ATWATER KENT RADIO

SERVICE DATA

With

PARTS LIST FOR

TYPE H CHASSIS RECEIVER

and

TYPE N SPEAKER

INDEX OF CONTENTS

Advantages of Atwater Kent Type H Super-Heterodyne

1—Like all other Atwater Kent receivers, Type H chassis has Atwater Kent expert design, precision workmanship, rugged construction, and life-time reliability.

2—It has Atwater Kent Tone Control, providing four definite shadings of the Golden Voice to please each owner.

3—It has the unexcelled Quick Vision Dial with accurate scale calibration that makes tuning easy, quick and convenient.

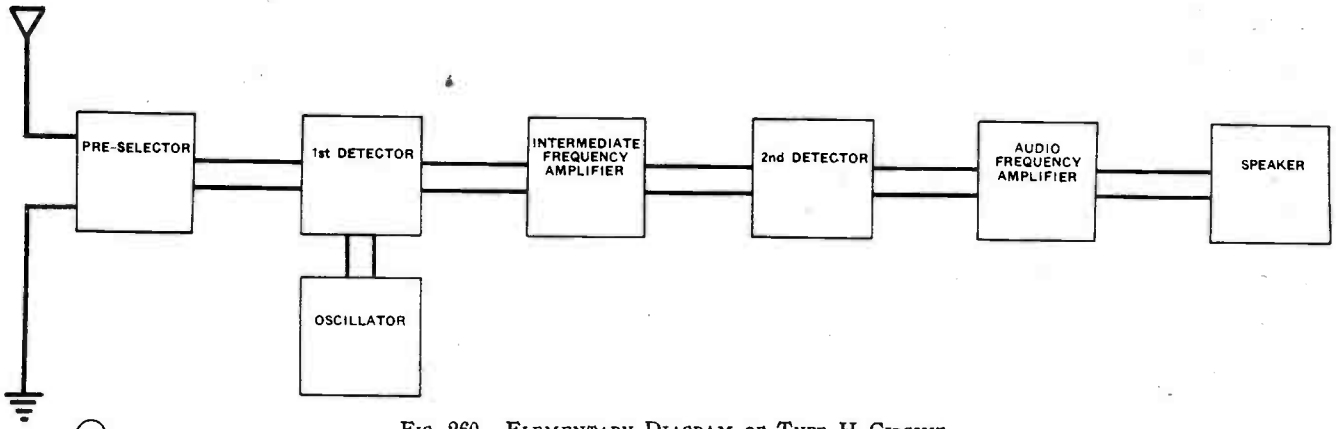
4—Type H chassis is extremely selective. This can be demonstrated by the ease of separating stations on adjacent broadcast channels. The resonance curve of this receiver has very steep sides and a practically flat top. The selectivity is practically constant over the broadcast range.

5—Type H-2 chassis has ten tuned circuits, three in the pre-selector tuned to the desired frequency, one in the pre-selector tuned to exclude the interfering frequency, one in the oscillator, and five in the intermediate-frequency amplifier. Each one of these ten tuned circuits contributes to the remarkable selectivity of the Atwater Kent super-heterodyne.

6—There is no difficulty from "double-spot" reception. Each station is received at only one position on the dial, not two.

7—Type H chassis tunes in and out of stations quietly and without distortion.

8—The antenna adjustment on Type H-2 makes it possible to fit the set to any antenna. This feature has proved to be highly desirable.



(114) FIG. 260. ELEMENTARY DIAGRAM OF TYPE H CIRCUIT

A Brief Explanation of The Origin and Action of The Super-Heterodyne Circuit

The super-heterodyne circuit was originated about 1918 primarily for the purpose of getting around certain limitations in the radio-frequency amplifiers that were then available.

At that time it was difficult to build sensitive and perfectly controlled amplifiers to cover a WIDE BAND OF HIGH radio frequencies (above about 500 kilocycles).

But it was possible to build sensitive and well-controlled FIXED-TUNED amplifiers to cover a NARROW BAND of LOW radio frequencies (below about 200 kilocycles).

With such amplifiers available, it was a logical step to decide to use high radio frequencies for transmission, receive the high radio frequency on a suitable tuner, convert it (at the receiver) to a low radio frequency, and then amplify the low radio frequency in an amplifier designed for this purpose.

The method used to convert a high radio frequency to a low radio frequency is based on a simple electrical principle that when energy of two different frequencies is combined in a suitable detector, there is produced, among other things, a third frequency (termed the beat note or intermediate frequency) which is equal to the difference between the first two frequencies.

Thus if we have an amplifier designed for 130 kilocycles and we wish to receive a broadcast signal of 1,500 kilocycles, we supply a locally-generated frequency either 130 kilocycles higher or 130 kilocycles lower than the received broadcast signal of 1,500 kilocycles. The combination of the received broadcast signal and the locally-generated signal gives a beat note or intermediate frequency equal to the difference between them or 130 kilocycles.

If the desired broadcast signal is 550 K. C. and we wish to convert it to 130 K. C. the same idea applies. In this case the locally-supplied frequency must be 130 K. C. higher or lower than 550 K. C. in order to give an intermediate frequency of 130 K. C.

(In the Atwater Kent super-heterodyne, the locally-supplied frequency, furnished by a tuned vacuum-tube oscillator, is arranged to be always 130 kilocycles more than the frequency of the received signal.)

This system, originated in 1918, and known as the super-heterodyne, proved very successful, and the same underlying principle is used today in modern super-heterodyne receivers. However, it was not until the perfection of the screen-grid tube, and its successful application to the super-heterodyne circuit, that this system was able to compete commercially with modern tuned radio-frequency receivers which had outdistanced the super-heterodyne in practical developments during the last few years.

Definition of Some Terms and Abbreviations Used In This Supplement

Super-heterodyne = The name applied to a radio receiving system in which the received frequency is converted to a different frequency and then amplified.

K. C. = Kilocycle per second. One kilocycle equals 1,000 cycles per second.

R. F. = Radio frequency. The broadcast range of radio frequencies covers from 550 K. C. to 1,500 K. C.

I. F. = Intermediate frequency. This is the beat note or difference between the received broadcast frequency and the oscillator frequency. In the Atwater Kent super-heterodyne, the intermediate frequency is 130 K. C., corresponding to about 2,310 meters.

A. F. = Audio frequency. The audio-frequency range is from 16 to 10,000 cycles.

R. F. T., I. F. T., A. F. T. = Transformer designed to couple R. F., I. F. or A. F. circuits respectively.

Trimmer = A small adjustable condenser which is used to tune or trim a circuit to the correct frequency.

Pre-selector = A series of tuned circuits that are used to select the desired broadcast frequency, at the same time excluding all undesired frequencies.

1st-detector = The tube in which the combined energy of the received signal and the oscillator signal is rectified. The plate circuit of this tube is tuned to the intermediate frequency.

Osc. = Oscillator. In the Atwater Kent super-heterodyne the oscillator is a tuned vacuum-tube generator of radio-frequency energy. Its frequency is 130 K. C. more than the frequency to which the set is tuned.

I. F. Amplifier = Amplifier in which the strength of the intermediate-frequency signal is increased before it passes into the 2nd-detector.

2nd-detector = The tube in which the amplified intermediate frequency signal is rectified. The modulation or A. F. component of the intermediate-frequency signal is then passed into the A. F. amplifier.

Double-spot reception = In some super-heterodyne circuits a local station may be received at two different points on the dial. This is explained on pages 260 and 261.

SERVICE NOTES

Testing

When a Type H chassis requires servicing, it will save time and needless work to determine definitely first that the trouble is not in the tubes, the antenna, irregular power supply, or a peculiar local receiving condition.

After checking these points thoroughly, examine the chassis and inspect the wiring, socket contacts, and parts for open circuits, short circuits, and grounds. Measure the voltages at each socket and correct any defects that may be discovered.

Then, and not before, systematically check over the R. F. and I. F. trimmer condensers in accordance with the instructions on pages 269 and 275.

Don't forget that it requires suitable equipment, and considerable time, knowledge and skill to adjust a superheterodyne receiver. Don't be discouraged if it seems difficult at first—but work systematically and follow the instructions carefully.

Trimmer Adjustments

There are four groups of trimmer adjustments and it is very essential to have a clear idea of each group and how each group affects the set. It is also important to know which trimmers are so inter-related that adjustment of one affects the other.

With a clear idea of this grouping it is rather easy to diagnose trouble and to adjust the receiver for maximum performance.

The four groups of trimmers are as follows:

(1) **The intermediate frequency trimmers** (three in the H-1, and five in the H-2). These are adjusted for maximum output from a 130 K. C. oscillator signal.

(2) **The oscillator trimmer** is adjusted at 1,500 K. C. and the oscillator-transformer adjusting disc (bottom of set) is adjusted at 800 K. C. Adjustment of one affects the other. Both must be adjusted correctly to make the dial calibration accurate. It is necessary to repeat the adjustment at 1,500 and at 800 K. C. until further adjustment gives no change in dial reading.

(3) **The pre-selector trimmers.** In the H-1, these are trimmers Nos. 1, 2 and 3, shown on page 268. In the H-2 they are trimmers Nos. 2 and 3, and the antenna trimmer which takes the place of trimmer No. 1 (see page 274). The pre-selector trimmers are adjusted for maximum output on a 1,500 K. C. oscillator signal. In both the H-1 and H-2, adjustment of trimmer No. 3 affects the adjustment of the double-spot trimmer.

(4) **The double-spot trimmer.** This is affected by adjustment of trimmer No. 3. Trimmer No. 3 is adjusted to give peak response to a normal 1,500 K. C. oscillator signal. The double-spot trimmer is adjusted to give **minimum** response to the double-spot point (1,240 K. C.) of an extra strong 1,500 K. C. signal. It is necessary to repeat the adjustment at 1,500 K. C. and at 1,240 K. C. until further adjustment gives no change in output.

Oscillator Notes

The oscillator trimmer condenser requires very careful adjustment because the accuracy of the dial calibration depends on the oscillator frequency. DO NOT ADJUST THE OSCILLATOR TRIMMER CONDENSER UNNECESSARILY because it may result in throwing the whole set out of adjustment.

It is possible to get reception at two different adjustments of the oscillator trimmer condenser, but it is important to use only the first adjustment which is secured as the oscillator trimmer is screwed in from a loose position.

When using slow-heating tubes, the Atwater Kent super-heterodyne may suddenly snap into operation about 20 seconds after the power switch is turned on. This is a perfectly normal action and is caused by the fact that the oscillator tube snaps into operation—it does not start gradually. If a quick-heating tube is used in the oscillator socket, it will be operating by the time the other tubes warm up and in this case the set will start gradually.

The spring and felt pad that presses against the rotor plates on the oscillator variable condenser are used to prevent microphonic movement of the rotor plates; such movement might otherwise result in undesirable noise.

It will be noted also that two rotor plates on the oscillator variable condenser are cut differently from the others. This is part of the design that keeps the oscillator "tracking" 130 kilocycles above whatever frequency the pre-selector is tuned to.

Antenna Circuit

Type H-2 chassis has a small trimmer condenser connected in series with the antenna. Adjustment of this trimmer makes it unnecessary to use a trimmer across No. 1 variable condenser.

Ordinarily when a condenser is connected in series with the antenna, the antenna tends to accumulate a static charge that discharges by sparking across the condenser, thus producing noise in the receiver. To prevent such an action in Type H-2 chassis, an R. F. choke coil is connected across the antenna trimmer. It acts as a leak to any static charge on the antenna.

Type H-2 chassis often gives excellent results with the ground as an antenna (no connection to the ground post). If an antenna is used, a length of 50 to 75 feet is recommended.

Double-Spot Reception

If a heterodyne whistle is present, it may be caused by incorrect adjustment of the double-spot circuit. To test for this, touch the control grid of the 1st-detector and if the squeal increases, readjust the double-spot circuit. Or if a local station is received at two points on the dial, one point being about 260 kilocycles below its normal frequency, the double-spot circuit may be adjusted to eliminate this effect. (See page 261.)

Replacing Parts

I. F. transformers. If one I. F. transformer is defective, it is not necessary to replace both. Replace the defective one and re-adjust its associated trimmer condensers on a 130 K. C. oscillator signal.

R. F. transformers. If one R. F. transformer is defective it is necessary to replace the whole group.

The pre-selector and oscillator trimmers must be re-adjusted as described on Pages 269 and 275.

(Continued on Page 262)

ELIMINATING "DOUBLE-SPOT" RECEPTION

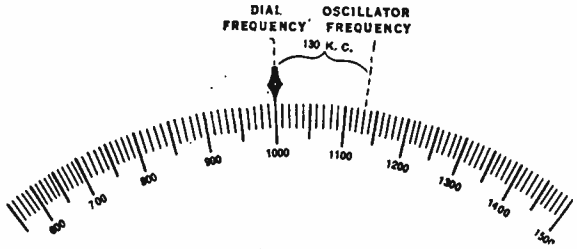


FIG. 261

1. The oscillator in Atwater Kent Type H chassis is always tuned 130 kilocycles ABOVE the dial frequency. Thus: if, as in Figure 261, the dial is tuned to 1000 K. C., the oscillator is simultaneously tuned to 1130 K. C. The difference between these two frequencies produces a beat note or intermediate frequency of 130 kilocycles.

