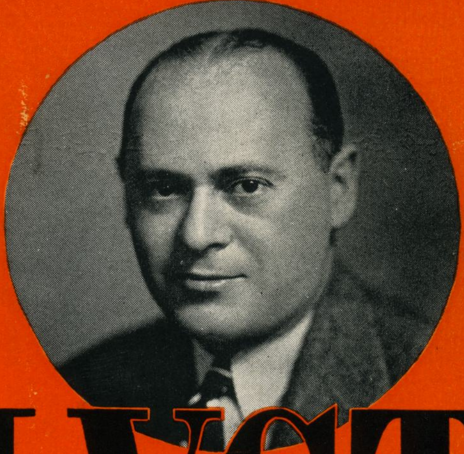


THE RIDER CHANALYST

RCA

THE GREATEST ADVANCE EVER MADE IN THE HISTORY OF RADIO SERVICE INSTRUMENTS

WHY YOU NEED THE CHANALYST

- It allows the application of the same systematic method of analysis to all receivers, irrespective of age or type.
- You do not have to take anything for granted, but can test every point under suspicion without interfering with the operation of the receiver or being limited by the circuit design.
- It greatly reduces the time required to analyze trouble in any receiver, thereby cutting the cost per job. You can determine conditions at the tube elements while the signal is present without interfering with the operation. This affords *positive identification with the greatest speed.*
- You can check the presence, absence, or character of the signal — the operating and control voltages at any point in the receiver, particularly in places difficult to test heretofore.
- You can check the operation of various types of filter circuits at radio, intermediate, or audio frequencies, thus establishing sources of hum and interaction between circuits.
- You have positive identification of oscillatory conditions.
- You can obtain constant monitoring of the various circuits in the receiver.
- You can locate the source of noise being developed within the receiver.
- You can locate "hard-to-find" troubles in a fraction of the time required by any other method.
- It enables very rapid inspection and estimating of repair costs.
- IT SOLVES THE INTERMITTENT PROBLEM.
- The obsolescence factor is kept at a minimum. The fundamental design of the entire system, being independent of circuit design, tube types, etc., assures many years of successful operation.

THE THEORY BEHIND THE CHANALYST

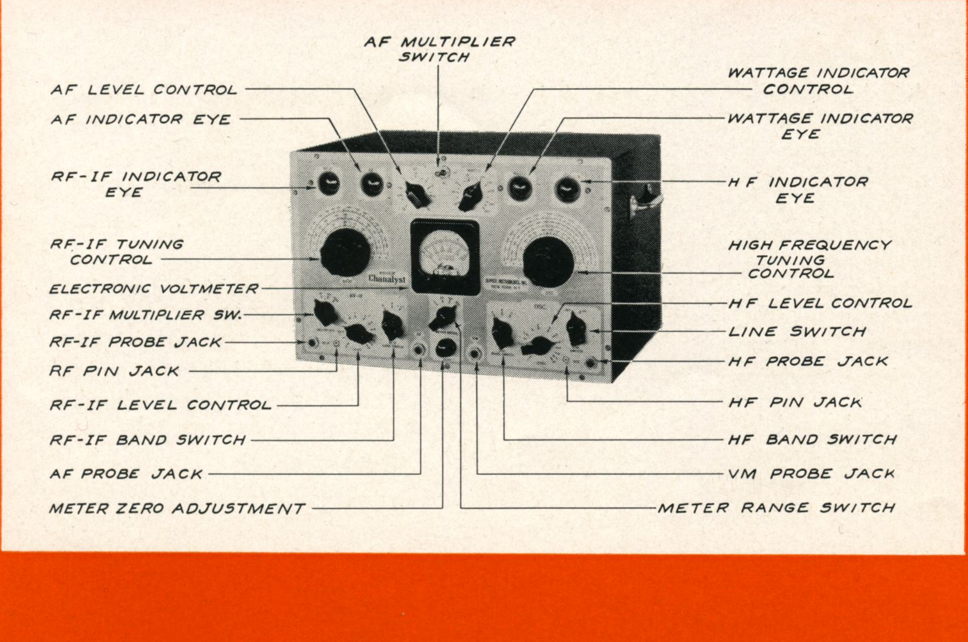
The Rider Chanalyst is possessed of tremendous capabilities, but the theory behind the instrument is nevertheless easy to understand. It is based upon one thing that every receiver, old—new—yet to come—has in common, and that is the signal itself. . . . No matter how you view the situation, you will find that the signal is the one fundamental factor—the common denominator of every receiver, be it T-R-F or SUPERHETERODYNE.

When you as a serviceman are called to a customer's home you are wanted because the receiver is not functioning as it should and the signal has been affected in some way. . . . Perhaps the signal is distorted—perhaps hum has been superimposed upon the signal because of a defect in the receiver—perhaps the sensitivity is low—a loss of control—or the receiver is dead and there is no signal. . . . No matter what the trouble, you can readily see that the signal alone, is the all-important factor. . . . The customer desires that the receiver be repaired and the signal be restored to its correct state. . . . That is your job as the serviceman.

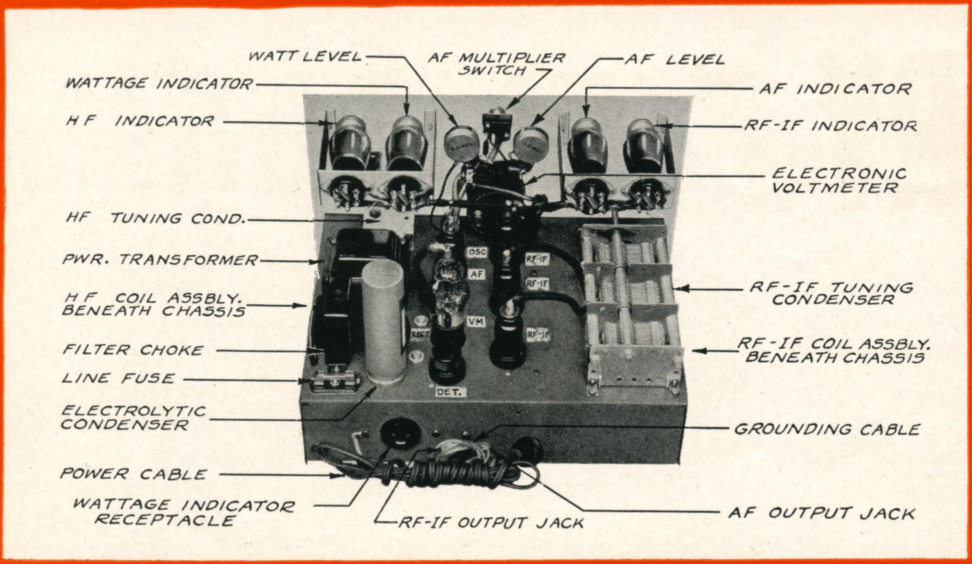
Since the signal is the all-important factor . . . since the signal is the common denominator . . . since the normal passage or control of the signal through the receiver is impaired by the defect—it is logical to establish the signal as a fundamental base upon which testing can be predicated. If we can establish how far a normal signal passes through the receiver—the place or point where it no longer is normal in level, becomes distorted or has been changed in character—that is the point at which trouble exists or is related to the trouble. . . . This reasoning is simple, logical, and practical and represents the basis of the systematic method of testing made possible by the Chanalyst.

