PLAIN TALK AND Technical Tips

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MORE ON PURITY

The effects of stray magnetic fields and the importance of North-South instrument orientation during purity adjustment was explained in November Plain Talk and Technical Tips.

In brief, the procedure is: place the instrument in a *North* or *South* orientation, check *center* convergence, set *center purity* with the disc magnets, and set *overall purity* by location of the deflection yoke.

Exact and lasting purity in any color receiver requires care during all adjustments. However, in instruments using 90° rectangular color picture tubes, the *positioning of the deflection yoke* must be more *selective,* and instrument operating time must be considered. By knowing and following a specific procedure, a stable purity setting can be obtained on rectangular tubes that remains pure from initial warmup time (20-30 minutes), up to and beyond any extended period of time.

RCA Victor Service Data for rectangular color instruments include a special note regarding purity adjustments; "If purity adjustments are made during minimum operating temperature conditions (20-30 minutes), the yoke should be set as close to *rear edge* of adjustment as is consistent with good purity." Receiver warmup may be accelerated by operating the instrument at a high brightness level (without blooming) for approximately 10-20 minutes; preferably 20 minutes. (The yoke will arrive at approximately the same *physical* location, regardless of "cold" or "hot" setup.)

To clarify this special note, the action and importance of yoke position and warmup time, refer to Figure 7. The illustration shows a 90° yoke housing, and simulated movement of the yoke within this housing (dotted lines extended into expanded areas above the housing). Notice there is a "range" through which *purity is maintained* as the yoke is moved forward or backward (the range represents slightly over ¼" of physical yoke travel). During "cold" conditions, the range extends in the forward direction—the yoke can be moved forward, *without losing purity*. During "hot" conditions, this range extends rearward.

The normal tendency would be to locate and set

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RCA'S TAPE CARTRIDGE TRANSPORT

The new "RELAY" series of RCA Victor Tape Cartridge Recorders utilize a tape transport mechanism which is noted for its positive action and simplicity of design.

Uniform and accurate tape speed, essential to achieving optimum performance, is accomplished by a 4-pole motor, a heavy flywheel, and a precision capstan shaft and pressure roller.

A combination of modern engineering, quality components and the overall design contribute not only to constant tape speed, but also to smooth action and trouble-free performance of this mechanism.

The 4-pole motor is shock mounted to prevent vibrations from affecting the mechanism; sealed bearings are used which are permanently lubricated, and a plastic cooling fan provides for heat protection of the motor and also cools the power transistors which are mounted on a bracket near the air-flow of the fan.

The drive belt is made of special material for long life and resistance to the shocks of frequent starting and stopping.

A heavy flywheel assists in maintaining constant speed, even when line voltage varies.

The capstan shaft is precision ground and in conjunction with the "self-centering" pressure roller pro-

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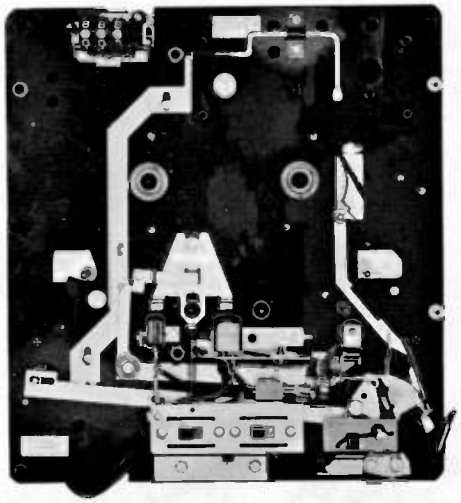

Figure 1—TCT 4A Mechanism—Top View

RCA'S TAPE CARTRIDGE TRANSPORT

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vides the force which pulls the tape past the play/record head. Slippage of tape at this point can cause uneven tape speed ("wow") and a loss of fidelity.

The slip clutch is an important part of the tape recorder mechanism. Since the speed of the tape past the recording head is constant, the take-up reel must run at constantly *varying* speeds to wind the tape as it leaves the capstan. When the tape is first started and there's little tape on the reel, the effective diameter is small and the reel has to turn fast to wind the tape. As the reel fills, it must turn slower and slower. This variation in speed is made possible by driving the take-up reel through a smooth-working slip clutch.

A detented speed selector provides for recorder operation at either 3¾ inches per second or 1⅞ inches per second.

