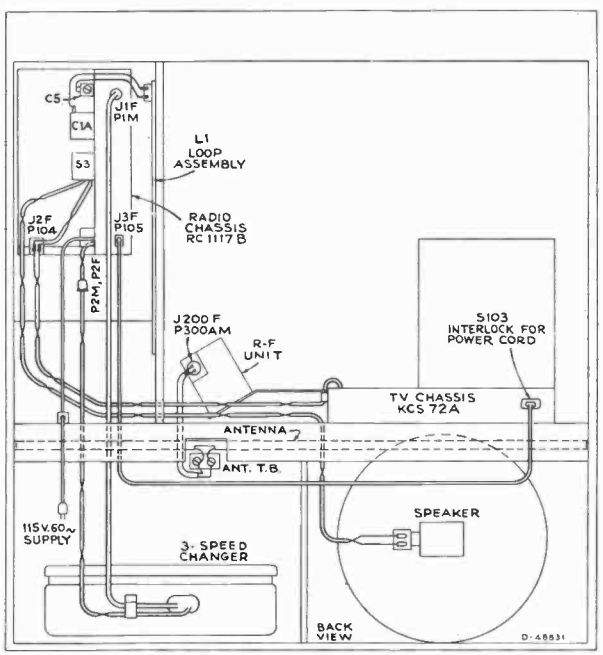


Figure 6—Model 21T242 Cable Diagram

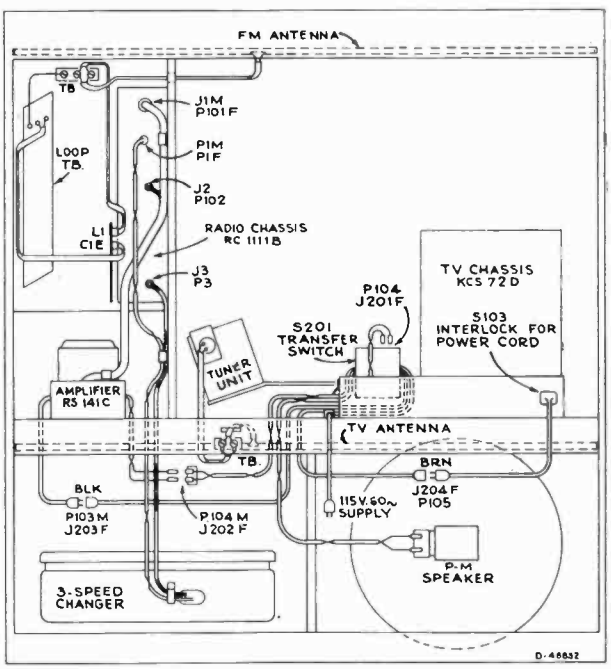


Figure 7—Model 21T244 Cable Diagram

TELEVISION CHASSIS TOP VIEW

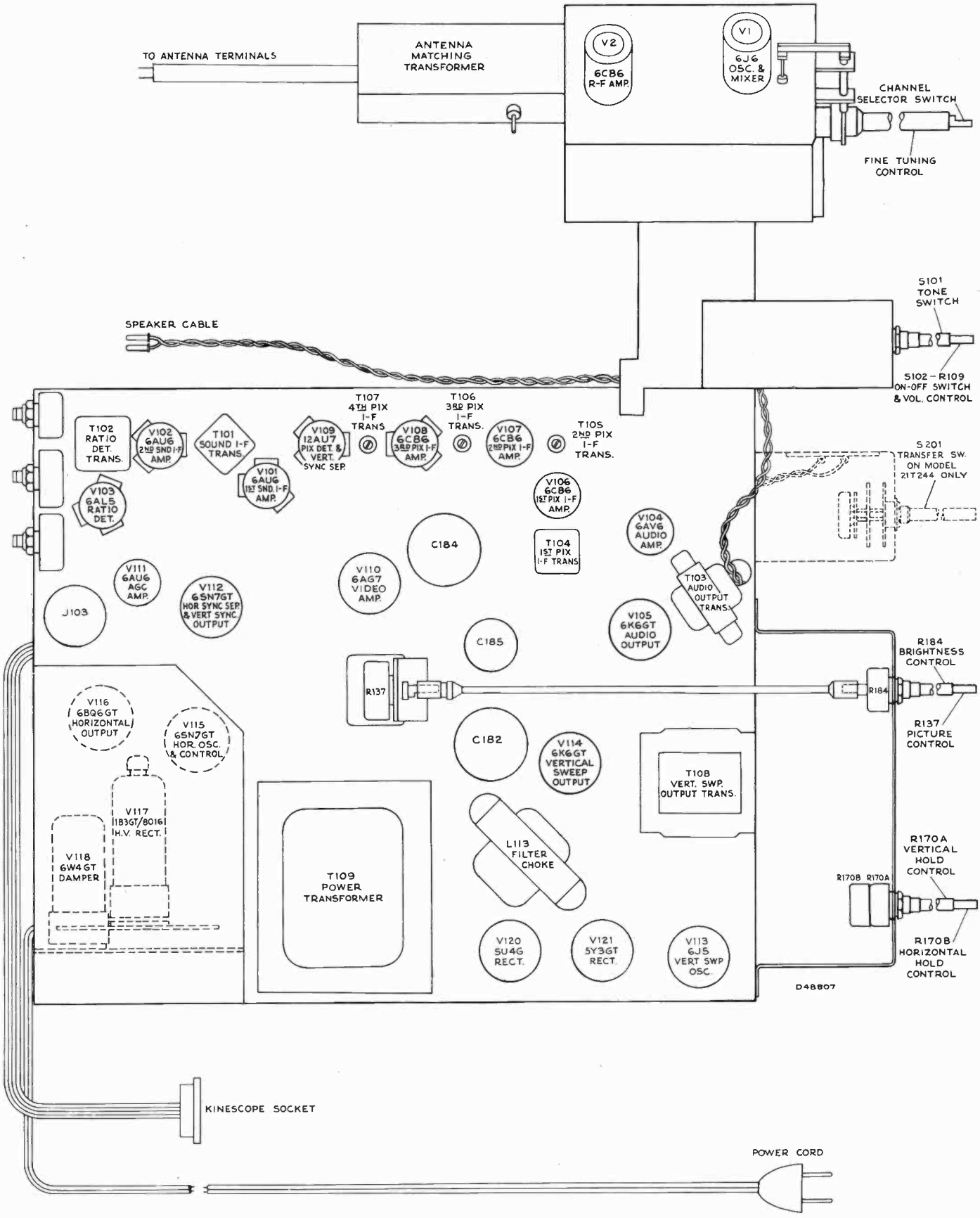


Figure 8—Television Chassis Top View

TELEVISION CHASSIS BOTTOM VIEW 21T242, 21T244

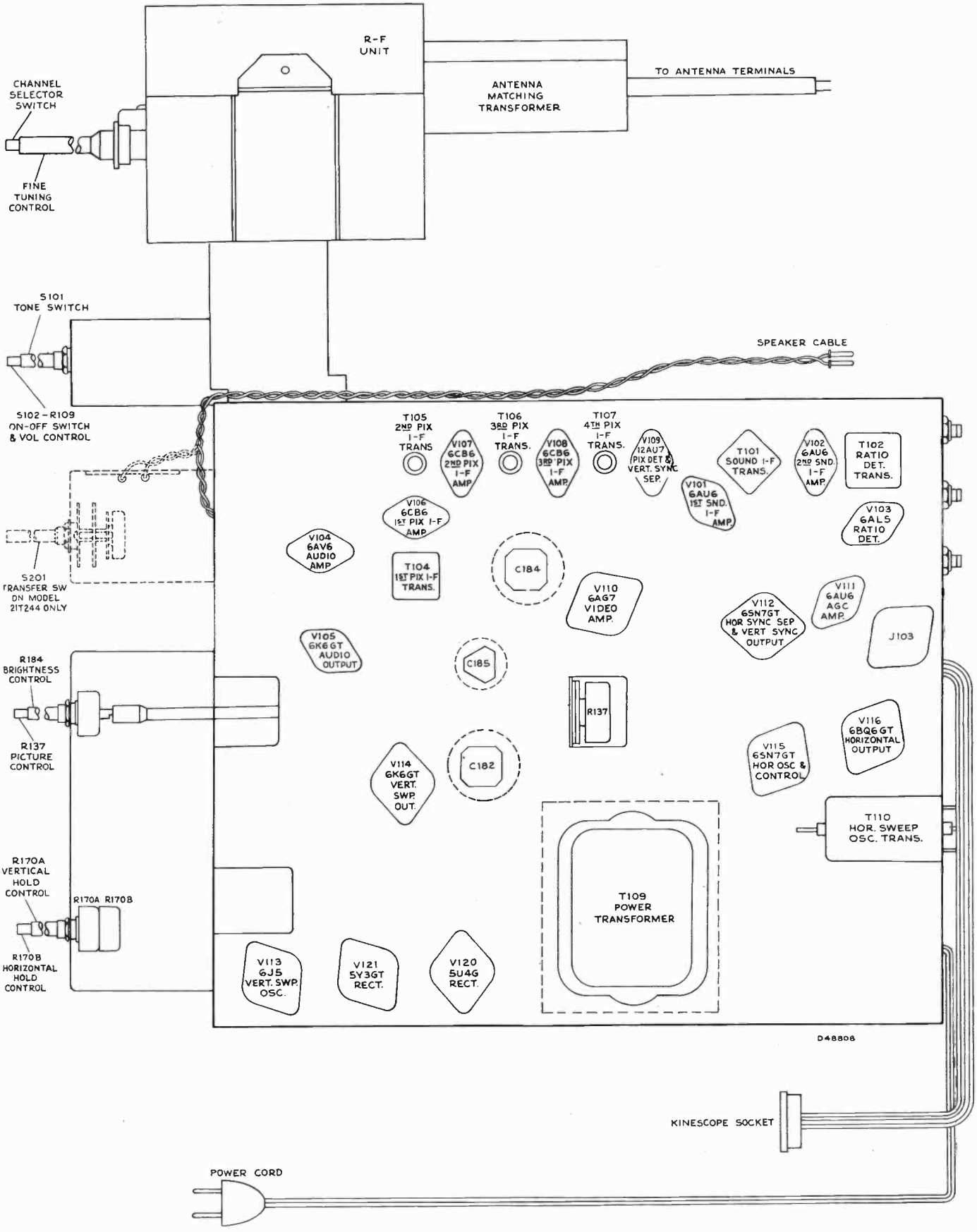


Figure 9—Television Chassis Bottom View

21T242

RADIO SCHEMATIC DIAGRAM

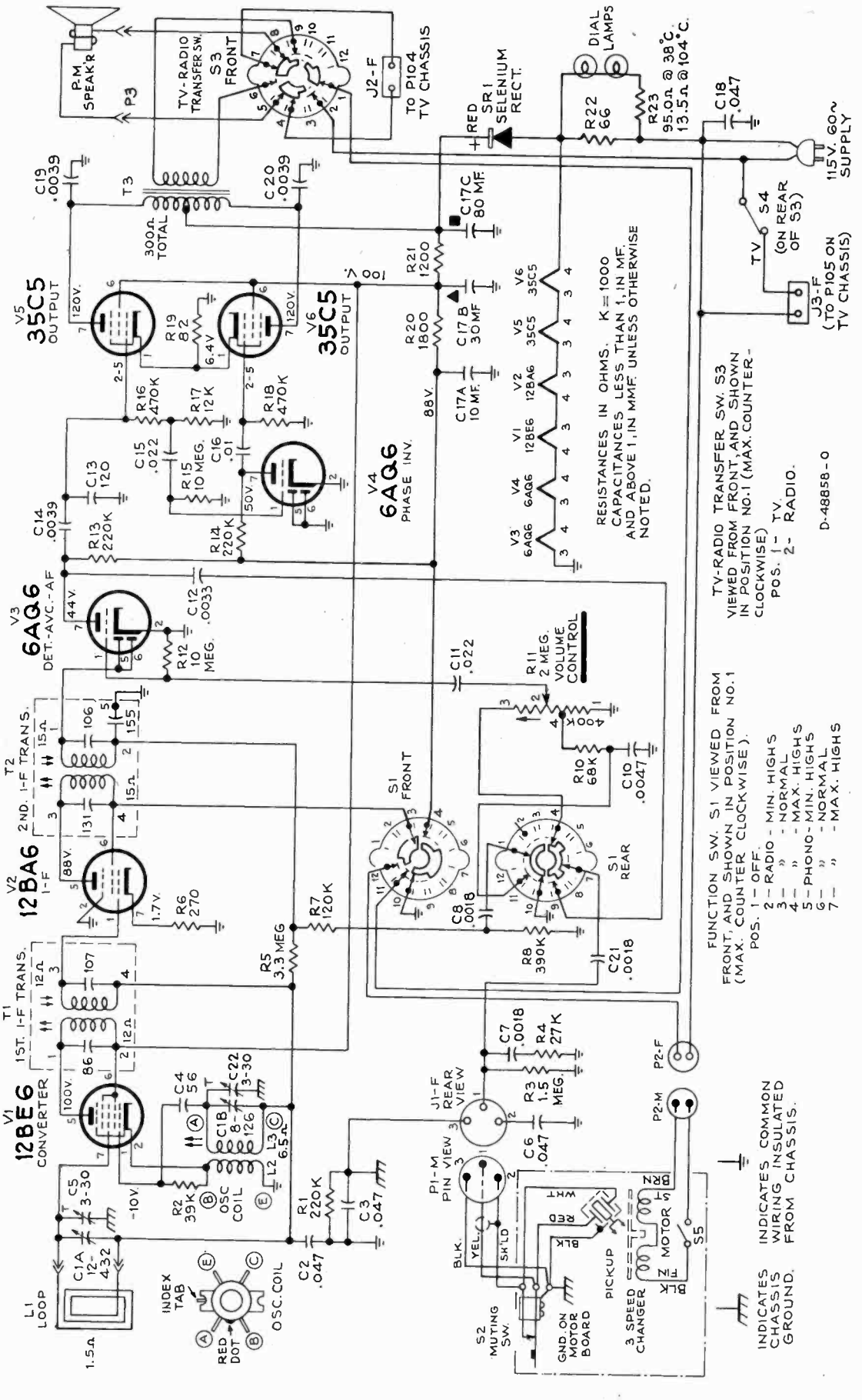


Figure 10— Radio Schematic Diagram

Chassis RC1117B

Critical Lead Dress

1. Dress C15 (.022 mfd. at grid of phase inverter) over tube socket away from filament leads.
2. Keep all filament leads close to chassis.
3. Keep leads of R26 (270 ohms at I-F amplifier cathode) short as possible.
4. 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 counter-clockwise (plates fully meshed). Adjust indicator pointer so that it is $3^{15}/_{16}$" from the left hand edge of the dial back plate.

