RCA

Television Service Tips

Volume XXI
Issue 1
January 19, 1970

Important Information for your Service Department

Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

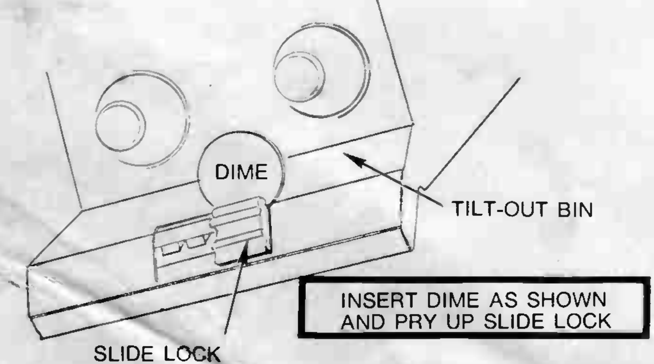
Tilt-Out Bin and Slide Lock Replacement "M" Line Color TV Instruments

Both the tilt-out bin (Crystal-control panel) and the slide lock (Clip-door lock) that holds the bin closed are individually replaceable on those "M" line color television instruments utilizing this feature.

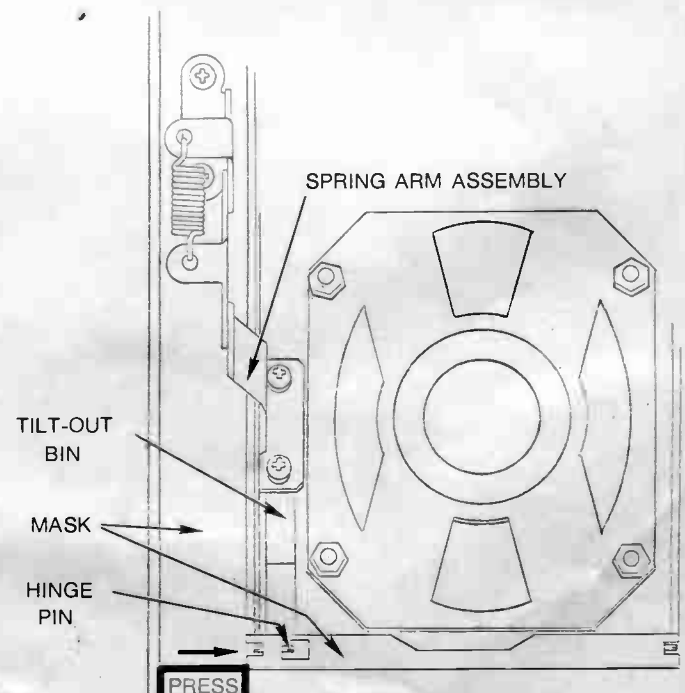
To remove the lock pry up the rear (or slide portion) of the lock with a coin or small screwdriver (as shown in the illustration) until it is released from its track on the bin. To replace, insert the lock so that the slide portion is above the track then press down until the slide snaps into place.

To remove the bin:

1. Remove the customer controls panel from the bin and disconnect speaker leads.
2. Remove two Phillips screws securing spring arm assembly to bin.
3. Facing cabinet rear, release the left hinge pin by pressing pin **into** hole (in bin) until pin clears edge of mask.
4. Bin can then be rotated slightly (to disengage other hinge pin) and removed **from the front.**



Slide Lock Removal



Tilt-Out Bin Removal

First Edition—First Printing

RCA

Television Service Tips

Volume XXI
Issue 5
May 1, 1970

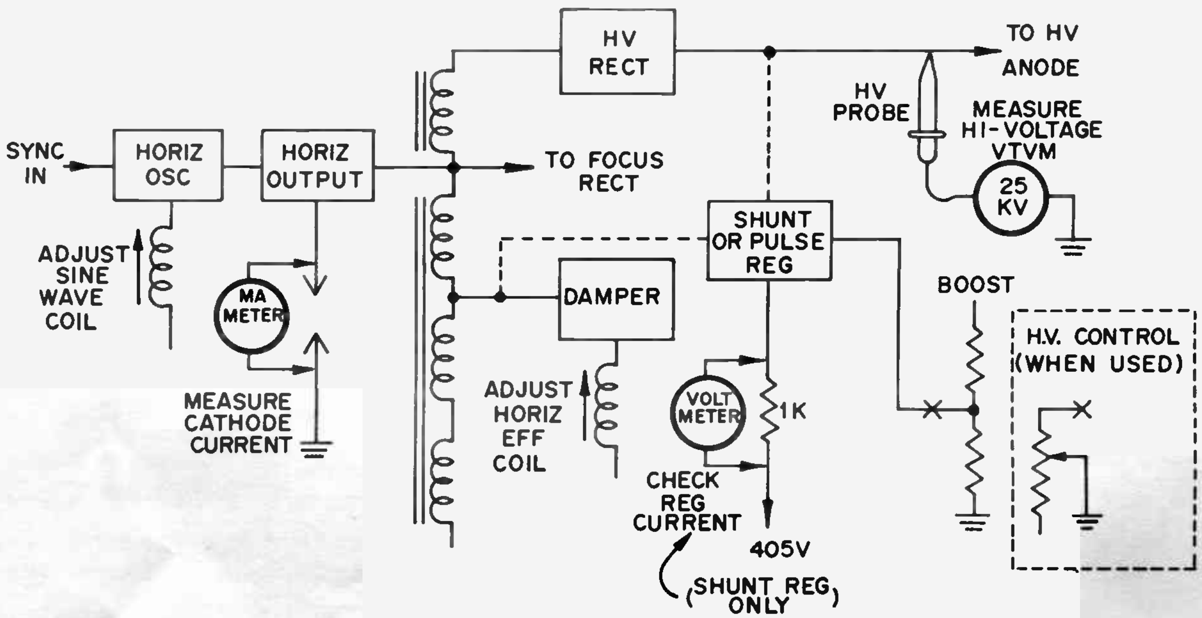
Important Information for your Service Department

Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

Servicing Color Television Deflection and High Voltage Circuits

The following information illustrates a basic procedure for servicing horizontal deflection and high voltage circuitry in tube-type color chassis. This procedure involves adjustments, the monitoring of key voltages and currents, and trouble analysis as a method to confirm proper operation. (The CTC 38 Chassis is used as an example for these servicing steps.)

The **"ADJUSTMENTS"** section should be checked and/or performed if the chassis is bench-serviced. The **"CIRCUIT CHECKS"** on page two are designed to help locate troubles, and prevent repeat failures, by confirming proper operation of the horizontal deflection stage.



ADJUSTMENTS

Preliminary Notes: Before attempting service or alignment of deflection circuits, accurate meters should be connected as shown in the illustrations. This permits immediate indication if a malfunction occurs after power is applied. Possible damage to the horizontal output tube and/or other components may result if the circuit is permitted to operate at high power dissipation for even a short time. The overall operation of color high voltage circuitry can be analyzed by performing the basic alignment procedure outlined in **Service Data** for each particular chassis. The Service Data details three circuit adjustments that are made while monitoring the results on the screen and/or test equipment.

