PLAIN TALK AND Technical Tips

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NEW COLOR PICTURE TUBES

All 1968 RCA Victor color television instruments are using a new family of rectangular HI-LITE color picture tubes that feature a new red phosphor. These tubes offer a significant improvement over earlier color picture tubes having the europuim activated yttrium vanadate rare-earth red phosphor. These improvements include:

1. A significant increase in brightness with improved contrast and higher color saturation.

2. The attainment of a unity current ratio as illustrated in Figure 1. In previous color picture tubes, the available red phosphors have been less efficient than than were the green or blue phosphors. Consequently, the red electron beam current has always been greater than that required for the green or blue phosphors to produce white light. This imbalance in beam currents caused the size of the red spot to be larger

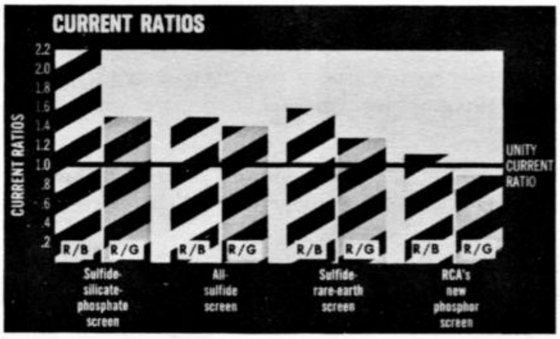

Figure 1—Current Ratios Required by Various Phosphor Combinations

than either the green or blue, resulting in red "blooming" (visible red fringing along image outlines).

The new red phosphor achieves a unity current ratio, i.e. equal beam current from each electron gun.

The benefits of a unity current ratio are:

a. elimination of color fringing due to red blooming at high drive conditions on both color and monochrome pictures.

b. brighter highlights

The "Perma-Chrome" temperature-compensated shadowmask assembly continues to eliminate purity drift. The following chassis utilize the listed respective new color picture tubes:

CTC 35—25XP22	CTC 28—25XP22
CTC 31—22JP22, 25XP22	CTC 27—19GWP22
CTC 30—25XP22	CTC 22—15LP22

Red Drive Control

In color picture tubes using the new red phosphor, it is possible for the *blue* phosphor to be less efficient than red or green. Previously, it was possible that only

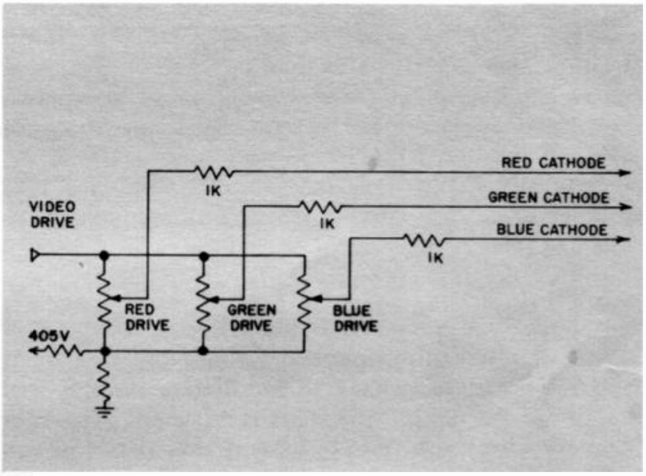

Figure 2—Simplified Schematic of Picture Tube Drive Controls

red or green could be the least efficient. Now it may be necessary to reduce the drive to both the red and green cathodes with respect to the blue cathode. As a result a RED DRIVE control is now provided for this purpose. The addition of the RED DRIVE control modifies the familiar Color Temperature Adjustment procedure. Initially one drive control (RED or GREEN) should be set at maximum and then the normal drive control set-up procedure is followed. If a satisfactory gray raster cannot be obtained with good tracking adjust the other drive control (RED or GREEN) to maximum and repeat drive control adjustments. Note: Optimum performance will be obtained only when one or more drive controls are set at maximum.

TEST EQUIPMENT CHECKS

It is wise to inspect your test equipment periodically. Don't wait until real trouble develops before wondering whether your test equipment is functioning properly. The reliability of test equipment and the ability of a technician to use it is of great importance in the efficient operation of a service shop.

