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Color Television Workshop-9

Servicing the XL-100 Modular Color Chassis

Many "Plain Talk" readers have participated in Color Television Workshop-8 which covers "in-home" servicing of RCA's XL-100 modular color chassis. Workshop-9 continues with XL-100 servicing by presenting bench servicing techniques for these chassis. As this program builds on the knowledge acquired in Workshop-8, the technician is advised to attend both workshops to learn all the efficient XL-100 servicing procedures.

Color Television Workshop-9 provides detailed service information for each functional area of the chassis. The workshop book contains a simplified schematic of each area, a short discussion of circuit operation, and step-by-step troubleshooting checks which are particularly helpful. A major portion of the workshop is concerned with the vertical and horizontal deflection sections of the modular color chassis. Other areas of coverage include RF/IF, video, chroma, sound, and the power supply. As added information, the workshop manual contains a section covering the operation and servicing of the CTC 48 varactor UHF tuning system.

Each participant in the Workshop-9 training program will receive a CTC 48 wall schematic and a workshop manual. But, more important, each technician in attendance will gain valuable experience in servicing the RCA modular color television chassis. For more information about this workshop, and other RCA Technical Training Programs, contact your RCA Consumer Electronics Distributor Service Manager.

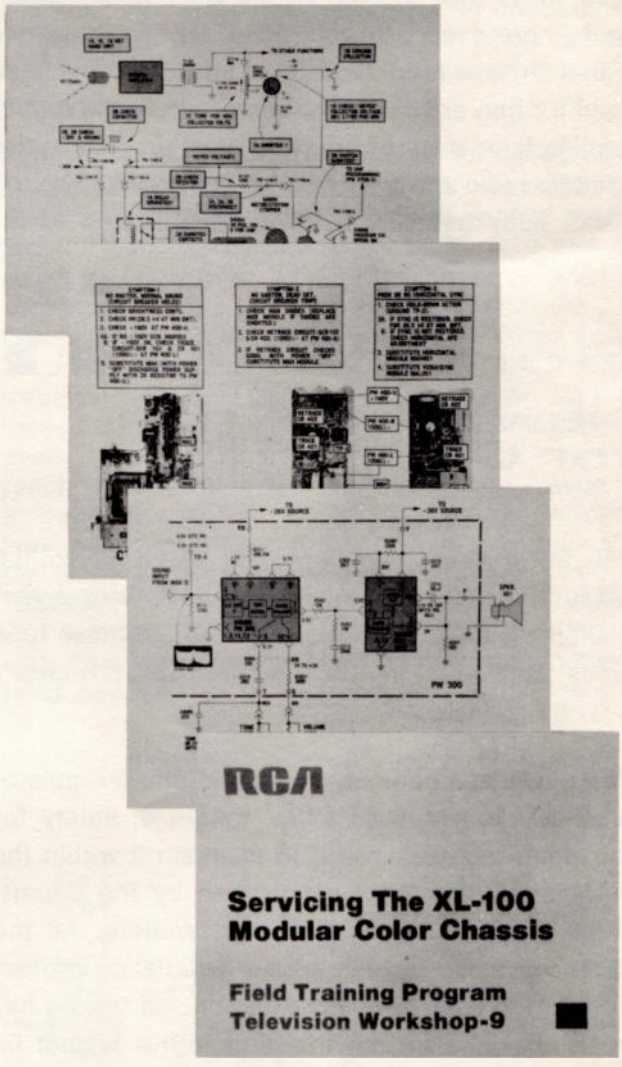

Figure 1—Typical Flipchart Pages

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Characteristics of Solder

Solder is an alloy (mixture) of two metals that have low-temperature melting points. The two metals used are tin and lead. Tin melts at about 460 degrees Fahrenheit and lead melts at about 625°F. An alloy of the two metals has a lower melting point than either metal in its pure state. The lowest melting point (known as the "eutectic" point) is reached when the tin-lead mixture is about 62 percent tin and 38 percent lead. The melting point of this mixture, usually written 60/40, is about 306°F. Figure-2 shows the various solid and liquid states of tin and lead alloys over a given temperature range. Since tin is more expensive than lead, a cheaper solder with a tin/lead ratio of 40/60 or 50/50 is sometimes used for non-critical applications where the higher melting temperatures are of no concern. The solder used for radio and television servicing should be the 60/40 alloy because a lower temperature is required to melt the solder, and thus the components of the circuit are not exposed to excessive temperatures.

