RCA

# Plain Talk and Technical Tips

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## Circuit Breaker Protection

Recent RCA color television receivers employ a circuit breaker plus a fuse to interrupt the AC power supply to the receiver in the event of a fault that overloads the chassis power supply. The circuit breaker is a bimetal, thermal-operating mechanism which has normally-closed contacts connected in series with one side of the AC power input to the set. In normal operation, AC current flows through a bimetal/contact assembly which has a specific resistance; in the event of a short or overload, the bimetal is heated, causing it to flex and release a spring-loaded retainer. This allows the contacts in series with the AC input to "open," removing power from the chassis. Once the breaker trips, the mechanism holds the contacts open until the bimetal element cools and the contacts are reclosed by manually depressing the red "reset" button which extends through the rear cover of the instrument. Back-up protection is provided by a "pigtail-type" line fuse that opens in the event of a circuit breaker malfunction.

### Hybrid Color Chassis

A variant of the basic circuit breaker is used in some hybrid-portable color chassis. In these chassis, the circuit breaker contains an auxiliary "heater" winding connected in series with the cathode of the horizontal-output tube to sample cathode current. In the event that horizontal-output tube grid drive is lost, the excessive cathode current will cause the breaker to trip and remove power before the horizontal-deflection components can be damaged.

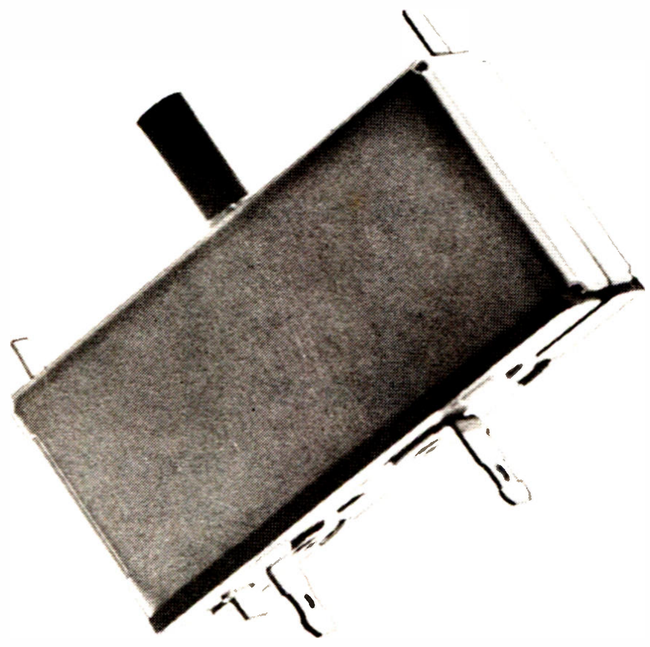

*Figure 1—Color TV Circuit Breaker*

### Isolating B+ Shorts in XL-100 Chassis

Most problems involving circuit-breaker tripping are due to B+ shorts and/or rectifier diode failures. However, there are one or two other causes of circuit-breaker tripping that can be very elusive. XL-100 chassis B+ short problems are usually quickly found by checking for shorts on the various B+ buses — with the MAB rectifier module removed. An ohmmeter probe is used to measure the supply bus resistance as the various loads on the affected power supply are disconnected. When the resistance goes up into the normal range, the failure has been isolated to the load just disconnected. Any resistance measurement less than indicated in the table below indicates a short or overload on that supply.

**POWER SUPPLY RESISTANCE**

| | | |
|---|---|---|
| + 77V | MAB # 1 | 50K |
| +160V | MAB # 9 | 10K |
| +225V | MAB #12 | 20K |
| 36,30,26V | | less than 300 ohms |

The 36-volt, 30-volt, and 26-volt supplies are obtained from a center tap on the transformer winding that supplies the 77-volt rectifier bridge. Shorts on these supplies may or may not trip the circuit breaker instantaneously, as do shorts on the other supplies; nevertheless, they should be checked when B+ overloads are suspected.

