

MODELS HM-225B, HM-226B

GENERAL ELECTRIC CO.

IMPORTANT NOTE

COMBINATION TELEVISION AND RADIO RECEIVER MODEL HM-226B
CONSISTS OF THE TELEVISION RECEIVER MODEL HM-225B REVISED
FOR NEW STANDARDS AND RADIO RECEIVER MODEL HM226-7A.

ALIGNMENT REVISED FOR NEW STANDARDS

TELEVISION ALIGNMENT PROCEDURE

The problem of aligning the several circuits in a television receiver is much more involved and requires more specialized equipment than the alignment of conventional radio receivers. Fortunately, the use of stable components in carefully engineered circuits of wide-band characteristics reduces to a minimum the necessity for alignment under normal operating conditions. Should alignment become necessary the following equipment will be needed:

(A) For Video I.F. Alignment

- (1) Cathode ray oscilloscope
- (2) Wide-band sweep oscillator capable of sweeping from 7.5 to 15 MC.

- (3) Marker system either provided in sweep oscillator or from separate signal generator for locating 12.75 and 9.75 MC points.

(B) Sound I.F. Alignment

- (1) Cathode ray oscilloscope
- (2) Wide band sweep oscillator capable of sweeping from 7.75 to 8.75 MC.

(C) R.F. Alignment

- (1) Cathode ray oscilloscope
- (2) Wide-band sweep oscillator capable of sweeping the following bands.

(a) 50 to 56 MC	(d) 78 to 84 MC
(b) 60 to 66 MC	(e) 84 to 90 MC
(c) 66 to 72 MC	

VIDEO I. F. ALIGNMENT

Input Freq.	Point of Input	Adjustments	Comments
1.			Connect vertical input cable of cathode ray oscilloscope across resistor R-43 of 6H6 video detector.
2. 7.5-15MC Sweep	Control grid of 6AB7 (2nd video I.F.)		Connect low output tap of video I.F. sweep oscillator to control grid of 6AB7 (2nd video I.F.). Connect ground lead to chassis. Turn contrast control (R-67) to about half of maximum or to a point which gives satisfactory vertical deflection without overloading. Set horizontal centering and gain controls on oscilloscope to give suitable horizontal deflection. Adjust sweep phase to give curve similar to Fig. 8, curve 2.

NOTE: If sweep oscillator has marker points internally supplied, steps 3 and 4 may be omitted.

3. Same as in No. 2 plus 12.75 MC	Same as in No. 2		Superimpose an accurately calibrated 12.75 MC signal in parallel with sweep signal. Signal will appear on sweep curve in oscilloscope as a wiggle, the center of which is a thin black line. With a pen or crayon mark this point on the screen of the oscilloscope. (NOTE: Hereafter the horizontal controls on the oscilloscope must not be touched.)
4. Same as in No. 2 plus 9.75 MC	Same as in No. 2		Superimpose an accurately calibrated 9.75 MC signal in parallel with sweep signal. Mark screen at point where signal appears on curve as in No. 2 above.
5. 7.5-15 MC Sweep	Control grid 6AC7 (4th video IF)	Iron cores of detector transformer T-9	Connect high tap of video I.F. sweep oscillator to control grid of 6AC7 (4th video I.F.). (Do not touch horizontal controls of oscilloscope.) Turn sweep phase to give as near a single curve as possible. Adjust iron cores of T-9 until curve appears similar to Fig. 8, curve 1, with relatively flat top, 12.75 MC mark half-way down one side and 9.75 MC mark at corner of other side. These conditions plus maximum amplitude insure correct alignment.
6. 7.5-15 MC Sweep	Control grid 6AB7 (3rd video IF)	Iron cores of 4th video transformer T-8.	Connect low tap of video I.F. sweep oscillator to control grid of 6AB7 (3rd video I.F.). Adjust iron cores for maximum gain, flatness and proper centering between markers as described in step No. 5 and illustrated in Fig. 8, curve 1.
7. 7.5-15 MC Sweep	Control grid 6AB7 (2nd video IF)	Iron cores of 3rd video transformer T-7.	Connect low tap to grid. Adjust primary and secondary iron cores for maximum gain, flatness and proper centering. Adjust series iron core for sharp cut-off on 9.75 MC side of curve. See Fig. 8, curve 3.
8. 7.5-15 MC Sweep	Control grid of 6AC7 (1st video I.F.)	Iron cores of 2nd video transformer T-6	Connect low tap to grid. Adjust primary and secondary iron cores for maximum gain, flatness and proper centering. Adjust series iron core for sharp cut-off on 12.75 MC side of curve. See Fig. 8, curve 3.
9. 7.5-15 MC Sweep	Converter Grid, 6F8G	Iron cores of 1st video transformer T-11	Connect low tap to grid. Adjust iron cores for maximum gain flatness and proper centering. 12.75 MC response must be equal to or slightly greater than 50% of the maximum response as indicated in Fig. 8, curve 4.
10. 14.25 MC	Converter Grid, 6F8G	Series iron core of 2nd video transformer T-6	To check alignment of 14.25 MC trap proceed as follows: Connect low tap to grid. Reduce horizontal gain of oscilloscope to minimum. Adjust iron core for minimum line length.
11. 8.25 MC	Converter Grid, 6F8G	Series iron core of 3rd video transformer T-7	To check alignment of 8.25 MC trap proceed as follows: Connect low tap to grid. Reduce horizontal gain of oscilloscope to minimum. Adjust iron core for minimum line length.

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MODELS HM-225B, HM-226B

ALIGNMENT REVISED FOR NEW STANDARDS
R. F. ALIGNMENT

Signal Input	Point of Input	Adjustments	Comments
1.		Band width adjustment coupling condenser	Turn (C-2) in until tight, then open approximately $\frac{1}{4}$ of a turn. Connect oscilloscope to junction of R-20 and C-32. Open-circuit B+ end of R-3 and short-circuit R-2.
2. 50 to 56 MC sweep	Antenna terminals	(L-10), (C-3), (C-8)	Depress band No. 1 push button. Set tuning control to mid-rotation. Adjust L-10 until curve is centered between maximum horizontal sweep points. Adjust C-3 and C-8 for maximum amplitude. See Fig. 8, curve 4.
3. 60 to 66 MC sweep	Antenna terminals	(L-11), (C-4), (C-9)	Depress band No. 2 push button. Adjust L-11 for centering; C-4 and C-9 for maximum amplitude. See Fig. 8, curve 4.
4. 66 to 72 MC sweep	Antenna terminals	(L-12; (C-5), (C-10)	Depress band No. 3 push button. Adjust L-12 for centering; C-5 and C-10 for maximum amplitude. See Fig. 8, curve 4.
5. 78 to 84 MC sweep	Antenna terminals	(L-13), (C-83), (C-19)	Depress band No. 4 push button. Adjust L-13 for centering; C-83 and C-19 for maximum amplitude. See Fig. 8, curve 4.
6. 84 to 90 MC sweep	Antenna terminals	(L-14), (C-84), (C-20)	Depress band No. 5 push button. Adjust L-14 for centering; C-84 and C-20 for maximum amplitude. See Fig. 8, curve 4.

WAVE TRAP ALIGNMENT

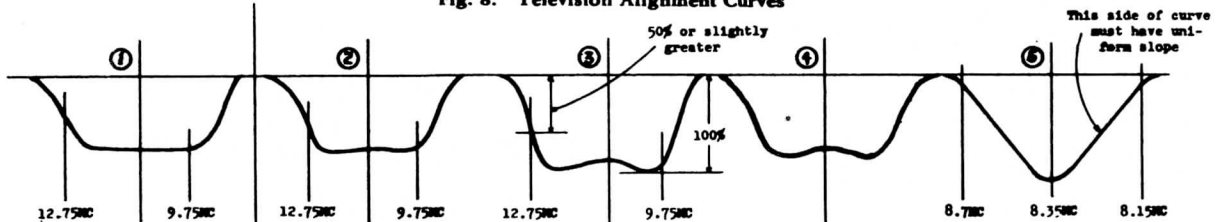
1. 11.75 MC With modulation	Antenna terminals	Wave trap trimmer, C-88	Adjust for maximum dip in oscilloscope curve, with oscilloscope connected to diode load resistor R-43.
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AUDIO I.F. ALIGNMENT

NOTE: In order to obtain frequency modulation detection in the sound channel with good fidelity, the audio I.F. amplifiers must be aligned to give a satisfactory selectivity curve for slope detection. For this reason a sweep generator and oscilloscope are necessary to obtain the resultant curve shown in Fig. 8, curve 5.