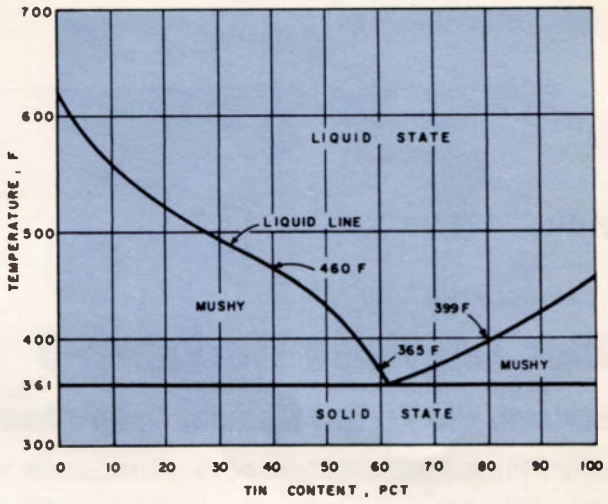

Figure 2—Melting Temperatures of Various Solder Alloys

Servicing ■ ■ ■

New Tube Types for CTC 39

The 6EN4 shunt regulator and 6ME6 horizontal output tubes were new in the 1972 model-year ("Q-Line") CTC 39 chassis. The use of these tube types continues in 1973 model-year ("R-Line") CTC 39 chassis.

The 6EN4 is a specially designed shunt-regulator tube that provides an extra margin of safety for the shunt-regulator stage to maintain it within the X-radiation standards established by the department of Health, Education, and Welfare. As the 6EN4 was used to gain added X-radiation protection for the CTC 39 chassis, the socket basing has been changed so that the older 6BK4 cannot be used as a replacement. Thus, 1972 model-year and later CTC 39 chassis are wired for use of the 6EN4 and a service technician **should not** change the wiring of the shunt-regulator circuit to accommodate a 6BK4, as this may cause the chassis to not comply with the H.E.W. standards. The 6EN4 is, however, an approved direct replacement for the 6BK4 used in earlier chassis.

The 6ME6 horizontal output tube is an improvement over the 6LQ6 previously used. This tube has been designed to provide an added margin of safety within the limits specified for the horizontal output stage. Thus, the 6ME6 is a direct replacement for the 6LQ6's and 6JE6's used in earlier chassis for the horizontal output function.

Voice Operated Cassette Recorders

The YZB 531 and YZB 532 cassette recorders have a voice-operated feature that permits the user to start the recorder by merely speaking into the microphone. Although the principles of the voice-control system operation are basically the same in both instruments, the circuitry used is different. For this reason, the circuit operation of each recorder will be discussed separately.

YZB 531 Circuit

The YZB 531 voice operation circuit utilizes three transistors to start the motor when audio at a sufficient level is present at the ouput of the audio amplifier. Figure-3 is a simplified schematic of the motor-switching circuit. In the **record** mode, S2 (Auto On/Off) is switched into the motor power circuit to enable the voice-operation circuit to start and stop the recorder. When S2 is in the "Auto-On" position for voice operation (as shown), the motor will run only when transistor Q13 is conducting. Transistor Q13 is driven to saturation when its base is biased about .7 volts less positive than the emitter.