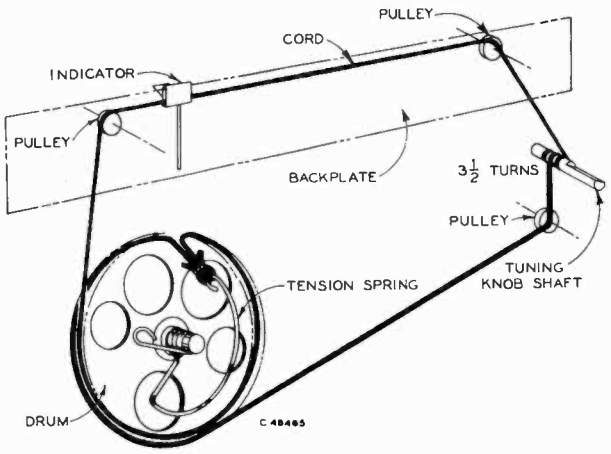


Figure 11—Dial Cord and Drive

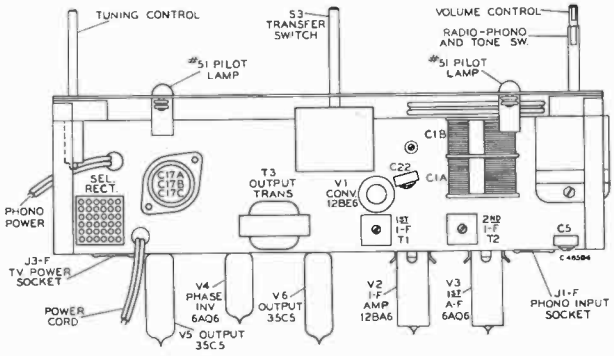


Figure 12—Chassis Top View

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 following for max. output
1	I-F grid, in series with .1 mfd.	455 kc	Quiet point 1,600 kc end of dial	Pri. & Sec. 2nd I-F transformer
2	Converter grid in series with .1 mfd.			Pri. & Sec. 1st I-F transformer
NOTE.—ANTENNA LOOP AND RECORD CHANGER MUST BE IN CABINET FOR THE FOLLOWING				
3	Short wire placed near loop for radiated signal	1,620 kc	Extreme R. H. end (gang open)	C1B-T (osc.)
4		1,400 kc	1,400 kc	C5 (ant.)
5	Repeat steps 3 & 4 if necessary			

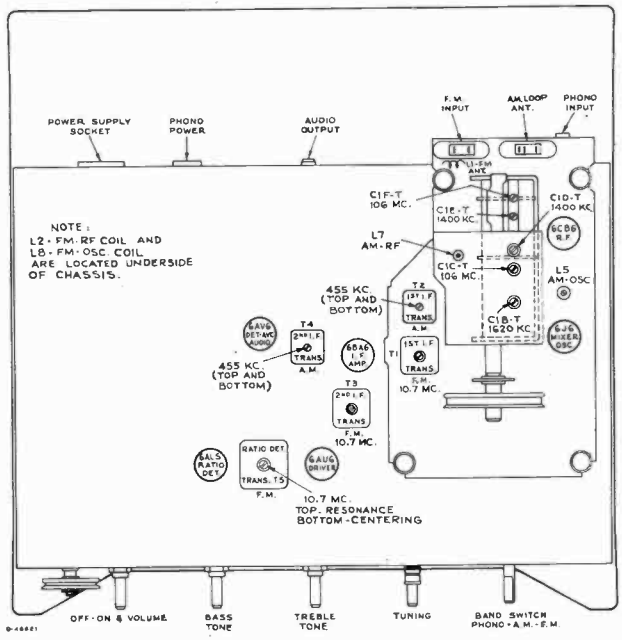


Figure 13—RC1111A Chassis Top View

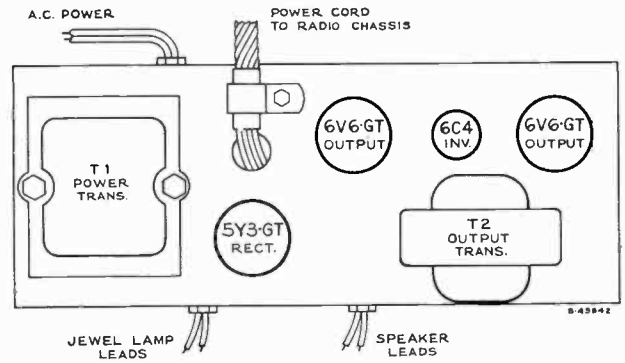


Figure 14—RS141C Chassis Top View

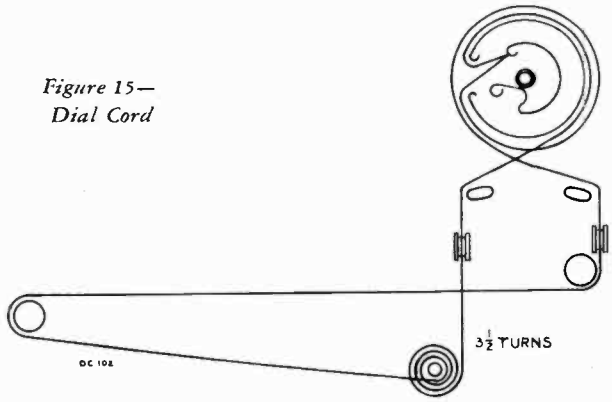


Figure 15—Dial Cord

CRITICAL LEAD DRESS

1. The 1st FM i-f plate lead should be dressed away from the r-f amp plate.
2. Dress the 1st AM i-f plate lead to the S2 wafer away from the AM r-f coil.
3. Dress the a-c power switch wires away from all audio components.
4. 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.
7. 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.

21T244

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. 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 necessary making final adjustment with input set to give approx. —4.0 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 terminals through 120 ohms in each side of line.	90 mc. 22.5 kc. FM mod.	FM	88 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.				
12	Connect a scope to junction R33 and C35, check response and linearity. Peak 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

Steps	Connect the High Side of the Test Osc. to—	Tune Test Osc. to—	Function Switch	Turn Radio Dial to—	Adjust the following
13	External radiating loop and couple loosely to receiver loop.	1,620 kc.	AM	Min. capacity	*Osc. C1-BT for maximum output.
14		1,400 kc.	AM	Tune to signal	*C1-DT and C1-ET for max. output.
15		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.
17	Repeat steps 13, 14, 15 and 16 until 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.	AM	FM	Phono
V1 6CB6 R-F Amp	Plate	5	215	180	—
	Screen	6	74	62	—
	Cathode	2	0.4	0.4	—
	Grid	1	—0.8	0.4	—
V2 6J6 Osc. and Mixer	Plate	2	55	58	—
	Grid	5	—1.2	—1.3	—
	Plate	1	43	46	—
	Grid	6	—2.0	—1.2	—
V3 6BA6 I-F Amp	Plate	5	210	210	—
	Screen	6	126	115	—
	Cathode	7	0.9	0.7	—
	Grid	1	—0.8	—0.2	—
V4 6AU6 Driver	Plate	5	216	216	—
	Screen	6	150	150	—
	Cathode	7	1.5	1.5	—
	Grid	1	0	0	—

Tube Type and Function	Tube Element	Pin No.	AM	FM	Phono
V5 6AL5 Ratio Det.	—	—	—	—	—
	—	—	—	—	—
V6 6AV6 Audio Amp.	Plate	7	88	88	104
	Grid	1	—0.7	—0.7	—0.8
V102 6C4 Phase Inverter	Plate	5	87.5	88	120
	Cathode	7	—11	—11	—13
	Grid	6	—16	—16	—19
V103 6V6GT V104 6V6GT Audio Power Output	Plate	3	300	300	298
	Screen	4	224	224	292
	Cathode	8	0	0	0
	Grid	5	—17	—17	—21
V101 5Y3GT Rectifier	Fil.	8	305	305	307

RADIO SCHEMATIC DIAGRAM

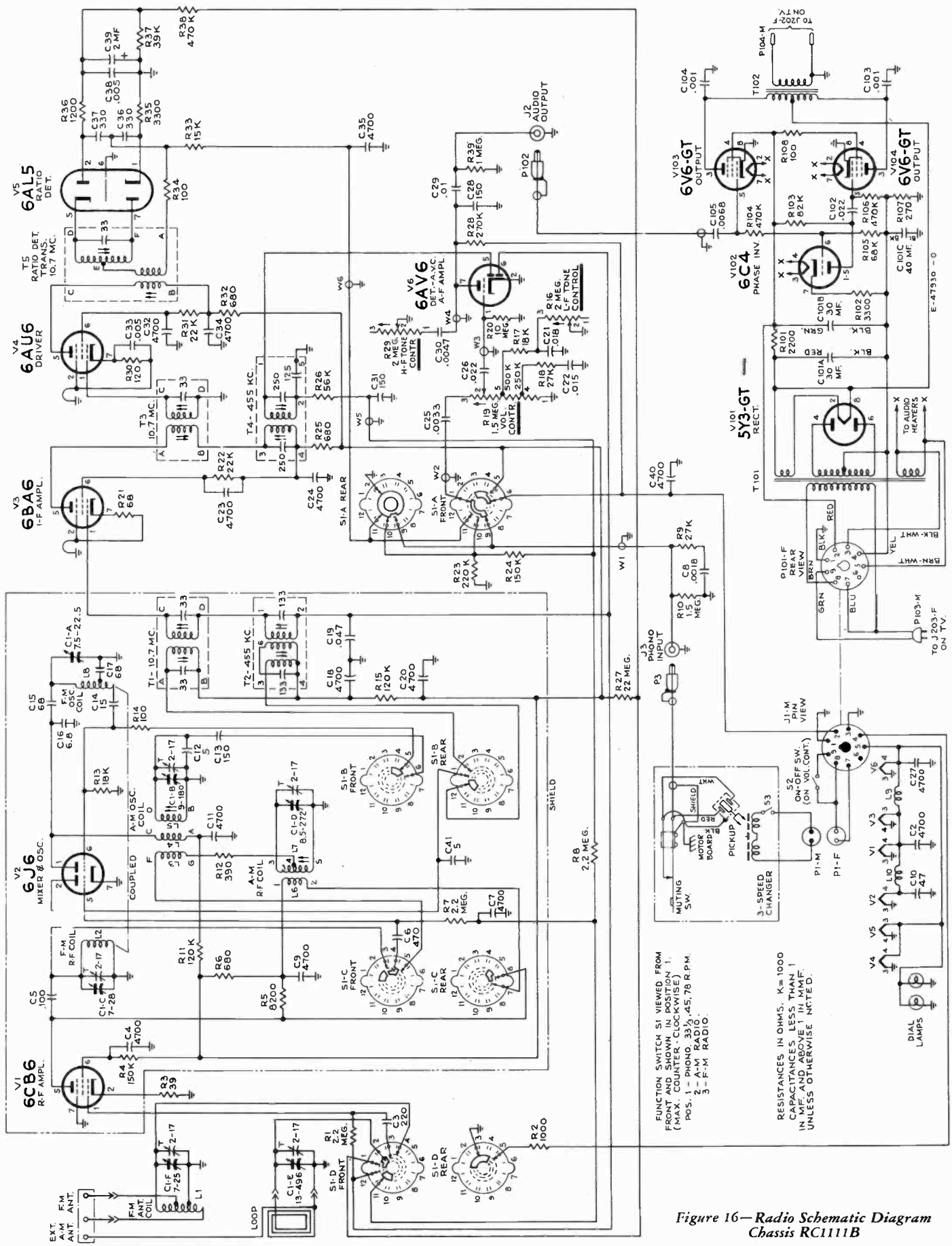


Figure 16—Radio Schematic Diagram Chassis RC1111B

21T242, 21T244

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 No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V1	6J6	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
V1	6J6	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	
V101	6AU6	1st 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.
V103	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	1st 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	1st Pix. I-F Amplifier	15000 Mu. V. Signal	5	246	6	258	2	<0.1	1	—8.6	
			No Signal	5	108	6	108	2	0.7	1	*—0.2	*Unreliable measuring point. Make measurement at T104-B
V107	6CB6	2nd Pix. I-F Amplifier	15000 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	
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

CHASSIS WIRING DIAGRAM KCS72D-1

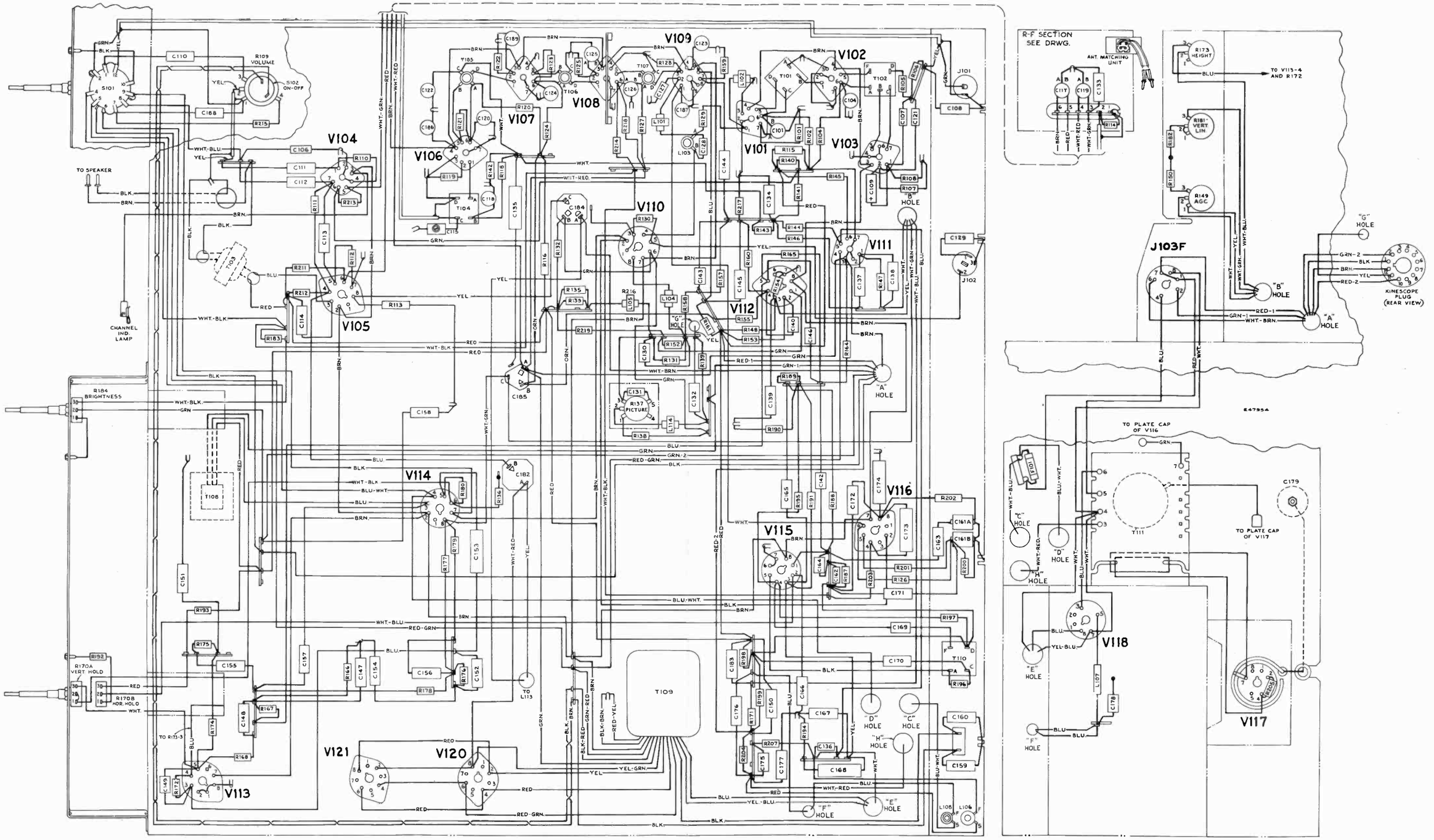


Figure 18—Chassis Wiring Diagram, KCS72D-1

TELEVISION VOLTAGE CHART

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	
V110	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	
			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	Cap	*	—	—	2 & 7	14,000	—	—	*High Voltage Pulse Present
			No Signal	Cap	*	—	—	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	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	—	—	

R-F UNIT WIRING DIAGRAM

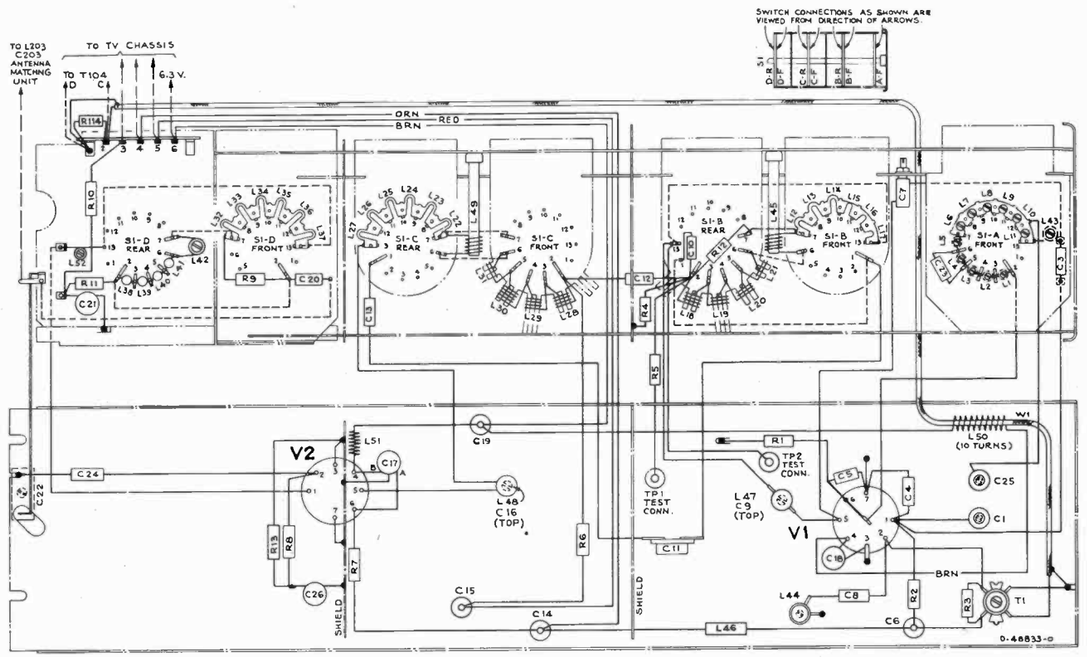


Figure 17—R-F Unit Wiring Diagram

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 C118, C120, C122, C124, C126, R114, R121 and R123 as short and direct as possible.
3. Do not run any leads under C115 trimmer capacitor.
4. Dress C118 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 ¼ 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.
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

