

PLAIN TALK

RCA RCA VICTOR 

AND

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CTC 19 CHASSIS FEATURES

The new CTC 19 Color chassis exemplifies RCA's continuing advance in the field of Color Television. The new chassis is designed to operate the newly engineered 19EYP22, a 19" rectangular 90° picture tube.

While the physical size and shape of the chassis is new (for accommodation of the 19" picture tube), the general operation of the receiver follows that of the current RCA color sets. Two "Solid Copper Circuit" boards are used in the main chassis. One board contains the chroma, audio output, and the video output stage. The second board contains the picture IF's, first

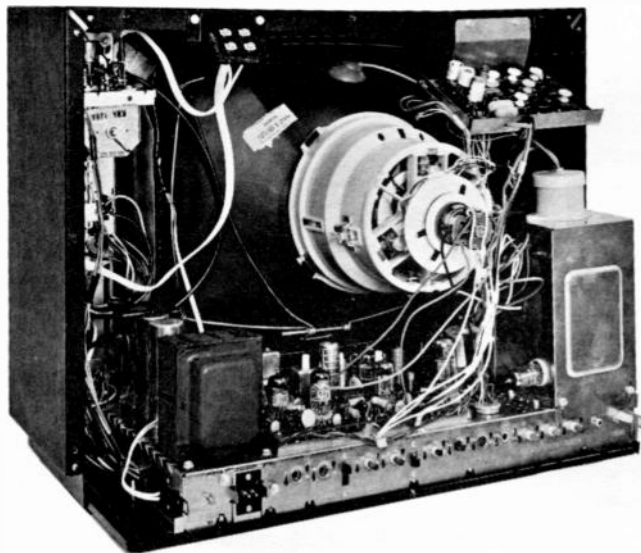


Figure 1—The CTC 19—Chassis View

video amplifier, sync, AGC, vertical oscillator-output, sound IF and demodulator, and the horizontal oscillator.

Instruments employing the CTC 19 chassis use the KRK 128 VHF tuner. This new tuner has four tuned stages, using a 6DS4 nuvistor RF amplifier and a frame-grid 6KE8 as a mixer-oscillator.

All receivers are factory equipped for UHF operation, using the transistorized KRK 120 UHF tuner. Remote control is included in some models. The three-function, all-transistor KRS 28 used in present black and white receivers is utilized.

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RCA VICTOR 19" COLOR

RCA's recently introduced compact 19-inch color television receiver offers many new advantages to the color television customer.

Most outstanding is the smaller overall size of the receiver—it measures 18-3/8" high, 24-1/2" wide and only 18-7/8" deep. Yet the 19" color picture tube delivers a 180 square inch picture. This compact, space saving table model color set fits most anywhere permitting color television to virtually become a part of any room setting.

A newly designed chassis, designated as the CTC 19 coupled with the 19" rectangular 90° color picture tube and advanced cabinet styling make this space saving color television instrument possible.

All of the high performance characteristics are maintained in the new 19-inch color receiver. The picture tube, using rare earth phosphors for truer color rendition, is glare-proof and dust-proof. Built in VHF and UHF antennas are provided; VHF is tuned with an advanced design four-circuit tuner, and UHF is tuned with a solid state UHF tuner. Signals are handled throughout the chassis with highly efficient circuits making use of RCA "Solid Copper Circuitry" in the majority of the overall chassis.

The CTC 19 color chassis is power transformer operated and 24,000 volts are developed by the high voltage circuits. Automatic degaussing, automatic gain control, and automatic scene control networks are included. This issue of "Plain Talk and Technical Tips" covers some of the many circuit advances of the new RCA 19-inch color television chassis.