Step 1—Horizontal Oscillator Alignment consists of removing the incoming sync signal, shorting the **SINEWAVE** coil and adjusting the **HORIZONTAL HOLD** control for the correct free running oscillator frequency; the short across the **SINEWAVE** coil is removed, and it is then adjusted for correct frequency. This assures that the oscillator is operating at the correct frequency, and provides maximum noise immunity to the circuit.

First Edition—First Printing

Step 2—Horizontal Output and High-Voltage Alignment involves the simultaneous adjustment and monitoring of horizontal output cathode current and high voltage. This assures maximum output stage efficiency and operation within the power dissipation rating of the output tube.

A. The **EFFICIENCY COIL**, when properly adjusted, assures maximum deflection circuit efficiency with minimum power dissipation in the horizontal output tube. This adjustment controls the decay of damper current and conduction of the output tube, to set the proper "crossover" transition between damper-tube current and output-tube current. A milliammeter is connected to measure the output tube cathode current, and the coil is adjusted for a dip (minimum current). Optimum horizontal linearity and efficiency usually occurs slightly offset from the "dip." Therefore, the coil should be adjusted to increase cathode current by 3 or 4 mA. However, the direction of adjustment must result in the following: Regulator current (voltage across 1K resistor) must increase, simultaneous with increasing output cathode current. **IF REGULATOR CURRENT DECREASES, THE EFFICIENCY COIL WAS ADJUSTED IN THE WRONG DIRECTION FROM THE DIP. THIS RESULTS IN LESS EFFICIENCY, POOR LINEARITY, AND MORE POWER DISSIPATION IN THE OUTPUT STAGE.**

B. A precision voltage divider (1% tolerance resistors) is provided to obtain 25kV±1.5kV with the picture tube at cutoff (minimum brightness). Under these conditions, picture tube current is minimum, and regulator current is maximum. Using a black picture permits measuring regulator current as a check on the capabilities of the high-voltage supply. In the event that the measured high-voltage does not meet the above specifications, the 1% voltage divider resistors and other components in the regulator circuitry (such as the 1000 ohm cathode resistor) should be suspected. If replacement of the 1% resistors is indicated, both should be replaced using only the correct replacement parts specified in **Service Data.**

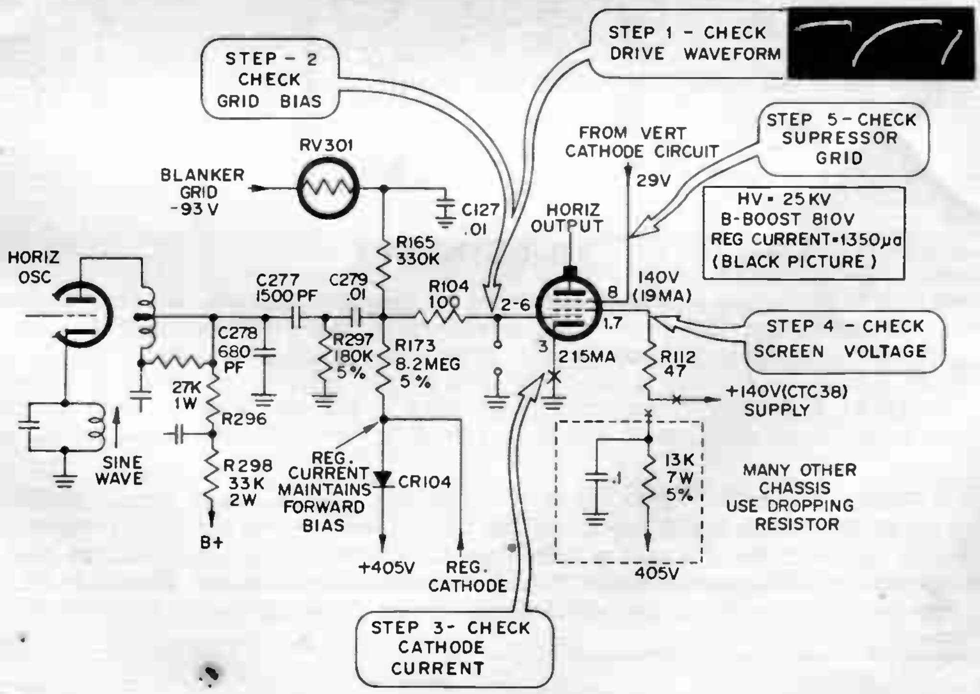
Chassis equipped with a **HIGH-VOLTAGE** control should be adjusted for the high-voltage specified in **Service Data** for that particular chassis. (The setting of the **HIGH-VOLTAGE** control should be re-checked in the home as a final step in servicing.)

With the anode voltage at 25kV and brightness at minimum, the regulator current must be at least 960 μA (.96V across 1K resistor). Typical current is approximately 1350 μA (1.35V). As the picture tube current increases (brightness advanced), the regulator current decreases by the same amount to maintain a constant load on the high voltage supply.

After adjusting the **HIGH-VOLTAGE**, the "dip" point in horizontal output cathode current should be rechecked, and reset.

CIRCUIT CHECKS

Preliminary Instructions: Perform all checks with **120V AC line input.** Use a variable AC power supply and adjust for 120V input, or adjust the line for nominal B+ as indicated in **Service Data**. All voltage and current readings as shown on the schematic below reflect these conditions. These voltage and current measurements are typical of one color chassis (CTC 38). Refer to the appropriate **Service Data** for typical and maximum readings on other chassis. **NOTE: The nominal B+ indicated should be obtained with the approximate nominal AC INPUT (120V). E.g. it should not be necessary to adjust line voltage for 135V to obtain nominal B+ voltage. This example would indicate trouble in the low-voltage power supply which must be corrected before horizontal checks and/or adjustments are attempted.**



Step 1—Check Drive Waveform

The grid of the horizontal output tube must receive a proper drive waveform for efficient operation. The grid-drive amplitude is normally **220 to 235 volts P-P.** Obtaining a correct waveform indicates normal operation of the horizontal oscillator stage.

Minimum acceptable **P-P** drive is approximately **200 volts**; a lower reading indicates trouble in oscillator tube or associated components. Possible causes include:

1. Weak oscillator tube—does not discharge timing network properly, thereby decreasing amplitude of drive signal.
2. Defective component in timing network—most likely shorted C277 or off-value C278. Changed value R296, R297, R298. R165, R173, RV301, and C127 can also affect drive.

Step 2—Check Grid Bias Voltage

Nominal DC grid bias when measured with a VTVM and 470K isolating resistor is approximately —54V, as determined by grid-drive signal and hold-down bias network. Latter circuit functions to limit high-voltage to a safe value if the regulator tube fails.

Low grid bias (less negative), can be caused by:

1. Improper drive signal.
2. Fault in hold-down circuit.
3. Faulty horizontal output tube.

High grid bias (more negative), can be caused by:

1. Faulty horizontal output tube.
2. Hold-down circuit action.
3. Excessive blanker grid voltage in chassis using blanker grid to furnish output stage bias.
   Blanker voltage can be checked by disconnecting R165, disconnecting R173 from anode of CR104 and connecting the open end of R173 to chassis ground. The normal grid bias of —54V should be developed under these conditions.