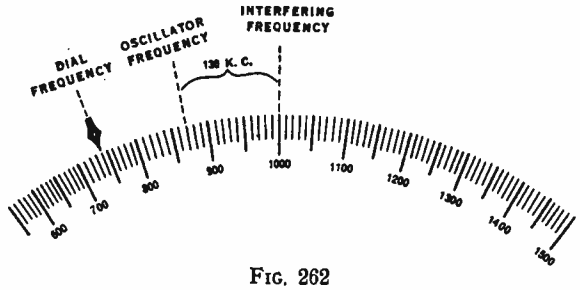


FIG. 262

2. An intermediate frequency or beat note may be produced if the oscillator is EITHER 130 K. C. ABOVE, or 130 K. C. BELOW the frequency of the received station. Therefore, if there is a strong station at say 1000 K.C., and the dial of the set is tuned to 740 K. C. (bringing the oscillator to 870 K. C., or 130. K. C. BELOW 1000 K. C.) and if any energy from the 1000 K. C. signal gets through the pre-selector, it will beat with the oscillator signal and produce a 130 K. C. beat note. Under such a condition, the received 1000 K. C. signal would be heard when the dial is tuned to 740 K. C. The reception of the 1000 K. C. signal with the dial tuned to 740 K. C. is in addition to the normal reception when the dial is tuned to 1000 K. C.

This action is known as double-spot reception, and as it is an undesirable condition, a special arrangement has been developed in the Atwater Kent Type H circuit to eliminate any difficulties from this source.

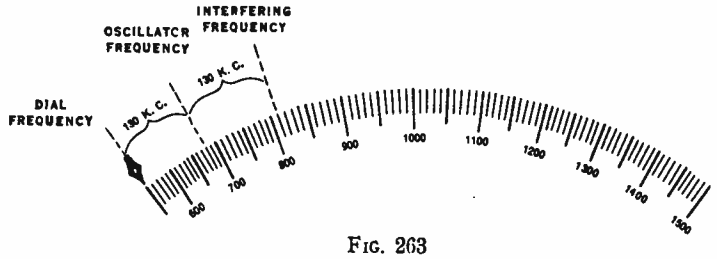


FIG. 263

3. From observation of Figures 262, 263 and 264, it will be seen that the double-spot point of a strong interfering signal is 260 K. C. less than the frequency of the interfering signal. Or, in other words, the interfering frequency that causes double-spot reception is always 260 K. C. more than the dial (pre-selector) frequency.

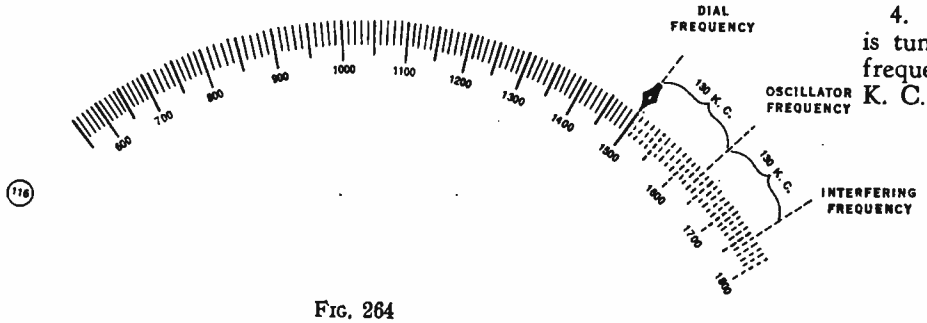


FIG. 264

4. Thus in Figure 263, when the dial is tuned to 550 K. C., the interfering frequency is 260 K. C. more, or 810 K. C. Or, as in Figure 264, when the dial is tuned to 1500 K. C., the interfering frequency is 260 K. C. more, or 1760 K. C.

(Continued on Page 261)

5. As the interfering signal that causes double-spot reception is always 260 K. C. more than the dial or pre-selector frequency, it is necessary to prevent any energy at this frequency from entering the 1st-detector. This is accomplished by the circuit arrangement shown in Figure 266.

In this circuit, No. 4 R. F. T. and No. 3 variable condenser form an acceptor circuit across the input of the 1st-detector. This acceptor circuit is tuned simultaneously with the pre-selector, but its frequency is always 260 K. C. higher than the pre-selector or dial frequency. The acceptor circuit acts as a short circuit to any energy at a frequency 260 K. C higher than the frequency to which the pre-selector is tuned. It therefore practically eliminates any of the energy that might otherwise cause double-spot reception.

Because of the fact that the double-spot trimmer and the trimmer of No. 3 variable condenser are in the same circuit, adjustment of one affects the other. The proper adjustment is secured when further adjustment of either trimmer does not increase the 1500 K. C. signal strength, and does not further decrease the double-spot volume at 1240 K. C.

The method used in adjusting the double-spot circuit is described below and also on Pages 269 and 275.

6. Adjustment of Double-Spot Circuit.

It is necessary to have a 1500 K. C. oscillator that may be switched from a normal strength to an extra-strong signal. The extra-strong 1500 K. C. signal must be of such strength that the double-spot volume of this signal (which is tuned in at 1240 K. C.) can not be entirely eliminated even with the double-spot circuit correctly adjusted. This is necessary in order to make an accurate adjustment of the double-spot trimmer. If there was no response at the double-spot point over a wide adjustment of the double-spot trimmer it would be impossible to set this trimmer to the correct point.

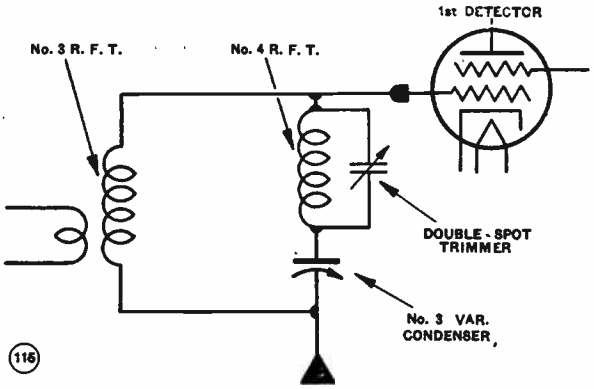


FIG. 266. THE DOUBLE-SPOT CIRCUIT IS SIMULTANEOUSLY TUNED TO TWO DIFFERENT FREQUENCIES

The complete circuit, consisting of No. 3 and No. 4. R. F. T. and No. 3 variable condenser, is tuned to the desired broadcast frequency. A part of this circuit, consisting of No. 4 R. F. T., the double-spot trimmer, and No. 3 variable condenser, is automatically tuned to 260 kilocycles more than the desired broadcast frequency. This later circuit, connected from grid to cathode of the 1st detector, acts as an acceptor circuit, or short circuit, to the frequency of the signal that might otherwise cause double-spot reception. This action is described in the text.

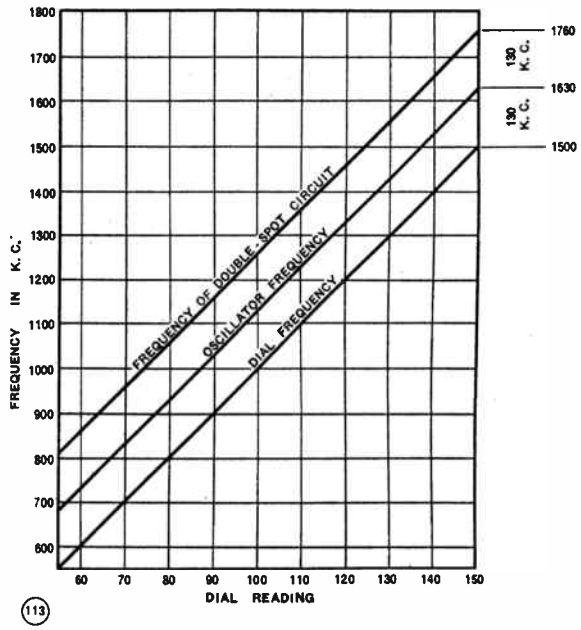


FIG. 265. THIS GRAPH REPRESENTS AN IDEAL CONDITION OF THE THREE FREQUENCY RANGES COVERED RESPECTIVELY BY THE PRE-SELECTOR (DIAL FREQUENCY), THE OSCILLATOR, AND THE DOUBLE-SPOT CIRCUIT

For any given setting of the dial, the oscillator frequency is 130 kilocycles more than the dial frequency, and the double-spot circuit is 260 kilocycles more than the dial frequency.

Procedure.

(a) Using the normal-strength 1500 K. C. signal, and with the dial pointer set to 1500 K. C. as described on Page 262, adjust the pre-selector trimmer (Nos. 1, 2 and 3 in the H-1; the antenna trimmer, and Nos 2 and 3 trimmer in the H-2) and the oscillator trimmer for maximum reading on the output meter.

(b) Switch on the extra-strong 1500 K. C. signal and tune in its double-spot at 1240 K. C. Adjust the double-spot trimmer to give **minimum** response on the output meter.

(c) Switch on the normal-strength 1500 K. C. signal, tune the set to 1500 K. C. and re-adjust trimmer No. 3 for maximum output.

(d) Tune back to 1240 K. C., switch on the extra-strong 1500 K. C. signal, and re-adjust the double-spot trimmer for minimum output.

(e) Repeat the adjustments described in paragraphs (c) and (d) until, first, further adjustment of trimmer No. 3 does not increase the output of the normal 1500 K. C. signal, and, second, until further adjustment of the double-spot trimmer does not further decrease the response of the double-spot at 1240 K. C.

(Continued from Page 259)

Oscillator transformer. Mount exactly like the old one and re-adjust the oscillator trimmer and adjusting disc according to instructions on Pages 269 and 275.

1st-detector plate choke. Mount exactly like the old choke and re-adjust 1st-I. F. trimmer on 130 K. C. oscillator signal.

Variable condenser group. The eye is a good judge of whether or not the rotor plates are centered between the stator plates. If the rotors are not centered, install a complete new condenser. Do not attempt to adjust the rotor positions, nor the rotor bearings. When a new group is installed, repeat the entire R. F. synchronizing procedure.

EQUIPMENT REQUIRED FOR SERVICING TYPE H CHASSIS

In order to make the correct adjustments of trimmer condensers in Type H chassis, it is necessary to have the following equipment:

1. **A four-wave oscillator** providing modulated signals at 1,500, 1,000, 800 and 600 kilocycles. The oscillator signals must come in at exactly these settings on a Type H chassis that has been checked on "standard-frequency" broadcast stations to make certain that the dial calibration is accurate. In other words, the set is used as a wavemeter to check the frequency of the oscillator. In turn, the set must be checked frequently against "standard-frequency" broadcast stations.

The oscillator frequencies should be checked at least once a day, and more often if necessary.

Each oscillator in the four-wave oscillator must have an adjustable pick-up. Adjustment of any one pick-up must not affect the frequency of its oscillator, nor should it affect the volume of the other oscillators.

The 1500 K. C. oscillator must have an extra pick-up that may be cut in to provide an extra-strong 1500 K. C. signal, or cut out to provide a normal-strength 1500 K. C. signal. The extra-strong 1500 K. C. signal is used in adjusting the double-spot trimmer.

2. **A 130-kilocycle oscillator.** This should be tuned to 130 K. C. by adjusting its trimmers to give maximum output when this oscillator is coupled to the I. F. amplifier in a Type H chassis that has the original factory synchronism. The frequency of the 130-K. C. oscillator should be checked frequently.

The 130-K. C. oscillator may be coupled to the Type H chassis in either one of two different methods, as follows: (a) The oscillator may be completely shielded, with a shielded lead connecting an adjustable pick-up in the oscillator to the control-grid cap of the 1st-detector. (b) The oscillator may be mounted under the test bench in such a position that it will be close to the 1st-detector plate-circuit choke. A 2-inch hole should be drilled at this point in the metal plate that covers the test bench. In this case, of course, the bottom plate of the set should be removed.

3. **An output measuring circuit** such as that shown on Page 256 of the Service Manual.

4. **Two No. 18261 coil shields with the tops cut off.** These are used in place of the regular No. 18261 shields to cover the I. F. transformers in Type H-2 Chassis, in order to make the I. F. trimmer condensers accessible.

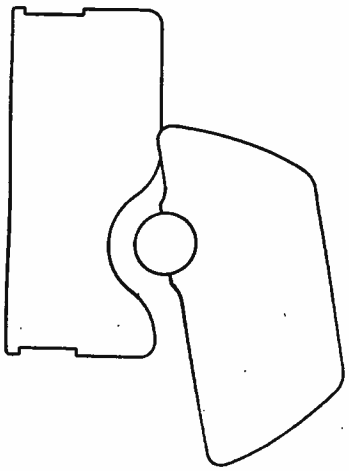
5. **One No. 17295 coil shield with a half-inch hole cut in the top.** This is used in place of the regular No. 17295 shield to cover No. 4 R. F. T., in order to make the double-spot trimmer accessible.