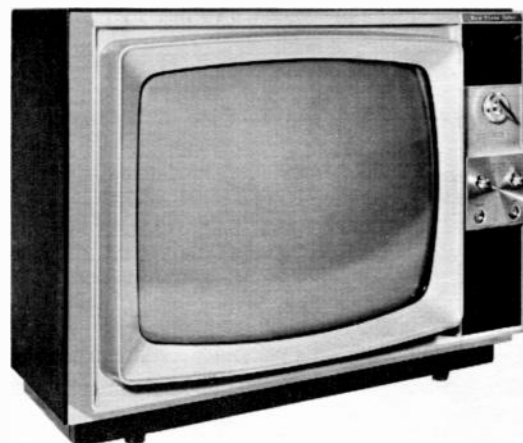


Figure 2—Model FG-525 19" Color Receiver

CTC 19 CHASSIS FEATURES

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The picture IF signal circuits in the CTC 19 chassis consists of two high-gain IF stages using the 6JD6 and the 6JC6, frame-grid tubes. Gain and response performance equal to a three-stage IF is obtained with the use of a high-gain tuner (nuvistor and frame-grid mixer), high-gain IF tubes, and double-tuned inter-stage transformers.

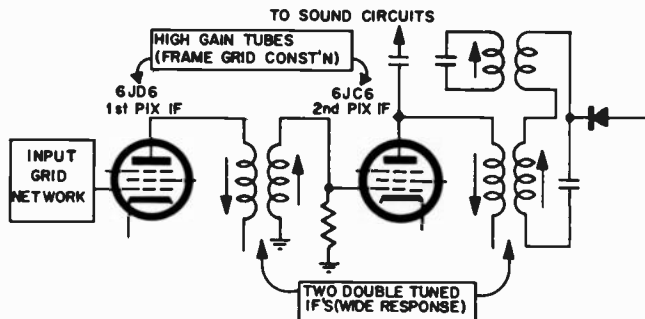


Figure 3—Simplified Schematic CTC 19 Two Stage IF

Video detection is accomplished by a diode circuit and the detected signal is applied to a two stage video circuit. The first video amplifier uses the triode section of 6GH8A. This stage has a "frequency-selective" coupling circuit; the grid and cathode are driven independently. The detector output is impressed between the grid-cathode of the triode for high frequencies; for low frequency luminance signals, the triode acts as a cathode follower and provides a low impedance match for the delay line. The luminance signal passes through the delay line to a second video stage that uses a 12HG7 high-gain video amplifier tube. The brightness signal is DC coupled from the plate circuit of the second video amplifier to the cathodes of the picture tube by way of the green and blue drive circuits. As in RCA's previous color receivers a convenient switch is included for set-up adjust-

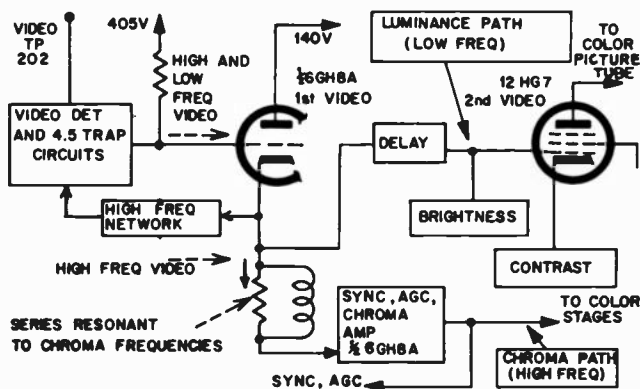


Figure 4—Block Diagram—Frequency Selective Video

ments. When in the service position, a fixed voltage is applied to the cathodes of the picture tube and vertical sweep is removed for set-up on a single horizontal line.

In the CTC 19 chassis, color and sync signals (obtained from the grid-cathode circuit of the first video amplifier) are fed to a sync, AGC, and *chroma amplifier* stage (the pentode section of a 6GH8A).

Color information receives special attention in the first video and chroma amplifier stages. The chroma signals are obtained from the cathode circuit of the first video amplifier via networks *selective* to high frequencies. Additional peaking to recover *maximum* chroma is obtained by a series resonant network in the input grid of the AGC, sync, chroma amplifier tube. Sync, AGC, and *high-level* chroma are available at the plate circuit of the sync/AGC/chroma stage.

The sound circuit has a separate diode detector; and as in previous chassis, the signal is taken from the plate of the last picture IF. The sound signal is handled by a three stage sound circuit, using a *frame-grid* 6JC6 as the sound IF amplifier, a 6HZ6 demodulator, and a 6AQ5 in the output stage.

