RCA

Plain Talk

and Technical Tips

May-June, 1970 • Volume 13/No. 5-6

New 1971 Chassis — CTC 39 And CTC 44

The 1971 Color Television line features two new chassis, including the hybrid CTC 39, 39X chassis series which is similar in many respects to the CTC 38. TransVista® color television instruments feature the new CTC 44 chassis that is very much like last year's CTC 40 and CTC 47 chassis.

Both new chassis have a slide-out chassis serviceability feature that allows the service technician to simply loosen two screws on the rear apron of the chassis and slide it back to expose the bottom area for servicing. All cable lengths are sufficient to allow the chassis to be operated in this mode.

Also, with an eye towards serviceability, both chassis feature a split-cascode mixer circuit that permits individual prealignment of the VHF tuner and IF link circuit so that the tuners may be interchanged in the field without the necessity of re-aligning the link circuit. These new chassis also feature dual 75/300 ohm antenna inputs that allows the instrument to be easily connected to a 75 ohm antenna system.

Both chassis feature Accu-Tint, a new customer feature that optimizes color reception under differing transmission conditions.

The CTC 39

The CTC 39 chassis features solid-state devices in the picture and sound IF circuits. Also, the CTC 39 chassis features the familiar transistorized ACC and color-killer circuits first introduced in the CTC 27 and 31 chassis. CTC 38-type balanced diode color demodulators drive pentode difference amplifier stages to furnish red and blue difference signals. Green is derived by matrixing red and blue, as in the previous CTC 38 chassis. Familiar tube-type circuitry provides the remaining circuit functions in this chassis.

Tuners used with CTC 39X chassis include the KRK 173 VHF tuner, that incorporates a split cascode mixer circuit wherein the second mixer transistor is located in a plug-in housing at the end of the chassis link cable.

The KRK 170 UHF tuner is also a new design. The circuitry of this tuner is much like that of other UHF tuners; however, it is designed to be used with a new 6-position detented UHF assembly. The 6-channel detent UHF allows each of the six positions to be programmed with any UHF channel i.e. Channels 14 through 83.

Figure 1—Model GP592 (CTC39X)

Figure 2—Model GP658 (CTC44)

A monthly publication for the service industry prepared by RCA Sales Corporation

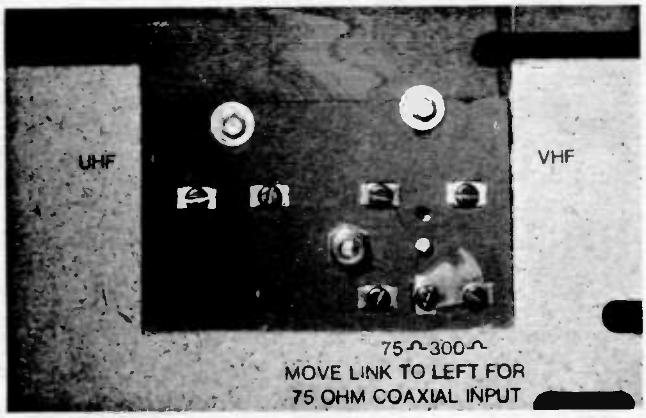

Figure 3—75/300 Ω Antenna Block

The CTC 44

Customer features of CTC 44 TransVista instruments include detented UHF of the familiar type that allows preprogramming of up to 24 UHF channels, a **Picture Sharpness** control, and Accu-Tint. Solid-state reliability is further enhanced in the CTC 44 by replacing the high-voltage rectifier tube with a quadrupler type high-voltage power supply. The quadrupler lowers the peak voltage supplied by the horizontal output transformer to about 7 kV, at the same time confining all "high-voltage" within the epoxy insulated quadrupler.

The CTC 44 is equipped with all solid-state KRK 172 VHF tuner, which is similar to the VHF tuner used with the CTC 40 in the respect that a MOSFET RF amplifier is used in conjunction with transistor oscillator and mixer functions. The difference is that the KRK 172 is of split-cascode design to allow easy tuner replacement in the field.