Associated with the tracing of the signal are certain voltage tests. These are the control voltages developed by the signal itself and related to the control of the signal. Thus a part of the theory underlying the application of the Chanalyst is a means of measuring the control voltages at the points where the signal exists, without interfering with the operation of the receiver. Of course the voltmeter measuring system must also embrace all of the operating voltages and must be applicable irrespective of the complex nature of the circuit.

What has been stated represents the theory behind the Chanalyst—the service instrument which has made the ideal method of trouble analysis or localization a practical reality.

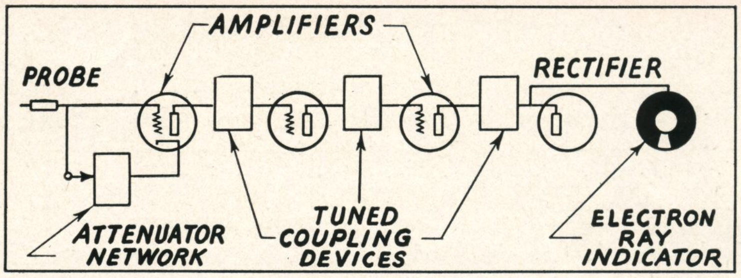


The various controls of the Chanalyst are grouped for greatest ease of operation, as may be seen in the illustration at left, the channel and function of each being clearly designated. The panel is of heavy chromium-plated brass and the calibrations are deeply etched to assure maximum visibility. The electron ray indicators are recessed behind the panel enabling easy observation. The steel cabinet has a dark gray crackle finish and the handles are chromium plated.



The various components of the Chanalyst are identified in the rear view of the chassis shown at left. The four electron ray indicators are supported perpendicularly to the front panel by two steel brackets, finished in the same dark gray crackle as the cabinet. Openings in the rear of the cabinet give access to the two jacks on the back wall of the chassis, which also is finished in the same gray crackle. The coil assemblies of the rf-if and oscillator channels are mounted on the under-side of the chassis in specially designed copper shields. All in all—a very handsome unit.

INSIDE THE CHANALYST



The RF-IF Channel

Five tubes are employed in the RF-IF channel; three as high-gain tuned amplifiers, the fourth as a diode rectifier, and the fifth as an electron-ray indicator. The amplifier covers three frequency bands: 600 kc to 1,700 kc; 240 kc to 630 kc, and 95 kc to 260 kc, the amplification being substantially flat over each band. The input circuit is calibrated, thereby making the channel suitable for gain measurements. The sensitivity of the amplifier at the control grid of the first stage for full indication is approximately 60 microvolts and a signal of less than 6 microvolts will show an indication. The pickup for the channel is made through a shielded cable, terminating in a capacitance of less than 1 micromicrofarad. Attenuation of the input circuit over a ratio of 10,000 to 1 is provided by a continuously variable resistive attenuator and a four-step capacitive attenuator.

A three-step switch selects the frequency band. A jack in the indicator circuit permits the output of the amplifier to be fed to headphones or an oscillograph so that the signal can be heard or its wave form examined. The rectifier circuit is so designed that the output depends upon the carrier voltage and not the modulation component; therefore the indication does not depend on the percentage of modulation.

What It Will Do

Starting with the RF-IF channel, we shall list a number of tests embraced by this channel, in the R-F, mixer and I-F portions of the receiver and those places where R-F and I-F signals may exist, although they are not supposed to be present. It might also be well to mention that the tests stated as being possible with the RF-IF channel do not cover all of the tests possible in the r-f, i-f and mixer circuits of a receiver. For example the Electronic Voltmeter is also suitable for use in the aforementioned three portions of a radio receiver to check conditions where they relate to operating and control voltages.

Still another point to be remembered is that while we may speak of a single r-f stage and the mixer, that which is said concerning the r-f stage in a superheterodyne applies equally well to all the r-f stages in a tuned-radio-frequency receiver and reference to the mixer circuit in the superheterodyne applies to the normal detector in the t-r-f receiver.

The following tests are embraced by the RF-IF channel.

Identify an oscillating r-f, mixer or i-f stage by checking the signal being generated within the tube.

Trace feedback into the r-f stage of the receiver.

Check for signal leakage across r-f chokes.

Check antenna pickup over the broadcast band. (The response of the instrument is flat over the entire broadcast band.)

Use the RF-IF channel as a comparison receiver substantially free from distortion.

Check gain or loss in r-f or i-f tubes.

Check gain or loss in r-f or i-f transformers.

Check signal voltage across entire or part of primary or secondary of r-f transformer.

Check for distortion in r-f, mixer, and i-f circuits by listening to the rectified signal taken out at either control grid or plate of tubes.

Check for noise in r-f, mixer, or i-f portion of receiver by proceeding from primary to secondary windings and from grid to plate of tubes, while listening to the signal. This identifies noisy volume and sensitivity controls and tubes.

Check noise pickup by antenna by using instrument as a comparison receiver.

Check signal at antenna coil.

Check signal at tube elements. (Open or shorted tuning condensers and coils.)

Check operation of r-f link circuits in triple-tuned transformers.

Check operation of antenna compensating condensers.

Check operation of oscillator control tube in AFC circuits.

Check presence of oscillator signal at mixer and oscillator coupling unit between separate oscillator and mixer tubes.

Check operation of oscillator circuit over r-f band in modern receivers with very low oscillator output. (Separate oscillator channel also serves to check oscillator circuits.)

Approximate frequency setting and check drift in oscillator circuits over the rf-if band.

Check for open rf-if by-pass condensers without removing the unit from the receiver chassis.

Check open coupling condensers in rf-if transformers.

Check for presence of more than one signal in r-f system.

Check for leakage of r-f signals into circuits where they do not belong.

Feed signal from r-f section of receiver to oscillograph for visual tests.

Check the frequency of the i-f signal being generated in a mixer tube when the receiver oscillator frequency is incorrect.

Determine the intermediate frequency when it is unknown.

Identify if the i-f system is out of alignment.

Check for signal leakage across i-f filter resistors and by-pass circuits.

Use instrument as a comparison i-f channel.

Check and adjust i-f wave-traps with accuracy.