Step 3—Check Cathode Current

Nominal cathode current for the CTC 38 chassis is 215 mA (235 mA max.) with properly adjusted horizontal oscillator, efficiency coil, and high voltage. The maximum safe current of 235 mA will vary with different chassis—consult specific Service Data for nominal and maximum currents. Total current depends on input drive, output load, efficiency adjustment, and screen grid operation. If current is near the Maximum Limit, perform monitor check as follows:

1. Operate set for 5 minutes, perform HV adjustments (if applicable), check cathode current.
2. Recheck cathode current "dip" (and reset) after 30-minutes operation.
3. Permit set to cool. Repeat (2) above.

Excessive current can be caused by: defective horizontal output tube, low drive signal, screen grid load, misadjusted or defective efficiency coil, overload from flyback system, boosted-B, or boosted-boost circuits.

Step 4—Check Screen Voltage

Screen grid voltage is an important checkpoint of output tube operation. Nominal voltage in the example circuit is 140V.

Nominal screen current under these conditions is 19 mA. Excessive screen current, leading to short output tube life may be caused by:

1. Defective tube.
2. Decrease in load resistor value.
3. High B+ voltage.
4. Improper load on horizontal output by flyback system.

Step 5—Check Suppressor Grid

Voltage on the suppressor-grid should be +20 to +40 volts, obtained from voltage divider in cathode circuit of vertical output tube. Positive voltage does improve the operating characteristics of the output tube. A wrong voltage here that could change tube operation would be evident by upset in vertical sweep on screen.

REPLACING THE HORIZONTAL OUTPUT TRANSFORMER

In the event that the previous Circuit Checks do not reveal the problem, it may be necessary to make detailed component checks in an effort to isolate a defective part. As any abnormal load on the horizontal ouptut stage will upset normal voltage readings, all circuits receiving horizontal derived voltages or pulses should be eliminated as a cause of trouble before major components are substituted.

Before replacing the horizontal output transformer, it would be advisable to eliminate the yoke and convergence components as a possible source of trouble. The yoke is best cleared of suspicion by substitution of a known good unit. The convergence circuit can be disconnected.

When it is definitely confirmed that the horizontal output transformer is defective, it would be well to consider the possible cause(s) of failure, and take steps to assure reliable operation of the replacement transformer. Two possible causes of failure are (not in order of predominance):

1. Over-voltage (insulation breakdown)—regulator failure (the tube and/or other components such as the precision voltage divider resistors or the 1000 ohm cathode resistor), hold-down circuit failure, or operation without load.
2. Excessive current—misadjusted efficiency coil, excess load on circuit, defective horizontal output tube. (Presence of dripped wax usually does not indicate that transformer is defective.)

The above two types of failures can be corrected by a conscientious application of the **"ADJUSTMENTS"** and **"CIRCUIT CHECKS"** procedure, taking care to watch for possible causes of (1) and (2) type failures as described above.

Other failures may be caused by poor lead dress, poor soldering, and/or dirt that results in corona or arcing-induced insulation failure. The steps outlined below will eliminate the possibility of damaging the replacement transformer and the attendant "repeat failure" situation.

Lead Dress

Dress all leads away from:

1. Transformer tire
2. Yoke lead terminals
3. Damper terminals
4. Inside of high voltage shield compartment

Solder Connections

Observe the following precautions:

1. Clean and rounded
2. No burned insulation
3. No stray wires
4. No solder splashes or metallic chips on transformer windings
5. Remove excess rosin flux

Clean

Dirt is the enemy of high voltage circuits. Use **clean dry** rag to wipe:

1. Interior of high-voltage shield compartment.
2. Replacement transformer
3. High voltage rectifier

Assure Correct Operation

Make previously described **EFFICIENCY COIL** and **HIGH-VOLTAGE** adjustments and checks. Be certain high-voltage rectifier is seated properly in anode socket cup on high voltage transformer.

Check for Breakdown and Corona

Breakdown will be evidenced by intermittant or continuous snapping sound —correct this condition. Corona may appear as a blue "glow" and some times audible "hiss". Also the acrid smell of ozone will often indicate the presence of corona. Other times it may not be visually or audibly evident. A good corona check is to operate the set with no signal while looking for interference bars flashing on the screen.

FINAL NOTE: When the chassis is returned to the home, the line voltage switch should be set to the position which produces the closest-to-nominal HIGH-VOLTAGE. This final servicing step requires measuring the anode voltage in the home.

RCA

Television
Service Tips

Volume XXI
Issue 6
May 22, 1970

Important Information for your Service Department

Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

Service Data
1968 No. T18
1969 No. T8
1969 No. T18
1970 No. T3
1970 No. T11
1970 No. T14

Color Killer Adjustment
CTC 38, CTC 39, CTC 41, CTC 42, CTC 43

Since the color-killer circuitry in these five chassis is similar, the explanation and set-up procedure given here applies to all of them. In most areas, the conventional method of adjusting the killer threshold is adequate. Simply position the tuner to a vacant channel, adjust the control from the clockwise extreme until colored snow is visible, and readjust it until the color disappears. While this technique is completely satisfactory under most conditions, refinement of the threshold adjustment may be necessary in those instances when broadcast stations inadvertently allow a small amount of burst signal to be transmitted with a monochrome signal. The killer system in this series of receiver chassis was designed with high burst sensitivity to enhance fringe-area color reception, and because of this, "leaking" burst may open the chroma channel, even though this burst is attenuated as much as 20 db (1/10 of normal). This results in intermittent colored snow during monochrome reception. The adjustment to be described normally will make it possible to maintain color killing during monochrome reception when residual burst is present and also allow normal color reception.

In all these chassis, the color-killer stage is a transistor switch. When this switch is "off" (transistor not conducting) negative voltage obtained from the blanker grid circuit is allowed to bias off the difference-amplifier stages. When turned "on," or conducting, the killer switch enables the difference-amplifier tubes to conduct by removing the negative grid bias and supplying a ground return for the grid resistors.

The conduction point of the switch transistor is dependent on both 3.58 MHz oscillator grid bias and the killer control setting. Conduction is controlled by combining a positive potential from B+ (through the killer control) with a negative potential from the 3.58 MHz oscillator grid. The resultant voltage is applied to the base of the killer transistor. With no color signal input, the oscillator grid voltage is low (approximately −3.5 volts); and the positive voltage from the killer control balances that obtained from the oscillator grid. Under these conditions the base bias is zero and the transistor switch is cut off. During color reception the oscillator grid voltage increases to approximately −8 volts. This increased negative bias is sufficient to override the positive potential from the killer control, thereby biasing the killer switch on and enabling the color-difference amplifiers.

