RADIO SERVICE NEWS

VOLUME XV, No. 1 — RCA TUBE DEPARTMENT, HARRISON, NEW JERSEY — Spring, 1950

RCA ANNOUNCES TWO NEW HIGH-VOLTAGE PROBES

Probes Adapt Electronic and Non-Electronic Meters To High-Voltage Ranges

Extend the DC voltage range of your instrument to 50,000 volts and you add important extra servicing value to your volt-ohm-meter. These two new RCA High-Voltage Probes enable you to measure DC voltages in television sets, and other high-voltage electronic devices.

Both models are identical except for their connectors. The RCA WG-289 has a microphone-type connector for use with Volt-Ohmyst* and similar types of VTVMs. The WG-290 has phone tips for use with non-electronic type voltmeters.

Safety is insured by the use of a low-loss polystyrene body providing an 8½-inch leakage path to ground. An anti-corona probe tip, grounded arc-over protection baffle, completely insulated grip, and a fully shielded cable and separate ground lead further guarantee the operator's safety.

Inside the probe barrel is a special resistor having moisture resistant, long-path construction. It is completely isolated within a polystyrene enclosure. A choice of five different values of this resistor adapt this probe to any one of a number of different type instruments.

If you service TV or any high-voltage equipment, an RCA High-Voltage Probe is a must for your bench or tool box. Ask your RCA Distributor to show you the RCA WG-289 or the WG-290. User price, either model, only $9.95 with resistor. (Available separately—Probe—$7.15, Resistor $2.80.)

*Reg. Trade Mark, U. S. Pat. Off.

TYPE DESIGNATIONS

The following dual type designations are being dropped in favor of single identification. As stocks of double-branded tubes are exhausted, single branded tubes will take their places. There is no change in tube characteristics or quality.

Old Brand	New Brand
1B3GT/8016	1B3GT
6AB7/1853	6AB7
6AC7/1852	6AC7

KUKLA, FRAN & OLLIE SELL RCA BATTERIES

Attention-compelling commercials about RCA Batteries will be presented on the top TV Puppet Show, Burr Tillstrom's KUKLA, FRAN & OLLIE (above), and on SCREEN DIRECTORS' PLAYHOUSE, RCA's famous NBC drama featuring Hollywood Stars! The commercials on these outstanding TV and AM shows will channel sales of high-quality, long-lasting RCA Batteries to you—the local Radio Dealer and Serviceman. Now, with national consumer advertising support, more than ever it's wise to stock and sell RCA—the battery for the Radio Trade!

ACCURACY REQUIREMENTS OF TV TEST EQUIPMENT

The advent of television has introduced new concepts of accuracy into service work, and has stressed the necessity for reliable instruments. Simple oscillators are being replaced by good test oscillators and by television calibrators; inaccurate oscilloscopes have lost their popularity to high-performance oscilloscopes adapted to visual-alignment work; and low-resistance voltmeters are being abandoned for vacuum-tube voltmeters provided with isolating probes.

Sweep-frequency generators are making their appearance in many shops for the first time, and television technicians are getting acquainted with crystal calibrators, marker generators, capacitance checkers, and high-frequency probes.

Television service techniques are progressive, and it is certain that the technician will find it profitable to make use of more accurate test equipment in the future than he has in the past. As receivers are improved in design, and components held to closer tolerances, instrument performance must keep pace.

Signal Sources

A sweep-frequency generator, such as the instrument shown in Fig. 1, is used for rapid alignment of wide-band circuits. When it is used in combination with an oscilloscope, rf, if, discriminator, and video response curves can be displayed on the screen of the 'scope. High-accuracy requirements exist in this application.

First, the output of the instrument must be quite flat; otherwise, the operator will misalign circuits in an endeavor to obtain a response curve of the shape recommended by the receiver manufacturer. The sweep generator illustrated in Fig. 1 is flat within ± 1.5 db.

Second, a precision attenuator is very necessary. Simple attenuators leak excessively when set for low values of output and overload the receiver when over-all response is checked; furthermore, if the generator output cannot be reduced to the noise level, the sensitivity of the

(*Continued on Page 2, Column 1*)

BIG RCA BATTERY CONTEST OFFERS $10,000 IN PRIZES

"Get the Facts" Contest Open to all Radio Battery Retailers!

Starting April 1st, radio battery retailers and their full-time employees, whose duties include the selling of radio batteries, are eligible to enter the new RCA Battery "Get The Facts" Prize Contest.

There are no purchases necessary—no sentences to complete! You're eligible to win by simply returning the Free Entry Coupon in RCA's Official "Get The Facts" Contest Booklet—obtainable, without charge, from any RCA Battery Distributor.

Sole purpose of this contest is to introduce radio battery retailers to the "plus" features of RCA Batteries—the reasons why RCA Batteries are chalking up greater sales gains every day!

GET THE FACTS on this *liberal* prize contest from your nearest RCA Battery Distributor. Make sure you return your Free Entry Coupon to Contest Headquarters prior to closing date, June 30, 1950! A new 1950 Ford may be your reward.

FM TRAP FOR TV RECEIVERS

Many older TV receivers receive interfering signals from local FM broadcast stations, resulting in poor picture quality or bar patterns. An effective remedy for this type of interference is the RCA Wave Trap, Stock No. 73239.

Although made especially for the RCA-201E1 TV Tuner, the wave trap has a bracket which makes it readily usable on early post-war models of RCA Victor sets using 300-ohm Transmission line. The wave trap is mounted as near to the tuner input as possible; the 300-ohm line is connected to the two terminals of the trap. Adjustable tuning, from 88- to 108-Mc, traps out unwanted signals from the FM band.

The RCA Wave Trap is now available at a new suggested list price of only $1.25! Make a hit with your customers who now have FM interference—give them a clearer picture. Order a stock of the RCA Wave Trap, Stock No. 73239, from your RCA Distributor today.

Photolithographed in U. S. A.