Meters can be quickly checked—one against another—by simply comparing voltage, current and resistance measurements taken from the chassis of a radio or television receiver. VTVM AC voltage measurements can be compared against the calibrated peak to peak readings on an oscilloscope. Low range DC voltmeters can be checked roughly against a reliable bias box, such as the WG 307B which provides for readings from zero to fifteen volts. Note, these test equipment operation checks serve two purposes. First, a thorough

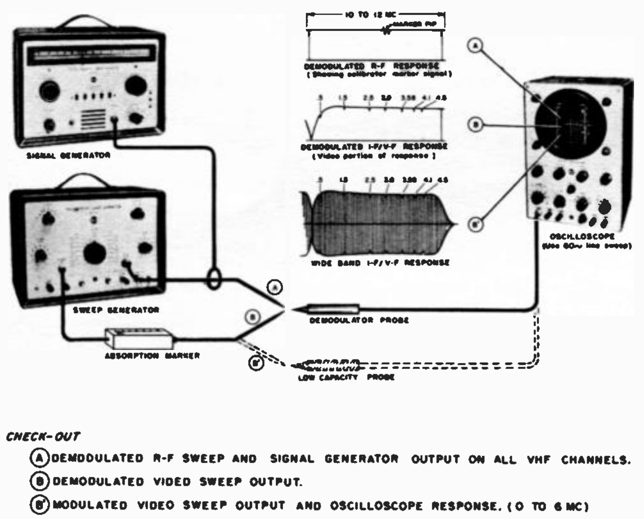

Figure 3—Alignment Equipment Checks

check-out will reveal the condition of the various pieces of test equipment, and second, the time spent will allow the technician to familiarize himself with the use of the equipment. This is especially important when dealing with test equipment that is not in constant use, such as the sweep generator, signal generator (calibrator), oscilloscope and associated test probes and cables.

Alignment Equipment

The *R-F output* of the sweep generator can be checked with reasonable accuracy (on all VHF channels) by applying the *R-F output* of the sweep generator to the *vertical input of an oscilloscope* through a *demodulator probe* and checking the demodulated sweep response on each VHF channel with marker signals obtained from the signal generator, see Figure 3. This procedure also provides a means of checking the operation of the signal generator at I-F and R-F frequencies.

The *video output* of the sweep generator can be checked by applying the *I-F output* of the sweep generator via a *"Multi-Marker"* (video absorption marker) to the *vertical input of an oscilloscope* through a *demodulator probe.* This arrangement also serves as a quick check on the action of the "Multi-Marker" and the demodulator probe.

The *operation* and *frequency response* of the *oscilloscope* can be checked by applying the *video output* of the sweep generator (sweeping from 50 Kc to 5 Mc), through the *"Multi-Marker"*, to the *vertical input of the oscilloscope* using a *low-capacity probe,* see Figure 3. This check also provides for an evaluation of the low-capacity probe.

Schedule a routine test equipment inspection procedure in your shop. Keep your equipment in good condition and retain constant familiarity with it. You'll save service time, improve your technical performance, and experience additional customer satisfaction.

"INSTANT PIC"

Two RCA Victor Black and White Television chassis (KCS 158 & KCS 160) feature "Instant Pic". This feature allows the chassis to provide a picture almost instantaneously. The manner in which this capability is achieved is explained below.

The power supply autotransformer employs a tap that when the set is turned "off" causes reduced power to be supplied to the filament string. This tap is actuated by the ON-OFF switch. When the switch is in the "OFF" position, the filament circuit is connected to the half-power tap and the B+ rectifier is disconnected from the autotransformer. The result is that the filaments are kept "warm", but B+ is not provided. When the set is turned "on", the filaments are switched to the "full power" autotransformer tap, and the B+ connection is re-established. The filaments then quickly reach operating temperature. The result is that normal set operation occurs almost instantaneously.

A MASTER ON-OFF switch is in series with the primary of the autotransformer to completely remove power from the chassis.

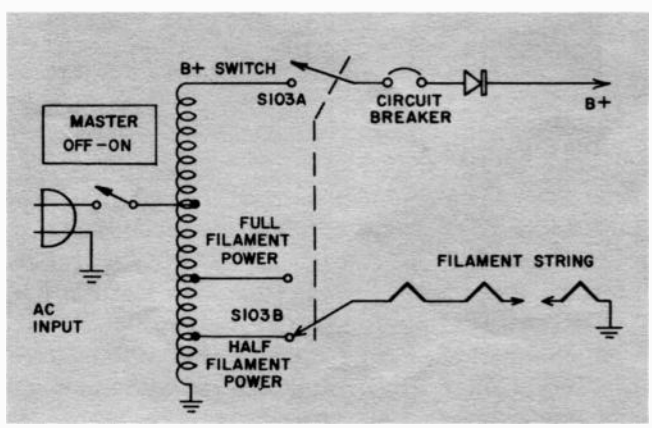

Figure 4—"Instant Pic" Simplified Schematic

CTC 30 "CHIP" AFT

New solid-state circuitry is found in the CTC 30 color chassis. This new chassis utilizes an integrated circuit as an AFT amplifier/discriminator. AFT was first introduced last year in deluxe RCA Victor color television instruments—CTC 21 color chassis.

