TELEVISION RECEIVER

MODEL GM-295

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I. DESCRIPTION

The Model GM-295 television receiver is a deluxe combination sight and sound reproducer, incorporating the latest refinements of mechanical design and technical improvement. The combined influence of electrical, video and acoustical treatment results in reception characterized by high definition pictures and tonal reproduction of remarkable realism.

The complete receiver consists of a dual power supply with safety interlocks, a video receiver with its picture tube, and a hi-fidelity sound receiver with its loudspeaker unit. The picture is reproduced in black and white contrast and is viewed indirectly from a mirror in the lid of the cabinet.

By careful design, this receiver is built to give noteworthy performance, simplicity of operation and trouble-free performance. Read the following instructions carefully before attempting to operate.

II. INSTALLATION

After unpacking the receiver, remove the back cover from the cabinet and unpack the accessory cartons. All of the glass tubes are shipped in cartons to prevent possible breakage during shipment. Place them in their proper sockets as shown on the chassis rating label.

Place the knobs (found in an envelope) on the control shafts under the top lid of the receiver. These knobs are easily attached by merely pushing them on. Felt washers found in the envelope should be placed between the knobs and the control panel.

Make certain:

1. That all tubes are in place and pressed down in their proper sockets.

2. That the grid leads are securely attached to the dome terminals of the proper tubes.

3. That a good ground lead is securely fastened to the ground terminal of the antenna terminal strip.

4. That the antenna transmission line is connected to the other terminals of the antenna terminal board.

Note: The power plug is attached to the cabinet back cover in such a manner that all power line circuits are opened by removal of this back cover. Be sure this plug and back are removed before doing any work on the receiver.

Tubes - This receiver is equipped and tested at the factory with the tubes that are shipped with it. In case of replacement be sure to remove the back cover and the power plug.

Picture Tube Installation

The picture tube is packed in a separate carton to prevent breakage during shipment. Before attempting to place this in position in the receiver. protect your eyes with a pair of goggles and wear a heavy pair of gloves to prevent flying glass injuring you in case of tube breakage. To install proceed as follows:

1. Remove picture tube window and frame from under top lid of cabinet. This is accomplished by removing the two front wood screws and sliding the frame out.

2. Spring the cabinet lid hinge and then open lid as far back as possible.

3. Unpack the picture tube except for the cardboard jacket that surrounds it. Remove the cardboard cap from the tube.

4. Gently place the tube in position, guiding the base thru the deflecting yoke. Lower the tube until it comes to rest on the supports making sure the anode lead hole in the side of the tube's cardboard jacket is to the right (from rear of cabinet) and lines up with the hole in the steel shield between the tube and the loudspeaker.

5. Connect the picture tube socket on the base of the tube and clip the plate lead onto the picture tube cap on the side of the tube. Also, connect the green lead from the picture tube socket to the lead coming directly out of the main amplifier chassis near the 6L6G video output tube.

Power Supply

This receiver will operate on a power supply of 115-125 volts at 60-cycles. Before plugging the receiver power cord into the receptacle, make sure that the voltage and frequency supplied your home conforms with this rating.

Antenna and Ground

For ordinary installations, an antenna of the half-wave doublet type is recommended. The actual length of the doublet chosen should be about one-half wave length over-all and should be calculated for the center of the radio frequency range in which it is desired to operate the receiver. The doublet should be located at as high a point as possible, both high in altitude and high above electrical ground. In orienting the doublet, it should be taken into account that it has maximum response when located at right angles to the direction of the signal. From the center of the doublet, a two conductor transmission line of about 100 ohms impedance and relatively low attenuation, should carry the signal to the two antenna input terminals of the receiver. A good ground to a cold water pipe should be connected to the ground terminal on the receiver.

In regions where there is reception difficulty, due to optical echos, a special antenna installation may be required. In such cases, each installation must be handled as an individual problem and no general solution can be offered beforehand.

Installation and Operating Precautions

1. This receiver uses a voltage of 6,000 volts on some parts of the circuit. Unless thoroughly acquainted with the receiver, do not attempt to service or adjust.

2. Due to a power interlock on the cabinet cover, it is necessary that this cover be in place before power can be applied to the receiver.

3. Due to the high vacuum in the picture tube, always wear heavy gloves and safety goggles when handling. In case of breakage, this tube crumbles into thousands of small flying particles.

4. Make sure a good ground connection is always connected to the receiver. This prevents any possible component failures from placing fatal high voltages on the chassis ground.

5. Cable plugs should be checked to make sure that they fit snugly in their respective sockets.

6. The side door does not have a power supply interlock and therefore, no work should be done on this chassis unless it is thoroughly grounded. When the side cover is open, it provides access to the low voltage circuits only.

III. OPERATION

Underneath the top lid of the cabinet are the only operating controls necessary to adjust the video and sound receivers for optimum results. These consist of five control knobs, seven television program keys and the OFF key.

Power Control

The power is turned ON by depressing any one of the seven program keys. To turn power OFF, merely depress the lower or OFF key as shown in Fig. 1.

Program Keys

Each of the seven station keys tune to a separate television program channel. Satisfactory reception on each key is dependent upon the distance of the receiver from the transmitter, upon receiving conditions and whether there is a station

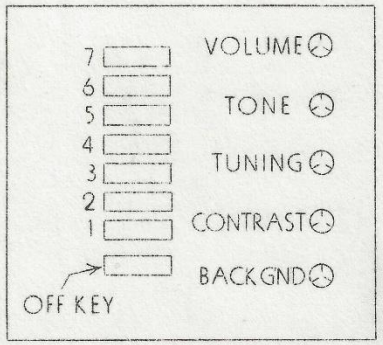


Fig. 1

operating at the time upon this assigned television channel. The keys are numbered in Fig. 1 and the assigned channel frequency is given under specifications on page 5.

To tune for a particular program channel, merely press the desired station key until it clicks into position. (Note - each key, when pressed, should lock in a depressed position until another key is pressed.) This tuning operation only sets the tuned circuits approximately and for a final adjustment, the vernier adjustment, described in the following paragraph, must be properly tuned.

Tuning Control

This tuning control (center control) properly adjusts the oscillator frequency for the television band being received and proper adjustment is essential for good picture detail and tonal reproduction.

Turn the volume control about half way on with tone control set for normal response; then, adjust this tuning control to that point where the tonal response of the sound receiver is the clearest and free from distortion. This point should also give optimum video performance.

Contrast Control (Video Receiver)

This control adjusts the black and white contrast between the various picture elements. The best position for this control is easily ascertained by the individual. Generally speaking, this point is reached when the bright fly-back line disappears from the picture, the background level being normal.