What's New in Tubes?

A regular feature of RCA RADIO SERVICE NEWS, bringing you the latest tube and price information.

NEW TYPES

Type	Service	Suggested List
1V2	Miniature high-voltage rectifier primarily for TV service	1.50
1X2	Miniature high-voltage rectifier primarily for TV service.	2.65
6AU5-GT	Beam power amplifier for TV horizontal deflection.	2.65
6AX5-GT	Full-wave high-vacuum rectifier with 6.3 v heater.	1.35
6BQ6-GT	Beam power amplifier for TV horizontal deflection.	3.20
6CB6	Miniature high-gain pentode amplifier for TV.	2.00
6CD6-G	Beam power amplifier for TV horizontal deflection.	6.00
6S4	Miniature medium-mu triode amplifier for TV vertical deflection.	1.65
16GP4	Short 16" metal kinescope (See story—Page 1)	60.00
6AS6	Miniature sharp-cut-off pentode with two grid-control electrodes.	3.65

PRICE ADJUSTMENT

Once again RCA's policy of extending savings through to customers is reflected in a new suggested list price on the 12LP4. Effective Feb. 16, 1950, the suggested list price on the 12LP4 is $37.50.

TV TEST EQUIPMENT

(*Continued from Page 1*)

receiver cannot be properly checked for fringe-area reception.

Attenuators leak because of stray capacitance. A simple potentiometer, for example, has stray capacitance between its terminals. As the frequency of operation is increased, the reactance of this stray capacitance falls to a low value and by-passes the rf energy around the resistance element instead of into the output circuit. At very high frequencies, coaxial-type capacitive attenuators are found suitable for wide-range attenuation.

If the output cable of a high-frequency sweep generator is not properly terminated, standing waves will occur along the cable. Accordingly, the flatness of the output, will be impaired by the varying cable impedance from one frequency to another.

A choice of balanced and unbalanced outputs should be available, to avoid a mismatch of the receiver input circuit to the generator output termination.

Accurate alignment requires that the output of the sweep generator be free from spurious harmonics and sum-and-difference frequencies. Accordingly, the generator should be designed to generate fundamentals or should be equipped with suitable filters to take out the spurious frequencies. Although the tuned circuits of a receiver will filter out many of the unwanted signals which are present in the output of a beat-frequency sweep generator, not all spurious responses are eliminated and, as a result, misleading markers may appear upon the trace. Spurious markers not only cause confusion in the interpretation of the display, but also tend to overload the receiver and to make the curve artificially flat.

Fig. 2 shows a good signal source for television work. This instrument has good scale accuracy. Most important of all, it contains a pair of crystal frequency standards and a heterodyne detector, which permit the instrument to be calibrated to an accuracy of ± 0.01% This instrument can be used as a heterodyne frequency meter to calibrate other equipment, such as test oscillators, and it is known, therefore, as a television calibrator.

A television calibrator is used to adjust local oscillators of TV receivers, to align stagger-tuned intermediate-frequency amplifiers, to adjust discriminators, and to provide precise frequency markers on visual-alignment curves. When externally modulated by an audio oscillator, the instrument can be used to troubleshoot defective receivers by signal injection.

It will be understood that such a generator is essentially a variable-frequency oscillator plus a heterodyne frequency meter with crystal oscillator for calibrating the vfo. The vfo is needed to obtain the high-level output required for general service work, as well as to interpolate between the side bonds produced when the crystal oscillator modulates the vfo. It is not commercially practical to construct a vfo with an extremely high accuracy; hence the heterodyne frequency meter is necessary to maintain the ± 0.01% accuracy recommendation for first class television service.

Harmonic generators are less desirable than instruments which provide fundamental frequencies only. The presence of frequencies other than the desired test frequency can lead to incorrect measurements, spurious markers, overloaded circuits, and misadjustment of trimmers.

Apologists for inaccurate generators sometimes maintain that the performance of most receiver circuits is not greatly impaired by consistent misalignment, provided the frequency error is in the same direction throughout (all frequencies set too high or too low). What has been overlooked, which the practical technician quickly discovers, is that the scale error of such instruments is not constant, but varies from one end of the dial to the other. Band switching usually introduces abrupt deviations, in addition to the more gradual deviations within individual bands.

There is no substitute for precision in modern service work.

A typical test oscillator is shown in Fig. 3. This instrument has an accuracy of ± 2%, and is recognized as a standard unit of AM test equipment. However, this instrument also finds useful application in television work when used in combination with the television calibrator. Intercarrier receivers utilize a 4.5-Mc sound channel, which is usually sweep-aligned. A test oscillator can be used to provide frequency markers on the alignment trace. Rapid trouble-shooting of TV intermediate-frequency amplifiers is also facilitated by signal injection with the aid of a modulated test oscillator. The af output of such an oscillator can be used to check video and audio amplifiers for inoperative stages.

Oscilloscopes

The television technician uses his oscilloscope primarily for visual alignment. Although there is a popular fallacy that "any oscilloscope can be used for visual alignment," such is not the case. A suitable oscilloscope must meet definite requirements of low-frequency response, spot size, trace brilliance, and voltage-measuring facilities. A suitable instrument is shown in Fig. 4.

To check the suitability of an oscilloscope for visual alignment, a

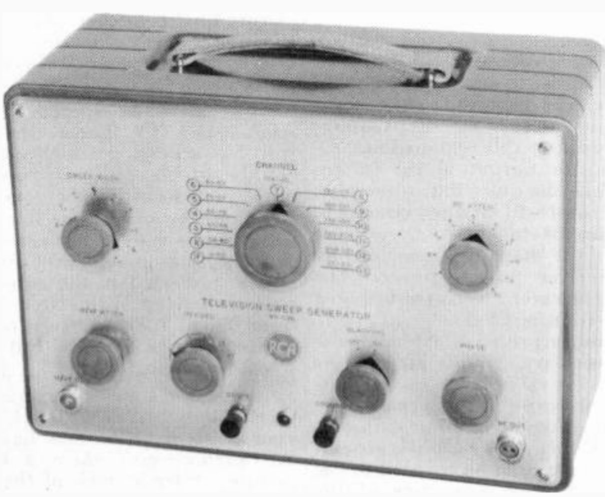

Fig. 1. This modern sweep-frequency generator delivers an output which is flat within ± 1.5 db, and provides a maximum attenuation ratio of 20000/1.