These specially cut shields are NOT supplied from the factory.

6. **One No. 15592 (black) tubular resistor** with a half-inch length of solid wire soldered to each end. This is used as described on Page 275.

7. **A trimmer-condenser screw-driver.** This should be made from a fibre rod about 10" long and ¼" in diameter.

INITIAL ADJUSTMENT OF ROTORS AND POINTER TO 1500 KILOCYCLES



(40)

FIG. 267. POSITION OF ROTOR BLADES FOR 1500 K. C.

When the variable-condenser unit has been replaced or adjusted in any way, it is necessary to check the alignment as follows:—

Center the pointer on the control arm and tighten the pointer screws.

(1) Loosen the gear set-screws.

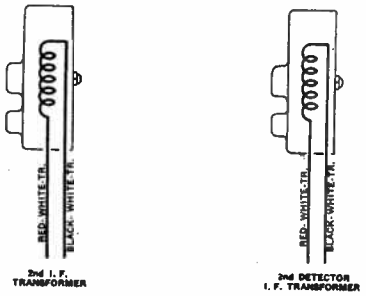
(2) Move the rotor plates to the position shown in Figure 267.

(3) With the rotor in this position, adjust the control arm to the 1500 K. C. position and tighten the gear set-screws.

(4) Note how far down on the 1500 K. C. mark the pointer comes, then turn the condenser knob to the 550 K. C. mark. The pointer should come down on this mark approximately the same as on the 1500 K. C. mark. If it does not, it is an indication that the front panel is not centered.

(5) If the front panel is not centered, loosen the screw at each end of the bottom of the front panel and shift the panel as necessary. Tighten the panel screws and then reset the control arm.

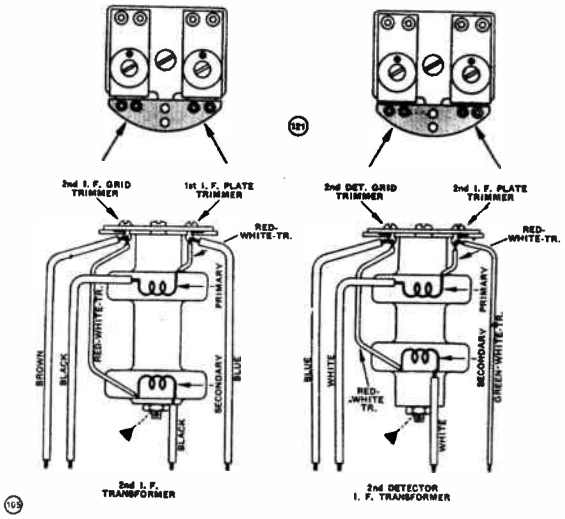
Connection of Units In Type H-1 and H-2 Chassis



(104)

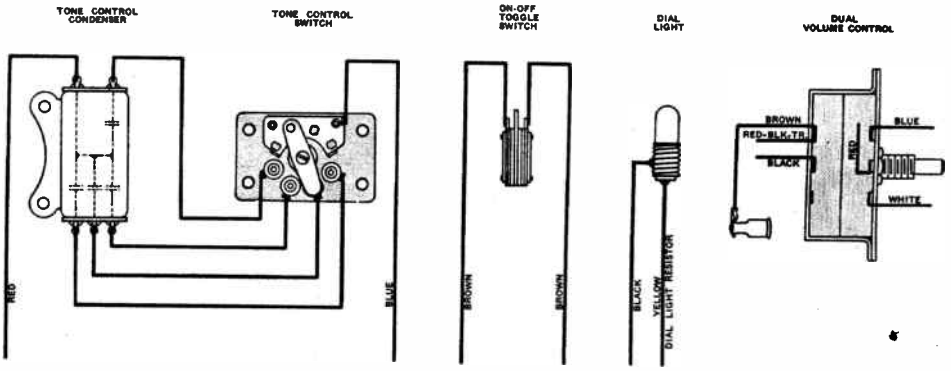
INTERMEDIATE-FREQUENCY TRANSFORMERS IN TYPE H-1 CHASSIS

The leads on some of these transformers do not have white tracers.



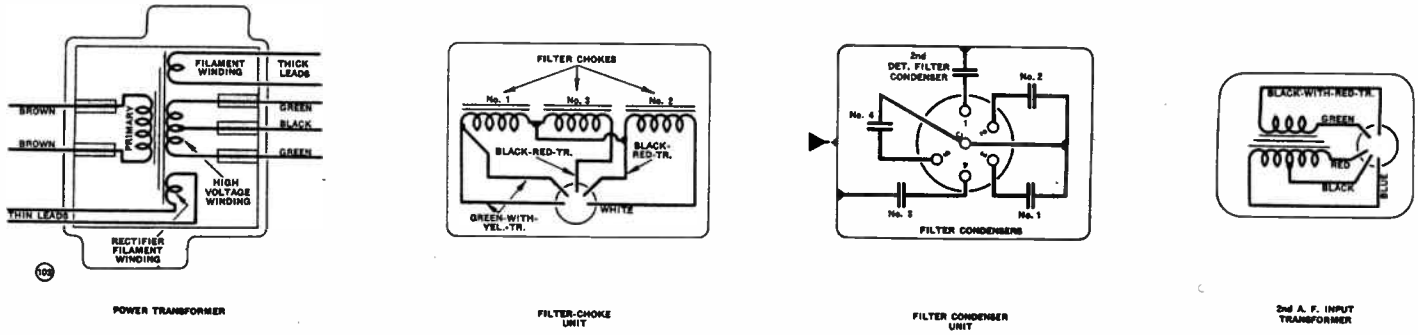
(105)

INTERMEDIATE-FREQUENCY TRANSFORMERS IN TYPE H-2 CHASSIS



(106)

PANEL UNITS IN TYPE H-1 AND H-2



(109)

POWER TRANSFORMER

FILTER-CHOKE UNIT

FILTER CONDENSER UNIT

2nd A. F. INPUT TRANSFORMER

POWER UNITS AND AUDIO TRANSFORMER IN H-1 AND H-2
FIG. 268

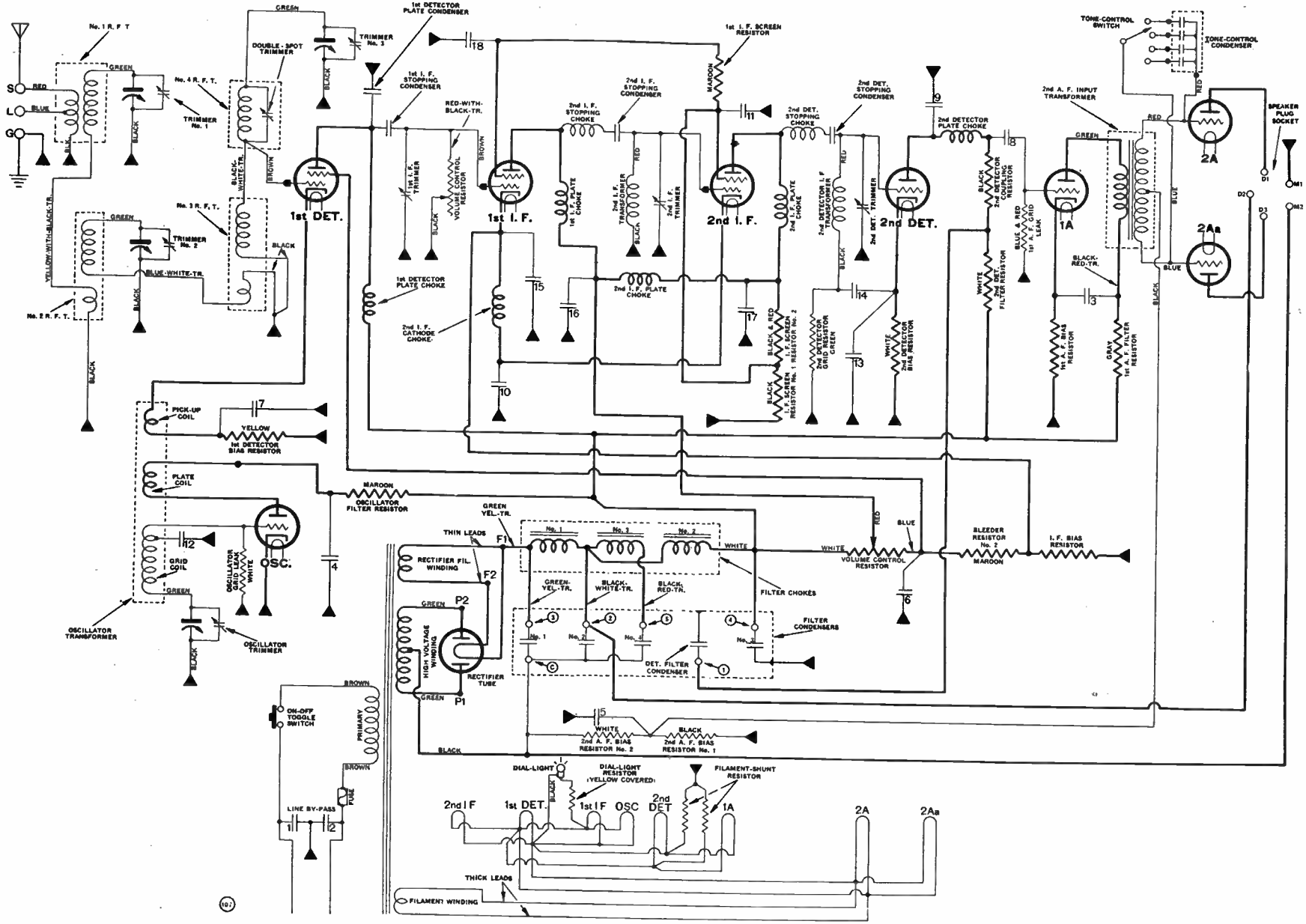


FIG. 269. SCHEMATIC DIAGRAM OF TYPE H-1 CHASSIS

For names of by-pass condensers, see Page 267.

In some Type H-1 sets the +B lead to the I. F. screens is connected to the 1st-I. F. side of the 1st-I. F. screen resistor.

VOLTAGE TABLE FOR TYPE H-1 CHASSIS

Set in operation. Volume control at maximum

Use High-Resistance D. C. Voltmeter (about 0-50-250) to Measure Plate and Grid Voltages. Use A. C. Voltmeter to Measure Filament Voltages

APPROX. VOLTAGES, USING 120 V. LINE

TYPE TUBE	POSITION IN SET	FILAMENT VOLTAGE	PLATE VOLTAGE	CONTROL-GRID VOLTAGE	SCREEN VOLTAGE
'24	1st-Det.	2.4	150	3	12
'27	Oscillator	2.3	100	10*	—
'24	1st-I. F.	2.3	150	3	75
'24	2nd-I. F.	2.3	145	3	85
'27	2nd-Det.	2.3	100	13**	—
'27	1st-A. F.	2.3	65	2	—
'45	2A	2.5	250	55*	—
'45	2Aa	2.5	250	55*	—
'80	Rectifier	4.7	—	—	—

With the volume control at minimum, the intermediate-frequency plate voltage is reduced to about 15 volts, and the I. F. screen voltage is reduced to about 10 volts.

* Use 250-volt scale.

** This is the voltage across the detector bias resistor; when measuring from grid to cathode, the voltage reading is only 2.

All readings made from cathode in heater-type tubes, and from —F in plain-filament-type tubes.

