RCA
Plain Talk
and Technical Tips

May-June, 1972 • Volume 15/No. 5-6

The CTC 48 Color Chassis

Five variations of the new CTC 48 chassis replace the familiar CTC 46 in 1973 model-year (R-line) color receivers. The CTC 48 chassis is quite similar to the CTC 46; however, there are some noteworthy changes. Differences include simplification of the horizontal deflection circuit, new VHF and UHF tuners, new remote control system, and the use of slide-type auxiliary controls in some chassis versions.

The CTC 48A is a manual-control chassis that is used in instruments equipped with a 21-inch diagonal picture tube. This chassis uses rotary auxiliary controls and the ACM-level adjustment control is concentric with the **TINT** control. Instruments using the CTC 48A feature continuous tuning of UHF and a 13-position detent VHF tuner.

Figure 1—CTC 48 Tuning Controls

The CTC 48B is used in remote controlled 21-inch diagonal picture instruments. Features include four-function remote control of VHF channel-change, volume up and down, and on/off. The CTC 48B uses a triac/photocell power switching system like that introduced in the CTC 54 color chassis. The auxiliary control panel is the same as that used with the CTC 48A.

The CTC 48H chassis is used in manual instruments featuring a 25-inch diagonal picture. Instruments using the "H" version feature a 70-position detented UHF tuner to provide full parity of UHF and VHF tuning. As a deluxe feature, this chassis includes slide potentiometers on the auxiliary control panel. The ACM color-level adjustment is concentric with the **BRIGHTNESS** control.

Deluxe 25-inch diagonal remote-control receivers are equipped with the CTC 48J chassis. This chassis features single-knob parity VHF and UHF tuning and slide-type auxiliary controls. The channel indicator drum displays VHF channels 2 through 13 and also provides insert positions for up to eight UHF channel numbers which are supplied as a separate strip of inserts.

The tuning system uses a conventional type detented VHF tuner in conjunction with a varactor UHF tuner to provide the single-knob channel change feature. The auxiliary controls bin includes eight UHF tuning potentiometers to allow the customer to pre-program up to eight UHF channels. Once the desired UHF channels are programmed and the proper channel insert is installed, VHF and UHF tuning can be accomplished with equal ease.

The remote control system, in addition to providing channel change of VHF and UHF channels, includes volume control, and on/off. The on/off function uses a triac for power control as do the other remote chassis in this year's line.

TV-stereo-radio combination instruments use three chassis versions; the CTC 48P, 48R, and 48T. The CTC 48P is used in 25-inch diagonal receivers and drives two speakers. Receivers featuring a 21-inch diagonal picture use the CTC 48R which drives one

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A publication for the service industry prepared by RCA Consumer Electronics

speaker. Deluxe instruments, having doors, 25-inch diagonal picture tube, and two speakers are equipped with the CTC 48T.

In all cases, these chassis are all similar to their TV-only counterparts except that the power switching circuit de-energizes the radio-phonograph system whenever the television is turned "on." Also, off the chassis circuitry is provided to transfer the speakers from the TV audio system to the separate stereo amplifier when radio phonograph system is activated.

Horizontal Deflection System

The horizonal deflection system of the CTC 48 is quite similar to that used in earlier solid-state chassis. However in this chassis, the horizontal windings of the yoke are directly driven from the trace SCR rather than through an impedance matching winding on the flyback transformer. For this reason, the impedance of the horizontal yoke windings are somewhat lower than they were in the CTC 46.

The CTC 48 also uses a high-voltage tripler instead of the quadrupler of the CTC 46. This requires an increased pulse output from the flyback transformer of about 9 kV instead of 7.5 kV used with the quadrupler in the CTC 46.

The CTC 48 chassis is equipped with a flame retardant flyback transformer which permits the high voltage cage to be eliminated. This allows better ventilation of the flyback to enhance its reliability. Careful design of the high voltage regulator circuits and flyback transformer has eliminated the need for a high-voltage bleeder resistor.