Check for leakage of i-f signal into r-f or a-f.

Check operation of each winding of triple-tuned transformers.

Check i-f signal being fed to tuning indicator circuit, thereby establishing condition of coupling elements and rectifiers when used.

Check i-f signal being fed to AVC tube diodes or control grid.

Check discriminator transformer in AFC circuits.

Check by-pass condensers and filter circuits feeding tuning indicators. (Flutter in tuning indicators.)

Check signal level at i-f tube grids.

Check for leakage of i-f signal into AVC circuits and operation of AVC by-pass condensers. (Open condensers and poor grounds.)

Check operation of fidelity controls in i-f circuits.

Feed i-f signal to oscillograph for visual observation.

Check distortion in second detector or demodulator.

Check leakage of i-f signal into a-f circuit. (Hash and overloading.)

Strange as it may seem, the testing of open by-pass condensers without removing them from the receiver as mentioned in the list is not difficult. Neither is the test for poor ground connections a difficult one to make.

The Oscillator Channel

The oscillator channel employs three tubes; a tuned amplifier, a diode rectifier and the electron-ray indicator. Coverage of oscillator operation extends as high as 70 megacycles. The tuned amplifier used in the channel operates over three frequency bands: 600 kc to 1,700 kc; 1,650 kc to 4,900 kc, and from 4,800 kc to 15,000 kc. Pickup to the circuit is through a shielded cable which terminates in a capacitance of less than 1 micromicrofarad. The input circuit is equipped with a gain control.

In order to provide for maximum sensitivity when working with modern superheterodyne receivers with comparatively low oscillator output voltage, high gain is obtained in the oscillator channel by using a type 1852 tube as the amplifier.

It was mentioned that the oscillator channel operates with a pickup of less than 1.0 micromicrofarad. This is used when checking oscillator operation over the 600 kc to 15,000 kc range. When checking for operation of oscillator systems without regard to frequency of the output, the electronic voltmeter channel is used.

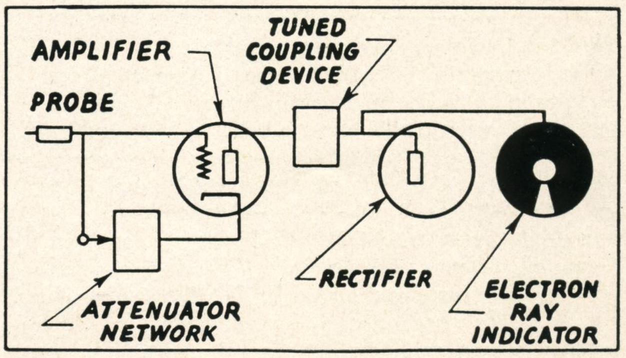
The oscillator channel supplements the RF-IF channel for checking of oscillators and is used when the RF-IF channel is in use, as in the case of intermittents or when it is desired to check oscillator circuits operating over the range of from 600 kc to 15,000 kc.

Check level of oscillator output.

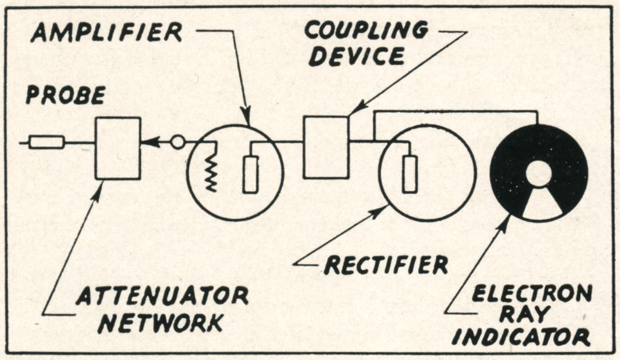
Approximate frequency of oscillator output.

Check operation of oscillator.

Check oscillator drift.



The Audio Channel



The a-f channel employs three tubes: an amplifier, a diode rectifier and an electron-ray indicator. It is resistance-capacity coupled and flat over a frequency range of 50 to 50,000 cycles. The sensitivity of the amplifier is .1 volt for full indication and is operative over an input voltage range from .1 to 1,000 volts. A jack is provided in the output circuit of the amplifier so that the signal output can be fed to headphones or to an oscillograph for aural or visual observation. The continuously variable attenuator and a switch-controlled, single-step attenuator provides attenuation over a ratio of about 10,000 to 1.

The design of the channel is such that any pair of high-impedance phones may be plugged into the a-f channel jack. When a plug is inserted into this jack, the electron ray visual indicator is disconnected.

Some of the tests that can be made with this channel are as follows:

Check hum and locate point of origin.

Check presence or absence of a-f voltages at any point in the audio amplifier.

Check distortion by picking off signal at any point and listening to signal through headphones or feeding it to oscillograph.

Check gain or loss in amplifier tubes.

Check gain or loss in coupling units.

Check level of signal at control grid or plate of amplifier tubes.

Check signal output of phase inverter tubes.

Check balanced input to pushpull stage. Signal voltage across each half.

Check balanced output from pushpull stage. Signal voltage across each half.

Use channel as output indicator.

Use channel as separate voltage amplifier.

Identify oscillating audio stage.

Check for noise in variable controls.

Check for noise in windings.

Check degenerative signal feedback.

Check open or shorted by-pass condensers in audio circuits.

Check poor ground connections.

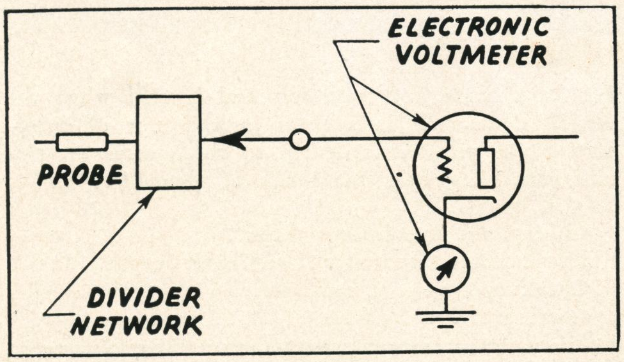
Check operation of audio filters.

Check operation of tone control.

Check operation of frequency compensation circuits.

The audio channel employs a single probe and this probe is placed in contact with the various points in the audio amplifier system. Of course all the tests outlined are not made as regular procedure. Those which relate to the passage of the signal such as level and character are the routine operations. The rest are applied as the occasion demands.