In those areas where a transmitter is known to leak burst, the best policy is to refrain from changing the original setting of the color killer. If this control has been adjusted, it may be returned to the optimum setting using the factory set-up procedure which follows:

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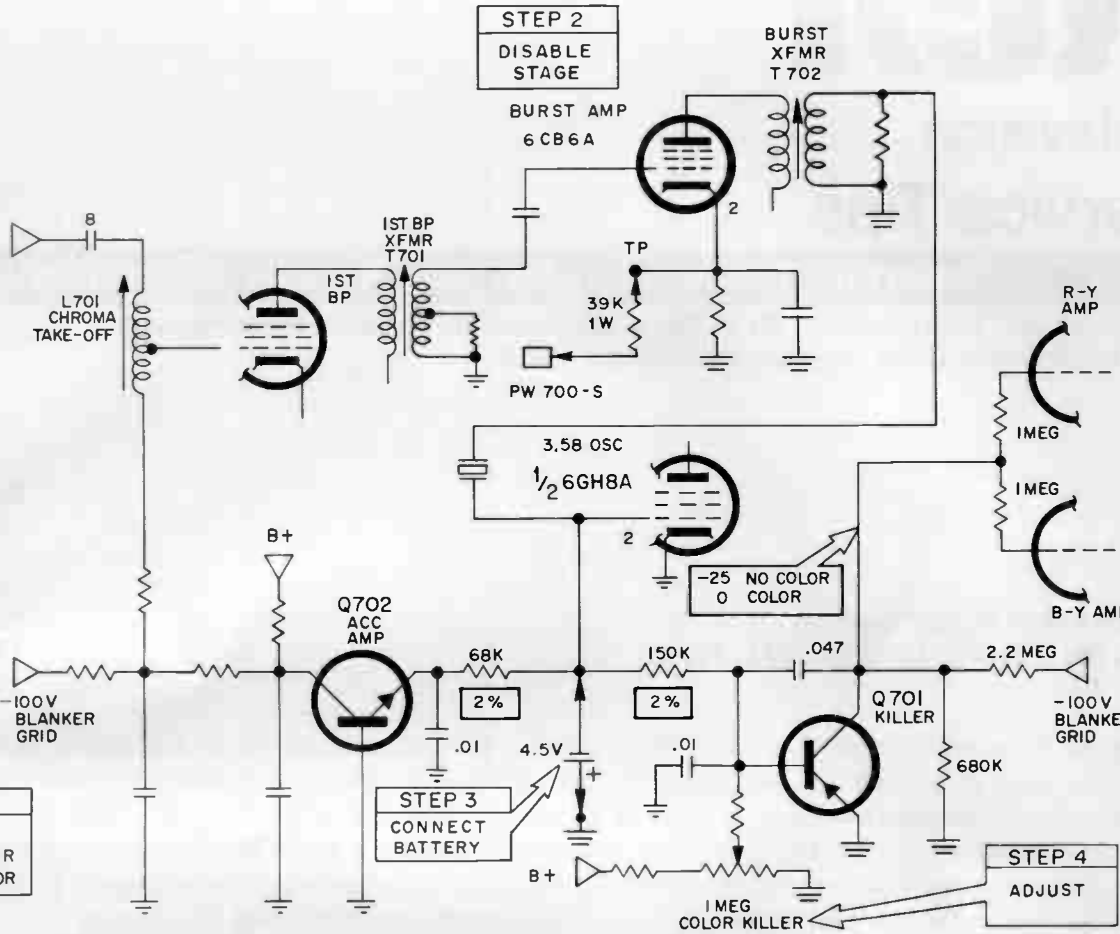

Simplified ACC/Color Killer Circuits

Step 1. Connect a color bar generator to the chassis in order to supply a constant-level color signal.

Step 2. Defeat the burst amplifier stage by connecting the cathode of the burst amplifier tube to approximately 270 volts B+ through a 39K, 1 watt resistor. The burst amplifier cathode is TP701 in the CTC 38 and CTC 39 chassis; TP 704 in the CTC 41, CTC 42 and CTC 43 chassis. The necessary B+ potential is available at terminal PW700-S in all chassis. This step makes the oscillator grid voltage independent of incoming color signal amplitude.

Step 3. Connect negative 4.5 volts bias (use a battery—VS 1149 or equivalent) to the 3.58 MHz oscillator grid (Pin 2) through a 470-uH choke (Stock No. 124271). It is necessary to isolate the grid with a choke to prevent loading, since the oscillator must be running during the setup procedure to produce color on the screen. This step establishes the optimum oscillator grid bias for killer adjustment.

Step 4. Adjust the killer control to kill the color bars on the picture tube screen.

An alternate setup procedure which requires less equipment but which requires somewhat more skill may be used in lieu of the factory adjustment.

Step 1. Tune receiver to a color broadcast.

Step 2. Connect a VTVM via a 470K resistor to the grid of the 3.58 MHz oscillator.

Step 3. Adjust receiver fine tuning (away from sound) until the VTVM indicates −4.5 volts.

Step 4. Adjust the killer control until color is just killed.

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Television Service Tips

Volume XXI
Issue 7
June 5, 1970

Important Information for your Service Department

Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

Service Data
1968 No. T20
1969 No. T17
1969 No. T19
1970 No. T15

SCR Stock Number Cross Reference

The SCR sweep system utilized in RCA Trans Vista instruments is a reliable simple-to-service horizontal deflection system. To maintain this reliability, in those isolated instances where a new SCR is required, the **correct** replacement **must** be used.

While a replacement other than that listed in Service Data or this Service Tip may appear to operate properly, other problems such as reduced SCR life, raster distortion, etc., may be introduced into the instrument. In some cases the sweep system will not operate at all with an incorrect replacement.

The following is a cross reference listing the approved Stock Numbers of replacement SCR devices for each application in the Trans Vista chassis.

	SCR 101 Trace		SCR 102 Commutator	
Chassis	**Stock No.**	***ID No.**	**Stock No.**	***ID No.**
CTC 40	126899 or 131346	3585-1	126898 or 131347	3585-2
CTC 44	126899 or 131346	3585-7	131347	3585-8
CTC 47	126899 or 131346	3585-4	130025	3585-3

*The number listed under ID (a portion of the Drawing Number stamped on the SCR case) pertains to the SCR originally installed in the chassis.

First Edition—First Printing

Television Service Tips

Volume XXI
Issue 10
August 31, 1970

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Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

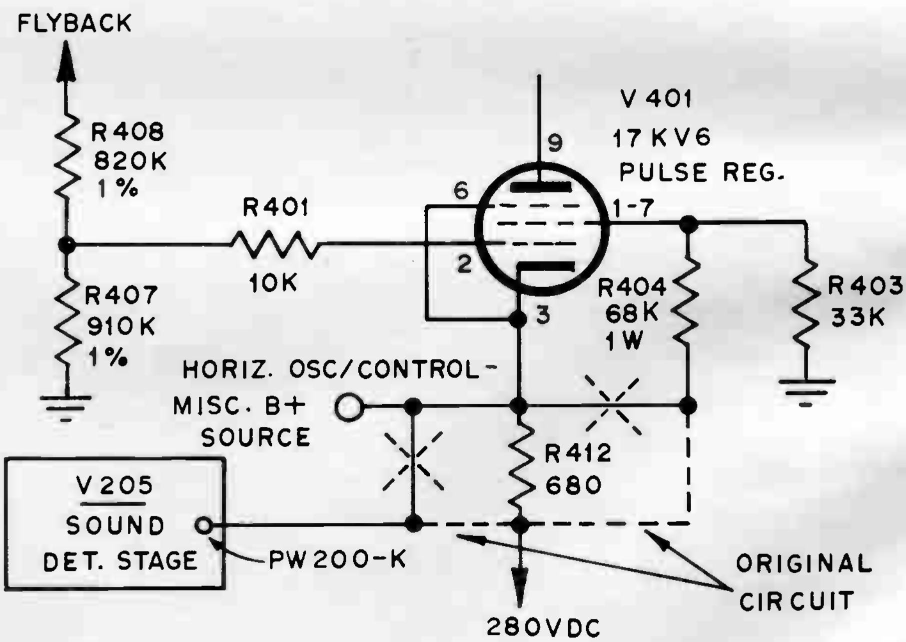
CTC 22AD Pulse Regulator

Service Data
1969 No. T12-S2

In early-production versions of the CTC 22AD, if Pulse Regulator tube failure in turn causes R412 to open, the instrument may operate, with marginal picture quality after the tube is replaced. The symptoms would be those associated with reduced horizontal drive.

