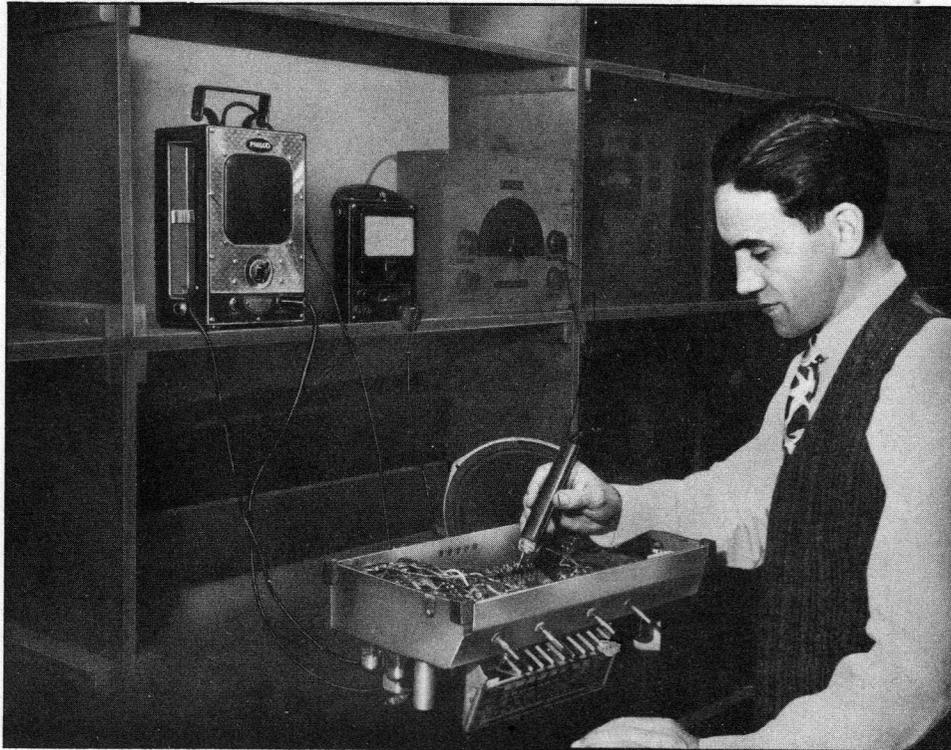


INSTRUCTION MANUAL

PHILCO DYNAMIC TESTER, MODEL 7030



Radio Servicing With the Dynamic Tester

TP-1932

WHAT IT IS—WHAT IT DOES

The Philco Dynamic Tester, Model 7030, is a modern test instrument designed for fast radio-trouble diagnosis. Basically, the Dynamic Tester consists of a detector and high-gain audio amplifier with loudspeaker output, for locating troubles by *listening in* on radio-frequency and audio-frequency circuits. In any circuit which normally has a signal present, the Dynamic Tester not only detects the signal, but also gives a comparative indication of its intensity.

The Dynamic Tester functions on the carrier modulation when testing r-f circuits, and on the audio signal when testing a-f circuits; the test signal may be obtained by tuning the radio under test to a broadcast station, or by using a modulated r-f signal from a signal generator.

The Philco Dynamic Tester can also be used to test public-address amplifiers, microphone circuits, and phonograph-pickup circuits.

The testing of all circuits, either r-f or a-f, is done with a *single* exploring probe. The probe is adapted to any circuit by its four built-in coupling elements, any one of which is selected instantly by turning the end of the probe.

Fast Trouble-Shooting

The Philco Dynamic Tester, designed for rapid radio servicing, makes trouble-shooting easy and sure—it quickly locates those hard-to-find troubles. A small, compact unit, the Dynamic Tester does a big job for the radio service technician.

Wide Frequency Coverage

In addition to operating on all audio frequencies, the Dynamic Tester responds at radio frequencies (without tuning) from the lowest intermediate frequencies to higher than 100 megacycles.

Sensitivity

The sensitivity of the Dynamic Tester (gain 10,000) is such that the signals which tell the story can be picked off the circuits of a radio all the way from the aerial coil to the speaker voice coil.

Low Circuit-Loading

The probe input circuit is adjustable to high impedance, making it possible to apply the Dynamic Tester to any circuit without interfering with its operation.

Locates Intermittent Troubles

Because of its basic method of testing, the Dynamic Tester is a real aid in locating the sources of intermittent radio troubles.

Locates Noisy Parts

Noisy parts, usually difficult to locate, are easily found with the Dynamic Tester by placing the probe in contact with the terminals of individual parts and listening for noise.

Locates Sources of Distortion

With the Dynamic Tester, distortion can be traced directly to the offending circuit, whether in the *audio* or *radio-frequency* system.

Locates Sources of Hum

The Dynamic Tester is unexcelled for locating sources of hum. It is effective on filter hum, hum modulation, and tunable hum.

Gain Comparisons

When used with an ordinary output meter, comparative gain measurements of radio and audio stages can be made with the Dynamic Tester.

Built-in Exploring Light

The built-in exploring light (with pre-focused Lucite lens) in the probe shows the way to connections in the darkest corners.

Portability

The Dynamic Tester is easily carried on service calls, lending its many advantages to the location of trouble in the customer's home; this means that before a radio is taken back to the shop for servicing, a more accurate preliminary estimate of the service charge may be given.

Utility-Amplifier System

The Philco Dynamic Tester may be used as an audio-amplifier system for demonstrations or other purposes. By means of the input jack provided, a microphone may be attached for public-address work, or a phonograph pickup may be connected for playing records. The power output is approximately two watts.

CIRCUIT DESCRIPTION

Operating Voltage: 110-120 volts, 60-cycle A.C.

Tube Complement: 1-6AQ6, 1-7L7, 1-7A5, 1-7Y4.

Pilot and Exploring Lamps: 6-8-volt, bayonet base, Philco Part No. 34-2040.

The circuit diagram of the Philco Dynamic Tester, Model 7030, is shown in figure 7.