The CTC 44 incorporates chroma circuitry that permits DC voltage control of Color and Tint. In the manual non-remote versions of the CTC 44, the customer **COLOR** and **TINT** controls are potentiometers connected across the +30 volt supply so that a variable DC voltage may be introduced to the color and tint circuitry. In remote versions of the chassis, motorless remote control of Color and Tint is provided by using a memory-module of the type first introduced in the CTC 47 and now used for **VOLUME** control in remote versions of the CTC 42X portable chassis.

Accu-Tint

Accu-Tint (A-T) is a new feature designed to provide pleasing flesh-tone reproduction under conditions where a reference signal (burst) phase error is present. Everyone has experienced the need to readjust the **TINT** control when changing channels. The tint change from channel-to-channel results because it is difficult for a station to maintain burst agreement with the others.

The **TINT** control also requires adjustment when the station switches from local programming to a network program. These tint changes resulting from burst phase errors are most noticeable in the flesh-tone colors for two reasons: First, the viewer normally adjusts the **TINT** control for pleasing flesh-tones and any variations from this setting will be noticeable. Second, the flesh-tones lie in the area of the color spectrum to which the human eye is most sensitive. The Accu-Tint system improves the color picture by modifying the color reproduction to minmize the change in tint of flesh-tones when a burst phase error exists.

Considering the phase angles of reproduced colors, referred to burst at zero degrees, it is found that the desirable flesh-tone orange lies very close to (or on) the phase angle of 57°. The vector diagram of Figure-4 reveals that the desirable flesh-tone is composed mostly of the +I signal plus a relatively small amount of + or —Q.

Assume now that the burst phase has shifted so that "greenish" flesh-tones are produced. "Green-

(Continued on Page 4)

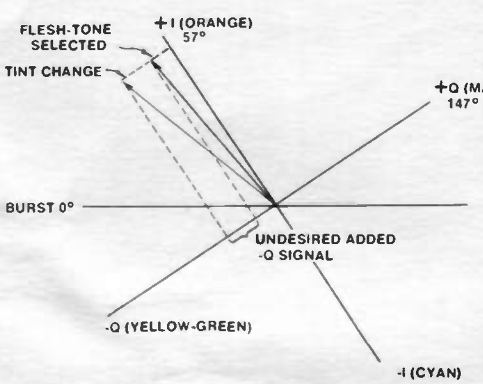

Figure 4—Flesh-tones without A-T

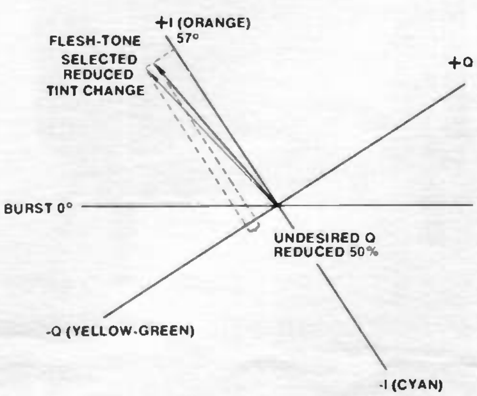

Figure 5—Flesh-tones with A-T

FM Stereo — Synchronous Detector Circuit

Many RCA stereo receivers use a 4-diode synchronous detector circuit to extract Left and Right channel audio from the multiplex stereo signal. The following circuit description of the synchronous detector should enhance the service technician's knowledge of FM stereo circuitry.

Detected composite audio consisting of Left plus Right (normal audio), Left minus Right (sidebands of the suppressed 38 kHz subcarrier) and a 19 kHz pilot signal, is applied to the input of the multiplex circuits. The 19 kHz signal (pilot) is separated from the composite audio, amplified, doubled in frequency, and is used as a 38 kHz demodulator drive signal which is applied to the primary of transformer T1.

The amplified and doubled pilot furnishes a high-level 38 kHz signal at secondary of T1, with the terminals (2) and (3) alternately delivering positive and negative output to switch the diodes of the synchronous detector "on" and "off" in such a manner that L+R main-channel and L—R subcarrier (composite audio) are recombined into Left and Right channel signals. This composite audio signal is applied to the center-tap of the secondary of T1.