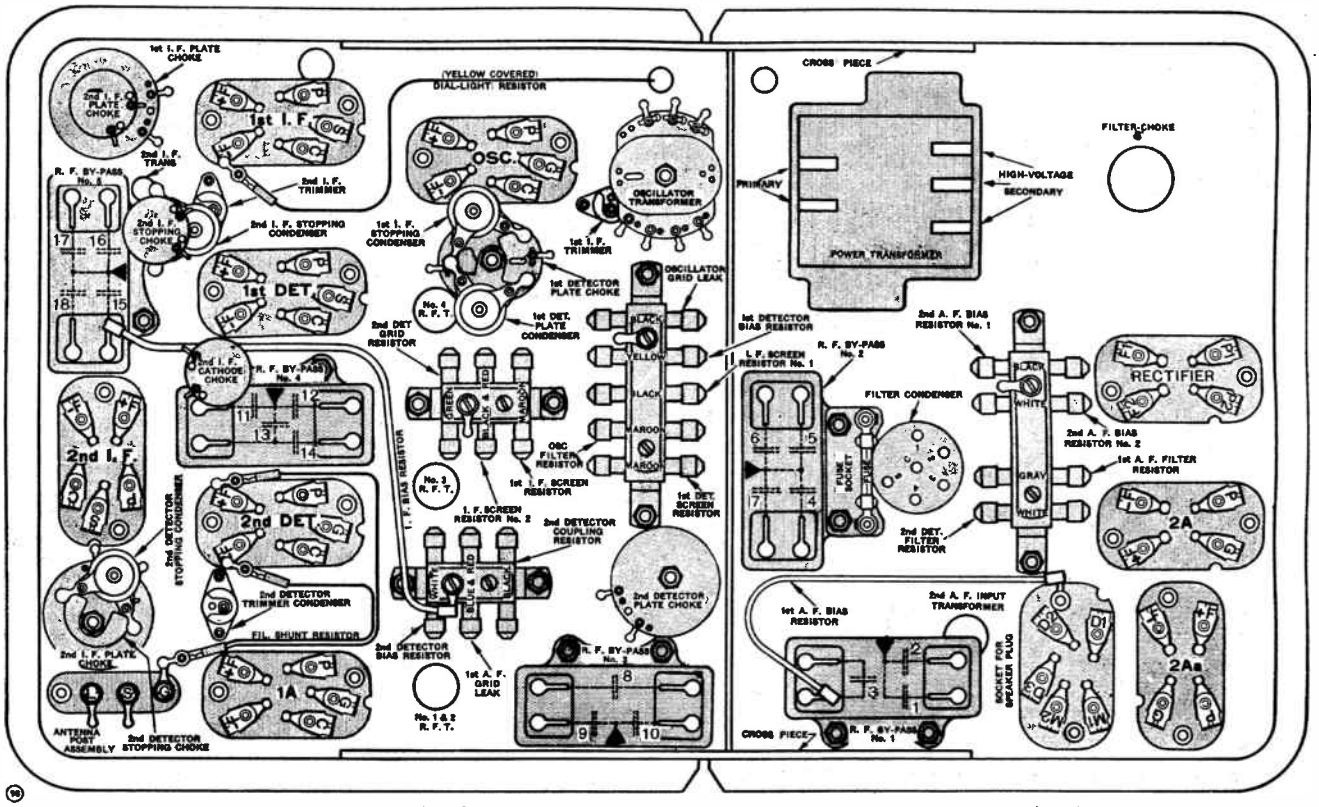


FIG. 270. BOTTOM CHART OF TYPE H-1 CHASSIS

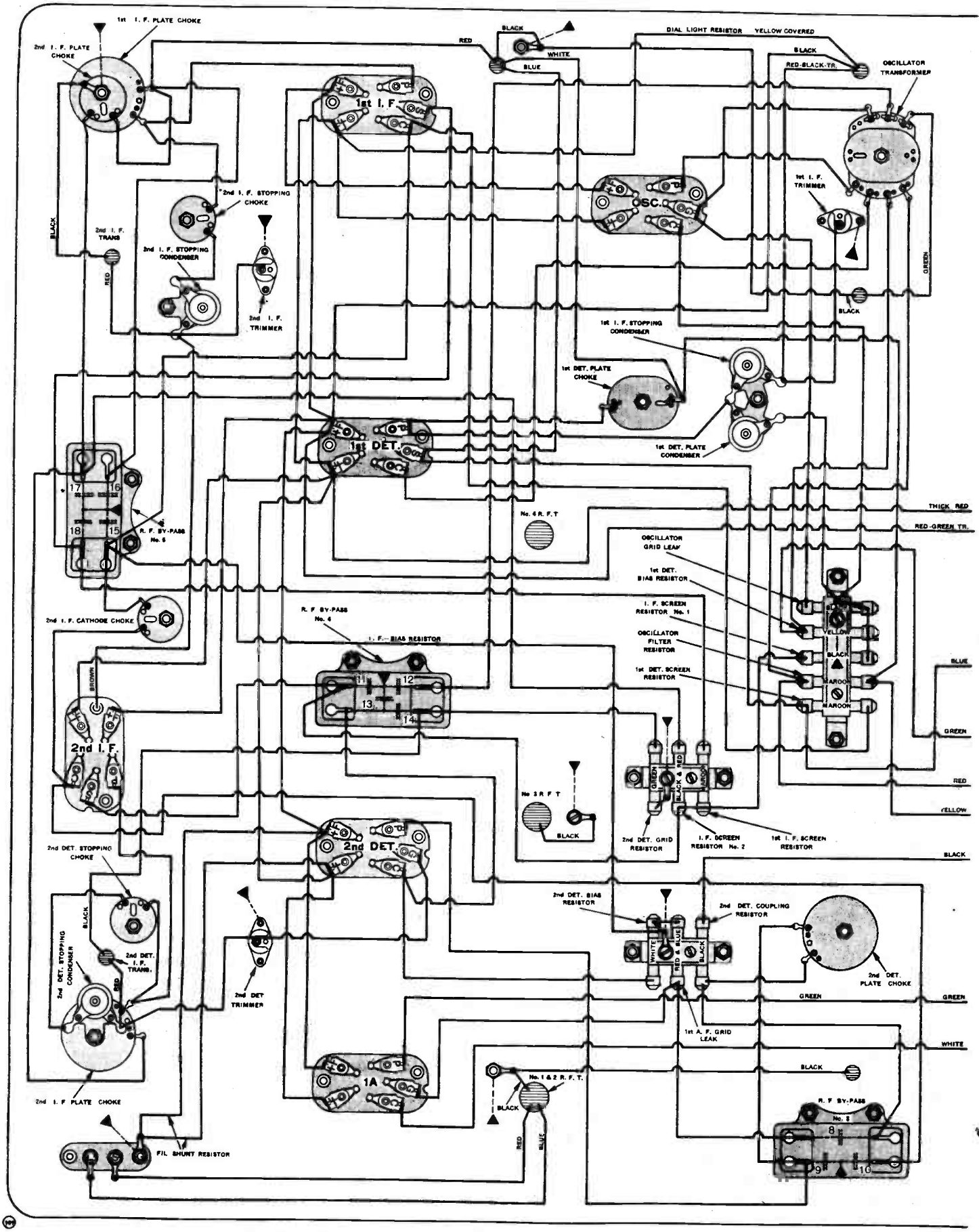


FIG. 271. BOTTOM WIRING OF R. F. SECTION OF TYPE H-1 CHASSIS

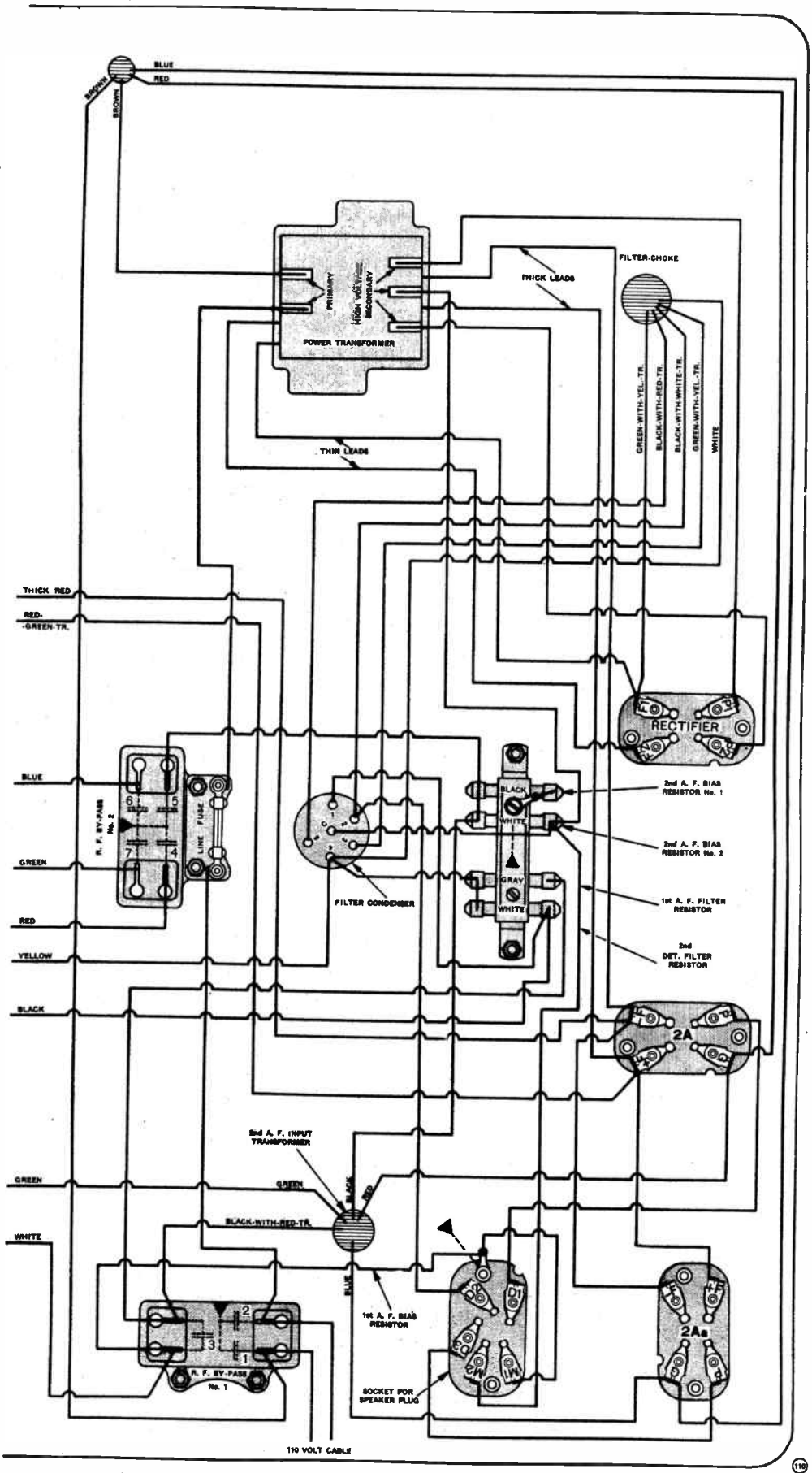


FIG. 271-A. BOTTOM WIRING OF AUDIO SECTION OF TYPE H-1 CHASSIS

By-pass Condensers in Type H-1 Chassis

R. F. By-Pass No. 1

1—Line by-pass.
2—Line by-pass.
3—1st-A. F. filter condenser.

R. F. By-Pass No. 2

4—Oscillator filter condenser.
5—2nd-A. F. bias by-pass.
6—1st-detector screen by-pass.
7—1st-detector bias by-pass.

R. F. By-Pass No. 3

8—Detector—1st-A. F. coupling condenser.
9—Phone condenser.
10—2nd-I. F. cathode by-pass.

R. F. By-pass No. 4*

11—2nd-I. F. screen by-pass.
12—Oscillator grid condenser.
13—2nd-detector bias by-pass.
14—2nd-detector grid-circuit by-pass.

R. F. By-Pass No. 5

15—I. F. bias by-pass.
16—I. F. plate-circuit by-pass.
17—2nd-I. F. plate-circuit by-pass.
18—1st-I. F. screen by-pass.

* This condenser should have code mark H-25. Do not use an H-26.