Probe Circuit

The grid-leak detector, tube type 6AQ6, is located in a cylindrical probe head from which the connections to the amplifiers in the main housing are made by a shielded cable. This construction makes it possible to bring the detector close to the circuit to be tested, thus avoiding the loss of r-f input signal strength. Any one of four series-coupling circuits between the probe tip and the grid of the detector is selected by a rotary switch; the four coupling elements (three capacitive, and one resistive) and the switch are built into the probe shell. The selection of coupling is made by turning the Lucite lens containing the probe tip until the red line on the side of the lens coincides with the desired coupling position, as follows:

| Position | Coupling Element |
|----------|--|
| 1 | Capacity between switch point and grid-lead terminal |
| 2 | Condenser, 4.7 mmf |
| 3 | Condenser, 470 mmf |
| M | Resistor, 220,000 ohms |

The three degrees of capacitive coupling are used for general testing on radio and audio-frequency circuits, while the resistive coupling is used when the Dynamic Tester is employed as an amplifier for a microphone or phonograph pickup.

The exploring light (a miniature pilot lamp) and the Lucite light-conducting element are also contained in the probe head, so that the illumination provided aids in making test contacts with the probe tip.

When the probe is seated in the well in the side of the case, the probe tip is connected to the input jack; the Dynamic Tester may then be used as an audio-amplifier system, by connecting a microphone or phonograph pickup to the input jack.

Audio Amplifier

The audio signal from the plate of the detector is fed through the probe cable, and through a coupling condenser to the grid of the type 7L7 audio-amplifier tube. The amplitude of the signal at the grid is controlled by the VOLUME control, thus regulating the amount of output from the speaker.

The plate circuit of the 7L7 tube is coupled capacitively to the grid of the output-amplifier tube, a type 7A5. This amplifier circuit is made somewhat degenerative, to obtain good output characteristics, thus holding distortion to a minimum. The loudspeaker is a 5-inch electrodynamic.

The OUTPUT jack is connected, through a fixed condenser, across the output circuit of the 7A5 amplifier tube. An output meter may be connected to this jack for visual indications. A pair of magnetic headphones may be used instead of the meter when it is desirable to obtain greater sensitivity or to exclude extraneous noises while testing.

Power-Supply Circuit

The high voltages for operating the detector and amplifier tubes, and the current supply for the speaker field coil, are obtained from a conventional power-supply circuit consisting of a power transformer, a type 7Y4 rectifier tube, and a two-section electrolytic filter condenser.

CONNECTING THE DYNAMIC TESTER

1. Connect the Dynamic Tester to a 110-120-volt, 60-cycle power source.

2. Connect the ground-wire clip of the probe to the radio chassis. With an AC/DC radio, it may be necessary to reverse the power plug to either the Dynamic Tester or the radio, or both, to reduce hum pickup to a minimum. If these changes do not give a normal hum level, attach the ground-wire clip to the common connector-bus (one side of a-c line) inside the radio chassis.

3. To start the Dynamic Tester, turn the VOLUME control to the right until the power switch clicks on.

EXTENDING PROBE GROUND LEAD

The probe ground lead is purposely made short (8 inches) to avoid erroneous test indications at high radio frequencies; the ground clip may be attached to any convenient portions of the chassis, or to any parts having good electrical ground connections to the chassis.

When testing some radios in which the construction does not permit short-run connections of the ground lead, it may be desirable to lengthen the lead by connecting an additional foot or so of wire (with another clip attached) to the ground clip. In general, a total ground-lead length of about two feet will be found satisfactory for testing at audio, intermediate, and standard-broadcast frequencies. For all short-wave testing, it is recommended that only the original length of ground lead supplied be used.

TROUBLE SHOOTING

The general procedure for locating trouble in a radio is as follows:

1. A modulated signal from an r-f signal generator is fed into the aerial circuit of the radio. The defective section of the radio is then isolated by testing with the Dynamic Tester probe at a few vital test points in the circuit. When no signal, or a very weak signal, is obtained at one of these points, the trouble is known to be immediately ahead of, or associated with, the stage at which the test is being made.

2. The various portions of the defective circuit are then tested individually with the Dynamic Tester until the defective part or connection is located. Certain tests for defective parts often require a voltmeter, ohmmeter, or capacity tester; however, the Dynamic Tester will often disclose troubles that cannot be readily located with general test equipment without removing the parts from the circuit.

GAIN COMPARISONS

The signal-level increase between the input and output circuits of a stage or tube, as registered by the output meter used with the Dynamic Tester when the probe is connected alternately to these points, is an indication of the signal gain provided by the stage or tube.

Since the use of a sensitive grid-leak detector in the probe does not permit linear amplification (output voltage which varies in direct proportion to input voltage) within the Dynamic Tester, gain measurements are interpreted in comparative readings rather than gain in volts. An understanding of the method of making and interpreting these gain measurements is necessary for the location of any minor troubles which may cause a radio to operate at low efficiency. Gain is measured by the following method:

With signal-generator input to the radio, a reference reading is taken with the probe at the input of the circuit to be checked; the generator output is adjusted for a definite output-meter reading, such as ½ volt. The output meter is then set for a high range, such as 100 volts, and another reading is taken at the output circuit of the tube or stage. The ratio of the second reading to the first represents the gain. Example: indication at stage input, ½ volt; indication at stage output, 50 volts; gain (comparative), $50 \div \frac{1}{2} = 100$.

The following important facts regarding gain measurements should be noted:

1. The signal gain is a direct indication of the operating efficiency of the amplifiers and circuits involved in the test.

2. The gain indicated between two test points in a radio circuit should be approximately the same (within $\pm 25\%$) as the gain between the same two points in another radio of the same model, if the two radios are operating normally and the test conditions identical.

3. The experience obtained by using the Dynamic Tester in testing various radios will soon enable the serviceman to recognize insufficient gain. Knowledge of the amplification characteristics of the tubes will often aid in estimating the gain to be expected in certain stages of unfamiliar radios.