1.			Connect vertical input cable of cathode ray oscilloscope between junction of R-4 and C-29 chassis.
2. 8.25 MC with 30% tone modulation	Grid of 6F8G converter.	Iron cores of all audio transformers	Align for maximum amplitude
3. 7.75 to 8.75 MC Sweep	Control grid of 6B8		Superimpose an accurately calibrated 8.15 MC signal in parallel with sweep signal and mark center of beat "wiggle" on oscilloscope screen as in step 3 of Video IF alignment. Also obtain an 8.35 MC beat signal mark on the oscilloscope screen. The steep straight portion of the over-all audio IF response curve must extend between these limits.
4. 7.75 to 8.75 MC Sweep	Control grid of converter 6F8G	Iron cores of audio IF transformers T2, T3 and T4.	Adjust iron cores until curve has been shaped as shown by curve 5, Fig. 7. It is important that the steep side be straight between 8.15 and 8.35 MC. The more gradual slope on the other side should extend from 8.35 MC to approximately 8.7 MC. Very few turns of the cores should be required to obtain the desired result. No more than 30% loss in peak over-all response should result from this process.

Fig. 8. Television Alignment Curves



IMPORTANT NOTES

OTHER SERVICE DATA NOT LISTED IS THE SAME AS FOR THE ORIGINAL TELEVISION RECEIVER.

FOR SERVICE DATA ON THE REGULAR RADIO CHASSIS OF THE COMBINATION TELEVISION AND RADIO RECEIVER MODEL HM-226B, SEE MODEL HM226-7A.

CHANGE IN CIRCUIT OPERATION

The horizontal oscillator is a multi-vibrator with speed controlled by varying the small positive grid voltage through R-69. The horizontal pulses are passed through proper wave shaping and amplifier circuits to the horizontal deflection coils of the picture tube. Horizontal linearity is adjustable by varying R-91. Horizontal sweep size is controlled by R-60 in the plate circuit of the 6F8G. The series circuits across the primary and secondary of the 6AL6G output transformer damp the output transient. Damping is adjustable through R-100.

Stock No.	Description	Stock No.	Description
Television Chassis Parts Common to Radio			
*RB-008	BOARD—Terminal board (2 lug)	*RQ-1250	RESISTOR—1000 ohms 1/2 W. carbon (R-1, 7, 56, 73) (Pkg. 5)
*RB-013	BOARD—Terminal board (2 lug)	*RQ-1263	RESISTOR—1500 ohms 1/2 W. carbon (R-19, 33) (Pkg. 5)
*RB-723	BOARD—Terminal board (4 lug)	*RQ-1267	RESISTOR—2200 ohms 1/2 W. carbon (R-2, 9, 15, 17, 20, 25, 31, 36, 37, 39) (Pkg. 5)
*RB-058	BOARD—Terminal board (8 lug)	*RQ-1269	RESISTOR—2700 ohms 1/2 W. carbon (R-21, 27) (Pkg. 5)
*RB-060	BOARD—Ant. gnd. terminal board	*RQ-1271	RESISTOR—3300 ohms 1/2 W. carbon (R-30, 43) (Pkg. 5)
*RB-096	BOARD—Terminal board (3 lug)	*RQ-1275	RESISTOR—4700 ohms 1/2 W. carbon (R-48) (Pkg. 5)
*RB-621	BEZEL—Pilot light bezel	*RQ-1279	RESISTOR—6800 ohms 1/2 W. carbon (R-32, 96) (Pkg. 5)
RB-1026	BOARD—Terminal board (2 lugs and 2 anchor lugs)	*RQ-1283	RESISTOR—10,000 ohms 1/2 W. carbon (R-26, 42, 47, 56, 98, 107) (Pkg. 5)
RC-007	CAPACITOR—.001 mfd. 1500 V. paper (C-32)	*RQ-1293	RESISTOR—27,000 ohms 1/2 W. carbon (R-5, 41) (Pkg. 5)
RC-011	CAPACITOR—.002 mfd. 600 V. paper (C-60)	*RQ-1299	RESISTOR—47,000 ohms 1/2 W. carbon (R-4, 12, 28, 54) (Pkg. 5)
RC-023	CAPACITOR—.005 mfd. 600 V. paper (C-12, 14, 21, 22, 23, 24, 26, 28, 31, 32, 35, 37, 38, 40, 41, 43, 45, 46, 79)	*RQ-1307	RESISTOR—100,000 ohms 1/2 W. carbon (R-8, 14, 102) (Pkg. 5)
*RC-039	CAPACITOR—.01 mfd. 600 V. paper (C-74, 85, 86)	*RQ-1313	RESISTOR—180,000 ohms 1/2 W. carbon (R-13) (Pkg. 5)
*RC-048	CAPACITOR—.02 mfd. 600 V. paper (C-34, 67, 69, 70)	*RQ-1315	RESISTOR—220,000 ohms 1/2 W. carbon (R-11, 44, 61, 62, 63, 64, 66, 78, 87) (Pkg. 5)
RC-090	CAPACITOR—.04 mfd. 600 V. paper (C-56)	*RQ-1323	RESISTOR—470,000 ohms 1/2 W. carbon (R-49, 72, 82, 105) (Pkg. 5)
*RC-092	CAPACITOR—.05 mfd. 600 V. paper (C-29, 44, 49, 53, 59, 66)	*RQ-1331	RESISTOR—1.0 megohm 1/2 W. carbon (R-6, 10, 34, 43, 55) (Pkg. 5)
*RC-096	CAPACITOR—.01 mfd. 200 V. paper (C-25)	*RQ-1339	RESISTOR—2.2 megohms 1/2 W. carbon (R-57, 95) (Pkg. 5)
*RC-123	CAPACITOR—.01 mfd. 400 V. paper (C-51, 57)	*RQ-1355	RESISTOR—10 megohms 1/2 W. carbon (R-94) (Pkg. 5)
*RC-147	CAPACITOR—.25 mfd. 400 V. paper (C-87)	RQ-1457	RESISTOR—820 ohms 1 W. carbon (R-66)
*RC-156	CAPACITOR—.5 mfd. 100 V. paper (C-48, 71, 73)	*RQ-1483	RESISTOR—10,000 ohms 1 W. carbon (R-3, 24, 74)
*RC-202	CAPACITOR—4 mmf. mica L.P.F. (C-16)	*RQ-1491	RESISTOR—22,000 ohms 1 W. carbon (R-97)
*RC-226	CAPACITOR—10 mmf. mica (C-50)	*RQ-1497	RESISTOR—39,000 ohms 1 W. carbon (R-93)
RC-233	CAPACITOR—22 mmf. mica (C-52)	RQ-1510	RESISTOR—100,000 ohms 1 W. carbon (R-103)
RC-241	CAPACITOR—33 mmf. mica L.P.F. (C-15, 36)	RQ-1520	RESISTOR—470,000 ohms 1 W. carbon (R-80)
*RC-242	CAPACITOR—150 mmf. mica (C-27, 47)	RQ-1530	RESISTOR—2.2 megohms 1 W. carbon (R-22, 81, 82, 83, 84, 85, 86)
RC-243	CAPACITOR—160 mmf. mica L.P.F. (C-18, 58)	*RS-217	SOCKET—879—2 X 2 tube socket (Pkg. 5)
RC-281	CAPACITOR—220 mmf. mica L.P.F. (C-63)	RS-252	SOCKET—Octal tube socket
RC-289	CAPACITOR—330 mmf. mica L.P.F. (C-30, 92)	RS-257	SOCKET—Electrolytic mounting socket
RC-293	CAPACITOR—470 mmf. mica (C-61)	RS-267	SOCKET—Pilot light socket
RC-314	CAPACITOR—47 mmf. mica L.P.F. (C-1, 13)	RS-1023	SPEAKER—12 inch P.M. Speaker
RC-316	CAPACITOR—56 mmf. mica L.P.F. (C-33)	RT-954	TERMINAL—Speaker lead contact terminal (Pkg. 10)
RC-318	CAPACITOR—82 mmf. mica L.P.F. (C-7, 11)	*RW-101	WASHER—Felt washer for control knob (Pkg. 10)
*RC-429	CAPACITOR—30 mfd. 450 V. wet electrolytic (C-64, 68, 75, 76, 80)	RW-112	WASHER—I.F. tuning shaft tension washer (Pkg. 10)
RC-698	CAPACITOR—Coupling padder (C-2)	*RX-030	ASSEMBLY—Speaker mounting assembly
RC-1995	CLAMP—Anti-transformer clamp (Pkg. 5)	RX-063	ASSEMBLY—Electrolytic mounting assembly (washers and pal nuts)
RC-9016	CONE ASSEMBLY—12 inch P.M. speaker cone assembly		
*RG-016	GRID CLIP—6F6G control grid clip (Pkg. 5)		
RK-044	KNOB—Control knob and spring assembly (Pkg. 2)		
*RL-359	CHOKE—Filter choke (L-25)		
RP-129	BOARD—Speaker plug terminal board (Pkg. 2)		
RQ-640	RESISTOR—240 ohms 2 W. carbon 3/4 (R-71)		
*RQ-643	RESISTOR—270 ohms 2 W. carbon (R-35, 106)		
RQ-650	RESISTOR—820 ohms 2 W. carbon (R-50)		
*RQ-687	RESISTOR—15,000 ohms 2 W. carbon (R-46)		
RQ-694	RESISTOR—33,000 ohms 2 W. carbon (R-90, 104)		
*RQ-1215	RESISTOR—15 ohms 1/2 W. carbon (R-29) (Pkg. 5)		
*RQ-1241	RESISTOR—180 ohms 1/2 W. carbon (R-38, 108) (Pkg. 5)		
*RQ-1247	RESISTOR—330 ohms 1/2 W. carbon (R-89) (Pkg. 5)		
*RQ-1251	RESISTOR—470 ohms 1/2 W. carbon (R-40) (Pkg. 5)		