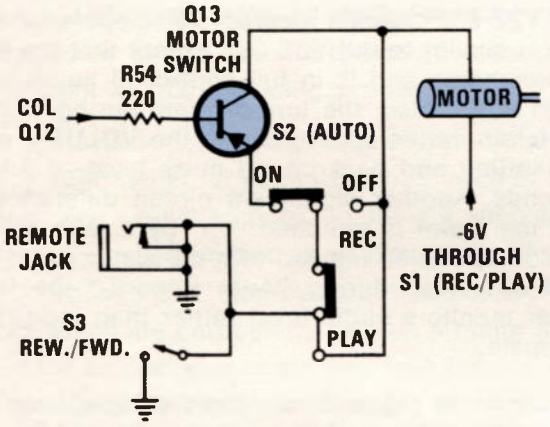

Figure 3—YZB 531 Motor Circuit

Figure-4 shows the circuitry that furnishes base bias to Q13. The circuit operation is simple. An audio sample taken from the secondary of output transformer T3, is rectified by diode Q10 and filtered by capacitor C34. This negative voltage serves as a source of base bias for transistor Q11 that is proportional to the signal level. When audio is present, capacitor C48 is rapidly charged through R48 (22 ohms) and transistor Q11 is biased "on" after a rather short time delay. However, it takes about ½-second for the motor to reach full operating speed. Thus during playback, a "beep" is heard each time the motor is switched "on" by Auto-function circuit. When an audio sample is no longer present at the secondary of T3, capacitor C34 discharges through R49 (1000 ohms) and the forward biased base-emitter junction of Q11. This long-time-constant discharge path maintains conduction of Q11 and Q13 for about two