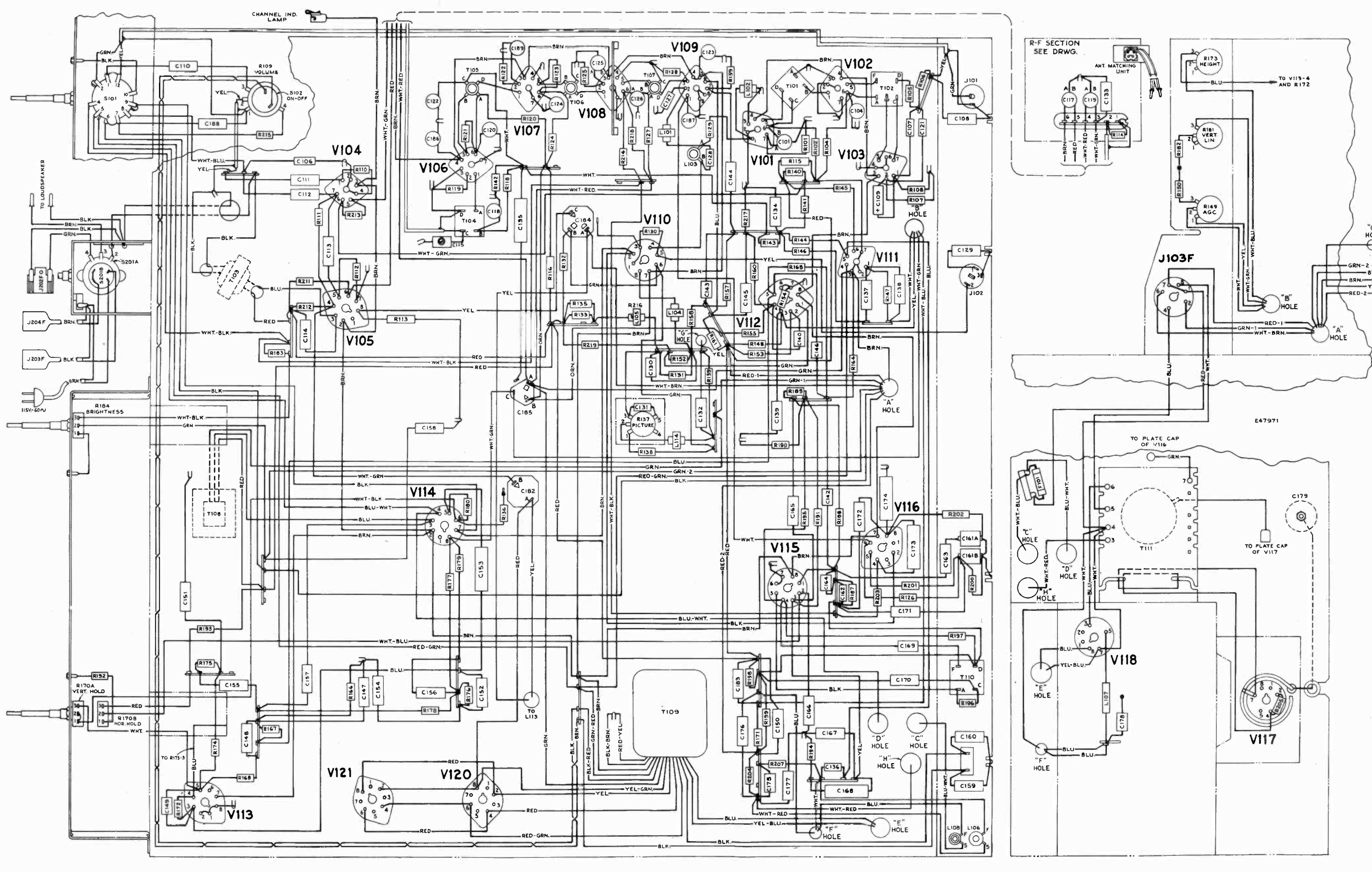
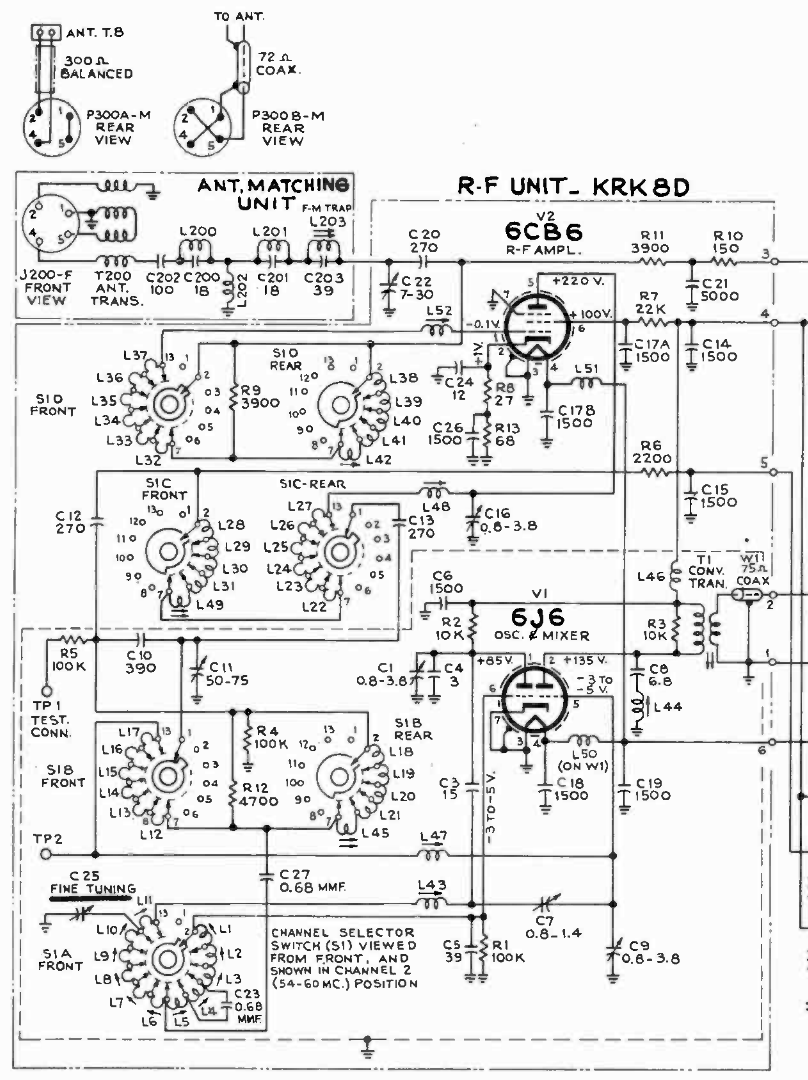
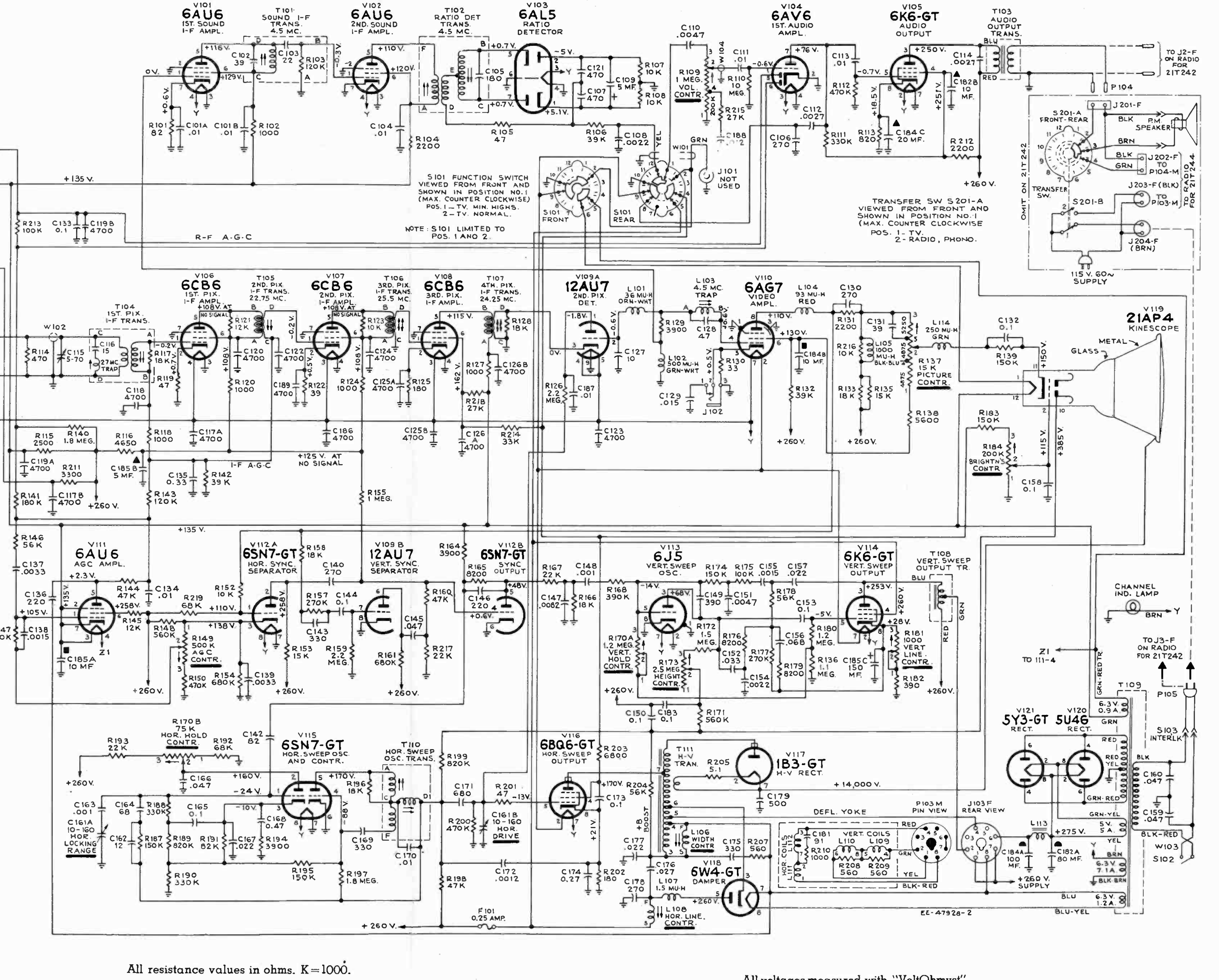


Figure 19—Chassis Wiring Diagram, KCS72D-2

TELEVISION CIRCUIT SCHEMATIC DIAGRAM





PRODUCTION CHANGES IN KCS72D-1, KCS72D-2

The schematic is shown in the latest condition. The notes below tell how early receivers differed from the schematic shown above.

In some receivers, R172, at pin 3 of V113, was 1.2 megohms.

In some receivers, R182, connected between terminal 1 of R181 vertical linearity control and ground, was 470 ohms.

REFER TO PAGES 236 TO 249 FOR TELEVISION ALIGNMENT PROCEDURE AND WAVE FORM PHOTOGRAPHS

All resistance values in ohms. K=1000.

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 ±20% with 117 v. a-c supply.