Television Chassis Parts Used in Television Only

RTB-500	KEY—Station selector key	RTO-1005	RESISTOR—150 ohms 7.4 W. wire wound (R-18)
RTB-1502	BACK COVER—Cardboard back cover for model HM-225	RTO-1006	RESISTOR—400 ohms 7.4 W. wire wound (R-77, 99)
RTB-1503	BACK COVER—Cardboard back cover for model HM-226-7A	RTO-1007	RESISTOR—1,500 ohms 6 W., 150 ohms 9 W. wire wound (R-59, 101)
RTB-2001	BUSHING—R.F. coil tuning bushing	RTQ-2010	RESISTOR—33 ohms 1 W. wire wound (R-88)
RTB-2500	BRACKET—Right R.F. unit support assembly	RTR-001	RING—Picture tube support ring
RTB-2501	BRACKET—Left R.F. unit support assembly	RTS-100	SOCKET—Power chassis power receptacle
RTC-1002	TRIMMER STRIP—Front station selector trimmer strip (C-8, 9, 10, 19, 20)	RTS-102	SOCKET—Power fuse socket
RTC-1003	TRIMMER STRIP—Top station selector trimmer strip (C-3, 4, 5, 83, 84)	RTS-103	SOCKET—6 prong connector socket
RTC-2000	CAPACITOR—.06 mfd. 4000 V. paper (C-77, 78)	RTS-301	SHAFT—R.F. coil tuning core shaft
RTC-3000	CAPACITOR—.20 mfd. 25 V. 40 mfd. 450 V. dry electrolytic (C-39, 72)	RTS-501	SWITCH—Station selector switch
RTC-3001	CAPACITOR—40 mfd. 25 V. dry electrolytic (C-62)	RTS-702	STUD—Focus coil adjustment stud
RTC-3002	CAPACITOR—10 mfd. 450 V. 5 mfd. 450 V. 20 mfd. 450 V. dry electrolytic (C-6, 54, 55, 65, 81)	RTS-703	SLEEVE—Picture tube rubber sleeve
RTC-5005	CONTROL—100,000 ohms horizontal speed control (R-69)	RTS-704	SCREW—Thumb screw for mounting picture tube bracket (Pkg. 2)
RTC-5007	CONTROL—2.0 megohms vertical linearity or size control (R-53, 65)	RTC-6000	CARD—Station No. 1 tab card (Pkg. 10)
RTC-5009	CONTROL—500,000 ohms vertical speed control (R-79)	RTC-6001	CARD—Station No. 2 tab card (Pkg. 10)
RTC-5011	CONTROL—10,000 ohms brightness or contrast control (R-52, 67)	RTC-6002	CARD—Station No. 3 tab card (Pkg. 10)
RTC-5012	CONTROL—200 ohms 2 W. focus control (R-75)	RTC-6003	CARD—Station No. 4 tab card (Pkg. 10)
RTC-5013	CONTROL—1000 ohms horizontal linearity control (R-91)	RTC-6004	CARD—Station No. 5 tab card (Pkg. 10)
RTC-5014	CONTROL—.5 megohm volume or tone control (R-16, 23)	RTC-6005	CARD—Station "Off" tab card (Pkg. 10)
RTC-5015	CONTROL—Tuning control (C-17)	RTC-7000	CORD—Power cord assembly
RTC-5025	CONTROL—1000 ohm horizontal size control (R-60)	RTC-7002	CABLE—Kinescope cable assembly on power chassis
RTL-1003	COIL—RF coil band No. 1 (L-5)	RTC-7003	CABLE—Interconnecting power cable assembly (First hole from rear on right side of receiver chassis)
RTL-1004	COIL—RF coil band No. 2 (L-6)	RTC-7004	CABLE—Interconnecting power cable assembly (Second hole from rear on right side of receiver chassis)
RTL-1005	COIL—RF coil band No. 3 (L-7)	KTC-8002	CLAMP—Picture tube clamp
RTL-1006	COIL—RF coil band No. 4 (L-8)	RTC-8003	CLAMP—Deflection yoke clamp
RTL-1007	COIL—RF coil band No. 5 (L-9)	RTC-8004	CLAMP—Dry electrolytic mounting clamp (.06 mfd. 4,000 V.)
RTL-2002	COIL—Converter-oscillator plate coil (1 1/2 turn) (T-15)	RTC-8005	CUSHION—9-inch picture tube cushion
RTL-2003	COIL—Converter-oscillator grid coil (1 turn) (T-15)	RTC-9006	CUSHION—12-inch picture tube cushion
RTL-3003	COIL—Oscillator tuning coil band No. 1 (L-10)	RTE-101	ESCUTCHEON—Television station selector escutcheon
RTL-3004	COIL—Oscillator tuning coil band No. 2 (L-11)	RTG-101	GRID CLIP—6A16G control grid clip
RTL-3005	COIL—Oscillator tuning coil band No. 3 (L-12)	RTG-102	GRID CAP—High voltage rectifier grid cap
RTL-3006	COIL—Oscillator tuning coil band No. 4 (L-13)	RTG-202	GROMMET—Receiver chassis grommets (1/4 inch dia. black)
RTL-3007	COIL—Oscillator tuning coil band No. 5 (L-14)	RTG-203	GROMMET—Power chassis grommet (1 inch dia.)
RTL-4004	CHOKE—Video choke (L-19)	RTG-300	GUIDE—Screwdriver guide on focus coil assembly
RTL-4005	CHOKE—Video choke (L-22)	RTI-001	INSULATOR—High voltage rectifier socket mounting board
RTL-4006	CHOKE—Video cathode choke (L-18)	RTI-002	INSULATOR—Television station trimmer strip mounting insulator board
RTL-4007	CHOKE—Video diode choke (L-16, 17)	RTI-003	INSULATOR—Stand off insulator
RTL-5500	COIL—Focusing coil (L-24)	RTS-705	SHIELD—Back cover tube projection shield for model HM-226-7A
RTL-8000	YOK—Deflection yoke (L-23)	RTS-800	SPRING—Picture tube support adjustment spring (Pkg. 5)
RTN-001	NUT—Pal nut for all controls (Pkg. 5)	RTT-0220	TRANSFORMER—High voltage power transformer (T-14)
RTP-001	PLUG—Female single slot plug on television chassis	RTT-0221	TRANSFORMER—Low voltage power transformer (T-13)
RTP-002	PLUG—Male plug on deflection yoke and focus cable	RTT-2000	TRANSFORMER—Antenna transformer (T-1)
RTO-1003	RESISTOR—400 ohms damping (R-100)		
RTO-1004	RESISTOR—400 ohms 17.9 W. wire wound (R-70)		

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Parts list continued.

RTT-3001	TRANSFORMER—1st video I.F. transformer (T-11)
RTT-3501	TRANSFORMER—2nd video I.F. transformer (T-6)
RTT-4001	TRANSFORMER—3rd video I.F. transformer (T-7)
RTT-4501	TRANSFORMER—4th video I.F. transformer (T-8)
RTT-5001	TRANSFORMER—5th video I.F. transformer (T-9)
RTT-6500	TRANSFORMER—Horizontal output transformer (T-12)
RTT-6750	TRANSFORMER—Vertical output transformer (T-16)
RTT-7001	TRANSFORMER—1st audio I.F. transformer (T-2)
RTT-7501	TRANSFORMER—2nd audio I.F. transformer (T-3)
RTT-8001	TRANSFORMER—3rd audio I.F. transformer (T-4)
RTT-9000	TRANSFORMER—Vertical oscillator transformer (T-10)
RTT-9500	TRANSFORMER—Audio output transformer (T-5)
RTW-501	WINDOW—Station letter window (Pkg. 5)
RTW-503	WINDOW—Safety glass window for Model HM-225
RTW-504	WINDOW—Safety glass window for Model HM-226-7A
RTX-1001	ASSEMBLY—Wave trap assembly (L-1, 2, 3, 4, C-1, 7, 11, 13)
RTX-1003	ASSEMBLY—Wave trap assembly (L-15, C-88)
RTX-2000	ASSEMBLY—Chassis mounting assembly

* Used on previous radio receivers.

CAUTIONARY INSTRUCTIONS

All adjustments not accessible with the back cover in place can be made without energizing the high-voltage circuits.

Servicing of the high-voltage circuits can be satisfactorily performed with the power-cord plug removed from any power supply outlet. A resistance check of the circuit components will indicate any trouble existing. **HIGH VOLTAGES SHOULD NEVER BE MEASURED.**

The "picture tube" is highly evacuated and is consequently subject to a very great air pressure. If it is broken, glass fragments will be violently expelled. Handle with care, using safety goggles and gloves.