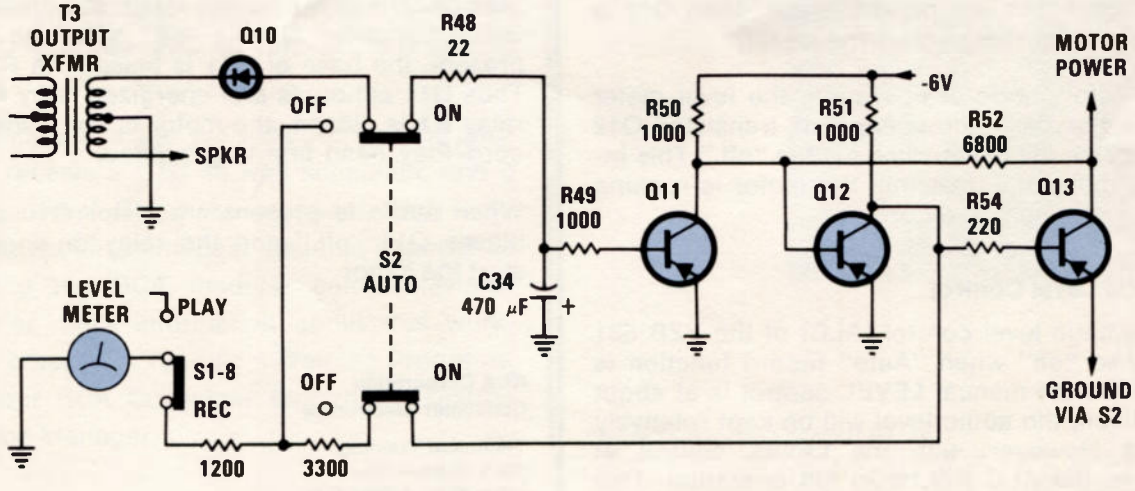

Figure 4—YZB 531 Voice Operated Motor Switching Circuit

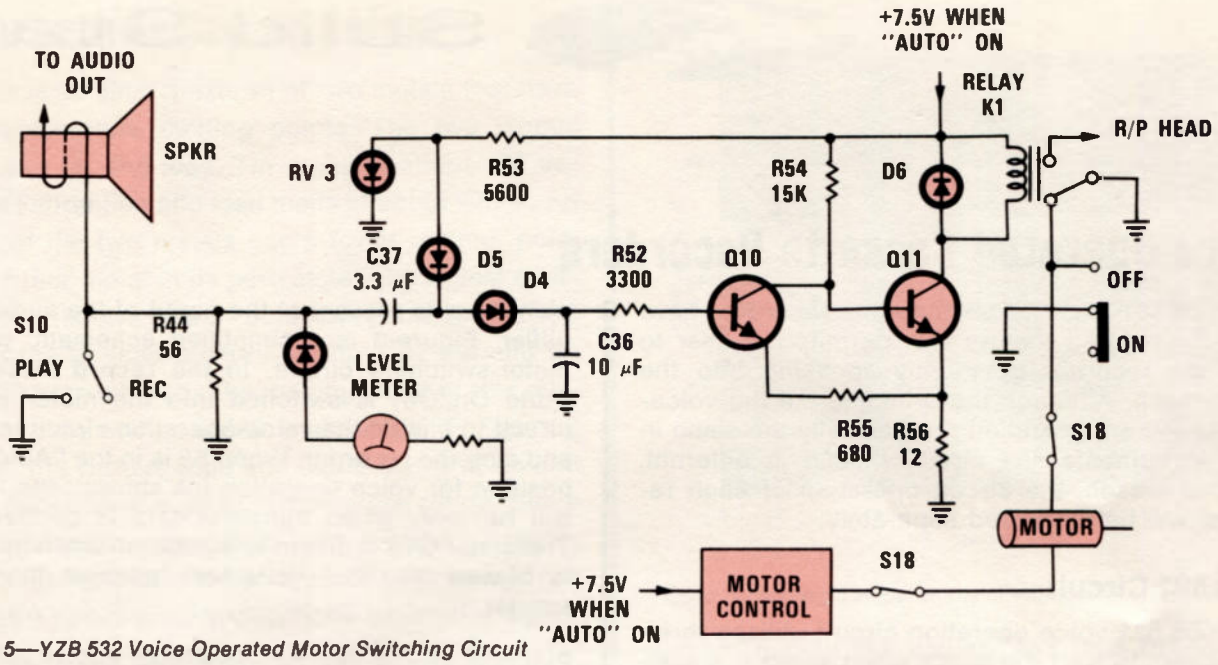

Figure 5—YZB 532 Voice Operated Motor Switching Circuit

seconds; thus, permitting short pauses in the audio that would otherwise stop the recorder. Since transistor Q11 is "off" when no audio is present, the base of Q12 receives base bias through R50 (1000 ohms) which biases it "on."

When Q12 conducts, the collector voltage drops to nearly zero. Therefore Q13 will not conduct and the motor does not run.

When audio **is** present, transistor Q11 conducts and removes the base bias of Q12. Thus, this stage is cutoff and transistor Q13 is biased "on" via base-bias resistor R51 (1000) ohms). This action drives the collector of Q13 less negative. A feedback resistor (R52—6800 ohms) couples this positive-going voltage to the base of Q12, driving it towards cutoff. This feedback action increases the conduction of transistor Q13 so that transistors Q12 and Q13 form a regenerative switch. When Q12 is "on," Q13 is fully "off"; and when Q12 is "off," Q13 saturates to start the motor.

In the "Auto" mode of operation, the level meter monitors the collector voltage of transistor Q12 and indicates full scale when Q12 is "off." This indication shows the user that the motor is running and the instrument is recording.

Automatic Level Control

The automatic level control (ALC) of the YZB 531 is switched "on" when "Auto" record function is used. When the manual **LEVEL** control is at about mid-position, the audio level will be kept relatively constant. However, with the **LEVEL** control at maximum, the ALC will be in full operation. This could bring the background noise to a level that might prevent the recorder from stopping with no audio.

YZB 532 Circuit

The YZB 532 cassette recorder voice operation feature is similar to the YZB 531 except that the ALC is switchable and is in full control of audio level when "on." Also, the turn-off time during "Auto" operation varies depending on the **VOLUME** control setting and background noise level—1.5 to 5 seconds. Another significant circuit difference is that the motor is switched "on" by a relay during "Auto" operation instead of a transistor, as in the YZB 531. Also during "Auto Record," the level meter monitors audio level rather than indicating full scale.

As shown in Figure-5, an audio sample from the output stage is rectified by diodes D4 and D5. Diode RV3 establishes a +.6-volt reference at the anode of D5 and +.6 volts base bias on Q10, the DC amplifier. When no audio is present, the base bias of Q10 is not high enough for it to conduct. Since transistor Q10 is "off" when no audio is present, the base of Q11 is biased via R54 (15K). Thus Q11 conducts and energizes relay K1. When relay K1 is closed, the motor is "off" and the Record/Play head line is grounded.

When audio **is** present, transistor Q10 conducts, biases Q11 "off," and the relay de-energizes to start the motor.

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