PLAIN TALK AND Technical Tips

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JUST A REMINDER

It is time to renew your subscription to RCA Victor Television, Radio, and "Victrola"® Phonograph Service Data. A subscription to RCA Victor Service Data assures the service technician of complete technical literature covering all RCA Victor home instrument products.

Figure 1—RCA Victor Technical Publications

To renew a subscription, the subscriber should notify his local RCA Victor Distributor of his desire to renew. If your address has changed, include this information, and be certain to include your ZIP CODE. Remember, all subscriptions are based on the Service Data Year. (A Service Data Year includes all publications referenced to a given "File" year.)

Service Data Binder

Your RCA Victor Distributor has available an attractive maroon three-ring binder for your 1968 Service Data—or for that matter other years as well.

The binder is designed to accept all the Television, Radio and "Victrola" Phonograph Service Data publications for any given year. A clear vinyl pocket on the back edge is provided for subject and date inserts. As an added convenience, a number of these inserts are furnished on a loose leaf page within each binder.

Check with your local RCA Victor home instruments distributor for information regarding the price and availability of these binders.

OSCILLOSCOPE APPLICATIONS

The oscilloscope is an invaluable aid to good television receiver servicing. A good service oscilloscope, such as the RCA WO-91B may be used to signal trace every section of the receiver. It is also very useful for making peak-to-peak voltage measurements in the sync, deflection, video and chroma sections. In alignment work, where video, chroma, and luminance circuit adjustments must produce specific waveforms, the oscilloscope is indispensable.

Signal Tracing

With the oscilloscope it is possible to trace the television signal through the receiver and determine how circuits are functioning. As the signal passes from one stage to another, the shape and/or the amplitude

Figure 2—RCA WO-91B Oscilloscope

of the waveform are valuable troubleshooting clues. When the oscilloscope is properly calibrated, it is possible to simultaneously read the voltage amplitude and observe the shape of the waveform; thus, signal tracing is speeded up and it is possible to quickly evaluate the circuit condition. In order to obtain meaningful waveforms it may be necessary to use the probes and procedures that are recommended in the manufacturers service data.

Video Waveforms

Probably the most important waveform encountered in television service work is the composite video waveform—the combination of video scene information, blanking pedestals, and sync pulses. The oscilloscope

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OSCILLOSCOPE APPLICATIONS

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will show what the composite video signal looks like as it proceeds through the video amplifier stages of a television receiver—making it easy to pinpoint troubles in the video amplifier.

The television service technician can gain valuable experience by devoting some time to the study of waveforms. This is easily done by setting up a television receiver known to be in good operating condition and noting the waveforms on the oscilloscope at various points throughout the circuits.

Alignment Applications

Television receiver alignment requires a greater amount of skill and understanding on the part of the service technician than does any other service function. Before undertaking alignment, it is important that the technician recognize the symptoms of a misaligned receiver.

The order in which various sections of the television receiver are aligned may differ from one chassis type to another. In all cases, however, the alignment procedure given in the service data should be followed.

When the oscilloscope is used with a sweep generator, such as the WR-69A, a 60 Hz sine-wave time base is used. This is because the sweep generator supplies test frequencies which vary at a 60 Hz rate. The WO-91B oscilloscope can be set to the "LINE" position to obtain a 60 Hz time base. Some sweep generators provide an output for use as a time base in the oscilloscope. In this case the scope is set to the "Hor Input" position and the sweep generator "Scope" terminal is used as the horizontal input signal. It is important that the two instruments be adjusted so that blanking is correct and the sweep of both instruments is in phase. If the phasing is not properly set before starting alignment, the sweep curve on the oscilloscope may be prematurely cut off or the curve may appear as a double or "mirror" image. These effects are sometimes misinterpreted as being caused by a test equipment malfunction or even improper alignment.

The vertical gain controls and the output from the sweep generator should be set according to the service data. The marker generator output should be kept at a low level to avoid overloading the receiver or distorting the sweep curve, causing an erroneous alignment waveform on the oscilloscope screen.