### Intermittent Tripping

One of the most frustrating service problems is the circuit breaker that apparently trips for no reason. Sometimes the set will run for an hour, a day, or six weeks, and then the breaker trips. When reset, normal operation is restored for a period of time. There are several possible causes for problems of this nature. In SCR deflection chassis for instance, a

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# TV Interference — Causes and Effects

Any technician realizes that television antennas are bombarded with all kinds of signals that could interfere with television reception; yet, modern receivers seldom reveal these extraneous signals as disturbances on the screen. In fact, today's color receivers — due to careful engineering — reject stray signals so well that little thought is given to interference problems in the field.

All technicians have seen conditions that produce interference. When actually encountered, however, many technicians have been frustrated in their efforts to find and correct such problems. Therefore, it is advantageous to know something of the more common sources of interference, how to recognize them, and above all how to correct these problems at the receiver.

TV interference is a broad subject and cannot be adequately covered without going into detail; however, there are four major types of signal interference that a technician should be able to recognize and know how to deal with — FM interference; adjacent-channel interference; co-channel interference; and RF interference. Each has its individual characteristics and should be considered independently.

## FM Interference

FM (frequency modulation) interference shows up as diagonal bars or a herringbone crosshatch in the picture. It is usually caused by an FM station on an image frequency of a low-channel television station; a direct FM signal overloading the TV tuner creating cross-modulation products which can fall on any television channel; or a second harmonic of an FM signal falling on a high-band television channel. Such interference can usually be eliminated by installing a commercially-available FM trap in the antenna lead-in. Adjusting the orientation of the antenna is also very often helpful.

## Adjacent-Channel Interference

Adjacent-channel interference results when a TV station on the next (higher or lower) channel blanks out a desired station. An adjacent-channel **picture signal** (higher channel) can cause a so called "windshield wiper" effect on the screen, while an adjacent-channel **sound signal** (lower channel) can cause an interference similar to familiar 4.5-MHz beats. Adjacent-channel problems are usually encountered when attempting to receive a distant station, especially when there is a strong local signal on the adjacent channel.

Sometimes, orientation of the antenna will improve conditions and, in stubborn cases, the use of a more directional antenna should be seriously considered. Other times, solution calls for a check of the RF and IF alignment of the receiver, with particular attention focused on the 39.75-MHz adjacent pix and 47.25-MHz adjacent sound traps.

## Co-Channel Interference

Co-channel interference appears as horizontal bars moving up and down through the picture — sometimes referred to as the "Venetian Blind" effect; in extreme cases the sound may also be garbled. This type of interference may be experienced when two stations are operating on the same channel, and is usually encountered when attempting to receive the weaker station. Orientation of the antenna or the use of a directional antenna with less pickup (a null) in the direction of the interfering signal are the most effective ways of dealing with co-channel interference.

## RF Interference

RF interference causes crosshatch or diagonal bars to appear in the picture. In extreme cases, the picture may be reversed (become negative) or the picture may be blacked out, with no visible beat pattern. Sometimes, the interfering signal may even be heard in the television sound.

RF interference is usually caused by direct pickup of the fundamental, a harmonic, or a parasitic frequency from a transmitter or combinations thereof. To combat this interference, a commercially available high-pass filter (cuts off signals below 50 MHz) should be installed as close to the receiver input as possible to supplement the tuner's internal filter (directly on tuner with a short ground connection). In some cases, a tuned-stub trap (available from RCA Parts and Accessories — Stock No. 78818) tuned to the interfering station and taped to the 300-ohm antenna line is also effective. Better still, the extra shielding afforded by 75-ohm coaxial cable minimizes RF interference — conversion to 75-ohm downlead might be advisable. A good AC line filter, in addition to the traps employed in the tuner can also be effective.

## Antenna Considerations

Antenna characteristics are of major concern when dealing with interference. A good knowledge of antenna directional characteristics is essential to do a good job on installations in interference areas. In many instances, troublesome interference can be greatly minimized, if not entirely eliminated, through use of a properly oriented antenna having a polar response suitable to the conditions of reception.

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# The Intrinsic Rectifier

The intrinsic rectifier . . . a new semiconductor device? The answer is yes and no.