The CTC 19 uses one stage of chroma amplification, "X" and "Z" demodulators, and color-difference amplifiers to recover R-Y, B-Y, and G-Y signals. The progress of chroma signals through these stages closely

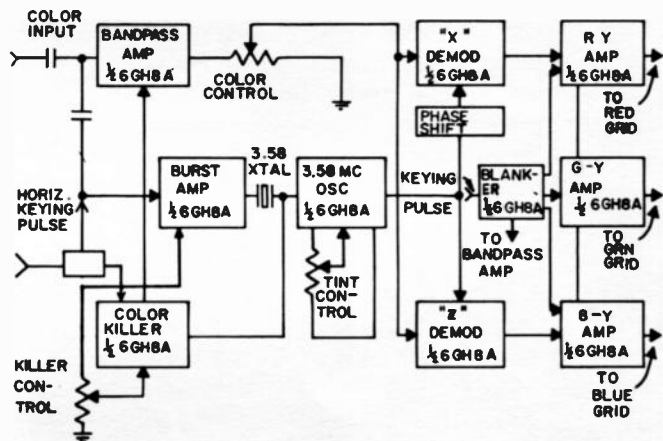


Figure 5—Block Diagram—CTC 19 Color Stages

follows the signal flow in previous RCA color receivers. Notice in the block diagram that type 6GH8A is used exclusively for all functions in the color circuits.

One of the most interesting circuits in the CTC 19 is found in the color sync stages. The output of the burst amplifier stage (pentode of 6GH8A), injects the color burst signal directly to an *Injection-Locked* oscillator. Burst is coupled into the crystal oscillator grid circuit, which in turn locks the 3.58 mc oscillator in step with the incoming burst signal. Temperature drift in the burst transformer has a minimum effect on the frequency and phase of the oscillator. The oscillator can be adjusted for the correct frequency, and the burst transformer can be peaked for maximum burst signal independently of each other. A capacitor trimmer located in the grid circuit of the 3.58 mc oscillator is used to adjust the oscillator on frequency;

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SEMICONDUCTORS IN THE CTC 19

Many present day *vacuum tube* products use *semi-conductors* extensively for various purposes. A color television chassis, because of the additional circuitry required, employs semiconductors to special advantage. RCA's new CTC 19 color chassis, for example, uses many components that are members of the semiconductor family (silicon, selenium, and germanium units) to perform various circuit functions.

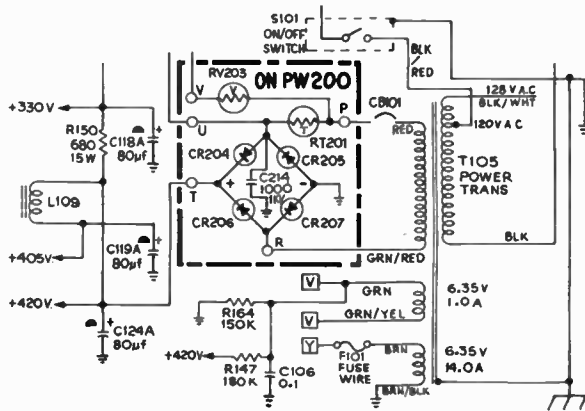


Figure 6—CTC 19 Power Supply

The low voltage power supply in the CTC 19 uses four *silicon* rectifiers—semiconductors well suited for use in circuits requiring high voltage, high current. This full-wave bridge circuit, also used in RCA's 21- and 25-inch color instruments, features good voltage regulation and low ripple content in the output. High reliability of individual components is obtained, since each rectifier operates well below its normal rating.

Several *selenium* rectifier units are used in CTC 19 circuitry. For example, CR801 is a four-section unit utilized in the convergence circuits. Another multiple section selenium, identified as CR203A, B, functions in the horizontal AFC stage. "Boosted-boost" voltage (1100 V) in the CTC 19 is developed by a *selenium*

Other semiconductors in the CTC 19 are two 1N60 type *germanium* diodes. One is used for video detection, while the other is used for sound detection.

The task of *stability* or *special purpose* applications in RCA's 19-inch color chassis is performed quite well by components that are basically semiconductor units. Voltage Dependent Resistors (resistors which change their value depending upon the voltage impressed across them) and Thermistors (resistors which change their value in accordance with temperature variations) are both used.