Sweep generators may use either a 60 Hz sinusoidal or sawtooth sweep. If a sinusoidal sweep is used, the scope may be driven internally by setting the horizontal selector of the scope to "LINE". If a sawtooth sweep is used, the sweep generator deflection signal may be fed to the H INPUT terminal of the scope.

If no blanking is used, the PHASE control should be adjusted until the two response curves coincide on the oscilloscope screen. If blanking is used, the PHASE control should be adjusted until the base line on the oscilloscope screen extends the full width of the curve trace. A sharp drop-off point on the response curve (a "chopped-off" appearance to the trace) also indicates improper phasing. When a marker is superimposed on the response curve, improper phasing will cause two markers to appear on the curve. The PHASE control should be adjusted to obtain the appearance of a single trace having only one marker. The setting of the PHASE control is important during sweep alignment of the receiver.

When an oscilloscope's internal "sync" is used, the synchronizing signal is taken from the vertical amplifier section of the scope. Thus, the signal being viewed is also used for sync. Often, this signal may not represent the best type of synchronizing signal; the result can be a drifting, or an unstable presentation. To overcome this, "external sync" can be used wherein a separate sync lead is connected to a point in the receiver under test to provide an improved sync signal. Examples of good sync signals would be the vertical pulse at the plate of the vertical output section for use when viewing vertical waveforms and the horizontal pulse (AGC pulse) for viewing horizontal waveforms.

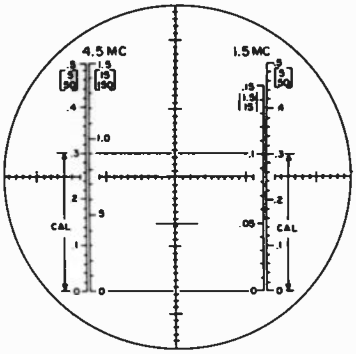

Figure 3—The WO-91B Graph Screen

Calibration Procedure

Calibration of the WO-91B is a very simple procedure. When the WO-91B is properly calibrated, the scales on the graph screen can be read just like a VTVM scale.

First, the BANDWIDTH switch is set to "Cal"; this applies a fixed AC voltage source to the vertical amplifiers. The second step is to adjust the V-CAL control (vertical gain) for 2 inches of deflection—"Cal" line on scope graph screen.

Adjust the VERTICAL CENTERING control, so the bottom of the trace will be on the "Zero" line of the graph screen and the top of the trace will be on the "Cal" line.

Peak-to-peak voltages may now be read directly from the graph; the scope is automatically calibrated for all settings of the V-RANGE Switch and BANDWIDTH Switch.

A good oscilloscope, such as the WO-91B, will find almost unlimited use in general service work.

SOLID-STATE VERTICAL CIRCUITRY

The vertical deflection system used in the transistorized KCS 157 chassis is basically a modified multivibrator circuit, such as shown in Figure 4.

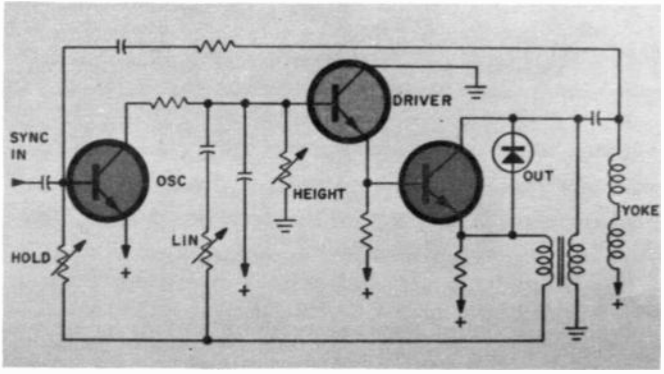

Figure 4—Vertical Deflection Circuit

Vertical Oscillator

The action of the first stage *(oscillator)* may be compared to that of a switch.