Fig. 2. The television calibrator comprises a high-quality vfo signal generator, dual crystal frequency standards, and a heterodyne frequency meter.

60-cycle square wave can be applied to the input terminals. If a good square wave is displayed on the screen, the 'scope is adequate from the standpoints of frequency response and phase shift.

The spot size must be quite small and astigmatism should be negligible so that a thin trace is obtained at any point on the screen. Such a trace permits a small marker to be observed satisfactorily; if a large marker is used, the receiver circuits will usually become overloaded, with resultant artificial flattening of the response curve.

The trace should be sufficiently brilliant so that details of the response curve can be easily seen when the spot is moving rapidly. This requirement does not mean, of course, that the trace should be set to a higher brilliance than is actually required, as the life of the cathode-ray tube may be shortened.

Because markers are usually specified not only in terms of frequency, but also in terms of position (per cent of maximum response voltage), it is convenient to use a 'scope which indicates the voltage at any point along the trace, and which has a VTVM-type range switch. With this operating convenience, it also becomes easy to read the stage gain by moving the sweep-generator connections from stage to stage.

Electronic Meters

Inaccuracies of voltage indication due to circuit loading led to the development of the vacuum-tube voltmeter. Such instruments were quickly recognized for their accuracy in measurement of tube electrode potentials and avc voltages.

Although a VTVM may have a very high input resistance, even on the low-voltage ranges, it still cannot be used to measure oscillator grid-bias voltages unless a special probe is provided because the presence of dc bias at the grid of an oscillator depends upon the existence of rf grid voltage. An instrument which has high-input resistance may also have high-input capacitance; this capacitance has a low-reactance at radio frequencies, and drains the rf energy away from the grid to ground. Accordingly, the oscillator goes dead when the technician attempts to measure the dc bias.

This difficulty is overcome in modern instruments such as the Volt-Ohmyst* by provision of an isolating resistor in the dc probe. This resistor provides an rf input impedance of approximately 1 megohm, and allows dc voltage to be measured without disturbance of the oscillator circuit.

Other advantages of the better electronic meters are: automatic protection against meter-movement burnout in case of accidental overload, and the ability to measure resistance values as high as 1000 megohms. The ohmmeter range can be used to detect high-resistance leaks in coupling capacitors.

An electronic meter serves as a signal tracer; also, it traces sync pulses through the sync separator and amplifier stages on the basis of grid-bias change. When used with a high-frequency probe such as a crystal or diode probe, the electronic meter serves also to measure or trace rf voltages.

The most modern electronic meters are provided with capacitance-measuring ranges which permit measurement of capacitance values from 5 uuf to 1000 uf. This facility is of considerable value to the technician, because many of the capacitors in television receivers have poorly identified values which must be measured before selecting a replacement.

Many modern meters are also provided with ac-voltage and dc-current ranges. High-voltage probes are available which enable the technician to measure dc voltages up to 50 kv.

Because an electronic meter is an easily portable instrument, it can be carried into the field. It provides a greater variety of accurate information about a television receiver than any other single test instrument.

Conclusion

Accurate, properly designed test instruments are the key to success in the television service shop. Experienced technicians know that their most valuable commodity is time, and that really good test equipment puts extra negotiable hours in every service day.

*Trade Mark Reg. U. S. Pat. Off.

OPTICS ALIGNER IS USEFUL TV TOOL

Service men who find themselves confronted with optical alignment of projection type television receivers often encounter difficulty with the adjust-and-try method. Naturally no one wants to put a fist into the neighborhood of several thousand volts.

For fast and accurate optical alignment, without turning on the set, use the RCA 202B1 Optics Aligner. With it, clear focus and exact centering can be set in a minimum of time and effort and with absolutely no danger.

Available at your RCA Distributor at a user price of $60.00, it's a must for every TV Technician servicing projection type receivers. Order yours today.

Fig. 3. Although primarily an AM service instrument, this reliable test oscillator may be used in combination with other instruments, as a marker generator in aligning TV sets.

Fig. 4. Particularly designed for rapid and accurate visual alignment, this oscilloscope is also useful in general oscillographic applications.

TELEVISION SERVICE

By John R. Meagher
Television Specialist, RCA Renewal Sales

PART IX
Blanking and Synchronizing Signals

It is now generally recognized that the majority of troubles in television receivers can be localized to a particular section of the receiver by correctly interpreting the symptoms displayed in the picture on the kinescope. It is not equally well known that the blanking and synchronizing signals, which normally are not visible on the kinescope, but which can easily be brought into view, provide a positive means for localizing sync troubles and for checking incorrect blanking.

To take full advantage of the information that can be obtained from visual inspection of the blanking and synchronizing signals, it is necessary to have a reasonably good knowledge of the relative signal amplitudes and time elements involved. We are, therefore, devoting this issue to a brief study of the blanking and synchronizing signals.

Technicians who need immediate assistance on blanking and sync troubles are advised to refer to Volume II of the RCA Pict-O-Guide. This volume contains practical information on blanking and sync troubles, interlacing, alignment, interference, test-pattern analysis, and numerous other subjects, profusely illustrated with photographs of actual troubles as they appear on the kinescope. In addition, Volume II contains more than 25,000 words of valuable and exclusive information on servicing problems. Volumes I and II of the RCA Pict-O-Guide provide a short cut that eliminates most of the long and rough road that technicians formerly had to travel in striving to become television experts. We earnestly recommend that the reader study Volumes I and II.