Figure 20—Television Circuit Schematic Diagram

STOCK No.	DESCRIPTION
	R-F UNIT ASSEMBLIES KRK-8D
75188	Board—Terminal board, 5 contact and ground
76845	Bracket—Vertical bracket for holding oscillator tube shield
75201	Cable—75 ohm coax cable (7¼") complete with coil (W1, L50)
76965	Capacitor—Ceramic, variable, for fine tuning—plunger type (C25)
75172	Capacitor—Tubular, steatite, adjustable, 0.65—1.2 mmf. (C7)
71504	Capacitor—Ceramic, 0.68 mmf. (C23)
71088	Capacitor—Headed lead, 0.68 mmf. (C27)
75184	Capacitor—Ceramic, adjustable, 0.75—4 mmf., complete with adjusting stud (C1)
76968	Capacitor—Ceramic, 3 mmf. (C4)
75197	Capacitor—Ceramic, 6.8 mmf. (C8)
75189	Capacitor—Adjustable, 7-30 mmf. (C22)
75200	Capacitor—Ceramic, 12 mmf. (C24)
45465	Capacitor—Ceramic, 15 mmf. (C3)
75196	Capacitor—Ceramic, 39 mmf. (C5)
75174	Capacitor—Ceramic, trimmer—50-75 mmf. (C11)
75199	Capacitor—Ceramic, 270 mmf. (C12, C13, C20)
75641	Capacitor—Ceramic, 390 mmf. (C10)
75166	Capacitor—Ceramic, 1500 mmf. (C6, C14, C15, C19)
73748	Capacitor—Ceramic, 1500 mmf. (C18, C26)
75089	Capacitor—Ceramic, dual 1500 mmf. (C17A, C17B)
73473	Capacitor—Ceramic, 5000 mmf. (C21)
76143	Clip—Tubular clip for mounting stand-off capacitors
73477	Coil—Choke coil (L51)
75202	Coil—Choke coil, .56 muh (L46)
75185	Coil—Converter plate loading coil (L44)
75182	Coil—Trimmer coil (1½ turns) with adjustable inductance core and capacitor stud (screw adjustment) for converter section (C9, L47)
75183	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f section (L48, C16)
76460	Contact—Test point contact
76966	Core—Adjustable core for fine tuning capacitor
75162	Detent—Detent mechanism and fibre shaft
73453	Form—Coil form for L45, L49
75165	Link—Link assembly for fine tuning
76518	Plate—Front plate and shaft bearing
	Resistor—Fixed, composition:—
503027	27 ohms, ±10%, ½ watt (R8)
503068	68 ohms, ±10%, ½ watt (R13)
503115	150 ohms, ±10%, ½ watt (R10)
503222	2200 ohms, ±10%, ½ watt (R6)
503239	3900 ohms, ±10%, ½ watt (R9, R11)
503247	4700 ohms, ±10%, ½ watt (R12)
502310	10,000 ohms, ±10%, ½ watt (R3)
503310	10,000 ohms, ±10%, ½ watt (R2)
503322	22,000 ohms, ±10%, ½ watt (R7)
503410	100,000 ohms, ±10%, ½ watt (R1, R4, R5)
14343	Retainer—Fine tuning shaft retaining ring
75164	Rod—Actuating plunger rod (fibre) for fine tuning link
71476	Screw—#4-40 x ¼" adjusting screw for L6, L7, L8, L9, L10, L11
75177	Screw—#4-40 x ⅜" adjusting screw for L1, L2, L3, L4, L43
75176	Screw—#4-40 x 7/16" adjusting screw for L5
73640	Screw—#4-40 x 7/16" adjusting screw for L52
74575	Screw—#4-40 x .359" adjusting screw for L42
76519	Shaft—Channel selector shaft and plate
76134	Shaft—Fine tuning shaft and cam
76962	Shield—Oscillator and converter sections shield—snap-on type
76967	Shield—Tube shield for V1, V2
75088	Socket—Tube socket, 7 contact, miniature, ceramic, saddle-mounted
75191	Spacer—Insulating spacer for front plate
75163	Spring—Friction spring (formed) for fine tuning cam
30340	Spring—Hair pin spring for fine tuning link
74578	Spring—Retaining spring for adjusting screws
76961	Spring—Retaining spring for oscillator tube shield
73457	Spring—Return spring for fine tuning control
75180	Stator—Antenna stator complete with rotor, coils, capacitors (C20, C21) and resistors (R9, R10, R11) (S1-4, C20, C21, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L52, R9, R10, R11)
77459	Stator—Converter stator complete with rotor, coils, capacitors (C10, C12) and resistors (R4, R5, R12) (S1-2, C10, C12, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L45, R4, R5, R12)
76963	Stator—Oscillator section stator complete with rotor, segment, coils, adjusting screws and capacitors (C3, C23) (S1-1, C3, C23, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L43)
76964	Stator—R-F amplifier stator complete with rotor, coils, capacitor (C13) and resistor (R6) (S1-3, C13, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L49, R6)
75170	Strip—Coil segment mounting strip—L.H. lower
75171	Strip—Coil segment mounting strip—L.H. upper—less trimmer C7
75169	Strip—Coil segment mounting strip—R.H. center
75446	Stud—Capacitor stud—brass—#4-40 x 3/16" with 3/64" screw driver slot for trimmer coils L47, L48 and capacitor C1 uncoded and coded "ER"
75447	Stud—Capacitor stud—brass—#4-40 x 3/16" with 3/64" screw driver slot for trimmer coils L47, L48 and capacitor C1 coded numerically and "Hi-Q"
75173	Stud—#6-32 x 13/16" adjusting stud for trimmer C7
75181	Transformer—I-F converter transformer (T1)
75607	Washer—Insulating washer (hex)
75190	Washer—Insulating washer (neoprene) for trimmer C7
	CHASSIS ASSEMBLIES KCS72D1—Model 21T242 KCS72D2—Model 21T244
76456	Bracket—Channel indicator lamp bracket
76454	Bracket—Mounting bracket complete with insulator for picture control
33098	Capacitor—Ceramic, 10 mmf. (C127)
75217	Capcitor—Mica, trimmer, dual 10-160 mmf. (C161A, C161B)
33380	Capacitor—Ceramic, 12 mmf. (C162)
75450	Capacitor—Ceramic, 39 mmf. (C203)
73664	Capacitor—Ceramic, 39 mmf. (C131)
76475	Capacitor—Mica, 68 mmf. (C164)
76474	Capacitor—Mica, 82 mmf. (C142)
75437	Capacitor—Ceramic, 100 mmf. (C202)
39630	Capacitor—Mica, 120 mmf. (C130)
75248	Capacitor—Mica, 220 mmf. (C146)
76673	Capacitor—Ceramic, 220 mmf. (C136)
47617	Capacitor—Ceramic, 270 mmf. (C106)
76579	Capacitor—Mica, 270 mmf. (C140, C178)
76476	Capacitor—Mica, 330 mmf. (C169, C175)
39640	Capacitor—Mica, 330 mmf. (C143)
73094	Capacitor—Mica, 390 mmf. (C149)
39644	Capacitor—Mica, 470 mmf. (C107, C121)
76461	Capacitor—Ceramic, 500 mmf., 20,000 volts (C179)
73473	Capacitor—Ceramic, 4700 mmf. (C118, C120, C122, C123, C124, C186, C189)
76990	Capacitor—Ceramic, dual 4700 mmf. (C117A, C117B) C119A, C119B, C125A, C125B, C126A, C126B)
76991	Capacitor—Ceramic, dual 10,000 mmf. (C101A, C101B)
73960	Capacitor—Ceramic, 10,000 mmf. (C104, C187)
74521	Capacitor—Electrolytic, 5 mfd., 50 volts (C109)
71496	Capacitor—Adjustable, mica, 5-70 mmf. (C115)
75218	Capacitor—Electrolytic, comprising 1 section of 10 mfd., 350 volts, 1 section of 5 mfd., 350 volts and 1 section of 150 mfd., 50 volts (C185A, C185B, C185C)
76987	Capacitor—Electrolytic comprising 1 section of 80 mfd., 400 volts and 1 section of 10 mfd., 350 volts (C182A, C182B)
76970	Capacitor—Electrolytic comprising 1 section of 100 mfd., 400 volts and 1 section of 10 mfd., 350 volts and 1 section of 20 mfd., 50 volts (C184A, C184B, C184C)
76479	Capacitor—Tubular, moulded paper, oil impregnated, .00068 mfd., 600 volts (C171)
75643	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 1000 volts (C148, C163)
76995	Capacitor—Tubular, moulded paper, oil impregnated, .0012 mfd., 600 volts (C172)
76508	Capacitor—Tubular, paper, oil impregnated, .0015 mfd., 600 volts (C138)
77123	Capacitor—Tubular, moulded paper, oil impregnated, .0015 mfd., 1000 volts (C155)
73595	Capacitor—Tubular, paper, oil impregnated, .0022 mfd., 600 volts (C108, C154)
73599	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 600 volts (C112)
73818	Capacitor—Tubular, paper, oil impregnated, .0027 mfd., 1600 volts (C114)
73795	Capacitor—Tubular, paper, oil impregnated, .0033 mfd., 600 volts (C137, C139)
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C110, C151)
73808	Capacitor—Tubular, paper, oil impregnated, .0082 mfd., 1000 volts (C147)
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 400 volts (C111, C113, C134)
73594	Capacitor—Tubular, moulded paper, oil impregnated, .01 mfd., 600 volts (C170)
74938	Capacitor—Tubular, paper, oil impregnated, .012 mfd., 200 volts (C188)
73797	Capacitor—Tubular, paper, oil impregnated, .015 mfd., 600 volts (C129)
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 400 volts (C167)
73798	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 600 volts (C157)
73810	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 1000 volts (C177)
73811	Capacitor—Tubular, paper, oil impregnated, .027 mfd., 1000 volts (C176)
73596	Capacitor—Tubular, paper, oil impregnated, .033 mfd., 1000 volts (C152)
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C145, C166)
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts (C159, C160)
73792	Capacitor—Tubular, paper, oil impregnated, .068 mfd., 400 volts (C156)
73784	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 200 volts (C132, C133)

STOCK No.	DESCRIPTION
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C144, C150, C158, C165, C183)
73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C153, C173)
73786	Capacitor—Tubular, paper, oil impregnated, 0.27 mfd., 200 volts (C174)
76994	Capacitor—Tubular, paper, oil impregnated, 0.33 mfd., 200 volts (C135)
73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C168)
76498	Choke—Filter choke (L113)
73591	Coil—Antenna matching coil (2 req'd) (Part of T200)
75241	Coil—Antenna shunt coil (L202)
76442	Coil—Horizontal linearity coil complete with adjustable core (L108)
76640	Coil—Peaking coil (1.5 muh) (L107)
76011	Coil—Peaking coil (36 muh) (L101)
71527	Coil—Peaking coil (93 muh) (L104)
71526	Coil—Peaking coil (250 muh) (L114)
75252	Coil—Peaking coil (500 muh) (L102)
77124	Coil—Peaking coil (1000 muh) (L105, R216)
76441	Coil—Width coil complete with adjustable core (L106)
74594	Connector—2 contact male connector for power cord
38853	Connector—4 contact female connector for antenna transformer (J200)
50367	Connector—6 contact female connector for yoke lead (J103)
75542	Connector—6 contact male connector—part of deflection yoke (P103)
77008	Connector—Anode connector complete with terminal and contact
35787	Connector—Phono input connector (J101)
76457	Connector—Second anode lead connector—mounted on the hi-voltage capacitor
75474	Connector—Single contact male connector for speaker cable
75482	Connector—Video connector (J102)
76975	Control—AGC control (R149)
76444	Control—Brightness control (R184)
76448	Control—Height control (R173)
76974	Control—Horizontal and vertical hold control (R170A, R170B)
76445	Control—Picture control (R137)
76976	Control—Vertical linearity control (R181)
77010	Control—Volume control and power switch (R109, S102)
71498	Core—Adjustable core and stud for FM trap 75449
76986	Cover—Back cover for hi-voltage compartment
76985	Cover—Side cover for hi-voltage compartment
74956	Cushion—Rubber cushion for deflection yoke hood
74839	Fastener—Push fastener for mounting tube socket 76453
73600	Fuse—0.25 amp., 250 volts (F101)
76459	Grommet—Rubber grommet for 2nd. anode lead exit
37396	Grommet—Rubber grommet for mounting tube socket 76453
76654	Hood—Deflection yoke hood less rubber cushions
76480	Lead—Anode lead complete with eyelet
76168	Magnet—Focus magnet
76141	Magnet—Ion trap magnet (P.M. type)
76464	Plate—Hi-voltage plate (bakelite) assembly complete with tube socket and corona ring
76796	Resistor—Wire wound, 5.1 ohms, 1/3 watt (R205)
76639	Resistor—Wire wound, 180 ohms, 2 watts (R202)
76988	Resistor—Wire wound, 820 ohms, 1 watt (R113)
76469	Resistor—Wire wound, 2500 ohms, 10 watts (R115)
76989	Resistor—Wire wound, 4650 ohms, 7 watts (R116)
	Resistor—Fixed, composition:—
503033	33 ohms, ±10%, ½ watt (R130)
502039	39 ohms, ±5%, ½ watt (R122)
502047	47 ohms, ±5%, ½ watt (R119)
503047	47 ohms, ±10%, ½ watt (R105, R201)
503082	82 ohms, ±10%, ½ watt (R101)
502118	180 ohms, ±5%, ½ watt (R125)
503139	390 ohms, ±10%, ½ watt (R182)
503147	470 ohms, ±10%, ½ watt (R114)
513156	560 ohms, ±10%, 1 watt (R207)
503210	1000 ohms, ±10%, ½ watt (R102, R118, R120, R124, R127)
503222	2200 ohms, ±10%, ½ watt (R104, R212)
503233	3300 ohms, ±10%, ½ watt (R211)
523233	3300 ohms, ±10%, 2 watts (R131)
502239	3900 ohms, ±5%, ½ watt (R129, R164)
503239	3900 ohms, ±10%, ½ watt (R194)
503256	5600 ohms, ±10%, ½ watt (R138)
523268	6800 ohms, ±10%, 2 watts (R203)
503282	8200 ohms, ±10%, ½ watt (R176, R179)
513282	8200 ohms, ±10%, 1 watt (R165)
502310	10,000 ohms, ±5%, ½ watt (R107, R108, R123)
503310	10,000 ohms, ±10%, ½ watt (R152)
502312	12,000 ohms, ±5%, ½ watt (R121)
503312	12,000 ohms, ±10%, ½ watt (R145)
503315	15,000 ohms, ±10%, ½ watt (R153)
523315	15,000 ohms, ±10%, 2 watts (R135)
503318	18,000 ohms, ±10%, ½ watt (R128, R158, R166, R196)
523318	18,000 ohms, ±10%, 2 watts (R133)
503322	22,000 ohms, ±10%, ½ watt (R167, R217)
513322	22,000 ohms, 10%, 1 watt (R193)
503327	27,000 ohms, ±10%, ½ watt (R215)
513327	27,000 ohms, ±10%, 1 watt (R218)
513333	33,000 ohms, ±10%, 1 watt (R214)
503339	39,000 ohms, ±10%, ½ watt (R106, R142)
503347	47,000 ohms, ±10%, ½ watt (R144, R160)
512347	47,000 ohms, ±5%, 1 watt (R198)
513347	47,000 ohms, ±10%, 1 watt (R132)
503356	56,000 ohms, ±10%, ½ watt (R146, R185, R204)
512356	56,000 ohms, ±5%, 1 watt (R178)
503368	68,000 ohms, ±10%, ½ watt (R219)
513368	68,000 ohms, ±10%, 1 watt (R192)
513382	82,000 ohms, ±10%, 1 watt (R191)
503410	100,000 ohms, ±10%, ½ watt (R183, R213)
513410	100,000 ohms, ±10%, 1 watt (R175)
30180	120,000 ohms, ±5%, ½ watt (R143)
503415	150,000 ohms, ±10%, ½ watt (R139, R174, R187)
512415	150,000 ohms, ±5%, 1 watt (R195)
502418	180,000 ohms, ±5%, ½ watt (R141)
502427	270,000 ohms, ±5%, ½ watt (R177)
503427	270,000 ohms, ±10%, ½ watt (R157)
503433	330,000 ohms, ±10%, ½ watt (R111, R188)
512433	330,000 ohms, ±5%, 1 watt (R190)
503439	390,000 ohms, ±10%, ½ watt (R168)
503447	470,000 ohms, ±10%, ½ watt (R112, R147, R150, R200)
503456	560,000 ohms, ±10%, ½ watt (R148, R171)
503468	680,000 ohms, ±10%, ½ watt (R154, R161)
503482	820,000 ohms, ±10%, ½ watt (R189, R199)
503510	1 megohm, ±10%, ½ watt (R155)
502511	1.1 megohm, ±5%, ½ watt (R136)
503512	1.2 megohm, ±10%, ½ watt (R180)
503515	1.5 megohm, ±10%, ½ Watt (R172)
11769	1.8 megohm, ±5%, ½ watt (R140)
39063	1.8 megohm, ±5%, 1 watt (R197)
503522	2.2 megohm, ±10%, ½ watt (R126, R159)
503610	10 megohm, ±10%, ½ watt (R110)
71456	Screw—#8-32 x 7/16" wing screw for mounting deflection yoke
76487	Shaft—Connecting shaft (nylon) for picture and brightness controls
73584	Shield—Tube shield for V101, V102, V103, V108
76972	Shield—Tube shield for V109
75718	Socket—Channel indicator lamp socket and leads
74834	Socket—Kinescope socket
31251	Socket—Tube socket, octal, wafer for V105, V112, V113, V116, V120, V121
71508	Socket—Tube socket, 6 pin, moulded for V117
50367	Socket—Tube socket, 6 pin, moulded, saddle-mounted for V118
73117	Socket—Tube socket, 7 pin, wafer miniature for V101, V102, V103, V104, V106, V107, V108, V111
50367	Socket—Tube socket, 8 pin, moulded, saddle-mounted for V114
72627	Socket—Tube socket, 8 pin, steatite saddle-mounted for V115
76971	Socket—Tube socket, 9 pin, wafer miniature for V109
76453	Socket—Tube socket, octal, moulded, saddle mounted for V110
76636	Stud—Adjusting stud complete with guard for focus magnet
77339	Switch—Tone control and phone switch less volume control and power switch (S101)
76463	Terminal—Screw type grounding terminal
76977	Transformer—Antenna matching transformer complete (T200, C200, C201, C202, C203, L200, L201, L202, L203, J200)
76795	Transformer—Hi-voltage transformer (T111)
76440	Transformer—Horizontal oscillator transformer complete with adjustable cores (T110)
76997	Transformer—Output transformer (T103)
76984	Transformer—Power transformer, 115 volts, 60 cycle (T109)
77112	Transformer—Ratio detector transformer (T102, C105)
76981	Transformer—Sound i-f transformer complete with adjustable core (T101, C102, C103, R103)
76978	Transformer—Vertical output transformer (T108)
76979	Transformer—First pix i-f transformer complete with adjustable cores (T104, C116, R117)
76980	Transformer—Second, third or fourth pix i-f transformer complete with adjustable core (T105, T106, T107)
75449	Trap—FM complete with adjustable core and stud (L203, C203)
75242	Trap—I.-F. trap (L200, L201, C200, C201)
76983	Trap—4.5 MC trap (L103, C128)
76616	Yoke—Deflection yoke complete with 6 contact male connector (L109, L110, L111, L112, C181, P103, R208, R209, R210)
	RADIO CHASSIS ASSEMBLIES RC-1117B (For Model 21T242)
76876	Antenna—Antenna loop complete
76867	Capacitor—Variable tuning capacitor complete with drive drum (C1A, C1B)
76872	Capacitor—Adjustable, trimmer, 2.5—30 mmf. (C5)
77116	Capacitor—Ceramic, 56 mmf. (C4)
76347	Capacitor—Ceramic, 120 mmf. (C13)
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 (C17A, C17B, C17C)
73851	Capacitor—Tubular, paper, .0018 mfd., 1600 volts (C7, C8, C21)
73795	Capacitor—Tubular, paper, .0033 mfd., 400 volts (C12)
73796	Capacitor—Tubular, paper, .0039 mfd., 600 volts (C14, C19, C20)
73920	Capacitor—Tubular, paper, .0047 mfd., 600 volts (C10)
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts (C16)
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts (C11, C15)