4. After a radio has been serviced, gain measurements, made at a few vital points (such as the test points indicated in figure 2), and tabulated for future reference, will be of great value in servicing another radio of the same model. Many hard-to-find troubles can be located with the aid of such data.

5. The first signal tests made on a radio are gain measurements or comparisons; these tests are made to determine whether a signal is present at certain test points, and, if so, whether the signal is of normal intensity.

BROADCAST STATIONS AS TEST-SIGNAL SOURCES

When a signal generator is not available, the radio under test may be tuned to the signal from a local broadcast station, or some station of moderate strength. When testing for distortion, it is desirable to use the signals from broadcast stations. However, for general testing in the shop, for performance or gain analysis, and for locating intermittent troubles, a good r-f signal generator with audio modulation should be used.

RAPID CHECKS WITH CHASSIS IN CABINET

In the customer's home, a quick check for the inoperative stage of a "dead" radio can often be made without removing the chassis from the cabinet, by following the same logic underlying the tests described below in ISOLATING THE DEFECTIVE STAGE. With a local broadcast station tuned in, the r-f signal can be checked by placing the probe tip on the control-grid caps of the r-f tubes, or at the stator plates of the tuning-condenser gang. When glass tubes are used in the audio system, the audio signal can be heard by holding the probe tip near the glass envelopes of the tubes; the VOLUME control of the Dynamic Tester should be at maximum. If the audio system is operative up to and including the primary of the output transformer, the signal can be heard by holding the probe tip near the transformer windings or leads.

CONNECTING THE SIGNAL GENERATOR

Connect the ground lead of the r-f signal generator to the radio chassis, or, for an AC/DC radio, to the common connector-bus (one side of a-c line) inside the chassis. Connect the generator output lead to the aerial terminal. Figure 1 shows methods of connection to various types of aerial or loop circuits. Note that in some instances, a series condenser is used, to avoid detuning the circuit.

Connect the signal generator to the power source, and turn on the modulation. Keep the signal-generator output at the lowest level giving a satisfactory indication, to avoid or minimize a-v-c action; only a few exceptions to this rule will be noted in

the trouble-shooting procedure to follow, where higher outputs are specified for special tests.

OUTPUT METER

For all tests requiring comparisons of signal level, an output meter should be used. Connect the meter leads to a phone plug, and insert the plug into the OUTPUT jack in the front panel of the Dynamic Tester.

Before testing at any point where the signal level is unknown, always switch the meter to a high-voltage range, or reduce the signal-generator output, to avoid damaging the meter mechanism.

ISOLATING THE DEFECTIVE STAGE

The schematic shown in figure 2, which represents an average radio, is used to illustrate the trouble-shooting procedure. Test points, lettered "A," "B," "C," etc. are used to indicate points to be contacted by the probe of the Dynamic Tester. With the power to the radio, signal generator, and Dynamic Tester turned on, proceed as follows:

1. Set radio volume control at maximum. Turn VOLUME control of Dynamic Tester half-way on. Set probe coupling to position 2. Set signal-generator frequency to 600 kc.

2. Place probe at point "A" (figure 2). Tune radio dial for maximum output. Reduce generator output. Use low output-meter range such as 3 or 5 volts. Adjust generator output for $\frac{1}{2}$ -volt indication.

NOTE: Meter ranges and readings used will vary with different service equipments, and radios under test. After some experience in the use of the Dynamic Tester, the serviceman will be able to determine the approximate readings to be expected under various conditions.

3. Increase meter range to 75 or 100 volts. Place probe at point "B" (converter plate). Tune radio for maximum meter reading at 600 kc. Substantial gain should be noted. No signal, or weak signal, indicates trouble in converter circuit; see paragraph 1 under ISOLATING THE DEFECTIVE PART, for test analysis of this circuit. If signal is apparently normal, proceed with step 4.

4. Reduce generator output. With probe at point "B," adjust generator output for $\frac{1}{2}$ -volt indication. Set meter for 75 or 100 volts. Place probe at point "C" (i-f amplifier plate). High signal gain should be obtained. No signal, or weak signal, indicates trouble in i-f; see paragraph 2, under ISOLATING THE DEFECTIVE PART, for test analysis. If signal is apparently normal, proceed with step 5.

5. With probe at point "C," adjust generator output for $\frac{1}{2}$ -volt indication. Set meter for 75 or 100 volts. Set probe coupling to position 3. Place probe at point "D" (first audio plate). Substantial gain should be obtained. No signal, or weak signal, indicates trouble in second detector or first audio circuits; see paragraphs 2 and 3a, under ISOLATING THE DEFECTIVE PART, for test analysis. If signal appears normal, proceed with step 6.

6. Adjust generator output for $\frac{1}{2}$ -volt indication at point "D." Set meter for 100 volts. Place probe at point "E" (output-tube plate.) Substantial gain should be obtained. No signal, or weak signal, indicates trouble in output-amplifier circuit; see paragraph 3b, under ISOLATING THE DEFECTIVE PART, for test analysis. No output from radio speaker, with normal signal at point "E," indicates trouble in output transformer or speaker voice coil.