Later-production instruments reflect the circuit changes outlined in the simplified schematic. Changing the B+ source point for the regulator screen grid resistor (R404) as shown "shuts down" horizontal operation in the event of R412 failure. The B+ source for the Sound Detector stage is also changed to this point. Symptoms for R412 failure in instruments with these changes will be: **no sound, no raster.**

In addition, R407 and R408 values may be either 820K, 1% or 910K, 1%. If replacement is required, use the same value resistor as the original. Stock numbers are: 820K, 1%—126429; 910K, 1%—126428. Check high voltage operation (per Service Data) after resistor replacement.



Pulse regulator circuit—CTC 22AD

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Television Service Tips

Volume XXI
Issue 11
September 1, 1970

Important Information for your Service Department

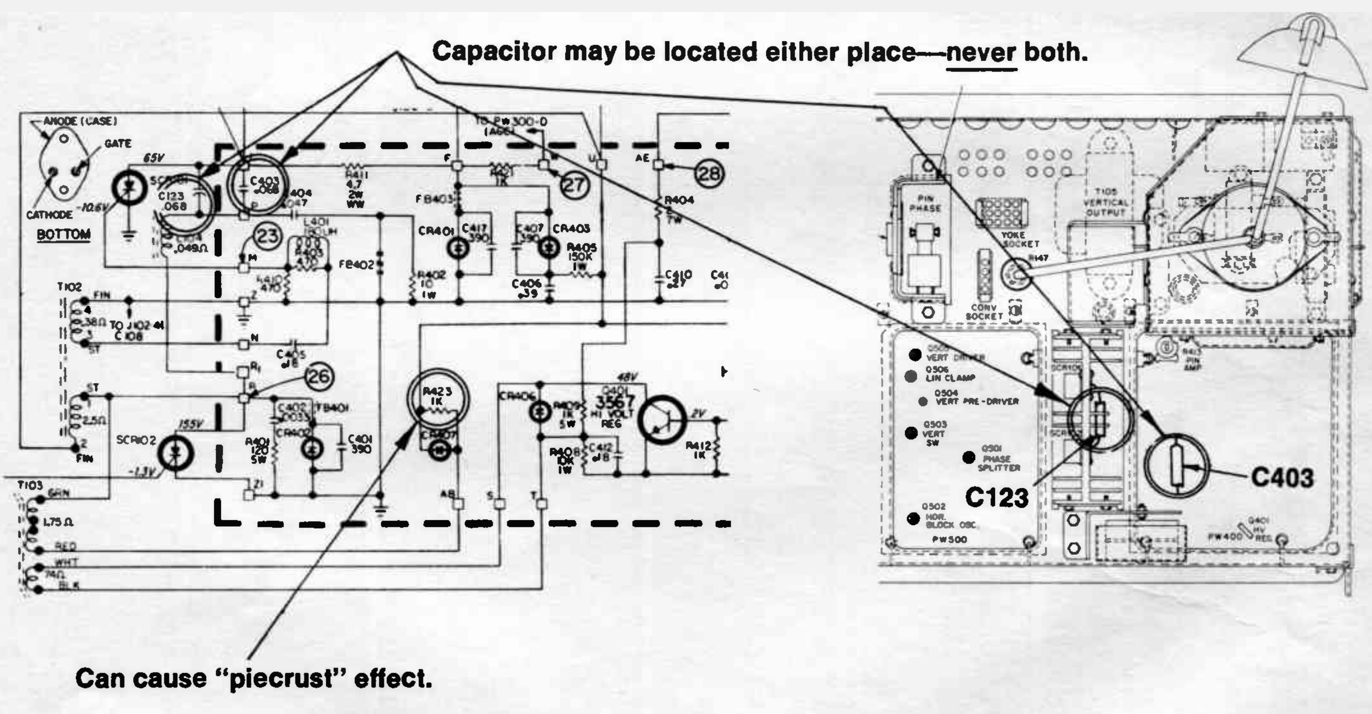
Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

Service Data
1968 No. T20
1969 No. T17
1969 No. T19

SCR Sweep System Servicing
CTC 40, CTC 47

The .068 μf commutator capacitor used in the horizontal deflection circuit of these chassis is located either on the PW400 board or on a terminal board under the SCR heat sink. Two capacitors in parallel are **never** used. If the capacitor is on PW400, it is C403; off the board, it is C123. In either case, the capacitor is the same type and the replacement stock number is 165437.

"Piecrust" or "geartooth" effect in the raster (scalloped edges) at different brightness levels may be the result of R423 opening. High voltage and brightness limiter operation appear to be normal. In some instances the symptom may be accompanied by a high pitched squeal.



Horizontal deflection circuit—CTC 40

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Television Service Tips

Volume XXI
Issue 12
September 2, 1970

Important Information for your Service Department

Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

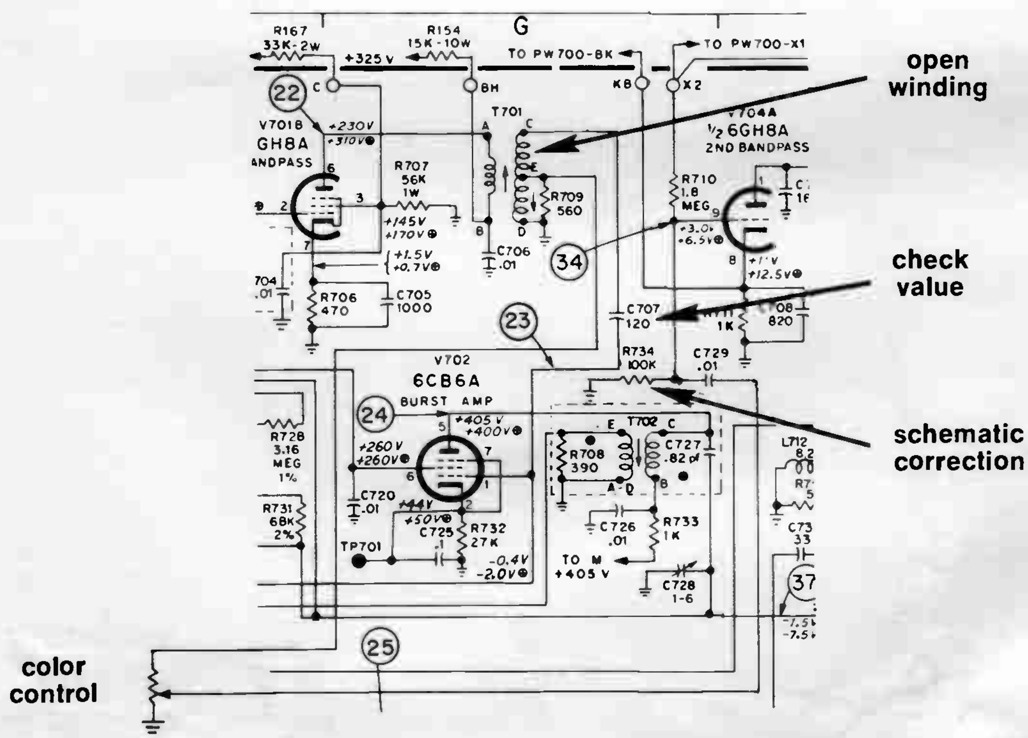
Service Data
1968 No. T18
1969 No. T8
1970 No. T3
1970 No. T8