Fig. 2 shows a partial view of the cartridge recorder mechanism when in the "play" position. When in this position, the driving force is transmitted from the motor to the flywheel and capstan shaft by means of the drive belt. The same drive belt causes the take-up pulley to turn in the direction shown. The tape is pulled across the tape head by the action of the capstan and the pressure roller; the function of the take-up pulley is to wind the tape as it leaves the capstan. Notice that the idler pulley is not employed

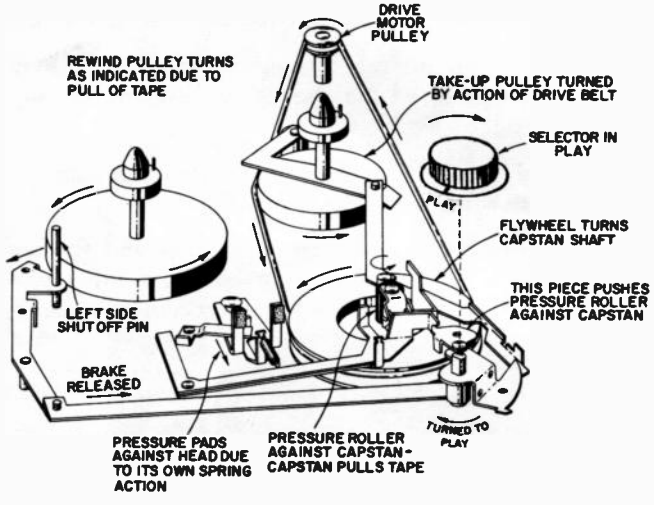

Figure 2—Tape Cartridge Mechanism In "PLAY"

in the "play" position and the pressure roller is pushing against the capstan shaft and the pressure pads are pressing against the tape head. The brake is released in the "play" position.

Fig. 3 shows a partial view of the recorder mechanism when it is in the "rewind" position. In this position the idler pulley pushes the drive belt away from the take-up pulley and against the rewind pulley. The flywheel and capstan shaft continue to receive drive from the motor but the pressure roller is away from the capstan shaft which permits the tape to travel in the reverse direction (right to left). Since the rewind pulley is now receiving power from the drive belt, it turns in the direction shown pulling the tape from the reel on the take up pulley. The pressure pads are pushed away from the tape and the brake is released.

When the speed selector knob is actuated, it causes a speed shift by forcing the drive belt off one step of the motor drive pulley and on to another. This action is assisted by a notched rim between the two steps on the motor drive pulley. The motor must be running to allow the speed change to take place.

The RCA Tape Cartridge mechanism is designated as the TCT-4 and TCT-4A; monophonic instruments

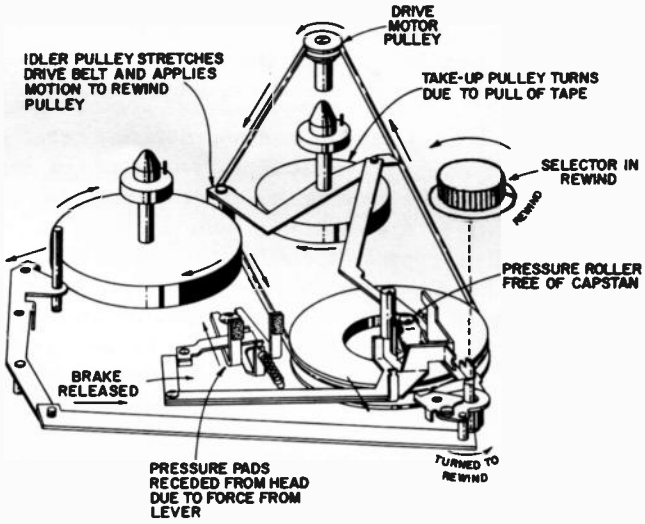

Figure 3—Tape Cartridge Mechanism In "REWIND"

use the TCT-4, while stereophonic instruments use the TCT-4A. A different track switch bracket and a play/record switch latching lever is used in the stereophonic units.

A digital counter with push button reset is included in most models and a meter type level indicator is utilized.

Solid State amplifiers are employed in all of the tape cartridge instruments with circuit variations in the monophonic, remote, stereo, and modular versions of these instruments.

Additional service information on this transport is given in RCA Victor Service Data 1965 No. 30, instrument and amplifier information is found in Service Data 1965 No. 28, and 1965 No. 29.

Since radio and television signals will vary greatly in signal strength from station to station and from one locality to another it is important that some provisions are made in the receiver circuits to "level off" these variations.

