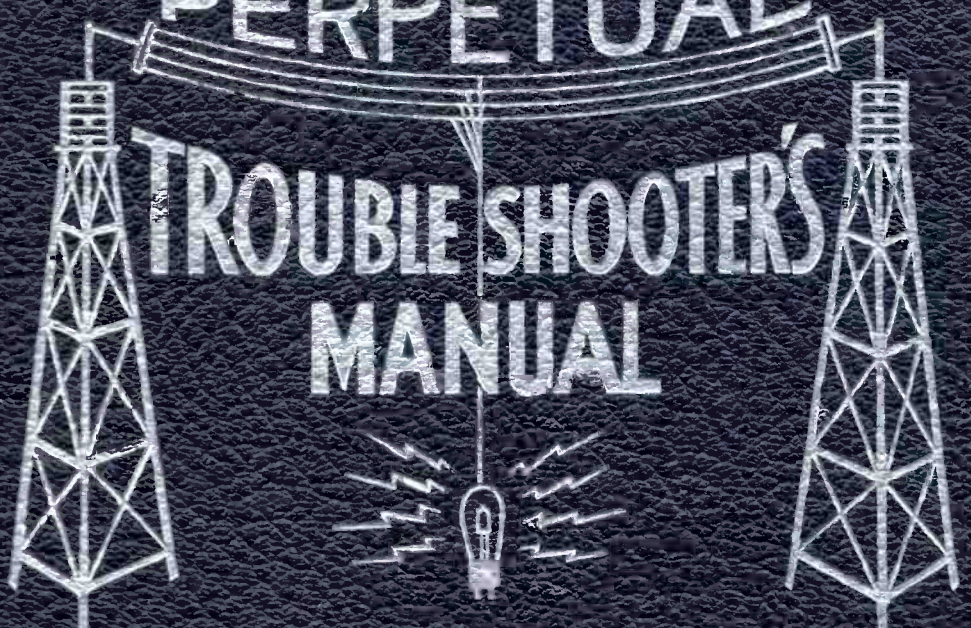
VOLUME V

PERPETUAL TROUBLE SHOOTER'S MANUAL



JOHN F. RIDER

MODEL 1932 Type
Single Reed
Elkonodes

P. R. MALLORY & CO.

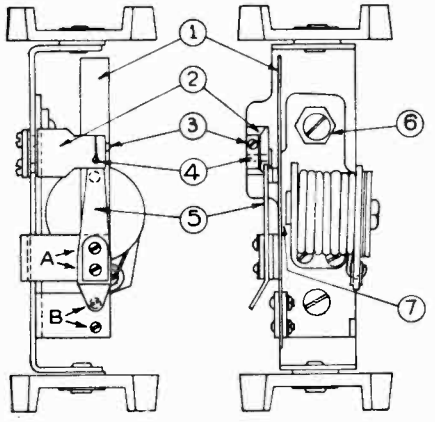
Directions for Servicing 1932 Type Mallory 'Single-Reed' Elkonodes

The 1932 type Mallory Elkonode is a half-wave, single-reed converter used with a BR Raytheon tube for rectification. This Elkonode is supplied in six standard types—from 1 to 6 inclusive—and modifications are supplied for special requirements, such as S101, S102, S103, T112, and S111. 12-volt single-reed Elkonodes are supplied in types G1 to G6 inclusive, and 32-volt Elkonodes in types from F1 to F6 inclusive.

The mechanical construction of the single-reed Elkonode is the same in all types with the exception of the size and number of turns of wire on the Elkonode coil. Following is a table of characteristics indicating the output obtainable from these standard Elkonodes:

Milli-amperes	12	15	17	20	22	25	27	30	32	35	37	40	42	45	47	50
Volts																
220	2	3	4	4	5	6	6									
210	2	3	3	4	5	5	6	6								
200	2	3	3	4	4	5	5	6								
190	2	3	3	4	4	5	5	6	6							
180	1	2	3	3	4	4	5	5	6	6						
170		2	3	3	4	4	5	5	6	6	6					
160		2	2	3	3	4	4	5	5	6	6					
150		2	2	3	3	4	4	4	5	5	6	6	6			
140		1	2	3	3	3	4	4	4	5	5	6	6	6		
135		1	2	2	3	3	3	4	4	5	5	5	6	6		

The following reproductions picture the Mallory single-reed Elkonode in two positions:



No. I

1. Reed Assembly
2. Stop Post mntg. block
3. Stop Post locking-screw

No. II

4. Stop-Post
5. Contact Spring Assm.
6. Cam-nut adjustment

7. Air-gap

(1) is a side view showing the Elkonode with cover and rubber cushion removed. (2) is a front view with can and cushion removed. Numbered arrows clearly indicate the position of the Elkonode parts involved in installing new contact spring assemblies and new reed assemblies.

Routine for Dismantling Elkonodes for the Purpose of Replacing Contact and Reed Springs

(a) Remove screws which fasten outer housing or can to base.

(b) Hold can in upright position and tamp gently against hand permitting base and rubber housing inside of can to drop out gently. (CAUTION: Do not attempt to remove Elkonode assemblies from cans by pulling on the base.)

(c) Remove rubber cushion from Elkonode assembly in the same manner as entire assembly was removed from can.

TO REMOVE SPRINGS:

(d) Remove contact spring assembly by extracting screws at point marked "A" on above diagram.

(e) Remove reed assembly by extracting screws at point marked "B" on above diagram.

(f) Install reed assembly, using care to insure that metal blocks in which this reed is mounted are squarely aligned. NOTE: Use only Kester Resin Core Solder.

(g) Install contact spring assembly using care to properly align metal blocks in which this spring assembly is mounted.

(h) Inspect alignment of contact points to insure that contacts on both reed and contact springs are in proper alignment, and that their surfaces engage squarely and evenly. Alignment of these points is controlled by the position of the springs, and the screws mounting these springs should not be tightened firmly until the points are in alignment.

(i) With points in proper alignment, the air-gap or clearance between pole-piece of the coil and reed should be adjusted to approximately 1/32 inch. This adjustment is provided for by the cam nut and locking screw at point marked "6" in diagram 2. The reed should be in a perfectly perpendicular plane, and the surface of the pole-piece or core of the coil should be exactly parallel with surface of reed.

MODEL 1933-34 Type
Dual Reed Elkonodes

P. R. MALLORY & CO.

(j) Loosen the locking screw of the stop post (identified at point 3, on diagram 1) and adjust the stop post (identified at point 4, diagram 1) so that the tip of contact spring assembly engages screw-side of stop post head, allowing contacts to meet with a light pressure. This stop post is easily adjusted by turning to left until head of contact post pulls contact on left, or contact spring, away from contact on right, or reed contact. Then turn stop post screw to right about 1/8 to 1/4 turn, until contact points meet the light pressure. At this point, stop post locking screw should be firmly tightened down to hold stop post in this position.

(k) If the foregoing mechanical adjustment has been carefully followed out the Elkonode is now ready for Electrical Tests. These tests should be conducted with a master Eliminator, into which the Elkonode can be inserted while the can and rubber cushion are still removed, and with a "dummy" load on the Eliminator which will require 180 volts at 35 m.a. for Elkonode types 6, S101, S102, S103, S111, and T112. The output of the Elkonode is adjusted by increasing or decreasing the air-gap clearance between pole-piece of coil and surface of the armature reed. A cam nut and locking screw arrangement provide a flexible adjustment which sometimes must be supplemented by inserting thin metal shims between coil and bracket. NB—Shims are required only where construction of the unit will not permit air-gap clearance being decreased to point required, by adjustment of cam nut.

(l) Electrical adjustment for other types of Elkonodes, from 1 to 5 inclusive, must be conducted with "dummy" load to equal maximum output available from whichever type Elkonode is involved per characteristics shown in the foregoing table.

(m) Extreme care must be exercised to insure that no dirt or foreign matter is allowed to accumulate on contact points and that entire Elkonode assembly is kept thoroughly dry.

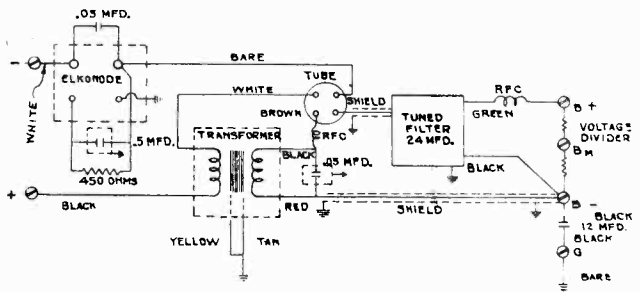
(n) Excessive sparking usually results from improper pressure between and alignment of contact points. If it is found necessary to bend the reed to secure a flat alignment of points, this should be done very carefully, using a pair of thin flat-nosed pliers, to grasp the reed firmly *at the base where it is mounted*. A very slight pressure at this point will be required to change the angle of contact for vibrator points. *No sparking* whatever results from improper adjustment of stop post, permitting contact springs to follow reed springs past the center of cycle of amplitude or arc of vibration. Contacts should be lightly touching when at rest so there is about .014 inch clearance between stop post and contact spring. Stop post will then break this contact at the center of cycle of amplitude.

If the foregoing instructions are followed carefully, and if reliable instruments are used to measure the output of the Elkonode when electrical adjustments are being completed, you should be able to install contact and reed spring assemblies without difficulty. When adjustments have been completed to your satisfaction, place vibrator assembly inside rubber cushion by holding cushion in inverted position, and allowing assembly to drop into place. Next, place entire assembly inside can, in same manner, and fasten can to base, using screws provided for that purpose.

Thorough instructions for servicing other parts of the Mallory Elkon "B" Eliminator are provided in the service and installation bulletin accompanying each unit,—copies of which may be had upon request.

The following equipment is recommended as being extremely useful in conducting repairs on Mallory-Elkon "B" Eliminators and Elkonodes:

1. High resistance volt-meter. Scale: 0 to 300. Resistance: Not less than 1000 ohms per volt.
2. One good quality milliammeter. Scale: 0 to 50.
3. One set feeler gauges.
4. One small screw-driver.
5. One pair thin, flat-nosed pliers (duck-bill type).
6. One 1932 Mallory-Elkon "B" Eliminator chassis.
7. One variable resistor—"dummy" load arrangement to duplicate maximum load for which each of six standard types of Elkonodes is designed.



Directions for Servicing 1933-34 Type Dual-Reed Mallory 'Self-Rectifying' Elkonodes

The 1933 Mallory Self-Rectifying Elkonode is a dual-reed converter which within itself sets up the essentially alternating current required, and likewise rectifies it to the form of direct current required for radio receiver plate supply. No rectifying tube is used with the 1933 Mallory Self-Rectifying Elkonode.

This Elkonode is supplied in five standard types—from 10 to 14 inclusive—and modifications are supplied for special requirements under such designations as Nos. 30, 31, 34, 35 (for Motorola Receivers), and Nos. 36 and 37. 12-volt types are supplied in types G10 to G14 inclusive, and 32-volt types from F10 to F14 inclusive. The mechanical construction of the dual-reed Self-Rectifying Elkonode is the same in all types with the exception of size and number of turns of wire on Elkonode coil.

MODEL 1933-34 Type
Dual Reed Elkonodes
Dismantling-Repair

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Following is a table of characteristics indicating output obtainable from each standard Elkonode at storage battery terminal voltage of 6.6, for the 6-volt, 13.2 for 12-volt type.

ELKONODE RATING TABLE

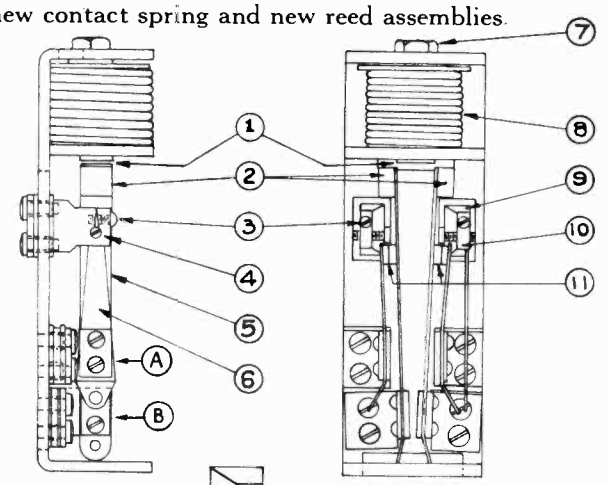
Elkonode Type	Volts Output	For Receivers Requiring the Following Current in Milliamperes in the B Minus Lead at 200 V. on Signal		Elkonode Rated Output Watts	Storage Battery Drain in Amps.
		Without Voltage Dividers in Elim.	With 2 M. A. (100,000 Ohm) Voltage Divider in Elim.		
10	200	40–45	38–43	8.4	2.1
11	200	35–40	33–38	7.4	1.9
12	200	30–35	28–33	6.4	1.6
13	200	25–30	23–28	5.4	1.4
14	200	20–25	18–23	4.4	1.2

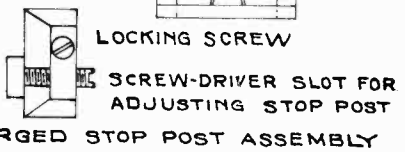
Current at which Phantom Load Relay should be adjusted

Elkonode Type	No. 10	No. 11	No. 12	No. 13	No. 14
Current	20 M.A.	17.5M.A.	15 M.A.	12.5M.A.	10 M.A.

Special Types Should be Adjusted to SET MFRS. Specifications (See Paragraph "N")

The following reproductions picture the Mallory dual-reed or self-rectifying Elkonode in two positions: (3) is a side view showing the Elkonode with cover and rubber cushion removed, and (4) is a front view with cover and cushion removed. Numbered arrows clearly indicate position of Elkonode parts involved in installing new contact spring and new reed assemblies.





ENLARGED STOP POST ASSEMBLY

No. III
1. Air-gap
2. Reed counter weights
3. Stop-post Locking-screw
4. Stop-post
5. Reed Spring Assm.
6. Contact Spring Assm.

No. IV
7. Coil mounting nut
8. Coil
9. Stop-post mounting block
10. Position contact spring behind stop-post head
11. Contact points

Routine for Dismantling Dual-Reed or Self-Rectifying Elkonodes for the Purpose of Replacing Contact and Reed Springs

(a) Remove screws which fasten outer housing or can to base.

(b) Hold can in upright position and tamp gently against hand, permitting base and rubber housing inside of can to drop out gently. (CAUTION: Do not attempt to remove Elkonode assemblies from cans by pulling on base.)

(c) Remove rubber cushion from Elkonode assembly in the same manner as entire assembly was removed from can.

(d) With internal assembly in view, displace condensers by turning each outward from center carefully.

TO REMOVE SPRINGS AND REEDS:

(e) Remove contact spring assembly by extracting screws at point marked "A" on above diagram, No. III.

(f) Remove reed assembly by extracting screws at point marked "B" on above diagram No. III.

(g) Install reed assembly, using care to insure that metal brackets in which these reeds are mounted are squarely aligned with reeds. (NB—Use only Kester Rosin Core Solder.)

(h) Install contact spring assembly using care to properly align metal brackets and blocks with which this assembly is mounted.

(i) Inspect alignment of contact points to insure that contacts on reed and contacts on springs are in proper alignment. Their surfaces must engage squarely and evenly. Alignment of points is controlled by the position of the springs. Screws mounting these springs should not be tightened firmly until points are in alignment.

(j) With points in proper alignment, air-gap or clearance between pole-piece of coil and counter-weights on ends of reed assemblies should be adjusted to approximately 1/32 inch, when reeds are pulled in to *center position*. This adjustment is provided for by removing or inserting shims between the Elkonode frame and coil, at top of coil.

(k) Loosen locking screw of stop posts (identified at point 3, diagram III, above) so that tips of contact spring assembly engage screw-side of stop post head, allowing contacts to meet with contacts on reed assemblies at light pressure. Stop post is adjusted by turning to left until head of contact post pulls contact springs away from contact on reed assembly. Then turn stop post screw to right (about 1/8 to 1/4 turn) until contact points on both contact spring and reeds meet with light pressure. At this point, stop post locking screw should be firmly tightened to hold stop post in this position.

MODEL 1933-34 Type
Dual Reed Elkonodes
Dismantling and
Adjustments

P. R. MALLORY & CO.

(l) It is extremely important, if secondary reed and contact spring assembly show any sign of having been burned as a result of "arcing," that condenser No. 16611, rated at .01 mfd. 1600 V., used across the secondary side of the Elkonode be replaced with a new one.