Color Sync
CTC 38, CTC 39

Some symptoms associated with the color sync and/or ACC-killer circuitry in instruments utilizing these chassis may be the result of an open winding in the first bandpass transformer, T701 (Stock No. 124761). If the open occurs in the winding connected between terminals C and E the color signal input to the burst amplifier stage will be incorrect. However, the path for chroma input to the second bandpass amplifier stage will be normal.

In addition, make certain capacitor C707 is the correct value (120pf).

The schematic correction pertains to Service Data 1970 No. T3 only.



Color burst circuit—CTC 38, CTC 39

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Television Service Tips

Volume XXI
Issue 13
October 19, 1970

Important Information for your Service Department

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600 N. Sherman Drive, Indianapolis, Indiana 46201

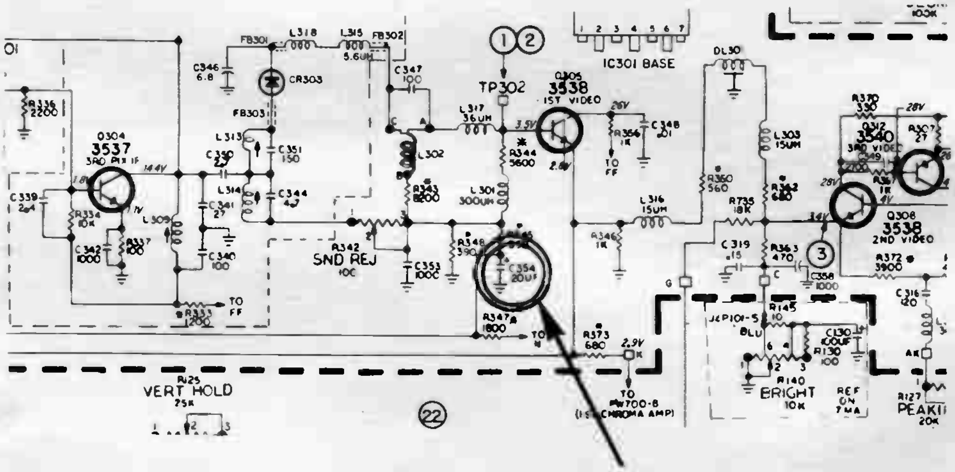
Service Data
1968 No. T20
1969 No. T17
1969 No. T19
1970 No. T15
1970 No. T16

Distorted Video and/or Marginal Sync
CTC 40, CTC 44, CTC 47

A wide variety of video and/or sync symptoms in these chassis may be the result of an electrolytic capacitor changing value. Possible symptoms include: video "smear"; video "bends"; unstable sync; various combinations of these symptoms. In addition, the symptom may vary with the brightness control setting.

The capacitor is:

SYMBOL No.	STOCK No.	DRAWING No.	DESCRIPTION
C354	121995	1471882-14	20μf, 15V, electrolytic



Check Electrolytic

First video amplifier circuit—CTC 40

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Television Service Tips

Volume XXI
Issue 14
October 19, 1970

Important Information for your Service Department

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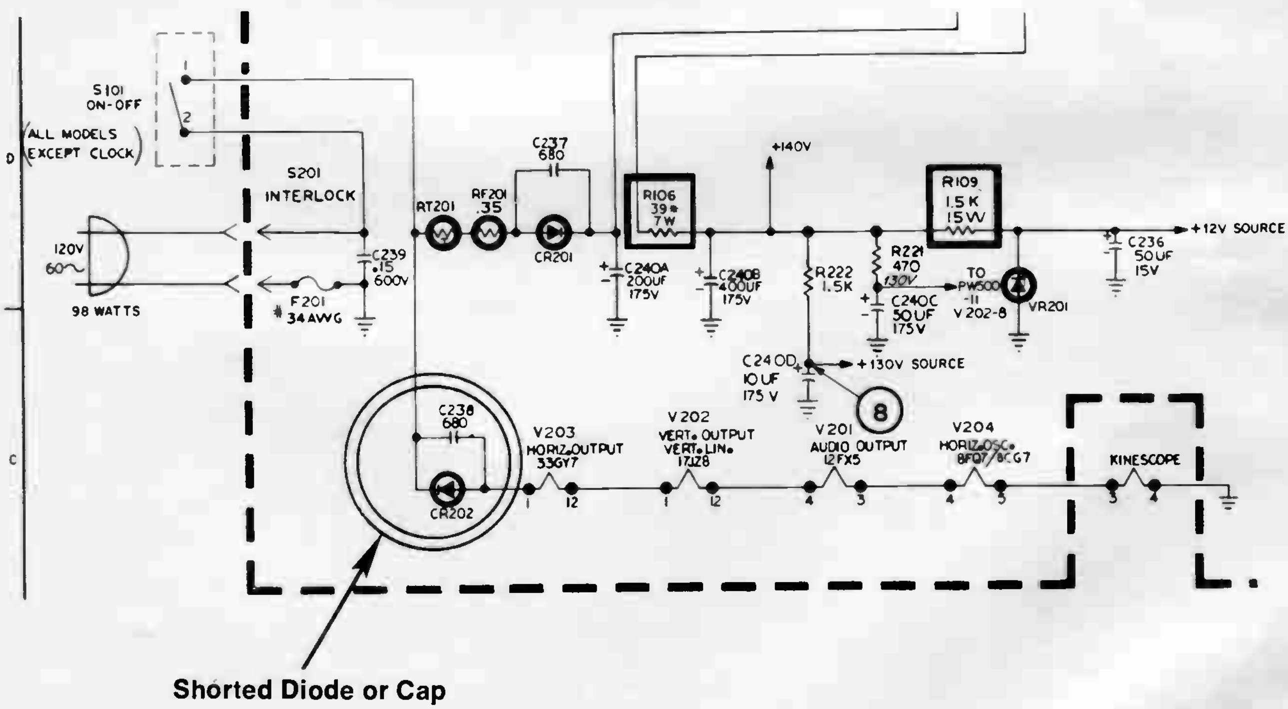
Service Data
1968 No. T15
1969 No. T5
1969 No. T14
1969 No. T15
1970 No. T5

Hum Bar in Raster and/or Loss of Sync
KCS 169, "L", "M", "P" Line Models
KCS 176, KCS 177 "M" Line Models

These chassis use a half-wave rectifier for filament power. Should the diode (or the capacitor across it) short, the filament string will be operating on full line voltage (120V AC) rather than the normal half-wave rectifier output. The tube filaments will glow brighter than normal and may result in reduced tube life. In addition, a hum bar in the raster and/or poor vertical sync may be evident.