Background Control (Video Receiver)

This control regulates the brilliancy of the received picture. A too brilliantly lit screen will often result in a loss of detail and it is advisable to strike a proper balance between the contrast and background control settings.

Volume Control (Sound Receiver)

When this control is in the extreme counterclockwise position, the volume of the sound receiver will be at a minimum. By clockwise rotation, volume may be increased to any degree until the full output of the sound receiver is attained.

Tone Control (Sound Receiver)

This control changes the audio response of the sound receiver and is continuously variable from bass (counterclockwise) to full range.

SPECIFICATIONS

Physical Specifications

Model	GM-295
Height	37-Inches
Width	39-Inches
Depth	17-Inches
Weight	260 Lbs.

Electrical Specifications

Voltage	115-125 V. A-C
Frequency	60 Cycles
Watts Consumption	325 Watts

Tuning Range: 44 - 108 M.C.

Push Button	RF	Video	Audio
#1	44-50 MC	45.25 MC	49.75 MC
#2	50-56	51.25	55.75
#3	66-72	67.25	71.75
#4*	78-84	79.25	83.75
#5*	84-90	85.25	89.75
#6*	96-102	97.25	101.75
#7*	102-108	103.25	107.75

*The coil complement is complete only for the first three channels.

SOUND RECEIVER

Type Circuit	Superheterodyne
Intermediate Frequency	12.0 M.C.
Band Width	100. K.C.
Electrical Power Output	
Undistorted	4.0 Watts at 5% distortion
Tone Control	Continuously Variable
Loudspeaker - Electrodynamic	
Outside Cone Diameter	12-Inches
Voice Coil Impedance (400 Cycles)	3.5 Ohms
Field Coil Resistance (Cold)	85 Ohms

Tubes

RF, Converter and Oscillator	See Video Tube Compliment
1st IF Amplifier	6SK7
2nd IF Amplifier	6SK7
3rd IF Amplifier	6SK7
2nd Detector AVC, 1st Audio	6Q7
Audio Power Amplifier	6L6G

VIDEO RECEIVER

Type Circuit — Superheterodyne

Picture Tube Data

Size of tube	12-Inches
Size of Image	9 x 6-3/4-Inches
Screen Color	White
Focus	Electrostatic
Deflection	Electromagnetic

Intermediate Amplifier

Mid-Frequency	14.5 M.C.
Band Width	12.5 - 16.5 M.C.

Sweep Oscillators

Horizontal - Frequency	13,230 Cycles
Vertical - Frequency	60 Cycles
Frame - Frequency	30/Second
Field - Frequency	60/Second, Interlaced

Tubes

RF Amplifier	1853
Converter	1852
Oscillator	6J5
IF Amplifier	(4) 1853
IF Amplifier	(1) 1852
2nd Detector	6H6
1st Video Amplifier	1853
2nd Video Amplifier	6L6G
AVC Amplifier	1853
AVC Diode and Syn. Separator	6H6
Clipper	1852
Forgetter	6F8G
Vertical Sweep Oscillator & Amplifier	6F8G
Delay Bias and Clipper	6H6
Horizontal Oscillator & Horizontal Syn. Amplifier	6F8G
Horizontal Amplifier	6L6G
Rectifier	(2) 5U4G
Hi-voltage Rectifier	(2) 879
Picture Tube - 12-Inches	C7318C or Equivalent

DESCRIPTION OF ELECTRICAL CIRCUIT

The video and sound receivers are of a superheterodyne type, using a total of twenty-eight tubes and the picture tube, the arrangement of which is given under the electrical specifications and the schematic circuit diagram of Fig. 6.

The Power Supply Unit consists of high voltage and low voltage supply units mounted as a single unit underneath the picture tube. A power interlock is provided on the back cover of the cabinet which automatically disconnects power when this cover is removed.

The high voltage supply uses two Type 879 tubes in a voltage doubling circuit to give an output voltage of approximately 6,000 volts. This high voltage is applied to the anode of the picture tube. Focus and auxiliary anode voltages are also supplied.

The low voltage power supply consists of a pair of 5U4G tubes, each tube being connected as a half-wave rectifier in a full-wave circuit. The low voltage transformer also supplies filament voltage for the various tubes.

Figures 2 and 3 show the approximate voltages to chassis ground at the various taps of the power supplies at rated tap line volts.