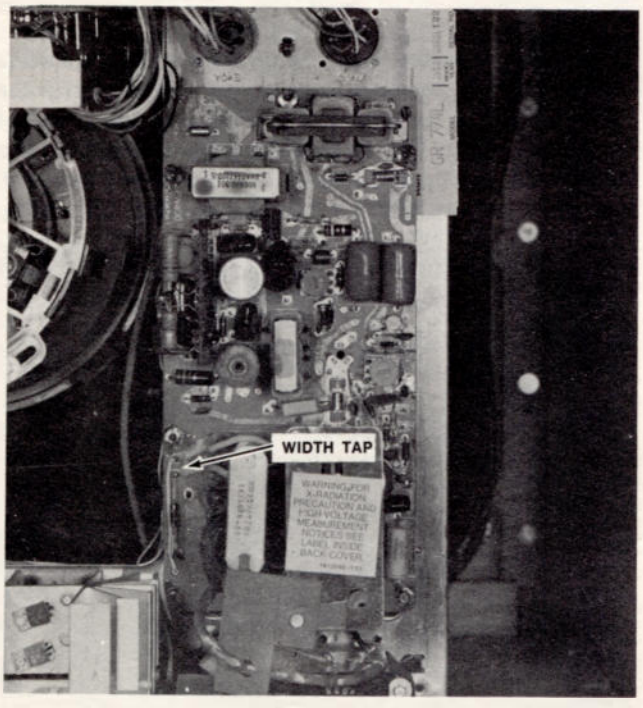

Figure 2—Simplified PW 400 Board

SPECIAL SERVICE NOTE: Although the decay time of the picture tube 2nd anode voltage is carefully controlled when the instrument is turned "off", there is a possibility that the residual high voltage will be greater than it was on earlier solid-state chassis. Thus, the technician should **always discharge the picture tube second anode** when servicing the high voltage area of this chassis.

Width Control

CTC 48 chassis also includes a width tap as illustrated in the photograph below. Instruments having a 21-inch diagonal picture have the width jumper connected to the narrow tap (W1), and those manufactured for use with a 25-inch diagonal picture tube will have the width connection made to (W3). This feature was incorporated because the 21-inch diagonal tube has a slightly greater horizontal deflection angle, which could, under limit conditions, produce more than the desired horizontal overscan. If this situation is encountered, it is simply corrected by moving the white jumper from (W1) to (W3), which will reduce the overscan to an acceptable amount. It is important to note that before changing the width tap be certain that the high voltage is correctly adjusted. With zero beam current (black picture), and 120 volts line voltage, the high voltage must be 26.5 kV. Thus, before and after making the width tap adjustment, be certain that the high voltage is as described above.

Simplified PW 400 Board

Simplification of the PW 400 board and improved circuit reliability comes as a result of connecting the convergence and pincushion circuitry in parallel with the yoke, rather than in series as was done in the previous CTC 46. This minimizes the copper path and solder connections that carry the high amplitude horizontal yoke current. Consequently, problems of open copper paths on the PW 400 board should be minimized.

Pilot Light Replacement

RCA Consumer Electronics products receive special design consideration to assure that all pilot lights, channel-indicator lights, and compartment lights will have a long operating life. The bulbs used in RCA products are long-life types that are usually operated at somewhat less than their rated voltage to further assure many hours of operation.

When a bulb fails, the service technician should exercise the same care in using the correct replacement as he would in replacing a tube or transistor. Many technicians are unaware of the problems that can result from using an improper replacement bulb —as they feel, "It's only a pilot light." Aside from

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CTC 48 Varactor UHF Tuning

Remote control 25-inch color receivers are equipped with the CTC 48J which features single-knob tuning of VHF and UHF channels. The VHF and UHF tuner assembly features a 20-position detent mechanism and channel indicator drum. Twelve of the detent positions are occupied by the VHF channels, leaving eight available to program UHF channels. The VHF tuner is of conventional mechanical detent construction while the UHF tuner is varactor tuned.

Channel Selection

When a VHF channel is selected, a gear train rotates the VHF tuner to the desired channel. For UHF operation, the channel selector is turned to the desired UHF channel, which causes the gears driving the VHF tuner to rotate it to the UHF detent position where it then stops because of a cutout of eight gear teeth on the driving gear. This means as the channel knob is rotated through the eight UHF channels, the VHF tuner remains at the UHF position and the channel selector mechanism drives a rotary switch to select preset tuning voltages for each of the programmed UHF channels.