(m) Elkonodes which have become inoperative through the breaking down of this condenser, or which show evidence of overload at contact points, should never be replaced in Eliminators or automotive radio receivers until the adjustment of the "phantom load" relay has been checked carefully. Following is an outline of the causes which may bring about Elkonode failure through no fault of the Elkonode, and the method for correcting them:

(n) Elkonode failure is usually the result of a "no load" operating condition, which ordinarily is due to (A) film of dirt between contact points of phantom load relay, (B) iron filings between core and clapper of phantom load relay, (C) insufficient tension in phantom load relay springs, (D) open phantom load resistor, (E) receiver output tube defective, (F) connections to output tube open.

Most prevalent of these difficulties are items (B) and (C) which invariably cause Elkonode failure through no fault of the Elkonode.

Conditions (A) and (B) are corrected by thorough cleaning with strips of paper. Condition (C) is corrected by inserting milliammeter in coil circuit of phantom load relay, or in B+ lead to receiver, and adjusting spring tension so that relay clapper will pull to core when current is equivalent to current rating for that type of Elkonode, as indicated in foregoing table. Conditions (D) and (F) are detected by continuity checks, while Condition (E) is detected by means of a tube tester.

(o) A choke coil is mounted within the rubber cushion in the base of the Elkonode can, and the continuity of this choke coil should be checked by continuity tests between mounting prongs and soldering terminal of the secondary contact spring assembly.

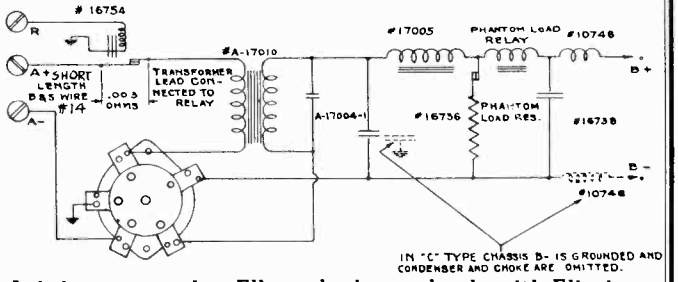
(p) If the foregoing mechanical adjustments have been carefully followed out, the Elkonode is now ready for electrical tests. These tests should be conducted with a master Eliminator, into which the Elkonode can be inserted while the can and rubber cushion are still removed. A "dummy" load to equal the output characteristics of whichever type dual-reed self-rectifying Elkonode is involved should be imposed, and all tests should be conducted with a battery terminal voltage of 6.6. Special types of Elkonodes designed for so-called "all-electric" automotive receivers may best be tested in this same manner, or with a "dummy" resistor load to match the output characteristics of that Elkonode.

(q) Extreme care must be exercised to insure that no dirt or foreign matter is allowed to accumulate on contact points, and that the entire Elkonode assembly is kept thoroughly dry.

(r) "Excessive sparking" usually results from improper pressure between and alignment of contact points. If it is found necessary to bend reed assembly to secure flat alignment of points, this should be done by carefully grasping reed assembly at bracket where it is mounted with a pair of thin, flat-nosed pliers. A very slight pressure will be required to change the angle of contact for vibrator points. "No sparking" results from improper adjustment of stop post, permitting contact spring to follow reed spring past center of cycle of amplitude or arc of vibration. Contacts should be lightly touching when at rest, so a clearance of approximately .012 exists between stop post head and contact spring on interrupter side and .002 to .006 on rectifier side. Stop post will then break these contacts at center of cycle of amplitude.

If the foregoing instructions are followed carefully, and if reliable instruments are used to measure output of Elkonodes when electrical adjustments are being completed, you should be able to install these contact spring and reed assemblies without difficulty. When adjustments have been completed to your satisfaction, place vibrator assembly inside rubber cushion by holding cushion in inverted position and allowing assembly to drop into place. Next, place entire assembly inside can, in the same manner, and fasten can to base.

Thorough instructions for servicing other parts of the Mallory-Elkon "B" Eliminator are provided in Service and Installation Bulletin accompanying each unit, copies of which may be had upon request. A circuit diagram of the entire Eliminator is shown herewith for your convenience in making continuity tests.



It is important that Elkonodes be used only with Eliminators having same type numbers, and that phantom load relays and resistors are matched to type of Elkonode and Eliminator involved. Correct types of phantom load relays and resistors are shown in the parts list.

The following equipment is recommended as being extremely useful in conducting repairs on Mallory-Elkon "B" Eliminators and Elkonodes:

1. High resistance volt-meter. Scale: 0 to 300. Resistance: Not less than 1000 ohms per volt.
2. One good quality milliammeter. Scale: 0 to 50.
3. One set feeler gauges.
4. One small screw-driver.
5. One pair thin, flat-nosed pliers (duck-bill type).
6. One 1933 type 10 Mallory-Elkon "B" Eliminator chassis, with one each proper phantom load relay and resistor for types 10, 11, 12, 13 and 14. (A test-board switching arrangement to cut in whichever type phantom load relay is required for the Elkonode being repaired will be valuable in conducting these tests.)

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Routine for Dismantling Elkonodes for the Purpose of Replacing Contact and Reed Springs

(a) Remove screws holding cover on can.

(b) Loosen cover from can and hold in upright position, prongs down; gently shake the rubber sock and Elkonode from the can.

(c) Closely observe the manner in which the leads from the prong base to the Elkonode are placed in the outer slots of the rubber sock. This is important for correct placement of wires when replacing assembly in can.

(d) Observe the location of the various parts, especially the position of the reed Armature (2) with respect to the coil pole shoe of the Elkonode. (1).

(e) Unsolder the three leads at the Elkonode terminals, noting that the top lead (with Elkonode held as in diagram) crosses over the ground lead to the center connection at the plug. Unsolder the coil wire at the spring terminal.

(f) Loosen lock nuts A, and A2 and turn the adjusting screws B, and B2 counter clockwise until the insulating bushings (5) are against the frame, then remove screws and slide out bushings.

(g) Loosen stack screws (3) and remove. Press on the under side of the bakelite stack and reed so as to move the assembly out from between the frame. Save the insulating bushings (5), stack screws (3), connector plate (4), adjusting screws, and the lock nuts. Remove the bakelite stack spacers and insulating tubes from the assembly.

ROUTINE FOR REBUILDING THE ELKONODE:

(h) Rebuild the stack assembly, making sure to use the thicker of the four bakelite spacers on either side of the reed.

(i) Since the Elkonode is largely magnetic in operation, extreme care must be taken to prevent particles or filings of iron from attaching themselves to the iron parts of the Elkonode. Clean the pole shoe, frame, and reed thoroughly.

(j) Hold the assembly with the reed in the position shown in the illustration, place the frame under the assembly, as shown also, and insert the assembly from the top. It may be necessary to spread the frame slightly in order to make the insertion. Inspect the stack screws for signs of weakening, and if satisfactory, replace with the connector plate and tighten slightly.

(k) The reed should stand approximately in the center of the frame at rest. The end of the reed should be parallel to the face of the pole shoe and from .003″ to .005″ distant from it when the reed is pulled down opposite its center. This distance should be accurately set by feeler gauges. The reed may be adjusted because of play in the mounting holes.

(l) Insert the insulating bushings in the slots in the ends of the springs, thread the adjusting screws into place, together with the lock nuts. Adjust the screws to place the contacts close to the reed contacts. The springs should be moved so as to allow the contacts to strike the reed contacts without overlapping. The contacts should be fairly flat in making contact, and still not bind on the insulated adjusting bushing.

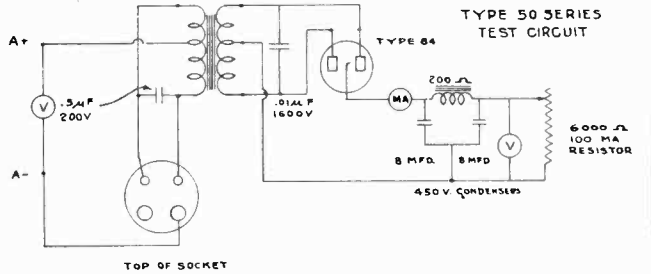
(m) Tighten the stack firmly without disturbing the adjustments. Hold the reed over a piece of white paper in the vertical position shown in the illustration. The end edge of the reed, on the opposite side from the armature should rest from flush with the edge of the pole piece to .003″ above same. Any bending of the reed should be done at the extreme armature end, and only slight alterations should ever be necessary. Should the pole shoe not be parallel with the armature in a vertical direction, turn the pole shoe with a pair of long-nosed pliers; *do not attempt to twist the reed.* Check the air-gap spacing and tightness of coil mounting screws, if such adjustments are made, then recheck alignment.

(n) Solder the leads back as before, with the ungrounded heater terminal lead to the reed tail. The connector plate is soldered to the reed tail also, at the same time, and the coil wire to the near spring lug.

(o) Some method of exerting high pressure upon the stack end of the Elkonode while the final tightening of the clamping screws is taking place is essential. It is suggested that an arbor press, capable of exerting a total pressure of about 2000 pounds, be used. Pressure should be exerted directly over the stack, between the screws, while a large screw driver draws the screws down firmly. This prevents loosening of the stack in service and consequent failure.

(p) Turn the adjusting screw B-1 clockwise until the space between the contacts G and H is between .003″ and .004″, as measured carefully with a feeler gauge, with the lock nut A-1 tightened firmly. Proceed likewise with B-2 and A-2 until clearance between contacts E and F is between .004″ to .006″. Check lock nuts for tightness. The unit should then be ready for operation.

Following is a test circuit which may be set up for electrically testing and adjusting Elkonodes of the "50" Series. "Sound" tests may be obtained only with receiver in operation.



(Transformer should be the same as used in set from which the Elkonode was taken. The set itself may be used for test if an extension lead is made up. Do not expect quiet operation while set is open and unit is uncanned.)

(q) If test equipment is available, operate the Elkonode on this equipment before placing it in the Elkonode can. The unit should start operation at 4.4 volts (2 cells of 6-volt battery on charge), should provide correct output at 6.6 volts and should operate satisfactorily at 8.8 volts (4 cells on charge). Should any adjustment be necessary, adjust screw B-2 only. A very slight movement of the screw should permit final adjustment.

CAUTION

(r) Do not attempt to bend contact springs.
Use only Kester Rosin Core Solder.
Keep moisture from all parts of the Elkonode.
Keep metallic particles out of Elkonode.
Keep dust, moisture, grease and liquid from the contact surfaces. Clean contact surfaces with a dry, clean piece of linen paper.

MODEL 60,60,80 Series
Elkonodes-Repair

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(Continued)

(s) When inserting the Elkonode into the rubber sock, be very careful to turn the frame of the Elkonode parallel with the flat sides of the inside holes of the sock, so as to leave the air spaces at the open sides of the Elkonode. The single ground lead (from reed) is taken down the smaller of the two slots, while the other two leads are taken down the larger slots. Place the Elkonode in the sock, so that no wires need be bent to meet this arrangement. Draw the leads to the prong base, and fold under the lid. Insert the sock assembly into the can, with the large slot next to the seam of the can. Screw cover to can with screws provided.

SERVICE EQUIPMENT REQUIRED

1. High resistance volt-meter. Scale: 0 to 300 and 0 to 600. Resistance: Not less than 1000 ohms at 2 volts.
2. A good quality milliammeter. Scale: 0 to 50 and 0 to 100.
3. One set feeler gauges.
4. One small screw driver and one large screw driver.
5. One pair thin long-nosed pliers.
6. One medium-sized arbor press.

"60-70-80" Series Units

The series 60, 70, and 80 Mallory Elkonodes are described as single-reed, full-wave inverters, with self-contained synchronous rectifiers. These units within themselves supply the direct current, high voltage for radio receiver plate supply. No tube rectifiers are required with these types. Inasmuch as the mechanical construction of all of the 60, 70 and 80 series units is the same, the following service information will apply to all such units:

The 60 series unit is no longer in production—having been replaced with the 70 series unit, and differs from the 70 series principally in that its self-contained point buffer condensers were of the wax impregnated paper type, rated at .008 mfd. 1600 volts DC. The 70 series is supplied with an oil-impregnated and immersed paper condenser of .01 mfd. capacity, rated at 1600 volts DC, and whenever occasion arises to replace contact spring and reed assemblies in the 60 series unit, advantage should be taken of that opportunity to replace the old unreliable paper condensers with the new type, described as our part A-18237.

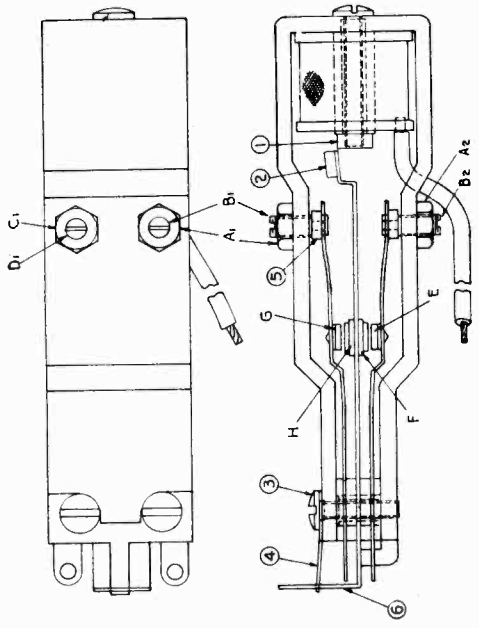
The 80 series Mallory Elkonodes are identical with the 60 and 70 series except that no internal point condensers are supplied. These units are to be used only in cases where the original point buffer condensers in the type 60 Elkonodes have been removed, and suitable condensers installed permanently at the Elkonode socket prong. In some special cases, a manufacturer may have used external secondary buffer condensers in place of the internal point condensers, but such cases will be rare.

As with all other types of Mallory Elkonodes, the prefix letter G denotes 12-volt operation, and the prefix letter F denotes 32-volt operation. Differences in wire size and in the number of turns of the Elkonode driver coil distinguish the 6-, 12-, and 32-volt types, but the output ratings as set forth in the following table apply to 6-, 12-, and 32-volt types alike:

Elkonode Series No.	Maximum Watts Output
60 —70 —80	11
60B—70B—80B	18
61 —71 —81	11
63 —73 —83	18
65 —75 —83	11

The reed of the Elkonode is grounded to the can, and the receiver circuit ground is necessary for all types but the 60, 60B, 70, 70B, 80 and 80B units, in which cases the ground returns through the A Battery. The types 65, 75 and 85 are for use on household battery receivers, or similar applications where the battery is not on charge while the receiver is in operation. All ratings given are for operating battery voltages of 6.6, 13.2 and 33 volts, for the standard 6-volt, 12-volt and 32-volt series respectively. It is necessary that the Elkonodes be properly polarized in connecting the prong base and transformer, in order to prevent a reversal of output voltage.

The following reproduction pictures the Mallory type 80 Elkonode in both top and side views with covers and with point buffer condensers of course removed:



Explanation of Above Charts

A—A2 —Rectifier Lock Nut
B1—B2 —Rectifier Adjusting Screw
C1—C2 —Interrupter Lock Nut
D1—D2 —Interrupter Adjusting Screw
E, F, G, H—Rectifier Contacts
E, F, G, H—Duplicate for Interrupter Side

1. Magnet Coil Pole Shoe
2. Reed Armature
3. Stack Clamping Screw
4. Connector Plate
5. Insulating Bushing
6. Reed Tail

MODEL 50 Series
Elkonodes-Repair

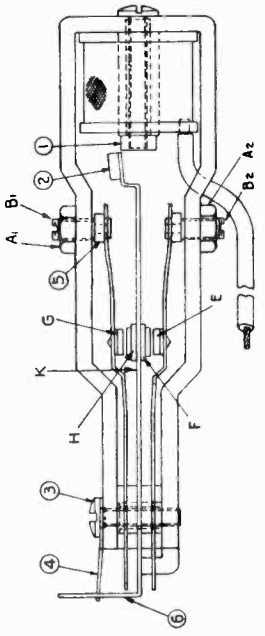
P. R. MALLORY & CO.

The 50 Series Mallory Elkonode is a single-reed full-wave inverter for use in supplying alternating-current voltage which in turn is rectified by a tube rectifier for supplying the high direct-current voltage needed for radio receiver plate supply.

This Elkonode is used in three standard types, Nos. 50, 51, and 53, and in certain modified forms for special requirements. For 12-volt operation, the type number is prefixed with the letter "G" to designate the change in construction. Likewise, for 32-volt operation, the letter "F" is used. The mechanical construction for all types is the same except for a change in the driver-coil windings for the 12-volt and again for the 32-volt types. The types 50 and 51 Elkonodes are adjusted and intended to carry output loads up to *11 watts*. The type 53 Elkonode is designed for loads from 11 to 18 watts. These types have an advantage over earlier types in not being limited to a narrow range of load conditions. Ratings are given, in every case, for operating battery voltages of 6.6, 13.2, and 33 volts, for the 50, G-50, and F-50 Series, respectively.