TYPE H-1, No. 16500, SUPER-HETERODYNE CHASSIS

(Below Serial No. 5,855,201)

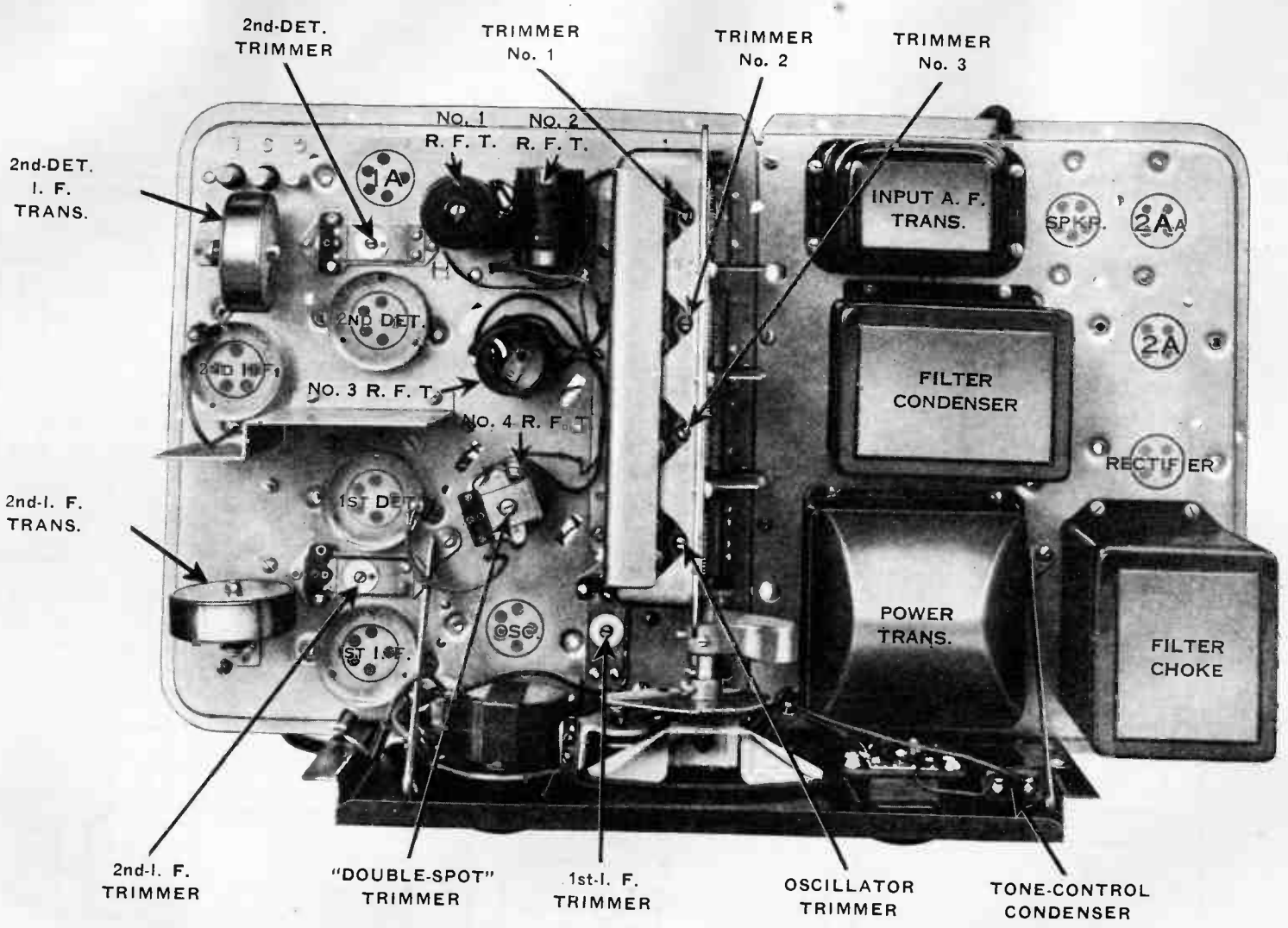


FIG. 272. TOP VIEW OF ATWATER KENT TYPE H-1 SUPER-HETERODYNE CHASSIS

ADJUSTING TRIMMERS ON TYPE H-1 CHASSIS

Make Adjustments In Order Listed

Read Instructions on Pages 259 and 262

Preliminary

(a) Couple the 130 K. C. oscillator to the set. See Section 2, Page 262.

(b) Connect the common pick-up lead from the four-wave oscillator to one end of a No. 8112 condenser. Connect the other end of this condenser to the Long-Antenna post. Connect the oscillator container to the Ground post.

(c) Connect the output measuring circuit shown on Page 256 to the speaker-plug socket on the set. Close S2 and S3. Throw S1 to the left. Put S4 on the second tap.

(d) Put all tubes in the set. Break away the sealing wax on the trimmer-condenser screws.

(e) Put special coil shield on No. 4 R. F. T. so the double-spot trimmer is accessible.

(f) Make initial adjustment of rotors and dial pointer to 1500 K. C. as described on Page 262.

I. F. Trimmers

(g) Switch on the set and the 130 K. C. oscillator. Adjust the 2nd-I. F. trimmer for maximum output. Keep meter reading about 50 by regulating volume control on set.

(h) Adjust the 2nd-detector trimmer for maximum output. Do not touch the 1st-I. F. trimmer unless the I. F. amplifier is unstable. In this case, turn the adjusting screw of this trimmer anti-clockwise until the amplifier becomes stable. Turn off the 130 K. C. oscillator.

Oscillator Trimmers

(i) Tune in the 1500 K. C. signal and adjust the oscillator trimmer to bring in this signal at exactly 150 on the dial.

(j) Adjust the **pre-selector trimmers** Nos. 1, 2 and 3 for maximum output.

(k) Turn dial pointer exactly to 80. Screw the oscillator-transformer adjusting disc in or out as necessary to the point that gives maximum output from the 800 K. C. signal.

(l) Turn dial pointer to 150. Re-set the oscillator trimmer to give maximum output from the 1500 K. C. signal.

(m) Turn dial pointer to 80. Re-set the disc for maximum output.

(n) Turn dial pointer **exactly** to 150. Adjust the oscillator trimmer for maximum reading.

(o) Repeat operations (m) and (n) if necessary. The object of this procedure is to bring in both the 1500 K. C. and the 800 K. C. signals at exactly the correct points on the dial; 150 and 80 respectively.

Double-Spot Trimmers

(p) Switch on the extra-strong 1500 K. C. signal and tune in its double-spot at 1240 K. C. Adjust the double-spot trimmer to give **minimum output.**

(q) Switch on the normal-strength 1500 K. C. signal and tune it in at 150. Adjust trimmer No. 3 to give maximum output.

(r) Repeat the instructions given in paragraphs (p) and (q) until further adjustment gives no change in output.

1st-I. F. Trimmer

(s) Tune in the 1000 K. C. signal and adjust the 1st-I. F. trimmer for maximum audible output with the volume control full on. If the I. F. amplifier is unstable, screw the 1st-I. F. trimmer anti-clockwise to a stable position.

Re-seal the trimmer screws.

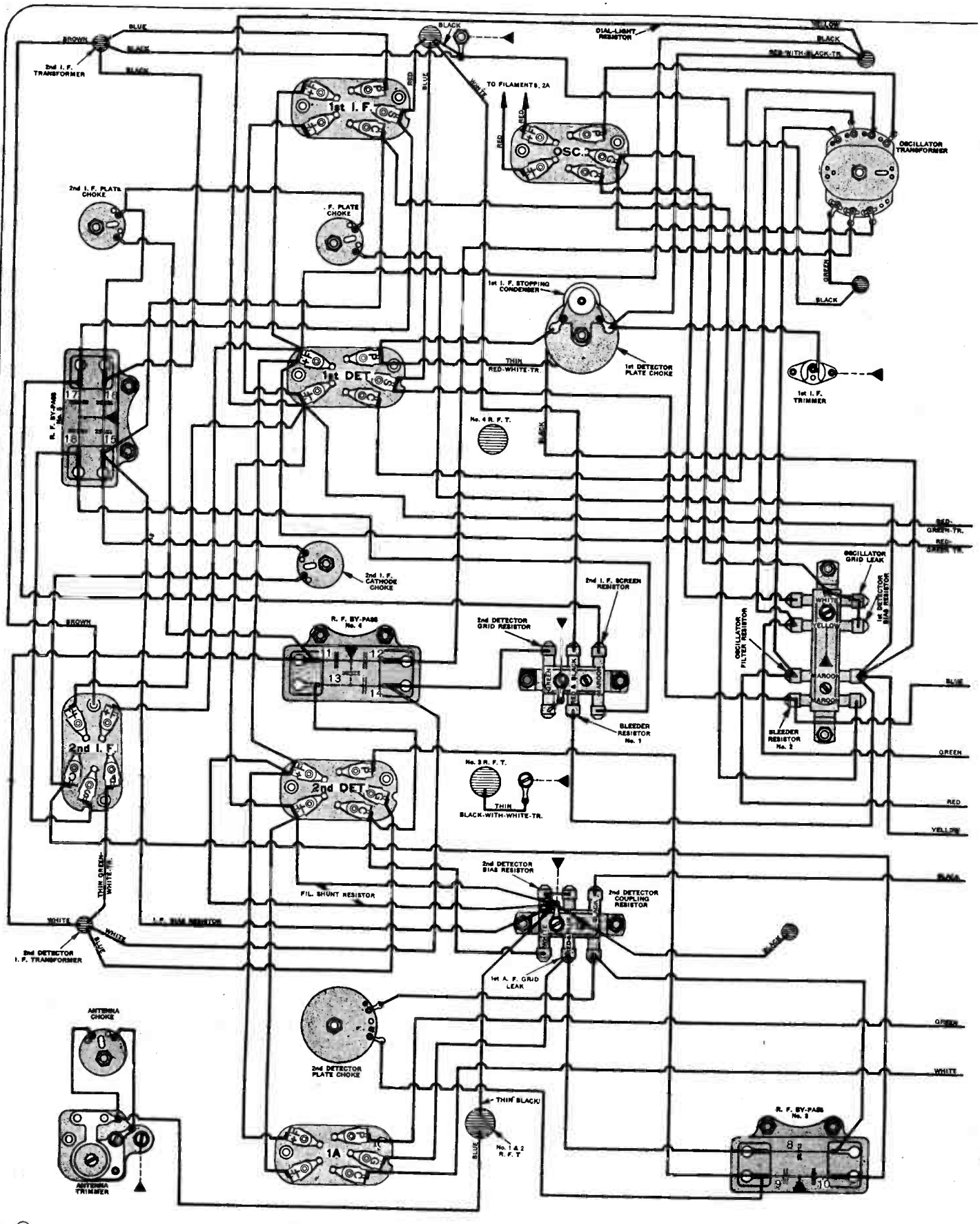


FIG. 273. BOTTOM WIRING OF R. F. SECTION OF TYPE H-2 CHASSIS

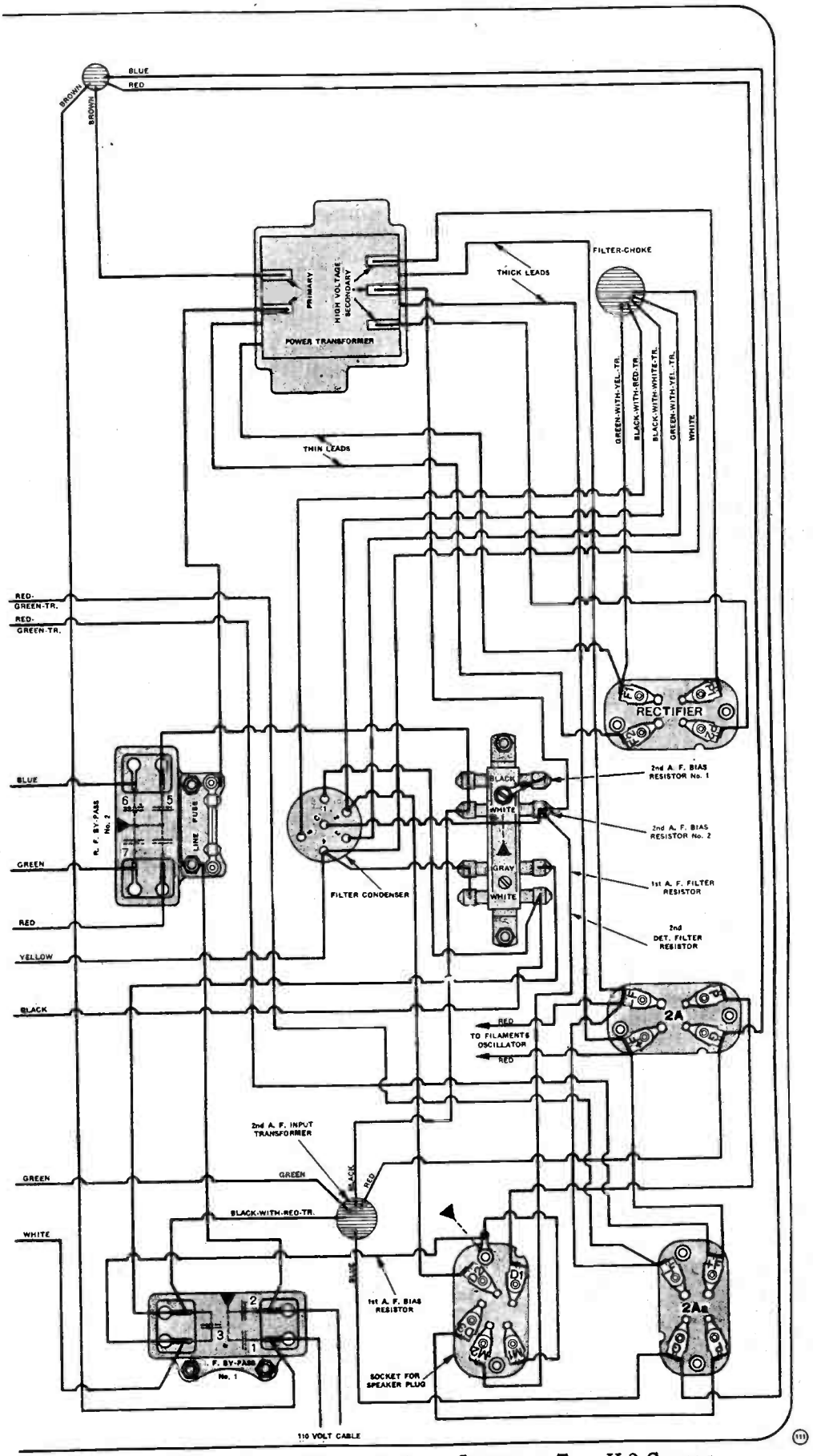


FIG. 273-A. BOTTOM WIRING OF AUDIO SECTION OF TYPE H-2 CHASSIS

By-pass Condensers in Type H-2 Chassis

R. F. By-Pass No. 1

1—Line by-pass.
2—Line by-pass.
3—1st-A. F. filter condenser.