The integrated circuit (IC) incorporated in this AFT unit is labeled IC 1301 in the circuit diagram. Functions performed by the IC and its associated com-

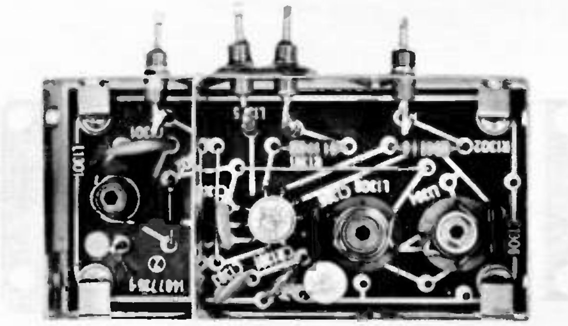

Figure 5—Integrated Circuit AFT Chassis

ponents include: buffer amplification (IF) detection, differential DC amplification, and DC voltage regulation.

AFT Circuit Operation

A sample of the video IF output (45.75 MHz) is applied to the AFT system through a 1.5 pf capacitor located in the plate circuit of the third video IF amplifier. The incoming IF signal is applied to a tuned input circuit consisting of L1301 and C1301. These components act both as an adjacent channel sound trap and an IF frequency peaking circuit—the correct trap frequency is automatically attained when the input circuit is peaked at 46.1 MHz.

The 45.75 MHz signal is fed into the buffer amplifier section of the IC and the output appears across the discriminator transformer primary (also peaked to 46.1 MHz). The discriminator transformer secondary is tuned to 45.75 MHz and feeds the integrated circuit discriminator diodes. Output from the discriminator diodes is applied to an amplifier which delivers a differential voltage output. This differential output is composed of two voltages—one appearing at each of the IC output terminals. The difference between these voltages (or differential), represents the amount and direction that the incoming IF frequency deviates from 45.75 MHz. If the incoming IF frequency is exactly 45.75 MHz, each discriminator output terminal voltage is equal the difference between them is zero volts. If the incoming IF frequency deviates from 45.75 MHz, one output terminal voltage increases and the other output terminal voltage decreases an equal amount. (Terminal voltage will increase or de-

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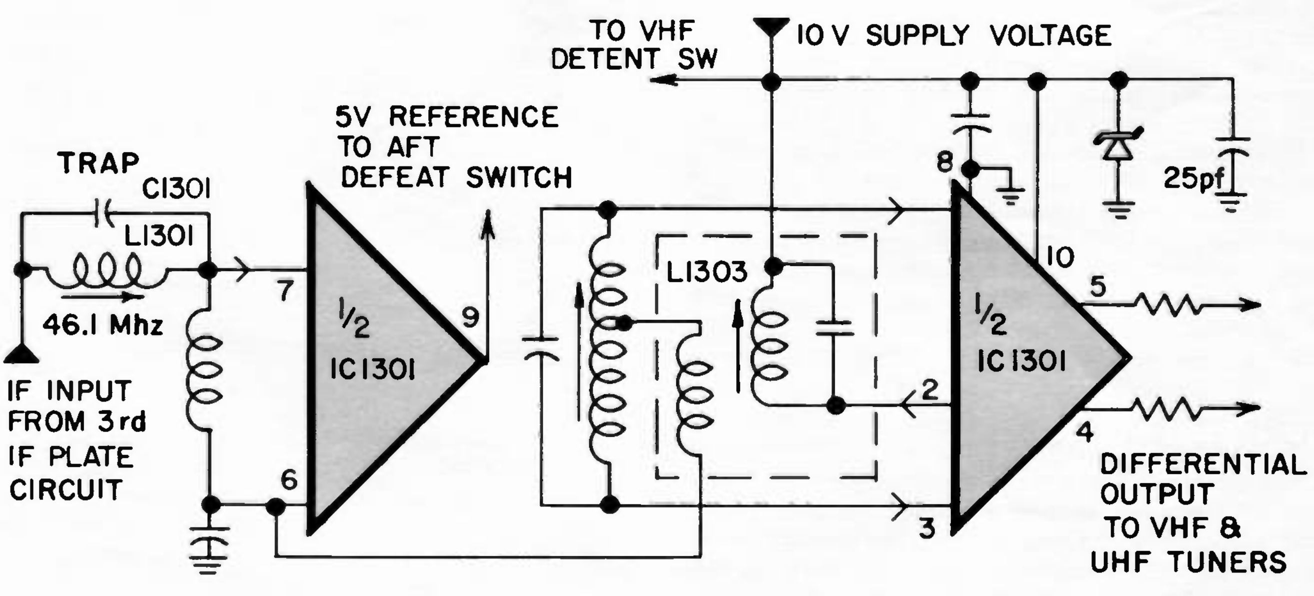