STOCK No.	DESCRIPTION
73553	Capacitor—Tubular, paper, .047 mfd., 400 volts (C2, C3, C6)
75071	Capacitor—Tubular, moulded paper, 047 mfd., 400 volts (C18)
73935	Clip—Mounting clip for i-f transformer
76866	Coil—Oscillator coil (L2, L3)
78586	Coil—Oscillator coil—complete with adjustable core
77114	Connector—Single contact male connector for loop lead
75474	Connector—Single contact male connector for speaker cable
30868	Connector—2 contact female connector for motor cable (P2)
52131	Connector—2 contact female connector for power input (J3)
36422	Connector—3 contact female connector for phono cable (J1)
76874	Control—Volume control (R11)
72953	Cord—Drive cord (approx. 53" overall)
70392	Cord—Power cord and plug
74838	Grommet—Power cord strain relief (1 set)
72283	Grommet—Rubber grommet to mount variable tuning capacitor (3 req'd)
11765	Lamp—Dial lamp—Mazda 51
28452	Plate—Bakelite mounting plate for electrolytic
77376	Plate—Dial back plate complete with four (4) pulleys less dial
77378	Pointer—Station selector pointer
76871	Rectifier—Selenium rectifier (SR1)
73072	Resistor—Nominal value, 95 ohms, @ 38° C with negative temperature coefficient (R23)
77379	Resistor—Wire wound, 66 ohms, 5 watts (R22)
	Resistor—Fixed, composition:—
503082	82 ohms, ±10%, ½ watt (R19)
503127	270 ohms, ±10%, ½ watt (R6)
513212	1200 ohms, ±10%, 1 watt (R21)
503218	1800 ohms, ±10%, ½ watt (R20)
503312	12,000 ohms, ±10%, ½ watt (R17)
503327	27,000 ohms, ±10%, ½ watt (R4)
503339	39,000 ohms, ±10%, ½ watt (R2)
503368	68,000 ohms, ±10%, ½ watt (R10)
503412	120,000 ohms, ±10%, ½ watt (R7)
503422	220,000 ohms, ±10%, ½ watt (R1, R13, R14)
503439	390,000 ohms, ±10%, ½ watt (R8)
503447	470,000 ohms, ±10%, ½ watt (R16, R18)
503515	1.5 megohm, ±10%, ½ watt (R3)
503533	3.3 megohm, ±10%, ½ watt (R5)
503610	10 megohm, ±10%, ½ watt (R12, R15)
76869	Shaft—Tuning knob shaft
76870	Shield—Tube shield
74697	Socket—Dial lamp socket
51955	Socket—Tube socket, 7 pin, miniature moulded, saddle-mounted
77115	Socket—Tube socket, 7 pin, miniature moulded
76368	Spring—Drive cord spring
76873	Switch—Radio-phono switch less volume control (S1)
77377	Switch—"Radio-TV" switch (S3, S4)
74918	Transformer—First i-f transformer complete with adjustable cores (T1)
73037	Transformer—Second i-f transformer complete with adjustable cores (T2)
77122	Transformer—Output transformer (T3)
33726	Washer—"C" washer for tuning knob shaft
	CHASSIS ASSEMBLIES RC1111B (For Model 21T244)
77332	Antenna—Radio antenna loop complete less cable
77308	Capacitor—Variable tuning capacitor (C1-1, C1-2, C1-3, C1-4, C1-5, C1-6)
75613	Capacitor—Ceramic, 5 mmf. (C12, C41)
77352	Capacitor—Ceramic, 6.8 mmf. (C16)
39044	Capacitor—Ceramic, 15 mmf. (C14)
76348	Capacitor—Ceramic, 47 mmf. (C10)
75612	Capacitor—Ceramic, 68 mmf. (C15, C17)
39396	Capacitor—Ceramic, 100 mmf. (C5)
75614	Capacitor—Ceramic, 150 mmf. (C13, C28, C31)
75611	Capacitor—Ceramic, 220 mmf. (C3)
39640	Capacitor—Mica, 330 mmf. (C36, C37)
39644	Capacitor—Mica, 470 mmf. (C6)
73473	Capacitor—Ceramic, 4700 mmf. (C2, C4, C7, C9, C11, C18, C20, C23, C24, C27, C32, C34, C35, C40)
73747	Capacitor—Electrolytic, 2 mfd., 50 volts (C39)
77468	Capacitor—Tubular, paper, .0018 mfd., 600 volts (C8)
73795	Capacitor—Tubular, paper, .0033 mfd., 400 volts (C25)
73920	Capacitor—Tubular, paper, .0047 fd., 600 volts (C30)
72490	Capacitor—Tubular, paper, .005 mfd., 200 volts (C33, C38)
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts (C29)
73797	Capacitor—Tubular, paper, .015 mfd., 600 volts (C22)
77469	Capacitor—Tubular, paper, .018 mfd., 200 volts (C21)
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts (C26)
73558	Capacitor—Tubular, paper, .047 mfd., 200 volts (C219)
73935	Clip—Mounting clip for i-f transformer #75558 and 76328
77313	Coil—Antenna coil—FM (L1)
71942	Coil—Filament choke coil (L9, L10)
75569	Coil—Oscillator coil—AM—complete with adjustable core (L3, L4, L5)
77315	Coil—Oscillator coil—FM (L8)
77305	Coil—R-F coil—AM—complete with adjustable (L6, L7)
77314	Coil—R-F coil—FM (L2)
33742	Connector—Single contact female connector for phono cable (J3)
35787	Connector—Single contact female connector for audio cable (J2)
75543	Connector—2 contact female connector for phono power cable (P1)
74879	Connector—2 contact female connector for antenna leads
74882	Connector—2 contact (polarized) male connector for antenna loop cable
75062	Connector—9 contact male connector for power input (J1)
75562	Control—Tone control—H.F. (R29)
75561	Control—Tone control—L.F. (R16)
75537	Control—Volume control and power switch (R19, S2)
72953	Cord—Drive cord (approx. 57" overall)
75564	Coupling—Spring coupling for function switch extension shaft
74839	Fastener—Push fastener to fasten RF shelf (4 req'd)
16058	Grommet—Rubber grommet for mounting RF shelf (4 req'd)
11765	Lamp—Dial lamp—Mazda #51
72602	Pulley—Drive cord pulley
35641	Pulley—Drive cord pulley—1⅜" dia.
	Resistor—Fixed, composition:—
503039	39 ohms, ±10%, ½ watt (R3)
503068	68 ohms, ±10%, ½ watt (R21)
503110	100 ohms, ±10%, ½ watt (R14, R34)
503112	120 ohms, ±10%, ½ watt (R30)
503139	390 ohms, ±10%, ½ watt (R12)
503168	680 ohms, ±10%, ½ watt (R6, R25, R32)
503210	1000 ohms, ±10%, ½ watt (R2)
502212	1200 ohms, ±5%, ½ watt (R36)
502233	330 ohms, ±5%, ½ watt (R35)
503282	8200 ohms, ±10%, ½ watt (R5)
503315	15,000 ohms, ±10%, ½ watt (R33)
503318	18,000 ohms, ±10%, ½ watt (R13, R17)
503322	22,000 ohms, ±10%, ½ watt (R22, R31)
503327	27,000 ohms, ±10%, ½ watt (R9, R18)
503339	39,000 ohms, ±10%, ½ watt (R37)
503356	56,000 ohms, ±10%, ½ watt (R26)
503412	120,000 ohms, ±10%, ½ watt (R11, R15)
503415	150,000 ohms, ±10%, ½ watt (R4, R24)
503422	220,000 ohms, ±10%, ½ watt (R23)
503427	270,000 ohms, ±10%, ½ watt (R28)
503447	470,000 ohms, ±10%, ½ watt (R38)
503510	1 megohm, ±10%, ½ watt (R39)
503515	1.5 megohm, ±10%, ½ watt (R10)
503522	2.2 megohm, ±10%, ½ watt (R1, R7, R8)
503610	10 megohm, ±10%, ½ watt (R20)
504622	22 megohm, ±20%, ½ watt (R27)
77303	Shaft—Extension shaft for function switch
75540	Shaft—Tuning knob shaft
73584	Shield—Tube shield for V1, V6
75192	Shield—Tube shield for V2
31364	Socket—Dial lamp socket
74179	Socket—Tube socket, 7 contact, miniature for V1, V3, V4, V5
77306	Socket—Tube socket, 7 pin, moulded, saddle-mounted for V2
73117	Socket—Tube socket, 7 contact, miniature wafer for V6
76332	Spring—Drive cord spring
75563	Spring—Retaining spring for function switch extension shaft
77304	Support—Polystyrene support for FM oscillator coil complete with mounting bracket
77307	Switch—Function switch (S1)
73743	Transformer—Ratio detector transformer complete with adjustable core (T5)
75558	Transformer—1st. i-f transformer—AM—complete with adjustable core (T2)
75559	Transformer—1st. i-f transformer—FM—complete with adjustable core (T1)
76328	Transformer—Second i-f transformer—AM—complete with adjustable core (T4)
75560	Transformer—Second i-f transformer—FM—complete with adjustable core (T3)
33726	Washer—"C" washer for tuning knob shaft or drive cord pulley
	AMPLIFIER ASSEMBLIES RS141C (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 (C101A, C101B, C101C)
75643	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 1000 volts (C103, C104)
73789	Capacitor—Tubular, paper, .0068 mfd., 400 volts (C105)
73562	Capacitor—Tubular, paper, .022 mfd., 400 volts (C102)
75064	Connector—9 contact female connector for power input cable (P101)
70392	Cord—Power cord and plug
74838	Grommet—Power cord strain relief (1 set)
72776	Pin—Contact pin for speaker lead (2 req'd)
73637	Resistor—Wire wound, 2200 ohms, 5 watts (R101)
	Resistor—Fixed, composition:—
503110	100 ohms, ±10%, ½ watt (R108)
522127	270 ohms, ±5%, 2 watts (R107)
502233	3300 ohms, ±5%, ½ watt (R102)
503368	68,000 ohms, ±10%, ½ watt (R105)
503382	82,000 ohms, ±10%, ½ watt (R103)
503447	470,000 ohms, ±10%, ½ watt (R104, R106)
31251	Socket—Tube socket, octal, wafer
73117	Socket—Tube socket, 7 pin, miniature, wafer
77323	Transformer—Output transformer (T102)
75566	Transformer—Power transformer, 117 volts, 60 cycle (T101)

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES 92569-12W RL111A1 RMA-274
75682	Cone—Cone and voice coil (3.2 ohms)
76093	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)
	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 description of part required.
	MISCELLANEOUS
77381	Back—Television compartment back cover complete with power cord for Model 21T242
77391	Back—Television chassis compartment back cover complete with power cord for Model 21T244
75707	Board—"A"—"FM" terminal board for Model 21T244
76184	Board—TV antenna terminal board
76629	Bracket—Hanger bracket for deflection yoke hood assembly
76697	Bracket—Masking panel support bracket (2 req'd)
75694	Bracket—Record changer rollout mechanism stop bracket less rubber bumper
76599	Bracket—"U" shape bracket for deflection yoke hood support rod
76699	Bumper—Rubber bumper for kinescope (as req'd)
75696	Bumper—Rubber bumper for rollout mechanism stop bracket
74579	Bumper—Rubber bumper for door for Model 21T244
77397	Cable—Interconnecting cable complete with 2 contact female connector for television or radio power input for Model 21T244
74296	Cable—Shielded pickup cable complete with pin plug for Model 21T244
71892	Catch—Bullet catch and strike for cabinet doors
70142	Clamp—Dial clamp for Model 21T242
X3222	Cloth—Grille cloth for blonde instruments
X3130	Cloth—Grille cloth for mahogany or walnut instruments
75474	Connector—Single contact male connector for television antenna cable (2 req'd) or for amplifier cable (2 req'd) for Model 21T244
74752	Connector—2 contact male connector for AM—FM cable for Model 21T244
77399	Connector—2 contact female connector (terminal board type) for radio speaker cable for Model 21T244
77398	Connector—2 contact female connector (terminal board type) for TV speaker cable for Model 21T244
30868	Connector—2 contact male connector for motor cable
74192	Connector—3 contact male connector for pickup cable for Model 21T242
39153	Connector—4 contact male connector for television antenna cable
77461	Cord—Power cord and plugs (male & female) for television chassis back cover
70392	Cord—Power cord and male plug—power input for Model 21T244
76698	Cushion—Rubber cushion for masking panel support bracket
76631	Cushion—Rubber cushion for dust sealing the kinescope
76627	Cushion—Rubber cushion for safety glass
71984	Decal—"RCA Victor" decal
77345	Decal—Radio control panel function decal for blonde instruments for Model 21T242
77344	Decal—Radio control panel function decal for mahogany or walnut instruments for Model 21T242
77347	Decal—Radio control panel function decal for Model 21T244
77343	Decal—Television control panel function decal for blonde instruments for Model 21T242
77342	Decal—Television control panel function decal for mahogany or walnut instruments for Model 21T242
77349	Decal—Television control panel function decal for Model 21T244
74273	Decal—"Victrola" decal
77380	Dial—Glass dial scale for Model 21T242
77394	Dial—Glass dial scale for Model 21T244
77012	Emblem—"RCA Victor" emblem
75456	Escutcheon—Channel marker escutcheon
74205	Escutcheon—Dial escutcheon less dial for Model 21T242
77392	Escutcheon—Dial scale escutcheon less dial for Model 21T244
76622	Glass—Safety Glass
74838	Grommet—Power cord strain relief (1 set)
37396	Grommet—Rubber grommet for speaker mounting (3 req'd)
77402	Handle—Pullout handle for mounting pan
73420	Hinge—Butt hinge for L.H. door for Model 21T242
71764	Hinge—Butt hinge for L.H. door for Model 21T244
74308	Hinge—Cabinet door hinge (1 set) for main doors
77346	Hinge—Cabinet door hinge for center door (1 set) for Model 21T244
76596	Knob—Brightness control, vertical hold control or television tone control knob—beige (outer)
76595	Knob—Brightness control, vertical hold control or television tone control knob—maroon (outer)
75464	Knob—Picture control, horizontal hold control or television volume control and power switch knob—beige—for Models 21T242 and 21T244 and radio-phono volume control knob for Model 21T242 (inner)
74963	Knob—Picture control, horizontal hold control or television volume control and power switch knob—maroon—for Models 21T242 and 21T244 and radio-phono volume control knob for Model 21T242 (inner)
77384	Knob—Radio phono function switch—beige—(outer) for Model 21T242
77383	Knob—Radio phono function switch knob—maroon—(outer) for Model 21T242
77330	Knob—Radio function switch knob—maroon—for Model 21T244
77386	Knob—Radio tuning control knob—beige—(outer) for Model 21T242
77385	Knob—Radio tuning control knob—maroon—(outer) for Model 21T242
77328	Knob—Radio tuning control, tone controls or volume control and power switch knob—maroon—for Model 21T244
76594	Knob—Television channel selector knob—beige (inner)
76593	Knob—Television channel selector knob—maroon (inner)
76592	Knob—Television fine tuning control knob—beige (outer)
76591	Knob—Television fine tuning control knob—maroon (outer)
77382	Knob—Transfer switch or radio tuning control knob—beige—(inner) for Model 21T242
75945	Knob—Transfer switch or radio tuning control knob—maroon—(inner) for Model 21T242
77388	Knob—Transfer switch knob—beige—(outer) for Model 21T242
77387	Knob—Transfer switch knob—maroon—(outer) for Model 21T242
77389	Knob—Transfer switch knob—maroon—for Model 21T244
11765	Lamp—Channel indicator lamp—Mazda 51
76589	Mask—Channel marker escutcheon light mask—beige
75459	Mask—Channel marker escutcheon light mask—burgundy
77036	Mask—Polystyrene masking panel
73634	Nut—Speed nut for speaker mounting screws
77013	Nut—Speed nut to fasten "RCA Victor" emblem
76177	Nut—#10-32 special nut for deflection yoke hood support rods
76601	Pad—Kinescope edge support pad (4 req'd)
77401	Pan—Record changer mounting pan (metal)—beige—complete with slides
77400	Pan—Record changer mounting pan (metal)—plum—complete with slides
76421	Pin—Slide mechanism stop pin
77393	Plate—Dial back plate less dial and pointer for Model 21T244
77395	Pointer—Station selector pointer for Model 21T244
77341	Pull—Cabinet door pull for Model 21T242
77348	Pull—Cabinet door pull for center doors for Model 21T244
73909	Pull—Cabinet door pull for outer doors for Model 21T244
76628	Rod—"L" shape threaded rod to support deflection yoke hood assembly
76632	Screw—#8 x ⅝" hex head wood screw for hanger bracket or masking panel support bracket
75623	Screw—#8-32 x ⅝" trimit head screw for door pull 77348 for Model 21T244
74113	Screw—#8-32 x 1" trimit head screw for door pulls 73909 and 77341
77403	Slide—Mounting pan slide mechanism
73643	Spring—Channel marker escutcheon spring clip
76630	Spring—Formed spring for kinescope masking panel
77006	Spring—Retaining spring for deflection yoke hood support rod
76422	Spring—Retaining spring for slide mechanism stop pin
30330	Spring—Retaining spring for knobs 74963 and 75464
76837	Spring—Retaining spring for knobs 75945, 76593, 76594, 76595, 76596, 77382, 77383, 77384, 77385, 77386, 77387, 77388 and 77389
72845	Spring—Retaining spring for knobs 76591 and 76592
74734	Spring—Spring clip for knobs 77328 and 77330 for Model 21T244
72936	Stop—Door stop
76600	Strap—Grounding strap (.005 x ½" x 7" soft copper strip)
77396	Switch—Transfer switch for Model 21T244
77023	Washer—Cellulose washer—gold—for knobs (1 13/16" O.D.)
77390	Washer—Cellulose washer—gold—(1 1/32" O.D.) for transfer switch knob for Model 21T244
75458	Washer—Felt washer—beige—between knob and channel marker escutcheon
75457	Washer—Felt washer—dark brown—between knob and channel marker escutcheon
75500	Washer—Felt washer for back cover or masking panel mounting screws

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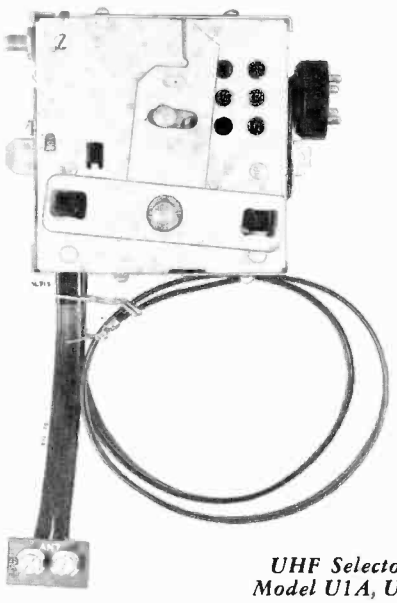


UHF Selector
Model U1A, U1B

RCA VICTOR

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 U1A and U1B 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 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.