The UHF varactor tuner is controlled by the circuit shown in Figure-3. In addition to the 15-volt B+ supply, the varactor tuner requires a variable tuning voltage. The circuit below satisfies this requirement by furnishing a regulated 30-volt supply, with AFT voltage added, which is applied to each of the eight channel-tuning potentiometers as they are selected by the rotary switch.

Tuning Voltage Circuit

The 30-volt tuning voltage supply is obtained from the 225-volt main chassis B+ source by a 68K dropping resistor and a 30-volt zener diode (CR 4802). AFT is added by an emitter-follower stage (Q4801) connected between the anode of the zener diode and ground so that the collector to emitter voltage of the AFT transistor is added to the regulated 30 volts. Thus, the tuning voltage supply includes a small variable voltage which shifts the

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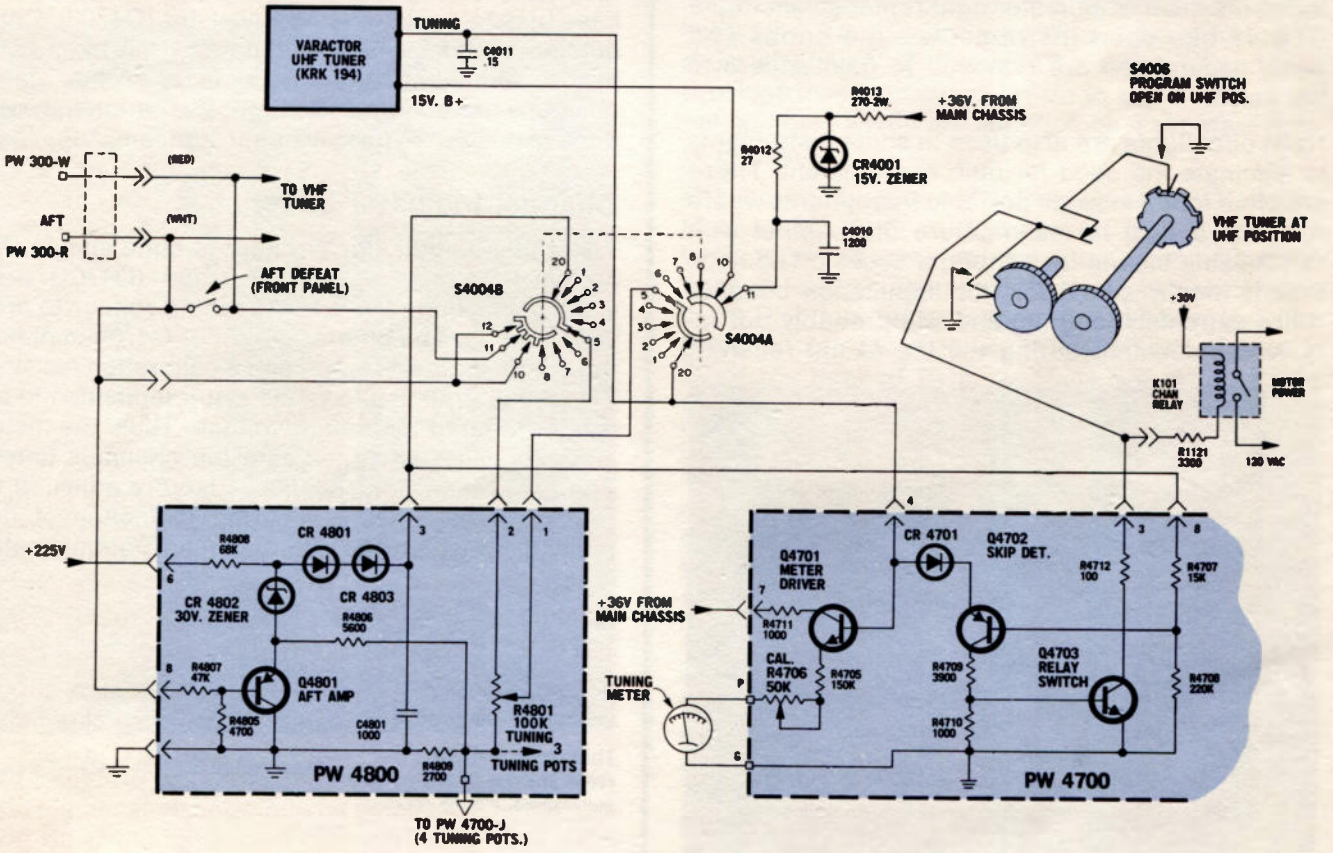

