RCC TELEVISION Service Manual

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1953 Supplement No. 7

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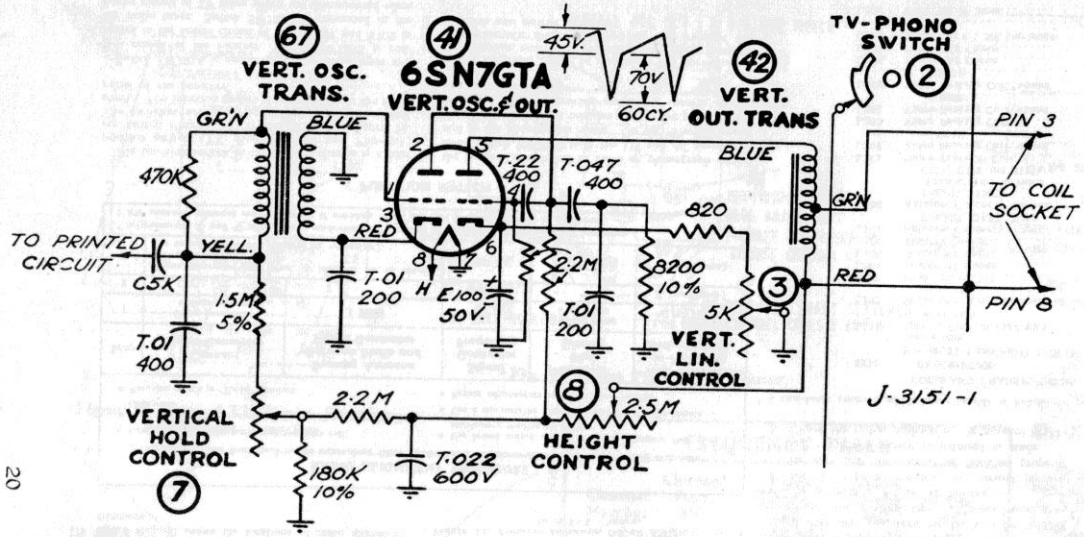
INDEX

NOTE: RE INDEXING

Since most TV circuits require fold pages for clear reproduction, it is necessary to bind them as a group in the middle of the book. As a result, related data such as alignment, voltages etc., may be widely separated in some cases. This is particularly true in this supplement because some models have as many as three different circuit diagrams which makes the fold section larger than normal. To avoid confusion, use your index to locate ALL data.

Gordon Oliver

R.C.C. TELEVISION Supplement No. 7



CIRCUIT REVISION SHEET FOR VERTICAL OSCILLATOR CONNECTIONS

T21 CHASSIS SERIES CHIPPENDALE - CLASSIC

Reports from the field indicate that there have been some instances of breakdown of the 20 mfd 450V electrolytic condenser between the boost voltage and the 280 volt line. For this reason the negative end of the condenser is being connected to the 180 volt line on present production.

In cases where the condenser is being changed in the field the following procedure may be followed.

(a) The orange lead from pin #7 of the 6AU6 A.G.C. keyer (socket 39) to the snyc. gating control is connected to blank terminal #3 on terminal strip 59.

(b) The negative end of the 20 mfd. 450V condenser is moved from terminal #1 to terminal #3 on strip 59.

(c) The positive end of the condenser remains connected as is.

This change has been carried out on all Series "O" chassis.

On early production of the Chippendale T21 a 1-1/4 amp. fuse was used. At a later date this was replaced with a 1/2 Amp. 250 volt slow blow fuse.

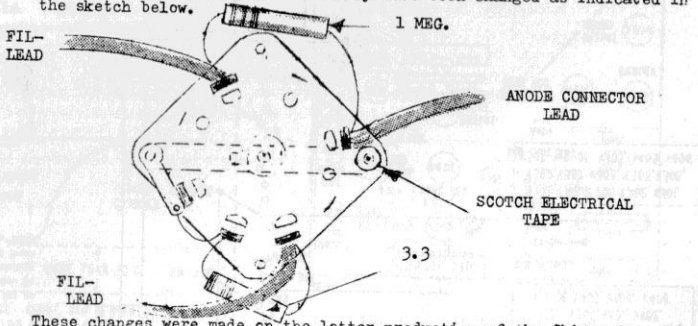
The 1/2 Amp. fuses should be used on all sets in the field originally supplied with 1-1/4 Amp. fuses. Your requirements may be obtained from our Service Department at "no charge".