Specially-Prepared Chart

To simplify the study of blanking and synchronizing signals, we have prepared a special chart, Fig. 2, in which the signals are drawn to scale and arranged in line-under-line sequence for ease in comparing with the same signals as they appear on the kinescope. Television students and instructors will find that this chart, together with the accompanying photographs, is much easier to understand and is, therefore, more effective than the conventional "synchronizing waveform" charts that have been used up to now.

The chart shows the waveform of signal voltage for each line of vertical blanking and sync in each of the two interlaced fields, which are identified as "A" and "B" for convenient reference. Waveforms for all-white and all-black picture lines are shown at the top of the chart; the actual waveform on each picture line depends on the televised scene.

As a further aid to the reader, we are including several unusual photographs (Fig. 5, 6, 10) that were made with a relatively high shutter speed of 1/100 second in order to show some of the lines in a single field. In 1/100 second, the electron beam in the kinescope traces about 160 of the full 525 lines.

In studying the chart in Fig. 2, the following points should be noted:—

1. *The Total number of horizontal scanning lines is 525.* There are approximately 490 picture lines and 35 lines of vertical blanking and sync. Half of these lines are in field A and half in field B. There is a permissible plus and minus tolerance in the number of lines of vertical blanking, with a similar tolerance in the number of picture lines to maintain the total at 525.

2. *The relative amplitude* of the signal voltage along each line is indicated by the figures 1.00, 0.75, and 0, adjacent to the top lines, corresponding to signal voltages of 100%, 75%, and zero. These figures are shown only on the top lines, but they apply to all lines.

Signal amplitudes higher than approximately 70% produce black. Signal amplitudes of approximately 15% or less produce white. Amplitudes between 15% and 70% produce various shades ranging from light grey to dark grey respectively. With correct adjustment of contrast and brightness, when the signal from the transmitter is greater than approximately 70% of its maximum voltage, the electron beam in the kinescope and the spot of light on the kinescope screen are blanked out. The spot, therefore, is blanked out for the duration of the blanking and sync signals.

3. Horizontal and vertical fly back occur during the respective blanking intervals. The beam is deflected rapidly from right to left during a portion of the horizontal blanking time. The beam is moved rapidly from bottom to top during a portion of the vertical blanking time.

4. *The duration* of the horizontal scanning lines and of the blanking and sync signals can be determined from the microsecond scale shown at the bottom of each field:—

	Approx. Duration
Complete horizontal line	63 u sec.
Horizontal blanking	10 u sec.
Picture portion of horizontal line (63 minus 10)	53 u sec.
Horizontal sync	5 u sec.
Equalizing pulses and short horizontal sync pulses	2.5 u sec.

5. *The waveform of horizontal blanking and sync* for each of the approximately 490 picture lines is shown at the top of each field in Fig. 2, and in more detail in Fig. 7.

6. *Horizontal sync on lines 6 to 11* is obtained by the rise in signal voltage from 75% to 100% near the right-hand side of these lines. Note that the leading edge of each horizontal sync pulse starts at the same instant in each line.

7. *Vertical sync* in field B starts near the right-hand end of line 6. Vertical sync in field A starts near the center of line 7. This difference may be noted also by careful inspection of Fig. 5 and 6. The time interval (1/60 second) between the start of vertical sync is precisely the same in successive fields. It is this fact, combined with the odd number (525) of horizontal scanning lines, that provides interlacing of the two fields.

8. *Equalizing pulses* are provided near the center of lines 1 to 18 to compensate for a difference in sync voltage conditions at the start of vertical sync in the two fields. In field A, the start of vertical sync is one-half line from the preceding horizontal sync pulse. In field B, the start of vertical sync coincides with the horizontal sync pulse at the end of line 6. The equalizing pulses, by their effect in the vertical integrating circuit, serve to smooth out the difference in signal-voltage conditions at the start of alternate fields, thus permitting the vertical oscillator to be triggered at exactly uniform time intervals from field to field. Even a slight difference in the time interval from one field to the next would result in imperfect interlacing.

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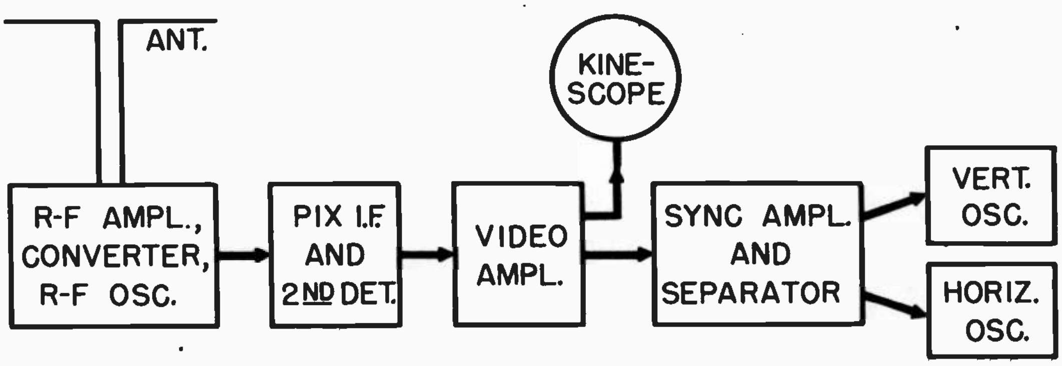

Fig. 1 Block diagram showing the path of sync signals from the antenna to the deflection oscillators. By learning to interpret the relative amplitude of sync signals as they appear on the kinescope, it is possible to tell—1. Whether faulty sync is due to trouble in stages to the left of the kinescope or to those to the right of it. (See Fig. 1). 2. Whether vertical blanking trouble is due to insufficient low-frequency response in the rf-if-video amplifier. 3. Whether horizontal blanking troubles are due to poor frequency response or to incorrect horizontal sync phasing.