"Yes," because many technicians are unaware that the intrinsic rectifier is used in the horizontal-deflection circuits of the CTC 62 and CTC 72 XL-100 chassis. The "no" part of the answer stems from the fact that the intrinsic rectifier, or "ITR" as it is known, includes the familiar SCR/diode combination in a single package resembling an SCR..

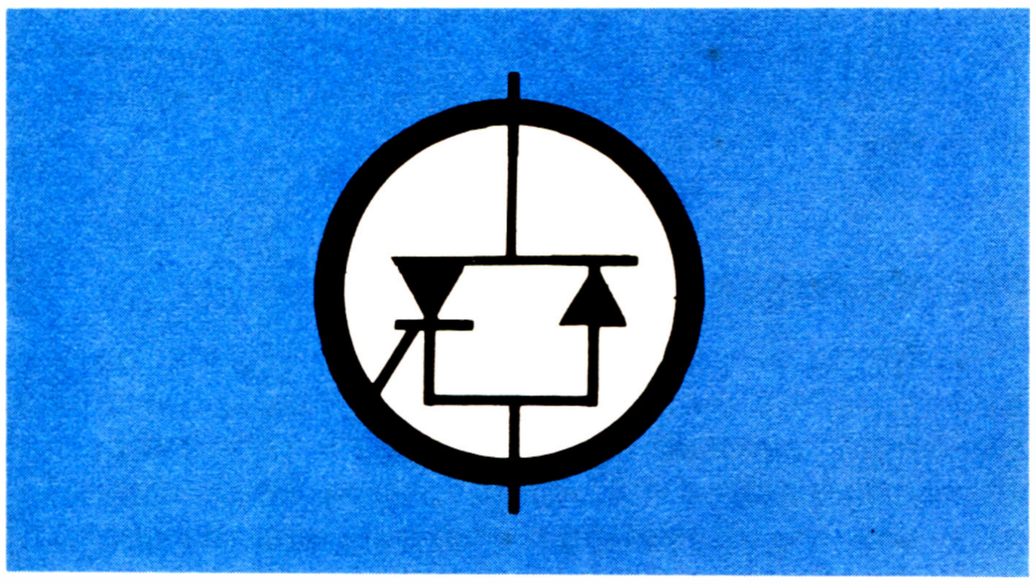

*Figure 2—ITR Schematic Symbol*

Probably the most noteworthy advantage of using single-package ITR's is simplification of the horizontal-output circuit. Specifically, they eliminate the trace and retrace diodes (CR 401 and CR 402). Also, circuit reliability is improved as the "diodes," now integral in the ITR's, are better heatsinked than the discrete diodes of other chassis which are mounted in clips on the PW 400 deflection board. Integrating diodes into the SCR packages also eliminates the need to conduct the high deflection-circuit current through the circuit-board copper pattern, which contributes to higher circuit reliability.

*Figure 4—Intrinsic Rectifier Used in CTC72*

From the standpoint of servicing, the SCR horizontal-deflection system service procedures presented in various RCA Technical Training Workshops and Publications are valid for ITR-equipped CTC 62 and CTC 72 chassis. However, the familiar ohmmeter checks for shorted trace and retrace devices are simplified to checking for a single shorted device in either the trace or retrace circuit.