R. F. By-Pass No. 2

4—Oscillator filter condenser.
5—2nd-A. F. bias by-pass.
6—1st-detector screen by-pass.
7—1st-detector bias by-pass.

R. F. By-Pass No. 3

8—Detector—1st-A. F. coupling condenser.
9—Phone condenser.
10—2nd-I. F. cathode by-pass.

R. F. By-pass No. 4*

11—2nd-I. F. plate by-pass.
12—Oscillator grid condenser.
13—2nd-detector bias by-pass.
14—2nd-detector grid-circuit by-pass.

R. F. By-Pass No. 5

15—I. F. bias by-pass.
16—I. F. plate-circuit by-pass.
17—1st-I. F. screen by-pass.
18—2nd-I. F. screen by-pass.

* This condenser should have code mark H-25. Do not use an H-26.

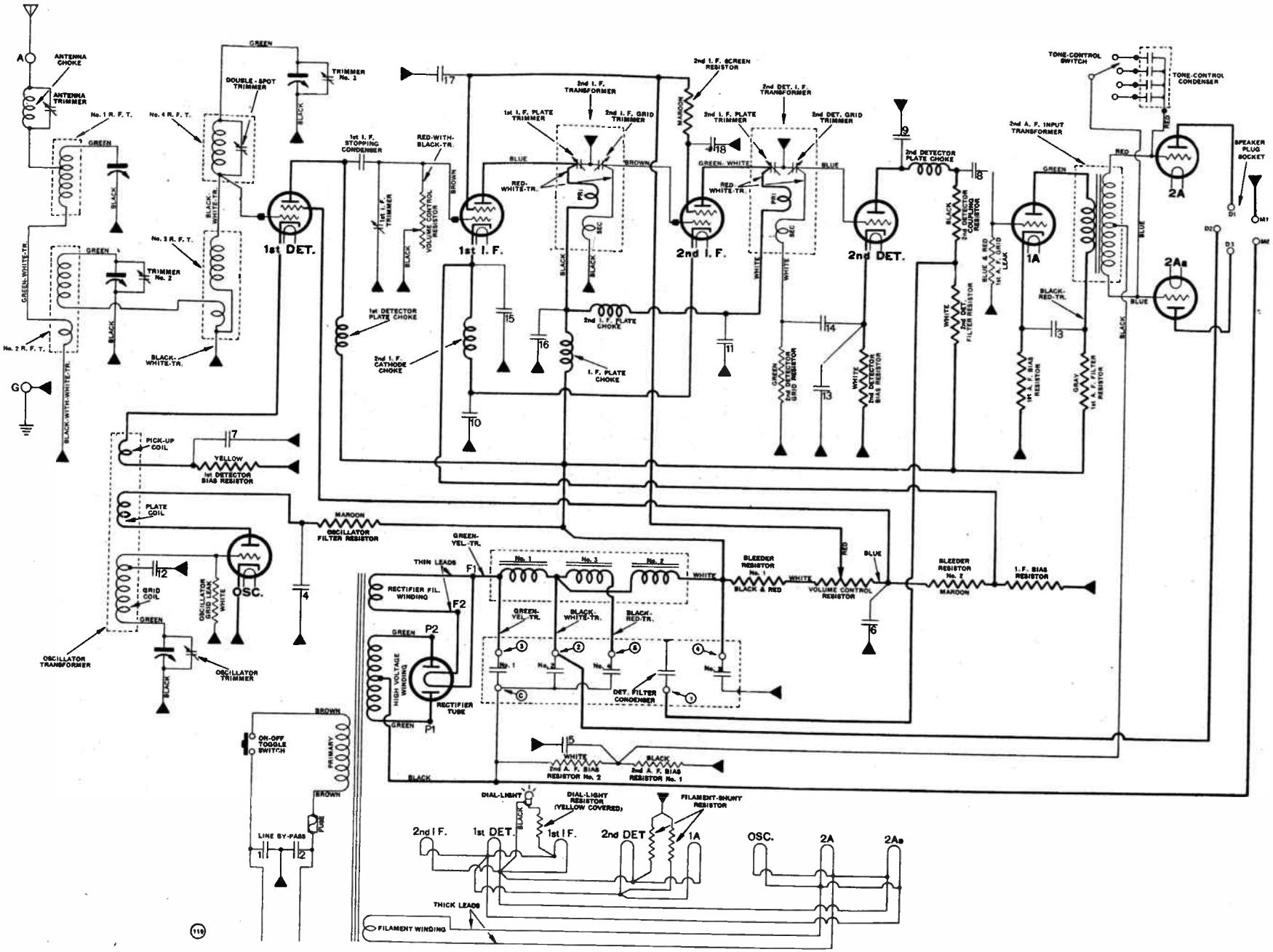


FIG. 274. SCHEMATIC DIAGRAM OF TYPE H-2 CHASSIS

For names of by-pass condensers see Page 271.

VOLTAGE TABLE FOR TYPE H-2 CHASSIS

Set in operation. Volume control at maximum

Use High-Resistance D. C. Voltmeter to Measure Plate and Grid Voltages

Use A. C. Voltmeter to Measure Filament Voltages

APPROX. VOLTAGES, USING 120 V. LINE

TYPE TUBE	POSITION IN SET	FILAMENT VOLTAGE	PLATE VOLTAGE	CONTROL-GRID VOLTAGE	SCREEN VOLTAGE
'24	1st-Det.	2.3	150	4	15
'27	Oscillator	2.5	130	10*	—
'24	1st-I. F.	2.3	150	3.5	100
'24	2nd-I. F.	2.3	150	3.5	85
'27	2nd-Det.	2.3	100	14**	—
27	1st-A. F.	2.3	70	2	—
'45	2A	2.5	250	55*	—
'45	2Aa	2.5	250	55*	—
'80	Rectifier	4.7	—	—	—

With the volume control at minimum, the I. F. screen voltage is reduced to about 15 volts.

* Use 250-volt scale.

** This is the voltage across the detector bias resistor; when measuring from grid to cathode, the voltage reading is only 2.

All readings made from cathode in heater-type tubes, and from —F in plain-filament-type tubes.

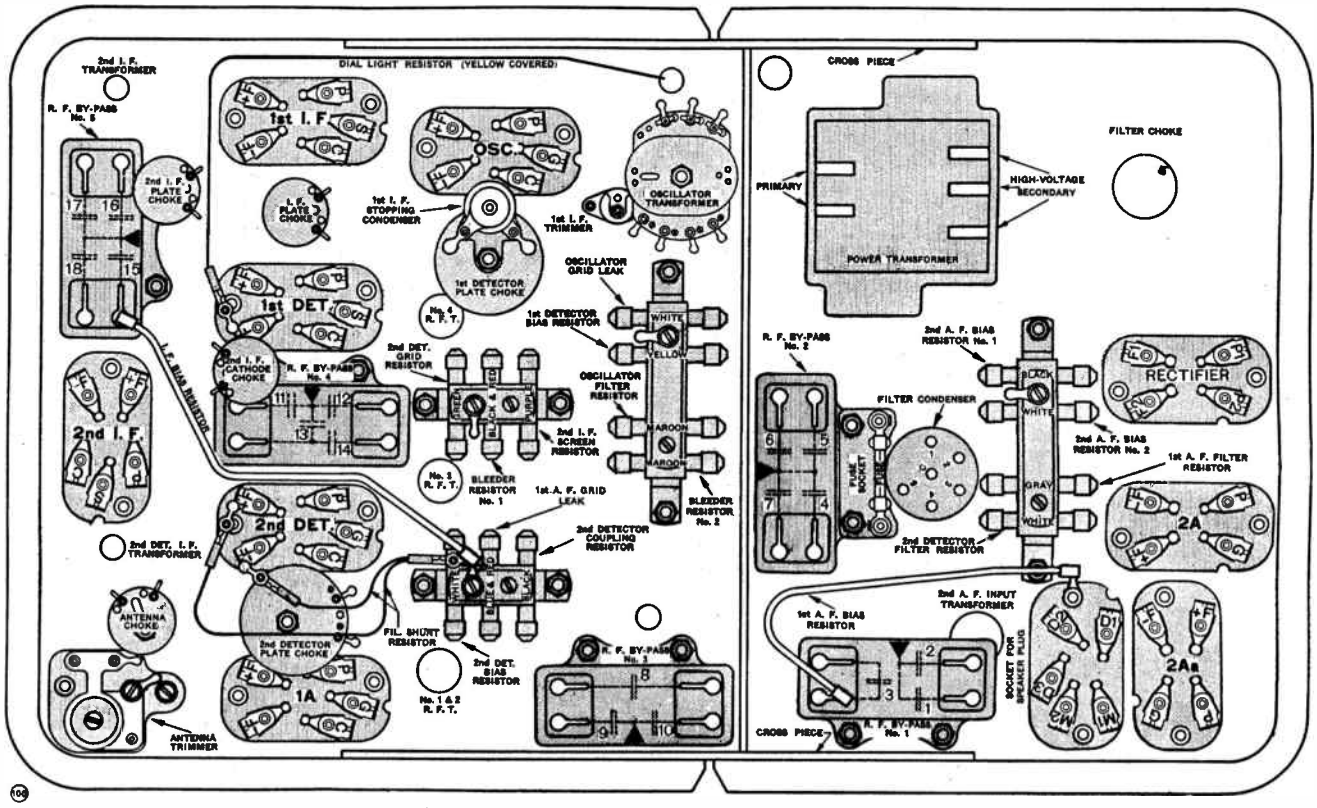


FIG. 275. BOTTOM VIEW OF TYPE H-2 CHASSIS

In this chart, the 2nd-I. F. screen resistor should be maroon instead of purple.

TYPE H-2, No. 16500, SUPER-HETERODYNE CHASSIS

(Above Serial No. 5,855,201)

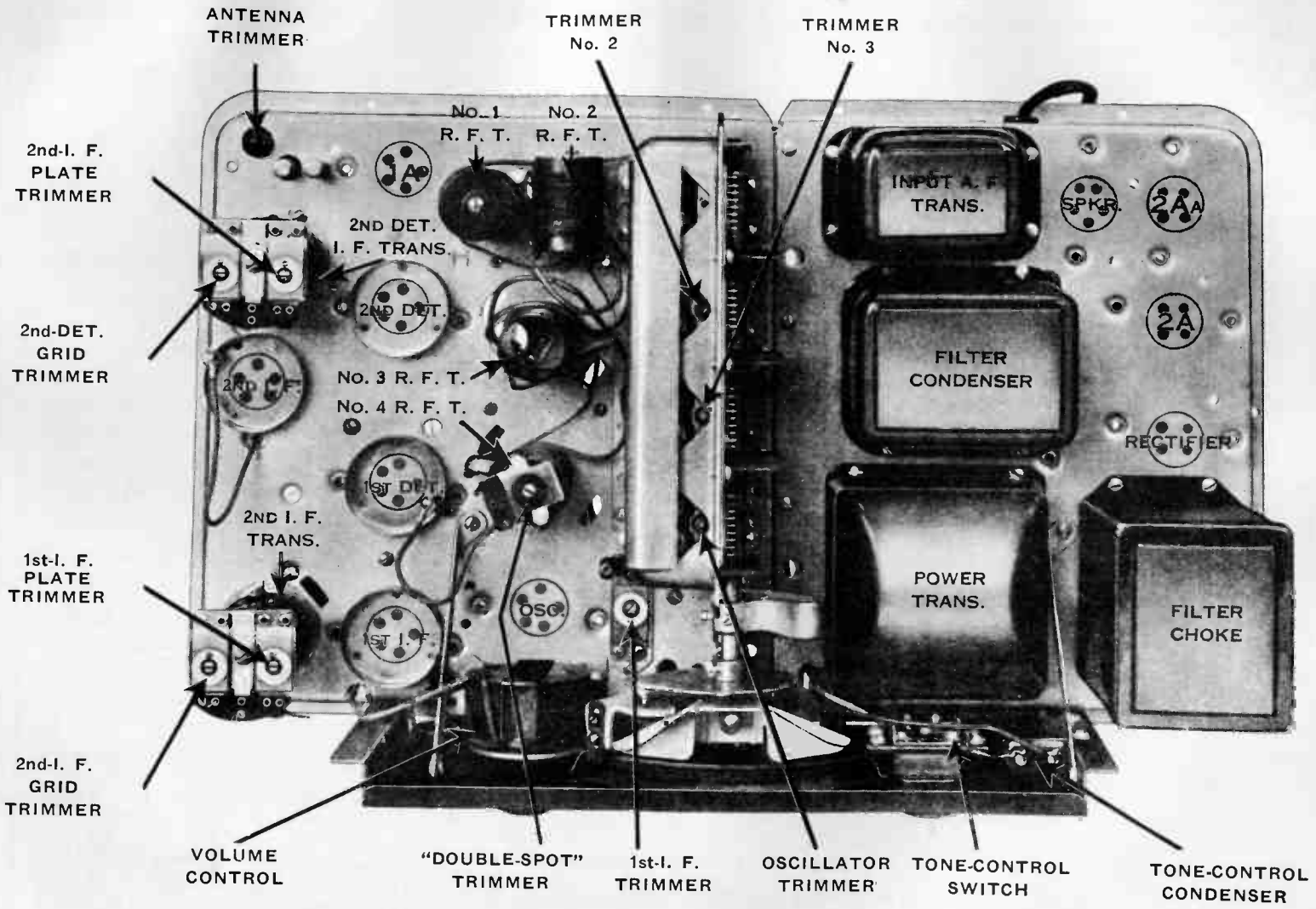


FIG. 276. TOP VIEW OF ATWATER KENT TYPE H-2 SUPER-HETERODYNE CHASSIS
Note that trimmer No. 1 is omitted. The antenna trimmer serves the same purpose

ADJUSTING TRIMMERS ON TYPE H-2 CHASSIS

Make Adjustments In Order Listed

Read Instructions on Pages 259 and 262

Preliminary

(a) Couple the 130 K. C. oscillator to the set. See Section 2, Page 262.