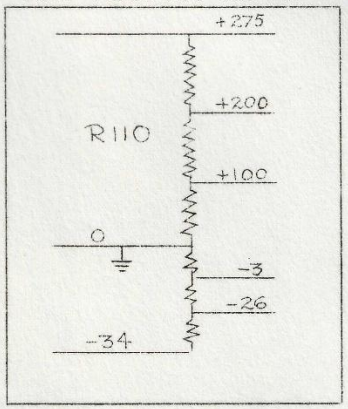


Fig. 2

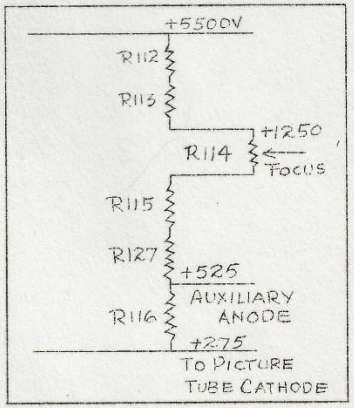


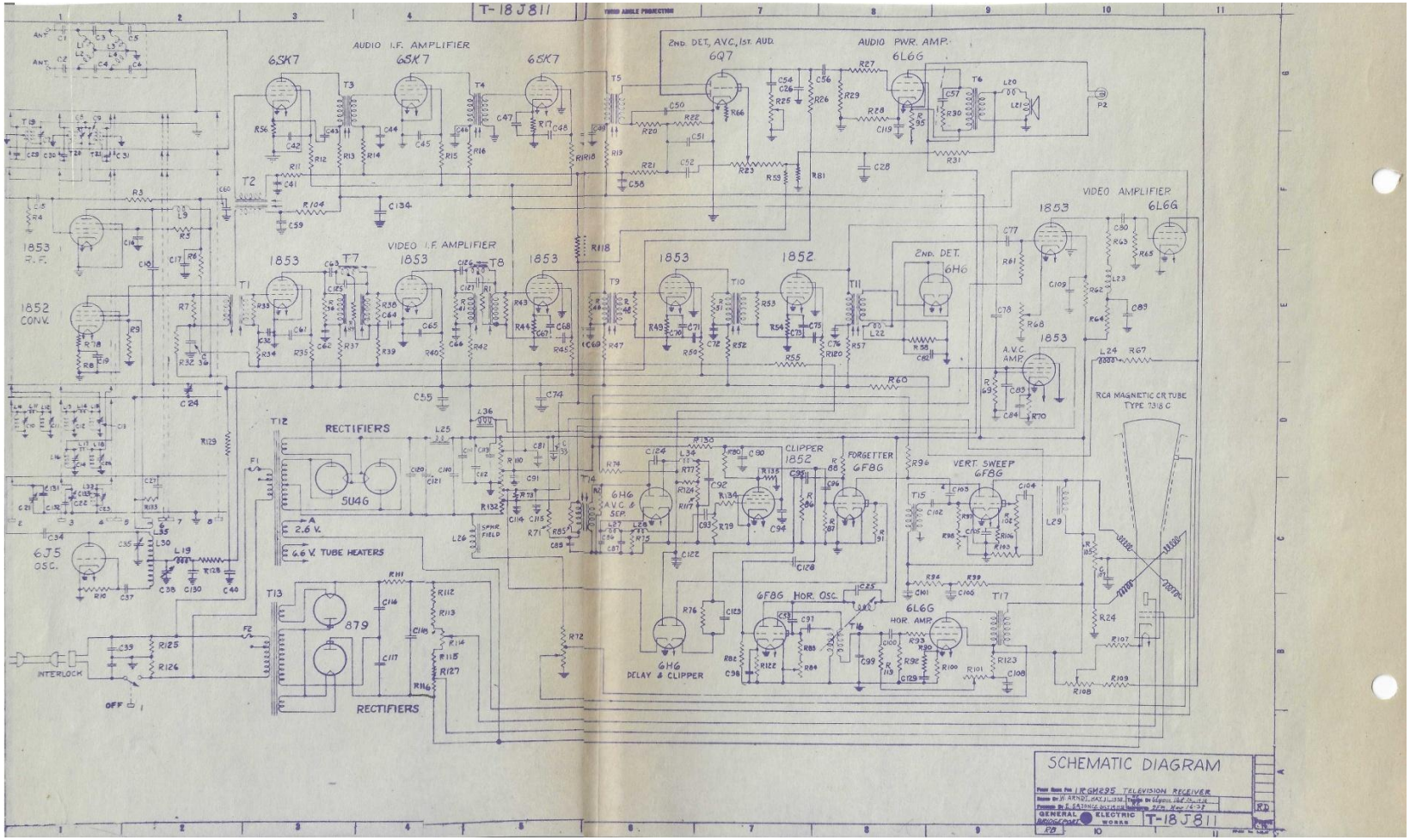
Fig. 3

The RF Unit serves as the converter, oscillator and RF amplifier for both the sound and picture receivers. Since the picture and audio carriers are separated by 4.5 megacycles, it necessitates designing this unit to pass a relatively broad band of frequencies.

SYMBOL	DESCRIPTION
C-1, 2	100 mmf. Mica Capacitor
C-3, 4	47 mmf. Mica "
C-5, 6	100 mmf. Mica "
C-7, 14	5-18 mmf. Trimmer "
C-11, 16	2000 mmf. Mica "
C-17	0.1 mfd. Paper "
C-19	2200 mmf. Mica "
C-19	4700 mmf. Mica "
C-20, 24	5-18 mmf. Trimmer "
C-25	82 mmf. Mica "
C-26	47 mmf. Mica "
C-28	.002 mfd. Paper "
C-29	82 mmf. Mica "
C-30, 31	47 mmf. Mica "
C-35	4700 mmf. Mica "
C-37	.005 mfd. Paper "
C-34	2000 mmf. Mica "
C-38	M.5-19 mmf. Trimmer Condenser
C-36	4700 mmf. Mica Capacitor
C-39	15 mmf. Mica "
C-39	.01-.01 mfd. Line "
C-40	8 mfd. 450 V. Dry Electrolytic
C-41, 49	.002 mfd. Paper Capacitor
C-50, 51	47 mmf. Mica "
C-52	.02 mfd. Paper "
C-53	15 mmf. Mica "
C-54	.01 mfd. Paper "
C-55, 56	.05 mfd. Paper "
C-57	.03 mfd. Paper "
C-58	.00 mfd. Paper "
C-59	.002 mfd. Paper "
C-60	4700 mmf. Mica "
C-61, 62	.002 mfd. Paper "
C-63	330 mmf. Mica "
C-64	0.1 mfd. Paper "
C-65, 73	.005 mfd. Paper "
C-74	0.1 mfd. Paper "
C-75, 76	.005 mfd. Paper "
C-77	1.0 mfd. Paper "
C-78	47 mmf. Mica "
C-80	0.1 mfd. Paper "
C-81	10 mfd. 450 V. Dry Electrolytic
C-83, 85	.002 mfd. Paper Capacitor
C-86	27 mmf. Mica "
C-87	47 mmf. Mica "
C-88	2 mfd. 450 V. Dry Electrolytic
C-89	2 mfd. 450 V. Dry Electrolytic
C-90	10 mfd. 350 V. Dry Electrolytic
C-91	10 mfd. 300 V. Dry Electrolytic
C-92	1.0 mfd. Paper Capacitor
C-93	.02 mfd. Paper "
C-94	0.1 mfd. Paper "
C-95	.001 mfd. Paper "
C-96, 97	470 mmf. Mica "
C-98	0.5 mfd. Paper "
C-99	470 mmf. Mica "
C-100	.25 mfd. Paper "
C-101	0.1 mfd. Paper "
C-102	.01 mfd. Paper "
C-103	470 mmf. Mica "
C-104	.25 mfd. Paper "
C-105	0.1 mfd. Paper "
C-106	8 mfd. 450 V. Dry Electrolytic
C-107	8 mfd. 450 V. Dry Electrolytic
C-108	6 mfd. 450 V. Dry Electrolytic
C-109	6 mfd. 450 V. Dry Electrolytic
C-110, 113	30 mfd. 500 V. Wet Electrolytic
C-114, 115	30 mfd. 50 V. Dry Electrolytic
C-116, 117	.06 mfd. Paper Capacitor
C-118	.03 mfd. Paper "
C-119	30 mfd. 50 V. Dry Electrolytic
C-120, 121	16 mfd. 500 V. Wet Electrolytic
C-122	0.1 mfd. Paper Capacitor
C-123	0.5 mfd. Paper "
C-124	100 mmf. Mica "
C-125	68 mmf. Mica "
C-126	330 mmf. Mica "
C-127	39 mmf. Mica "
C-128	.05 mfd. Paper "
C-129	.008 mfd. Paper "
C-130	.006 mfd. Paper "
R-1	4700 ohm Carbon Resistor
R-2, 3	27,000 ohm " "
R-4	3200 ohm " "
R-5	27,000 ohm " "
R-6	47,000 ohm " "
R-7	3200 ohm " "
R-8	1200 ohm " "
R-9	2200 ohm " "
R-10	22,000 ohm " "
R-11	100,000 ohm " "
R-12	56,000 ohm " "
R-13	3200 ohm " "
R-14	100,000 ohm " "
R-15	33,000 ohm " "