The following reproduction pictures the Mallory Type 50 Series Elkonode in a top view, with covers removed.

1. **Magnet coil pole shoe**
2. **Reed armature**
3. **Stack clamping screw**
4. **Connector plate**
5. **Insulating bushing**
6. **Reed foil**



A—lock-nut. B—adjusting screw.
E. F. G. H—contact points

Instructions For Adjusting Contact Springs When Such Springs Do Not Require Replacement

As with automobile ignition contacts, the tungsten contact points in Elkonodes will show some evidence of wear after they have been in service for a long period of time. This wear progresses gradually, and as long as the Elkonode is capable of operation, any amount of wear at the contact points will have no influence whatever on the performance of the radio set or on the voltage supplied to the tubes. However, after a long period of service the Elkonode may refuse to start, and when this point is reached it should be taken as indicative of excessively worn contact points. The Elkonode has been designed with a generous reserve of tungsten in its contact points, and this reserve may be utilized to give the Elkonode extended life, providing one simple adjustment is made. This adjustment is outlined as follows:

1. Remove the Vibrator unit from the can and rubber sock, by following closely the directions covered by paragraphs A, B, C and D in the procedure for dismantling Elkonode. Use care to avoid bending wires at the soldered connections.

2. Place the Elkonode on a piece of white paper, so that when viewed from above it appears exactly as in drawing above.

3. Loosen lock nut (A2) and turn screw (B2) clockwise until .005″ of light can be seen between contacts (F) and (E). If the contact points are roughened, the light can not be seen across their entire diameter, even though they are correctly spaced (i. e., within .005″ of touching each other).

4. A check on the accuracy of the spacing adjustment is obtained by pressing lightly against the center of the reed with a small pointed metal instrument in the direction and location shown by arrow (K). When the reed is thus moved, so as to just close contacts F and E, the weight (2) on the free end of the reed should move 1/64 inch from its "at rest" position. Check should be made after lock nut has been firmly tightened down.

5. DO NOT readjust spacing between contacts G and H, unless the tungsten is nearly all worn away. In this case, readjustment is obtained in exactly the same manner as for contacts F and E.

6. In reinserting the Elkonode into its rubber sock, be very careful to turn the "flats" of the sock hole so that they are in line with the lock-nuts. This provides ample space in the sock for the free movement of the reed. In reinserting the "socked" Elkonode into the can, be sure that the can seam lines up with the wider of the wire-carrying channels on the outside of the sock. This is important.

CAUTION: Inasmuch as the Elkonode mechanism is partially magnetic, extreme care should be observed while making adjustments to prevent iron filings or similar metallic matter from getting into the Elkonode.

Directions for Replacing Contact Spring and Reed Assemblies in the 1933 and 1934 '60,' '70,' and '80' Series Mallory Self-Rectifying Elkonodes

ROUTINE FOR DISMANTLING ELKONODE:

(a) Remove screws holding cover on can.

(b) Loosen cover from can and hold in upright position, prongs down; gently shake the rubber sock and Elkonode from the can.

(c) Closely observe the manner in which the leads from the prong base to the Elkonode are placed in the outer slots of the rubber sock. This is important for correct placement of wires when replacing assembly in can.

(d) Observe the location of the various parts, especially the position of the reed Armature (2) with respect to the coil pole shoe of the Elkonode (1).

(e) For your own protection, it will be well to make a pencil sketch of the manner in which the five leads are connected to the Elkonode terminals, before removing these leads. Do not cut them to remove, but carefully unsolder each one. In the 60 and 70 series units, where Condensers are supplied internally, remove them also and unsolder the coil wire at the spring lug.

(f) Remove coil mounting screw from end of frame, and remove coil and pole shoe from frame. Loosen lock nuts A-1, A-2, C-1 and C-2 and remove adjusting screws B-1, B-2, D-1 and D-2. Remove the insulating bushings from the slots in ends of springs.

(g) Loosen stack screws (3) and remove. Press on the under side of the bakelite stack and reed so as to move the assembly out from between the frame. Save the insulating bushings (5), stack screws (3), connector plate (4), adjusting screws, and the lock nuts. Remove the bakelite stack spacers and insulating tubes from the assembly.

ROUTINE FOR REBUILDING THE ELKONODE:

(h) Rebuild the stack assembly (unless you are using stack assembly complete as provided under our part Number A 18448), making sure to use the thicker of the four bakelite spacers on either side of the reed. Make sure that in assembling the springs, the lugs for soldering line up on the outside edge of the stack.

(i) Since the Elkonode is largely magnetic in operation, extreme care must be taken to prevent particles or filings of iron from attaching themselves to the iron parts of the Elkonode. Clean the pole shoe, frame, and reed thoroughly.

(j) Hold the assembly with the reed in the position shown in illustration, (*see page 24*). Place the frame under the assembly, as shown also, and insert the assembly from the top. It may be necessary to spread the frame slightly in order to make the insertion. Inspect the stack screws for signs of weakening, and if satisfactory, replace with the connector plate and tighten slightly.

(k) Reinsert the driver coil and pole shoe and clamp in place with the screw removed previously. Draw the screw up tightly, and with long-nosed pliers, turn the pole shoe to a vertical position parallel with the reed surface. The coil wire should be inserted through the hole in the frame before the coil is inserted in the frame.

(l) The reed should stand approximately in the center of the frame at rest. The end of the reed should be parallel to the face of the pole shoe, and from .003" to .005" distant from it when the reed is pulled down opposite its center. This distance should be accurately set by feeler gauges. The reed may be adjusted because of play in the mounting holes.

(m) Insert the insulating bushings in the slots in the ends of the springs, thread the adjusting screws into place, together with the lock nuts. Adjust the screws to place the contacts close to the reed contacts. The springs should be moved so as to allow the contacts to strike the reed contacts without overlapping. The contacts should be fairly flat in making contact, and still not bind on the insulated adjusting bushing.

(n) Tighten the stack firmly without disturbing the adjustments. Hold the reed, over a piece of white paper in the vertical position shown in illustration, (*see page 24*). The end edge of the reed, on the opposite side from the armature should rest from flush with the edge of the pole piece to .003" above same. Any bending of the reed should be done at the extreme armature end, and only slight alterations should ever be necessary. Should the pole shoe not be parallel with the armature in a vertical direction, turn the pole shoe with a pair of long-nose pliers, *do not attempt to twist the reed.* Check the air-gap spacing and tightness of coil mounting screws, if such adjustments are made, then recheck alignment.

(o) Solder the leads to the spring, and reed lugs after threading all into place first. If condensers are to be used, place them in position and solder the leads from them at the same time. Make sure that the insulation is over the "hot" condenser lead and that it does not "short" against the frame. Also make sure that the grounded lead does not touch the spring lug or wire. Solder the coil wire at the same time, and solder the connector plate lug to the reed tail. It is suggested that you use another Elkonode as a sample, since it is quite important that all wires be replaced exactly as removed.

(p) Some method of exerting high pressure upon the stack end of the Elkonode while the final tightening of the clamping screws is taking place is essential. It is suggested that an arbor press, capable of exerting a total pressure of about 2000 pounds, be used. Pressure should be exerted directly over the stack, between the screws, while a large screw driver draws the screws down firmly. This prevents loosening of the stack in service and consequent failure.

(q) Loosen lock nuts C, C-1 and C-2. Turn adjusting screw D-1 clockwise until clearance between contacts G and H is between .002" and .003" as measured with a feeler gauge. Lock nut C-1 should be drawn up firmly before this measurement is taken. Adjust C-2 similarly so that the clearance between contacts E and F is between .004" and .006" with the lock nut (C-2), drawn up firmly. This adjustment sets the interrupter section for correct operation.

(r) Turn the adjusting screw (B-1), until the clearance between contacts G and H is between .009" and .012". Adjust screw B-2 until the clearance between E and F is between .011" and .013". This sets the rectifier section in an approximately correct position for operation.

(s) **If test equipment** is available it is very advisable to inspect the operation of the Elkonode before assembling into the receiver. (A suitable test circuit is outlined later in this section.) The unit should start operating at 4.4 volts (2 cells of 6-volt battery on charge), should provide correct output at 6.6 volts, and should operate satisfactorily at 8.8 volts both with load and at no load.

(t) Should the unit flare or spark excessively at higher voltages, adjust the rectifier contacts slightly to control this arcing. The contacts E and F should always have slightly wider clearance between them than contacts G and H.

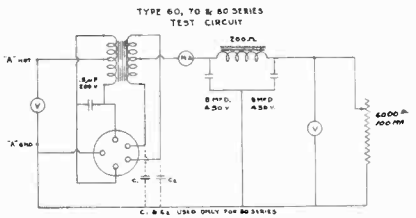
(u) *Do not adjust the interrupter contacts*, unless the unit will not start at 4.4 volts. Then adjust the B-2 screw only and do not make the clearance any smaller than is absolutely necessary. After any adjustment changes, always check the operation thoroughly at all voltages.

CAUTION

(v) Do not attempt to bend contact springs.
Use only Rosin Core Solder.
Keep moisture from all parts of the Elkonode.
Exercise extreme care to keep metallic particles out of Elkonode.
Keep dust, grease and liquid from the contact surfaces.
Clean with a clean, dry piece of linen paper.

(w) When inserting the Elkonode into the rubber sock, be very careful to turn the frame of the Elkonode parallel with the "flat" sides of the inside holes of the sock, so as to leave the air spaces at the open sides of the Elkonode. The tail of the reed should be pointing toward the narrower of the two slots in the outer surface of the rubber. Bring the two rectifier leads (smaller wire) down the smaller slot and the three interrupter and ground leads down the larger slot. One interrupter and one rectifier lead will have to be reversed to do this and enough slack must be left at the bend to prevent wire breakage at the soldered joint. Draw the remaining wires under the lid and fold down, seeing that the wires are not twisted in the slots.

(x) See that the rubber pad is in the can, insert assembly with the large slot adjacent to the seam of the can and screw the lid to the can with the screws provided.



The transformer should be the same as used in the set from which the Elkonode was taken. The set may be used for test if an extension cable is made up. Do not expect quiet operation while the set is open and unit is uncanned.

SERVICE EQUIPMENT REQUIRED

1. High resistance volt-meter. Scale: 0 to 300 and 0 to 600. Resistance: Not less than 1000 ohms at 2 volts.
2. A good quality milliammeter. Scale 0 to 50 and 0 to 100.
3. One set feeler gauges.
4. One small screw driver and one large screw driver.
5. One pair thin long-nosed pliers.
6. One medium-sized arbor press.

Explanation of Descriptive Letters Used to Identify Special Types of Mallory-Elkon "B" Eliminators

The Mallory-Elkon "B" Eliminator is supplied in two basic types—Standard (no descriptive letter) and the "C" type. The standard unit is designed for receivers which employ a floating B minus circuit (B minus not grounded) and with a voltage divider composed of a 75,000 ohm, ½ watt carbon type resistor between B minus and BM and a 25,000 ohm ½ watt carbon type resistor between BM and B plus. The "C" type is designed for receivers having the B minus grounded and where only one high voltage lead is used. Therefore, no voltage divider is used in the "C" type, except in special cases where the Eliminator is built to be used with a particular type of radio set as shown below in PC—CA—and CD:

Type PC—Basic type "C." 50,000 ohm 1 watt carbon type resistor between B plus and BM; 50,000 ohm 1 watt carbon type resistor between BM and B minus.

Type CA—Basic type "C." 1500 ohm 3 watt wire wound resistor between B plus and BM. Connect wire from B plus Choke to BM terminal instead of to B plus terminal.

Type CD—Basic type "C." 25,000 ohm 1 watt carbon type resistor between B plus and BM; 75,000 ohm 1 watt carbon type resistor between BM and B minus; 1850 ohm wire wound 3 watt resistor between B plus terminal and radio frequency Choke (B plus).

Type P—Standard basic type. 50,000 ohm 1 watt carbon type resistor between B plus and BM; 50,000 ohm 1 watt carbon type resistor between BM and B minus.

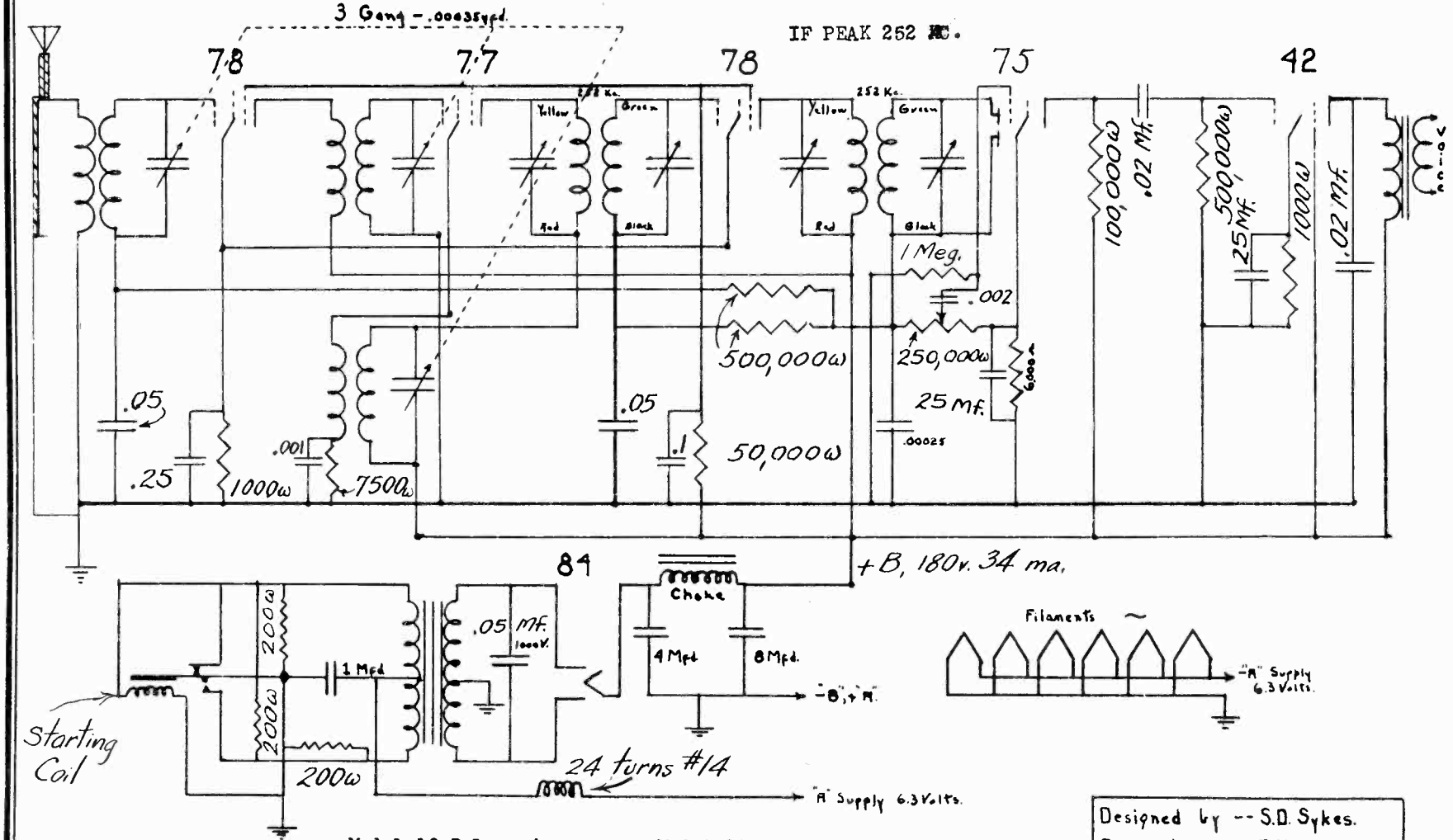
Type M—Standard basic type. Remove resistors between B plus and BM, and BM and B minus. Install 1250 ohm 1 watt resistor between B minus and G terminal. (It is necessary to provide screw for the G terminal point on terminal board.)

Type S—Standard basic type. Use 20,000 ohm ½ watt resistor between B plus and BM. Install 20,000 ohm ½ watt resistor from BM to G terminal. Install 5000 ohm 1 watt resistor from G terminal to B minus.

Type ST—Standard basic type. Install 20,000 ohm ½ watt resistor between B plus and BM. Install 20,000 ohm ½ watt resistor between BM and G terminal. Install 3500 ohm 1 watt resistor between B minus and G terminal.