The large end of the "picture tube"—particularly that part at the rim of the viewing surface—must not be struck, scratched or subjected to more than moderate pressure. **DO NOT FORCE THE SOCKET ONTO THE TUBE OR STRAIN ANY EXTERNAL CONNECTIONS.** If it fails to slip into place smoothly, investigate and remove the cause of the trouble.

Extremely high voltages (4000 volts or more) are used in the operation of this receiver; therefore, every precaution must be exercised to insure safety to the service engineer and to the customer.

The back cover, while in place, protects the user and should never be removed except by a qualified television service engineer.

The power-cord plug should not be inserted in a power supply outlet until a good, solid ground connection has been properly made to the receiver chassis.

For safety, the following operations must be performed with power plug disconnected before working on the receiver with the back cover removed:

1. Remove 879/2X2 tube from socket.
2. Detach top cap lead of 879/2X2 tube and insulate the contact end of this cap lead.
3. Ground the receiver chassis.

TELEVISION RECEIVER CIRCUITS

The television receiver circuits are divided into the following sections:

1. R.F. Unit
2. Converter-Oscillator and Amplifier
3. Audio Unit
4. Video Unit
5. Sync Pulse Clipper—Amplifier
6. Horizontal Oscillator—Output
7. Vertical Oscillator—Output
8. Low Voltage Rectifier
9. High Voltage Rectifier

R. F. Unit

This unit, comprising all circuits between the antenna terminal posts and the converter grid, consists of a high pass

filter input, a series tuned antenna coil primary, a shunt capacity coupled secondary (C-2) and a video I.F. wave trap (C-88, L-15). The wave trap is broadly tuned at 11.75 M.C. to prevent I.F. interference. Any one of the five tuned circuits for each of the five television transmission bands can be connected into the secondary circuit by pressing the appropriate button. The secondary circuit trimmers when properly tuned give a broad, flat response curve.

Converter-Oscillator and Amplifier

A plate-tuned oscillator is used with vernier tuning permitted from the front control panel through trimmer C-17. The resultant video I.F. signal of 12.75 M.C. and the audio I.F. signal of 8.25 M.C. developed in the converter-oscillator tube circuit is coupled through transformer T-11 to the 1852 amplifier tube.

Audio Unit

The audio unit is a conventional-type superheterodyne sound receiver with the I.F. stages tuned to 8.25 M.C. The audio I.F. signal is taken off through the suppressor of the 1st video I.F. tube.

Video Unit

This unit includes all the video I.F. amplifier stages, the video detector, two stages of video amplification and the picture tube input. Three wave traps are provided in this unit; one at T-6 for rejecting the audio I.F. of the adjacent television band, one at T-7 for rejecting the audio I.F. of the band concerned, and one in the cathode circuit of the 1st video, 6F8G, comprising L-18 and C-52, for removing the 12.75 M.C. video I.F. from the detected signal amplifier stages. A sensitivity control, known as contrast control, (R-67), is provided in the AVC circuits of the 6H6 video detector for varying the grid bias on the 2nd and 3rd video I.F. tubes.

D.C. reinsertion (automatic background control) is accomplished in the 2nd-video 6F6G tube circuit by using part of the varying screen voltage developed across R-93 to control the picture tube grid voltage. A high impedance voltage divider, R-94 and R-95, is used and the coupling condenser, C-38, is made small to prevent low frequency variations in the plate supply from getting to the picture tube grid.

Sync-pulse Clipper—Amplifier

Sync-pulses are taken off the plate of the right section of the 1st video and clipper tube, 6F8G. The video signals are separated by tube cut-off since the plate voltage is only about 10 volts. The sync-pulses are then amplified in the sync amplifier tube and coupled through a high-pass filter to the grid of the horizontal oscillator.

Horizontal Oscillator—Output

The horizontal oscillator is a multi-vibrator with speed controlled by varying the small positive grid voltage through R-69. The horizontal pulses are passed through proper wave shaping and amplifier circuits to the horizontal deflection coils of the picture tube. Horizontal linearity is adjustable by varying R-91. Horizontal sweep size is controlled by R-60 in the cathode circuit of the 6AL6G. The degeneration resistor R-22 and series circuit across the secondary of the 6AL6G output transformer damp the output transient. Damping is adjustable through R-100.

Vertical Oscillator—Output

Vertical sync-pulses are separated from the horizontal pulses in the vertical clipper right section of 6F8G and are fed to the vertical oscillator. This oscillator is of the blocking type, transformer coupled. The generated sawtooth wave across C-70 is shaped by the vertical linearity control, R-53. The speed of the oscillator is controlled by R-79 and the length of sweep (size) is adjustable through R-65. The output is amplified and coupled to the vertical deflection coils of the picture tube.

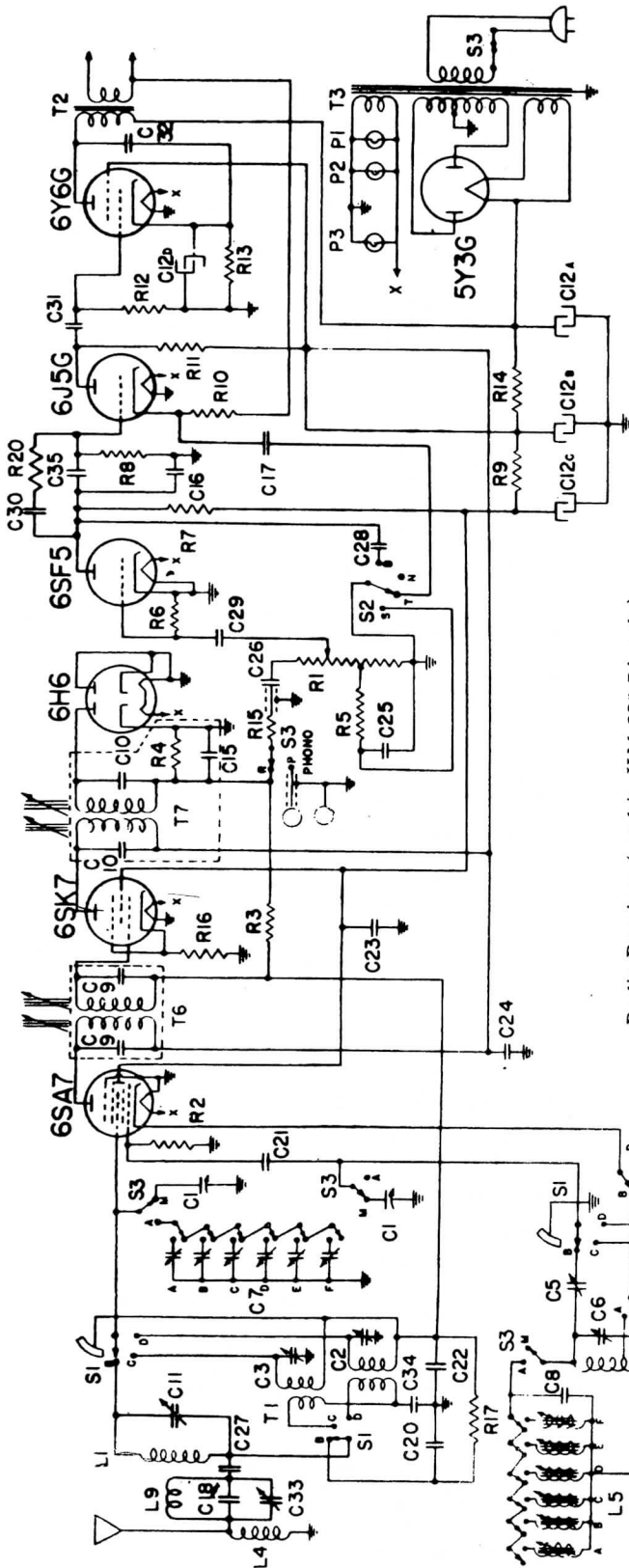
Low-voltage Rectifier

Two 5U4G rectifiers are necessary to supply plate current which is over 300 ma. A combination of choke and resistance filters is used so that the audio and oscillator plate supplies will be free from video and sweep signals.

High-voltage Rectifier

The high voltage rectifier uses a resistance filter. The bleeder is connected across the filter input to reduce ripple. R-103 is inserted in the plate lead for protection.

GENERAL ELECTRIC CO.



Radio Receiver (used in HM-226-7A only)
Band "B".....540-1600 K.C.
Band "C".....2.1-6.5 M.C.
Band "D".....6.25-22.5 M.C.