SYMBOL	DESCRIPTION
R-16	2200 ohm Carbon Resistor
R-17	330 ohm " "
R-18	22,000 ohm " "
R-19	2200 ohm " "
R-20	47,000 ohm " "
R-21	470,000 ohm " "
R-22	220,000 ohm " "
R-23	2.5 megohm Volume Control
R-24	39,000 ohm Carbon Resistor
R-25	500,000 ohm Tone Control
R-26	100,000 ohm Carbon Resistor
R-27	1000 ohm " "
R-28	270 ohm " "
R-29	220,000 ohm " "
R-30	3700 ohm " "
R-31	1400 ohm " "
R-32	1000 ohm " "
R-33	4700 ohm " "
R-34, 35	100,000 ohm " "
R-36, 38	2200 ohm " "
R-39, 40	100,000 ohm " "
R-41, 43	2200 ohm " "
R-44	550 ohm " "
R-45	4700 ohm " "
R-46	3300 ohm " "
R-47	2200 ohm " "
R-48	3300 ohm " "
R-49	220 ohm " "
R-50	4700 ohm " "
R-51	3300 ohm " "
R-52	2200 ohm " "
R-53	3300 ohm " "
R-54	180 ohm " "
R-55	100,000 ohm " "
R-56	100 ohm " "
R-57	2200 ohm " "
R-58	2700 ohm " "
R-59	560 ohm " "
R-60	27,000 ohm " "
R-61	470,000 ohm " "
R-62	15,000 ohm " "
R-63	1800 ohm " "
R-64	6800 ohm " "
R-65	100,000 ohm " "
R-66	1 ohm W. W. Resistor
R-67	4700 ohm Carbon Resistor
R-68	3000 ohm " "
R-69	3300 ohm " "
R-70	220 ohm " "
R-71	2200 ohm " "
R-72	6 ohm Hor. Centering Control
R-73	2700 ohm Carbon Resistor
R-74	10 megohm " "
R-75	56,000 ohm " "
R-76	1.8 megohm " "
R-77	100,000 ohm " "
R-78	47 ohm " "
R-79	3.3 megohm " "
R-80	10,000 ohm " "
R-81	560 ohm " "
R-82	1.0 megohm " "
R-83	75,000 ohm " "
R-84	12,000 ohm Hor. Sync. Control
R-85	15,000 ohm Carbon Resistor
R-86	4700 ohm " "
R-87	470,000 ohm " "
R-88	100,000 ohm " "
R-89	5600 ohm " "
R-90	390 ohm " "
R-91	1000 ohm " "
R-92	470,000 ohm " "
R-93	100 ohm " "
R-94	1.0 megohm " "
R-95	0.33 ohm W. W. Resistor
R-96	10,000 ohm Carbon Resistor
R-97	330,000 ohm " "
R-98	0.5 megohm Vert. Sync. Control
R-99	47,000 ohm Carbon Resistor
R-100	470 ohm " "
R-101	0.5 megohm Hor. Size Control
R-102	2.0 megohm Vert. Size Control
R-103	0.1 megohm Vert. Distr. Control
R-104	47,000 ohm Carbon Resistor
R-105	20,000 ohm Vert. Centering Control
R-106	470 ohm Carbon Resistor
R-107	100,000 ohm " "
R-108	100,000 ohm Background Control
R-109	47,000 ohm Carbon Resistor
R-110	Bleeder Resistor
R-111	470,000 ohm Carbon Resistor
R-112, 113	390,000 ohm " "
R-114	250,000 ohm Focus Control
R-115	330,000 ohm Carbon Resistor
R-116	270,000 ohm " "
R-117	180,000 ohm " "

SYMBOL	DESCRIPTION
R-118	4.7 megohm Carbon Resistor
R-119	120,000 ohm " "
R-120	47,000 ohm " "
R-121	3900 ohm " "
R-122	1000 ohm " "
R-123	33,000 ohm " "
R-124	820,000 ohm " "
R-125, 126	470,000 ohm " "
R-127	150,000 ohm " "
R-128	1000 ohm " "
R-129	2200 ohm " "
R-130	100,000 ohm " "
R-131	0.5 megohm " "
R-132	330 ohm " "
T-1	1st Video I.F. Transformer
T-2	1st Audio I.F. "
T-3	2nd Audio I.F. "
T-4	3rd Audio I.F. "
T-5	4th Audio I.F. "
T-6	Audio Output Transformer
T-7	2nd Video I.F. "
T-8	3rd Video I.F. "
T-9	4th Video I.F. "
T-10	5th Video I.F. "
T-11	6th Video I.F. "
T-12	Low Voltage Power Transformer
T-13	High Voltage Power Transformer
T-14	Sync. T.F. Transformer
T-15	Vert. Oscillator Transformer
T-16	Hor. Oscillator Transformer
T-17	Hor. Output Transformer
T-18	Deflection Yoke
T-19	Antenna Transformer
T-20	Antenna Transformer
T-21	Antenna Transformer
L-1, 4	Wave Trap Assembly
L-9	R.F. Choke
L-10	R.F. Interstage Filter
L-11	R.F. Interstage Coil
L-13	R.F. Interstage Filter
L-14	R.F. Interstage Coil
L-16	R.F. Interstage Filter
L-17	R.F. Interstage Coil
L-18	R.F. Interstage Filter
L-19	R.F. Choke
L-22	Video Diode Choke
L-23, 24	Video Choke
L-25	Filter Choke
L-26	Speaker Field
L-27, 28	Video Choke
L-29	Vertical Choke
L-30	Oscillator Plate Coil
L-33	Oscillator Coils
L-34	A.F.C Choke
L-35	Coupling Coil
L-36	Audio Filter Choke


T-18J811
AUDIO I.F. AMPLIFIER
6SK7
6SK7
6SK7
2ND. DET, AVC, 1st. AUD.
6Q7
AUDIO PWR. AMP.
6L6G
VIDEO I.F. AMPLIFIER
1853
1853
1853
1853
1852
2ND. DET.
6H6
VIDEO AMPLIFIER
1853
6L6G
1852
CONV.
1853
R.F.
1853
A.V.C. AMP.
RCA MAGNETIC CR TUBE TYPE 7318 C
RECTIFIERS
5U46
2.6 V.
6.6 V. TUBE HEATERS
6J5
OSC.
879
RECTIFIERS
INTERLOCK
OFF
6H6
A.V.C. & SEP.
CLIPPER
1852
FORGETTER
6F8G
VERT. SWEEP
6F8G
6F8G HOR. OSC.
6L6G
HOR. AMP
6H6
DELAY & CLIPPER
SCHEMATIC DIAGRAM
RGH825 TELEVISION RECEIVER
GENERAL ELECTRIC
T-18J811

Each television channel has individual coils (antenna and converter) and they are tuned by pre-set trimmers connected into the circuit as desired by a push-button switch. The oscillator uses one main coil and is tuned by shunt pre-set trimmers. On the higher frequency bands shunt coils are switched in parallel with the main oscillator tank coil. A small variable air trimmer (C-35) is used for final adjustment of the oscillator frequency for the television band being received.