ELECTRICAL SPECIFICATIONS

TELEVISION R-F FREQUENCY RANGE

All 70 UHF television channels .....470 mc. to 890 mc.
I-F Output Frequency .....Channel 5 or 6

POWER SUPPLY RATING

Filament .....6.3 volts, .225 amps.
Plate .....Approx. 10 ma at 70 to 370 volts (see text)

ANTENNA INPUT IMPEDANCE

72 ohms unbalanced.

TUBE COMPLEMENT

Tube Used	Function
RCA 6AF4	R-F Oscillator
CK 710	Crystal Mixer

INSTALLATION INSTRUCTIONS

UHF Selector U1A 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 end 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.

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 U1A and U1B 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 U1A and U1B 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 U1 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.

U1A, U1B INSTALLATION INSTRUCTIONS

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 method 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.

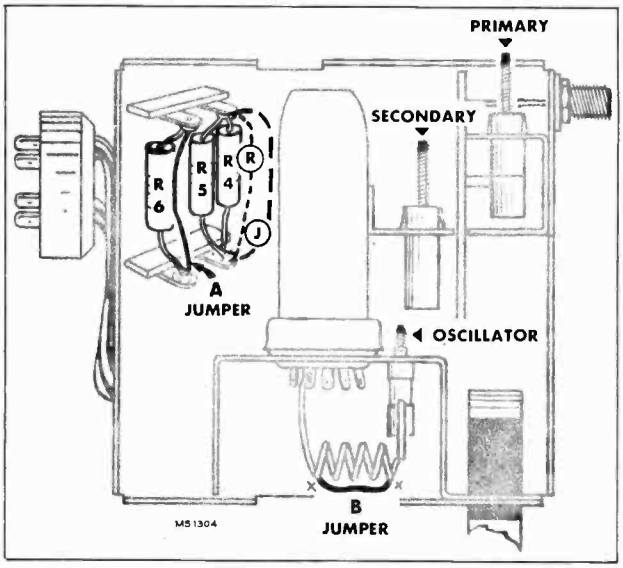
As a test for drift, turn the receiver off for five minutes then turn it on again. Within approximately one minute it should be possible to receive the UHF station by adjustment of the receiver fine tuning control and without the necessity of readjusting the UHF Selector oscillator.

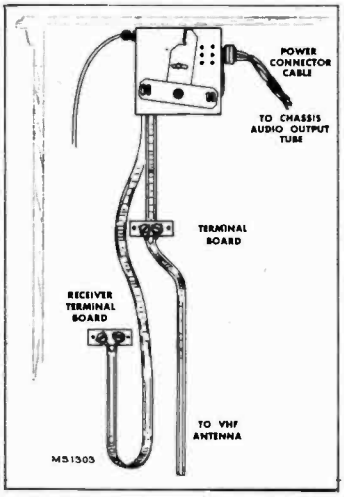
When it is desired to receive a VHF station on the television receiver, switch the UHF selector switch to the VHF position and operate the receiver normally.

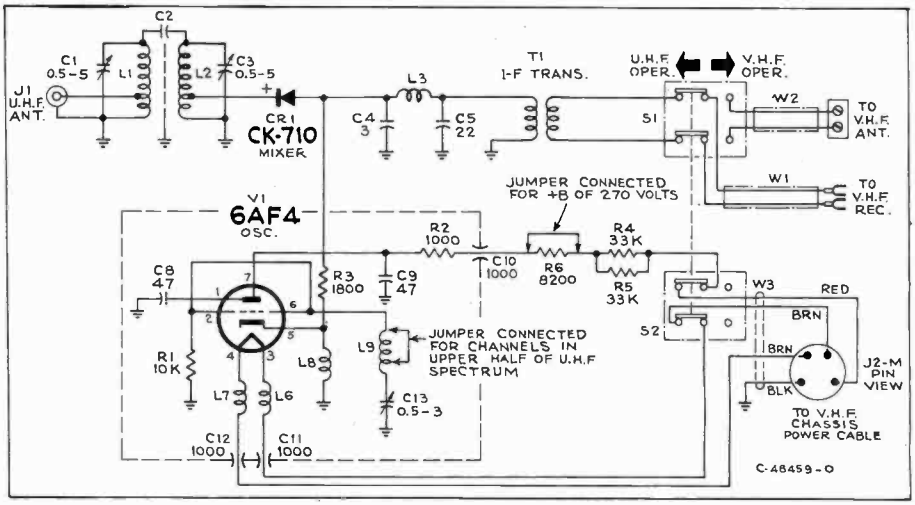
TABLE 1—ADJUSTMENTS VERSUS CHANNEL NUMBER

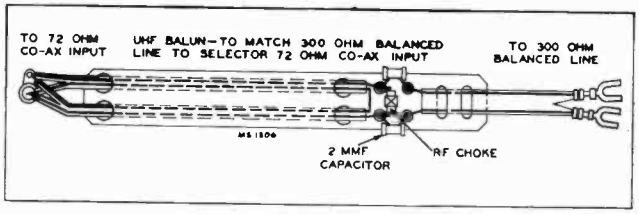
CHANNEL	PRIMARY & SECONDARY	OSCILLATOR
14	6.5 turns CW	1 turn CW
15-16	5.5 turns CW	1 turn CCW
17-19	5.0 turns CW	2 turns CCW
20-23	4.5 turns CW	3 turns CCW
24-27	3.5 turns CW	4 turns CCW
28-32	2.5 turns CW	5 turns CCW
33-37	2.0 turns CW	6 turns CCW
38-41	1.5 turns CW	7 turns CCW
42-44	1.0 turn CW	8 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

The above tabulation is based on the assumption that the Selector is aligned to 670 mc, the condition in which the unit leaves the factory. CW means clockwise. CCW means counter clockwise.









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.

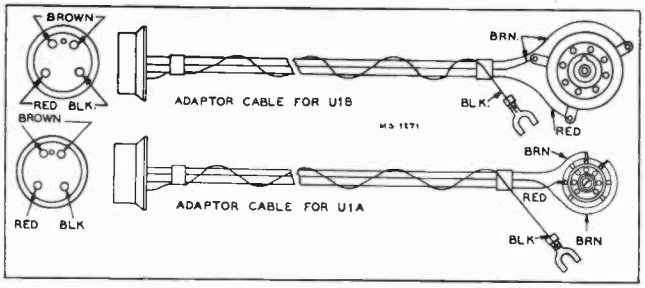


TABLE NO. 2 The table below lists all RCA Victor television receivers to date and data regarding the selector to be employed. The voltages in the receiver and hence the voltage at the selector may vary depending on the signal strength, the a-c line voltage and the particular chassis involved. In some cases, therefore, it may be necessary to employ slightly different values of resistors across R4 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 U1A
77276	Adapter—Standard octal tube adapter for U1B
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 (J1)
5040	Connector—4 contact female, for adapter cable (J2)
5039	Connector—4 contact male connector for power cable
77271	Printed Circuit—Input printed circuit comprising two inductances and one capacitance (L1, L2, C2)
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 saddle-mounted for V1
76961	Spring—Retaining spring for tube shield
46760	Switch—"UHF-VHF" switch (S1, S2)
77283	Transformer—I-F transformer (T1)

RECEIVER MODELS	AUDIO OUTPUT		USE SELECTOR	JUMPER ACROSS R6	JUMPER OR RESISTOR ACROSS R4 AND R5
	TUBE	VOLTS			
621TS	6K6GT	200	U1B	Leave In	22K, 1 watt
630TS, 630TCS	6K6GT	265	U1B	Leave In	None
641TV	6F6G	270	U1B	Leave In	None
648PTK	6F6G	270	U1B	Leave In	None
648PV	6F6G	270	U1B	Leave In	None
721TS, 721TCS	6K6GT	200	U1B	Leave In	22K, 1 watt
730TV1, 730TV2	6K6GT	245	U1B	Leave In	None
741PCS	6F6G	250	U1B	Leave In	None
8PCS41	6F6G	250	U1B	Leave In	None
8TS30	6K6GT	245	U1B	Leave In	None
8TV41	6F6G	270	U1B	Leave In	None
8T241, 8T243, 8T244	6K6GT	80	U1B	Leave In	Jumper across R4
8T270, 8TC270, 8TC271	6K6GT	152	U1B	Leave In	6.8K, 0.5 watt
8TR29, 8TK29	6K6GT	80	U1B	Leave In	Jumper across R4
8TK320	6V6GT	152	U1B	Leave In	6.8K, 0.5 watt
8TV321, 8TV323	6V6GT	295	U1B	Leave In	None
9PC41	6F6G	250	U1B	Leave In	None
9T240, 9T240K, 9TC240	6K6GT	80	U1B	Leave In	Jumper across R4
9TC245, 9TS247, 9TC249	6K6GT	80	U1B	Leave In	Jumper across R4
9T246	6K6GT	80	U1B	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	U1B	Leave In	Jumper across R4
9TW333	6V6GT	217	U1B	Leave In	33K, 1 watt

U1A, U1B

TABLE NO. 2—Continued

RECEIVER MODELS	AUDIO OUTPUT		USE SELECTOR	JUMPER ACROSS R6	JUMPER OR RESISTOR ACROSS R4 AND R5
	TUBE	VOLTS			
9TW390	6V6GT	210	U1B	Leave In	27K, 1 watt
T100	6K6GT	80	U1B	Leave In	Jumper across R4
T120, T121	6K6GT	80	U1B	Leave In	Jumper across R4
TC124, TC125, TC127	6K6GT	80	U1B	Leave In	Jumper across R4
TA128	6V6GT	80	U1B	Leave In	Jumper across R4
TA129	6V6GT	80	U1B	Leave In	Jumper across R4
T164, TC165, TC166, TC167, TC168	6K6GT	120	U1B	Leave In	5K, 1 watt
TA169	6V6GT	85	U1B	Leave In	Jumper across R4
S1000	6V6GT	210	U1B	Leave In	27K, 1 watt
2T51, 2T61	6AQ5	268	U1A	Leave In	None
2T81	6V6GT	210	U1B	Leave In	27K, 1 watt
4T101	6AQ5	270	U1A	Leave In	None
4T141	6V6GT	210	U1B	Leave In	27K, 1 watt
6T72	6K6GT	120	U1B	Leave In	5K, 1 watt
6T53, 6T54, 6T64, 6T65	6K6GT	360	U1B	Clip Out	None
6T71, 6T74, 6T75, 6T76	6K6GT	360	U1B	Clip Out	None
6T84	6V6GT	210	U1B	Leave In	27K, 1 watt
6T86, 6T87	6V6GT	290	U1B	Leave In	None
7T103, 7T103B, 7T104, 7T104B	6K6GT	360	U1B	Clip Out	None
7T11B, 7T112, 7T112B, 7T122	6K6GT	360	U1B	Clip Out	None
7T122B, 7T123, 7T123B, 7T124	6K6GT	360	U1B	Clip Out	None
7T125B	6K6GT	360	U1B	Clip Out	None
7T132	6AQ5	360	U1A	Leave In	None
7T143	6V6GT	290	U1B	Leave In	None
9T57, 9T77, 9T79	6K6GT	360	U1B	Clip Out	None
9T89	6V6GT	290	U1B	Leave In	None
9T105, 9T126, 9T128	6K6GT	360	U1B	Clip Out	None
9T147	6V6GT	290	U1B	Leave In	None
16T152	6K6GT	360	U1B	Clip Out	None
17T150, 17T151, 17T163	6AQ5	250	U1A	Leave In	None
17T153, 17T154, 17T155, 17T160	6AQ5	250	U1A	Leave In	None
17T162, 17T172, 17T172K, 17T173	6AQ5	250	U1A	Leave In	None
17T173K, 17T174, 17T174K	6AQ5	250	U1A	Leave In	None
17T200, 17T201, 17T202	6K6GT	250	U1B	Leave In	None
17T211, 17T220	6K6GT	250	U1B	Leave In	None
17T250DE, 17T261DE	6AQ5	250	U1A	Leave In	None
21T159, 21T159DE, 21T165	6AQ5	356	U1A	Clip Out	None
21T174DE, 21T176, 21T177	6AQ5	356	U1A	Clip Out	None
21T178, 21T178DE, 21T179, 21T179DE	6AQ5	356	U1A	Clip Out	None
21T197DE	6V6GT	290	U1B	Leave In	None
21T208, 21T217, 21T218	6K6GT	250	U1B	Leave In	None
21T227, 21T228, 21T229	6K6GT	250	U1B	Leave In	None
21T242 See note below	6K6GT	250	U1B	Leave In	None
21T244 See note below	6K6GT	250	U1B	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

RCA VICTOR
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.
FOR
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

All 70 UHF television channels ..... 470 mc. to 890 mc.
I-F Output Frequency ..... Channel 5 or 6

POWER SUPPLY RATING

WEIGHT AND DIMENSIONS

Net Weight	Shipping Weight	Width Inches	Height Inches	Depth Inches
5	6½	8⅝	4⅝	7⅞

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
6BQ7 (U2), 6BQ7A (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 TB1 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 J1.

If a separate UHF antenna with 72 ohm co-ax transmission line is employed, remove the balun from J1, attach a male co-ax fitting to the UHF antenna transmission line and plug it into the selector co-ax input J1. 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 1 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.