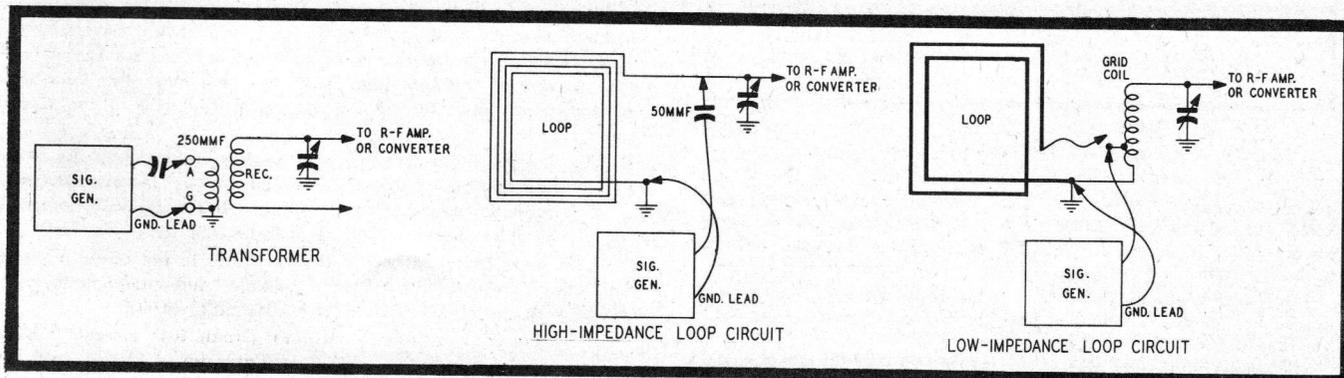


Figure 1. Signal-Generator Connections to Aerial Circuits

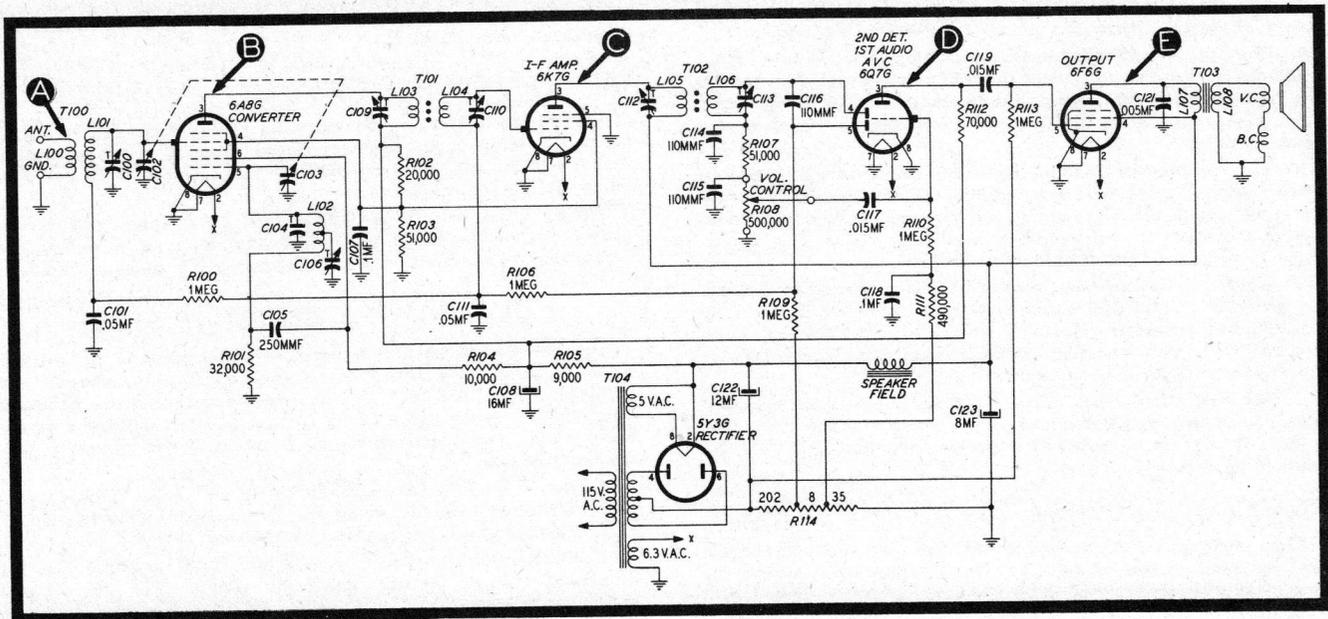


Figure 2. Circuit of Typical Superheterodyne

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ISOLATING THE DEFECTIVE PART

After the defective stage is located, the Dynamic Tester is used for a test analysis of the stage, until the trouble is directly indicated, or isolated to a small portion of the circuit, so that it is easily found by resistance, voltage, or capacitance tests.

In order to cover all possible troubles in the most logical sequence of test operations, the following procedures are given in a progressive order, working along the path of the signal (left to right in the schematic diagrams). Any of these steps which are not required for testing a particular radio may be disregarded.

1. CONVERTER STAGE

a. Aerial Transformer

(1) Set probe coupling to position 2. Set signal-generator frequency to 600 kc. Place probe at point "A" (figure 3). No signal

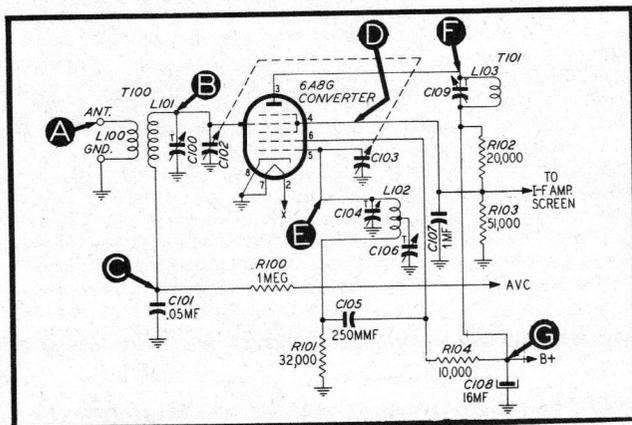


Figure 3. Converter Circuit

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indicates grounded aerial coil L100. Weak signal indicates partially shorted winding, L100. A signal which does not fluctuate as the radio is tuned through 600 kc indicates that coil L100 is probably open.

(2) Place probe at point "B." Tune radio for maximum signal at 600 kc. Signal should be slightly stronger than at point "A," because of transformer action.

No signal indicates: open coil L101; shorted shunt trimmer C100; shorted tuning condenser C102.

Weak signal indicates: open C100 or C102; partially shorted L101; open a-v-c filter condenser C101.

b. A-V-C Filter Condenser

Tune radio to input signal. Place probe at point "C."