We would suggest you retain the 1-1/4 Amp. fuses as they may be used in voltage doubler models.

CHIPPENDALE T21

The original H.V. socket assembly used on the T21 chassis had the 1 meg resistor connected to adjacent pins 6 and 7. In some cases this resulted in breakdown of the socket.

In order to minimize this condition, the physical position of the resistors and leads to this assembly have been changed as indicated in the sketch below.



These changes were made on the latter production of the Chippendale T21, the Classic, and the 21" Custom T.V.

MODEL 72 - The circuit diagram in the service manual for the Model 72 shows the tone control (R323-2) as 150K tapped at 75K. This is in error and should read 750K tapped at 50% rotation.

NON-OPERATING CONTROLS

PICTURE CENTERING—The use of an electrostatically focussed picture tube eliminates the need for occasional focus and centering adjustments. Centering is set at the factory by the centering device around the tube neck immediately behind the deflection coils. This may be reached by removing the top five screws of the cabinet back.

ION TRAP MAGNET—Held over tube neck by clamp or spring.

DEFLECTION YOKE—Wing screw.

WIDTH—Rear skirt—coil on the left behind protective bracket.

HORIZONTAL LINEARITY—Rear skirt—coil on the right behind protective bracket.

HORIZONTAL FREQUENCY—Rear skirt—at right hand corner.

HORIZONTAL DRIVE—Rear skirt—trimmer near right corner.

SYNC. GATING CONTROL—Rear skirt—left hand side next to A.C. Outlet.

A.G.C. DELAY CONTROL—Rear skirt near centre, next to interlock.

ION TRAP MAGNET ADJUSTMENT

Proper adjustment of the ion trap on the electrostatic kinescope is very important. Always mount the trap so that the magnet is closest to the tilted gun and adjust for the brightest possible raster. THIS IS VERY IMPORTANT. The picture tube will be damaged if the ion trap is not perfectly adjusted.

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 ADJUSTMENT

For further adjustments, obtain a test pattern on the receiver. Turn on receiver and follow tuning procedure.

CHECK OF HORIZONTAL OSCILLATOR ALIGNMENT

Tune in a station and adjust the horizontal hold control until the picture falls into sync. Momentarily remove the signal by switching off channel and then back. The picture should pull into sync over a range of 90° rotation of the horizontal hold control. If in the above check the receiver fails to hold sync or the pull-in range is at the extreme end of the control, and is less than 60°, it will be necessary to make the following adjustment.

HORIZONTAL FREQUENCY ADJUSTMENT

With the horizontal hold control set to the center of its range of rotation, adjust the horizontal frequency coil until the picture pulls into sync. Recheck the "Horizontal Oscillator Alignment".

HEIGHT AND LINEARITY ADJUSTMENTS

These controls are behind plastic bath tub, behind trap door.
Adjust the height control until the picture fills the mask vertically. Adjust the vertical linearity control until the picture is symmetrical from top to bottom. Adjustment of either control will require a re-adjustment of the other control. Centering may be adjusted by the device around the neck of the tube immediately behind the deflection coils.

DRIVE ADJUSTMENT (See also note under Mode Hopping).

This control is a trimmer which varies the amount of drive to the horizontal output tube. Turning the screw clockwise increases the drive. With the control too far clockwise the picture compresses near the middle and a vertical white line may appear. If the drive control is not advanced far enough, mode hopping may occur. The proper position of the control is just to the left of the position where the vertical white line disappears.

WIDTH and LINEARITY ADJUSTMENTS

Turn the Width Coil Screw towards maximum clockwise position.

Turn the Linearity Coil Screw anticlockwise until it projects beyond bracket.

Set the Sync. Gating Control about 4/5 clockwise.

Set Horizontal Hold Control in centre position.

Adjust Horizontal Frequency Coil until pattern locks in.

Adjust Sync. Gating Control for maximum stability of picture.

Adjust the Drive Trimmer as outlined.

Adjust Width Coil and Linearity Control until proper width and linearity are obtained. (Note: As the linearity control is turned in it will pass through two positions of proper linearity, the one with the slug farthest out is correct.)

RECHECK DRIVE TRIMMER

Readjust Horizontal Frequency for balanced pull-in as outlined under check of horizontal oscillator alignment.

A.G.C. DELAY CONTROL

The control is designed to increase the bias on the R.F. Stages to prevent the picture blocking on very strong signals.