Fig. 12. Radio Schematic Diagram
(Model HM-226-7A only)

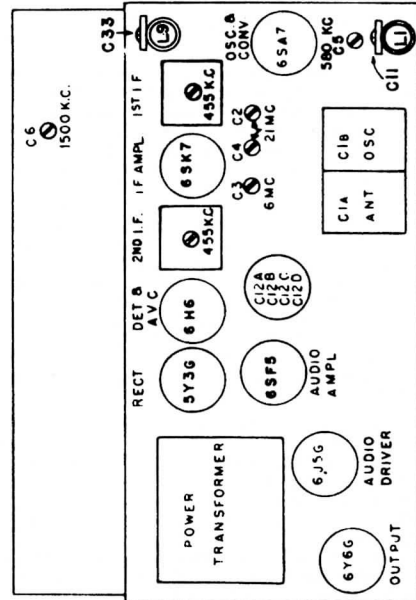


Fig. 11. Radio Chassis Trimmer Location
(Model HM-226-7A)

- Radio (used in HM-226-7A only)
- Converter-Oscillator..... GE-6SA7
 - I.F. Amplifier..... GE-6SK7
 - Detector and AVC..... GE-6H6
 - 1st Audio Amplifier..... GE-6SF5
 - 2nd Audio Amplifier..... GE-6J5G
 - Audio Output..... GE-6Y6G
 - Rectifier..... GE-5Y3G
 - Dial Lamps..... (3) Mazda No. 44

Loud-speaker—"Ahnico" *Magnetic Dynamic*
Type of Cone..... Curvilinear
Cone Diameter..... 12 inches
Voice Coil Impedance (400 cycles)..... 3.5 ohms

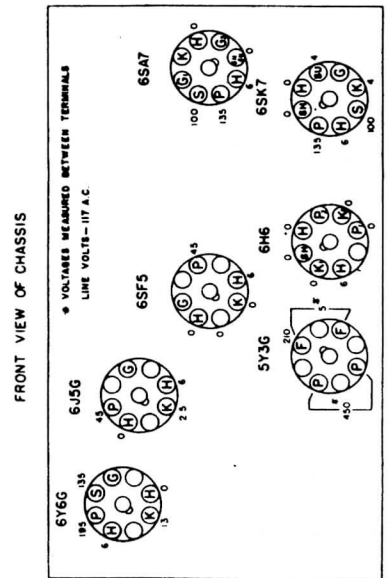


Fig. 13. Radio Chassis Socket Voltages
VOLTAGES MEASURED BETWEEN SOCKET
TERMINALS AND CHASSIS.
Band "B." No signal input. Max. volume.

GENERAL ELECTRIC CO.

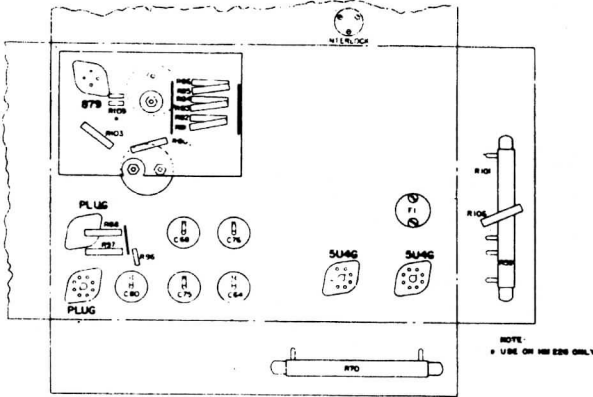


Fig. 10. Power Chassis Parts Layout
LOUD-SPEAKER

To center the voice coil, loosen the two screws which clamp the speaker spider in position. These two screws are available from the rear of the speaker. Shift the spider around until the voice coil is centered, then tighten the screws in position.

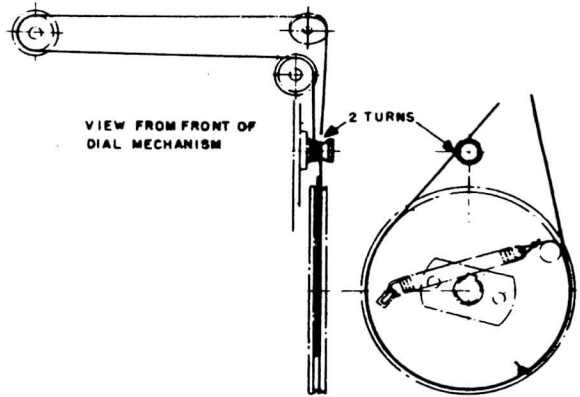


Fig. 14. Dial Drive Stringing Diagram
PHONOGRAPH CONNECTIONS

Model HM-226-7A radio receiver is equipped with a phono-terminal (pin jack) to allow the convenient connection of a record player. General Electric plug, Stock No. RP-145, fits the pin jack.

NOTE—A suitable load consisting of a 100,000 ohm resistor in series with a .01 mfd. capacitor should be connected across the pick-up leads when using a crystal-type unit.

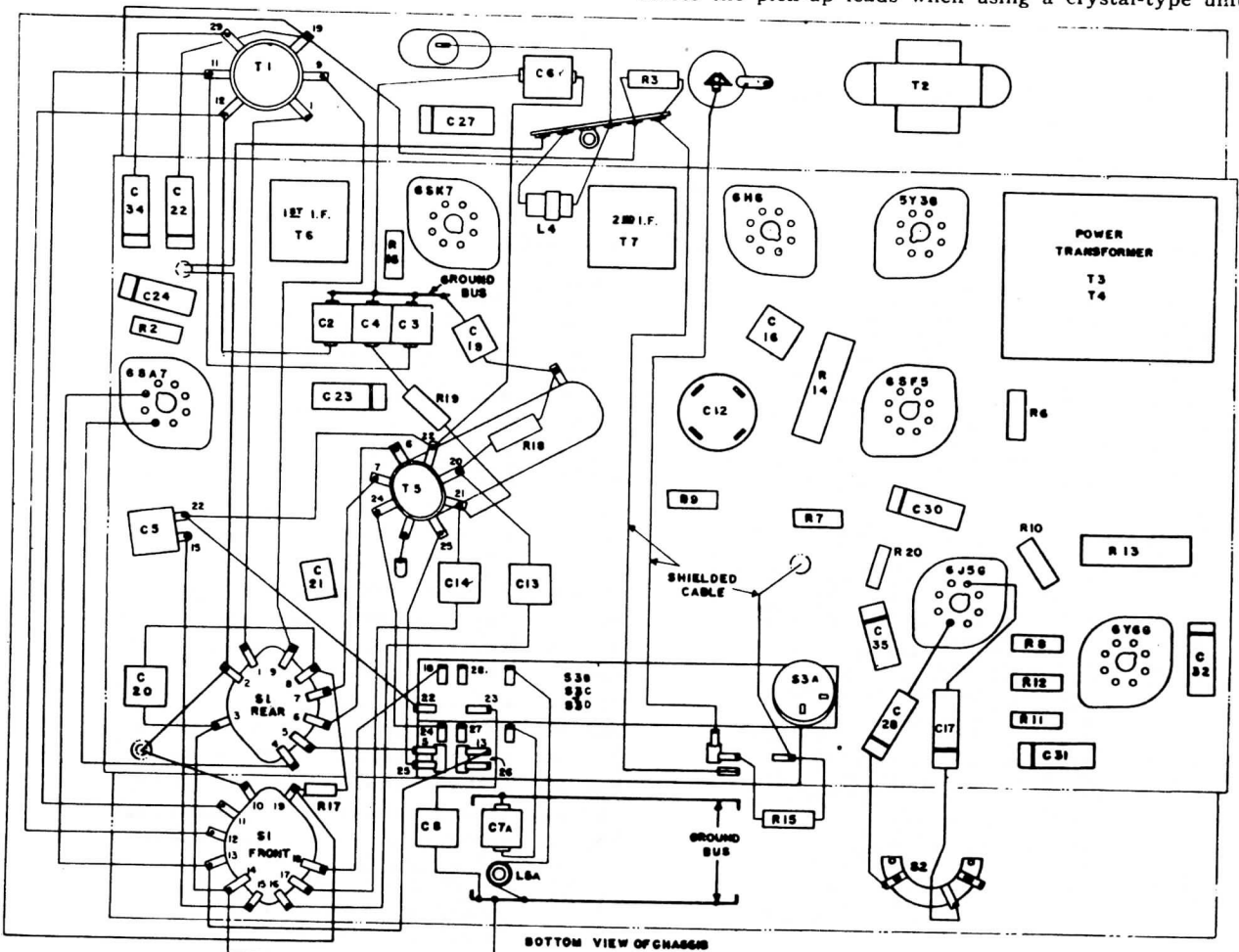


Fig. 15. Radio Chassis Parts Layout
(Model HM-226-7A only)

RADIO ALIGNMENT PROCEDURE

(Model HM-226-7A only)

I. F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. 2nd I.F. Pri. (T-7)	Gang condenser plates closed—"Manual" key depressed—connect audio input of oscilloscope to chassis and to junction of R-3 and R-15. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. 1st I.F. Pri. (T-6)	

I. F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. 2nd I.F. Pri. (T-7)	Gang condenser plates closed—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. 1st I.F. Pri. (T-6)	