Circuits in the CTC 19 using VDR's include focus, pincushioning, vertical sweep, horizontal sweep, and automatic degaussing. Thermistors are found in degaussing circuitry and in deflection yoke circuitry.

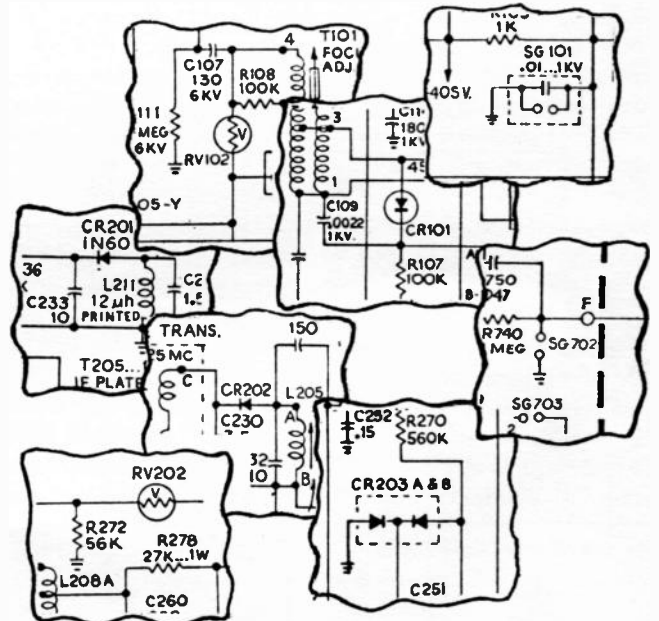


Figure 8—Semiconductors and Special Devices Are Used Extensively Even In Tube Type Receivers

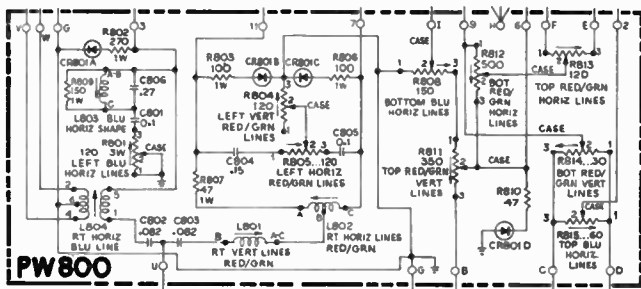


Figure 7—CTC 19 Convergence Board

rectifier. Sections of the vertical and picture tube screen circuits receive power from the CR101 source voltage.

Additional use of semiconductors in the CTC 19 include the UHF transistor tuner in which a transistor serves as the local oscillator, and a diode functions as the mixer.

Other devices, while not semiconductors in the strict sense, are used for protective reasons. These are the combination capacitor/spark gap units located in the picture tube control grid and screen grid circuits.

It is interesting to observe that even in a tube type instrument, such as the CTC 19 color chassis the use of semiconductors in one form or another serve to accomplish many circuit functions.

CTC 19 CHASSIS FEATURES

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the burst transformer is adjusted for maximum transfer of the burst signal to control the oscillator. The frequency of the oscillator is determined mainly by the crystal circuitry; any variation in loading on the output plate has little effect on the oscillator frequency. The TINT control is part of a phase shifting network in the plate circuit. Rotating the control alters the phase fed to the color demodulators.