In Figure 5 the oscillator transistor is replaced by a single-pole/single-throw switch. Here the switch is shown in the "charge" position—allowing charging

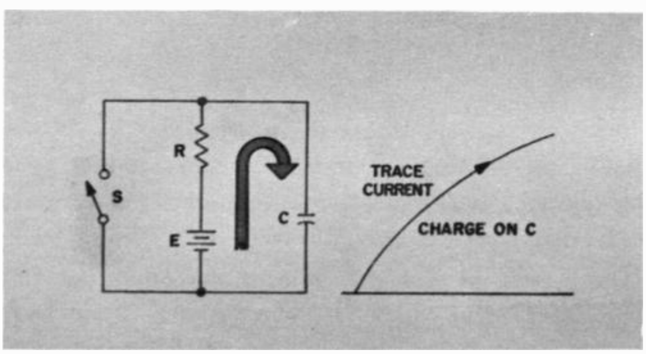

Figure 5—Switch in "Charge"

capacitor C to charge from the supply voltage through resistor R. This charging voltage is amplified by the output stage thereby supplying the vertical yoke trace current.

In the "discharge" position (Figure 6) the switch shorts capacitor C, discharging it and the resulting voltage change is translated as yoke retrace current.

In Figure 7, the switch is replaced by a transistor. The result is a simplified electronic vertical switching or oscillator circuit.

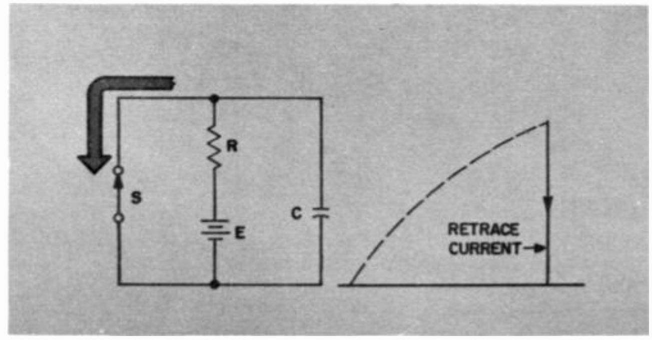

Figure 6—Switch in "Discharge"

Referring to the more complete vertical oscillator circuit in Figure 8, the switching function is provided by the transistor; C is the charging capacitor, and R_1 is the vertical height control. A feedback circuit from the vertical output transistor collector to the oscillator transistor base, supplies the vertical retrace pulse to the oscillator, to control its switching action. The base of the oscillator transistor also receives vertical sync pulses from the sync separator. The sync pulse determines the exact time that the oscillator is switched "on". Another feedback path—from the emitter of the oscillator stage—controls the oscillator "off" time, which determines basic switching frequency of the oscillator. Variable resistor R_2 in this circuit provides some control over the switching frequency and thus becomes the VERTICAL HOLD control.

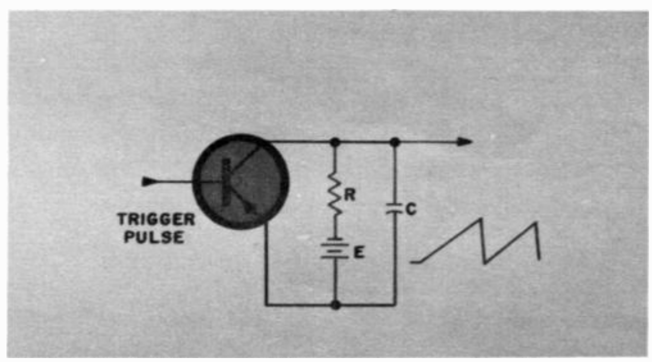

Figure 7—Vertical Oscillator "Switch"

Vertical linearity is optimized by negative feedback from the output stage. A portion of the output waveform is applied (180° out-of-phase) to the waveform developed on the charging capacitor, resulting in the

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SOLID-STATE VERTICAL CIRCUITRY