Increase generator output. Any appreciable signal strength indicates open condenser C101.

c. Screen By-Pass Condenser

Place probe at point "D" (generator output same as above). Any appreciable signal strength indicates open condenser C107.

d. Converter Plate Circuit

Take reference signal at point "B." Adjust generator output for 1/2-volt indication. Set meter for 100 volts. Place probe at point "F" (converter plate). Substantial increase in signal strength should be noted, indicating gain provided by converter tube.

No signal indicates: defective tube; open i-f transformer primary L103; shorted trimmer C109; no plate-supply voltage.

Weak signal indicates: defective tube; open or misaligned trimmer C109; leaky filter condenser C108; no screen voltage; oscillator not operating, or misaligned.

e. Oscillator Circuit

The following test determines whether the oscillator is operating, and, if so, its operating frequency.

(1) Set probe coupling to position 1. Place probe at test point "E" (stator of oscillator tuning condenser). Connect generator output lead to a piece of insulated wire, and wrap a turn of insulated portion around probe tip. Turn off generator modulation.

(2) Adjust generator for moderate output. Tune generator through a range within which the oscillator should be operating. If the oscillator is operating, a beat note should be heard from the speaker of the Dynamic Tester; at zero beat, the frequency of oscillations is indicated by the calibrated dial of the signal generator.

NOTE: The oscillator frequency is usually higher than the radio dial indication by the amount of the intermediate frequency. Example: dial setting, 600 kc; i-f., 460 kc; oscillator frequency = 600 + 460, or 1060 kc.

If no beat signal is heard, the oscillator is not operating and the tube, anode (oscillator plate) voltage, and components associated with the circuit, should be individually tested.

When checking a "dead" oscillator circuit, it is extremely helpful to test the resonance of the oscillator tuned circuit, with its coil, tuning condenser, and trimmer or padder condensers; this can be easily done with the Dynamic Tester, even though the circuit is not capable of oscillating, by the following method:

(3) Connect the signal-generator output lead through a 50-mmf condenser to the stator of the tuning condenser, point "E." Use modulated signal. Set the attenuator for full output.

(4) Set the probe coupling to position 2. Connect the probe also to point "E." Tune the generator through the frequency at which the oscillator should normally be operating. If the oscillator tuned circuit is electrically complete, and resonant at or near this frequency, the signal from the speaker of the Dynamic Tester will show a definite increase at resonance; if the generator has sufficient output, the indication may be seen on the output meter.

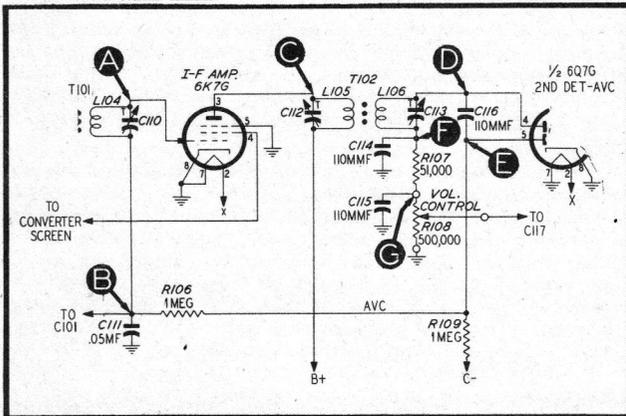
f. Plate-Circuit By-Pass Condenser

Re-connect generator output lead to aerial terminal. Set generator to 600 kc, and adjust for moderate output. Tune radio to input signal (600 kc). Set probe coupling to position 2, and place probe at point "G." Any appreciable signal strength indicates that condenser C108 is open.

2. I-F AMPLIFIER AND SECOND DETECTOR

a. Grid Circuit

Set probe coupling to position 2. Place probe at point "A" (i-f amplifier grid). See figure 4. Tune radio for maximum signal; strength should be approximately the same as at point "F" in converter circuit.



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Figure 4. I-F Amplifier and Second-Detector Circuits

No signal indicates: shorted trimmer C110; open or shorted i-f transformer secondary L104.

Weak signal indicates: open or misaligned trimmer C110; partially open, or partially shorted i-f transformer secondary L104; open a-v-c filter condenser C111.

b. Second A-V-C Filter Condenser

Increase generator output. Place probe at point "B." Any appreciable signal strength indicates open condenser C111.

c. Plate Circuit

Take reference signal at point "A" adjusting generator output for 1/2-volt indication. Set meter for 100 volts. Place probe at point "C" (i-f amplifier plate). Substantial increase in signal strength should be noted, indicating gain provided by i-f amplifier tube.

No signal indicates: defective i-f amplifier tube; shorted trimmer C112; shorted or open i-f transformer primary L105; no plate voltage.

Weak signal indicates: defective tube; open or misaligned trimmer C112; partially shorted, or partially open transformer primary L105; low plate voltage.

d. Diode-Detector Circuit

(1) Place probe at point "D" (detector diode). Signal strength here is usually somewhat less than at point "C" because the transformer secondary works into a low-impedance tube input.

No signal indicates: open transformer secondary L106; shorted trimmer C113.

Weak signal indicates: partially shorted, or partially open L106; open or misaligned C113; open r-f by-pass condenser C114.

(2) Place probe at point "E" (a-v-c diode). Signal should be about the same as at point "D." This test determines the effectiveness of coupling condenser C116. No signal indicates that C116 is probably open (this would account for lack of a-v-c action).

(3) Place probe at point "F"; this is the first point at which the detected (audio) signal appears. Signal strength should be about the same as at point "D."

No signal indicates: defective detector tube (diode section); shorted C114.

Weak signal indicates: defective tube; shorted C115; open R107 or R108.

(4) Place probe at point "G" (volume control). Signal strength should be slightly less than at point "F."

No signal indicates: open R107; shorted C115.

3. FIRST AUDIO AND OUTPUT STAGES

a. First Audio Circuit

(1) Place probe at point "A" (See figure 5), and turn radio volume control throughout its range. If the control is normal, the signal should vary in accordance with the position of the rotary arm.