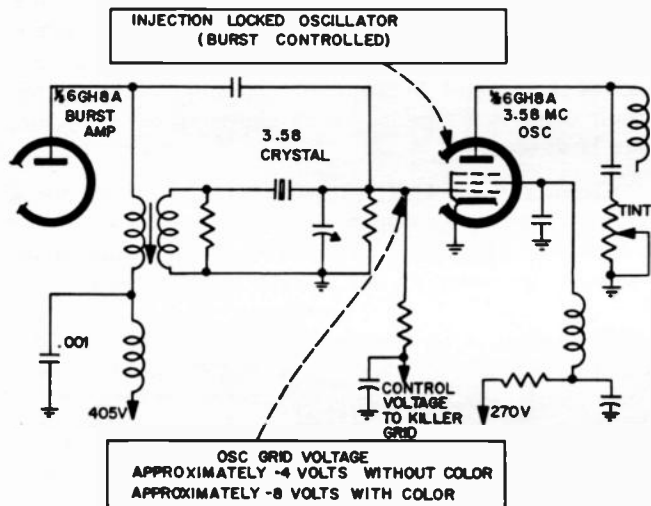


Figure 9—Simplified Schematic CTC 19—3.58 mc Oscillator

Control voltage for the killer stage (and thus the chromas bandpass stage) is derived directly from the grid of the oscillator circuit. During conditions of no color, negative voltage on the oscillator grid is approximately 4 volts; *with* color, negative 8 volts (the actual voltage will depend on the amplitude of the incoming burst signal). This voltage change in a more-negative direction is fed to the killer grid, and is sufficient to cut off the killer, allowing the bandpass stage to conduct. The circuit and operation of the

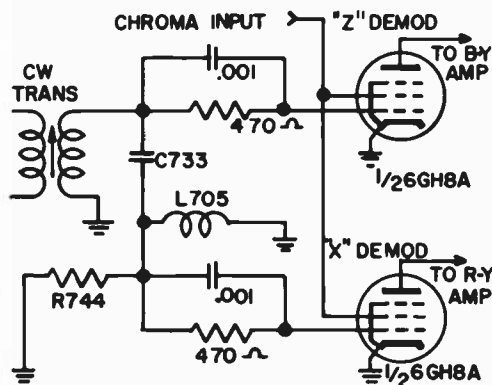


Figure 10—CTC 19—3.58 mc Phase Shift Circuit

horizontal blanker and the three-position kine bias switch is very similar to that of previous RCA color receivers. Most of the circuits in the CTC 19 are very closely related to the reliable circuits used in other RCA color chassis.

The vertical oscillator-output stage uses a 6GF7 and the basic circuit follows closely the vertical circuits in previous color chassis. Similarly the horizontal oscillator-AFC circuit is related to previous circuits, with the commonly used 6FQ7 as the oscillator. The application of voltage dependent resistors (VDR) in the vertical, and horizontal circuits of RCA's color chassis, to provide circuit stability, is continued in the CTC 19. Several new tube types in the horizontal and high voltage circuits are being used for the first time in RCA's 19" color chassis. Among these are the 2AV2 focus rectifier, and the 6BS3 damper. The horizontal output tube is a new type 6KM6. The use of a new tube type, the 6BK4B, ensures higher reliability in the shunt regulator stage. The familiar 3A3 high voltage rectifier tube furnishes the 24KV second anode voltage for the 19" picture tube. Slightly modified versions of the focus and horizontal linearity circuits are used in the CTC 19. Adjustments for high voltage, regulator current, and horizontal output current are made using the same procedures as used in previous RCA color chassis.

The high-quality performance, reliability, and service-features expected of RCA color engineering is continued in the new CTC 19. The following notes will serve to summarize some of the features of the new color chassis: There are 20 tubes in the CTC 19 chassis. Seven 6GH8A's are used. A 19EYP22 color picture tube is employed in instruments using this new color chassis. The UHF tuner is transistorized. The power supply is a full-wave bridge circuit using four silicon rectifiers. Protection for the B+ line is a reset circuit breaker. A wire link fuse protects the main filament line. All receivers using the new chassis are equipped with automatic degaussing. Vertical pincushion circuits are used. Adjustments for top and bottom pincushion are the same as in the CTC 17. A side pincushion circuit is not needed with this 19" color picture tube. The CTC 19 features RCA "Solid Copper Circuit" construction; two main chassis boards are used. Receiver setup adjustments (purity, convergence, etc.) are accomplished with the same procedures as used previously. Two video amplifiers are used: 6GH8A, first video; 12HG7 second video. The CTC 19 demodulates on "X" and "Z" axes to recover R-Y, B-Y and G-Y difference signals. Color sync processing is by means of an injection-locked 3.58 crystal oscillator, directly controlled by the incoming burst signal, and color killer signal bias is obtained from the grid circuit of the 3.58 mc oscillator.

The service technician will find that the CTC 19 has many similarities to previous color receivers. The few circuit areas which are different are straightforward and service techniques presently used can be easily applied to this new color receiver.

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