A wave trap is incorporated between the antenna and the first tuned circuit. This unit is a balanced high pass filter with a sharp cut-off frequency of 35 megacycles. It is used to filter out any low frequency interference such as that produced by amateur stations. Another filter is used before the converter tuned circuit to increase selectivity. This consists of the condensers and coils, L-10, 11, 12, 13, 14, 15, etc. Each filter is switched for its respective band by means of the push button switch in the same manner as the antenna and converter tuned circuits.

The Sound Receiver uses the above RF unit in conjunction with three IF stages, a combined detector and 1st audio stage and a power amplifier. The IF amplifier has broad band characteristics for ease of tuning and high fidelity reception and works at a frequency of 12.0 megacycles. Degeneration is used in the audio amplifier to bring about excellent overall audio fidelity.

The Video Receiver consists of the forementioned RF unit, IF amplifier, video signal amplifier, AVC and synchronizing signal separator, clipper forgetter, vertical sweep, horizontal sweep and picture tube.

The picture IF amplifier uses six iron core multi-tuned transformers in a five stage wide-band amplifier operating at a mid-frequency of 14.5 M.C. Transformer T-7 has a parallel tuned circuit interconnecting the primary and secondary coils. This filter rejects any part of the audio IF of the particular band in use that might come through transformer (T-1) and cause interference with the picture signal. A similar filter is incorporated in (T-8) except that the parallel tuned circuit rejects any of the audio IF which might get into the video IF from the adjacent channel sound carrier. The IF signal is detected by a 6H6 and then passed on to the video amplifier. An additional IF stage is used in conjunction with the regular video IF to amplify the AVC and synchronizing pulses. These are detected by a 6H6 diode, the AVC voltage for the IF and RF amplifiers being developed across resistors R-77 and R-117. An initial bias voltage of approximately 1.5 volts is applied to the AVC bus through the 6H6 diode, labeled "Delay and Clipper".

The synchronizing signals after being detected at the AVC 6H6 diode are passed on to the 1852 clipper. At this point, the video signal is amplified and chopped off so as to pass only the tops of the synchronizing pulses.

The Horizontal Oscillator uses a 6F8G tube as a combined horizontal pulse amplifier and blocking oscillator, the synchronizing signals being supplied from the 1852 clipper through the capacitor C-128. This horizontal oscillator operates at a frequency of 13,230 cycles per second and this frequency is adjusted by the variable resistance (R-84) in the oscillator grid circuit. The resultant saw-tooth wave is amplified by a 6L6G tube and then applied across one pair of the magnetic deflecting coils which sweep the tube in a horizontal direction.

Negative synchronizing pulses are formed by virtue of the time constant of the grid circuit of the 6F8G forgetter. The positive pulses are clipped off by the 6H6 clipper diode and then amplified by the 6F8G.

The Vertical Oscillator uses a 6F8G tube as a combined blocking oscillator and sweep amplifier. The synchronizing signals for the oscillator are supplied from the 6F8G forgetter through the capacitor (C-103). The vertical oscillator operates at a frequency of 60 cycles per second and this frequency may be adjusted by the variable resistance (R-98) in the oscillator grid circuit. The resultant saw-tooth wave is amplified by one section of the 6F8G and then applied across the vertical magnetic deflecting coils.

The Video Signal Amplifier is a resistance coupled voltage amplifier capable of passing a wide range of frequencies without discrimination of amplitude or time delay. The video signal obtained from the 6H6 2nd detector is first amplified by an 1853 tube then is passed on to a 6L6G. The plate of the 6L6G is coupled directly to the picture tube grid, the variation of this tube plate voltage gives the contrasting black and white elements of the picture. The restoration of the background is effected by grid rectification in the 6L6G which in turn controls the average plate current and hence, bias on the picture tube control grid.

PRE-SET PICTURE CONTROLS

There are eight miscellaneous controls located on the base of chassis at the rear of the cabinet. They are adjusted at the factory for optimum results and should not require attention over a long period of time. Should adjustment become imperative, it should only be accomplished by an experienced television engineer or service organization. The location of the various controls is shown in Fig. 4.

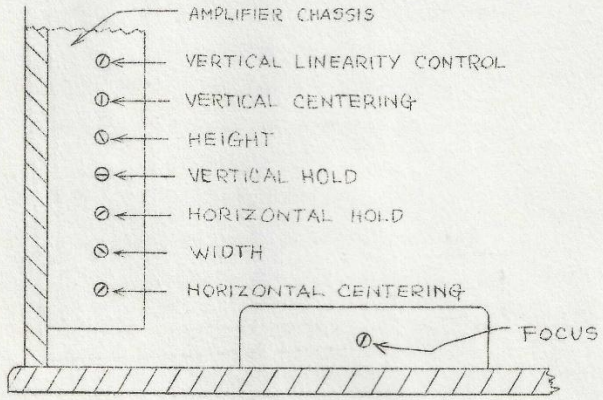


Fig. 4 Miscellaneous Control Locations

The Vertical Linearity Control (R-103) changes the bias on the vertical sweep amplifier. Correct adjustment of this control is indicated when, with a steady tone video modulation, horizontal bars in a vertical direction are spaced equally on the picture tube.

The Vertical Centering Control is located on the main chassis. This control (R-105) moves the picture either up or down and proper adjustment is indicated when the picture is centered in the vertical direction.

The Height Control (R-102) changes the gain of the vertical sweep amplifier and thereby controls the size of the picture in a vertical direction. Correct adjustment is indicated when the height of the picture is approximately 6-3/4 inches.

The Vertical Hold Control (R-98) changes the time constant of the grid circuit in the vertical oscillator, thereby changing its frequency. Incorrect adjustment of this control will cause the picture to lose frame or flicker badly.

The Horizontal Hold Control (R-84) changes the time constant of the grid circuit in the horizontal oscillator, thereby changing its frequency. Incorrect adjustment will cause parts of the picture to "tear out" in a horizontal direction.

The Width Control (R-101) changes the gain of the horizontal oscillator by changing the size of its plate resistance. Adjust the horizontal borders of the picture to approximately 9-inches.