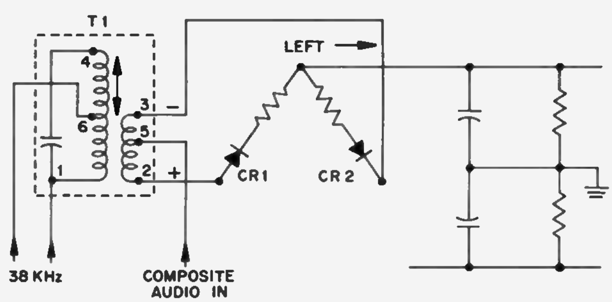

Figure 6—Left Channel Audio

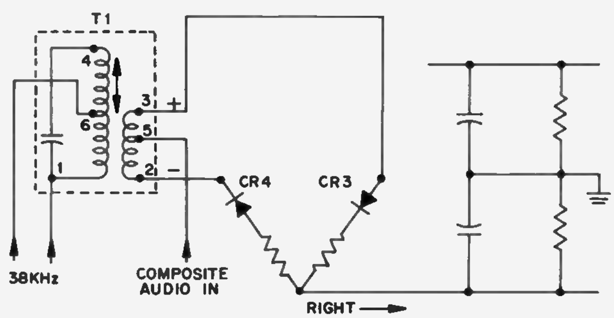

Figure 7—Right Channel Audio

Synchronous detector operation depends on the fact that the L—R sideband information of the composite audio signal surrounding the suppressed 38 kHz carrier is constantly changing polarity at a 38 kHz rate.

Consider first when the 38 kHz signal is of negative polarity at T1 terminal #3. Now the upper two diodes (CR1 and CR2) become conductive, effectively connecting the Left output to the center tap of T1. This allows L+R and the detected + (L—R) to appear at the Left output of the detector. The Right information, +R and —R, then cancels and predominantly Left channel audio is delivered to the Left output circuit.

When the polarity of the 38 kHz signal reverses, the lower two diodes (CR3 and CR4) become conductive. Now, the Right output is connected to the center tap of T1. At this time, the L—R sideband information also reverses polarity and the signals at the output of the detector are L+R and the detected — (L-R). These signals, when combined, provide Left cancellation so predominantly Right channel audio is delivered to the Right output circuit.

When the 19 kHz pilot signal fails below 6%, or when monophonic signals are present, the stereo indicator light will not be lit and a minus 9 volts is applied to the center tap of T1. This causes diodes CR2 and CR4 to conduct, directing equal amounts of audio to both channels for monophonic operation.

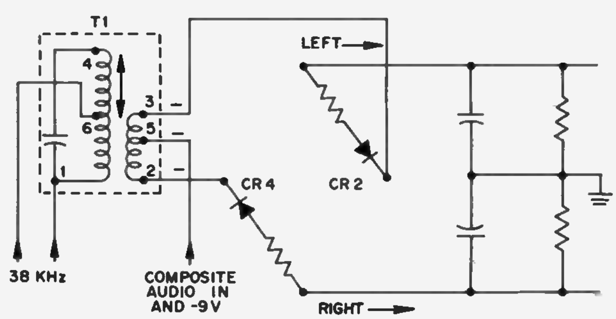

Figure 8—Monophonic Audio

New Color Chassis

(Continued from Page 2)

ish" flesh-tones result from the addition of more —Q, as illustrated in Figure-4. If the burst phase error should be in the other direction, or where +Q is added to +I, the flesh-tone vector rotates to a phase angle producing "purplish" flesh-tones. Thus, the addition of undesired amounts of ± Q produces undesirable flesh-tone changes.

Accu-Tint reduces the flesh-tone tint change by reducing the amount of ±Q added to the I signal. This minimizes the change in the flesh-tone coloration as a result of burst phase errors. Engineering and viewing tests revealed that the Q signal could be reduced 50% without adversely affecting the color picture quality. The reduction of Q is possible because the narrow bandwidth Q signal contains substantially less color information than the I signal. Also, colors produced by large amounts of ±Q are those to which the eye is relatively insensitive.