MISSION-BELL RADIO CO.

MODEL 11 AUTO-RADIO.



Model 12 DeLuxe is same as Model 11 with the addition of a special 8-inch electro-dynamic speaker in wooden sound box.

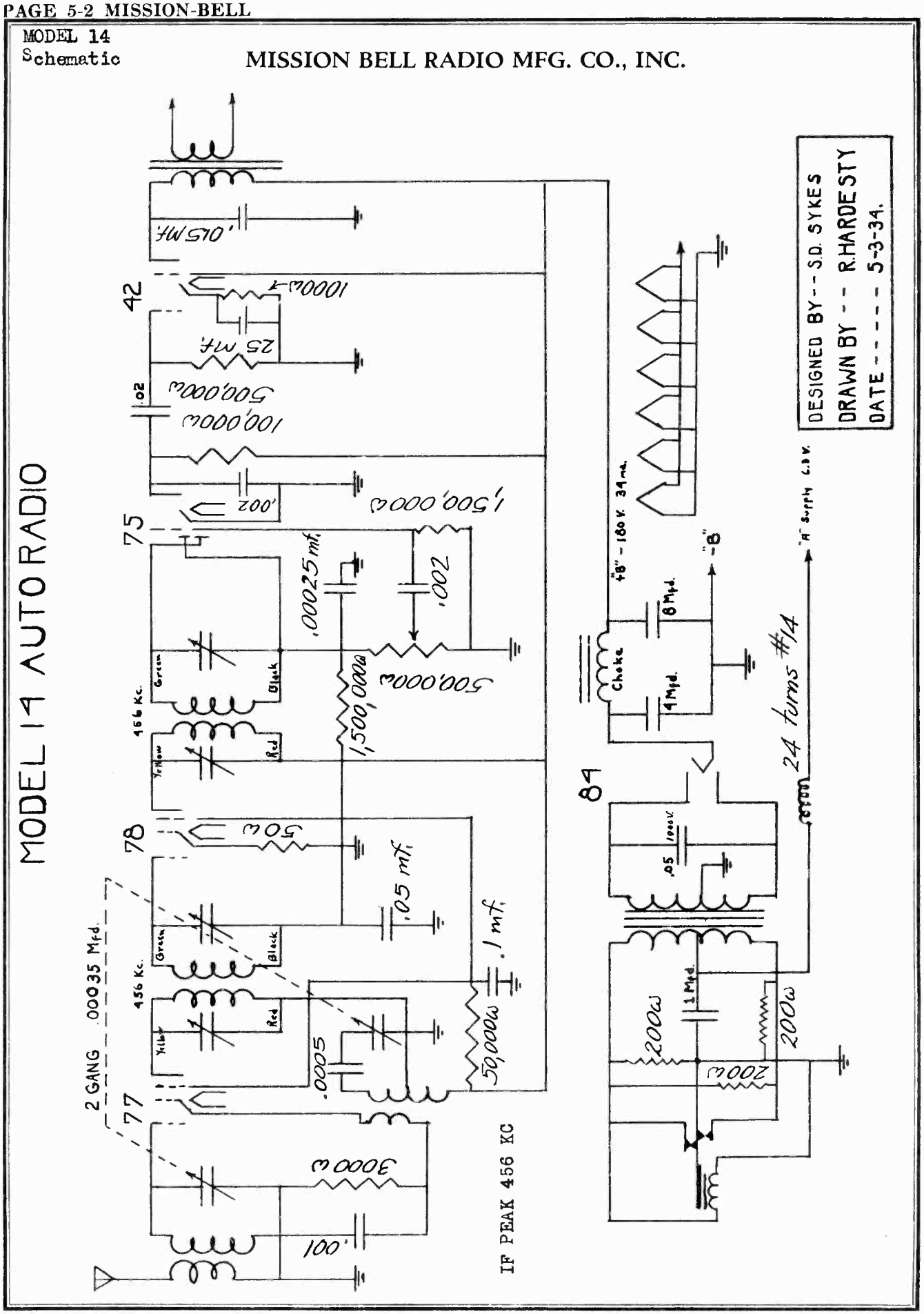
Designed by	S.D. Sykes.
Drawn by	R. Hardesty.
Date	5-7-34.

MISSION BELL RADIO MFG. CO., INC.

MODEL 11
Schematic

MODEL 14
Schematic

MISSION BELL RADIO MFG. CO., INC.



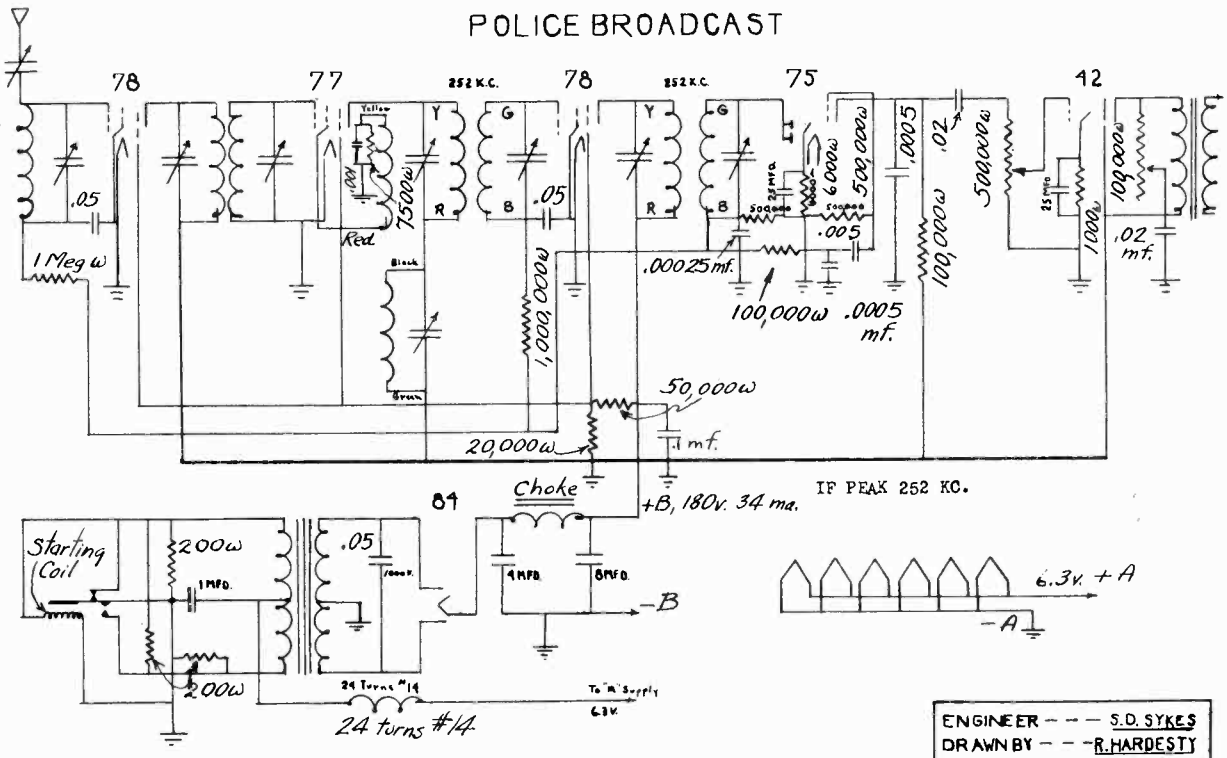
MODEL 25-A
Schematic
MODEL 40
Schematic

MISSION BELL RADIO MFG. CO., INC.

MISSION BELL RADIO CO.

MODEL 25-A 6-TUBE SUPER

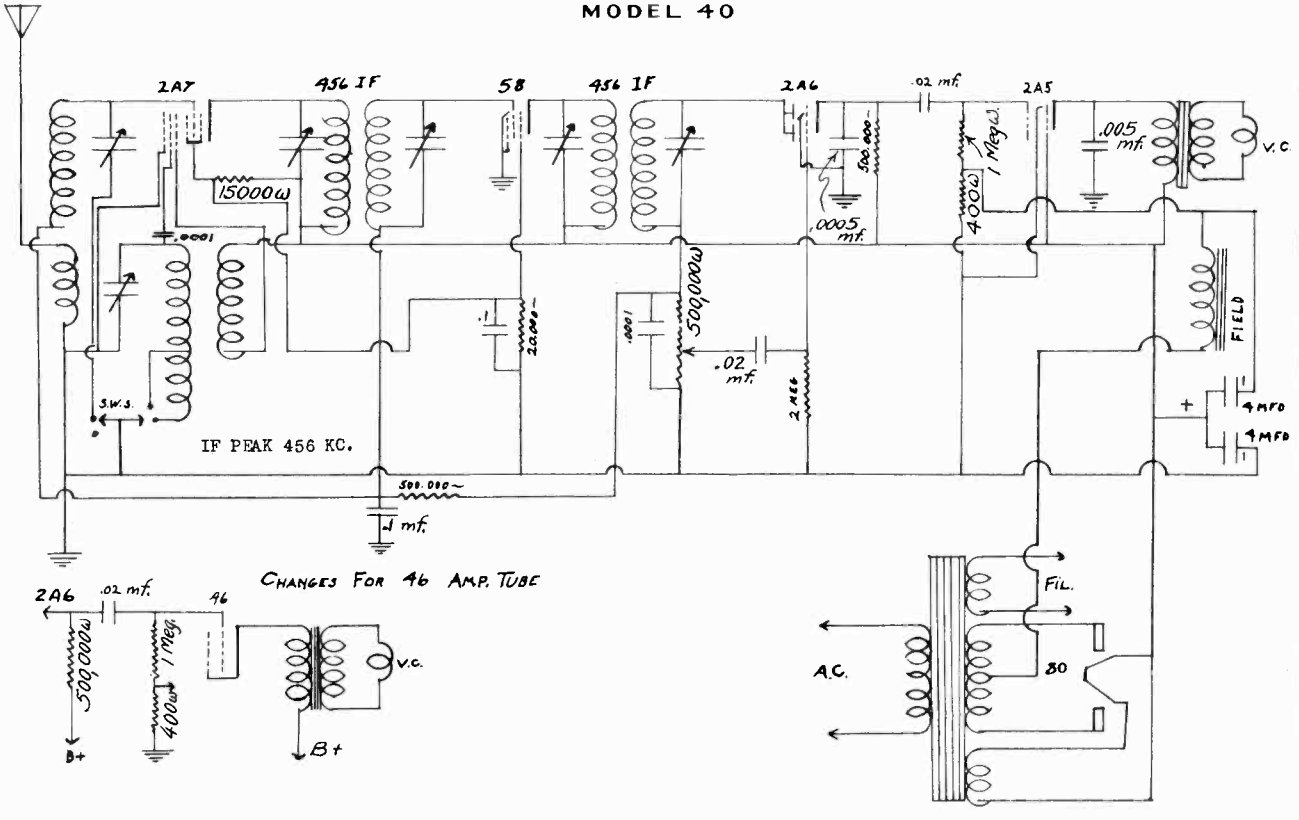
POLICE BROADCAST



ENGINEER	S.D. SYKES
DRAWN BY	R. HARDESTY
1-25-'34	

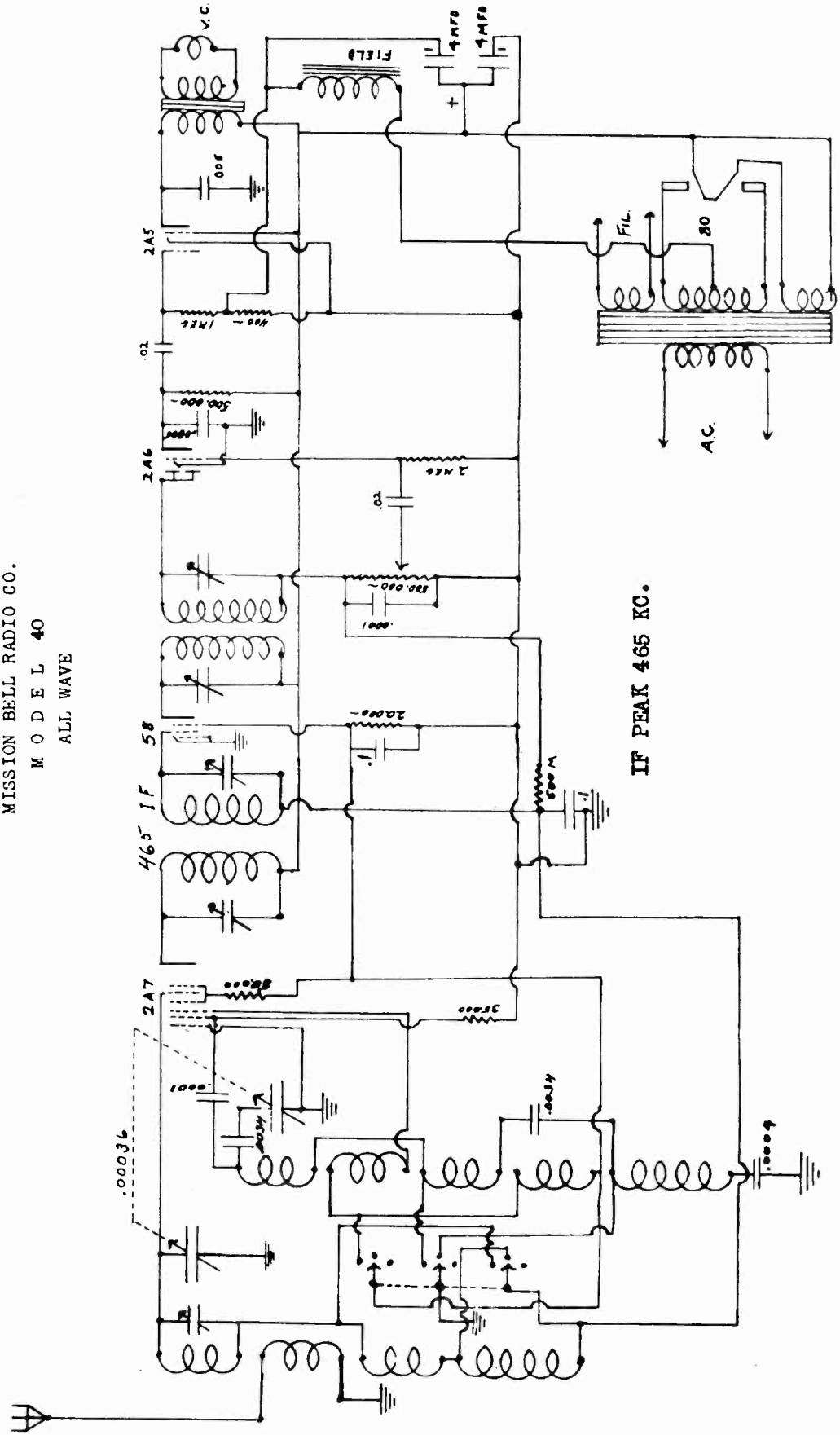
Mission Bell Radio Co.