The Focus Control (R-114) is located on the power supply chassis and controls the voltage on the focus anode of the picture tube. With a normal picture being received adjust this control for maximum clearness.

The Horizontal Centering Control (R-72) moves the picture in a horizontal direction. Proper adjustment is indicated when the picture is centered on the screen.

CIRCUIT ALIGNMENT

Picture IF and AVC Amplifier

Due to the good stability of components and the wide band frequency characteristic of this amplifier, alignment should be unnecessary under normal operating conditions. Since the picture IF amplifier must pass a band of frequencies much greater than in the usual broadcast receiver and at a much higher mid-frequency, it is necessary to have available a special high frequency signal generator with a wide band sweep. Due to the high cost of such equipment and the fact that it is not readily available, it is suggested that if IF alignment becomes imperative, that the receiver be sent back to the factory or a competent television engineer be assigned the job.

Sound IF Amplifier

1. Connect a micro-ammeter in 6Q7 diode audio detector so as to read diode current.

2. Open connection of R-21 to C-58. This removes audio AVC.

3. Apply a 12.0 megacycle signal from a signal generator through a .01 mfd. condenser to the grid of the 1852 converter tube.

4. Peak all audio IF transformer trimmer plugs for maximum diode current on the micro-ammeter.

RF Unit

The RF unit is mounted on the top side of the main chassis and the trimmers are available by removing the control panel escutcheon in the top of the cabinet. Realignment should not be necessary since the circuits are very broad for reception of both audio and video

carriers. The location of the trimmers is shown in Fig. 5. They consist of the antenna, input filter, output filter and oscillator trimmers for each of the seven television channels. The mid-frequency in megacycles is shown above each series of trimmers.

Note: The following alignment procedure should be carried out only when a signal generator having good frequency calibration and stability is available.

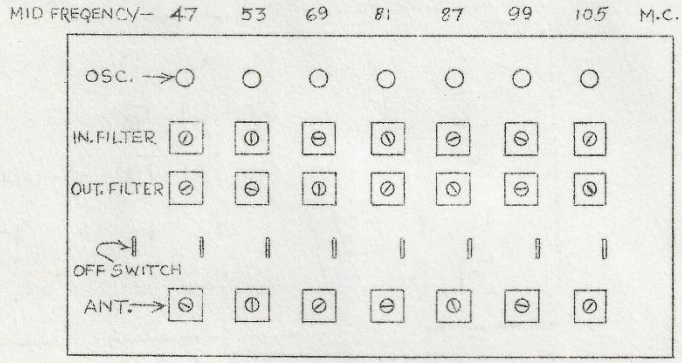


Fig. 5 RF Unit Trimmer Location

The Oscillator Trimmers are aligned through the sound receiver as follows:

1. Connect a micro-ammeter in the 6Q7 audio diode detector so as to read diode current.

2. Set the vernier tuning condenser so that the plates are meshed about half-way.

3. Apply a carrier from the signal generator with a frequency of 2.75 megacycles plus mid-frequency of the particular band being aligned, to the antenna terminals.

4. Peak each oscillator trimmer plug for maximum diode current using a fairly low input signal.

The Antenna Trimmers are aligned using the video receiver as follows:

1. Connect a micro-ammeter in the Video diode circuit so as to read diode current.

2. Apply a carrier from the signal generator to the antenna terminals. The frequency should be the mid-frequency of the particular band being aligned.

3. Peak each antenna trimmer for maximum Video diode current using a low input signal.

The Filter Trimmers are somewhat more difficult to align but may be accomplished by using the video receiver as follows:

1. Connect a micro-ammeter in the video diode circuit so as to measure diode current.

2. Parallel the series filter coil, i.e., L-11, in the first filter, by a 100 ohm resistor.

3. With 1,000 ohms in series with signal generator lead, apply a carrier to the RF plate bus on trimmer assembly and set signal generator frequency 2.0 megacycles below the mid-frequency of each particular band being aligned.

4. Peak each filter trimmer for maximum video diode current using as low an input signal as possible.

Note: Each filter has two trimmers to peak to each band; an input and output filter trimmer.

After the above alignment, it is necessary to re-align the oscillator trimmers as described above for proper audio carrier response, and to check back on the filter alignment.

REPLACEMENT PARTS LIST
TELEVISION RECEIVER
MODEL GM-295

Stock No.		Description
*RB-023	BOARD	- Terminal board (4 lugs)
*RB-041	BOARD	- Terminal board (2 lugs)
*RB-058	BOARD	- Terminal board (6 lugs)
RB-097	BOARD	- Osc. coupling coil terminal board assembly
RB-098	BOARD	- Ant-gnd terminal board
RB-166	BRACKET	- Pilot lamp bracket
RB-167	BRACKET	- Focus control bracket and mtg. board
*RB-617	BUTTON	- Tuning push buttons (molded)
*RC-009	CAPACITOR	- .001 mfd. 600 V. paper (C-95)
*RC-011	CAPACITOR	- .002 mfd. 600 V. paper (C-28,33,41, 42,43,44,45,46,47,48,49,59,61,62,65, 66,67,68,69,70,71,72,73,75,76,83,84,85)
*RC-031	CAPACITOR	- .008 mfd. 1600 V. paper (C-129)
*RC-039	CAPACITOR	- .01 mfd. 600 V. paper (C-54,102)
*RC-048	CAPACITOR	- .02 mfd. 600 V. paper (C-52,93)
*RC-060	CAPACITOR	- .03 mfd. 600 V. paper (C-57)
*RC-092	CAPACITOR	- .05 mfd. 600 V. paper (C-55,56,58,128)
*RC-104	CAPACITOR	- .1 mfd. 600 V. paper (C-17,64,80,94, 101,105,122)
RC-125	CAPACITOR	- .03 mfd. 6000 V. paper (C-118)
RC-126	CAPACITOR	- .06 mfd. 3000 V. capacitor (C-116)
RC-127	CAPACITOR	- .06 mfd. 3000 V. capacitor (C-117)
*RC-149	CAPACITOR	- .25 mfd. 400 V. paper (C-100,104)
*RC-156	CAPACITOR	- .5 mfd. 100 V. paper (C-98, 123)
RC-194	CAPACITOR	- 1 mfd. 100 V. paper (C-77,92)
*RC-203	CAPACITOR	- 12 mmf. mica (C-53)
*RC-204	CAPACITOR	- 15 mmf. mica (C-37)
*RC-205	CAPACITOR	- 22 mmf. mica
*RC-209	CAPACITOR	- 39 mmf. mica (C-127)
*RC-216	CAPACITOR	- 47 mmf. mica (C-3,4,26,30,31,50,51,78, 87)
RC-222	CAPACITOR	- 27 mmf. mica (C-86)
RC-225	CAPACITOR	- 68 mmf. mica (C-125)
RC-226	CAPACITOR	- 10 mmf. mica (C-82)
RC-227	CAPACITOR	- 82 mmf. mica (C-25,29)
*RC-235	CAPACITOR	- 100 mmf. mica (C-1,2,5,6,124)
*RC-274	CAPACITOR	- 330 mmf. mica (C-63,126)
*RC-294	CAPACITOR	- 470 mmf. mica (C-96,97,99,103)
RC-354	CAPACITOR	- 2,200 mmf. mica (C-15,16,18,34,130)
*RC-393	CAPACITOR	- 4,700 mmf. mica (C-19,32,36,60)
*RC-427	CAPACITOR	- 16 mfd. 500 V. wet electrolytic (C-120,121)
*RC-429	CAPACITOR	- 30 mfd. 500 V. wet electrolytic (C-110,111,112,113)
RC-694	CAPACITOR	- Trimmer capacitor (C-38)