(2) Place probe at point "B" (first audio grid). No signal indicates open coupling condenser C117.

Place probe at point "C." Any appreciable signal strength indicates open bias filter condenser C118.

(3) Take reference signal at point "B," adjusting generator output for 1/2-volt indication. Set meter for 100 volts. Place probe at point "D" (first audio plate). Substantial gain should be noted.

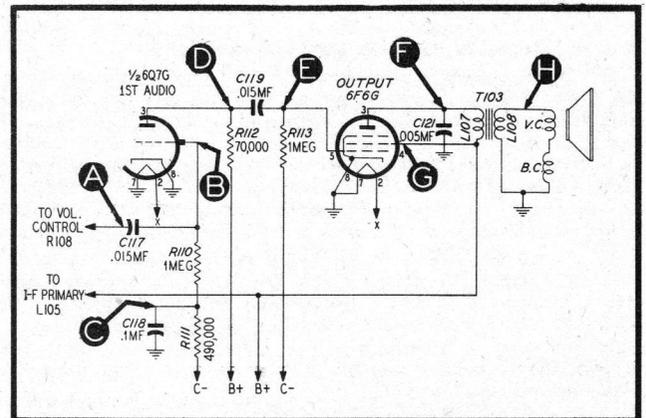
No signal indicates: defective tube (triode section); open R112; no plate-supply voltage.

Weak signal indicates: defective tube; defective (partially open) R112.

b. Output Amplifier

(1) Place probe at point "E" (output-amplifier grid). Signal strength should be the same as at point "D." No signal indicates open coupling condenser C119.

(2) Take reference signal at point "E," adjusting generator output for 1/2-volt indication. Set meter for 100 volts. Place probe at point "F" (output-tube plate). Substantial gain should be noted.



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Figure 5. First Audio and Output Stages

No signal indicates: defective output tube; shorted C121; open transformer primary L107; no plate-supply voltage.

Weak signal indicates: defective tube; no bias voltage; leaky C121 or C119; partially shorted L107; grounded secondary L108; saturated core in transformer T103 (this trouble occurs infrequently, usually only in old-style transformers made before the advent of high-permeability iron).

(3) Set probe coupling to position 3. Place probe at "H" (voice-coil circuit). Signal strength much lower than at point "F" is normal. No signal indicates open or shorted secondary of output transformer, or voice coil. Use resistance tests to locate trouble.

4. POWER SUPPLY

Most of the troubles in the power supply are normally located by a-c and d-c voltage measurements or resistance tests; how-

LOCATING SOURCES OF DISTORTION

For tracing distortion in a radio, tune in a good quality signal from a broadcast station. Starting with the first stage, and working toward the output stage, place the probe at one plate circuit after another, while listening for a change in the quality of reproduction from the speaker of the Dynamic Tester. When distortion first appears, trouble is indicated in the circuit from which the signal is taken.

Signals from the Dynamic Tester may be heard without interference from extraneous sounds by listening through a pair of headphones (2000 to 3000-ohm magnetic) connected to the OUTPUT jack.

When tracing distortion, care must be exercised to avoid overloading the sensitive detector in the Dynamic Tester, thereby introducing distortion in the reproduction of the test signal; use the lowest probe-coupling capacity possible.

LOCATING SOURCES OF HUM

The location of hum in power-supply circuits is discussed in paragraph 4, under ISOLATING THE DEFECTIVE PART.

1. A-C Hum

A-C hum may occur in certain circuits of a radio although the power supply is operating normally. One example of this trouble is the hum caused by an open bias filter condenser in an audio stage. Such trouble can be traced with the Dynamic Tester by listening to its output; some cases may be made easier by using a pair of headphones (2000 to 3000-ohm magnetic) connected to the OUTPUT jack. No input signal is required for these tests.

Turn the radio volume control off, turn the probe coupling to position 3, and contact various plate and grid circuits in the audio system until, working back toward the detector, a circuit having no hum (or normal hum) output is reached. The hum is then known to originate just behind this point (toward the output stage).

2. Hum Modulation

Hum modulation (modulation of the incoming signal at power-line frequency) may be traced to its source by listening in, with the Dynamic Tester, at various plate and grid circuits in the radio. Apply a modulated or unmodulated signal to the radio, or tune in a broadcast station, whichever causes the most noticeable hum-modulation effect. Work from the input circuit toward the output stage. A pair of headphones connected to the OUTPUT jack of the Dynamic Tester may make identification of the hum easier. When the first point giving evidence of hum is reached, the circuit into which the hum is being introduced is known to be closely associated with this point. The hum-radiation field of wires carrying a.c. can be followed by moving the probe along near cabled wiring etc., with the VOLUME control of the Dynamic Tester turned about three-fourths on; thus, the required dressing of leads to eliminate hum pickup by certain circuits (grid or cathode) is indicated.

If hum modulation appears in the first circuit of the radio, the trouble may be caused by lack of filtering of power-supply voltages, or by the introduction of hum into the aerial or ground system by some peculiarity of the house wiring, or wiring ground connection, or possibly by an open a-c line by-pass condenser in the radio.

EXPLORING FOR AUTO-IGNITION NOISE

In auto-radio servicing and installing, it is often necessary to reduce or eliminate ignition-noise radiation from wires and cables under the cowl; in some cars, certain cables pick up noise within the motor compartment and transfer the noise through the fire wall into the area under the cowl, where the radiation is picked up by the aerial lead-in or by the radio itself.

The method most commonly used for eliminating such troubles is the cut-and-try process in which some leads are bonded and grounded, and other leads are covered with grounded shields, until the noise is finally reduced to a satisfactory level. This process requires a great deal of time. The Dynamic Tester offers a means of quickly exploring all these leads and cables for noise radiation, and eliminates the necessity for time-wasting experimentation.