Figure 6—Simplified Schematic Integrated Circuit AFT

CTC 30 "CHIP" AFT

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crease depending on direction incoming IF frequency deviates from 45.75 MHz). This AFT unit is capable of producing a ±9-volt differential within its pull-in range, representing a correction for a frequency error (fine tuning or drift) of approximately ±1.0 MHz; the final VHF frequency error attained by the system is very small.

Tuner Control Circuitry

Oscillator frequency control is accomplished by a "variable capacitance" transistor in the VHF tuner and a varicap diode in the UHF tuner. AFT defeat action is similar to that employed by last year's CTC 21. However, there are some electrical differences as explained below.

VHF AFT defeat action operates by shorting together the differential amplifier outputs. However, UHF defeat operation is slightly different. To achieve total UHF defeat voltage, the AFT diode in the UHF tuner is clamped to a stable 5-volt source—generated *within* the "chip." This 5-volt reference is supplied in place of the correction voltage normally applied to the UHF tuner.

Switching Circuit

The automatic switching action that accomplishes UHF and VHF defeat is similar to that employed in last year's CTC 21.

GROUND POINTS

R-F and I-F circuit ground points are very critical. Anytime a grounded component in such circuitry is replaced, it is very important that the same ground point is used when the replacement is wired in.

Although not immediately obvious, an improper ground point can actually change the receiver circuitry. This is most apparent in R-F or I-F tuned circuits. Capacitive and inductive characteristics of a circuit change when replacement parts are grounded at different points. (Remember lead dress is *very* critical in high frequency circuits.) Troubles can be introduced into the circuitry by improper grounding and lead dress that later may be very difficult to find.

YOKE THERMISTOR

The resistance of the vertical windings in a deflection yoke increases as its temperature increases. Unless this condition is compensated for, the increase in resistance of the vertical windings will decrease the height of the raster and adversely affect the vertical linearity.

To compensate for this undesirable condition, RCA Victor Television receivers use a thermistor (a temperature compensating resistor) in series with the vertical windings of the deflection yoke. A thermistor serves to compensate for the resistance changes that take place in the vertical windings of the yoke due to variations in temperature.

A thermistor decreases in resistance as the ambient temperature increases; placed in series with the vertical windings of the deflection yoke and positioned in close proximity of the windings, it heats as the yoke

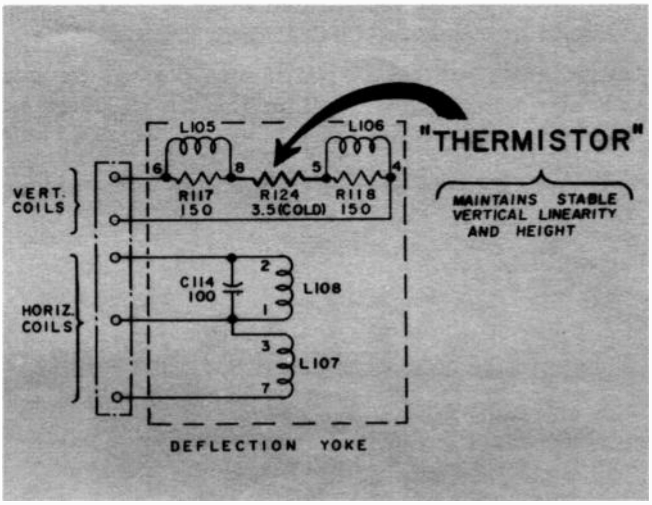

Figure 7—Thermistor Location

windings heat, see Figure 7. Since any change in the resistance of the "thermistor" and the yoke windings are opposite one another, the effective overall resistance of the circuit remains constant.

Although few thermistors fail, keep in mind that an improperly functioning thermistor can affect picture vertical linearity and height. Whenever a replacement thermistor is called for, consult your RCA Service Data for the stock number; ***it is important that you use the proper replacement part.***

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