Stock No.		Description
RC-695	CAPACITOR	- 3.5-17 mmf. trimmer (C-35)
RC-696	CAPACITOR	- 2-12 mmf. trimmer (C-21,22,23)
RC-697	CAPACITOR	- Trimmer capacitor (2-12 mmf.) (C-7,8,9,10,11,12,13,14,20,24)
*RC-755	CAPACITOR	- .01-.01 mfd. 250 V. A.C. line capacitor (C-39)
RC-5108	CAPACITOR	- 6 mfd., 8 mfd., 6 mfd., 6 mfd., 450 V. dry electrolytic (C-106)
RC-5109	CAPACITOR	- 2 mfd., 450 V; 2 mfd., 450V; 10 mfd., 350 V; 10 mfd., 300 V; dry electrolytic (C-88)
RC-5110	CAPACITOR	- 8 mfd., 10 mfd., 450 V. dry electrolytic (C-40,81)
RC-5117	CAPACITOR	- 30 mfd., 50 V. electrolytic (C-114,115, 119)
RC-6000	CONTROL	- .1 meg. background control (R-108)
RC-6001	CONTROL	- .1 meg. vertical linearity control (R-103)
RC-6002	CONTROL	- 2 meg. height control (R-102)
RC-6003	CONTROL	- .5 meg. width or vertical hold control (R-98,101)
RC-6004	CONTROL	- Horizontal hold control or vertical centering control (R-84, 105)
RC-6005	CONTROL	- Horizontal centering control, 6 ohms c.t. (R-72)
RC-6006	CONTROL	- Contrast control, 2000 ohms (R-68)
RC-6007	CONTROL	- 250,000 ohms, focus control (R-114)
RC-8089	CABLE	- Power cable and plug #2 (5 prong)
RC-8090	CABLE	- Power cable and plug #1 (Octal base)
RC-8091	CORD	- Power cord
RC-8092	CABLE	- Speaker cable
RC-8093	CABLE	- Kinescope cable
RC-8094	CABLE	- Kinescope grid cable
RC-8095	CABLE	- Kinescope yoke cable
RD-208	DRIVE	- Vernier drive
RD-402	DRUM	- Drive drum assembly
RE-044	ESCUTCHEON	- Push button assembly escutcheon
RG-108	GASKET	- Kinescope cap assembly
*RK-028	KNOB	- Control knob (Pkg. 5)
RL-071	COIL	- Ant. transformer (T-19)
RL-072	COIL	- Ant. transformer (T-20)
RL-073	COIL	- Ant. transformer (T-21)
RL-149	COIL	- RF interstage filter coils (L-16,18)
RL-150	COIL	- RF interstage coil (L-17)
RL-151	COIL	- RF interstage coil (L-14)
RL-152	COIL	- RF interstage coil (L-11)
RL-153	COIL	- RF interstage filter coil (L-10)
RL-274	COIL	- Oscillator coupling coil (L-35)
RL-275	COIL	- Oscillator plate coil (L-30)
RL-276	COIL	- Oscillator and interstage filter coils (L-12,13,15,33)
RL-335	CHOKE	- Audio filter choke (L-36)
RL-337	CHOKE	- Vertical sweep choke (L-29)
RL-338	CHOKE	- Video or AVC choke (L-27,28,34)