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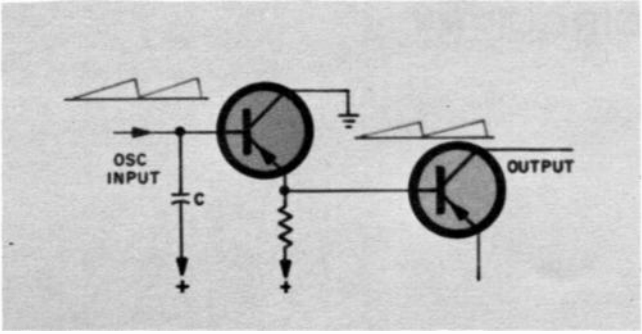

Figure 8—Vertical Oscillator Circuit

cancellation of any waveform non-linearties at the charging capacitor. Resistor R_3 controls the amplitude of the feedback applied to the charging capacitor, thus, serving as the VERTICAL LINEARITY control.

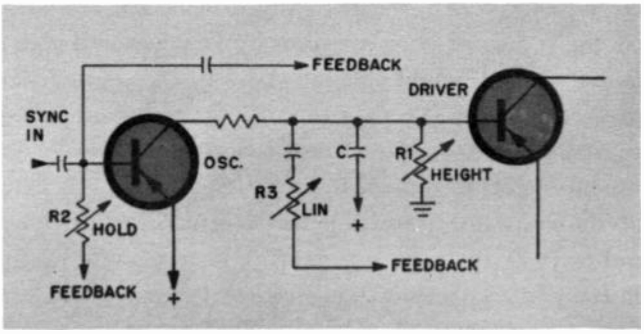

Figure 9—Vertical Driver Circuit

Vertical Driver

A buffer amplifier or driver is employed to prevent the low input impedance of the output stage from excessively loading the charging capacitor. The buffer stage in Figure 9 is an emitter-follower amplifier. The emitter-follower is idealy suited for its purpose in this circuit—its high input impedance minimizes loading of the charging capacitor; its relatively low output impedance matches the vertical output stage.

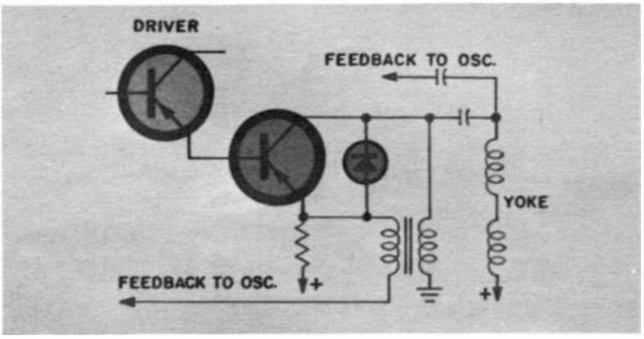

Figure 10—Vertical Output Circuit

Vertical Output

The common-emitter vertical output stage (illustrated in Figure 10) develops vertical sweep voltage across the vertical output choke; this sweep drives the vertical winding yoke winding via a coupling capacitor. The diode connected between the emitter and collector of the vertical output stage protects this stage from flyback transients.

REPLACEMENT ANTENNA ARMS

Have your ever wanted to replace the bent or broken antenna arms on a customer's portable television set to make the repair job complete? To facilitate easy replacement, RCA Parts and Accessories is now offering low cost replacement antenna arms for most portable television sets.

The replacement arms are available in two lengths—4 sections and 5 sections. A few minutes and a screw-

Figure 11—Replacement Arms

driver are all that is required for installation. The replacement arms can be securely fastened by a screw to the ball swivel assembly located in the cabinet back.

Both types of replacement arms may be obtained in individual blister packs from your local RCA parts distributor under the following stock numbers:

4 section arm—Stock No. 10E100
5 section arm—Stock No. 10E101

The replacement arms are also available in a bulk package (box of 12) by ordering these stock numbers:

4 section arms—Stock No. 10EB100
5 section arms—Stock No. 10EB101

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