MODEL 40



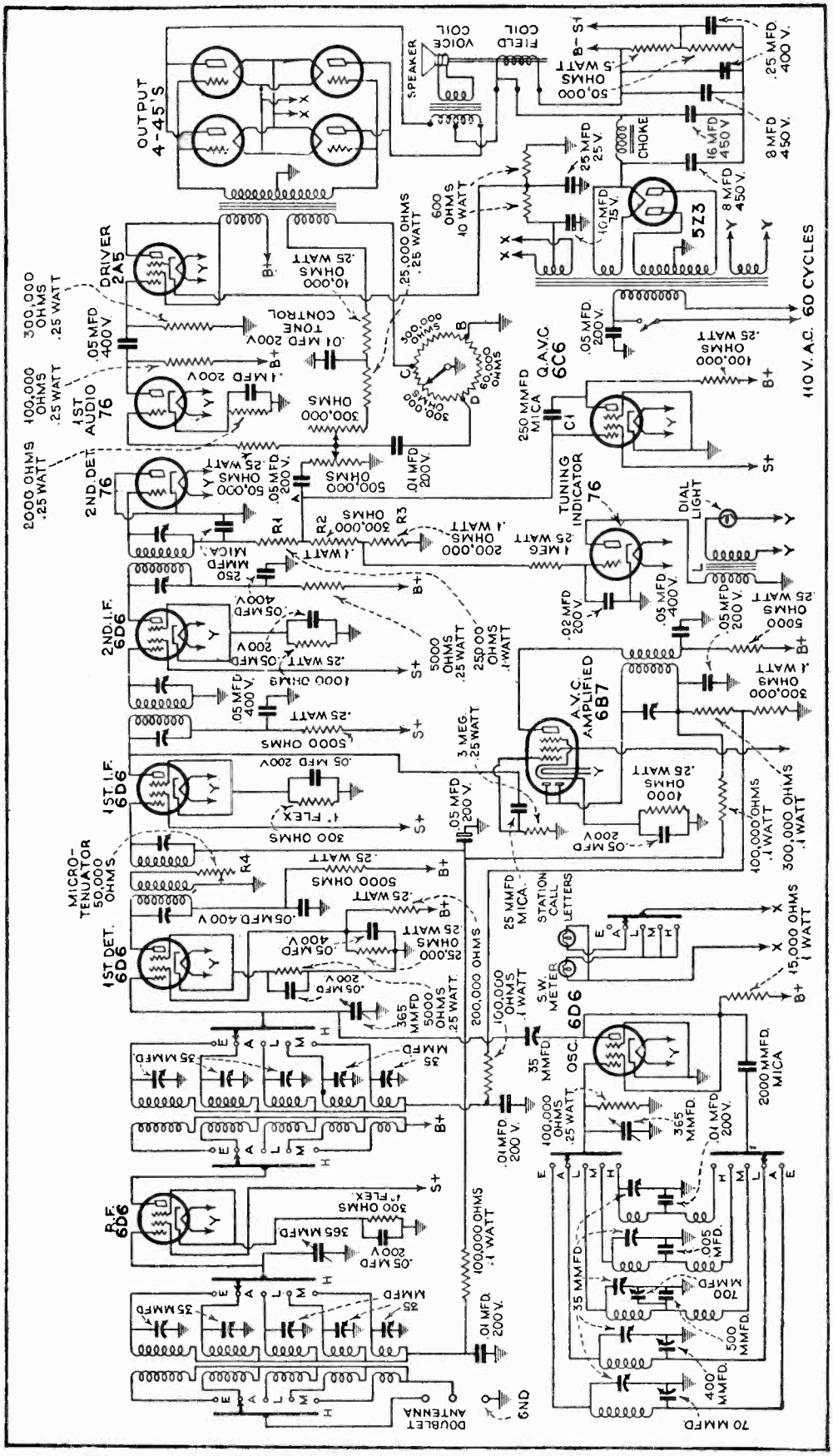
MODEL 40 All-Wave
Schematic

MISSION-BELL RADIO MFG. CO., INC.



MODEL 1935 Deluxe
Schematic

MID-WEST RADIO CORP.



MONTGOMERY-WARD & CO.

MODEL 62-118

Schematic, Voltage Socket, Parts

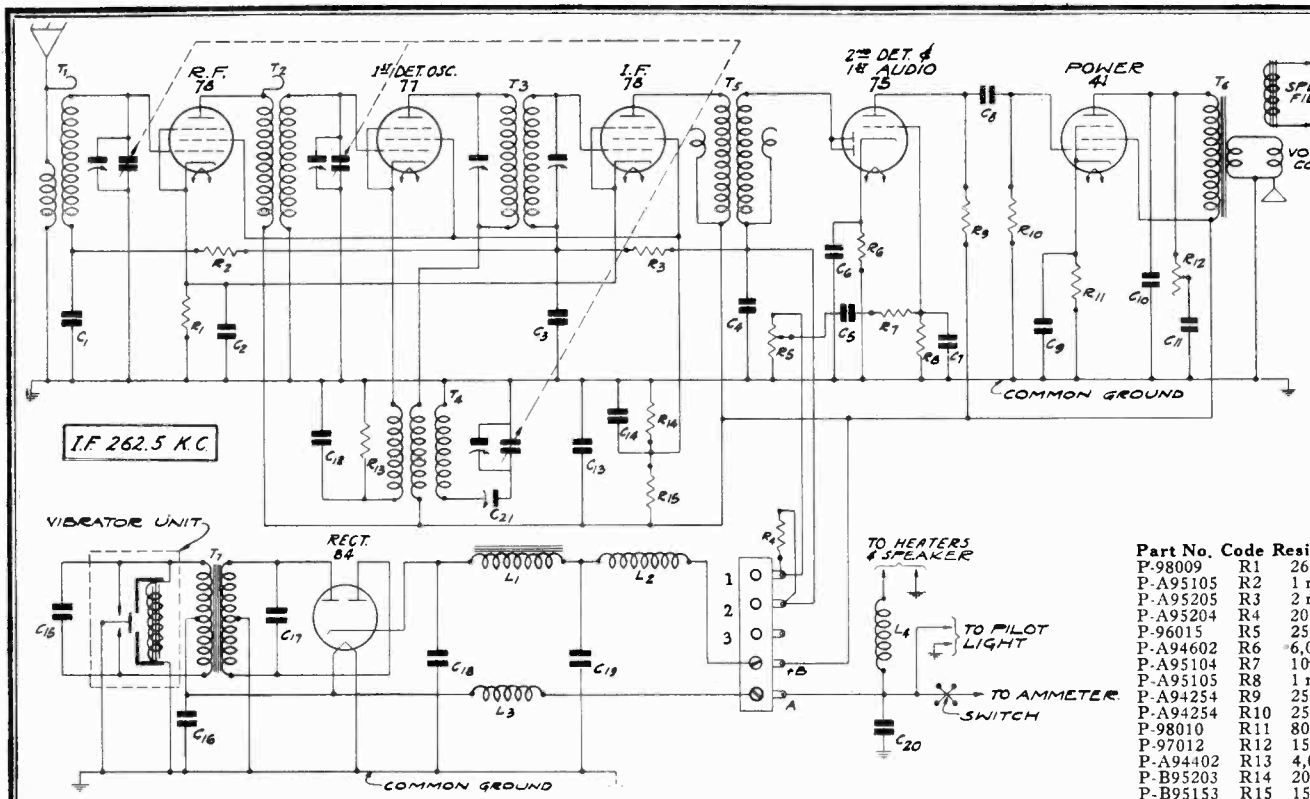


Fig. 1—Schematic Circuit Diagram.

"B" UNIT PARTS

Part No.	Item
P-50637	Filter Choke L1
P-50633	Power Transformer T7
P-5175	Eliminator "A" Choke L3
P-5174	R.F. "B" Choke L2
P-2080	Vibrator—Mallory Type 53
P-2110	Vibrator—Radiart Type 3264
P-1572	Fuse Clip Assembly
P-2024	No. 84 Tube Socket
P-2023	Vibrator Socket
P-2082	Two Lug Terminal Strip
P-2106	Single Insulated Terminal Strip
P-1924	15 Ampere Fuse
P-70765	Eliminator Cable
P-10322	Sponge Rubber Disc

RESISTORS

Part No.	Code	Resistance	Wattage	Type
P-98009	R1	260 ohm.	0.5	Wire-Wound
P-A95105	R2	1 megohm	0.2	Carbon
P-A95205	R3	2 megohm	0.2	Carbon (In 2nd I.F.)
P-A95204	R4	200,000 ohm	0.2	Carbon
P-96015	R5	250,000 ohm		Volume Control & Switch
P-A94602	R6	6,000 ohms	0.2	Carbon
P-A95104	R7	100,000 ohm	0.2	Carbon (In 2nd I.F.)
P-A95105	R8	1 megohm	0.2	Carbon (In 2nd I.F.)
P-A94254	R9	250,000 ohm	0.2	Carbon
P-A94254	R10	250,000 ohm	0.2	Carbon
P-98010	R11	800 ohm	0.5	Wire-Wound
P-97012	R12	150,000 ohm		Tone Control
P-A94402	R13	4,000 ohm	0.2	Carbon
P-B95203	R14	20,000 ohm	0.5	Carbon
P-B95153	R15	15,000 ohm	0.5	Carbon

CONDENSERS — IN CHASSIS

Part No.	Code	Capacity	Voltage	Type
P-81009	C1	0.050 mfd.	200 V.	Tubular
P-80919	C4	0.00025 mfd.	600 V.	Moulded (In 2nd I.F.)
P-80862	C5	0.050 mfd.	200 V.	Tubular
P-80919	C7	0.00025 mfd.	600 V.	Moulded (In 2nd I.F.)
P-81025	C11	0.020 mfd.	600 V.	Tubular
P-80821	C12	0.001 mfd.	600 V.	Moulded
P-81024	C20	0.500 mfd.	120 V.	Tubular
P-81026				Three Gang Condenser
P-1539	C21	600 K.C.		Trimmer Condenser
P-81022	C2	0.500 mfd.	200 V.	Condenser Block
	C3	0.050 mfd.	200 V.	
	C8	0.050 mfd.	300 V.	
	C10	0.003 mfd.	600 V.	
	C13	0.500 mfd.	300 V.	
	C14	0.100 mfd.	200 V.	
P-81021	C6	12.00 mfd.	25 V.	Electrolytic Block
	C9	12.00 mfd.	25 V.	

CONDENSERS — IN "B" UNIT

Part No.	Code	Capacity	Voltage	Type
P-81024	C15	0.500 mfd.	120 V.	Tubular
P-81031	C16	1.000 mfd.	120 V.	Tubular
P-81030	C17	0.010 mfd.	1600 V.	Tubular
P-81028	C18	10.00 mfd.	350 V.	Electrolytic Block
	C19	10.00 mfd.	350 V.	

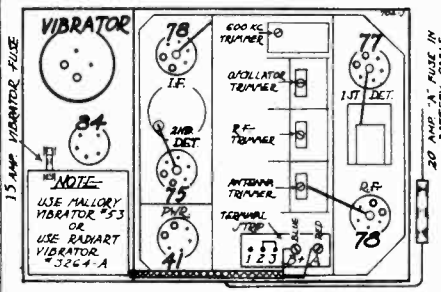


Fig. 2—Location of Tubes.

VOLTAGES AT SOCKETS

Antenna Disconnected—Battery 6 Volts Under Load

Type of Tube	Function	Across Heater	Plate to Cath.	Screen to Cath.	Cath. to Ground	Normal Plate M.A.
78	R. F.	5.7	220	100	3.5	5.0
77	1st Det. and Osc.	5.7	220	100	8.0 (1)	1.1 (1)
78	I. F.	5.7	220	100	3.5	5.0
75	2nd Det.	5.7	140 (2)		1.0	0.3
41	Output	5.7	200	210	15.5	18.0
84	Rect.	5.7				20. per plate

(1) Subject to variation.

(2) Triode Plate to Cathode—as read with 1,000,000 ohm meter.

MODEL 62-118
Alignment, Data

MONTGOMERY-WARD & CO.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself in broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and accurately calibrated signals at and around 262.5 K. C., the intermediate frequency and an output indicating meter are desirable.

Do not take the chassis out of the box. First set the signal generator at approximately 262.5 K. C. Connect the antenna lead from the generator to the control grid of the I. F. 78 tube, through a .05 mfd. condenser. The ground lead of the generator goes to the ground of the receiver. Turn the rotor plates of the tuning condenser completely out and keep the signal weak enough to prevent A. V. C. action. Note from Fig. 1 that the second I. F. transformer is self tuned and cannot be adjusted. Adjust the frequency of the signal generator until the output meter shows maximum output. The intermediate frequency setting of the generator is then correct, although it may be a very small percentage higher or lower than 262.5 K. C.

Next connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd. condenser. Do not change the signal generator setting. Then adjust the 1st I. F. trimmer condenser screws for maximum output. There are 2 holes at one end of the chassis box. The 2 trimmer screws can be reached through these holes. CAUTION—use an insulated screwdriver to prevent short circuiting to ground.

Now disconnect the signal generator and adjust it to exactly 1400 K. C. The antenna lead from the generator is then connected to the antenna lead of the receiver. Connect the tuning condenser flexible drive shaft to the chassis if it has been disconnected. Turn the station selector knob until the rotor plates are completely in mesh. Then with a screwdriver turn the calibration screw on the back of the control unit, until the pointer is at the lowest frequency mark. This is the large point, 5 points below the 55 mark. Then turn the station selector knob until the pointer on the dial scale is at 1400 K. C.

Then adjust the oscillator, R. F., and antenna trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator section first. See Fig. 2.

Next, set the signal generator for a signal of 600 K. C. and adjust the oscillator 600 K. C. trimmer. This condenser is mounted on the end of the gang condenser. See Fig. 2.

A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 600 K C. trimmer screw until the highest output is obtained.

Then set the signal generator again for a signal of 1400 K C. and check the adjustment of the tuning condenser trimmers at this frequency for maximum output.

If the control unit or flexible shaft is moved after the set has been aligned, the setting of the dial pointer may change. This can be adjusted by turning the control unit calibration screw until the pointer is at the correct setting.

Adjusting Antenna Trimmer

After the receiver is installed and the car antenna is connected it will be necessary to adjust the antenna trimmer. Tune in a weak signal between 1200 and 1400 K. C. with the volume control about three-fourths on. Remove the cover of the chassis box. The antenna trimmer is the trimmer condenser closest to the terminal strip—see Fig. 2. Turn the adjusting screw of this condenser up or down until maximum output is obtained. CAUTION—Do not turn any of the other trimmer adjusting screws for this adjustment.

Removing and Replacing Units From Chassis Box

Removing Chassis Unit From Box

Disconnect the flexible shafts, antenna cable and pilot lamp lead at the chassis box. Pull off the tone control knob and disconnect the battery cable at the fuse receptacle. Remove the cover of the box and take off the black lead on the cover screw. Disconnect the "A" and "B+" leads at the terminal strip. Pull the battery cable inside of the box.

Take out the 4 screws around the speaker grill. Then pull the chassis out by means of the "A" choke and condenser block. Do not pull the chassis out by means of the gang condenser as this might injure the cushion mounting.

Removing "B" Unit From Box

Disconnect the "A" and "B+" leads at the terminal strip. On the end of the box at which the "B" unit is located will be found 9 screws **around the edge.** Remove these 9 screws. The "B" unit and end plate can then be lifted out.

Replacing the Vibrator

Note that vibrator unit is of the plug-in type. This unit can be inserted and removed in the same manner as a tube.

Replacing Chassis Unit

In replacing the chassis unit be sure that the ground spring near the output transformer makes a good contact with the chassis box. Reverse the procedure as given above for removing this unit.

Replacing "B" Unit

When replacing the "B" unit be sure that the ground spring makes a good contact to the partition wall in the chassis box. Reverse the procedure as given above for removing this unit.

Removing Speaker

If service work is required on the chassis, it is advisable in some cases to remove the speaker, as this will permit ready access to all of the units and wiring.

The pot magnet is secured to the vertical walls of the chassis base by means of 3 screws, 2 on one side and 1 on the other. Remove these screws. Then carefully lift out the speaker as far as the leads will permit. The yellow field lead and the black secondary lead may then be unsoldered.

Trouble Shooting and Service

Vibrator Unit

When servicing this receiver a new vibrator unit should be tried out in the same manner as a new set of tubes would be tried out. These units are plugged in in the same manner as a tube. One or more vibrator units should be kept on hand for replacement purposes.

"B" Unit

In case of failure in the "B" unit try out a new vibrator. If this does not remedy the difficulty and the "B" unit cannot be repaired locally it is not necessary to return the entire chassis. Remove the "B" unit from the chassis box as per the instructions in this manual after which this unit may be carefully packed and returned separately.