Filament power circuit—KCS 177

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RCA

Television Service Tips

Volume XXI
Issue 15
November 16, 1970

Important Information for your Service Department

Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

UHF Channel Indicator KRK 170 (TMA 417)

Service Data 1970 No. T3

In areas of multiple UHF channel reception (where the channels are relatively close together), some difficulty may be encountered identifying specific channels on instruments utilizing the six-detent U tuner (KRK 170).

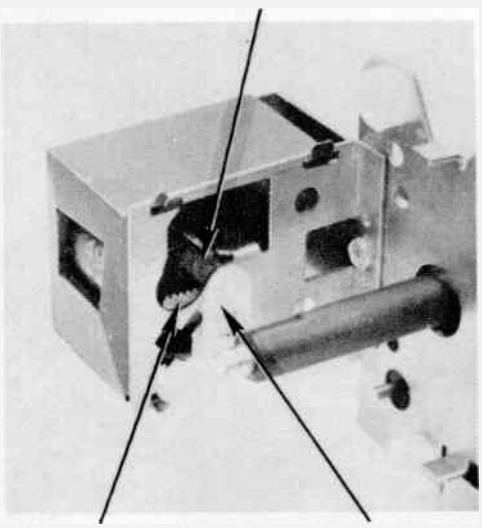
Optimum channel identification can be achieved by either of the following methods. Both require removal of the TMA.

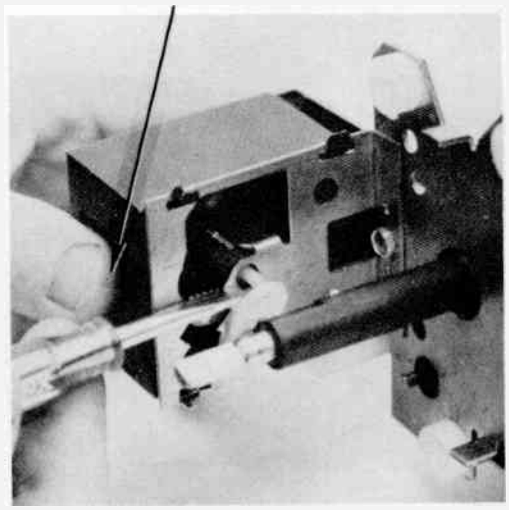
First, if the error is slight and the instrument is non-remote:

1. Tune the mechanism so that the lowest channel in the area is indicated on the drum.
2. Loosen three ¼ inch U tuner mounting screws and slide the tuner (holes are slotted) until that channel is received, then tighten the screws.

If the error is greater, or the instrument is a remote type:

1. Tune the KRK 170 for reception of a known channel, preferably one between channels 45 and 55.
2. While holding the indicator drum, spring the nylon retainer out until the teeth of the drum gear are disengaged from the teeth of the rack gear arm.
   NOTE: The drum is spring-loaded. If it is inadvertently released, rotate approximately one turn after the coil spring is engaged in its notches.
3. Turn the U drum until the indicator shows the channel being received.
4. Mesh the teeth of the drum gear and the rack gear, then return the nylon retainer to its original position.





UHF channel indicator—CTC 39X

First Edition—First Printing

RCA

Television Service Tips

Volume XXI
Issue 16
November 16, 1970

Important Information for your Service Department

Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

Service Data
1969 No. T18-S2
1969 No. T19
1970 No. T11
1970 No. T15

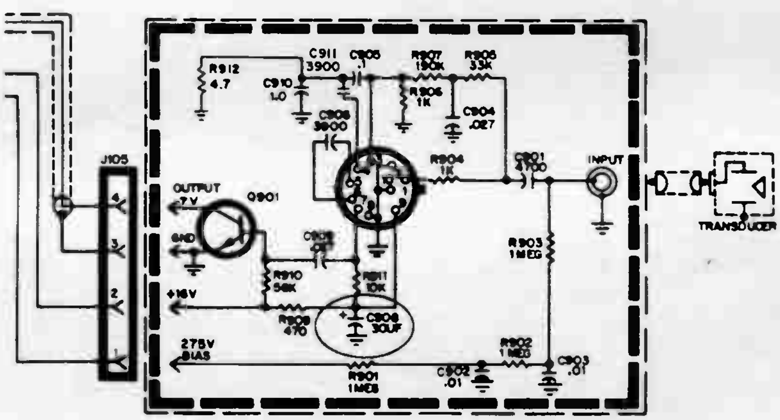
Reduced Remote Sensitivity
CTC 42, CTC 43, CTC 44, CTC 47

Reduced remote control sensitivity of instruments utilizing these chassis may be the result of an off-value electrolytic capacitor in the preamplifier. The capacitor is:

SYMBOL No.	STOCK No.	DRAWING No.	DESCRIPTION
C908	128058	1471882-19	30μf, 15V, electrolytic

If this capacitor must be replaced, for maximum reliability use the following tantalum type:

SYMBOL No.	STOCK No.	DRAWING No.	DESCRIPTION
C908	132062	1446192-14	27μf, 15V, electrolytic



Remote preamplifier circuit—PW 900

First Edition—First Printing

RCA

Television Service Tips

Volume XXI
Issue 17
November 16, 1970

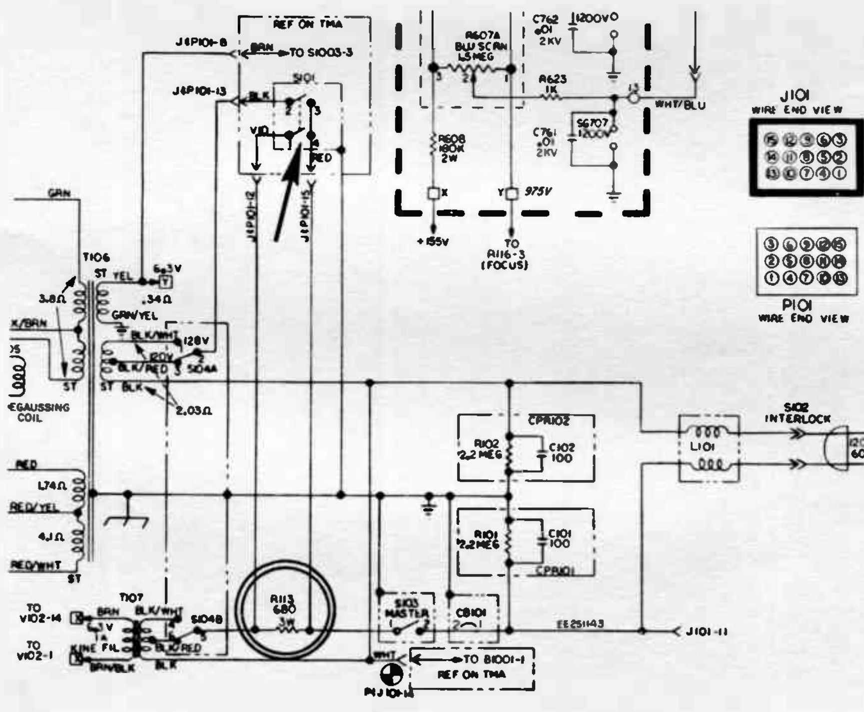
Important Information for your Service Department

Prepared and Distributed by **RCA Sales Corporation, Product Performance**
600 N. Sherman Drive, Indianapolis, Indiana 46201

Service Data
1968 No. T20
1969 No. T17
1970 No. T16

Color Tracking
CTC 40

Some color tracking problems in instruments utilizing the CTC 40 chassis—which seem to relate to a defective picture tube—may actually be the result of a defective on/off switch. Should that section of the switch used to bypass the picture tube filament dropping resistor (R113) become intermittent, the filament voltage could vary between 5 (standby) and 6.3 (on) volts. This can cause variations in color tracking.