In strong signal areas adjust control until full contrast and stable picture can be achieved. In weak signal areas adjust control for minimum amount of snow on screen.

NOTE: Many of these controls will interact. Therefore an adjustment of one control may require a resetting of other controls.

TO REMOVE CHASSIS FROM CABINET

1. Remove knobs by pulling straight out from their shafts.
2. Remove the cabinet dack.
3. Disconnect and remove speaker.
4. Loosen the nuts on the four chassis mounting "J" bolts until they become disengaged from the holes in the chassis skirts. It is not necessary to remove the nuts and washers completely from the bolts.
5. Pull the chassis carefully to the rear.

TO REPLACE KINESCOPE

1. Remove the chassis as above.
2. Remove high voltage connector from cavity in kinescope bell. TOUCH CONNECTOR TO CHASSIS TO REMOVE STATIC CHARGE.
3. REMOVE STATIC CHARGE ON KINESCOPE by shorting with an insulated wire between the cavity in kinescope bell and chassis.
4. Remove kinescope socket and ion trap.
5. Loosen kinescope retaining band.
6. Loosen bracket on front which prevents kinescope from moving forward.
7. Lift front of kinescope VERY SLIGHTLY, just enough to prevent sticking between the kinescope glass and the cushions on which it rests.
8. Draw the kinescope forward very carefully. DON'T STRAIN THE KINESCOPE NECK. If binding occurs, replace the kinescope on its cushions, loosen the screws holding the rear support bracket, and loosen the wing-nut holding the deflection coils. With a second person guiding the tube from the rear, draw it straight forward until clear. Set the tube, **only face down**, on a clean, soft surface.
9. To replace the tube, reverse the above, making sure that when the tube face is against the stop bracket, the cushion at the rear of the bell is forward as far as possible, so as to support the tube all the way around the rubber ring.

SERVICE PRECAUTIONS

To service the receiver remove the chassis from the cabinet. To do so, remove the knobs, the cabinet back, the chassis mounting bolts. The chassis may be serviced with the picture tube in place provided the chassis is turned on its side with the housing on the bottom. The weight of the chassis will be supported against the housing. A block of wood under the corner of the picture tube will help steady the chassis.

CAUTION: Do not permit the kinescope second-anode lead to become shorted to the chassis. To do so will cause a considerable overload on the one meg. high voltage filter resistor.

TEST EQUIPMENT

To service this receiver properly, 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, 10 mc sweep width
40 to 90 mc, 10 mc sweep width
170 to 225 mc, 10 mc sweep width

(b) Output adjustment with at least .1 volt maximum

(c) Output constant on all ranges.

(d) Flat output in all attenuator positions.

CATHODE-RAY OSCILLOSCOPE—preferably one with a wide band vertical deflection and an input calibrating source.

SIGNAL GENERATOR—to provide the following frequencies, with adjustable output over the amplitudes specified.

(a) 25.25 mc, 100 uv to .1V.
23.1 mc, 100 uv to .1V.
26.0 mc, 100 uv to .1V.
24.1 mc, 100 uv to .1V.
23.5 mc, 100 uv to .2V.
21.7 mc, 10,000 uv to 1.0V.

(b) 4.5 mc, 100 uv to 2.0 v

(c) 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

HETERODYNE FREQUENCY METER—with crystal calibrator if the signal generator is not crystal controlled.

ELECTRONIC VOLTMETER—and a high voltage probe for use with this meter to permit measurements up to 20 kilovolts.

SOUND I.F. ALIGNMENT

Remove picture detector 6AL5 (40) from its socket.

Connect 4.5 mc signal generator through 3300 ohms to pin 7 of 6AL5 (40).

Connect dc VTVM to pin 7 6AL5 ratio detector (11).

Align for maximum output, sound take-off coil (25) bottom, picture I.F. transformer (15) top and bottom, and ratio detector transformer primary (13) bottom. Keep reading under three volts by reducing input as necessary. Increase input until output reads five volts.

Then connect VTVM as follows: ground side to junction of 22,000 ohm resistors across ratio detector pins 5 and 7, strip (12) term 3, high side to audio take-off, strip (12) term 2.

Align ratio detector transformer (13) top for zero voltage between + and — peaks.

4.5 MC. TRAP ALIGNMENT

With signal generator connected as above and 6AL5 (40) out of its socket connect an AC reading VTVM or diode and DC VTVM to kinescope grid (strip 32 lug 1). Apply two volts C.W. from generator and align 4.5 mc. trap (28) for minimum response.