Figure 3—CTC 48 UHF Varactor Tuning Control Circuits

Pilot Light Replacement

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customer complaints that the replacement pilot lamp is too bright or too dim, premature failure can occur. Or even more serious, the wrong replacement bulb can actually damage or impair the operation of the instrument. This may sound a little far-fetched, but consider a couple of examples: The stereo indicator light of FM stereo tuners is often connected in the collector circuit of a stereo-switch transistor. The wrong replacement light here could damage the transistor. The G-2000 (CTC 47) color receiver provides another example of where the wrong replacement light bulb in the channel indicator display could impair the operation of the instrument. The electronic tuning circuit of the CTC 47 uses individual channel-driver transistors to provide DC voltage to the channel-indicator bulbs and diode-switching voltage for the VHF tuner. The use of a replacement bulb of higher than the rated current could cause failure of the driver transistor. This would keep the switching diodes for that channel turned "on", thus no other channels could be received. These examples should emphasize the importance of using the correct bulb when pilot or channel-indicator lights are replaced.

RCA has also considered the ease of bulb replacement. Nearly all instruments manufactured in the last few years are designed to permit changing light bulbs from the front. The photograph below illustrates the ease of indicator light replacement in the CTC 48-equipped instruments—the knobs and panel escutcheon are removed to gain access to the bulbs.

Neon pilot lights are also used in some instruments to eliminate the need for bulb replacement. These are often found in small portable instruments where it is impractical to manufacture the cabinet with removeable inserts for pilot light access. The neon bulb is ideally suited for this application because it has extremely long life and will probably not require replacement during the life of the receiver.

Figure 4—Easy Bulb Replacement

Varactor Tuning

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frequency of the UHF tuner up or down as required to compensate for mis-fine tuning or system drift. The 30-volt output of the tuning voltage supply feeds the selected tuning potentiometer through a pair of diodes (included for temperature compensation) and channel selector switch section S4004B. A percentage of the 30 volts (voltage is adjusted to tune desired channel) is obtained from the slider of the tuning potentiometer, applied back to S4004A, and out to the tuning voltage input of the varactor UHF tuner.

In addition to the tuning voltage supply, the tuner control assembly contains an electronic programming circuit and a channel-indicator meter.

Programming Circuit

The electronic programming circuit is easily understood if it is considered that the tuning potentiometer is adjusted beyond the highest UHF channel to deprogram or bypass an unused channel. This means that the tuning voltage on bypassed channels will exceed approximately +29 volts. The biasing of the skip detector transistor (Q4702) prevents conduction of the device at voltages less than 29.2 volts. Thus the tuning voltage must be above this threshold for Q4702 to conduct. When the emitter voltage of Q4702 becomes high enough to forward bias the base of the device, it conducts and applies base bias to a relay switch transistor (Q4703). Conduction of this transistor completes a ground path in the channel-change motor circuit so that when channels are changed remotely, the motor will continue to run and bypass the unprogrammed channel.

Channel-Indicator Meter

The channel-indicator circuitry is quite simple. An emitter-follower meter-driver stage (Q4701) presents a high impedance to the tuning voltage to prevent loading. The emitter circuit of Q4701 contains the tuning indicator meter and a calibration resistor. This configuration allows the meter indication to be proportional to the tuning voltage. Thus, the meter can be calibrated to indicate the channels tuned. The calibration pot. (R4706) is factory adjusted to provide a reasonably accurate indication of the channel to which the programming potentiometer is set.

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