(b) Connect the common pick-up lead from the four-wave oscillator to one end of a No. 8112 condenser. Connect the other end of this condenser to the Antenna post. Connect the oscillator container to the Ground post.

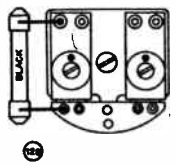
(c) Connect the output measuring circuit shown on Page 256 to the speaker-plug socket on the set. Close S2 and S3. Throw S1 to the left. Put S4 on the second tap.

(d) Put all tubes in the set. Break away the sealing wax on the trimmer-condenser screws.

(e) Put special coil shield on No. 4 R. F. T. so the double-spot trimmer is accessible. Also put special shields on the I. F. transformers.

(f) Make initial adjustment of rotors and dial pointer to 1500 K. C. as described on Page 262.

I. F. Trimmers



(g) Switch on the set and the 130 K. C. oscillator. Connect the black resistor across the 2nd-detector grid trimmer (see small illustration at left) and adjust the 2nd-I. F. plate trimmer for maximum output.

(h) Connect the resistor across the 2nd-I. F. plate trimmer and adjust the 2nd-detector grid trimmer for maximum output.

(i) Connect the resistor across the 2nd-I. F. grid trimmer and adjust the 1st-I. F. plate trimmer for maximum output.

(j) Connect the resistor across the 1st-I. F. plate trimmer and adjust the 2nd-I. F. grid trimmer for maximum output.

(k) Adjust the volume control to keep the output meter reading about 50 during these operations.
Turn off the 130 K. C. oscillator.

Oscillator Trimmers

Connect the black resistor across the 2nd-detector grid trimmer while adjusting the oscillator trimmers.

(l) Tune in the 1500 K. C. signal and adjust the oscillator trimmer to bring in this signal at exactly 150 on the dial.

(m) Adjust the antenna trimmer and trimmers Nos. 2 and 3 for maximum output from the 1500 K. C. signal.

(n) Turn dial pointer exactly to 80. Screw the oscillator-transformer adjusting disc in or out as necessary to the point that gives maximum output from the 800 K. C. signal.

(o) Turn dial pointer to 150. Re-set the oscillator trimmer to give maximum output from the 1500 K. C. signal.

(p) Turn dial pointer to 80. Re-set the disc for maximum output.

(q) Turn dial pointer **exactly** to 150. Adjust the oscillator trimmer for maximum output reading.

(r) Repeat operations (p) and (q) until further adjustment gives no change in dial reading. The object of this procedure is to bring in, without further adjustment, both the 1500 K. C. and the 800 K. C. signals at exactly the correct points on the dial: 150 and 80 respectively.

Double-Spot Trimmers

Remove the black resistor for this adjustment.

(s) Switch on the extra-strong 1500 K. C. signal and tune in its double-spot at 1240 K. C. Adjust the double-spot trimmer to give **minimum** output.

(t) Switch on the normal-strength 1500 K. C. signal and tune it in at 150. Adjust trimmer No. 3 to give maximum output.

(u) Repeat the instructions given in paragraphs (s) and (t) until further adjustment gives no change in output.

1st-I. F. Trimmer

Connect the black resistor across the 2nd-detector grid trimmer for this adjustment.

(v) With volume control full on, tune in the 1000 K. C. signal and adjust the 1st-I. F. trimmer for maximum audible output.
Re-seal the trimmer screws.

PARTS LIST—TYPE H-2, No. 16500, CHASSIS

BELOW SERIAL No. 5,855,201

(For Top View, see Page 268)

FRONT PANEL ASSEMBLY

Part No.	
19035	Front panel, complete
19036	Front panel, with dial plate
17224	Front-panel brace (2 used)
18551	Escutcheon
18339	Panel stud
17244	Volume-control or tone-control knob
17310	On-off switch
17270	Volume-control
18259	Volume-control bracket
18223	Tone-control condenser clamp
17959	Dial pointer
17814	Dial knob
16430	TONE-CONTROL SWITCH COMPLETE
18148	Base
18146	Shaft
18112	Contact blade

POWER UNITS

16660	Power transformer
17825	Power-transformer spring
17824	Power-transformer cover
17563	Power-transformer insulating sheet
15850	Filter condenser
18188	Filter-condenser case
17534	Filter-condenser spacer
17290	Filter choke
17302	Filter-choke lid
17280	INPUT A. F. TRANSFORMER
19034	VARIABLE-CONDENSER STATOR, ROTOR AND FRAME (with leads and balance weight)
17107	Rotor connection (long)
17291	Rotor connection (short)
17062	Trimmer mica
16420	Dial-light socket and reflector, less resistor and lead (one-hole mounting)
16420A	Dial-light socket and reflector, less resistor and lead (two-hole mounting)
18615	Dial gear
17936	Dial-knob bracket (one-hole mounting)
18144	Dial-knob bracket (two-hole mounting)
17935	Dial-knob bracket support
17941	Dial-knob shaft
17961	Dial rubber and bushing
17962	Pointer control arm
15404	Dial light
18236	Dial-light resistor
18866	Stopping spring (on oscillator variable condenser)

R. F. AND I. F. CHOKES

Part No.	
18220	2nd-I. F. stopping choke
18220	2nd-I. F. plate choke (small)
17390	2nd-I. F. plate choke (large)
18220	2nd-detector stopping choke
18220	2nd-I. F. cathode choke
17390	1st-I. F. plate choke
17390	2nd-detector plate choke
17410	1st-detector plate choke

R. F. AND I. F. TRANSFORMERS

19038	R. F. Coil Group
8519	No. 1 R. F. T. cap
18271	No. 2 R. F. T. bracket
	The R. F. coil group includes R. F. T. No. 1, 2, 3 and 4, and the double-spot trimmer. If one R.F. transformer requires replacement, replace the entire group.
17430	Oscillator transformer
19033	2nd-I. F. transformer
19033	2nd-detector I. F. transformer
18283	Mounting bracket
17295	R. F. transformer shield

SOCKETS

17518	1st-I. F. socket
17518	1st-detector socket
17519	2nd-detector socket
17519	1st-A. F. socket
17519	Oscillator socket
18774	2nd-I. F. socket
17509	2A socket
17511	2Aa socket
17377	Socket insulator (9 used)
18007	Speaker-plug socket
18016	Socket insulator
18449	Fuse socket
17508	Rectifier socket

MISCELLANEOUS PARTS

17524	110-volt cable, with plug
8956	Plug only
16741	Bushing for 110-volt cable
16742	Bushing-retaining spring
17521	Antenna and grd. post and base
17323	Base only
8215	Binding post
18286	Shield between I. F. trans.
15214	Tube-shield base (4 used)
15213	Tube-shield (4 used)
13989	Ground clamp
17223	Cross piece (10 in. by $\frac{7}{8}$ in.)
18117	Balance weight
	Trimmer-condenser sealing wax
17210	Literature assembly
18652	Instruction book
18118	Guide card (form F-680)
18119	Log card (form F-681)
18661	Shipping container
17536	Bottom plate
18534	Fuse (2 ampere)
18566	"Super Heterodyne" name plate

PARTS LIST—TYPE H-2, No. 16500, CHASSIS

BELOW SERIAL No. 5,855,201

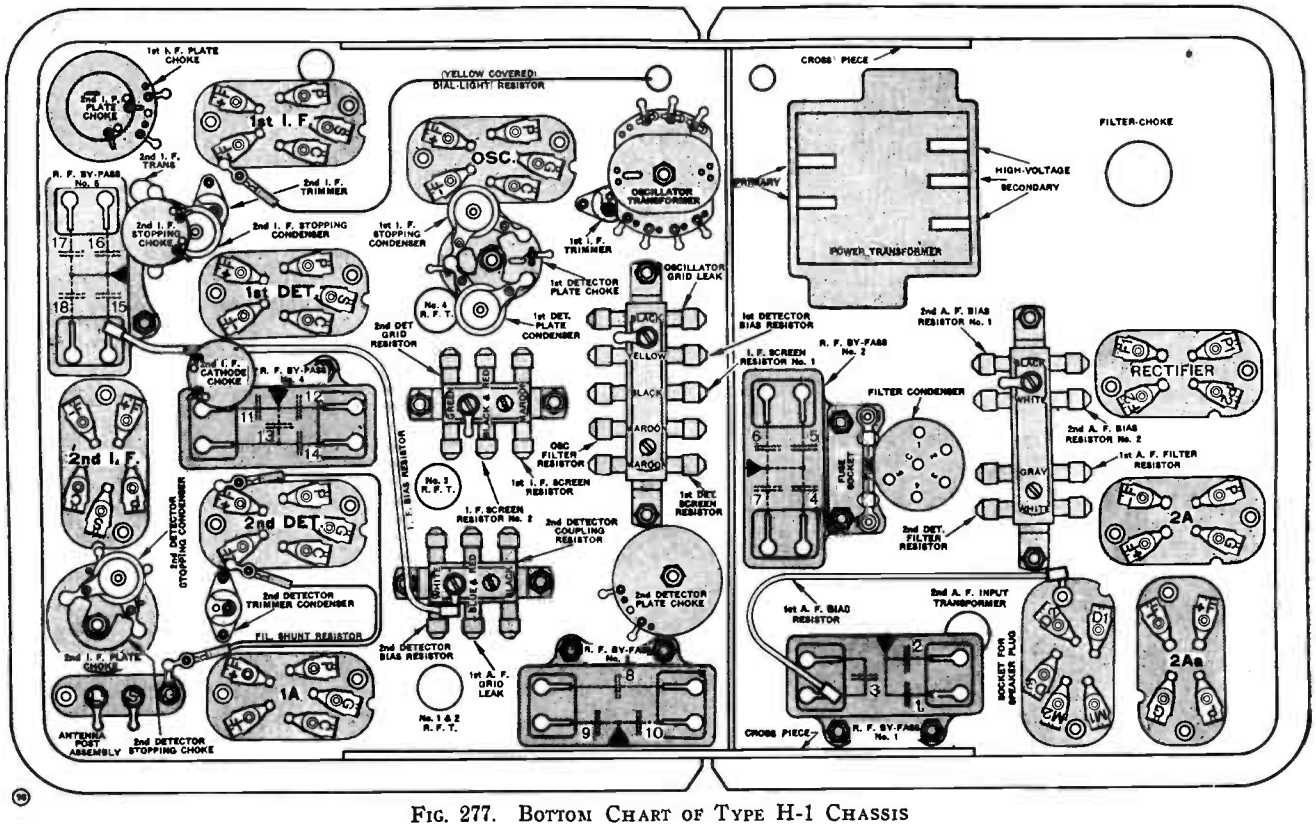


FIG. 277. BOTTOM CHART OF TYPE H-1 CHASSIS

TUBULAR RESISTORS
FIVE-RESISTOR GROUP

Part No.

15592 I. F. screen-grid resistor No. 1 (black) .....
15544 1st-det. bias resistor (yellow) ..
15545 1st-det. screen resistor (maroon)
15592 Oscillator grid leak (black) ....
15545 Oscillator filter resistor (maroon) .....
17118 Mounting bracket .....
17117 Fibre resistor-pad .....
17119 Metal clamping-strip .....

FOUR-RESISTOR GROUP

15592 2nd-A. F. bias resistor No. 1 (black) .....
16724 2nd-A. F. bias resistor No. 2 (white) .....
15285 1st-A. F. filter resistor (gray).
16724 2nd-det. filter resistor (white).
17118 Mounting bracket .....
17117 Fibre resistor-pad .....
17119 Metal clamping-strip .....

THREE-RESISTOR GROUPS

16282 1st-A. F. grid leak (blue and red) .....
15592 2nd-detector coupling resistor (black) .....
16724 2nd-detector bias resistor (white) .....