R. F. ALIGNMENT

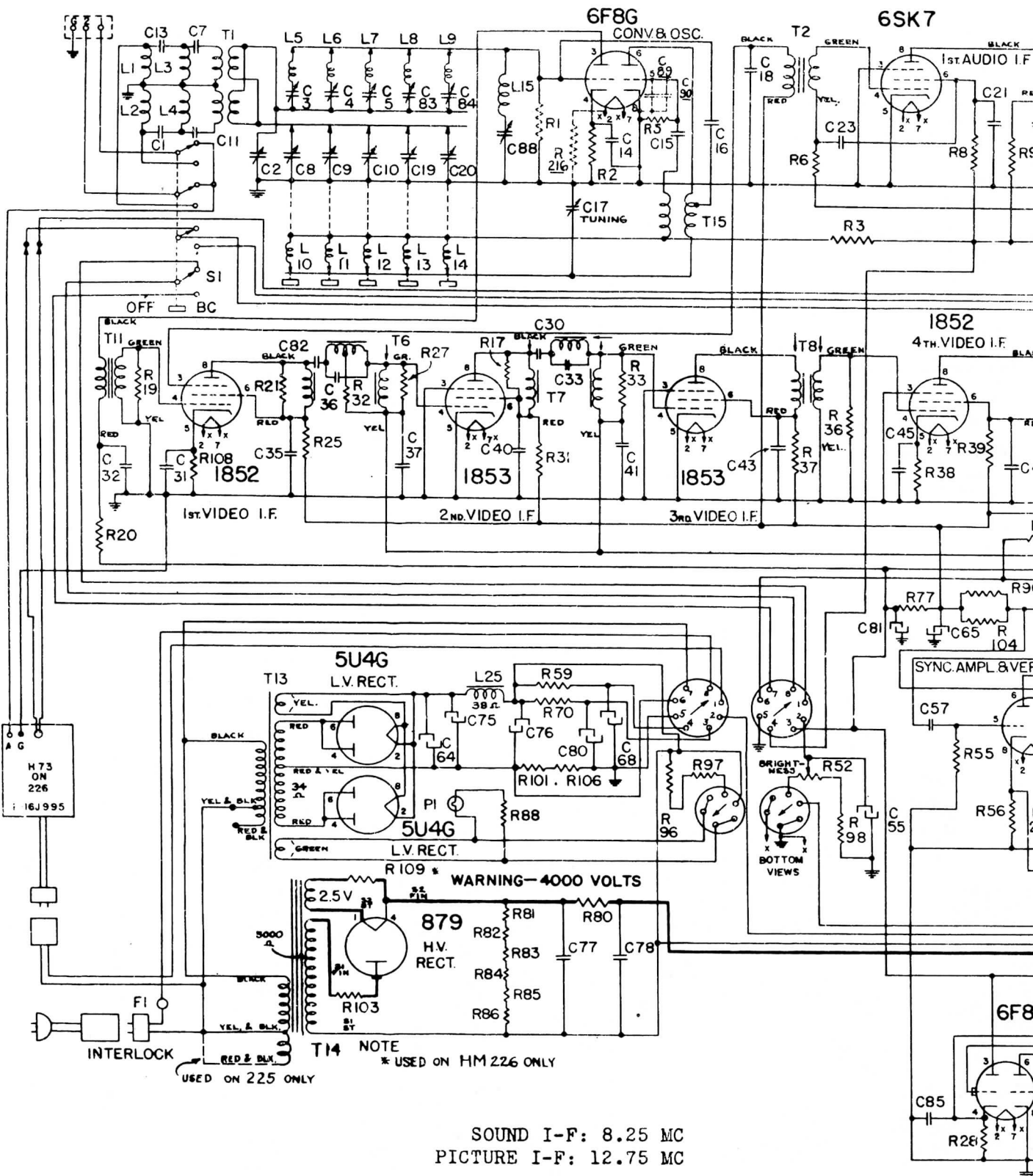
1. Band "B"					Close gang plates—adjust pointer to first line at left end of tuning scale. Connect output meter across voice coil—tone control on "Bass" position. The image of any "D" band signal should be heard 910 K.C. below signal input when (C-4) is on proper peak. Example: 18 M.C. image, 17.09 M.C. Peak (C-2) while rocking the gang condenser. Peak for maximum output with a low input signal. Align (C-6) on 1500 K.C. and peak output with (C-11). Align for maximum output with a low input signal, rocking gang condenser. Retrim at 1500 K.C.
2. Band "D"	21 M.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-4) Ant. (C-2)	
3. Band "C"	6 M.C. with Modulation	Antenna Post	I.R.E.	Ant. (C-3)	
4. Band "B"	1500 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-11)	
5. Band "B"	580 K.C. with Modulation	Antenna Post	I.R.E.	Osc. Padder (C-5)	
6. Band "B"	1500 K.C. with Modulation	Antenna Post	I.R.E.	Osc. (C-6) Ant. (C-11)	

RADIO CHASSIS PARTS

(Model HM-226-7A Radio)