Stock No.		Description
RL-339	CHOKE	- Low voltage supply filter choke (L-25)
RL-340	CHOKE	- Video choke (L-23,24)
RL-341	CHOKE	- Video diode choke (L-22)
RL-342	CHOKE	- RF choke (L-9,19)
RM-300	MIRROR	- Kinescope viewing mirror
RQ-525	RESISTOR	- 150,000 ohm, 1-W. resistor (R-127)
RQ-540	RESISTOR	- 270,000 ohm, 1-W. carbon (R-116)
RQ-543	RESISTOR	- 3.3 meg. 1-W. carbon (R-131)
RQ-550	RESISTOR	- 330,000 ohm, 1-W. carbon (R-113,115)
RQ-554	RESISTOR	- 390,000 ohm, 1-W. carbon (R-112)
RQ-643	RESISTOR	- 270 ohm, 2-W. carbon (R-28,100)
RQ-669	RESISTOR	- 2,700 ohm, 2-W. carbon (R-30)
RQ-695	RESISTOR	- 39,000 ohm, 2-W. carbon (R-24)
RQ-923	RESISTOR	- 470,000 ohm, 3-W. carbon (R-125,126)
*RQ-1227	RESISTOR	- 47 ohm, 1/2-W. carbon (R-78)(Pkg.5)
*RQ-1235	RESISTOR	- 100 ohm, 1/2-W. carbon (R-56,93)(Pkg.5)
*RQ-1241	RESISTOR	- 180 ohm, 1/2-W. carbon (R-54)(Pkg.5)
*RQ-1243	RESISTOR	- 220 ohm, 1/2-W. carbon (R-44,49,70) (Pkg. 5)
*RQ-1247	RESISTOR	- 330 ohm, 1/2-W. carbon (R-17)(Pkg.5)
*RQ-1249	RESISTOR	- 390 ohm, 1/2-W. carbon (R-90)(Pkg.5)
RQ-1251	RESISTOR	- 470 ohm, 1/2-W. carbon (R-106)(Pkg.5)
*RQ-1253	RESISTOR	- 560 ohm, 1/2-W. carbon (R-59,81)(Pkg.5)
*RQ-1259	RESISTOR	- 1000 ohm,1/2-W.car.(R-27,32,91,122,128) (Pkg.5)
RQ-1261	RESISTOR	- 1200 ohm, 1/2-W. carbon (R-9,8)(Pkg.5)
*RQ-1263	RESISTOR	- 1500 ohm, 1/2-W. carbon (R-4)(Pkg.5)
*RQ-1265	RESISTOR	- 1800 ohm, 1/2-W. carbon (R-31,63)(Pkg.5)
*RQ-1267	RESISTOR	- 2200 ohm, 1/2-W. carbon (R-7,13,16,19, 36,37,38,41,42,43,47,52,57,71,129)(Pkg.5)
*RQ-1269	RESISTOR	- 2700 ohm,1/2-W.car. (R-33,58,73)(Pkg.5)
*RQ-1271	RESISTOR	- 3300 ohm,1/2-W.car.(R46,48,51,53,69) (Pkg.5)
*RQ-1273	RESISTOR	- 3900 ohm, 1/2-W. carbon (R-121)(Pkg.5)
*RQ-1275	RESISTOR	- 4700 ohm, 1/2-W. carbon (R-45,50,67, 86,1)(Pkg. 5)
RQ-1277	RESISTOR	- 5600 ohm, 1/2-W. carbon (R-89)(Pkg. 5)
*RQ-1283	RESISTOR	- 10,000 ohm, 1/2-W.car.(R-80,89,96)(Pkg.5)
*RQ-1287	RESISTOR	- 15,000 ohm, 1/2-W.car.(R-62,85)(Pkg.5)
*RQ-1291	RESISTOR	- 22,000 ohm 1/2-W.car(R-10,18,123)(Pkg.5)
*RQ-1293	RESISTOR	- 27,000 ohm,1/2-W.car(R-2,3,5,60)(Pkg.5)
RQ-1295	RESISTOR	- 33,000 ohm, 1/2-W. carbon (R-15)(Pkg. 5)
*RQ-1299	RESISTOR	- 47,000 ohm, 1/2-W. carbon (R-6,20,104, R-99,109,120)(Pkg. 5)
*RQ-1301	RESISTOR	- 56,000 ohm, 1/2-W. carbon (R-12, 75) (Pkg. 5)
*RQ-1304	RESISTOR	- 75,000 ohm, 1/2-W. carbon (R-83)(Pkg.5)
*RQ-1307	RESISTOR	- 100,000 ohms, 1/2-W. carbon (R-11,14,26, 35,40,34,39,55,77,65,88,107,119,130) (Pkg. 5)
*RQ-1313	RESISTOR	- 180,000 ohms, 1/2-W.car. (R-117)(Pkg.5)
*RQ-1315	RESISTOR	- 220,000 ohm, 1/2-W. carbon (R-22,29) (Pkg. 5)

Stock No.		Description
*RQ-1317	RESISTOR	- 270,000 ohm, 1/2-W. carbon (R-124) (Pkg, 5)
*RQ-1319	RESISTOR	- 330,000 ohm, 1/2-W. carbon (R-97) (Pkg. 5)
*RQ-1323	RESISTOR	- 470,000 ohm, 1/2-W. carbon (R-21,61,87, 92,111)(Pkg. 5)
*RQ-1331	RESISTOR	- 1.0 meg., 1/2-W. carbon (R-82,94) (Pkg. 5)
*RQ-1335	RESISTOR	- 10 meg. 1/2-W. carbon (R-74)(Pkg. 5)
*RQ-1337	RESISTOR	- 1.8 meg., 1/2-W. carbon (R-76)(Pkg. 5)
RQ-1343	RESISTOR	- 3.3 meg., 1/2-W. carbon (R-79)(Pkg. 5)
RQ-1347	RESISTOR	- 4.7 meg., 1/2-W. carbon (R-118)(Pkg.5)
*RQ-1447	RESISTOR	- 330 ohm, 1-W. carbon (R-132)
RQ-1479	RESISTOR	- 6,800 ohm, 1-W. carbon (R-64)
RR-747	RESISTOR	- 2,200 ohm - 715 ohm bleeder res. (R-110)
RR-748	RESISTOR	- 1,090 ohm - 120 ohm - 3000 ohm bleeder resistance (R-110)
RR-1008	RESISTOR	- .33 ohm, 1/2-W. W.W. resistor (R-95)
RR-1009	RESISTOR	- 1 ohm, 1/2-W. W.W. resistor (R-66)
RS-195	SHIELD	- IF transformer shield can assembly (small dia.)
RS-196	SHIELD	- IF transformer shield can assembly (large dia.)
*RS-200	SOCKET	- Octal base tube socket (Pkg. 5)
*RS-217	SOCKET	- Tube socket (4 prong)(Pkg. 5)
*RS-227	SOCKET	- Molded tube socket (voltage cable)
*RS-229	SOCKET	- Low loss octal base tube socket
RS-234	SOCKET	- Power cable socket (5 prong)
RS-919	SHAFT	- Shaft and coupling for volume and contrast controls
RS-920	SHAFT	- Focus control shaft
RT-194	TRANSFORMER	- High voltage power transformer (T-13)
RT-195	TRANSFORMER	- Low voltage power transformer (T-12)
RT-277	TRANSFORMER	- Synchronous pulse IF trans. (T-14)
RT-278	TRANSFORMER	- 6th video IF transformer (T-11)
RT-279	TRANSFORMER	- 3rd video IF transformer (T-8)
RT-280	TRANSFORMER	- 2nd video IF transformer (T-7)
RT-281	TRANSFORMER	- 4th audio IF transformer (T-5)
RT-282	TRANSFORMER	- 2nd or 3rd audio IF trans. (T-3,4)
RT-283	TRANSFORMER	- 1st, 4th or 5th video IF transformer (T-1,9,10)
RT-284	TRANSFORMER	- 1st audio IF transformer (T-2)
RT-444	TRANSFORMER	- Hor. sweep output transformer (T-17)
RT-445	TRANSFORMER	- Audio output transformer (T-6)
RT-602	TRANSFORMER	- Hor. osc. transformer (T-16)
RT-603	TRANSFORMER	- Vertical osc. transformer (T-15)
RT-714	TONE CONTROL	- .5 meg. tone control (sound receiver) (R-25)
RT-860	TRIMMER	- Trimmer assembly
RT-861	TRIMMER	- Trimmer assembly
*RV-029	VOLUME CONTROL	- 2 meg. volume control (sound receiver) (R-23)
*RW-027	WINDOW	- Celluloid station windows (Pkg. 25)

Stock No.		Description
RW-029	WINDOW	- Kinescope window
RW-408	WAVE TRAP	- Wave trap assembly (L-1,2,3,4)
RY-002	YOKE	- Kinescope deflection yoke (T-18)

SPEAKER ASSEMBLY - GM-295

RC-932	CONE	- 12-inch cone and voice coil assembly
RS-089	SPEAKER	- 12-inch speaker complete

1/30/39