1. Connect the Dynamic Tester to the power source through a suitable extension cord, and place the Tester inside the car on the floor; run the extension cord to the car from the rear (to avoid noise pickup by the cord from the motor compartment), and bring it in through one of the windows, so that all doors may be closed while exploring for noise.

2. Lengthen the probe ground lead by attaching it to a section of braid (1/2-inch wide or larger) four or five feet long. Connect the free end of the braid to one of the mounting bolts of the radio, or if this is not possible, to the radio case.

3. Set the probe coupling to position 3, and turn the VOLUME control about three-fourths on. Start the motor, and run the probe tip along the leads (choke, battery cable, oil gauge tubing, etc.), noting the leads from which the strongest noise radiation is obtained. It is not necessary to contact the leads with the probe. If strong noise pickup is obtained anywhere within a few feet of the leads, change the probe coupling to position 1, and attenuate the VOLUME control until noise pickup is confined to within a few inches of certain leads. If mechanical noises make it difficult to hear the speaker of the Dynamic Tester, listen in on a pair of headphones (2000 to 3000-ohm magnetic) plugged into the OUTPUT jack. The heater, and its conducting tubes (particularly those in hot-water systems), should also be checked for noise radiation.

EXPLORING FOR MOTOR-HOOD NOISE RADIATION

The whip-type aerial, mounted on the side of the cowl, is sometimes subject to direct noise radiation from the motor hood, due to lack of hood ground contact, particularly at the rear edge of the hood, adjacent to the aerial. The Dynamic Tester can be used to determine whether this condition exists.

1. Place the Dynamic Tester on the running board or on some support near this position. See that the extension power cord extends to the rear, not past the motor.

2. Connect the probe ground to the body of the car near the aerial, or to a grounded fitting used to mount the aerial, if possible. Set the probe coupling to position 3, and turn the VOLUME control about three-fourths on.

3. Wave the probe back and forth across the junction of the motor hood and the cowl, listening to determine whether ignition noise exists over this area. If the noise level is high, turn the probe coupling to position 1, and retard the VOLUME control. Hood radiation is indicated if the noise increases sharply when the probe is moved from the cowl over the rear edge of the hood. The radiation may be reduced to a satisfactory level by using contact springs under the rear edge of the hood at several points nearest the aerial.

This method of exploring for noise can be used to detect radiation from other parts of the car, such as fenders, muffler, etc.

REMOVING PROBE POINT

The test point of the probe may be removed, for sharpening or replacing with a new point, by simply unscrewing it from the threaded stud which projects from the Lucite lens.

CONNECTING MICROPHONE OR PHONO PICKUP TO THE DYNAMIC TESTER

Set the probe coupling to position M. Insert the probe into the retaining clip in the side of the housing, making sure that the probe tip is engaged by the small contact clip. The probe is now connected electrically to the input jack in the side of the housing. The input-circuit resistance is suitable for the output of a crystal microphone or a crystal phono pickup; connect the mike or pickup cable to the input jack. Adjust the VOLUME control for the desired sound level.

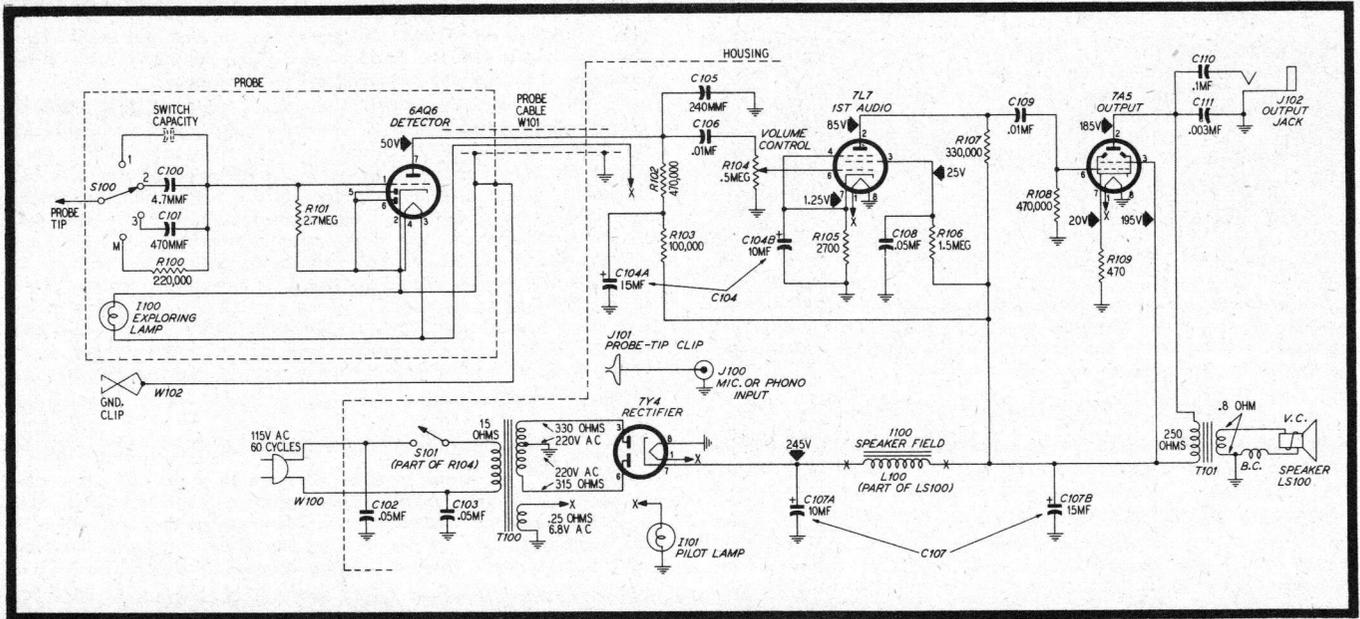
REPLACING TUBES IN DYNAMIC TESTER

Three of the tubes (types 7L7, 7A5, and 7Y4) and the pilot lamp, are contained in the housing. Remove the ten cross-recess-head screws from around the edges of the front panel, and lift the panel and instrument from the housing.