RECEIVES AWARD

John R. Meagher, RCA Renewal Sales Television Expert, has been selected to receive RCA's Award of Merit. Mr. Meagher, author of the increasingly popular TV Service series now appearing in RCA Radio Service News, is universally recognized as one of the country's foremost authorities on modern electronic television servicing.

RCA's Award of Merit is made annually to a small group of RCA personnel in recognition of outstanding service.

RELATIVE SIGNAL AMPLITUDE

SYNC LEVEL = 100 %

BLANKING LEVEL = 75 %

BLACK LEVEL = 65-75 %

WHITE LEVEL = 0-15 %

(PERCENTAGES MAX. CARRIER VOLTAGE)

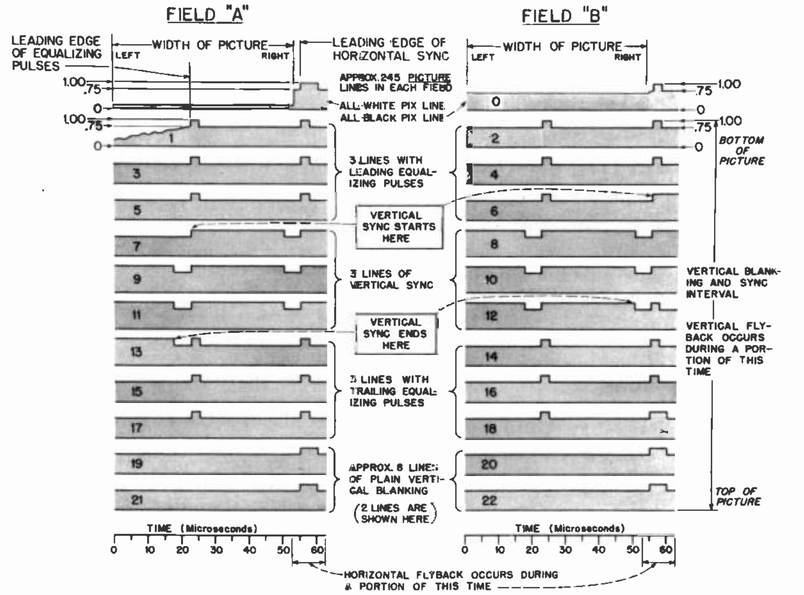

Fig. 2—Waveform of television blanking and sync signals, drawn to scale in voltage amplitude and in time, and arranged in line-under-line sequence for easy comparison with these signals as they appear on the kinescope. Photographs Fig. 3 to 9 show how the blanking and sync signals appear on the kinescope.

(*Continued from Page 4*)

Practical Pointers

Here are some important practical facts about blanking and sync signals:—

A. The vertical blanking signal can be brought into view on the kinescope by carefully adjusting the vertical hold control so that the picture moves slowly downward out of sync. The horizontal blanking signals can be brought into view by adjusting the horizontal sync phasing control (if there is such a control on the receiver) or, in some sets, by adjusting the horizontal hold control.

To observe and check the relative amplitude of blanking and sync signals, it is necessary to reduce the

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(Ask your Distributor for a copy of the RCA TV WALL CHART which contains these and many other diagrams and photographs on television trouble shooting.)

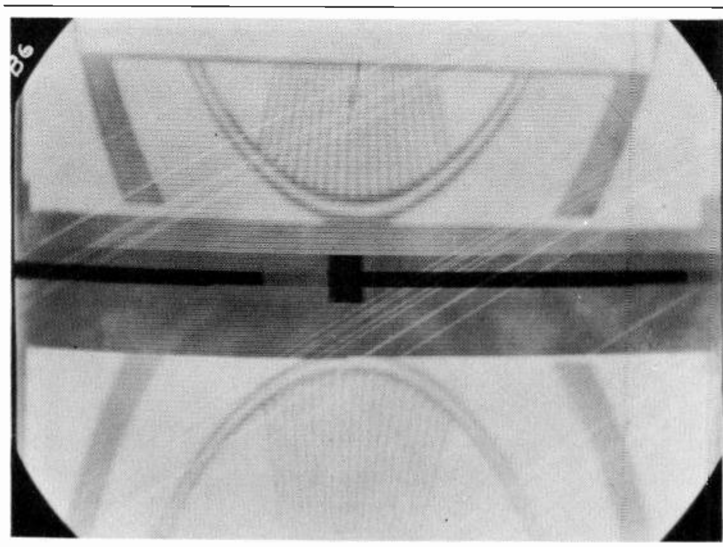

Fig. 3—Vertical blanking and sync, showing only a portion of the total width of these signals. The blanking should be slightly darker than the darkest picture elements, and sync should be definitely darker than the blanking. Refer to detailed views in Figs. 4, 5 and 6.

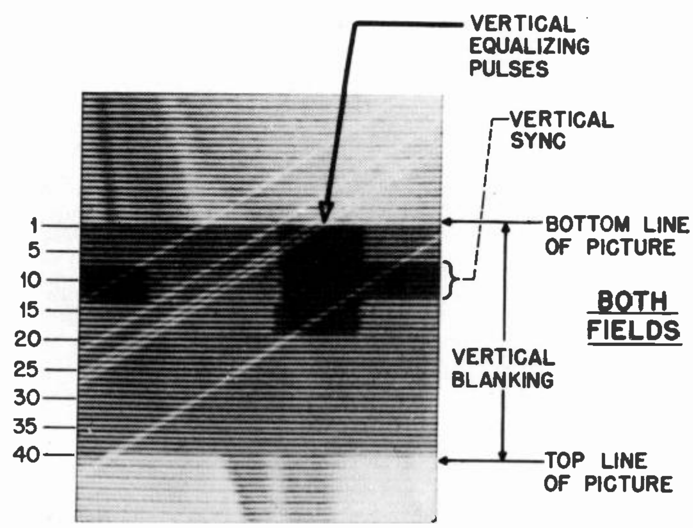

Fig. 4—Portion of vertical blanking and sync, including equalizing pulses. This photograph shows both fields, with a total of approximately 39 lines of vertical blanking. The lines are numbered to correspond with Fig. 2.