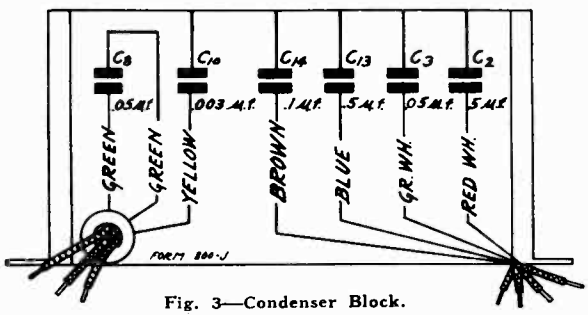
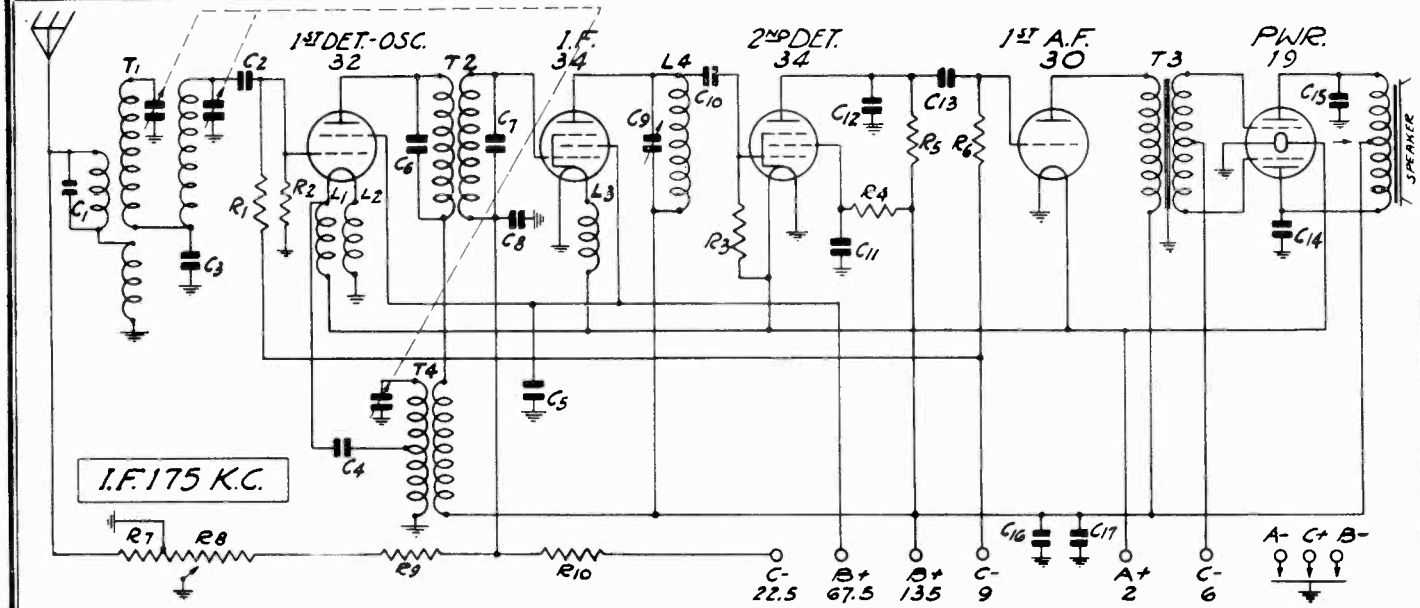
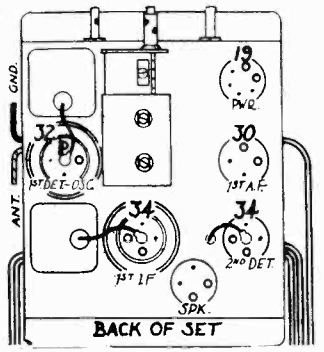


Fig. 3—Condenser Block.





D. C. Resistance of Windings

Following are the D.C. resistances of the various windings in the chassis.

Part No.	Item	Code	D. C. Resistance in Ohms
P-5168	Double Tuned Ant. Coil Pri.	T1	19.2
	Double Tuned Ant. Coil Sec. (Preselector)	T1	3.2
	Double Tuned Ant. Coil Sec. (1st Det.)	T1	3.2
P-5199	1st I.F. Coil Pri.	T2	90.0
	1st I.F. Coil Sec.	T2	116.0
P-50586-D	Audio Input Trans. Pri.	T3	1010.
	Audio Input Trans. Sec. Cent. Tap to outside end	T3	648.
	Audio Input Trans. Sec. Cent. Tap to inside end	T3	588.
P-5187	Oscillator Coil, Grid Winding	T4	4.1
	Oscillator Coil, Plate Winding	T4	10.4
P-5172	Double Filament Reactor Assem.	L1	.61
	Double Filament Reactor Assem.	L2	.61
P-5189	Single Filament Reactor Assem.	L3	.61
P-5188	2nd I.F. Reactor Coil	L4	52.1
P-2124	6" Magnetic Speaker, Center Tap to outside end		272.
	6" Magnetic Speaker, Center Tap to inside end		225.
P-2125	8" Magnetic Speaker (same as P-2124)		

MISCELLANEOUS

Part No.	ITEM
P-2131	No. 32 Socket
P-1645	No. 34 Socket
P-1644	No. 30 Socket
P-1833	No. 19 Socket
P-1640	Speaker Socket
P-20406-A	Tube Shield for 34 and 32 Tubes
P-20786	Tube Shield Base
P-50586-D	Audio Input Transformer T3
P-5168	Double Tuned Ant. Trans. Assem. Comp. with resistors and condensers T1 less can
P-40432	Can for above Assem.
P-5199	1st I.F. Coil and Can Assem. T2
P-5187	Oscillator Coil and Can Assem. T4
P-5188	2nd I.F. Coil and Can Assem. L4
P-5172	Double Filament Reactor L1, L2
P-5189	Single Filament Reactor L3
P-30342-A	Grid Cap Only
P-2060	Knob, plain
P-2122	Knob, Arrow Indicator
P-1441-A	Double Insulated Terminal Strip
P-1786	Five Lug Terminal Strip
P-1831	On-Off Switch
P-20711	Gang Condenser Shield
P-10272	Rubber Chassis Cushions
P-70703	Antenna and Ground Wire
P-70749	"B" Battery Wire Assem.
P-70771	"A" Battery Wire Assem.
P-70772	"C" Battery Wire Assem.
P-2124	Speaker 6"
P-2125	Speaker 8"

RESISTORS

Part No.	Code	Resistance	Wattage	Type
P-A94505	R1	5 Megohm	0.2	Carbon
P-A94105	R2	1 Megohm	0.2	Carbon
P-A94205	R3	2 Megohm	0.2	Carbon
P-B94104	R4	100,000 Ohm	0.5	Carbon
P-B94403	R5	40,000 Ohm	0.5	Carbon
P-A95105	R6	1 Megohm	0.2	Carbon
P-96001	R7	3,000 Ohm		Volume Cont
	R8	60,000 Ohm		
P-A94901ww	R9	900 Ohm	0.2	Wire Wound
P-A94652	R10	6,500 Ohm	0.2	Carbon
*P-A94106	R1	10 Megohm	0.2	Carbon
*P-A94205	R2	2 Megohm	0.2	Carbon

*These resistors were used on first models.

CONDENSERS

Part No.	Code	Capacity	Voltage	Type
P-81812	C1	200 mmf		Wire—Part of Ant. Assem.
P-81801	C2	35 mmf		Wire—Part of Ant. Assem.
P-80862	C3	0.05 mf	200V	Tubular
P-80862	C4	0.05 mf	200V	Tubular
P-80862	C5	0.05 mf	200V	Tubular
P-81806	C6	70 mmf		Wire
P-81804	C7	45 mmf		Wire
P-80862	C8	0.05 mf	200V	Tubular
P-1685	C9	70 ± 30 mmf		I. F. Trimmer
P-81800	C10	50 mmf		Wire
P-81045	C11	0.25 mf	200V	Tubular
P-80863	C12	0.004 mf	600V	Tubular
P-80898	C13	0.006 mf	600V	Tubular
P-80969	C14	0.01 mf	400V	Dual
	C15	0.01 mf	400V	
P-80864	C16	0.1 mf	200V	Tubular
P-80968	C17	4.0 mf	150V	Electrolytic
P-81036	3 Gang Condenser			

MODEL 62-120,62-122
62-126,62-128
Alignment,Voltage

MONTGOMERY-WARD & CO.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself as broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and at the intermediate frequency, and an output meter are required for indicating the effect of adjustments.

First set the signal generator to a frequency of 175 K. C. Connect the antenna lead of the signal generator to the grid of the 1st detector thru a .05 mfd. condenser. The ground lead from the signal generator goes to the ground lead of the receiver. Adjust trimmer condenser C9 on the back panel of the chassis until maximum output is obtained. **A non-metallic screw driver should be used in making this adjustment as the I. F. trimmer is at B+ potential.**

Next set the signal generator for 1730 K. C. Turn the rotor to the full open position. The antenna lead from the signal generator is in this instance connected to the antenna lead of the receiver. Adjust the trimmer of the oscillator section of the 3 gang condenser until maximum output is obtained. The oscillator section is the one with the cut plate rotor.

Then set the signal generator for 1400 K. C. and turn the rotor until maximum output is obtained. Adjust the other two trimmers on the gang condenser for maximum output.

To obtain dial scale calibration tune in an 800 K. C. signal and set the dial pointer at that mark on the dial scale. When calibrated in this manner, the setting will be approximately correct at both ends of the scale.

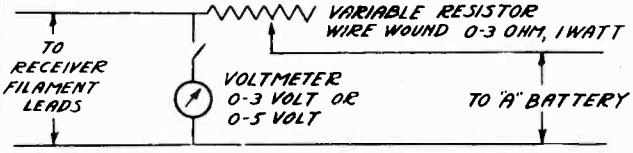


Fig. 4—Using Voltage Regulator with 3 Volt "A" Battery

The use of the cut plate type of condenser eliminates the necessity of a 600 K. C. padder and no adjustment at this frequency, therefore, is required.

Low Volume

In a battery operated receiver the two most common causes of low volume are run down batteries and defective tubes.

Check the "B" and "C" batteries under load with a high resistance voltmeter. See if the filament voltage is low and if so, put in a new "A" unit. A high resistance voltmeter is not necessary for testing the "A" batteries.

The next most common cause of low volume is defective tubes. In any case of low volume, therefore, procure a new set of tubes that have been tested or have been operating satisfactorily in another receiver. Insert these in the chassis one at a time and note any difference in performance.

Altho a short inside antenna is sometimes satisfactory. a good outside antenna 100 to 150 ft. in length is recommended. If the antenna system is faulty or in a shielded location, the volume may be low on distant or weak stations. This is particularly true if the antenna is in or near a steel building. The antenna and lead-in should be inspected for poor connections and grounds. In a shielded location try a longer antenna in a different location.

Misaligning or mistracking of variable tuning condensers is another possible cause of low volume. Instructions for realigning are contained in this manual. Do not, however, attempt realignment unless other causes of low volume have first been investigated.

Other causes of low volume are defective speaker, and various opens, shorts and grounds in the receiver assembly.

Voltages

Check the voltages at the sockets to see if correct values are being delivered to the tubes. The antenna and ground should be disconnected and the antenna and ground leads from the set connected together. The volume control should be turned to the right or maximum position.

VOLTAGES AT SOCKETS
Volume Control at Maximum—Antenna Shorted to Ground
B+135 Volts
Voltages to Chassis

Type of Tube	Function	Across Filament	Plate to Cath.	Screen to Cath.	Grid to Cath.	Normal Plate M. A.
32	1st Det. & Osc.	2.0	135	67.5	7.5(1)(2)	2.5
34	I. F.	2.0	135	67.5	2.5(3)	2.8
34	2nd Det.	2.0	50	40(1)	0	1.8
30	1st Audio	2.0	135		9(4)	3.0
19	Output	2.0	135		6	1.8 Total

(1) With 250,000 ohm meter.
(2) Subject to variation due to oscillatory current.
(3) With 25,000 ohm meter.
(4) As read at "C" battery.

All of the voltage readings as shown in the chart are read with a 1,000 ohm-per-volt meter. As high a range as possible should be used. In general, the higher the resistance of the meter, the more accurate the reading will be.

The voltage chart gives the voltages with all tubes in, the speaker connected and the set in operating condition. These voltages are typical of the sets but will vary slightly with variations in individual receivers, tubes, test equipment used and battery voltages.

Oscillation and Whistle

Should the set oscillate on being connected up, it may be due to tubes whose characteristics vary considerably from the standard. In case of oscillation, therefore, change the tubes around and try out some new ones.

See if the receiver is properly grounded and if it is, try out a new ground. See if any of the battery voltages are excessively high.

The tube shields must all be on and the control grid leads to the top grid connection tubes firmly in place. Otherwise oscillation may result.

An open bypass condenser or open leads to the bypass condensers are a common cause of oscillation. Check the bypass condensers for capacity and the leads to them for continuity of circuit. A quick way to check bypass condensers for opens is to take a good condenser with test leads attached to the terminals and connect the new condenser across the condenser in the chassis. Oscillation may also be caused by poor chassis ground connections and by poor tuning condenser ground contacts. A shorted "A" line choke would, in some instances, result in oscillation.

MODEL 62-124, 62-129
Schematic, Parts
Coil Resistance

MONTGOMERY-WARD & CO.

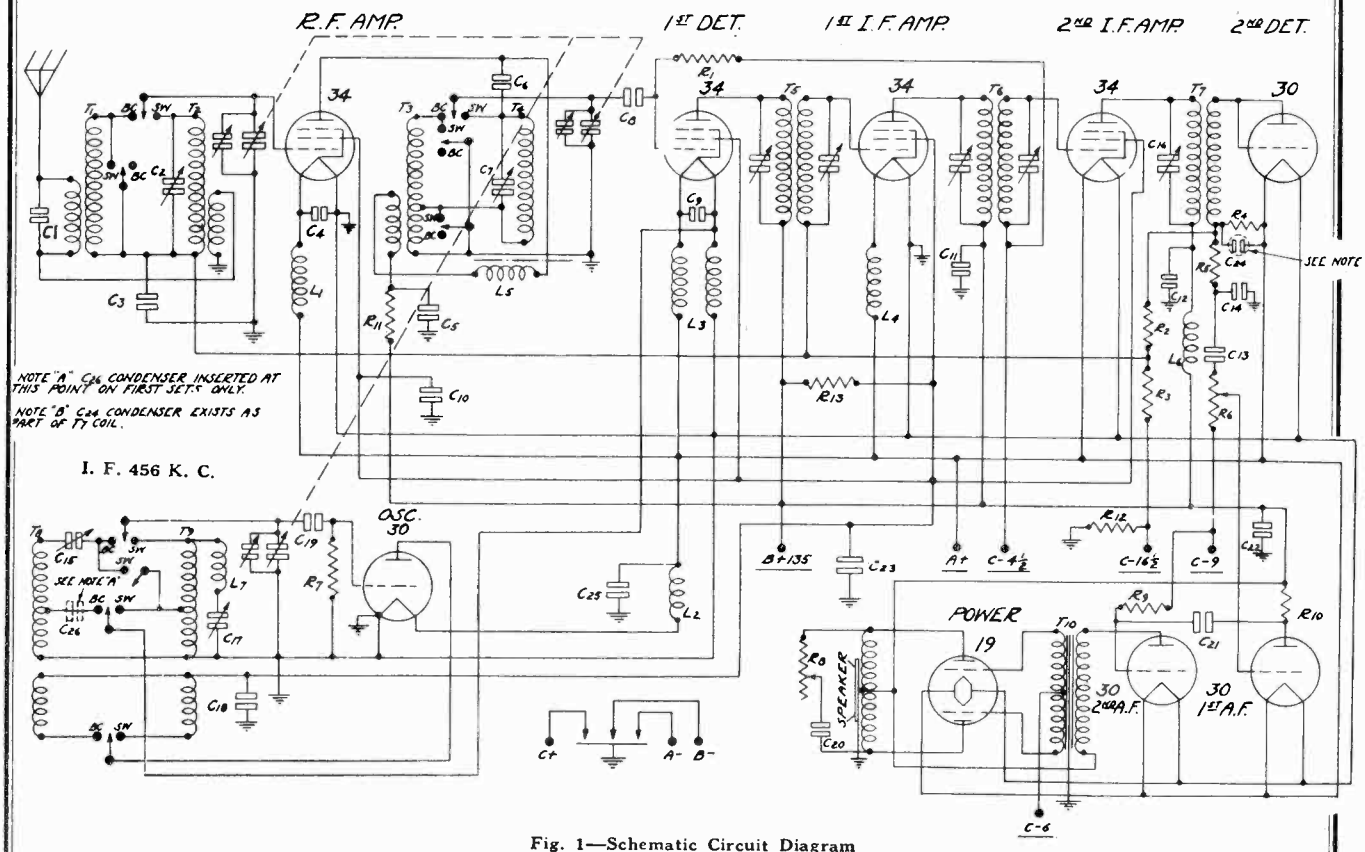


Fig. 1—Schematic Circuit Diagram

RESISTORS

Part No.	Code	Resistance	Wattage	Type
P-A95305	R1	3 Megohm	.2	Carbon
P-A95305	R2	3 Megohm	.2	Carbon
P-A94805	R3	8 Megohm	.2	Carbon
P-A94304	R4	300,000 Ohm	.2	Carbon
P-A95104	R5	100,000 Ohm	.2	Carbon
P- 96016	R6	2 Megohm		Volume Control
P-A94104	R7	100,000 Ohm	.2	Carbon
P- 97013	R8	45,000 Ohm		Tone Control
P-A94105	R9	1 Megohm	.2	Carbon
P-A94104	R10	100,000 Ohm	.2	Carbon
P-A95102	R11	1,000 Ohm	.2	Carbon
P-A95153	R12	15,000 Ohm	.2	Carbon
P-B94652	R13	6,500 Ohm	.2	Carbon
*P- 97011		150,000 Ohm		Tone Control
*P-A95603		60,000 Ohm	.2	Carbon

* These parts were used on first models only—see article on Changes in Early Models.