VIDEO I.F. ALIGNMENT

Replace 6AL5 picture detector (40)

A. Connect I.F. signal generator to mixer grid by means of ungrounded tube shield. Connect DC VTVM with 22,000 ohms by passed by 1000 uufd. in series with its probe to junction of green peaking coil and 4700 ohm resistor (strip 27 term 2).

Apply—3 volts battery bias to A.G.C. line (strip 18 term. 2).

At the following frequencies, align the coils indicated, keeping the reading on the VTVM no greater than—1.5 volts.

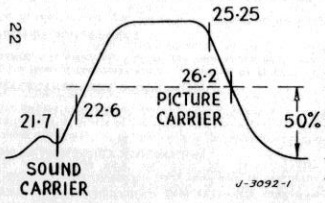
	Freq.	Adjustment
1.	25.25 mc.	Mixer plate coil (on top of tuner) for maximum.
2.	23.1 mc.	1st Pix I.F. transformer (20) for maximum.
3.	26.0 mc.	2nd Pix I.F. transformer (22) for maximum.
4.	24.1 mc.	3rd Pix I.F. transformer (24) bottom for maximum.
5.	21.7 mc.	3rd Pix I.F. transformer (24) top for minimum.

B. Connect I.F. sweep generator and marker generator to ungrounded tube shield of 6J6 mixer.

Connect oscilloscope through 22,000 ohm and 100 uufd. filter in probe to junction of green peaking coil and 4700 ohm resistor (strip 27 terminal 2). Set scope for observation at sweep frequency of generator.

Connect -4.5 volts battery bias to a.g.c. line. (Strip 18, terminal 2).

Switch tuner to dead channel between 2 and 6.



ELECTRICAL SPECIFICATIONS

Power Supply	105-125 Volts AC cycle as marked
Power Consumption	220 Volt-Amps
Power Output	2.4 Watts Maximum
	1.8 Watts Undistorted
Antenna Input Impedance	300 ohms Balanced
Intermediate Frequencies	Picture 26.20 Mc.
	Sound 21.7 Mc and 4.5 Mc.
Voice Coil Impedance	3.2 ohms, 400 cycles
Video Response	To 3.2 Mc.
Anode Voltage	16,000

Obtain sweep pattern on scope, keeping total input to scope no more than 2 volts peak to peak (0.7 v rms.)

A marker at 26.2 mc. should fall between 40% and 55% of maximum. If not, touch up 2nd pix I.F. coil (22) top.

The flatness across the top and position of a marker at 25.25 mc. is obtained by simultaneous adjustment of the 25 mc. mixer plate coil (top of tuner) and the 3rd pix I.F. trans. (24) bottom. The 25.25 mc. marker should fall within 10% of the top.

A 22.6 mc. marker should fall between 15% and 20% of response. It is controlled by the 1st pix I.F. transformer (20). However, it is NOT advisable to change the setting of this coil as sound rejection will be affected.

DO NOT ADJUST THE TRAP COIL.

DO NOT ADJUST ANY COIL MORE THAN HALF A TURN.

SOUND REJECTION CHECK

Connect I.F. signal generator with calibrated attenuator to mixer through ungrounded shield.

Connect d.c. V.T.V.M. to junction of green peaking coil and 4700 ohm resistor (strip 27 terminal 2).

Feed in maximum generator signal of 21.7 mc. C.W. Observe input and output. (If output is greater than one volt, reduce input until output reads one volt).

Reduce input signal by 35.5 times (31 db) and change frequency to 23.5 mc C.W. Observe output. It should be at least as great as the original reading, but not more than twice that amount.

R.-F. SWEEP AND OSCILLATOR ADJUSTMENT

Connect sweep generator and marker generator to antenna.

Connect oscilloscope and battery as for I.F. sweep observation.

Observe sweep pattern on each channel, adjusting output to give level of two volts peak to peak maximum at scope.

With fine tuning control set at mid-position, sound carrier marker should fall in sound carrier dip. Adjust oscillator slugs at front of tuner to obtain this.

The flatness across the top should not be more than + 15 percent from level on any channel: Adjustment of the following trimmers should help if required: antenna trimmer nearest where the twin lead emerges, r.f. trimmer between the tubes, and mixer trimmer in front of the 6J6.

However very few sweep generators indicate the correct r.f. response, especially on the high channels, due to reflections in the connecting cables. Do not rely heavily on the curve shape.