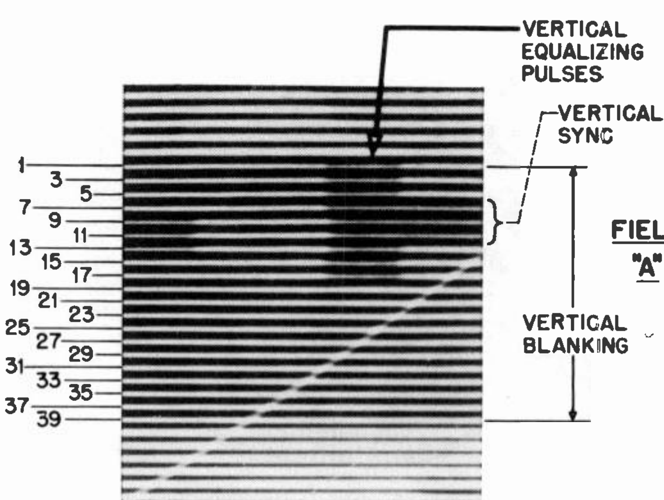

Fig. 5—Same as Fig. 4, but showing field A only. (The photographs in Figs. 5 and 6 were made with a camera shutter speed of 1/100 second.)

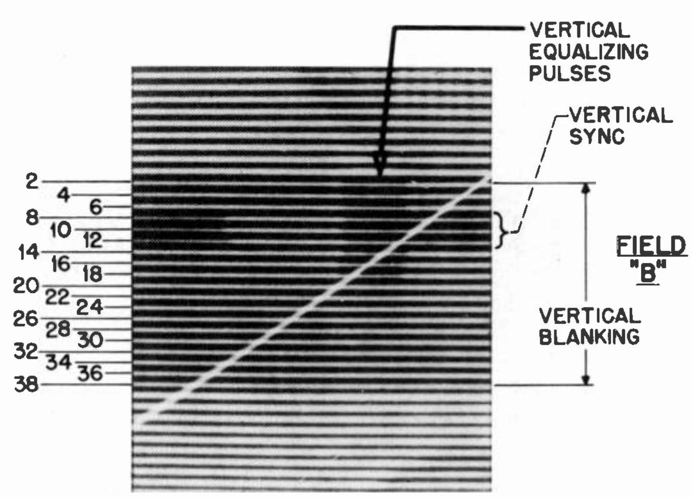

Fig. 6—Same as Fig. 4, but showing field B only.

TELEVISION SERVICE

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contrast (not enough to lose sync) and increase the brightness until the sync becomes just blank. Under this condition, in a normal receiver the blanking becomes grey, as shown in Fig. 3, 7, and 8.

When sync troubles are analyzed, it is sufficient for most purposes to view only the vertical blanking and sync signals which, as mentioned previously, can be brought into view easily and quickly by means of the vertical hold control.

B. *In a normal receiver, the blanking signals are slightly darker than the darkest picture signals, and the sync is decidedly darker than the blanking, as shown in Fig. 3.*

C. If blanking is as light as, or lighter than, the darkest picture signals, it will be difficult or impossible to blank out the vertical return lines at normal contrast settings. (The vertical return lines slope upward from left to right across the picture). Poor vertical blanking is usually caused by insufficient low-frequency response in the video amplifier. It may also be caused by poor low-frequency response in the rf-if amplifier due to the picture carrier being too low on the slope of the response curve.

D. The horizontal phase and hold controls should be adjusted to obtain approximately equal amounts of blanking signal at the left- and right-hand sides of the picture. The horizontal blanking on each side of the picture can be brought into view by temporarily shifting the centering control or the focusing coil. In order to see the blanking signals, it is necessary to adjust contrast and brightness so that sync becomes dark grey. Horizontal sync is to be considered as part of horizontal blanking when the picture is being adjusted for equal blanking on both sides.

If there is no blanking on one side of the picture, a portion of each horizontal return line will be unblanked. Picture signals on the unblanked portions will appear as faint and indefinite forms that are most evident in black areas of the picture. This trouble will not be present if there is some amount of horizontal blanking on each side of the picture.

E. The kinescope serves as a monitor to show whether poor sync action is due to trouble in circuits ahead of the kinescope or beyond it, as indicated in Fig. 1.

In case of sync trouble, the first step is to inspect the vertical sync and blanking signals as they appear on the kinescope. If the sync is normal, that is, if it is definitely darker than the blanking and the darkest picture elements, it may be assumed that the trouble is in the circuits between the video amplifier and the deflection oscillators. If the sync is not normal, that is, if it is not definitely darker than the blanking and picture signals, the trouble is in the rf, if, or video amplifier. The trouble in this case may be due to poor low-frequency response in the video amplifier, poor rf-if alignment, or undesired limiting action in the video amplifier.

PROOF AGAIN

THAT RCA TUBES CAN TAKE IT

51,952 hours service—and still in good operating condition! That's tube performance that's hard to beat.

Two RCA tubes—an RCA-843 and an RCA-802—recently reached this ripe old age at Radio Station KWOC, Poplar Bluff, Mo., according to a letter received from Don M. Lidenton, Chief Engineer.

Mr. Lidenton reports that each tube logged 3,056 days of continuous service—and his 250-watt Mutual outlet is on the air 17 hours a day. The tubes were retired after compiling this service, but both are still in good operating condition.

As an after-hour sideline, Mr. Lidenton handles radio and television service work for the Field McCarthy Co., in Poplar Bluff. And, you guessed it, every replacement tube he uses is branded RCA!