Automatic Gain Control (AGC) circuits are employed to accomplish this purpose. In tube type circuitry the "remote cut-off" type tubes permit the use of a bias voltage (derived from the incoming signal) to vary the overall gain of the receiver.

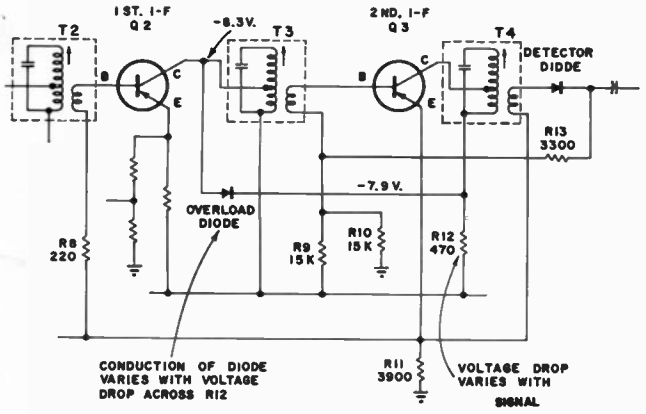

Figure 4—The Overload Diode

In Solid State circuitry this becomes more difficult since the transistor is basically a "sharp cut-off" device. Many radio receivers use the *overload diode* to accomplish a measure of "AGC".

In this circuit, an increased incoming signal causes an increase in voltage drop on R12, which causes the overload diode to conduct. This produces a "shunting" effect on the primary of T3 which *reduces* the gain of the system.

The transistorized television chassis of the RCA KCS 153 employs a special AGC circuit which controls the gain of the RF amplifier and the 1st IF amplifier to achieve AGC action.

The system consists of a closed loop made up of the AGC gate, the RF amplifier, IF amplifier, 1st video amplifier, and back to the AGC gate. The circuit maintains a constant voltage at the emitter of the first video amplifier over a wide range of signal inputs.

It is a "gated" or keyed AGC system in which an AGC voltage is developed at horizontal sync time and sustains for the duration of the horizontal scan time. Sync tips only are utilized to produce the control voltage; the system is noise immune, and not affected by scene variations.

Operation of the AGC circuits is as follows: As signal increases at the antenna, the output of the first video amplifier tends to increase. The increased video

TRANSISTOR AGC

level is applied as an input signal to the "AGC gate." The AGC gate is rendered operative at horizontal sync time by a 30 volt negative pulse from the HV transformer which is applied to the collector of the AGC gate. At that time the AGC gate amplifies the sync signal which is simultaneously occurring at the base. A positive AGC voltage is then developed, and is retained during scan time by the long time-constant

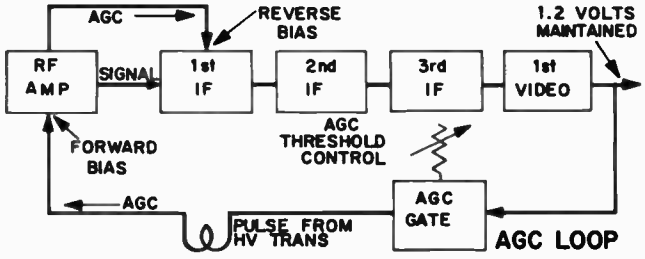

Figure 5—The KCS 153 AGC System

of the AGC bus. In order to prevent the collector to base junction of the AGC transistor from becoming forward biased by this developed AGC voltage, a diode is inserted between the AGC gate collector and the AGC bus. The positive AGC voltage so formed is then applied as forward bias on the RF amplifier transistor. This reduces the gain of the RF stage.

The RF amplifier then serves a "dual" role—in addition to its function as an RF amplifier, it amplifies and inverts the AGC voltage variations delivering it to the base of the first IF amplifier as reverse bias. This reduces the gain of the first IF amplifier.

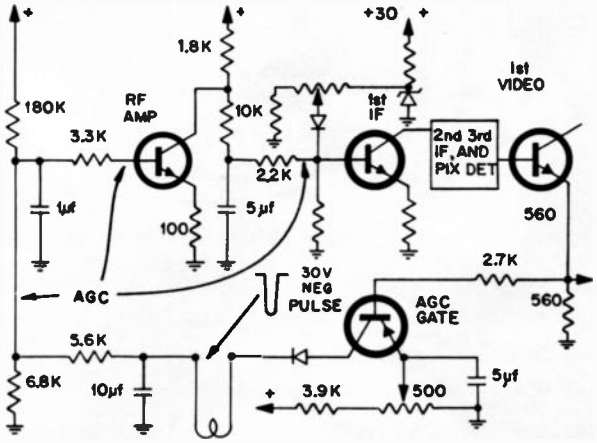

Figure 6—Simplified Schematic KCS 153 AGC

NOTE: Either reverse bias or forward bias will cause a reduction of gain in a transistor amplifier. In one case the cut off characteristic of the transistor is utilized, and in the other case the saturation characteristic is utilized.