1. **MODE-HOPPING**

When the mode of oscillation of the horizontal multivibrator changes so that the 15.75 kilocycle frequency is not achieved, several symptoms appear. These are as follows:

(a) A rough, medium-frequency whistle is heard.

(b) The raster may be invisible or just visible, and will consist of widely spaced horizontal lines folded over in one or two places. These fold-overs will cause brighter vertical bars to appear.

(c) The raster will be only about two-thirds normal size.

(d) The horizontal output tube and the damper will be heavily loaded.

Mode-hopping will usually occur when the set is first turned on, especially from a cold start, and with low line voltage. It is caused by a lack of drive to the horizontal discharge tube.

The correction of this condition, therefore, lies in the adjustment of the horizontal drive control. With the trimmer too far clockwise, a white vertical line appears at the centre of the picture. This indicates too much drive. With the trimmer too far anti-clockwise, the mode-hopping occurs. The proper position for the control is just to the left of the position where the vertical white line disappears.

2. **SPITTING AND ARCING**

When the sweep circuits first begin to operate, there is a gradual build-up of anode voltage until the full fourteen kilovolts is applied. The spitting which is sometimes heard is arc-over in the narrow spacing between the accelerator at anode potential and focussing (at 250 volts) electrodes of the kinescope. Any loose particles of aquadag or phosphor which settle on the gap surfaces will cause an arc and will be burned off in the process. Any electrostatic kinescope will exhibit this arcing when new, especially after shipment and handling. Over a period of a few hours, the gap will become free and only very occasional arcing will be encountered. It can in no way hurt the receiver and is not at all dangerous.

3. **GATING CONTROL AND PICTURE STABILITY**

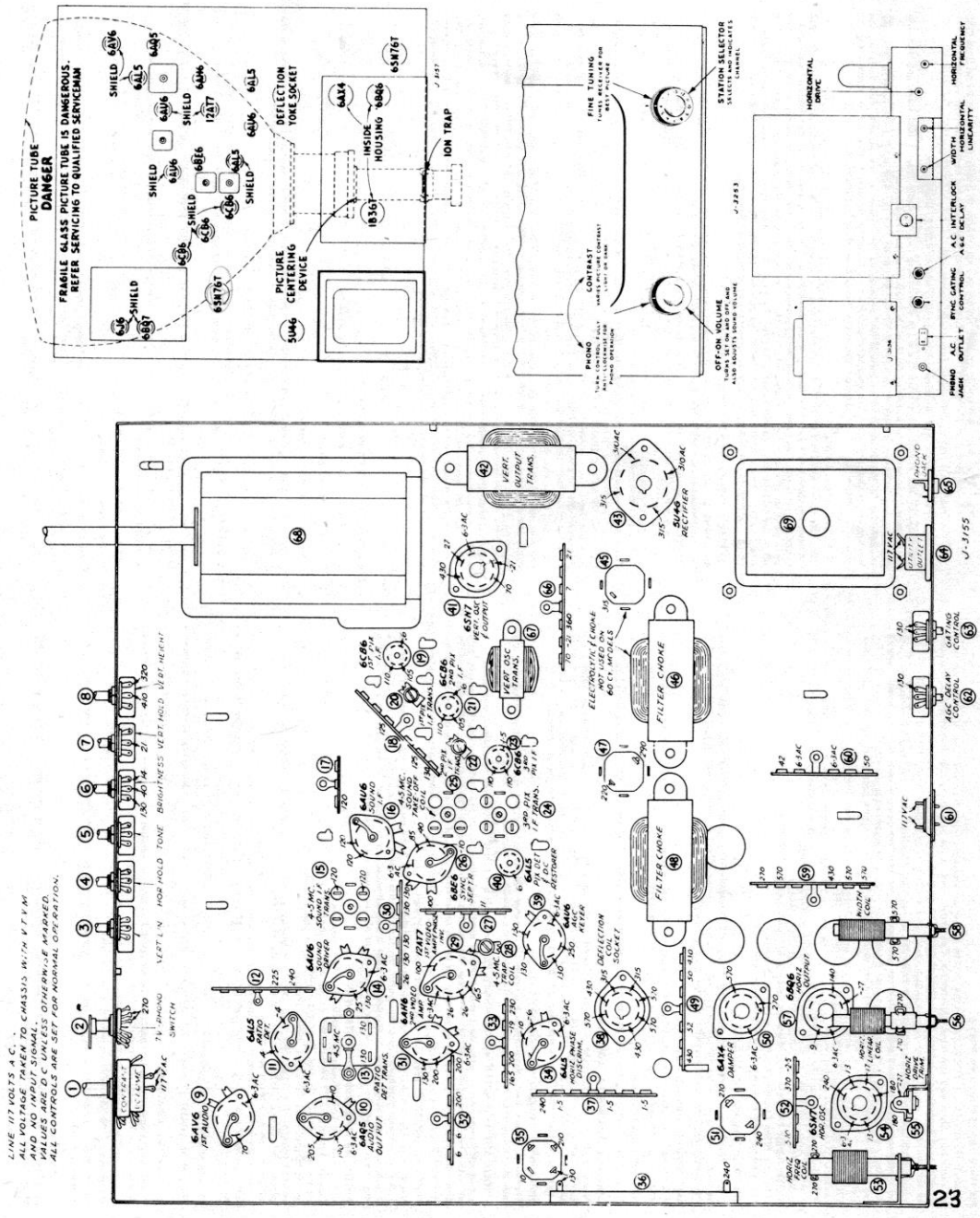
Exceptional picture stability, even in fringe areas, should be obtained from these receivers. However, with the gating control improperly set, it may be impossible to hold sync. at all.