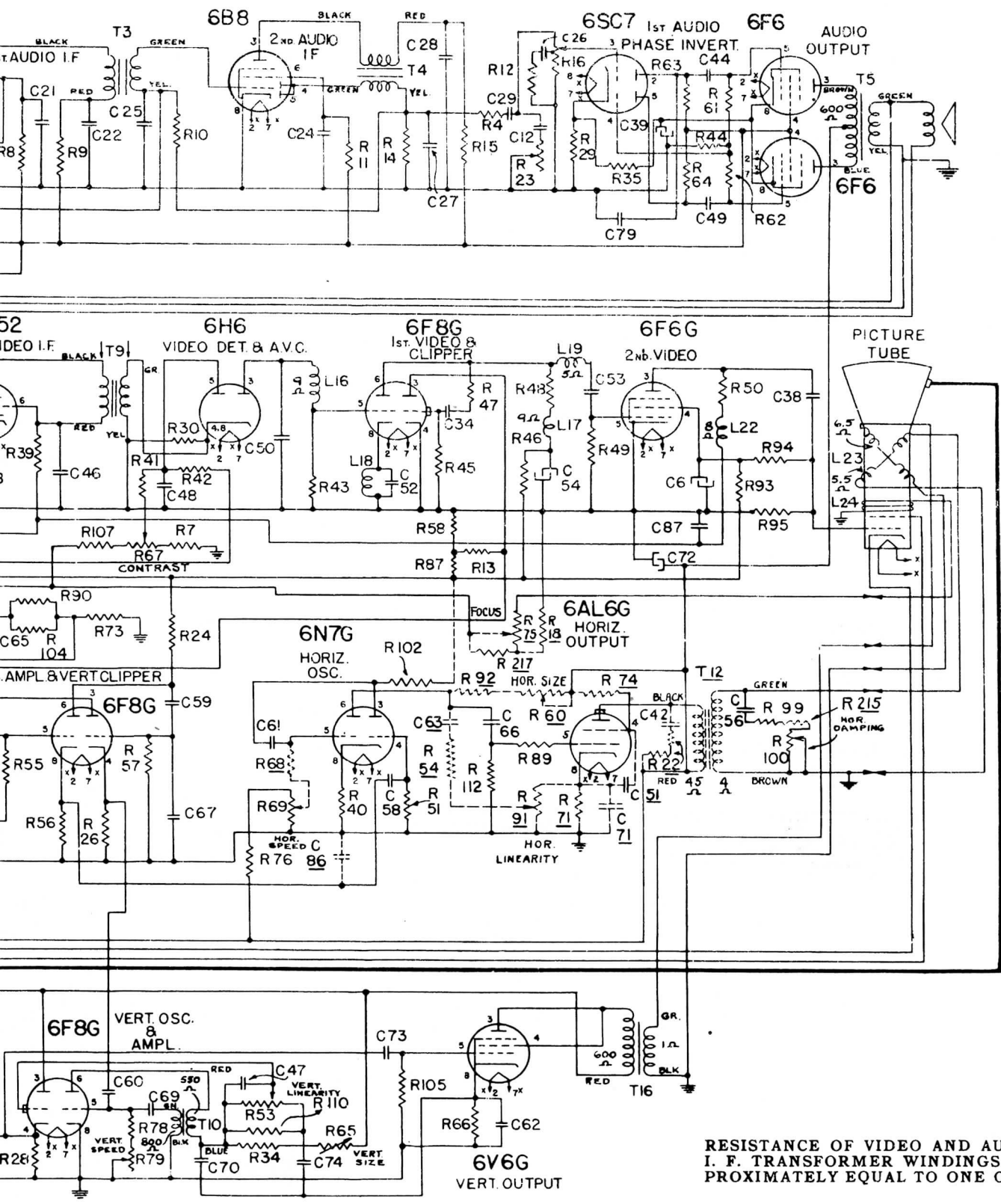
*RB-008	BOARD—Terminal board (2 lug)	RK-044	KNOB—Radio control knob (Pkg. 2)
*RB-009	BOARD—Terminal board (1 lug)	RK-204	KEY—Station key
*RB-026	BOARD—Antenna terminal board	RL-083	COIL—C and D band antenna coil (T-1)
*RB-046	BOARD—Terminal board (5 lug)	RL-096	COIL—B band antenna coil (L-1)
*RB-096	BOARD—Terminal board (3 lug)	RL-287	COIL—Oscillator coil (T-5)
RB-098	BOARD—Ant. gnd. terminal board	RL-345	CHOKE—Antenna choke (L-4)
RB-625	BUSHING—Tuning control shaft bushing	RL-606	COIL—Wave trap coil (L-9)
RB-1009	BOARD—Phono terminal board	RL-9510	COIL—Station selector coil assembly (L-5)
*RC-009	CAPACITOR—.001 mfd. 600 V. paper (C-35)	RM-501	MASK—Dial scale mask (Pkg. 10)
RC-016	CAPACITOR—.002 mfd. 600 V. paper (C-28)	RP-127	POINTER—Dial pointer assembly (Pkg. 5)
*RC-023	CAPACITOR—.005 mfd. 600 V. paper (C-26, 30)	*RP-303	PULLEY—Pulley and C clip (Pkg. 2)
*RC-039	CAPACITOR—.01 mfd. 600 V. paper (C-29)	RQ-642	RESISTOR—220 ohms 2 W. carbon (R-13)
*RC-048	CAPACITOR—.02 mfd. 600 V. paper (C-17, 25, 31)	RQ-670	RESISTOR—3,300 ohms 2 W. carbon (R-14)
*RC-060	CAPACITOR—.03 mfd. 600 V. paper (C-32)	*RQ-1231	RESISTOR—68 ohms 1/2 W. carbon (R-19) (Pkg. 5)
*RC-092	CAPACITOR—.05 mfd. 600 V. paper (C-22, 23, 24, 34)	*RQ-1239	RESISTOR—150 ohms 1/2 W. carbon (R-18) (Pkg. 5)
*RC-096	CAPACITOR—.01 mfd. 200 V. paper (C-27)	*RQ-1251	RESISTOR—470 ohms 1/2 W. carbon (R-16) (Pkg. 5)
*RC-206	CAPACITOR—50 mmf. wax treated mica (C-21)	*RQ-1271	RESISTOR—3,300 ohms 1/2 W. carbon (R-10) (Pkg. 5)
RC-233	CAPACITOR—22 mmf. mica (C-19)	*RQ-1273	RESISTOR—3,900 ohms 1/2 W. carbon (R-9) (Pkg. 5)
*RC-235	CAPACITOR—100 mmf. mica (C-15, 16)	*RQ-1291	RESISTOR—22,000 ohms 1/2 W. carbon (R-2) (Pkg. 5)
RC-307	CAPACITOR—750 mmf. silvered mica (C-8)	*RQ-1299	RESISTOR—47,000 ohms 1/2 W. carbon (R-15, 17) (Pkg. 5)
RC-337	CAPACITOR—1,600 mmf. mica *5% (C-18)	*RQ-1301	RESISTOR—56,000 ohms 1/2 W. carbon (R-5) (Pkg. 5)
RC-358	CAPACITOR—2,000 mmf. mica *5% (C-13)	*RQ-1307	RESISTOR—100,000 ohms 1/2 W. carbon (R-11) (Pkg. 5)
RC-394	CAPACITOR—4,700 mmf. mica *5% (C-20)	*RQ-1315	RESISTOR—220,000 ohms 1/2 W. carbon (R-7) (Pkg. 5)
RC-396	CAPACITOR—5,600 mmf. mica *5% (C-14)	*RQ-1319	RESISTOR—330,000 ohms 1/2 W. carbon (R-12) (Pkg. 5)
RC-875	CABLE—Power cable	*RQ-1323	RESISTOR—470,000 ohms 1/2 W. carbon (R-4, 20) (Pkg. 5)
RC-1987	CLAMP—Oscillator and antenna coil clamp (Pkg. 2)	*RQ-1331	RESISTOR—1.0 megohm 1/2 W. carbon (R-8) (Pkg. 5)
RC-1989	CUSHION—Condenser cushion (Pkg. 5)	RQ-1339	RESISTOR—2.2 megohms 1/2 W. carbon (R-3) (Pkg. 5)
RC-5130	CAPACITOR—40 mfd. 300 V.; 20 mfd. 300 V.; 20 mfd. 300 V.; 20 mfd. 25 V. dry electrolytic (C-12a, 12b, 12c, 12d)	*RQ-1365	RESISTOR—15 megohm 1/2 W. carbon (R-6) (Pkg. 5)
RC-6509	CAPACITOR—B band padder (C-5)	*RS-236	SOCKET—Radio dial light socket
RC-6510	CAPACITOR—B band oscillator trimmer (C-6)	RS-252	SOCKET—Octal tube socket
RC-6523	CAPACITOR—B band antenna trimmer (C-11)	RS-253	SOCKET—Electrolytic mounting socket
RC-6524	CAPACITOR—Wave trap trimmer (C-33)	RS-285	SOCKET—Bezel pilot lamp socket
RC-7011	CONDENSER—Tuning condenser (C-1a, 1b)	*RS-401	SPRING—Drive cord spring (Pkg. 2)
RC-8125	CABLE—Condenser drive cable assembly	RS-924	SHAFT—Tuning control shaft
RC-8141	CABLE—Power cable to radio (Power chassis end)	RT-862	TRIMMER STRIP—Station selector trimmer strip (C-7a, 7b, 7c, 7d, 7e, 7f)
RC-8500	CARD—Station letter cards (1 set)	RT-863	TRIMMER STRIP—D and C antenna trimmers, D oscillator trimmer (C-2, 3, 4)
RC-8505	CARD—Key manual tab card (Pkg. 10)	*RT-952	TERMINAL—Speaker lead terminal (Pkg. 10)
RC-8507	CARD—Key off tab card (Pkg. 10)	RV-067	VOLUME CONTROL—2 megohm volume control (R-1)
RC-8512	CARD—Key phono tab card (Pkg. 10)	*RW-101	WASHER—Knob felt washer (Pkg. 10)
RD-135	DIAL—Radio dial	RW-908	WHEEL—Dial tuning volume wheel
RD-407	DRUM—Condenser drive drum assembly		
RE-204	ESCUTCHEON—Station key escutcheon		
RE-205	ESCUTCHEON—Tuning and volume escutcheon		
RH-006	HAIRPIN COTTER—Tuning drive shaft hairpin cotter (Pkg. 10)		
RS-3022	SWITCH—Station selector switch (S-3)		
RS-3047	SWITCH—Tone control switch (S-2)		
RS-3048	SWITCH—Band change switch (S-1)		
RT-0520	TRANSFORMER—60 cycle power transformer (T-3)		
RT-313	TRANSFORMER—1st I.F. transformer (T-6)		
RT-314	TRANSFORMER—2nd I.F. transformer (T-7)		
RT-462	TRANSFORMER—Output transformer (T-2)		

* Used on previous radio receivers.



SOUND I-F: 8.25 MC
PICTURE I-F: 12.75 MC

ELECTRIC CO.



RESISTANCE OF VIDEO AND AUDIO I. F. TRANSFORMER WINDINGS APPROXIMATELY EQUAL TO ONE OHM

Tubes

- Television
- Converter-Oscillator..... GE-6F8G
- 1st Audio I.F. Amplifier..... GE-6SK7
- 2nd Audio I.F. Amplifier..... GE-6B8
- Audio Amplifier and Phase Inverter..... GE-6SC7
- Audio Output..... (2)GE-6F6
- 1st and 4th Video I.F. Amplifier..... (2)GE-1852/6AC7
- 2nd and 3rd Video I.F. Amplifier..... (2)GE-1853/6AB7
- Video Detector and AVC..... GE-6H6
- 1st Video Amplifier and Sync. Clipper..... GE-6F8G
- 2nd Video Amplifier..... GE-6F6G
- Sync. Amplifier and Vertical Clipper..... GE-6E8G
- Vertical Oscillator and Amplifier..... GE-6F8G
- Horizontal Oscillator..... GE-6N7G
- Vertical Output..... GE-6V6G
- Horizontal Output..... GE-6AL6G
- Low Voltage Rectifier..... (2)GE-5U4G
- High Voltage Rectifier..... GE-879/2X2
- Picture Tube (HM-225)..... GE-MW-22-2
- Picture Tube (HM-226-7A)..... GE-MW-31-3

Intermediate Frequencies

- Television Video (Picture)..... 12.75 M.C.
- Television Audio..... 8.25 M.C.
- Radio..... 455 K.C.