INSTALLATION INSTRUCTIONS

Model U2

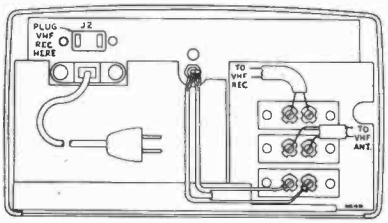


Figure 1—Connections for Employing VHF Antenna for UHF Reception

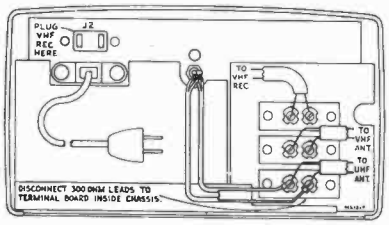


Figure 2—Connection for Employing Separate UHF Antenna with 300 Ohm Lead-In

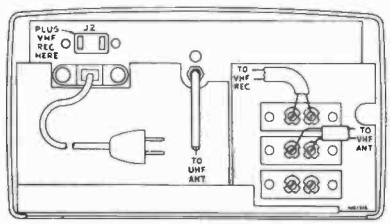


Figure 3—Connection for Employing Separate UHF Antenna with 72 Ohm Co-ax Lead-In

Model U2A

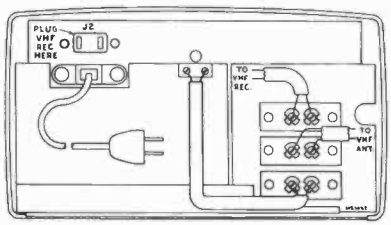


Figure 4—Connections for Employing VHF Antenna for UHF Reception

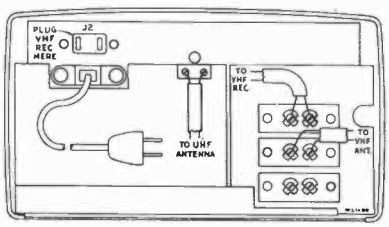


Figure 5—Connection for Employing Separate UHF Antenna with 300 Ohm Lead-In

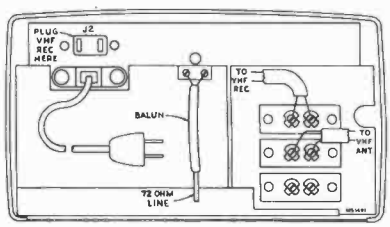


Figure 6—Connection for Employing Separate UHF Antenna with 72 Ohm Co-ax Lead-In

ADJUSTMENT INSTRUCTIONS

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 CR1 as follows. Disconnect the balun matching stub from the input jack J1 (or the 300 ohm jumper on Model U2A from the UHF ANT terminal board). Connect a bus wire to the center conductor of the balun connector P1 (on U2A to right hand terminal of UHF ANT terminal board TB4). Insert the other end of the bus wire 1½ inches straight into the ¼ 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 C19 for best sound and picture with minimum interference. 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 C14 and the harmonic tank capacitor C18 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 counterclockwise position).

UHF Channel	OSC Tank C14 or C15	Harmonic Tank C18 or C19
14-16	13.0 turns CW	12.5 turns CW
17-19	11.5 turns CW	11.5 turns CW
20-22	10.25 turns CW	10.25 turns CW
23-25	9.0 turns CW	9.5 turns CW
26-28	8.25 turns CW	8.5 turns CW
29-31	7.25 turns CW	7.75 turns CW
32-34	6.25 turns CW	7.0 turns CW
35-37	5.5 turns CW	6.5 turns CW
38-40	4.75 turns CW	6.25 turns CW
41-43	4.25 turns CW	5.75 turns CW
44-46	3.5 turns CW	5.25 turns CW
47-49	13.0 turns CW	5.0 turns CW
50-52	12.25 turns CW	4.75 turns CW
53-55	11.25 turns CW	4.25 turns CW
56-58	10.5 turns CW	4.0 turns CW
59-61	9.5 turns CW	3.5 turns CW
62-64	9.0 turns CW	3.25 turns CW
65-67	8.25 turns CW	3.0 turns CW
68-70	7.75 turns CW	2.75 turns CW
71-73	7.0 turns CW	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).

UHF Channel	OSC Tank C14 or C15	Harmonic Tank C18 or C19
14-16	16.25 turns CW	11.0 turns CW
17-19	14.75 turns CW	9.75 turns CW
20-22	13.25 turns CW	8.75 turns CW
23-25	11.75 turns CW	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	8.0 turns CW	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	16.25 turns CW	3.75 turns CW
50-52	15.5 turns CW	3.5 turns CW
53-55	14.5 turns CW	3.25 turns CW
56-58	13.5 turns CW	3.0 turns CW
59-61	12.5 turns CW	2.75 turns CW
62-64	11.5 turns CW	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	9.0 turns CW	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 V1.

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.

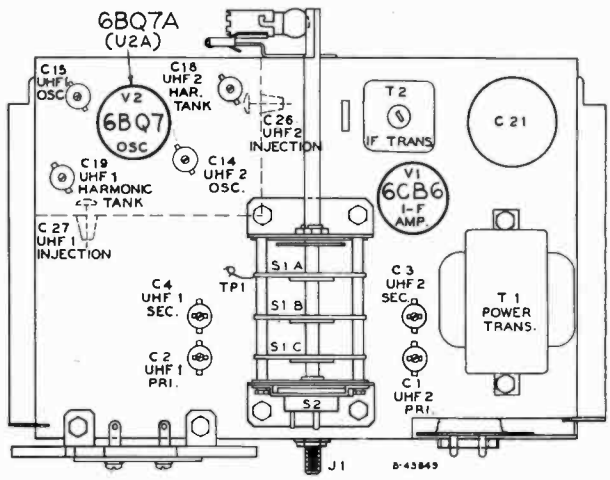


Figure 7—Chassis top view

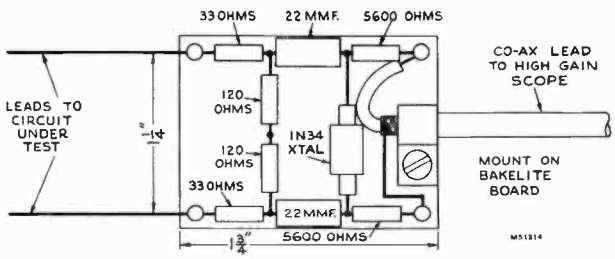


Figure 8—300 Ohm Balanced Detector

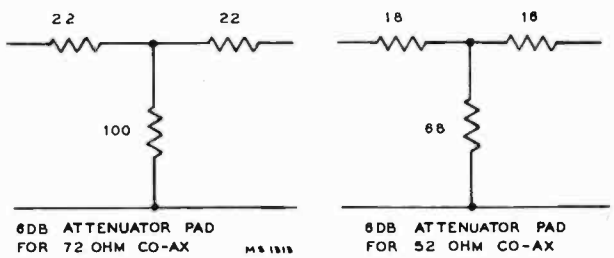


Figure 9—Attenuator Pad

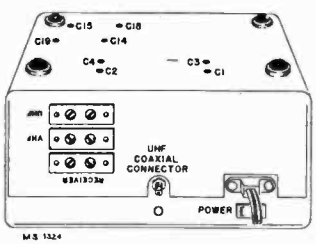


Figure 10—Adjustment Locations

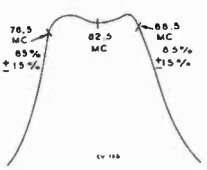


Figure 11—I-F Response

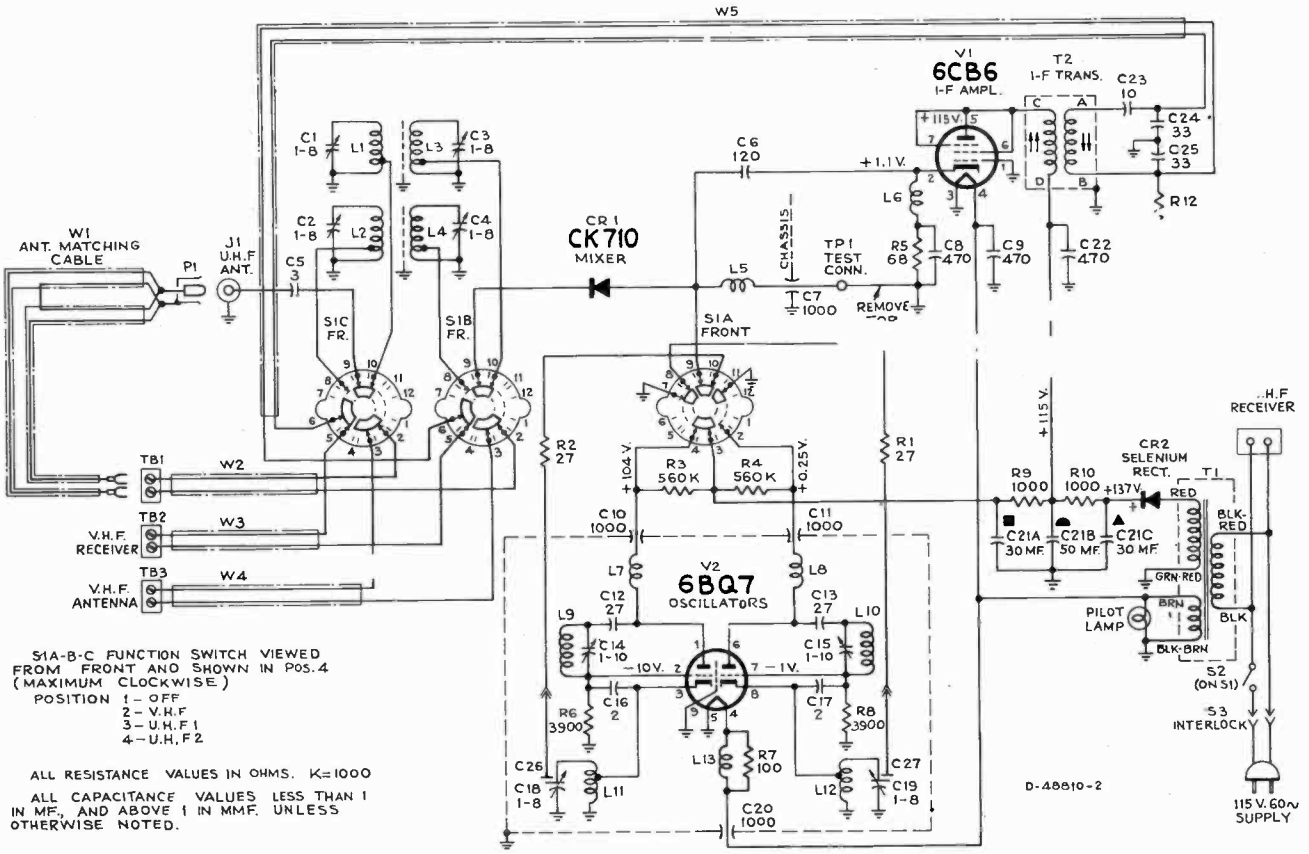


Figure 12—U2 Schematic Diagram, KCS79

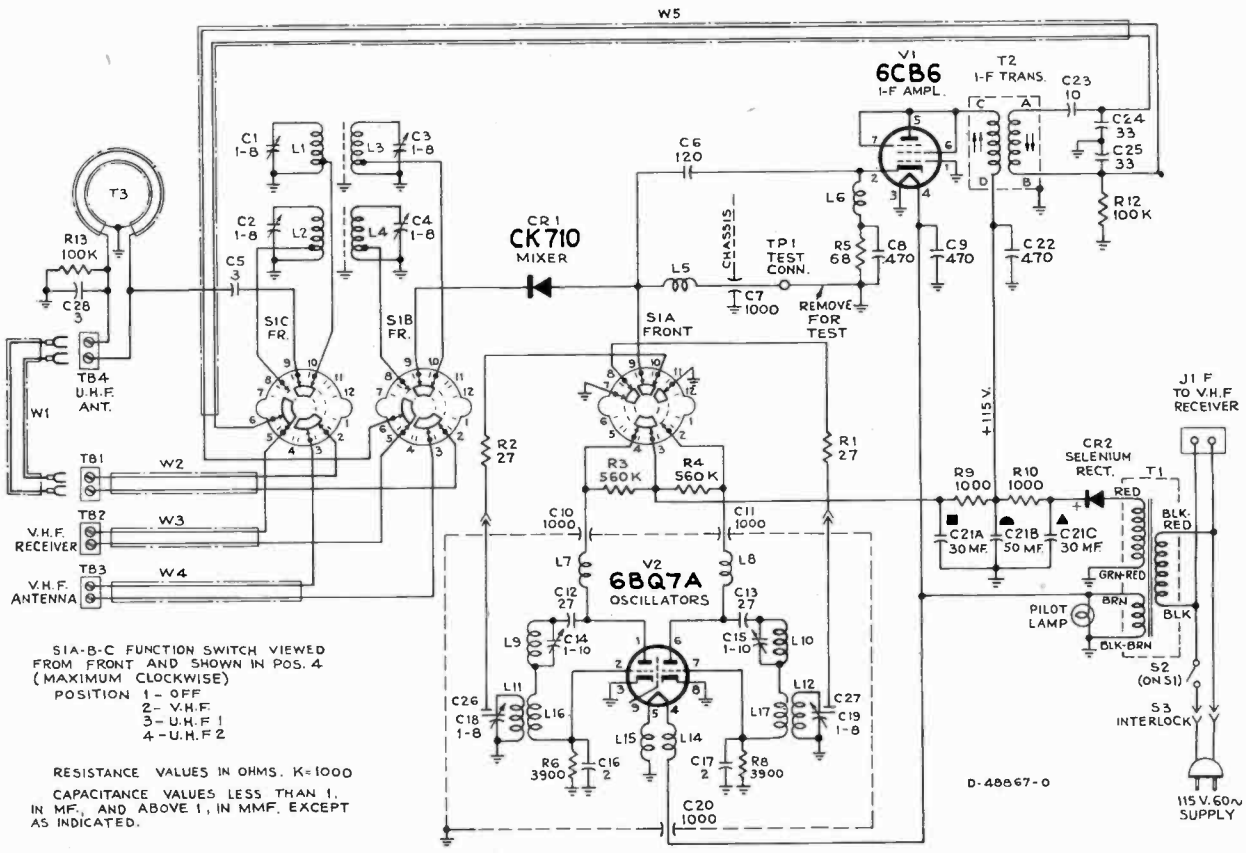


Figure 13—U2A Schematic Diagram, KCS79A

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES KCS79, KCS79A
75039	Board—"Antenna" terminal board
77290	Capacitor—Tubular trimmer, 1-8 mmf., complete with adjustable core (C1, C2, C3, C4, C18, C19)
77210	Capacitor—Ceramic, 2 mmf. (C16, C17)
77277	Capacitor—Ceramic, 3 mmf. (C5, C28)
77340	Capacitor—Tubular trimmer, 1.0-10.0 mmf., complete with adjustable core (C14, C15, L16, L17)
53511	Capacitor—Ceramic, 10 mmf. (C23)
72570	Capacitor—Ceramic, 27 mmf. (C12, C13)
70596	Capacitor—Ceramic, 33 mmf. (C24, C25)
76347	Capacitor—Ceramic, 120 mmf. (C6)
77293	Capacitor—Ceramic, 470 mmf. (C8, C9, C22)
77084	Capacitor—Ceramic, feed-thru, 1000 mmf. (C7, C10, C11, C20)
77086	Capacitor—Electrolytic comprising 1 section of 50 mfd., 200 volts and 2 sections of 30 mfd., 200 volts (C21A, C21B, C21C)
77298	Coil—Choke coil (L13, R7)
77296	Coil—Fundamental oscillator coil (L9, L10)
77297	Coil—Harmonic tank coil (L11, L12)
77153	Coil—r-f choke coil (L5, L7, L8, L14, L15)
77279	Coil—r-f choke coil (L6)
77294	Coil—r-f coil (primary and secondary) (L1, L2, L3, L4)
77088	Connector—Single contact connector for UHF antenna (J1) for model U2
52131	Connector—2 contact female connector for television power (J2)
74594	Connector—2 contact male connector for power input
76460	Contact—Test point contact
77286	Cover—Oscillator section shielding Cover for Model U2A

STOCK No.	DESCRIPTION
11765	Lamp—Pilot lamp—Mazda #51
77282	Rectifier—Germanium rectifier (CR1)
77292	Rectifier—Selenium rectifier (CR2)
	Resistor—Fixed, composition:—
513027	27 ohms, ±10%, 1 watt (R1, R2)
503068	68 ohms, ±10%, ½ watt (R5)
513210	1000 ohms, ±10%, 1 watt (R9)
523210	1000 ohms, ±10%, 2 watts (R10)
503239	3900 ohms, ±10%, ½ watt (R6, R8)
503410	100,000 ohms, ±10%, ½ watt (R11, R12, R13, R14)
503456	560,000 ohms, ±10%, ½ watt (R3, R4)
77284	Shield—Oscillator shield for Model U2A
77285	Shield—r-f shield
76967	Shield—Tube shield for V1
76534	Shield—Tube shield for V2
35574	Socket—Lamp socket
77087	Socket—Tube socket, 7 pin, miniature for V1
76530	Socket—Tube socket, 9 pin, miniature for V2
77289	Switch—Selector switch (S1, S2)
78578	Transformer—Antenna input transformer (T3)
77288	Transformer—i-f transformer (T2)
77287	Transformer—Power transformer, 117 volt, 60 cycle (T1)
	MISCELLANEOUS
77300	Back—Cabinet back complete with power cord
77212	Connector—Single contact male connector for antenna matching assembly
77033	Emblem—"RCA Victor" emblem
74889	Foot—Felt foot
77299	Knob—Selector knob
77013	Nut—Speed nut to fasten emblem
74734	Spring—Spring clip for knob

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS


RCA

RCA VICTOR

UHF Selector Model U70

UHF SELECTOR
MODEL U70
Chassis No. KCS70
— Mfr. No. 274 —

SERVICE DATA
— 1952 No. T8 —

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

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.