The Electronic Voltmeter



This voltmeter employs a tube and a meter-type indicator. As a result of design, it has a number of special features not found in other instruments. The meter has a center zero and indicates both positive and negative voltages with respect to ground. The range of voltages covered by the meter is as follows:—5 to 0 to +5; —25 to 0 to +25; —100 to 0 to +100; and —500 to 0 to +500. Each range is selected by means of a four-position switch. The input resistance of the instrument on all scales is 10,000,000 ohms, which means that on the low-voltage scale, the resistance is equal to 2,000,000 ohms per volt. The overall accuracy of the voltmeter is approximately 5 percent. of the full-scale deflection. A single probe lead provides contact between the voltmeter and the point being checked. All d-c operating and control voltages may be measured with the instrument, thus making it possible to measure r-f, i-f, a-f, and oscillator voltages directly at the grid and plate without interfering with the operation of the receiver. The voltmeter is thoroughly protected against damage from overload.

We made the statement earlier in this booklet that the Electronic Voltmeter will measure all d-c voltages encountered in the radio receiver. While the statement is all embracing, it still does not really present a proper picture of just what tests can be made with this instrument; hence the following:

Measure bias voltage applied to control grid of AFC control tube during operation.

Use for alignment of discriminator transformer in AFC systems without breaking into any circuits.

Check characteristics and level of discriminator output voltage.

Measure AVC bias voltages direct at the control grid of controlled tubes with signal present in the circuit.

Check control characteristic of AVC circuit.

Measure rectified voltage in diode circuits.

Check for leakage in by-pass condensers along AVC bus.

Measure voltages in tuning flasher circuits with signal applied.

Measure all cathode voltages.

Measure leakage in coupling or blocking condensers.

Measure rectified voltage in triode and tetrode type AVC circuits.

Utilize as output meter for alignment purposes.

Utilize as indicator for signal input comparison.

Measure d-c power supply voltages up to 500 volts of either negative or positive polarity with respect to ground.

Measure bias cell voltages accurately. (*On 5-volt range resistance of meter is* 2,000,000 *ohms per volt.*)

Measure rectified voltage fed to tuning meter tubes.

Check overloading in audio circuits by measuring d-c voltage developed in grid circuit as the result of grid current.

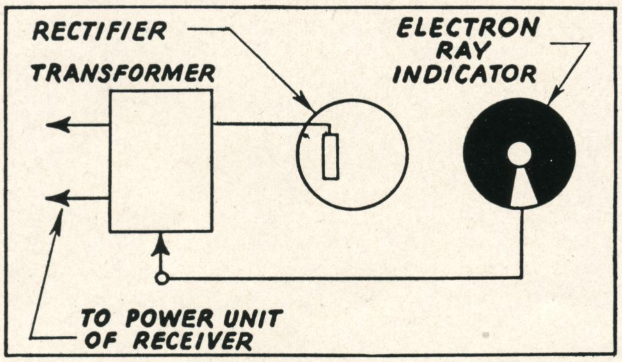
Measure distribution of AVC voltage along AVC bus.

Check operation of oscillator tubes by measuring rectified voltage developed across oscillator grid leak and ground. (*Voltmeter probe is placed upon control grid of oscillator tube.*)

Measure d-c operating potentials upon all elements of vacuum tubes without interfering with receiver operation.

In connection with the above mentioned measurements, one probe is used in conjunction with a common ground. Change in polarity does not require switching of voltmeter leads. Also the ground lead may be connected to a point other than ground when the measurement so requires. The application of the Electronic Voltmeter enables the measurements stated without loading the circuits or in any way interfering with the normal operation of the receiver. The input resistance of the Electronic Voltmeter on all ranges is 10,000,000 ohms.

The Wattage Indicator



The wattage indicator employs two tubes: a diode rectifier and an electron-ray indicator. It is calibrated to indicate the power consumption of the receiver under test and covers a range from 25 to 250 watts. This unit is automatically connected into the circuit when the receiver is plugged into the receptacle provided for that purpose. To obtain the amount of power consumed, the watt level pointer is turned until the shadow in the watt indicator is a minimum, the eye is just closed. The wattage then is read directly off the scale engraved on the panel.

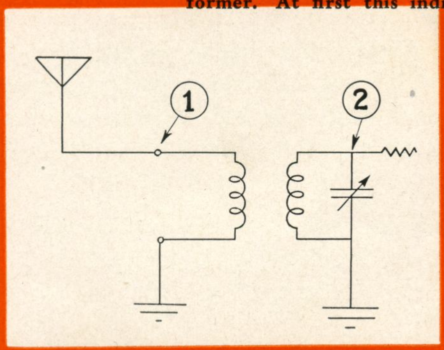
PRACTICAL APPLICATION

AS TOLD BY A CHANALYST OWNER

1

A 1939 BUICK CAR RADIO GAVE VERY WEAK AND DISTORTED RECEPTION.

"A preliminary test showed all plate and screen voltages normal. The Chanalyst was applied at the antenna circuit on a 700 kc signal. The RF-IF channel showed presence of a signal, with normal gain between stages, up to the secondary circuit of the 2nd IF transformer. With a normal signal at the plate of the IF tube indicating that the primary circuit was functioning normally, the probe was moved to the diode plate lead of the 6R7G second detector. (These points are indicated as 1 and 2 respectively on the diagram shown—Ed. note.) At this point (2) the signal disappeared, indicating trouble in the IF transformer. At first this indication was confusing, because during the signal tracing check the presence of AVC was noted on all tubes so controlled, also an ohmmeter check showed continuity of the diode secondary winding. It was reasonable to assume that no AVC voltage could be developed if no signal voltage was developed in the diode circuit. However, upon closer inspection of the wiring, it was noted that signal voltage for AVC operation was taken off at the primary winding of the IF coil (point 3 on diagram) and rectified by a separate plate of the 6R7G. The transformer was replaced and the set operated OK."