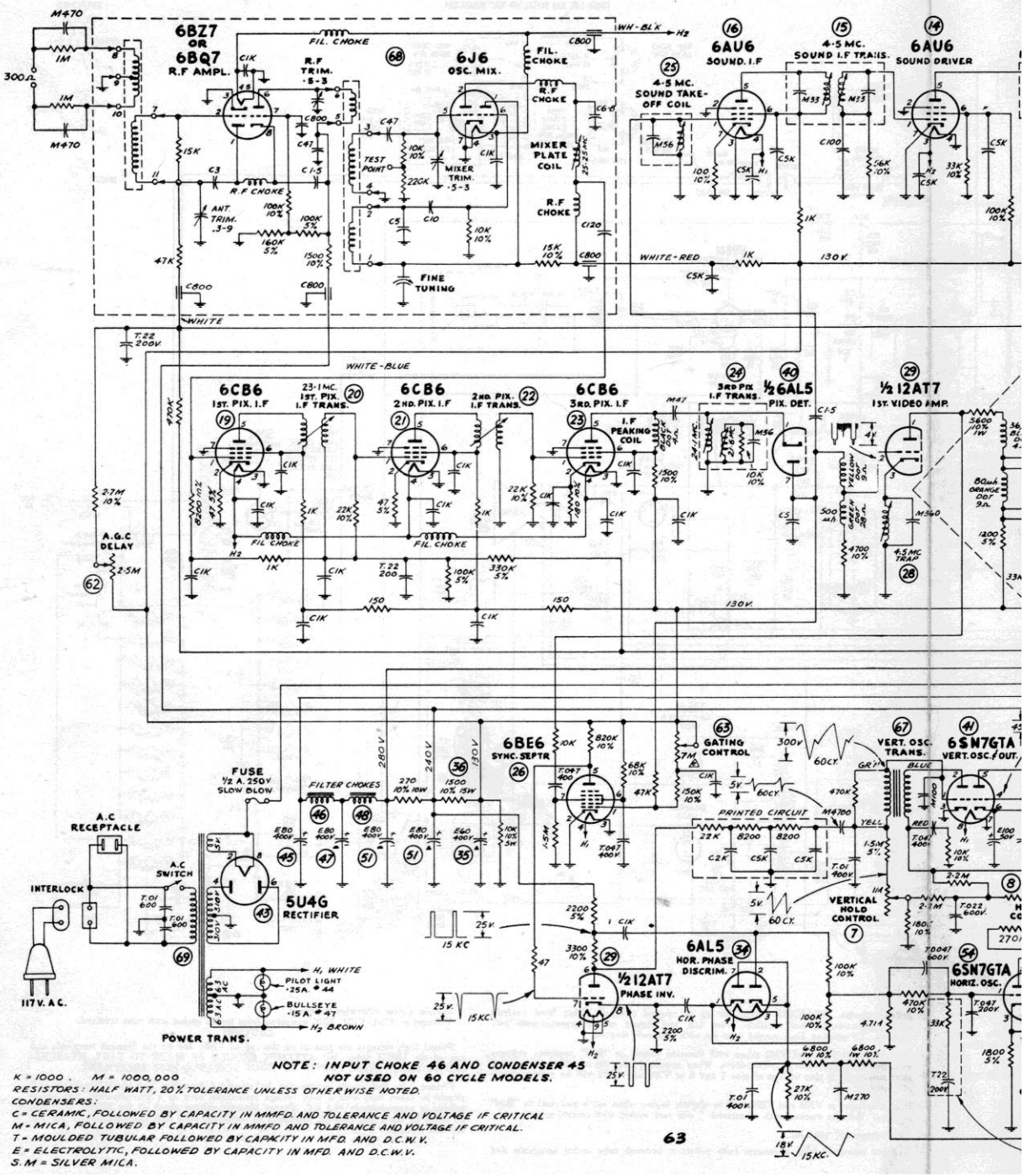
Operation of the 6BE6 separator is as follows: the signal is fed a fifty volt sync, positive signal. Screen voltage is very low and plate voltage is held down by the direct connection to the 12AT7 phase inverter grid following. With the high (1.5 megohm) signal grid resistor, positive peaks of the incoming signal (the desired sync.) cause grid current so that the grid biases itself off to a high negative value. The 6BE6 is then operating as a normal grid-leak pentode limiter.