CONDENSERS

Part No.	Code	Capacity	Voltage	Type
P-80919	C1	250 mmf.		Moulded
P- 2102	C2	3–40 mmf.		Trimmer
P-81076	C3	.05 mf.	200V	Tubular
P-81076	C4	.05 mf.	200V	Tubular
P-81076	C5	.05 mf.	200V	Tubular
P-81094	C6	.006 mf.	600V	Tubular
P- 2102	C7	3–40 mmf.		Trimmer
P-81800	C8	50 mmf.		Wire Capacitor
P-81076	C9	.05 mf.	200V	Tubular
P-81102	C10	.25 mf.	140V	Tubular
P-81110	C11	.25 mf.	200V	Tubular
P-81076	C12	.05 mf.	200V	Tubular
P-81076	C13	.05 mf.	200V	Tubular
P-80977	C14	100 mmf.		Wire Capacitor
P- 2112	C15	300–500 mmf.		Trimmer
P- 1685	C16	40—100 mmf.		Trimmer
P- 1685	C17	40—100 mmf.		Trimmer
P-81076	C18	.05 mf.	200V	Tubular
P-81005	C19	35 mmf.		Moulded
P-81071	C20	.05 mf.	400V	Tubular
P-81094	C21	.006 mf.	600V	Tubular
P-82001	C22	4.0 mf.	150V	Electrolytic
	C23	8.0 mf.	150V	
	C24	Part of 3rd I. F. Coil		Assembly T7
P-81102	C25	.25 mf.	140V	Tubular
*P-81076	C26	.05 mf.	200V	Tubular
P-81027		3 Gang Condenser		

D. C. Resistance of Windings

Following are the D. C. resistances of the various windings in the chassis. The values given below will vary slightly in different sets.

Part No.	Item	Code	D. C. Resistance in Ohms
P-5176	B. C. Antenna R. F. Transformer, Primary	T1	28.0
	B. C. Antenna R. F. Transformer, Secondary	T1	5.0
	S. W. Antenna R. F. Transformer, Primary	T2	0.25
	S. W. Antenna R. F. Transformer, Secondary	T2	Small
P-5236	B. C. Interstage R. F. Transformer, Primary	T3	5.25
	B. C. Interstage R. F. Transformer, Secondary	T3	5.0
	S. W. Interstage R. F. Transformer, Secondary	T4	Small
P-5224	B. C. Oscillator Grid Coil	T8	2.4
	B. C. Oscillator Plate Coil	T8	3.5
	S. W. Oscillator Grid Coil	T9	1.0
	S. W. Oscillator Plate Coil	T9	Small
P-5179-A	1st I. F. Coil Primary	T5	12.0
	1st I. F. Coil Secondary	T5	13.0
P-5185	2nd I. F. Coil Primary	T6	5.5
	2nd I. F. Coil Secondary	T6	5.5
P-5186	3rd I. F. Coil Primary	T7	12.0
	3rd I. F. Coil Secondary	T7	30.0
P-50586-B	Audio Transformer Primary	T10	910.0
	Audio Transformer Secondary, Center tap to outside	T10	590.0
	Audio Transformer Secondary, Center tap to inside	T10	530.0
P-5189	Filament Reactor	L1	0.65
P-5189	Filament Reactor	L2	0.65
P-5235	Double Filament Reactor (each)	L3	0.3
P-5189	Filament Reactor	L4	0.65
P-5228	S. W. R. F. Interstage Plate Reactor	L5	28.0
P-5227	I. F. Isolating Reactor	L6	1.6
P-2179	Speaker Voice Coil, Center tap to outside		300.0
	Speaker Voice Coil, Center top to inside		250.0

MODEL 62-124, 62-129
Alignment

MONTGOMERY-WARD & CO.

Condenser Alignment

Correct alignment is extremely important in connection with all wave receivers. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide an accurately calibrated signal of 456 K. C. and accurately calibrated signals over the broadcast and short wave bands, 530-1730 K. C. and 5.8-16.0 M. C., is required. An output indicating meter is also necessary. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

Use a non-metallic screw driver for the adjustments. The complete procedure is as follows:

Intermediate Frequency Adjustment

Set the signal generator for 456 K. C. Connect the antenna lead of the signal generator to the grid of the 1st detector through a .05 mfd. condenser. Turn the tuning

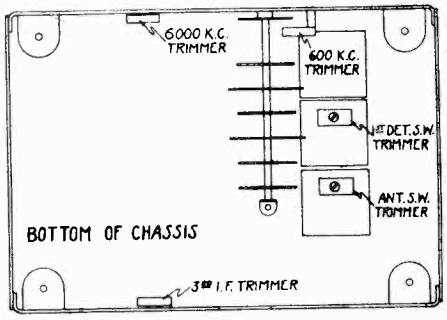


Fig. 3—Trimmer Locations

condenser rotor until the plates are completely out. The ground lead from the signal generator goes to the ground lead of the receiver. The volume control should be at the maximum position. Reduce the signal so that A. V. C. action is not obtained.

Then adjust the five I. F. trimmer condensers until maximum output is obtained. The adjusting screws for the 1st and 2nd trimmer condensers are reached from the top of the chassis and are in the round I. F. cans—See Fig. 2. The openings of these trimmer condensers are covered over by small cover plates which are held in position by screws. Loosen these screws until the cover plates can be swung around. **CAUTION—Use an insulated screwdriver for adjusting trimmers to prevent short circuiting to ground.** In the 3rd I. F. coil, only the primary has a variable trimmer condenser. This condenser is mounted on the back panel of the chassis as shown in Fig. 3 and the adjustment screw is reached through a hole in the back panel.

Broadcast Band Adjustment

The broadcast short wave switch should be in the broad-

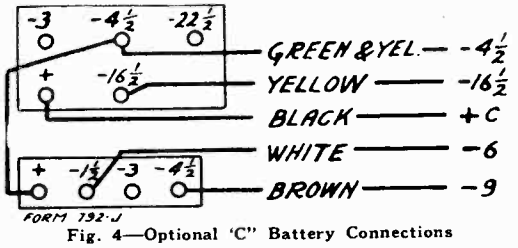


Fig. 4—Optional 'C" Battery Connections

cast position. Set the signal generator for 1730 K. C. Turn the rotor to the full open position. The antenna lead from the signal generator is in this instance connected to the antenna lead of the receiver. Reduce the signal so that A. V. C. action is not obtained. Adjust the oscillator broadcast trimmer until maximum output is obtained. This trimmer is on the tuning condenser and its location is shown in Fig. 2.

Then set the signal generator for 1500 K. C. Turn the rotor until maximum output is obtained. Loosen the set screw in the pointer hub and set the pointer at the 1500 K. C. mark on the broadcast band scale. Retighten the hub set screw. Then adjust the antenna and 1st detector broadcast trimmers until maximum output is obtained.

Next set the signal generator for 600 K. C. and adjust the 600 K. C. trimmer. The adjusting screw is reached through a hole in the front panel of the chassis as shown in Fig. 3. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting at the same time adjusting the 600 K. C. trimmer screw until the highest output is obtained.

Short Wave Band Adjustment

CAUTION—After the broadcast band alignment as described above has been made, do not change the adjust-

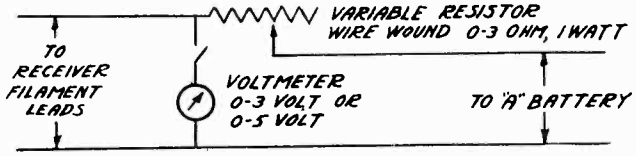


Fig. 5—Using Voltage Regulator with a 3 Volt "A" Battery

ment of any of the broadcast band trimmers.

In aligning the short wave band of the receiver, it will be noted that the signal will be heard with the signal generator set at two points 912 K. C. apart. That is, if the receiver is tuned to 15,000 K. C. a signal will be heard when the signal generator is set at 15,000 K. C. and again at approximately 15,912 K. C. This is due to image reception or the fact that a 456 K. C. beat is obtained when the signal is 456 K. C. lower than the receiver oscillator and also when the signal is 456 K. C. higher than the receiver oscillator. Care should be taken to see that the receiver is tracked with the signal generator adjusted to the lower of the two frequencies, at which a signal is heard, in order that the oscillator in the receiver will be 456 K. C. higher in frequency than the signal.

Turn the broadcast short wave switch to the short wave position. As explained above, the volume control should be at the maximum position and the signal should be reduced to prevent A. V. C. action.

Next set the signal generator for 15,000 K. C. Turn the rotor until maximum output is obtained. Then adjust the antenna and 1st detector short wave trimmers for maximum output.

Next set the signal generator for 6000 K. C. and adjust the 6000 K. C. trimmer. This condenser is mounted on the front panel of the chassis as shown in Fig. 3 and is reached through a hole in the front panel. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 6000 K. C. trimmer screw until the highest output is obtained.

Changes in Early Models

The condenser, C26 was used only on the early models of this receiver. Another change was in the tone control circuit. In the early models R8 was a 150,000 ohm resistor paralleled by a 60,000 ohm resistor. However, in the later models this arrangement was replaced by a single 45,000 ohm resistor to provide greater sensitivity in tone control.

MONTGOMERY-WARD & CO.

MODEL 62-124, 62-129
Voltage, Socket, Drive Cord Data

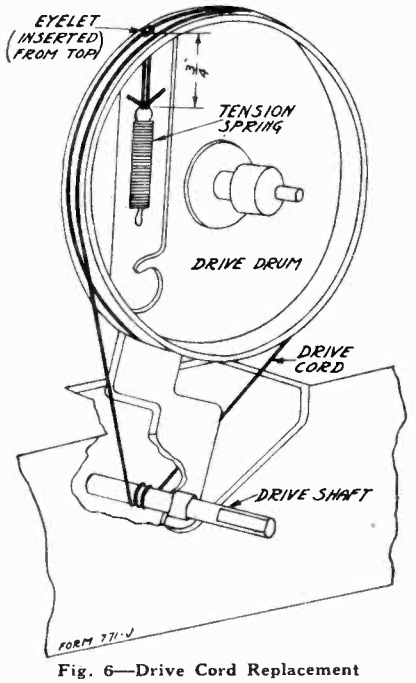


Fig. 6—Drive Cord Replacement

Voltages at Sockets

Antenna Shorted to Ground
Batteries Up to Rated Voltages. See Fig. 1
Voltages Read from Negative Filament Terminal

Type of Tube	Function	Across Filament	Plate to Gnd.	Control Grid to Ground	Screen to Gnd.	Normal Plate M. A.
34	R. F.	2.0	135	4.5(1)	80	2.8
34	1st Det.	2.0	135	4.5(1)	80	3.0
30	Osc.	2.0	80			2.8
34	1st I. F.	2.0	135	4.5(1)	80	2.8
34	2nd I. F.	2.0	135	4.5	80	2.8
30	2nd Det.	2.0				
30	1st Audio	2.0	95	9.0(2)		0.35
30	2nd Audio	2.0	135	9.0(3)		3.0
19	Output	2.0	135	6.0		1.3

(1) Computed figure—cannot be read because of high resistance cir.
(2) Volume Control at minimum.
(3) As read at battery.

Replacing Drive Cord

Lift off the pilot light assembly.

Detach the large pointer by removing the center screw.

Loosen the dial assembly by taking out the two screws which secure the bottom of this assembly to the chassis.

Then lay the complete dial assembly face downward in front of the chassis. It is not necessary to remove the volume control and tone control collars which hold the indicator cords of these two controls in position.

Turn the drive drum until the opening in this drum is approximately vertical and with the hole at the top as shown in Fig. 6.

Remove the tension spring and the old drive cord.

See that the eyelet is in the hole in the drive drum as shown in Fig. 6. Insert one end of the drive cord from the outside through the hole in the eyelet in the drive drum.

Tie the end of the cord which has been inserted in the hole to one end of the tension spring.

Wrap the cord in a clockwise direction (facing front of chassis) around the drive drum approximately one-half turn.

Then tilt the chassis up on its back panel and bring the cord mentioned in the previous paragraph down to the drive shaft. Wrap it two and one-half times around the drive shaft as shown in Fig. 6.

Then bring this cord up from the drive shaft and wrap it around the drive drum approximately one and one fifth turns in a clockwise direction until it is up to the hole in this drum as illustrated.

Insert the free end of the cord through the hole in the eyelet and tie it to the end of the tension spring. The end of the spring, when hanging free, should be approximately ¾" from the flange of the drum as shown in Fig. 6. Cut off the surplus length of cord after it is knotted.

Then secure the other end of the tension spring over the spur on the drive drum.

Replace the dial assembly and pointer.

Replace the pilot light assembly.

Batteries

To prolong "B" battery life instruct the customer to keep the volume down as high volume increases the "B" drain considerably. The average "B" drain is 23.5 milliamperes. The reception of weak signals also increases the "B" drain.

This receiver is designed to operate from a 2 volt storage cell but can be operated from a 3 volt dry cell used in conjunction with the voltage regulator shown in Fig. 5. This device consists of a rheostat in series with the supply, for controlling the voltage and a voltmeter for measuring it.

The voltmeter should not indicate more than 2 volts when the above arrangement is used, an optimum setting being 1.9 to 2.0 volts.

For the grid bias a special 22½ volt "C" battery with 4½, 6, 9 and 16½ volt taps (Fig. 2) may be used. If not available, a standard 4½ volt "C" and a standard 22½ volt "C" battery can be connected as shown in Fig. 4.