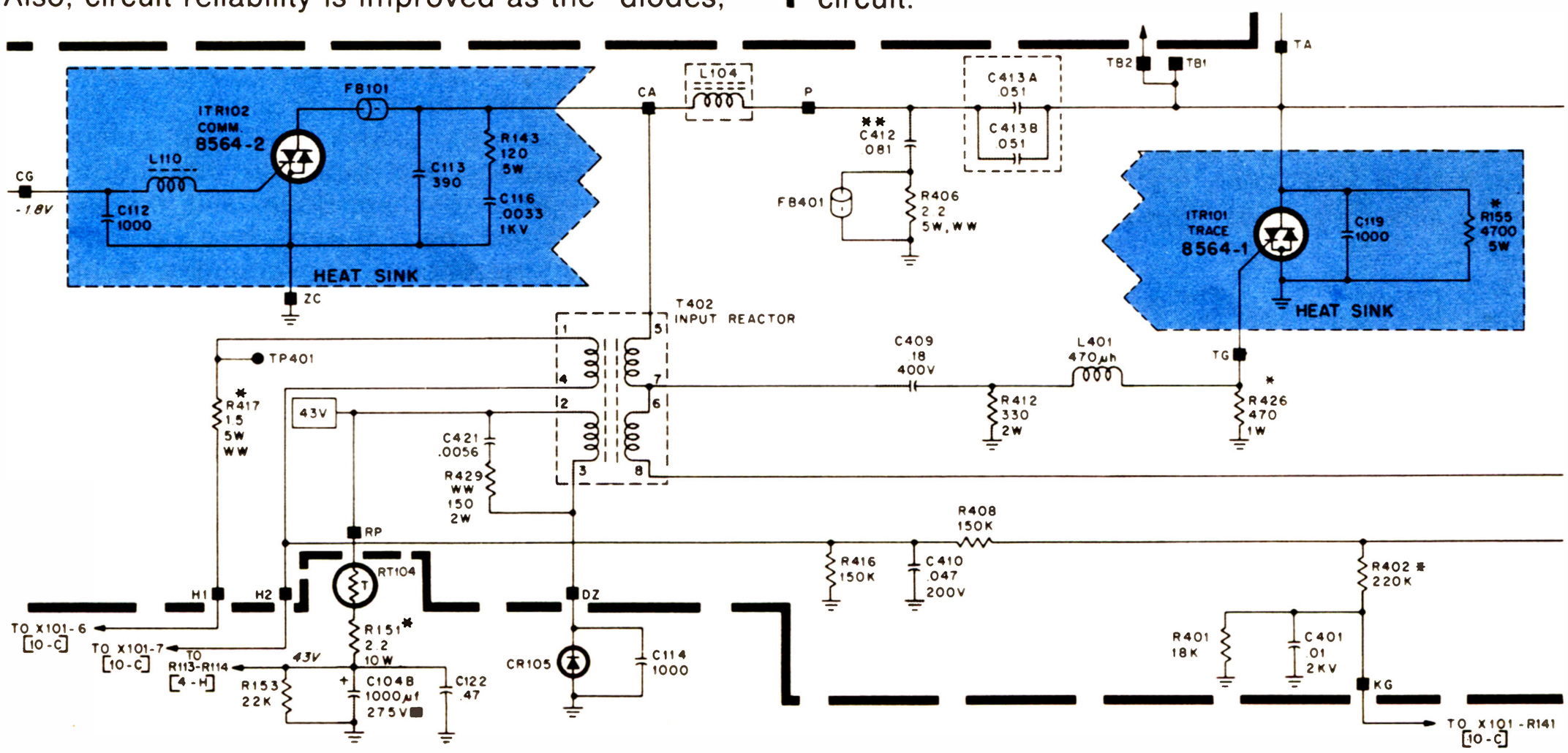


*Figure 3—CTC 72 Horizontal Deflection Area*

# Special Technical Book Offer

Have you ever experienced difficulties when servicing horizontal-deflection or AGC/sync circuitry? Statistics show that more of the so-called "dogs" appear in these circuits than any of the others. Usually, the inability to locate a problem evolves from the fact that circuit operation is not understood or the technician is not familiar with expedient service techniques. RCA Technical Training, realizing that technicians need more information on the operation and servicing of horizontal-deflection, and AGC/sync circuit areas, has published two interesting books, now available directly from RCA Consumer Electronics.

The first book, entitled **"Color Television Horizontal Deflection and High Voltage"** explains the theory of operation and servicing of tube-type horizontal-deflection and high-voltage systems. The second book, titled **"Color Television AGC and Sync"** discusses AGC and sync circuitry in recent RCA color chassis, and outlines diagnostic service techniques that allow the technician to quickly isolate and repair AGC/sync problems.