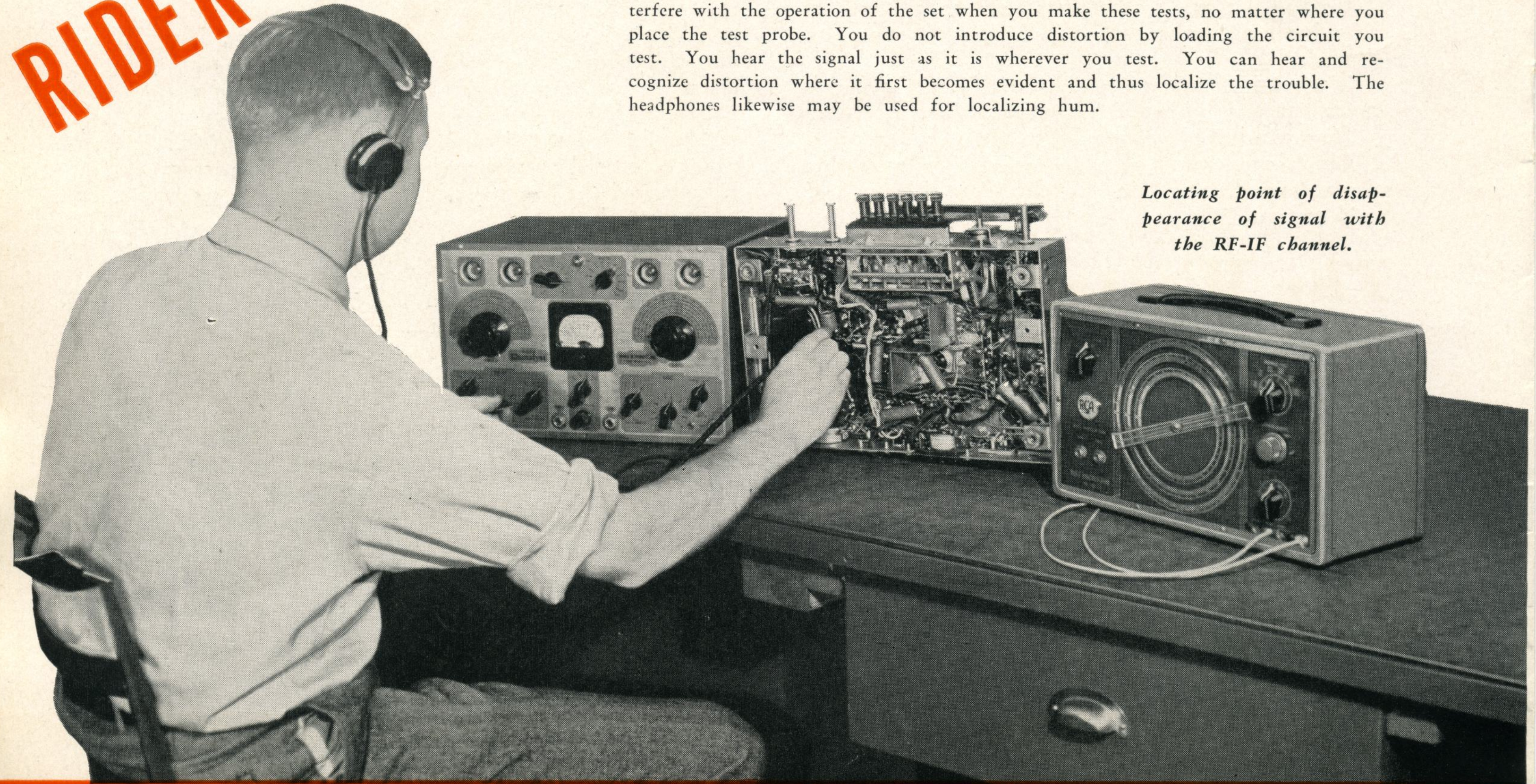


"This case is positive proof that the Chanalyst can be relied upon where all other tests fail. **A partial short of a diode winding (as was the case) is difficult to locate, and to make the continuity test more confusing a resistor of high value was connected in series with the coil and enclosed within the can. In spite of the fact that no schematic was available at the time, a complete check was made and the defective coil spotted in less than 15 minutes, whereas with other methods, hours would probably have been required with the confusing indication encountered."**

STANLEY S. STEVENS, 196 Iron Street, Bloomsburg, Pa.

WITH THE RIDER CHANALYST ...YOU CAN **HEAR** THE SIGNAL·

If you want to listen to the signal in ANY part of the radio receiver, you can do so with the Rider Chanalyst. Simply plug in a pair of high-impedance headphones and you will be able to HEAR the signal picked up by the Chanalyst probes. By tuning in a local broadcast station and following its signal through the receiver you can locate quickly the precise stage where distortion first appears. You do not interfere with the operation of the set when you make these tests, no matter where you place the test probe. You do not introduce distortion by loading the circuit you test. You hear the signal just as it is wherever you test. You can hear and recognize distortion where it first becomes evident and thus localize the trouble. The headphones likewise may be used for localizing hum.



Locating point of disappearance of signal with the RF-IF channel.

PRACTICAL APPLICATION

2 AS TOLD BY A CHANALYST OWNER

1936 AC RADIO. Complaint, intermittent sputtering.

"An intermittent sputtering condition of this kind is very difficult to locate and many excellent servicemen would spend hours in finding the source of the disturbance. With the aid of the Chanalyst, the source of this noise was quickly located in the plate winding of the second IF transformer. With the RF-IF probe of the plate terminal of the socket, each time the sputter occurred it caused a very noticeable movement on the Chanalyst eye.

"A check of this transformer by usual methods indicated continuity, which would have left the average serviceman at sea as to the cause of the sputter."

GEORGE B. JONES,
Jones Radio Company, Pottsville, Pa.