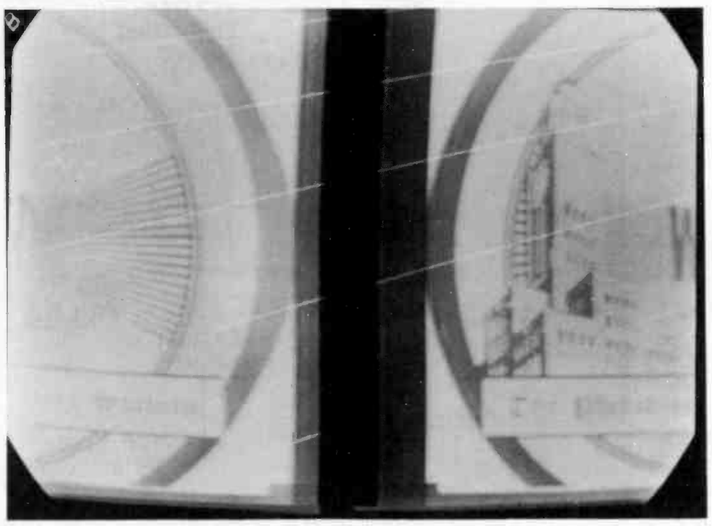

Fig. 7—Photograph of horizontal blanking and sync signals.

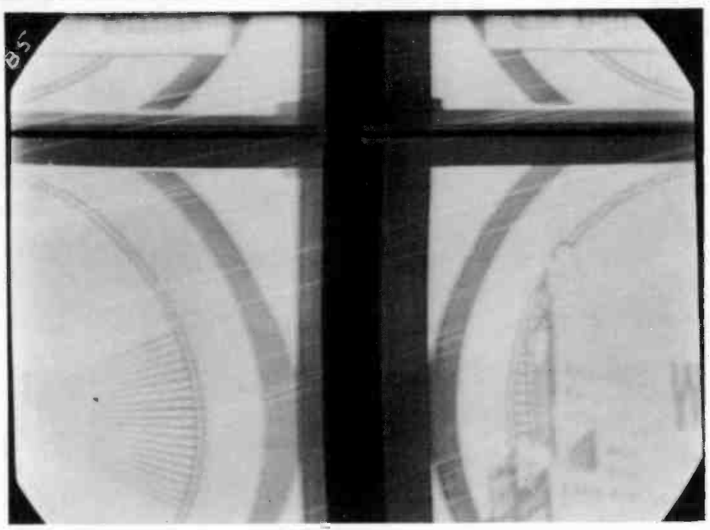

Fig. 8—Horizontal and vertical blanking and sync signals. Refer to detailed view in Fig. 9.

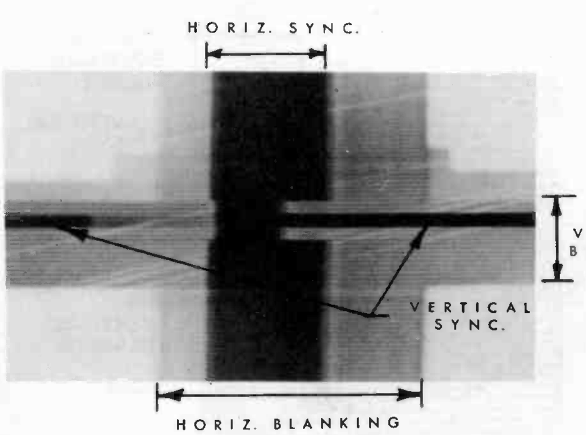

Fig. 9—Enlarged section of Fig. 8, showing a portion of the vertical and horizontal blanking and sync signals. The short-duration horizontal sync signals are shown in lines 0 to 5 and 12 to 17 in Fig. 2.

Fig. 10—This photograph was made with a camera shutter speed of 1/100 second to show how the horizontal wedge of a test pattern appears when formed by only one field: Every other horizontal scanning line is missing. The effect resembles, but is not the same as, an out-of-interlace condition.

TEST LEADS, PROBES, AND MISCELLANEOUS ACCESSORIES FOR RCA TEST EQUIPMENT

The following list of test leads, probes, and miscellaneous accessories for RCA Test Equipment, along with their correct parts numbers, has been especially prepared for Radio Service News readers. It represents the very latest information, including several recent revisions, and supersedes any previous listing.

WP-23A REGULATED POWER SUPPLY
- Power Cord (Including Plugs)....... 53678

WO-27A DC OSCILLOSCOPE
- Power Cord (Including Plugs)....... 52556
- Binding Post....... 46907
- Binding Post....... 30277

WO-55A OSCILLOSCOPE
- Power Cord (Including Plugs)....... 53678
- Binding Post Pin-Plug....... 47062

WO-58A OSCILLOSCOPE
- Probe cable (4′ long including chassis connector and screw base)....... 58495
- Direct probe attachment....... 58496
- Attenuating probe attachment....... 58497
- Crystal rect. probe attachment....... 58498
- Clip attachment....... 57311
- Power Cord (Including Plug)....... 53678
- Binding Post Pin-Plug....... 47062

WO-60C OSCILLOSCOPE
- Power Cord (Including Plug)....... 53678
- Binding Post Pin-Plug....... 47062

715-B OSCILLOSCOPE
- Attenuating Cable....... 48447
- Direct Cable....... 48448
- Graph Screen....... 48755
- Binding Post....... 47515
- Banana Plug Jack....... 48430
- Banana Plug....... 18728

WR-39A TELEVISION CALIBRATOR
- RF Output Cable (Including Coax Connector and two clips)....... 55279
- Power Cord (Including Plugs)....... 53678
- 0.25 Mc Freq. Determining Crystal Y1....... 56909
- 2.5 Mc Freq. Determining Crystal Y2 56910
- Binding Post Pin-Plug (Black)....... 47062

WR-53A FM SWEEP GENERATOR
- Connector Switch....... 54685
- Output Cable (Complete)....... 54662
- Power Cord (Including Plugs)....... 53678

WR-59A TV SWEEP GENERATOR
- IF/VF Output Cable (Including Coax Connector and 2 Clips)....... 55279
- RF Output Cable (Including Twinax Connector and 3 Clips)....... 55280
- Power Cord (Including Plugs)....... 53678
- Binding Post Pin-Plug (Black)....... 47062