Under these operating conditions, the cut-off characteristic of the oscillator grid is very sharp. Applied to this oscillator grid is a three volt sync. negative signal as well as a d.c. bias adjustable from the gating control. With the gating control properly set, the 6BE6 will just conduct during sync. peaks. Any signal beyond this level will completely cut off plate current flow. Thus any noise interference of amplitude greater than sync: level will close off the separator so that no false information can pass on to the sweep circuits. These circuits, with hold controls properly adjusted, can carry on in the absence of sync. for several cycles, and be in step when the sync. is restored.

The over-all results of this type of separation give a remarkable stable picture under any conditions. Were signal levels to vary appreciably, the separator effectiveness would be reduced accordingly. However, the amplified, keyed a.g.c. results in a practically flat response level between 100 and 500,000 microvolts, so that signal of all normal intensities will be properly separated and separation will be noise-immune.

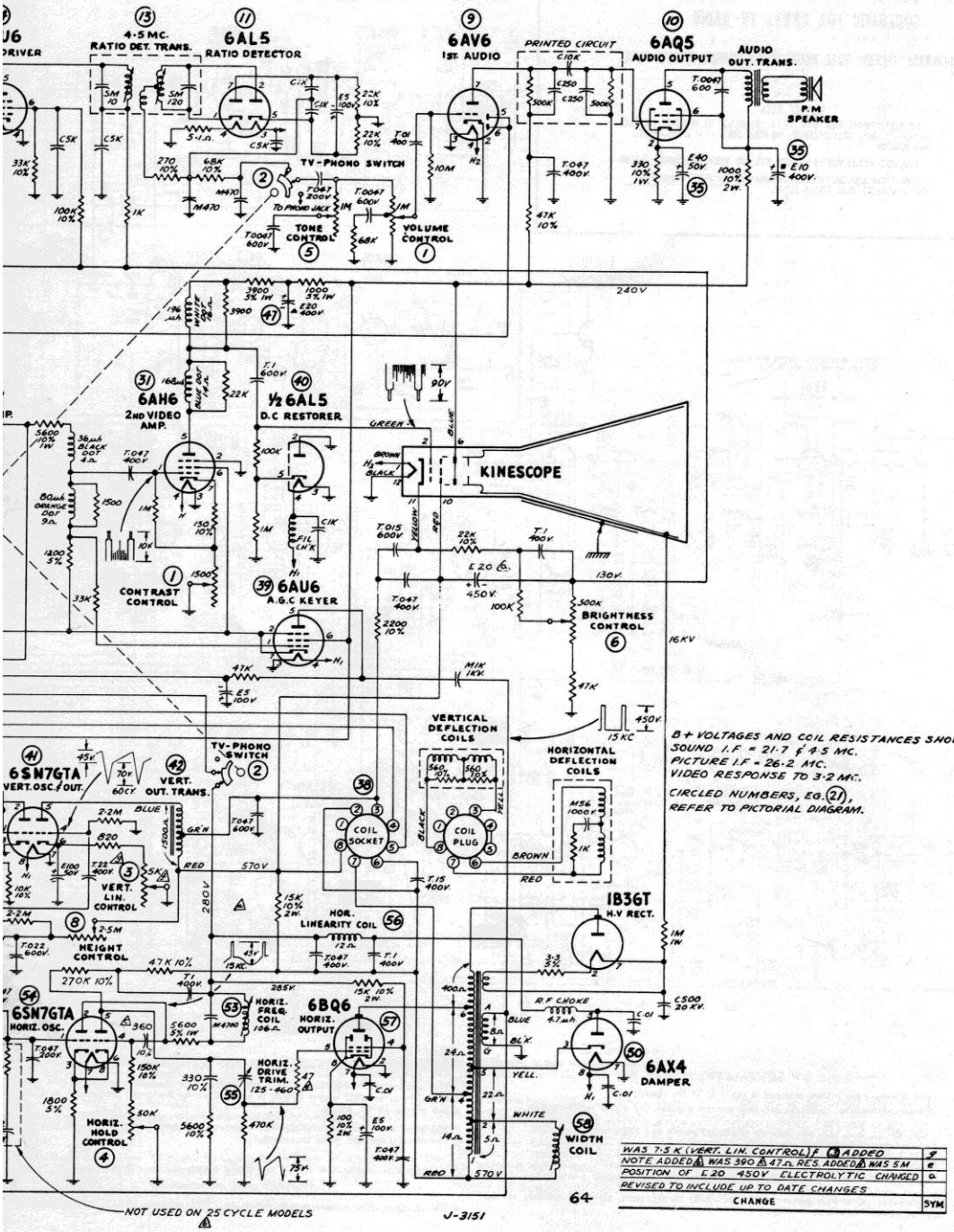
Proper setting of the gating control is as follows: too far counterclockwise, the picture will pull to the left, —(the separator is cutting off during sync. intervals and is separating the blanking pedestals from the video). Too far clockwise, the picture becomes unstable and at least vertical rolling may be observed. The proper setting is half way between these extremes. On weak fringe signals, better stability will be realized with the control retarded (counterclockwise) from this mid-position. Under any conditions, a reasonably broad range of adjustment is afforded on the control.