...YOU CAN SEE THE SIGNAL... ANYWHERE IN THE SET

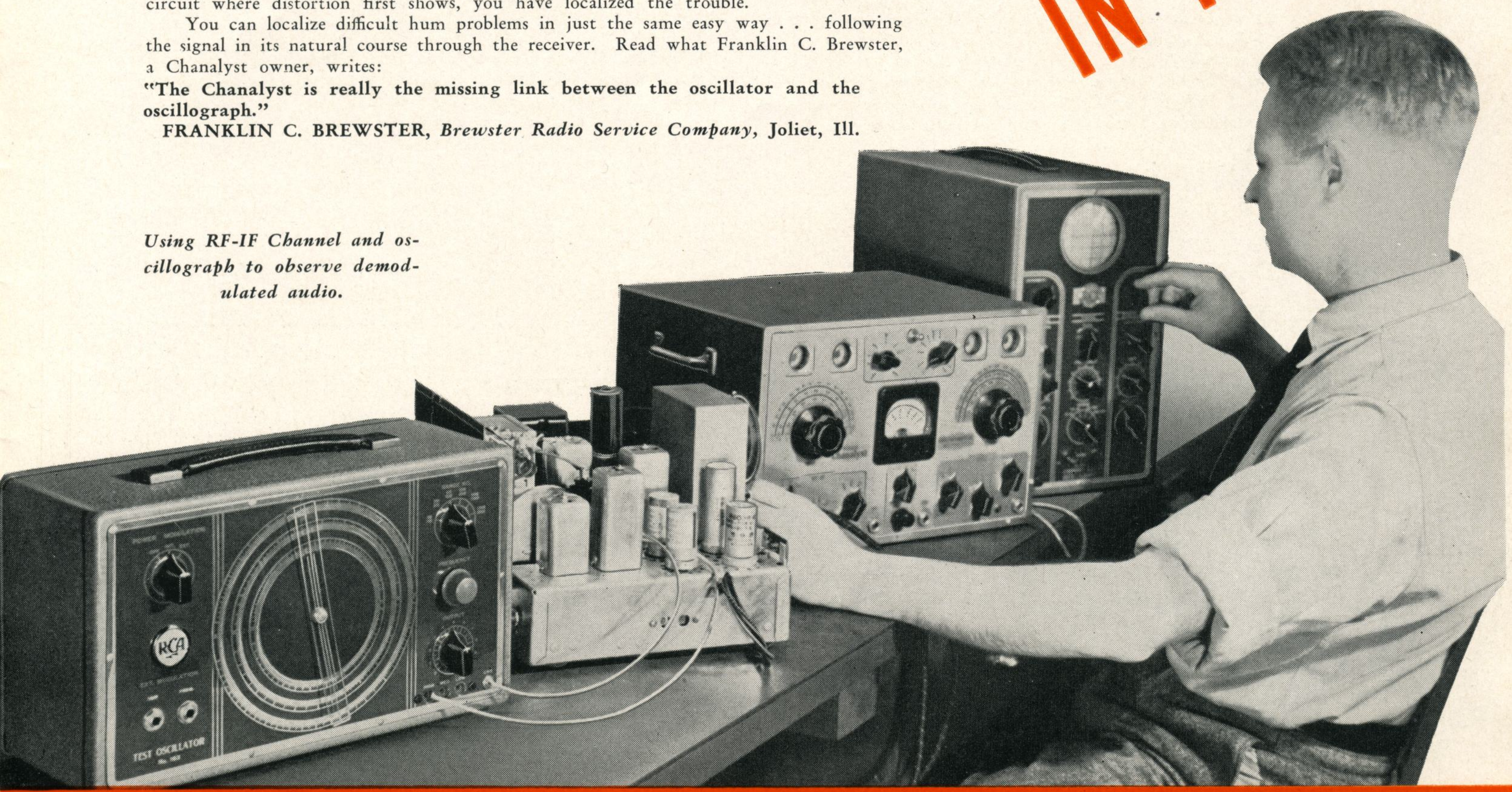
Your cathode ray oscillograph may be used to advantage in many applications. If you plug it into the RIDER CHANALYST, you can use it to test the signal wherever you choose, not just at hard-to-find points. To find where distortion starts, you can follow the signal from stage to stage, easily and quickly, as fast as you can move a probe from one point to another. You can check the signal right at the grids of tubes, even in tuned circuits, without affecting the operation of the receiver. And when you reach the circuit where distortion first shows, you have localized the trouble.

You can localize difficult hum problems in just the same easy way . . . following the signal in its natural course through the receiver. Read what Franklin C. Brewster, a Chanalyst owner, writes:

"The Chanalyst is really the missing link between the oscillator and the oscillograph."

FRANKLIN C. BREWSTER, *Brewster Radio Service Company*, Joliet, Ill.

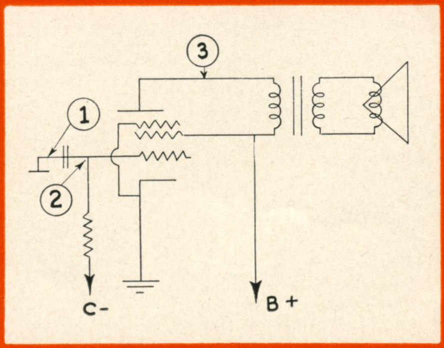
Using RF-IF Channel and oscillograph to observe demodulated audio.



PRACTICAL APPLICATION

3 AS TOLD BY A CHANALYST OWNER

BATTERY-OPERATED RECEIVER. Complaint, OK on short wave but very weak on the broadcast band.



"Having traveled 200 miles to have his battery-operated receiver serviced, one of our customers was in a great hurry for a diagnosis of this trouble—said he couldn't wait even five minutes for a definite analysis, although he was willing to leave the receiver for the repair itself to be made. However, he simply must know the trouble before he went about other business.

"He was able to tell us the symptoms: O.K. on short wave, but very weak on broadcast. Natural conclusion (one of the most natural, at least) on our part was a defective antenna transformer, since we often find burnt primaries resulting from lightning or, in the case of an AC-DC set, plugging antenna connection into hot side of a-c line. The transformer was not readily acceptable for visual confirmation, and an ohmmeter test is often misleading so was not resorted to; instead, our Chanalyst was put to work at once.

"We simply checked the strength of a local station at the antenna post (with NO tubes in the sockets; the owner hadn't brought his and couldn't wait for us to put some in for a test. Anyway, they weren't needed!). We checked the same signal at the r-f grid lead, tuning the receiver gang condenser to resonance as indicated by the Chanalyst. Instead of a gain, there was considerable loss in signal at this point (2 on diagram shown—Ed.), making it practically certain that the primary was indeed "shot"—(since resonance could be obtained at the proper gang condenser frequency setting, the secondary hardly could be to blame.) Our customer was impressed by this few seconds diagnosis and confirmation and left us to correct the trouble. In turn, we were gratified on opening the transformer housing, for the primary was burned to a crisp.

"It isn't often that r-f trouble can be diagnosed thus accurately without connecting batteries or applying power from other sources to a set, but when it can be done, we are satisfied that the Chanalyst is the instrument for the job."

G. N. ILES, *Iles Radio Service*, Edmonton, Alberta, Canada

TESTIMONIALS

REAL SPEED

An average of about 180 sets per month pass through my shop for service and out of this number one to ten are of the intermittent type, on which a great deal of time is lost in finding the exact trouble. This, of course, adds to the average time per set each month. I believe I can give you some figures on average time per set saved after a month or two that will show that the Chanalyst will soon pay for itself. If this is so, I will place my order for one more unit.

W. C. MOORE,
Paducah, Ky

AMAZED AT THE POSSIBILITIES

While I was well sold on the Chanalyst from the first, having placed my order sixty days before even seeing one, I was amazed at the possibilities after using it for awhile and seldom a day passes that I do not discover a new short cut in servicing. I am sincere when I say that I believe the Chanalyst is destined to become an essential to the modern service shop.

E. S. COURTER,
Iola, Kans.

BEST SERVICE INSTRUMENT

The Chanalyst is the best service instrument I have ever seen and it really makes all other service instruments become obsolete when compared to it.

EUGENE FERRELL,
Williamson, West Va.

POSITIVE RECEIVER IS RIGHT AFTER REPAIR

I am the fortunate owner of a Chanalyst and it is all and even more than you claim. I make this statement, not only from the angle of speed and ease with which troubles may be located, but rather because it affords a means of being absolutely positive that a receiver is right after repair. We rubber-stamp every set on which we use the Chanalyst and point out the fact to the owner, which has tended to make our customers feel greater confidence in our work. I can only wonder how the industry got along so long without such an instrument.

RAY PENTECOST,
Metropolitan Radio Service
Chicago, Ill.