In this manner both the RF amplifier and the first IF amplifier act to reduce the gain of the system.

MORE ON PURITY

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the yoke in the center of its purity range, compensating for any plus or minus change from "cold" to "hot" conditions — *this procedure is incorrect for rectangular picture tubes.*

A further study of the illustration will disclose an *overlapping* area where purity *will remain stable* through all operating temperature conditions. Special attention must be given to locate the yoke in this "lasting" position.

During "Cold" Conditions

If adjustment is made after a minimum warmup time (20-30 minutes), use the following procedure: Adjust center purity, slide yoke *forward* for good red field, *then* slide *rearward* until slight impurity appears, *then* move slightly *forward* to just clear impurity.

During "Hot" Conditions

Use the following procedure for adjustment during "hot" conditions, after 2-3 hours operation: Slide yoke to *most forward* position for good red screen, *then* slide *forward* until slight impurity appears, *then* move slightly *rearward* to *just clear* impurity.

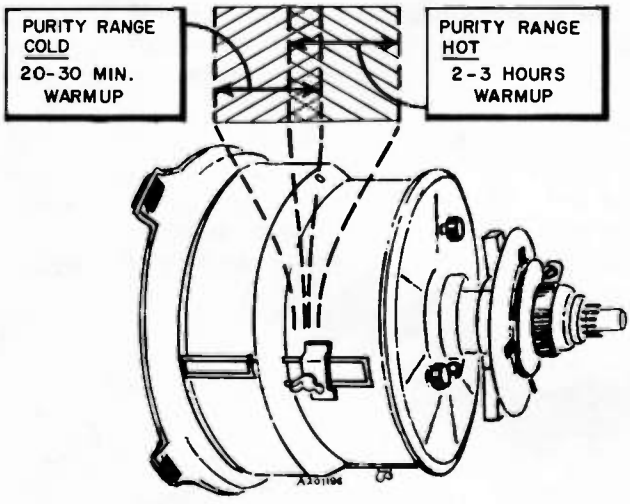

Figure 7—Yoke Movement Related To Purity Range

Although reference is made primarily to rectangular picture tubes, the same procedures apply to round color tubes. However, the 21" round tube is somewhat less critical regarding yoke placement.

Quality performance from color television depends a great deal on proper setup—including purity. The technician should remember the advantages of North-South orientation and proper yoke placement while making purity adjustments on color receivers, particularly those using rectangular picture tubes. This procedure gives the best assurance of stable purity during the warmup period and throughout prolonged operation.

VOLUME UNITS

Certain RCA Victor Tape Recorder instruments include a recording level indicator which is referred to as a "VU" meter.

The volume unit—abbreviated "VU"—is used to express the level of a complex wave such as speech or music in terms of decibels above or below a reference volume. A common assumption is that peak values of speech or music will be 10 db above a pure sine wave peak.

In practical terms, the "VU" is simply a convenient way to refer to speech or music levels taking into consideration the occasional peaks which occur.

ELECTROLUMINESCENT CLOCK

A feature of one of the clock radios in the current line, the RGD-30, is an electroluminescent clock face. A layer of phosphor material is sandwiched between layers of glass and, when excited by 117 v ac, it glows bright enough to be seen in a darkened room. In a bright room, the dial appears black. The dial is illuminated so long as the radio is plugged in; it is not affected by the radio on/off switch. Plugged in continuously, it is estimated that the annual cost of operation of this feature is less than 5 cents a year.

RCA WT-115A and Modification Kit

RCA's line of test equipment and accessories now includes a modification for use with the WT-115A Color Picture Tube Tester.

The new WG-405A Color Picture Tube Socket Adapter and Modification Kit expands applications of the WT-115A to include testing of the 19EXP22, 19EYP22, 25AP22A, and 25BP22A color-TV picture tubes.

All current production WT-115A Testers include the socket adapter and the modifications.

The WT-115A Color Picture Tube Tester is an approved test instrument designed specifically for measurement of performance characteristics of color-TV picture tubes. The unit rates each gun of the color picture tube for emission quality, inter-electrode leakage, shorted elements, and warmup performance.

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