PICTURE TUBE
DANGER
FRAGILE GLASS PICTURE TUBE IS DANGEROUS.
REFER SERVICING TO QUALIFIED SERVICEMAN
SHIELD
DEFLECTION YOKE SOCKET
INSIDE HOUSING
ION TRAP
PICTURE CENTERING DEVICE
FINE TUNING
CONTRAST
PHONO
OFF-ON VOLUME
STATION SELECTOR
HORIZONTAL DRIVE
AC INTERLOCK
AGC DELAY
WIDTH
HORIZONTAL LINEARITY
HORIZONTAL FREQUENCY
PHONO JACK
A.C. OUTLET
SYNC GATING CONTROL
LINE 117 VOLTS A.C.
ALL VOLTAGE TAKEN TO CHASSIS WITH V.T.V.M.
AND NO INPUT SIGNAL.
VALUES ARE D.C. UNLESS OTHERWISE MARKED.
ALL CONTROLS ARE SET FOR NORMAL OPERATION.
TV PHONO SWITCH
VERT LIN
HOR HOLD
TUNE
BRIGHTNESS
VERT HOLD
VERT HEIGHT
ELECTROLYTIC CHOKE
NOT USED ON 60 CY MODELS
FILTER CHOKE
VERT. OUTPUT TRANS.
5U4G RECTIFIER
DEFLECTION SOCKET
J-3155
23



K = 1000 . M = 1000,000
RESISTORS: HALF WATT, 20% TOLERANCE UNLESS OTHERWISE NOTED.
CONDENSERS:
C = CERAMIC, FOLLOWED BY CAPACITY IN MMFD. AND TOLERANCE AND VOLTAGE IF CRITICAL
M = MICA, FOLLOWED BY CAPACITY IN MMFD. AND TOLERANCE AND VOLTAGE IF CRITICAL.
T = MOULDED TUBULAR FOLLOWED BY CAPACITY IN MFD. AND D.C.W.V.
E = ELECTROLYTIC, FOLLOWED BY CAPACITY IN MFD. AND D.C.W.V.
S.M = SILVER MICA.

ELECTROHOME
T21



CHANGE	SYM.
WAS 7.5 K (VERT. LIN. CONTROL) F ADDED	g
NOTE ADDED WAS 390 47Ω RES. ADDED WAS 5M	e
POSITION OF E 20 450V ELECTROLYTIC CHANGED	a
REVISED TO INCLUDE UP TO DATE CHANGES	