PERFECT ALIGNMENT INDICATOR

Your statement that the meter of the Chanalyst makes a perfect indicator during alignment I found to be true yesterday. On the same set at the same time I had connected an output meter across the voice coil, an oscillograph at its usual point of contact, and the Chanalyst meter to the r-f control grid. It is quick and very convenient to attach. I didn't have to hunt around for the inaccessible terminals of the voice coil or questionable point of contact for the oscillograph . . . the Chanalyst as an output meter is alone worth the price asked.

JOHN O. MYHRE,
Des Moines, Iowa

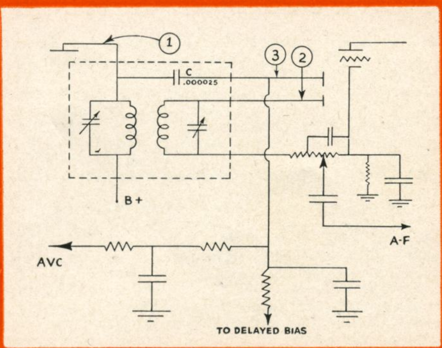
PRACTICAL APPLICATION

4 AS TOLD BY A CHANALYST OWNER

DISTORTION IN AC-DC SET.

"We invested in a Chanalyst recently and *find it excellent, especially in finding the really difficult faults in sets which would never be apparent with the conventional volt-ohmmeter method of testing.*

"Since case histories are more interesting to the prospective customer than all the fulsome praise, I would be glad to have you make use of the following example of Chanalyst efficiency, if you wish.



"An ac-dc set brought in for servicing played about 5 minutes perfectly then gradually got weaker and the tone became badly distorted. A quick voltage test showed a drop from 90 to 60 volts at the output tube plate (point 3 in diagram shown-Ed.) and from 8 volts negative to several volts positive at the output tube grid (point 2 on diagram-Ed.) All indications pointed to a defective coupling condenser, but disconnecting and testing it showed no leakage.

"This tube, which had previously checked okay in a tube tester, was replaced and the trouble remedied.

"By testing this tube dynamically with the Chanalyst and eliminating the possibility of the coupling condenser being at fault, the trouble was automatically narrowed down to the tube itself."

C. A. SERVICE, JR., *Service Radio Company*, Sarasota, Florida

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"Here is a use for the Chanalyst which I have not seen mentioned and which proves a time-saver when working with Philco Mystery models. When the Remote Control does not change station properly and is erratic, before going into the chassis, plug the RF-IF cable into the RF-IF channel of the Chanalyst and place near the Remote Unit. Adjust the channel to the frequency for which the receiver unit is tuned (somewhere between 365 kc. and 395 kc.), then dial the mystery unit and note the deflection on the Chanalyst eye. A good, smooth pulse should be noted at the eye each time the mystery dial passes a contact. If the pulses are regular, the trouble is in the remote unit."

S. C. FORD, 2824 Cloverdale Avenue, Los Angeles, California

INTERMITTENT RECEPTION

We all know that many aggravating hours are spent by servicemen in the effort to locate intermittent troubles in a receiver. The Chanalyst solves this problem by accomplishing that about which servicemen have dreamed for years—namely, knowledge of how far the signal is passing through the receiver when the intermittent develops.

Speaking in generalities, the process of solving an intermittent is to divide the receiver into five major divisions and to monitor these divisions, as shown in the accompanying sketch. For example, the wattage indicator takes care of the power supply. The RF-IF channel can be used to monitor the r-f signal at the mixer or the i-f signal at the second detector or at one of the i-f tubes, if more than one is used. The oscillator channel monitors the receiver oscillator. The AF channel monitors the audio signal at the output of the second detector, which may be the volume control or the control grid of the first audio tube. The speaker is the second audio monitor. The Electronic Voltmeter can be used to monitor any one of the operating voltages or a control voltage, depending upon the symptoms being displayed by the receiver.

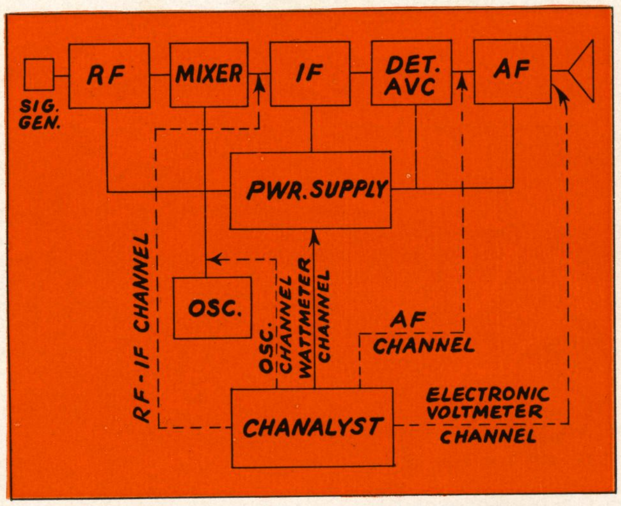
For example, if the intermittent seems to affect the control of the signal, then a control voltage at one of the control grids can be monitored. If the intermittent seems to affect the signal strength, then one of the operating voltages can be monitored. A signal is fed into the receiver from a test oscillator at some frequency, say 600 or 700 kc and the Chanalyst controls adjusted while the receiver is in operation.

When the intermittent develops, the Chanalyst indicators will show the status of the wattage consumption, the operating or control voltage at the point monitored, the r-f, i-f, oscillator and a-f signals. Interpretation of these indications will show how far the signal gets through the receiver. It may be necessary to move the r-f, i-f or a-f probe from one stage to the next after a fade:—that is, when more than one r-f, i-f or a-f stage is used—but this can be done with the receiver in the intermittent state—and definite conclusions arrived at.

No doubt you will be interested in a specific example of how intermittents were located.

Case 1. The receiver performed normally when first turned on. After 10 minutes the signal would fade out. If the receiver was turned "off" for a few minutes and then turned "on" again, it again performed normally and then the signal again faded after 10 minutes . . . ad infinitum . . .

With pardonable pride we say that the Chanalyst located the trouble within a few minutes after the first fade. The receiver was turned on and a 600 kc signal fed to the antenna. The r-f at the mixer was monitored. The oscillator circuit, a-f circuit, wattage consumption and the highest d-c voltage at the output tube of the receiver were monitored. The controls were adjusted and then we waited for the fade.



Ten minutes elapsed and as if by clockwork, the signal heard in the receiver faded out. The Chanalyst showed that the r-f signal at the mixer was normal. The wattage consumption was normal and the same was true of the d-c voltage at the screen of the output tube. . . However the "oscillator" indicator on the Chanalyst showed *no oscillator signal*. Then we checked the oscillator to establish if it was oscillating, by shifting the voltmeter probe from the output tube to the control grid of the oscillator. We found that the oscillator tube was oscillating, yet the Chanalyst indicator shadow was open. This meant one thing: the oscillator was functioning at a different frequency.