Part No.

15545 1st-I. F. screen resistor (maroon) .....
15891 I. F. screen resistor No. 2 (black and red).....
15892 2nd-detector grid resistor (green) .....
17341 Mounting bracket .....
17342 Fibre resistor-pad .....
17345 Metal clamping-strip .....

FLEXIBLE RESISTORS

16320 1st-A. F. bias resistor .....
17380 I. F. bias resistor.....
17077 Filament-shunt resistor .....
18236 Dial-light resistor .....

FIXED CONDENSERS

17360 R. F. by-pass No. 1.....
15262 R. F. by-pass No. 2 or No. 5...
16745 R. F. by-pass No. 3.....
17370 R. F. by-pass No. 4.....
16490 Tone-control condenser .....
17440 1st-I. F. stopping cond. (thick).
17470 1st-detector plate condenser (X scratched on fibre).....
17974 2nd-detector stopping condenser
17974 2nd-I. F. stopping condenser...

TRIMMER CONDENSERS

17230 "Double-spot" trimmer.....
17240 2nd-detector trimmer .....
17240 1st-I. F. or 2nd-I. F. trimmer..

PARTS LIST—TYPE H-2, No. 16500, CHASSIS

ABOVE SERIAL No. 5,855,201

(For Top View, see Page 274)

FRONT PANEL ASSEMBLY

Part No.	
19035	Front panel, complete
19036	Front panel, with dial plate
17224	Front-panel brace (2 used)
18551	Escutcheon
18339	Panel stud
17244	Volume-control or tone-control knob
17310	On-off switch
17270	Volume control
18259	Volume-control bracket
18223	Tone-control condenser clamp
17959	Dial pointer
17814	Dial knob

16430	TONE-CONTROL SWITCH COMPLETE
18148	Base
18146	Shaft
18112	Contact blade

POWER UNITS

16660	Power transformer
17825	Power-transformer spring
17824	Power-transformer cover
17563	Power-transformer insulating sheet
15850	Filter condenser
18188	Filter-condenser case
17534	Filter-condenser spacer (fibre)
17290	Filter choke
17302	Filter-choke lid

17280	INPUT A. F. TRANSFORMER

19324	VARIABLE-CONDENSER STATOR, ROTOR AND FRAME (with leads and balance weight)
17107	Rotor connection (long)
17291	Rotor connection (short)
17062	Trimmer mica
16420A	Dial-light socket and reflector, less resistor and lead
18615	Dial gear
18144	Dial-knob bracket
17935	Dial-knob bracket support
17941	Dial-knob shaft
17961	Dial-rubber and bushing
17962	Pointer control arm
15404	Dial light
18236	Dial-light resistor
18866	Stopping spring (on oscillator variable condenser)

R. F. AND I. F. TRANSFORMERS

Part No.	
19497	R. F. Coil Group
8519	No. 1 R. F. transformer cap
18271	No. 2 R. F. T. bracket
	The R. F. coil group includes R. F. T. No. 1, 2, 3 and 4, and the double-spot trimmer. If one R.F. transformer requires replacement, replace the entire group.
17430	Oscillator trans.
19225	2nd-I. F. transformer
19226	2nd-detector I. F. transformer
17295	Transformer shield (1 used)
18261	Transformer shield (3 used)

TRIMMER CONDENSERS

19326	Antenna trimmer (less antenna and ground posts)
17230	"Double-spot" trimmer
17240	1st-I. F. trimmer
18150	2nd-I. F. grid trimmer and 1st-I. F. plate trimmer
18150	2nd-det. grid trimmer and 2nd-I. F. plate trimmer

FIXED CONDENSERS

17360	R. F. by-pass No. 1
15262	R. F. by-pass No. 2
16745	R. F. by-pass No. 3
17370	R. F. by-pass No. 4
15262	R. F. by-pass No. 5
16490	Tone-control condenser
17440	1st-I. F. stopping condenser

MISCELLANEOUS PARTS

17524	110-volt cable, with plug
8956	Plug only
16741	Bushing for 110-volt cable
16742	Bushing-retaining spring
8215	Binding post (antenna or ground)
15214	Tube-shield base (4 used)
15213	Tube-shield (4 used)
13989	Ground clamp
17223	Cross piece (10 in. by $\frac{7}{8}$ in.—2 used)
18117	Balance weight
	Trimmer-condenser sealing wax
18180	Literature assembly
19192	Instruction book
18118	Guide card (form F-680)
18119	Log card (form F-681)
18661	Shipping container
17536	Bottom plate
18534	Fuse (2 ampere)
18566	"Super Heterodyne" name plate

PARTS LIST—TYPE H-2, No. 16500, CHASSIS

ABOVE SERIAL No. 5,855,201

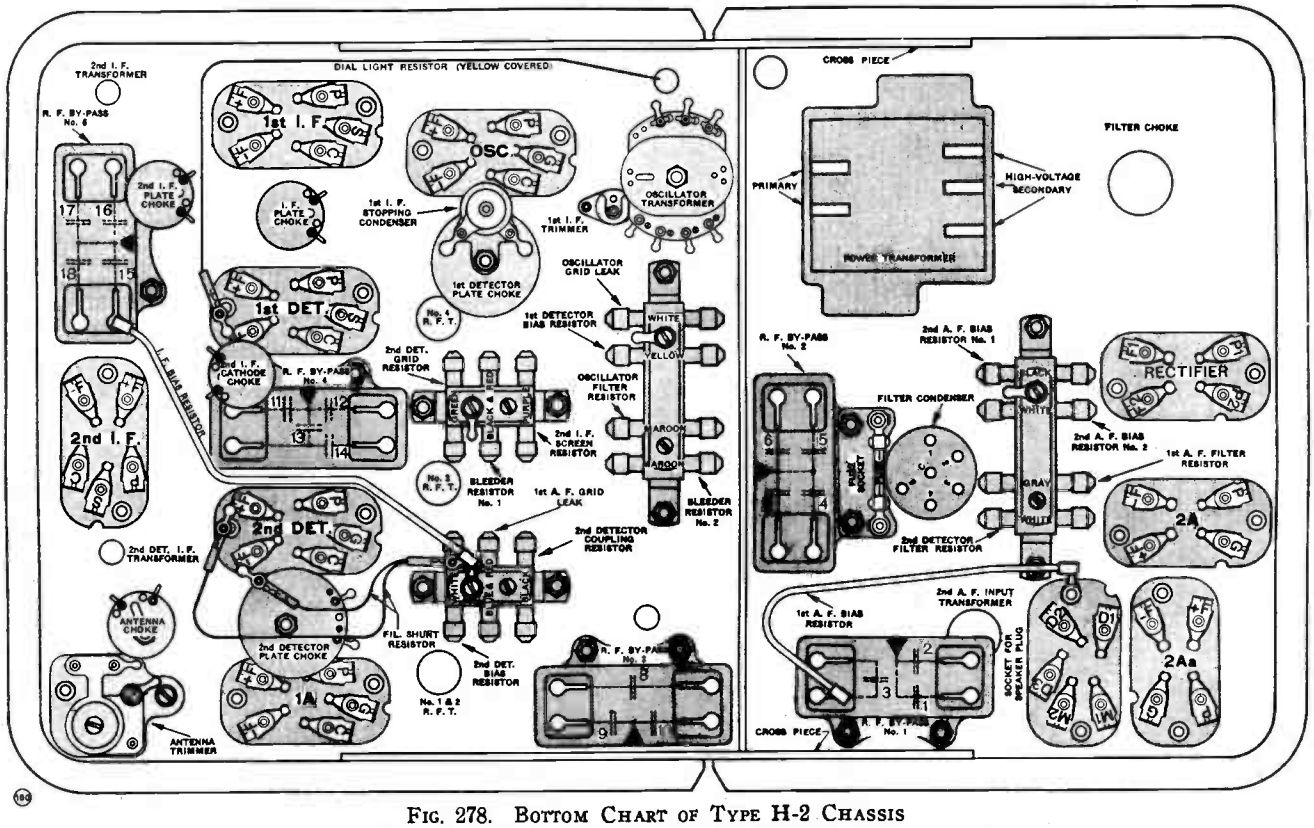


FIG. 278. BOTTOM CHART OF TYPE H-2 CHASSIS

In this chart, the 2nd-I. F. screen resistor should be maroon instead of purple.

TUBULAR RESISTORS
FOUR-RESISTOR GROUPS

Part No.	
15592	2nd-A. F. bias resistor No. 1 (black)
16724	2nd-A. F. bias resistor No. 2 (white)
15285	1st-A. F. filter resistor (gray)
16724	2nd-det. filter resistor (white)
15545	Bleeder resistor No. 2 (maroon)
15544	1st-det. bias resistor (yellow)
16724	Oscillator grid leak (white)
15545	Oscillator filter resistor (maroon)
17118	Mounting bracket
17117	Fibre resistor-pad
17119	Metal clamping-strip

THREE-RESISTOR GROUPS

16282	1st-A. F. grid leak (blue and red)
15592	2nd-detector coupling resistor (black)
16724	2nd-detector bias resistor (white)
15545	2nd-I. F. screen resistor (maroon)
15891	Bleeder resistor No. 1 (black and red)
15892	2nd-detector grid resistor (green)

Part No.	
17341	Mounting bracket
17342	Fibre resistor-pad
17345	Metal clamping-strip

SOCKETS

17518	1st-I. F. socket
17518	1st-detector socket
17519	2nd-detector socket
17519	1st-A. F. socket
17519	Oscillator socket
18774	2nd-I. F. socket
17509	2A socket
17511	2Aa socket
17508	Rectifier socket
17377	Socket insulator (9 used)
18007	Speaker-plug socket
18016	Socket insulator
18449	Fuse socket

FLEXIBLE RESISTORS

16320	1st-A. F. bias resistor
17380	I. F. bias resistor
17077	Filament-shunt resistor
18236	Dial-light resistor

R. F. AND I. F. CHOKES

18220	Antenna choke
18220	2nd-I. F. plate choke
18220	2nd-I. F. cathode choke
17390	2nd-detector plate choke
18160	1st-detector plate choke
18220	I. F. plate choke

PARTS LIST—TYPE N, 16400, CHASSIS SPEAKERS

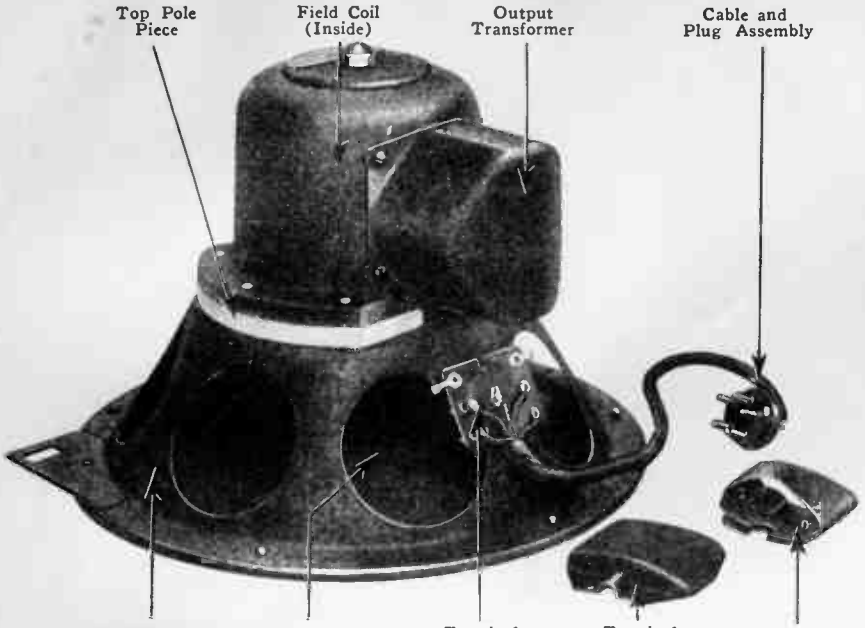


FIG. 279. TYPE N SPEAKER

Part No.	
18081	Diaphragm
16410	Field coil
18093	Field-coil insulator
18075	Field-coil spacer
18055	Top pole piece
18073	Cone-housing and card
17889	Terminal card
17796	Terminal insulator
17803	Terminal-card cover
17895	Cable and plug
18582	Plug only
14382	Steel ring
16390-A	Output transformer 5-conductor cable
18068	Instruction sheet
15578-N	Shipping container

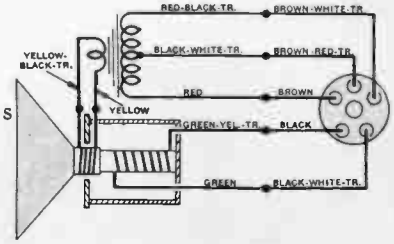


FIG. 280. CONNECTIONS OF N SPEAKER

SMALL PARTS ON H-1 AND H-2 CHASSIS AND N SPEAKER

Illustrations are Full Size