Power standby circuit—CTC 40

First Edition—First Printing

RCA

Television Service Tips

Volume XXI
Issue 18
November 16, 1970

Important Information for your Service Department

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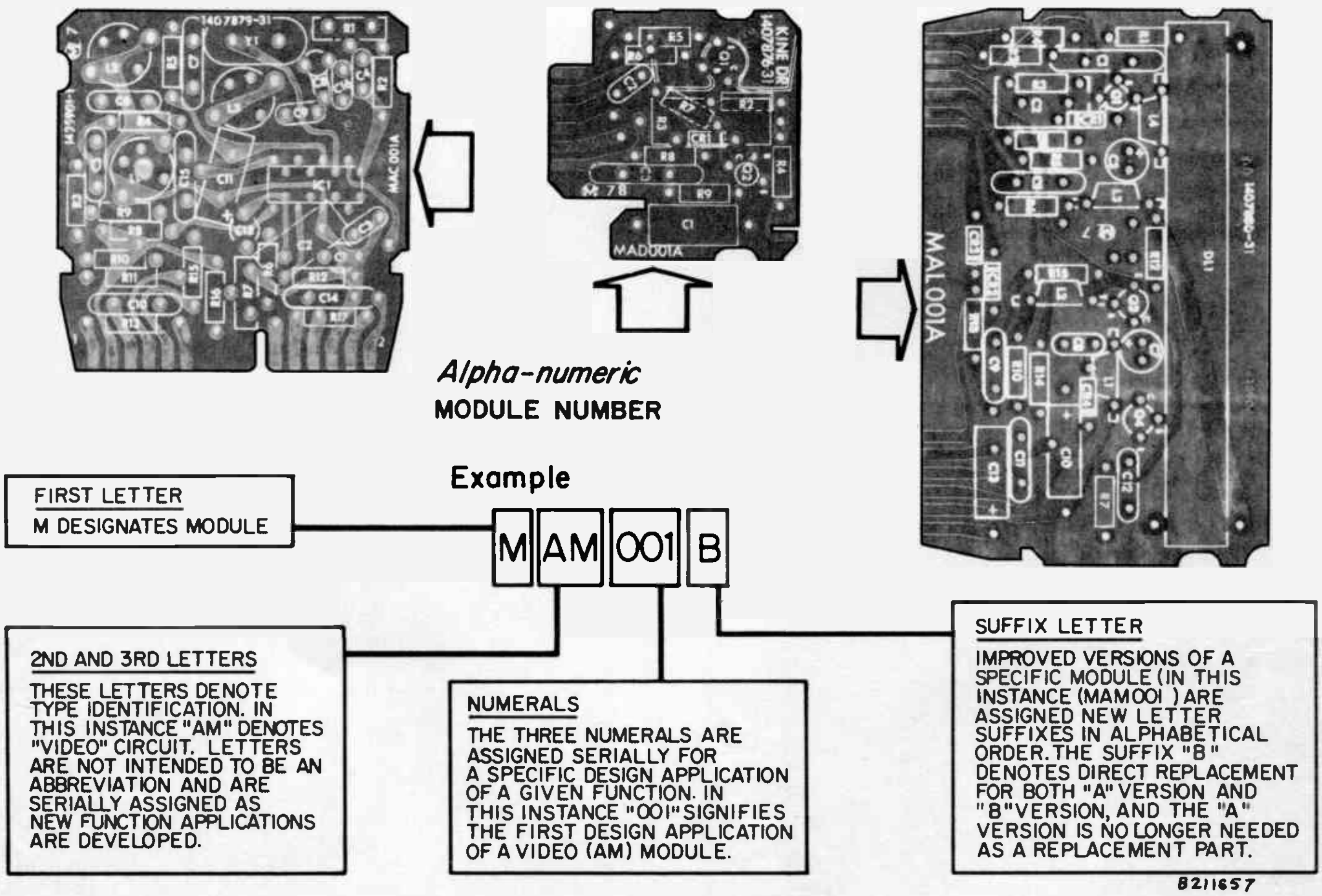
Module Identification

The following guide outlines the system used to identify modules used in RCA instruments.



Module identification system guide

First Edition—First Printing

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Remote Sensitivity CTP 13A (CTC 40R)

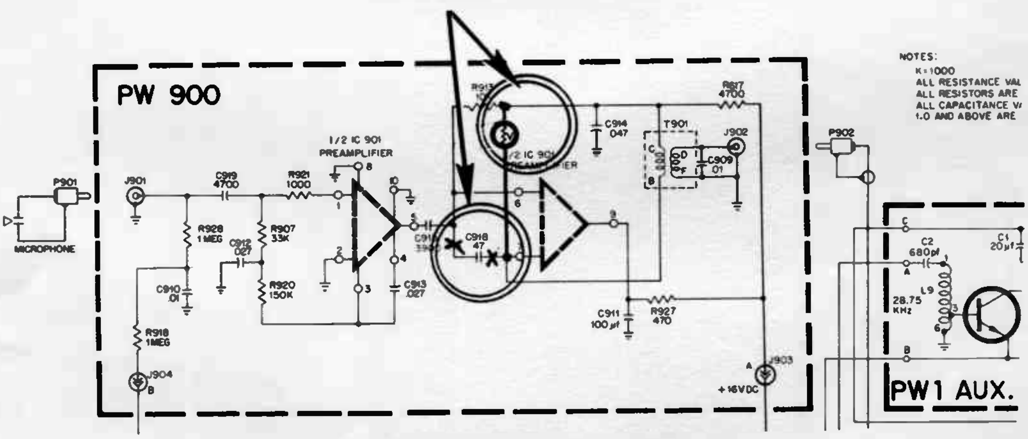
Service Data 1969 No. T17

Some versions of the PW900 board utilized in CTP 13A remote amplifiers may have a circuit modification. As shown in the schematic, C918 is deleted and a varistor (Stock No. 130042, Drawing No. 1472668-7) added in parallel with the primary of T901.

Physically, the varistor replaces the capacitor. The printed circuit is modified slightly in order to make the proper connections.

Marginal remote sensitivity in amplifiers that have been modified may be improved by removing the varistor. It is not necessary to replace the capacitor unless high frequency interference is evident in the picture during remote functions.

Capacitor replaced with varistor



Remote preamplifier circuit—CTP 13A

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