WR-67A TEST OSCILLATOR
- RF Output Cable....... 52524
- Power Cord (Including Plug)....... 53678
- Ground Lead (For 52524)....... 52525

WV-95A MASTER VOLTOHMYST
- DC Cable (Blue) (With Probe and Pin-Plug)....... 48994
- Ohms-MA Cable (red) (With Probe and Pin-Plug)....... 51960
- AC Cable (red) (With Probe and 4 Prong Plugs)....... 57222
- Clip for Probes....... 35267
- Power Cord (Including Plugs)....... 53678
- Diode Probe Complete....... 52810
- Diode Probe Multiplier Complete....... 52817
- Binding Post Pin-Plug (Red)....... 47089
- Binding Post Pin-Plug (Black)....... 47062

WG-260 (MI-18760) TEST POINT ADAPTERS
- 8 pin Octal....... 51354
- 8 pin Lockin....... 51355
- 6 pin Small....... 51356
- 7 pin Small....... 51357
- 4 pin Small....... 51358
- 5 pin Small....... 51359
- 7 pin Large....... 51360

AUDIO OSCILLATOR WA-54A
- Power Cord (Including Plugs)....... 53678
- Binding Post Pin-Plug (Red)....... 47089
- Binding Post Pin-Plug (Black)....... 47062

AUDIO VOLTMETER WV-73A
- Input Cable with plug and clips....... 53676
- Power Cord (Including Plugs)....... 53678

VOLTOHMYST (BAT. OP.) WV-65A
- DC cable (Blue) (with probe and pin-plug)....... 48994
- Ohms-Ma cable (Red) (with probe and pin-plug)....... 51960
- Common lead (Black) (with probe and pin-plug)....... 48996

OSCILLOSCOPE WO-79A
- Input cable (low capacity)....... 53842
- Input cable (direct)....... 53843
- Power Cord (Including Plugs)....... 52556

VOLTOHMYST 195, 195A
- DC cable (Blue) (with probe and pin-plug)....... 48994
- AC/Ohms cable (Red) (with probe)....... 48995
- Ground lead (Black) (with probe and pin-plug)....... 48996

ADVANCED VOLTOHMYST WV-75A
- DC cable (Blue) (with probe and pin-plug)....... 48994
- Ohms-Ma cable (Red) (with probe and ping-plug)....... 51960
- Ground lead (Black) (with clip and pin-plug)....... 48996
- Diode probe complete....... 52810
- Clip for probes....... 35267
- Diode probe multiplier complete....... 52817
- Binding Post pin-plug (Red)....... 47089
- Binding Post pin-plug (Black)....... 47062
- Ground lead with tip and pin-plug (Black)....... 52809
- Diode probe clip attachment....... 52821
- Alligator clip for ground lead....... 35262

JUNIOR VOLTOHMYST 165, 165A
- DC cable (Blue) (with probe)....... 43915
- AC/Ohms cable (Red) (with probe)....... 43913
- Common lead (Black) (with clip)....... 43914
- Clip for probes....... 35267
- Probe for AC-Ohms cable....... 46533

OSCILLOSCOPE 158
- Input cable (comp.)....... 33873
- Binding Post pin-plug....... 47062
- Locking pin-plug....... 47089

SIGNALYST 161
- Output cable (Black), complete....... 35431
- RF output adapter....... 35434
- IF output adapter....... 35696

CHANALYST 162, 162A
- AF test cable assembly (Green)....... 35263
- Oscillator test cable assembly (Brown) 35266
- RF/IF test cable assembly (Red)....... 35264
- Voltmeter test cable assembly (Blue) 35265
- Clip for probes....... 35267
- Flex. (probe) connector....... 35710

CHANALYST 162B
- AF test cable assembly (Green)....... 35263
- Interchannel cable assembly (Black). 46685
- Oscillator test cable assembly (Brown) 35266
- RF-IF test cable assembly (Red)....... 35264
- Voltmeter test cable assembly (Blue). 35265
- Clip for probes....... 35267
- Flex. (probe) connector....... 35710

CHANALYST 162C
- AF test cable assembly (Green)....... 35263
- Ground lead (Black)....... 47080
- Interchannel cable (Black)....... 46685
- Oscillator test cable assembly (Brown) 35266
- RF/IF test cable assembly (Red)....... 35264
- Voltmeter test cable assembly (Blue). 35265
- Clip for probes....... 35267
- Binding Post pin-plug (Red)....... 47089
- Binding Post pin-plug (Black)....... 47062

AUDIO CHANALYST 170
- AF-In. and Voltmeter cable (Incl. probe and connector)....... 44842
- Ground cable (Black) (Incl. clip and pin-plug)....... 44844
- Output cable (Incl. probe and conn.). 44845
- Clip for probes....... 35267
- Osc. Out. cable (Incl. clips and connector)....... 44843
- Power cable (Incl. plug)....... 52556

AUDIO CHANALYST 170A
- (Interchannel) shielded cable assembly (Black)....... 49320
- Power Cord (Including Plugs)....... 52556
- Binding Post pin-plug (Red)....... 47089
- Binding Post pin-plug (Black)....... 47062
- AF Test cable assembly (Green)....... 35263
- Voltmeter test cable assembly (Blue). 35265
- Test cable (Black)....... 49321
- Test cable (Red)....... 49322

DYNAMIC DEMONSTRATOR 182-A
- Pair of test cables....... 70355
- Cable clip....... 70354

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From

RCA TUBE DEPARTMENT
HARRISON, N. J.

TO:

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RCA Radio Service News is published by the RCA Tube Department in the interest of radio servicemen and dealers everywhere. It is distributed free of charge to members of the radio-service fraternity through the courtesy of RCA and its tube, battery, test equipment and parts distributors.

T. A. 'PAT' PATTERSON --- Editor

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