With reduced Q the vectors of Figure-5 result, illustrating the Q error reduced by 50%. Notice that the flesh-tone vector produced by adding I and one-half Q is much closer to the ideal flesh-tone than that produced by the same error in a receiver without Accu-Tint.

Up to now A-T has been described in terms of I and Q. Modern color receivers demodulate color difference signals directly. This means our thinking must be modified somewhat to consider the Accu-Tint equipped R-Y and B-Y receiver. These receivers recover red and blue chrominance information by choosing demodulation axes that recover the R-Y and B-Y signals. R-Y demodulation occurs on an axis shifted from burst by approximately 90°. B-Y is demodulated at a phase angle of approximately 180° from the zero degree burst reference. The vector diagram of Figure-9 illustrates that the R-Y and B-Y signals are actually composed of specific amounts of ±I and ±Q. The vector additions of I and Q that yields a 90° R-Y signal and a 180° B-Y signal are illustrated in Figure-9.

When Accu-Tint is used in an R-Y/B-Y receiver, the 50% amplitude reduction is accomplished by altering the R-Y/B-Y demodulation angles and reducing the B-Y channel gain. The R-Y signal is shifted slightly toward the +I axis and the B-Y signal is shifted towards the —I axis. The result is a set of three color signals which are identical to those produced by an I-Q demodulation system with a 50% reduction in Q demodulator gain. Thus, by suitable choice of demodulation angles and color difference signal amplitudes, the effects of burst phase error on flesh-tones are minimized. The Accu-Tint R-Y and B-Y vectors are illustrated in Figure-10.

The Accu-Tint system carries flesh-tone optimization one step further by shifting the picture tube screen temperature from the normal 9300°K to a lower (more-sepia) 6800°K. This warmer picture has proven to be subjectively more pleasing and

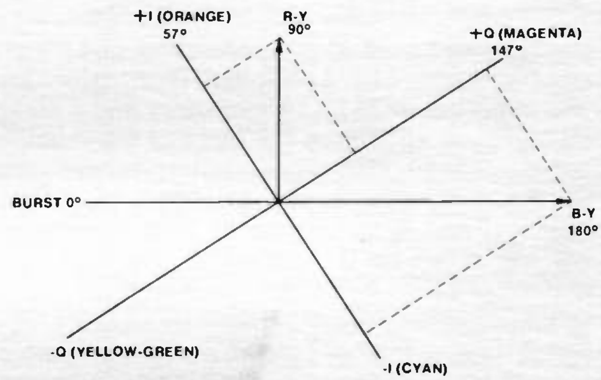

Figure 9—Vector Addition for R-Y and B-Y

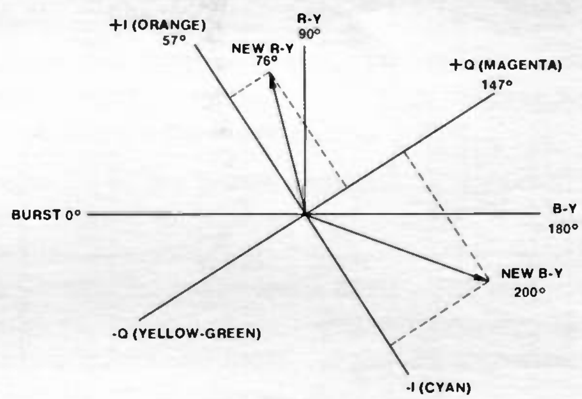

Figure 10—Vector Addition for R-Y and B-Y with A-T

allows flesh-tone correction with less reduction of the Q signal. In addition, the green in the picture is enhanced due to the reduced amount of blue in the white reference background.

RCA Sales Corporation

A Subsidiary of RCA Corporation
Product Performance—Technical Training

600 North Sherman Drive
Indianapolis, Indiana 46201