Maximum Electrical Output

- Television Audio..... 10 Watts
- Radio Audio..... 5 Watts

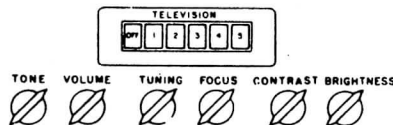
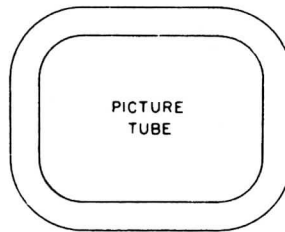


Fig. 1. Front Control Location Model HM-225

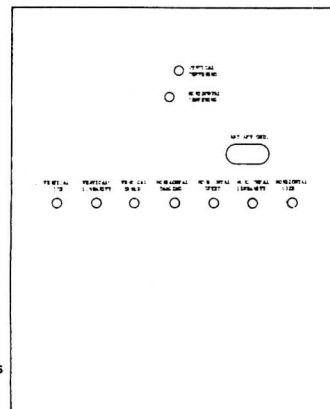


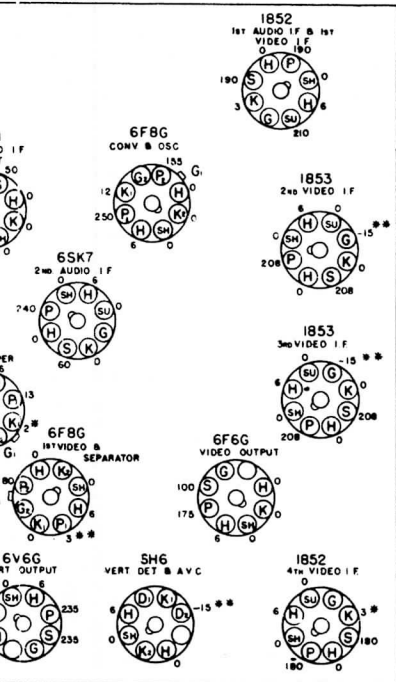
Fig. 3. Rear Control Location Model HM-225

Picture Size

Model.....	HM-225	HM-226-7A
Height.....	5 3/4 inches	7 1/2 inches
Width.....	7 3/4 inches	10 inches

Continuously variable
4-position

VIEW OF CHASSIS



SOCKET TERMINAL AND CHASSIS CONNECTIONS
MAXIMUM, COUNTERCLOCKWISE EXCEPT VOLUME
MINIMUM VOLUME

1000 OHMS PER VOLT METER
1030 OHMS PER VOLT METER

VIEW OF CHASSIS

Socket Voltages

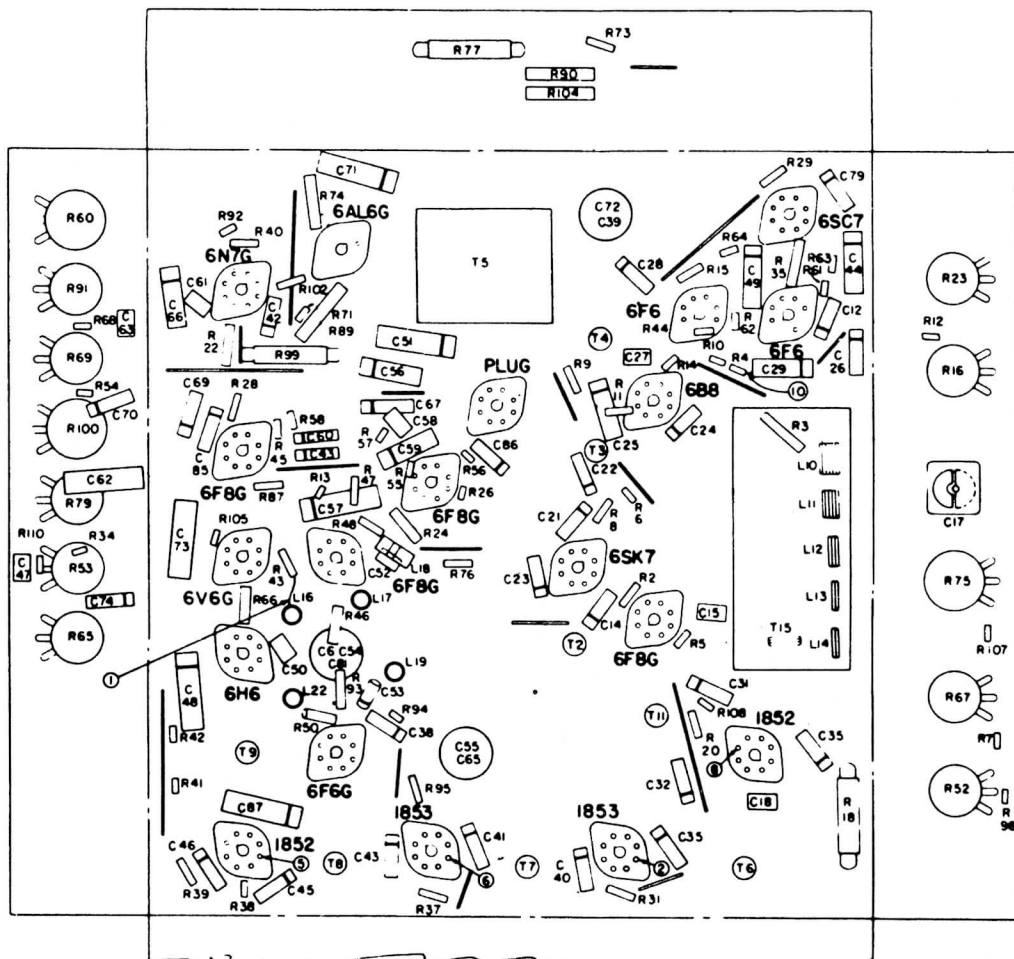


Fig. 5. Television Chassis Parts Layout Models HM-225 and HM-226-7A

RECOMMENDED PROCEDURE FOR READJUSTING THE R.F. CIRCUITS TO CONFORM TO THE NEW TELEVISION FREQUENCY ALLOCATIONS ON THE LOWER CHANNELS.

Necessary Equipment:

- (1) Oscilloscope - G.E. Model CRO-5-S or equivalent.
- (2) Wide-band sweep oscillator capable of sweeping the following bands:

(a) 54 to 60 MC	(c) 66 to 72 MC	(e) 82 to 88 MC
(b) 60 to 66 MC	(d) 76 to 82 MC	
- (3) Accurately calibrated absorption wave-meter with a frequency range of at least 54 to 88 MC.
- (4) Accurately calibrated signal generator with a frequency range of at least 59.75 to 87.75 MC with 30% tone modulation.
- (5) 50,000 ohm 1/2-W resistor.

PROCEDURE FOR CIRCUITS ASSOCIATED WITH #1 PUSH BUTTON.

1. Disconnect R-2 from ground and connect a 50,000 ohm resistor in series with it to ground.
2. Remove all rectifier tubes.
3. Connect vertical input of oscilloscope across R2 and the 50,000 ohm resistor.
4. Connect wide band sweep generator to antenna terminals and adjust for a 54-60 MC sweep. Output of generator should be set near maximum.
5. Depress the #1 push-button (heaters should be on) and adjust sweep and sync controls on scope to give a curve similar to Fig. 1.
6. Turn band width adjustment coupling condenser C-2 in until tight, then open approximately 1/16 of a turn.
7. Check location of the 54 and 60 MC points on the curve with the absorption wave-meter.
8. Adjust trimmers C-3 and C-8 until the 54 and 60 MC points appear on the curve as shown in Fig. 2. It will probably be necessary to decrease the inductance of L-5 somewhat by spreading the coil, before the 54 and 60 MC points come in at the proper place.
9. Remove the 50,000 ohm resistor, connect R-2 back to ground, remove scope and replace rectifier tubes.
10. Disconnect wide band sweep generator from antenna terminals and connect in its place the modulated signal generator adjusted to exactly 59.75 MC.

11. Set tuning control C-17 to mid-rotation. Adjust brass slug of L-10 until maximum audio tone is heard, with volume control turned partially up. If slug does not have sufficient range, it will be necessary to decrease the inductance of L-10 somewhat by spreading the coil.

PROCEDURE FOR CIRCUITS ASSOCIATED WITH #2 P.B.

1. Same as for the #1 P.B.
2. ditto
3. "
4. " - except that the oscillator is adjusted for a 60-66 MC sweep.
5. Depress the #2 push button.
6. Do not readjust C-2. Check location of the 60-66 MC points on curve with absorption wave-meter. The 60-66 MC points should appear on curve as shown in Fig. 3 without any adjustment since these circuits have already been aligned at this frequency 60-66 MC. However, if the 60-66 MC points do not appear at the proper place on curve, it will be necessary to adjust trimmers C-4 and C-9 until they do.
7. Same as in step #9 for the #1 P.B.
8. " " " " #10 " " " " - except that the modulated generator is adjusted to exactly 65.75 MC.
9. Same as in step #11 for the #1 P.B. - except that the brass slug of L-11 is adjusted and it should not be necessary to adjust the coil itself.

PROCEDURE FOR CIRCUITS ASSOCIATED WITH #3 P.B.

1. Same as for the #1 P.B.
2. ditto
3. "
4. " - except that the oscillator is adjusted for a 66-72 MC sweep.
5. Depress the #3 push button.
6. Check location of the 66-72 MC points on curve with absorption wave-meter. They should appear as shown in Fig. 4 without any adjustment since these circuits have already been aligned at this frequency 66-72 MC. If necessary, adjust trimmer C-5 and C-10 for proper location of the 66-72 MC points.
7. Same as in step #9 for the #1 P.B.
8. Same as in step #10 for the #1 P.B. - except that the modulated signal generator is adjusted to exactly 71.75 MC.
9. Same as in step #11 for the #1 P.B. - except that the brass slug of L-12 is adjusted.