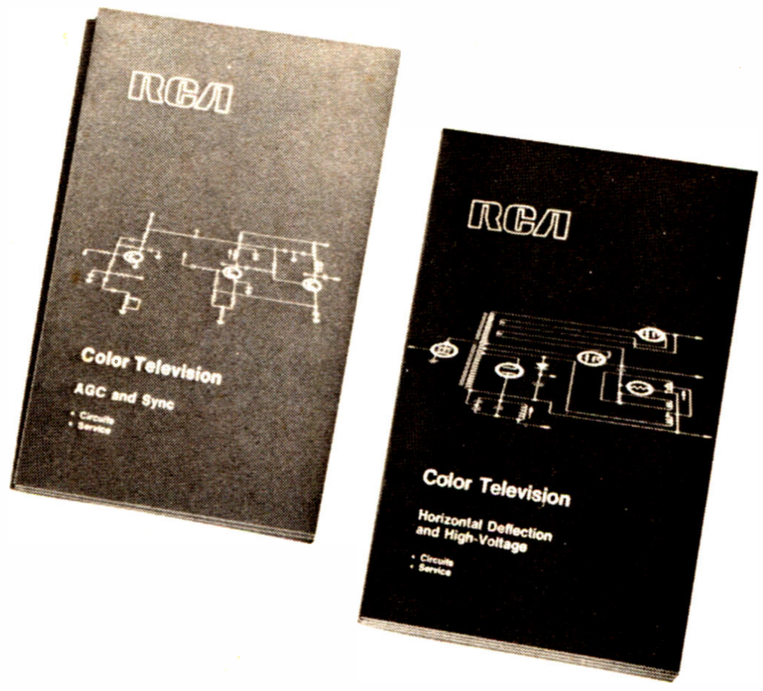


*Figure 5—Technical Books*

Each book is available at a price of $1.00, or both may be purchased for a combined price of only $1.75. For convenience, and rapid delivery, please use the order blank included in this mailing package. Make check or money order payable to RCA Consumer Electronics.

## TV Interference

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### Receiver Considerations

Before taking steps to reduce or minimize interference in the ways outlined above, always make certain there is no malfunction in the receiver itself. An open coil within the antenna balun transformer can produce a snowy picture and make a receiver susceptible to interference. Check for an open balun or open 300-ohm transmission line by simply sliding a hand along the transmission line while observing the effect upon the picture. If the picture changes considerably as the hand is moved, the line or antenna is probably open.

Interference can also be caused if the AGC circuits are functioning improperly; for example, if the RF bias is too high and the IF bias too low, due to a divider network changing in value, the picture can show excessive snow and be subject to RF beat interference.

Alignment of a receiver must also be right if interference is to be minimized. The sound traps and adjacent-channel traps must be tuned properly and the overall alignment must be correct.

In summary, television interference, and the techniques of dealing with it, is an expansive subject. Modern receivers are designed to greatly minimize problems of interference. Still, a technician should be prepared to deal with interference promptly in instances when it does show up.

## Circuit Breaker

*Continued from Page 1*

"kine arc" can trigger the retrace SCR to conduct and momentarily short the 160-volt supply. The cure for this problem is to eliminate the cause of arcing — check for secure connections and proper picture-tube grounding. Related to this is a problem where the circuit breaker trips when channels are changed, or when the picture sync is disturbed such as when the station "joins the network." Tripping problems of this nature are usually caused by a defective retrace SCR in which the triggering sensitivity of the device's gate has increased, making t susceptible to mis-gating. The cure here is obvious — replace the retrace SCR.

Other causes of occasional circuit-breaker tripping are voltage spikes on the power line, excessive line voltage, or a defective circuit breaker. Although circuit breakers are rugged, they can be damaged by repeated excessive overloads and "resets." Eventual metal fatigue causes a diminished over-current trip point. When this is suspected, the obvious cure is to replace the circuit breaker.

When replacing a circuit breaker, think of it as a fuse with a specific current rating and **replace it with one of the same rating.** Don't make the common mistake of replacing it with whatever is in stock. A replacement with a **higher rating will not protect** the instrument, one with a **lower rating will not "hold in."**

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