ELECTRICAL SPECIFICATIONS

TELEVISION R-F FREQUENCY RANGE

All 70 UHF television channels.....470 mc. to 890 mc.
I-F Output Frequency.....Channel 5 or 6

POWER SUPPLY RATING.....115 volts, 60 cycles, 40 watts

WEIGHT AND DIMENSIONS

Net Weight	Shipping Weight	Width Inches	Height Inches	Depth Inches
10 lbs.	12 lbs.	11⅛	8¼	9 21/32

ANTENNA INPUT IMPEDANCE

UHF — Choice: 300 ohms balanced or 72 ohms unbalanced.
VHF — 300 ohms balanced.

TUBE COMPLEMENT

Tube Used	Function
6AF4	R-F Oscillator
6CB6	1st I-F Amplifier
6CB6	2nd I-F Amplifier
5Y3GT	Rectifier

A 1N82 crystal is used as a mixer.

INSTALLATION INSTRUCTIONS

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.

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.

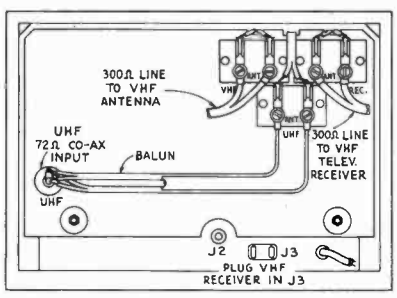


Figure 1—Selector Connections When VHF Antenna Is Employed For UHF Reception.

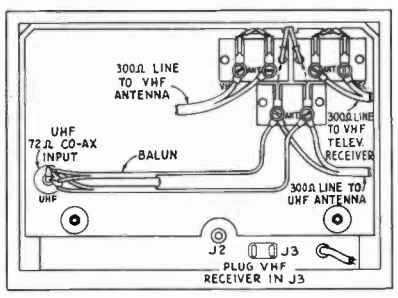


Figure 2—Selector Connections For Use of Separate UHF Antenna With 300 Ohm Lead-In.

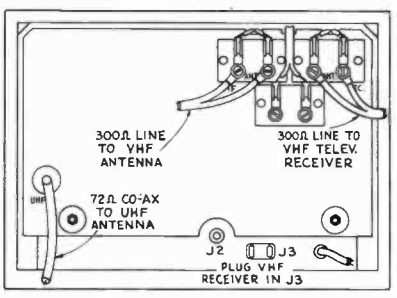


Figure 3—Selector Connections For Use of Separate UHF Antenna With 72 Ohm Co-Ax.

U70 ALIGNMENT PROCEDURE

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 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 T1.

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 i-f 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 1¼ 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 ¾ 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 J1. 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%.

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.

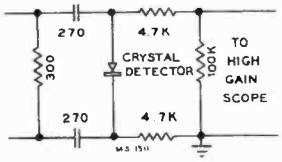


Figure 4 — 300 Ohm Balanced Detector

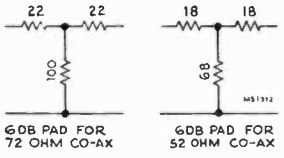


Figure 5 — Sweep Cable Attenuator

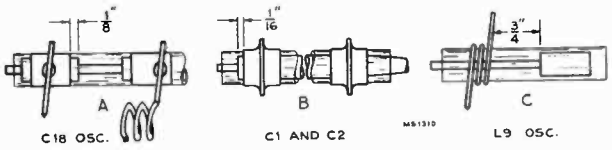


Figure 6 — Preset for R-F Adjustments

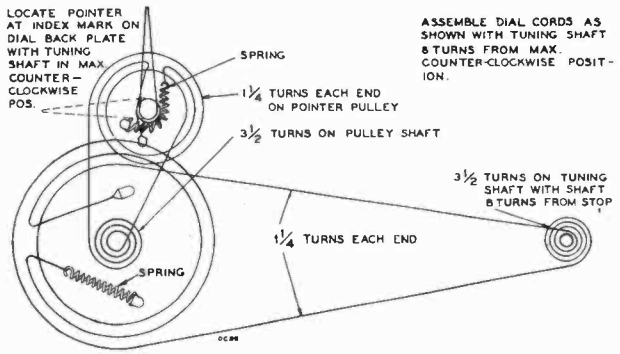


Figure 8 — Dial Cord and Drive

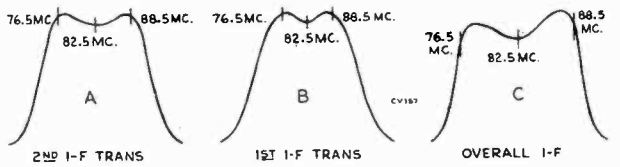


Figure 9 — Sweep Response Curves

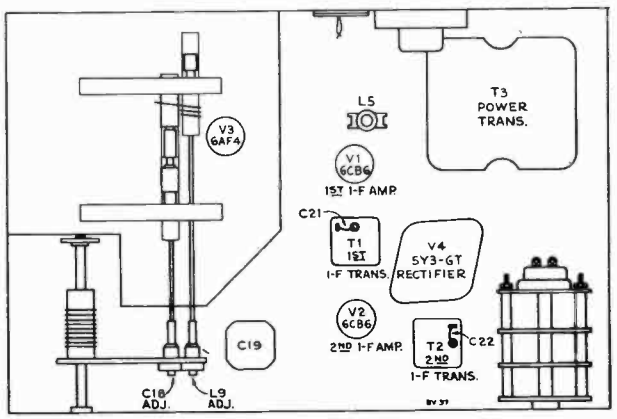


Figure 7 — Bottom Chassis Adjustments

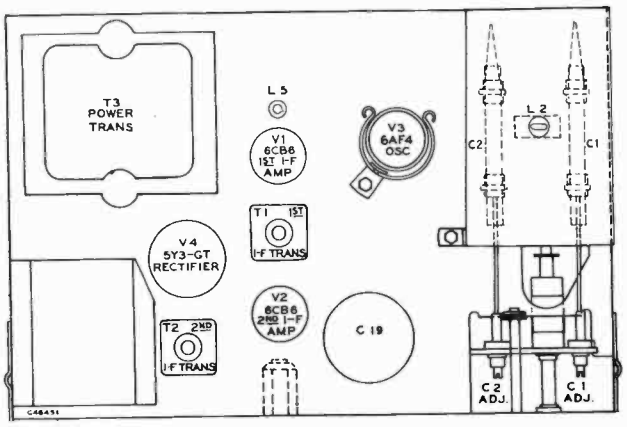


Figure 10 — Top Chassis Adjustments

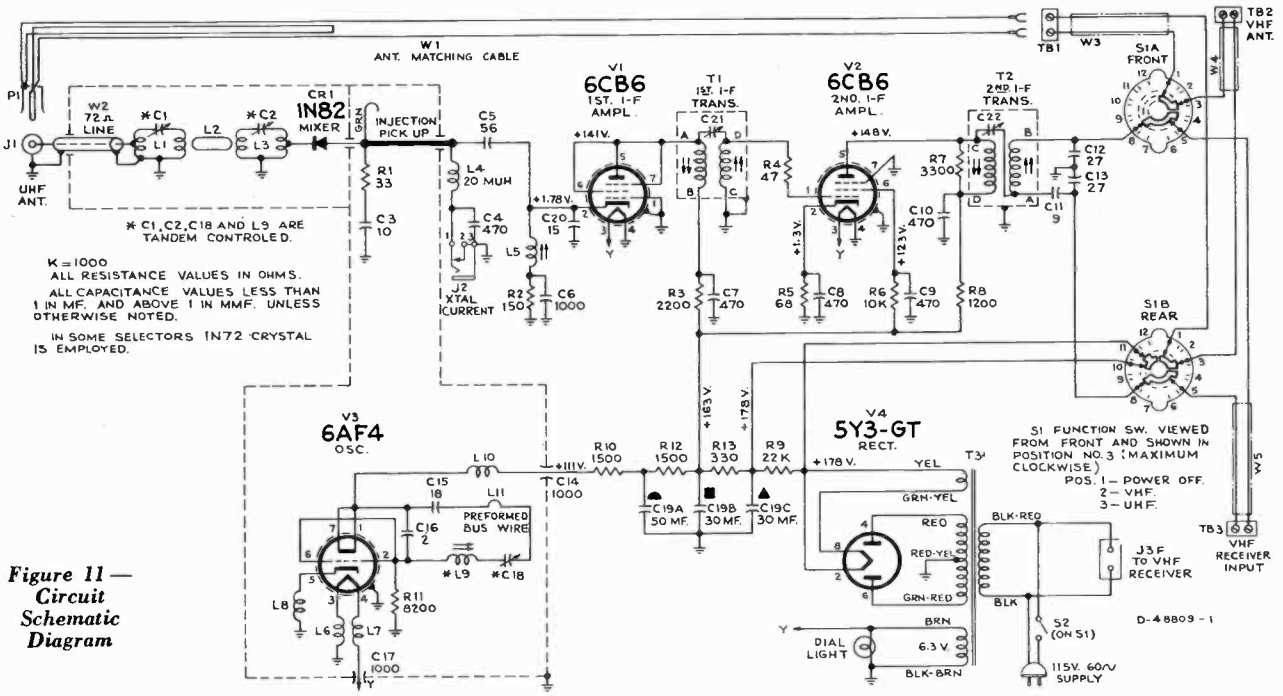


Figure 11 — Circuit Schematic Diagram

STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES KCS70
77097	Back—Back cover complete with three (3) terminal boards
76184	Board—Terminal board for back cover
77069	Bracket—Mounting bracket for r-f tuning assembly (includes L2 and part of L1, L3, C1, C2) less glass tubing
76522	Bracket—Vertical bracket for tube shield for 6AF4
77072	Bushing—Drive shaft bushing (in rear of coil spring)
77210	Capacitor—Ceramic, 2 mmf. (C16)
77108	Capacitor—Ceramic, 9 mmf. (C11)
77085	Capacitor—Ceramic, feed-thru, 10 mmf. (C3)
45465	Capacitor—Ceramic, 15 mmf. (C20)
77209	Capacitor—Ceramic, 18 mmf. (C15)
70935	Capacitor—Ceramic, 27 mmf. (C12, C13)
70599	Capacitor—Ceramic, 56 mmf. (C5)
75198	Capacitor—Ceramic, 470 mmf. (C4, C7, C8, C9, C10)
77084	Capacitor—Ceramic, feed-thru, 1,000 mmf. (C14, C17)
77252	Capacitor—Ceramic, 1,000 mmf. (C6)
77086	Capacitor—Electrolytic comprising 1 section of 50 mfd., 200 volts and 2 sections of 30 mfd., 200 volts (C19A, C19B, C19C)
77102	Clamp—Polystyrene clamp for oscillator tuning capacitor and coil (2 required)
77109	Coil—Choke coil (L6, L7, L8, L10)
77083	Coil—Cathode peaking coil (L5)
77224	Coil—Oscillator tuning coil (L9)
72618	Coil—Peaking coil (20 muh) (L4)
77212	Connector—Single contact male connector for antenna matching assembly (P1)
75474	Connector—Single contact male connector for W3, W4, W5
77088	Connector—Single contact connector for 72 ohm antenna connection (J1)
52131	Connector—2 contact female connector (J3)
72953	Cord—Drive cord (approx. 23" overall)
72953	Cord—Drive cord (approx. 38" overall)
70392	Cord—Power cord and plug
77074	Core—Adjusting core assembly for r-f tuning assembly capacitors C1 and C2
77075	Core—Adjusting core assembly for oscillator tuning capacitor C18
77076	Core—Adjusting core assembly for oscillator tuning coil L9
77093	Cover—Bottom cover for oscillator tuning shield
	Crystal—See Rectifier
77103	Cushion—Rubber cushion for mounting oscillator tuning coil (2 required) or oscillator tuning capacitor (2 required)
74838	Grommet—Power cord strain relief (1 set)
77079	Holder—Holder for crystal rectifier
75482	Jack—Test jack (J2)
11765	Lamp—Dial lamp—Mazda 51
77106	Plate—Dial back plate and bushing less dial and pulley
77073	Plate—Plate complete with five (5) bushings for drive shaft and adjusting cores
77095	Pointer—Station selector pointer
77077	Post—Retainer post for plate and bushing assembly
77105	Pulley—Drive cord pulley (1⅜" dia.) and shaft
77094	Pulley—Drive cord pulley (2¾" dia.) and shaft assembly
77489	Rectifier—Crystal rectifier 1N82 (CR1)
30340	Retainer—Retainer ring for drive shaft

STOCK No.	DESCRIPTION
	Resistor—Fixed, composition:
503033	33 ohms, ±10%, ½ watt (R1)
503047	47 ohms, ±10%, ½ watt (R4)
503068	68 ohms, ±10%, ½ watt (R5)
503115	150 ohms, ±10%, ½ watt (R2)
523133	330 ohms, ±10%, 2 watt (R13)
503212	1,200 ohms, ±10%, ½ watt (R8)
523215	1,500 ohms, ±10%, 2 watt (R10, R12)
503222	2,200 ohms, ±10%, ½ watt (R3)
503233	3,300 ohms, ±10%, ½ watt (R7)
503282	8,200 ohms, ±10%, ½ watt (R11)
503310	10,000 ohms, ±10%, ½ watt (R6)
513322	22,000 ohms, ±10%, 1 watt (R9)
77078	Shaft—Drive shaft
77092	Shield—Shield assembly for oscillator tuning assembly
77091	Shield—Shield assembly for r-f tuning assembly
77090	Shield—Tube shield for 6AF4
76967	Shield—Tube shield for 6CB6
31251	Socket—Tube socket, octal, wafer
31364	Socket—Dial lamp socket
77087	Socket—Tube socket, 7 pin, miniature, moulded phenolic, saddle-mounted
77207	Socket—Tube socket, 7 pin, miniature, steatite, saddle-mounted
77071	Spring—Drive shaft spring
77096	Spring—Drive cord spring
12007	Spring—Retaining spring for adjusting cores
75068	Spring—Retaining spring for tube shield for 6AF4
77208	Support—Oscillator tuning coil support (glass tube)
77099	Support—Polystyrene support only for oscillator tuning coil and capacitor
77089	Switch—Function and power switch (S1, S2)
76463	Terminal—Screw type grounding terminal
77080	Transformer—Power transformer, 117 volts, 60 cycles (T3)
77081	Transformer—First i-f transformer complete with adjustable cores (T1, C21)
77082	Transformer—Second i-f transformer complete with adjustable cores (T2, C22)
77100	Tubing—Capacitor tubing (glass) for oscillator tuning capacitor (Part of C18)
77070	Tubing—Capacitor tubing (glass) for r-f tuning assembly capacitors C1 and C2
2917	Washer—"C" washer for drive shaft and drive cord pulleys
33726	Washer—"C" washer for plate and bushing retainer post
77098	Washer—Spring washer for drive shaft
	MISCELLANEOUS
77111	Clamp—Dial clamp (2 required)
77110	Dial—Glass dial scale
77033	Emblem—"RCA Victor" emblem
77492	Foot—Rubber foot (4 required)
77251	Knob—Function and power switch knob—maroon—for mahogany and walnut instruments
77844	Knob—Function and power switch knob—beige—for blonde mahogany instruments
77140	Knob—Tuning control knob—maroon—for mahogany and walnut instruments
77843	Knob—Tuning control knob—beige—for blonde mahogany instruments
77013	Nut—Speednut to fasten emblem to cabinet
74734	Spring—Spring clip for knobs

The system of employing an asterisk before the stock number of new items has been discontinued.

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