The detector tube and exploring lamp are contained in the probe head; access to these may be had by pushing in the small latch pin at the rear end of the probe shell, and sliding off the cylindrical case. The tube may be removed by pushing it out of its socket. The exploring lamp is reached by grasping its filament-supply lead and withdrawing the lamp and socket from the spring clip.

CAUTION!

When replacing the cylindrical case over the inner probe assembly, do not grasp the case with one hand over the hole in the end, or the probe tip may puncture the hand. Hold the case as you would grasp the handle of a hammer.



TP-1932G

Figure 7. Complete Schematic of Dynamic Tester, Model 7030

NOTE: Voltage readings were taken at 115 volts, 60 cycles, using a 20,000-ohms-per-volt meter. The probe tip was grounded to the chassis, and the VOLUME control was turned to minimum. All resistance values are in ohms unless otherwise specified.

REPLACEMENT PARTS LIST—DYNAMIC TESTER

NOTE: Parts marked with an asterisk (*) are general replacement items, and the numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items furnished may differ from the values indicated in the schematic and parts list. The values substituted in any case are so chosen that the operation of the instrument will be either unchanged or improved. When ordering replacements, use only the "Service Part No." in this parts list.

| SYMBOL | DESCRIPTION | PART NO. |
|--------|---|---------------|
| C100 | Condenser, probe-coupling, 4.7 mmf | 60-90505007* |
| C101 | Condenser, probe-coupling, 470 mmf | 60-10515307* |
| C102 | Condenser, line-filter, .05 mf | 61-0122* |
| C103 | Condenser, line-filter, .05 mf | 61-0122* |
| C104 | Condenser, electrolytic, 3-section (20-mf 20 V section not used) | 61-0086* |
| | C104A: Condenser, detector plate-supply filter, 15 mf | Part of C104 |
| | C104B: Condenser, cathode by-pass, 1st audio 10 mf | Part of C104 |
| C105 | Condenser, r-f by-pass, detector plate, 240 mmf | 60-10245307* |
| C106 | Condenser, coupling detector output, .01 mf .. | 61-0120* |
| C107 | Condenser, electrolytic, 3-section (20-mf 25 V section not used) | 61-0089* |
| | C107A: Condenser first filter, 10 mf | Part of C107 |
| | C107B: Condenser, second filter, 15 mf | Part of C107 |
| C108 | Condenser, screen by-pass, 1st audio, .05 mf | 61-0122* |
| C109 | Condenser, coupling, 1st audio output, .01 mf | 61-0120* |
| C110 | Condenser, coupling, output jack, .1 mf | 61-0113* |
| C111 | Condenser, h-f by-pass, output plate, .003 mf | 61-0109* |
| I100 | Lamp, exploring | 34-2040* |
| I100 | Lamp, pilot | 34-2040* |
| J100 | Jack, phono or microphone input | 76-2003 |
| J101 | Clip, probe-tip connector | 56-3193 |
| J102 | Jack, phone, (for mtg. nuts and lock washers, see misc. parts) output-meter connector | 42-1784 |
| L100 | Field, speaker | Part of LS100 |
| LS100 | Speaker, (with output transformer) electrodynamic, 5-inch | 36-1507-1* |
| R100 | Resistor, probe-coupling, 220,000 ohms | 66-4221340* |
| R101 | Resistor, detector grid-leak, 2.7 meg. | 66-5271340* |
| R102 | Resistor, det. plated-load, 470,000 ohms | 66-4473340* |

| SYMBOL | DESCRIPTION | PART NO. |
|--------|--|--------------|
| R103 | Resistor, det. plate filter, 100,000 ohms | 66-4103340* |
| R104 | Potentiometer, volume control, .5 meg. | 33-5538-10* |
| R105 | Resistor, 1st audio cathode, 2700 ohms | 66-2273340* |
| R106 | Resistor, 1st audio screen-dropping, 1.5 meg. .. | 66-5153340* |
| R107 | Resistor, 1st audio plate-load, 330,000 ohms .. | 66-4333340* |
| R108 | Resistor, output-tube grid, 470,000 ohms | 66-4473340* |
| R109 | Resistor, output-tube cathode, 470 ohms | 66-1474340* |
| S100 | Switch-head assembly, probe coupling (less test point) | 76-1773 |
| S101 | Switch, a-c power | Part of R104 |
| T100 | Transformer, power | 32-8276* |
| T101 | Transformer, output | 45-7501* |
| W100 | Cord, a-c line (with plug) | L-3337 |
| W101 | Cable, shielded, probe connector | 41-3731 |
| W102 | Wire and clip assembly, ground lead | 41-3781 |

MISCELLANEOUS PARTS

| | |
|---|-------------|
| Bull's eye and lamp socket assembly | 76-1658 |
| Foot (8 req.), felt | 54-4240 |
| Grille, speaker | 56-3194 |
| Knob, volume-control | 54-4281* |
| Panel, front | 56-2787 |
| Plate, model data | 56-3195 |
| Plate, name (PHILCO) | 76-2114 |
| Rivet (6 req.), socket mtg. | 1W36671FA5 |
| Screw (10 req.), front-panel mtg., 6-32 x 3/8 CRH | W2509-1FA39 |
| Screw (4 req.), speaker mtg., 6-32 x 3/8 CRH | W2509-1FA39 |
| Screw (4 req.), handle mtg., 6-32 x 3/8 CRH | W2509-1FA39 |
| Socket (3 req.) Loktal | 27-6213* |

PROBE PARTS

| | |
|--|----------|
| Case (cylindrical) | 56-2790 |
| End-piece assembly (bakelite bushing) | 54-4288 |
| Lamp-socket assembly, exploring lamp | 76-1677 |
| Point, (probe tip) | 56-3225 |
| Probe, complete, with 6AQ6 tube and shielded cable | 76-1772 |
| Socket, miniature detector tube | 27-6211* |

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PHILADELPHIA, PA.

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