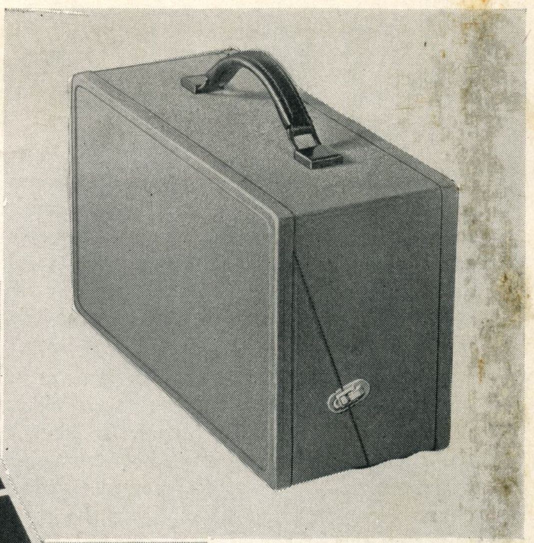
We then changed the tuning of the oscillator channel condenser both sides of the original setting. At one point about 100 kc higher than the original frequency, we again picked up the signal. The original setting was about 1050 kc; the new one was 1150 kc. The trouble was oscillator drift.

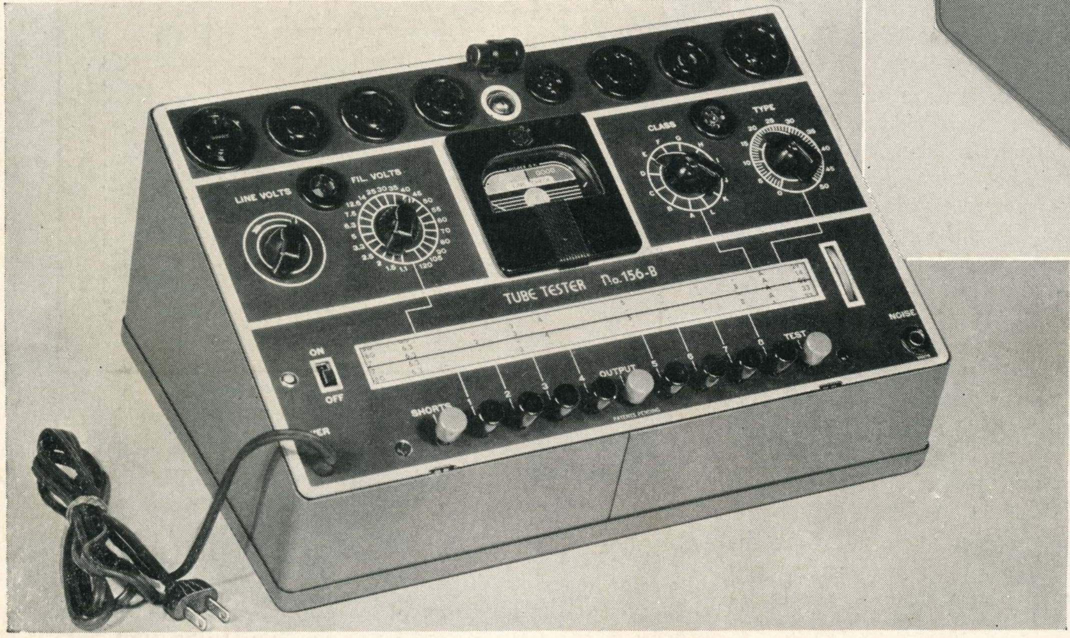
To prove this the following was done. Since the oscillator was oscillating and fed a signal into the mixer, an i-f signal of 1150—600 should be present in the mixer. To check this we shifted the RF-IF probe from the control grid of the mixer to the plate of the mixer and tuned the Chanalyst, looking for the i-f signal. At approximately 550 kc the signal was evident on the Chanalyst indicator. The i-f being produced was not the originally required 450 kc as determined by the design of the receiver, but 550 kc as determined by the new frequency of the oscillator. The final test was to feed a 700 kc signal into the mixer circuit without touching the receiver tuning. This should mix with the 1150 kc oscillator signal and produce the correct intermediate frequency of 450 kc, the frequency to which the i-f system was tuned. The signal passed through the receiver, thus substantiating the observations made. The trouble was localized in the oscillator section of the receiver.

The time elapsed to make these tests after the first fade did not consume more than five or six minutes.

RADIO TUBE TESTER

MINIMIZED *Obsolescence*





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39^{95}

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(Complete with cover and snap out Handle)

COUNTER TYPE

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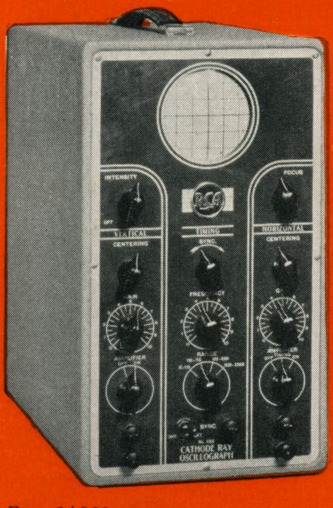
Only **RCA** with its vast resources and technical skill could design a tube tester as nearly obsolescence proof as the new **Model 156-B**. This tester literally has everything—provision for heaters up to 120 volts, two spare sockets, additional space on roller chart for 100 new tube types, plus the basic easy testing features that have made **RCA Tube Testers** the popular choice everywhere. Not only does it test practically every radio tube, but a socket has been included for checking miniature lamps (Xmas tree and flashlight bulbs).

A built-in socket provides for all "Loktal" types and the miniature base tubes. Your RCA Test Equipment Distributor has one of these new **Tube Testers** in stock for you at a price you can afford. See it—and be convinced of its outstanding value.

3-Inch CATHODE RAY OSCILLOGRAPH



The **RCA 3" Cathode Ray Oscillograph** is ideal for the vast majority of service applications. All controls, including those for spot centering, are located on the front panel. Attractive new styling, more flexible electrical design and better performance, make this instrument an unusual value.

STOCK No. 155
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STOCK No. 9640. Same as 9545 (earlier model but for 25 cycle operation).

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A-C OPERATED TEST OSCILLATOR

RCA has long set the pace in **Test Oscillators** for servicing the most complex of receivers. With this new instrument you are ready to offer your customers a service that is impossible with less modern instruments. This 6" giant dial—over 50" in length—insures an easily read setting, the high frequency range alone covering 10". **RCA** all-metal tubes give stability to circuit design and eliminate the need for tube shielding. Complete AC operation and fuse protection are other important features.

STOCK No. 153

NET PRICE **29^{95}**

Form 1A969

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