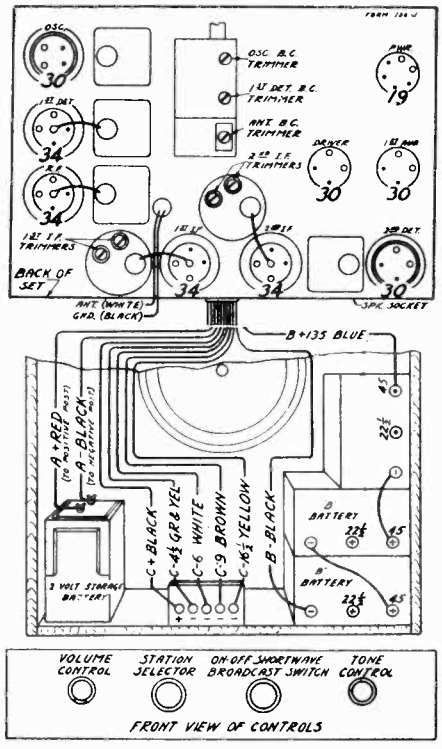


Fig. 2—Arrangement of Tubes, Batteries and Controls

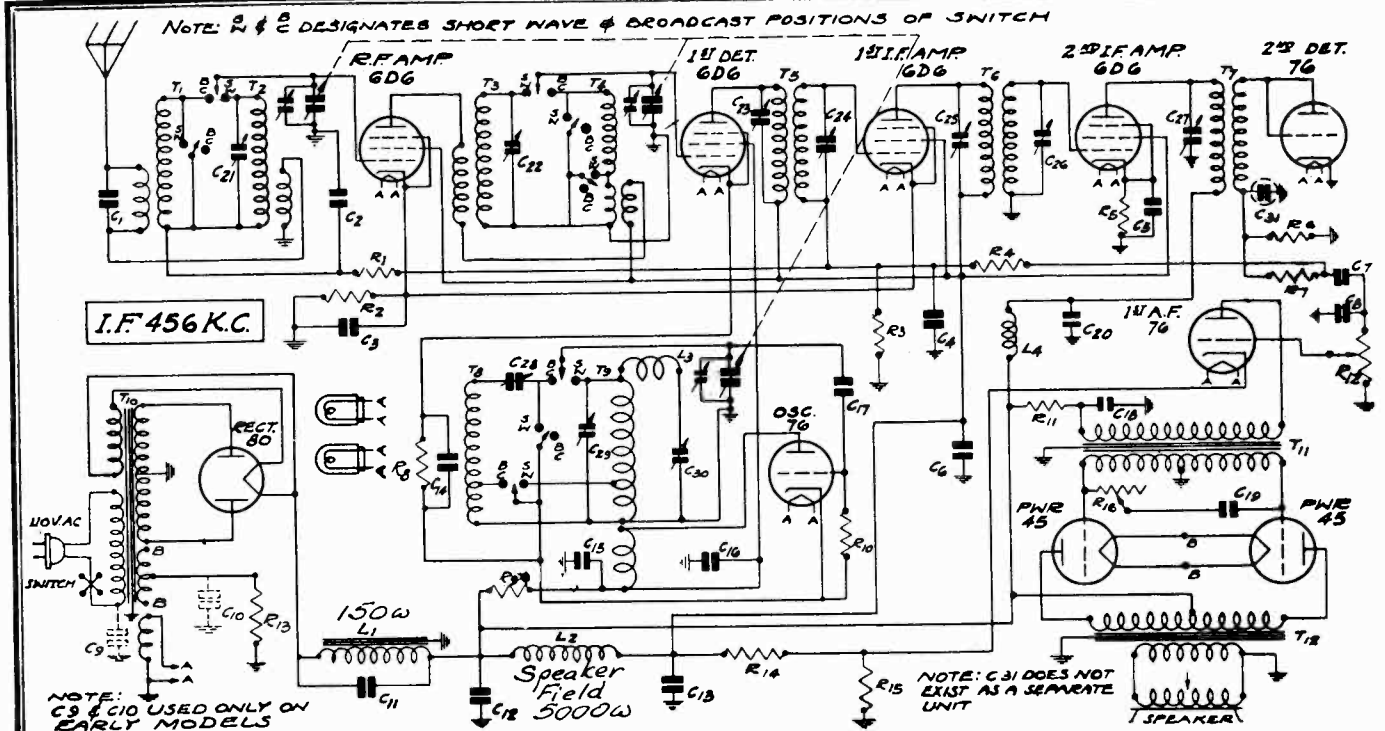


Fig. 1—Schematic Circuit Diagram

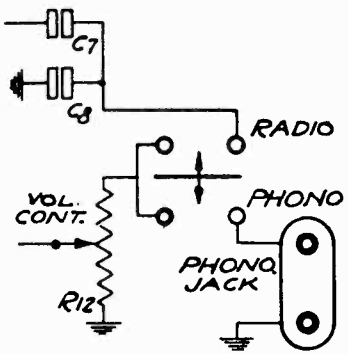


Fig. 5—Phonograph Connections

Part No.	Code	Capacity	Volts	Type
P-80919	C1	250 mmfd.		Moulded
P-80862	C2	.05 mfd.	200V.	Tubular
P-80888	C3	.25 mfd.	200V.	Tubular
P-80862	C4	.05 mfd.	200V.	Tubular
P-80862	C5	.05 mfd.	200V.	Tubular
P-80888	C6	.25 mfd.	200V.	Tubular
P-80862	C7	.05 mfd.	200V.	Tubular
P-81005	C8	35 mmfd.	600V.	Moulded
*P-80997	C9	.01 mfd.	600V.	Condenser in metal can
*P-80888	C10	.25 mfd.	200V.	Tubular
P-80985	C11	.15 mfd.	220V.	Tubular
P-81039	C12	16.0 mfd.	400V.	Wet Electrolytic
P-81018	C13	6.0 mfd.	150V.	Dry Electrolytic
	C16	2.0 mfd.	300V.	
	C18	2.0 mfd.	300V.	
P-80862	C14	.05 mfd.	200V.	Tubular
P-80864	C15	.10 mfd.	200V.	Tubular
P-81005	C17	35 mmfd.	600V.	Moulded
P-80863	C19	.004 mfd.	600V.	Tubular
P-81041	C20	.10 mfd.	400V.	Tubular
P-2102	C21	3-40 mmfd.		Ant. S.W. Trimmer
P-2102	C22	3-40 mmfd.		1st Det. S.W. Trimmer
P-2103	C23	200± 50 mmfd.		Dual Trimmer
	C24	200± 50 mmfd.		Part of I.F. Assem.
P-2103	C25	200± 50 mmfd.		Dual Trimmer
	C26	200± 50 mmfd.		Part of I.F. Assem.
P-1685	C27	70± 30 mmfd.		3rd I.F. Coil Trimmer
P-2112	C28	300-500 mmfd.		600 K.C. Trimmer
P-2102	C29	3-40 mmfd.		Osc. S.W. Trimmer
P-1685	C30	70± 30 mmfd.		6000 K.C. Trimmer
P-81027		Three Gang Condenser		

RESISTORS

Part No.	Code	Resistance	Watts	Type
P-A95204	R1	200,000 ohm	.2	Carbon
P-98023	R2	150 ohm	.5	Flex. Wire Wound
P-A95105	R3	1 megohm	.2	Carbon
P-A95205	R4	2 megohm	.2	Carbon
P-98024	R5	400 ohm	.5	Flex. Wire Wound
P-A94304	R6	300,000 ohm	.2	Carbon
P-A95104	R7	100,000 ohm	.2	Carbon
P-A94252	R8	2,500 ohm	.2	Carbon
P-98022	R9	30,000 ohm	2.0	Carbon
P-A95104	R10	100,000 ohm	.2	Carbon
P-C94303	R11	30,000 ohm	1.0	Carbon
P-96005	R12	2 megohm		Volume Control and Switch
P-98006	R13	780 ohm	3.0	Armored Wire Wound
	R14	6000 ohm	1.4	
	R15	460 ohm	.2	
P-97003	R16	3 megohm		Tone Control

*Used in Early Models only.

Part No.	Item
P-50638	Power Transformer 115V. 60 cycles T 10
P-50639	Power Transformer 115V. 25 cycles T 10
P-50640	Power Transformer 115-230V. 40-60 cycles T 10
P-50641	Power Choke L 1
P-50642	Audio Output Transformer T 12
P-50643	Audio Input Transformer T 11
P-5176	Antenna R.F. Trans. T 1 and T 2 less can
P-5177	Interstage R.F. Trans. T3 and T4 less can
P-5178	Oscillator Coil Assembly T8 and T9 less can
P-5186	3rd I. F. Coil T7 less can
P-40433	Cans for the above coils
P-5184	1st I.F. Coil & Can Assembly T5
P-5185	2nd I.F. Coil & Can Assembly T6
P-5190	H. F. Oscillator Tracking Coil L3
P-5151	I.F. Plate Isolating Reactor L4
P-70702	A.C. Cord & Plug
P-1421	Single Insulated Terminal Strip
P-1441	Double Insulated Terminal Strip
P-2060	Small Knob
P-2062	Large Knob
P-30342A	Grid Cap only
P-30456	Small Pointer
P-20912	Large Double End Pointer
P-2012	Pilot Light Bulb
P-10272	Rubber Mounting Feet
P-10320	Glass Crystal
P-20875	Crystal Retaining Ring
P-1968	10" Dynamic Speaker Console L2
P-2101	Three Position Band Change Switch
P-20905	Condenser Shield
	8" Black Drive Cord (V.C. or T.C. Ind.)
	29" Black Drive Cord (Cond. Drive)
P-2126	Pilot Lamp Socket & Clip Assembly
P-20911	Bottom Shield
P-1011A	Phono-Radio Switch
P-1193	Phono Jack

MONTGOMERY-WARD & CO.

Condenser Alignment

Correct alignment is extremely important in connection with all wave receivers. The receivers are all properly aligned at the factory with precision instruments and re-alignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide an accurately calibrated signal of 456 K. C. and accurately calibrated signals over the broadcast and short wave bands, 530-1740 K. C and 5.8-18.3 M. C., is required. An output indicating meter is also necessary. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

Use a non-metallic screw driver for the adjustments. The complete procedure is as follows:

Intermediate Frequency Adjustment

Set the signal generator for 456 K. C. Connect the antenna lead of the signal generator to the grid of the 1st detector through a .05 mfd. condenser. Turn the tuning condenser rotor until the plates are completely out. The ground lead from the signal generator goes to the ground lead of the receiver. The volume control should be at the maximum position. Reduce the signal so that A. V. C. action is not obtained.

Then adjust the five I. F. trimmer condensers until maximum output is obtained. The adjusting screws for the 1st and 2nd trimmer condensers are reached from the top of the chassis and are in the round I. F. cans - See Fig. 2. The openings to these trimmer condensers are covered over by small cover plates which are held in position by screws. Loosen these screws until the cover plates can be swung around. **CAUTION - Use an insulated screwdriver for adjusting trimmers to prevent short circuiting to ground.** In the 3rd I. F. coil, only the primary has a variable trimmer condenser. This condenser is mounted on the back panel of the chassis as shown in Fig. 2 and the adjustment screw is reached through a hole in the back panel.

Broadcast Band Adjustment

The broadcast short wave switch should be in the broadcast position. Set the signal generator for 1740 K. C. Turn the rotor to the full open position. The antenna lead from the signal generator is in this instance connected to the antenna lead of the receiver. Reduce the signal so that A. V. C. action is not obtained. Adjust the oscillator broadcast trimmer until maximum output is obtained. This trimmer is on the tuning condenser and its location is shown in Fig. 2.

Then set the signal generator for 1500 K. C. Turn the rotor until maximum output is obtained. Loosen the set screw in the pointer hub and set the pointer at the 1500 K. C. mark on the broadcast band scale. Retighten the hub set screw. Then adjust the antenna and 1st detector broadcast trimmers until maximum output is obtained.

Next set the signal generator for 600 K. C. and adjust the 600 K. C. trimmer. The adjusting screw is reached through a hole in the front panel of the chassis as shown in Fig. 2. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting at the same time adjusting the 600 K. C. trimmer screw until the highest output is obtained.

Short Wave Band Adjustment

CAUTION—After the broadcast band alignment as described above has been made, do not change the adjustment of any of the broadcast band trimmers.

In aligning the short wave band of the receiver, it will be noted that the signal will be heard with the signal generator set at two points 912 K. C. apart. That is, if the receiver is tuned to 15,000 K. C. a signal will be heard when the signal generator is set at 15,000 K. C. and again at approximately 15,912 K. C. This is due to image reception or the fact that a 456 K. C. beat is obtained when the signal is 456 K. C. lower than the receiver oscillator and also when the signal is 456 K. C. higher than the receiver oscillator. Care should be taken to see that the receiver is tracked with the signal generator adjusted to the lower of the two frequencies at which a signal is heard, in order that the oscillator in the receiver will be 456 K.C. higher in frequency than the signal.

Turn the broadcast short wave switch to the short wave position. Turn the rotor to the full open position. As explained above, the volume control should be at the maximum position and the signal should be reduced to prevent A. V. C. action. Set the signal generator for 18,300 K. C. Then adjust the oscillator short wave trimmer for maximum output. This trimmer is reached from under the chassis and its position is shown in Fig. 2. If a maximum output peak cannot be reached, it may be due to the fact that the antenna and 1st detector short wave trimmers are screwed down too far. Back off these two trimmer screws two or three turns and then adjust the oscillator short wave trimmer for maximum output.

Next set the signal generator for 15,000 K. C. Turn the rotor until maximum output is obtained. Then adjust the antenna and 1st detector short wave trimmers for maximum output.

Next set the signal generator for 6000 K. C. and adjust the 6000 K. C. trimmer. This condenser is mounted on the front panel of the chassis as shown in Fig. 2 and is reached through a hole in the front panel. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 6000 K. C. trimmer screw until the highest output is obtained.

Twenty-five Cycle Receivers

The twenty-five cycle receiver differs from the sixty-cycle, receiver only in the fact that a different power transformer is used. The correct power transformer is shown in the parts list.

A 115-230 Volt, 40-60 cycle Power Transformer is also available for this model.

Phono Connections

Phonograph connections can be made as shown in Fig. 5. A single pole double throw switch and double pin jack are required. These should be mounted on the back panel of the chassis close to the 2nd detector. The connections are made by opening the diode circuit at the point shown in the illustration and completing the connections to the switch and pin jacks as indicated. A high impedance pick-up should be used. If a low impedance pick-up is used a step-up transformer will be required for sufficient volume. The volume control of the set will regulate the phono volume.

Voltages at Sockets

LINE VOLTAGE — 115

ANTENNA SHORTED TO GROUND

Type of Tube	Function	Across Fila. or Heater	Plate to Cath.	Screen to Cath.	Cath. to Ground	Normal Plate M. A.
6D6	R. F.	6.3	95	95	2.8	7.0
6D6	1st Det.	6.3	88	95	9.2	2.9
76	Osc.	6.3	110	—	—	5.0
6D6	1st I. F.	6.3	95	95	2.8	7.0
6D6	2nd I. F.	6.3	300	95	3.3	6.0
76	2nd Det.	6.3	—	—	—	—
76	1st Audio	6.3	160	—	9.0	4.0
45	Output	2.5	245	—	48.0	30.0
80	Rectifier	5.0	890 V. A. C. pl. to pl.			58.0 per plate

MODEL 62-132,62-137
Socket,Trimmers
Drive Cord Data

MONTGOMERY-WARD & CO.

Replacing Drive Cord

Remove chassis from cabinet.

Take off the pilot light assembly by lifting off the two sockets and spring clips.

Detach the large pointer by removing the screw at the center of the dial.

Loosen the dial assembly by taking out the two screws which secure the bottom of this assembly to the chassis.

Then lay the complete dial assembly face downward in front of the chassis. It is not necessary to remove the volume control and tone control collars which hold the indicator cords of these two controls in position.

Turn the drive drum until the opening in this drum is approximately vertical and with the hole at the top as shown in Fig. 4.

Remove the tension spring and the old drive cord.

See that the eyelet is in the hole in the drive drum as shown in Fig. 4. Insert one end of the drive cord from the outside through the hole in the eyelet in the drive drum.

Tie the end of the cord which has been inserted in the hole to one end of the tension spring.

Wrap the cord in a clockwise direction (facing front of chassis) around the drive drum approximately one-half turn.

Then tilt the chassis up on its back panel and bring the cord mentioned in the previous paragraph down to the drive shaft. Wrap it two and one-half times around the drive shaft as shown in Fig. 4.

Then bring this cord up from the drive shaft and wrap it around the drive drum approximately one and one fifth

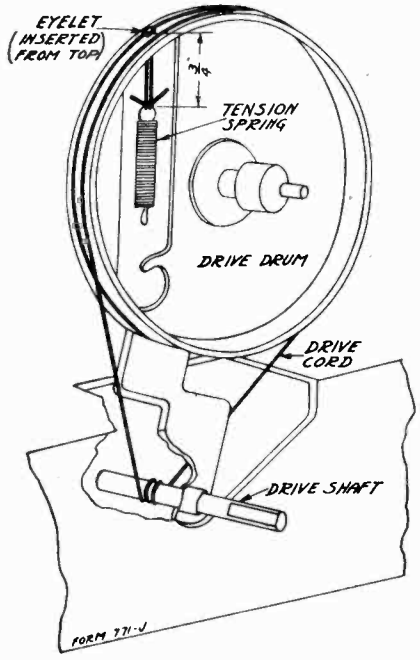


Fig. 4—Drive Cord Replacement

turns in a clockwise direction until it is up to the hole in this drum as illustrated.

Insert the free end of the cord through the hole in the eyelet and tie it to the end of the tension spring. The end of the spring, when hanging free, should be approximately ¼" from the flange of the drum as shown in Fig. 4. Cut off the surplus length of cord after it is knotted.

Then secure the other end of the tension spring over the spur on the drive drum.

Replace the dial assembly and pointer.

Replace the pilot light assembly after which the chassis may be reinstalled in the cabinet.

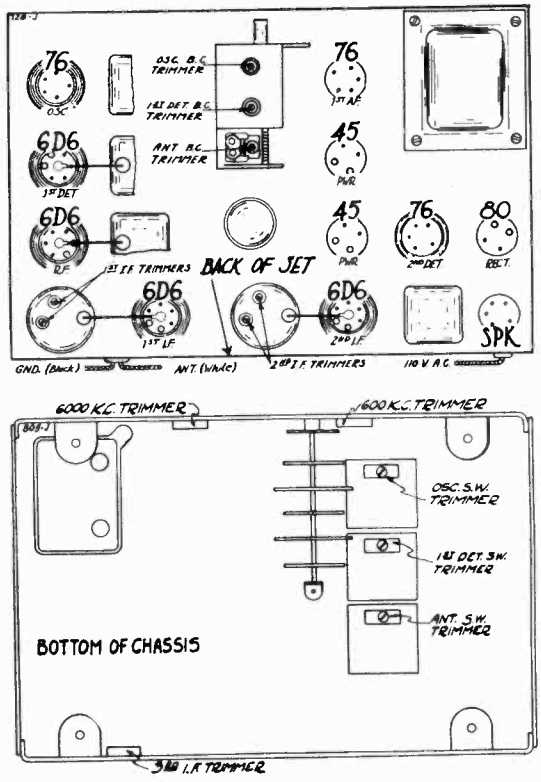


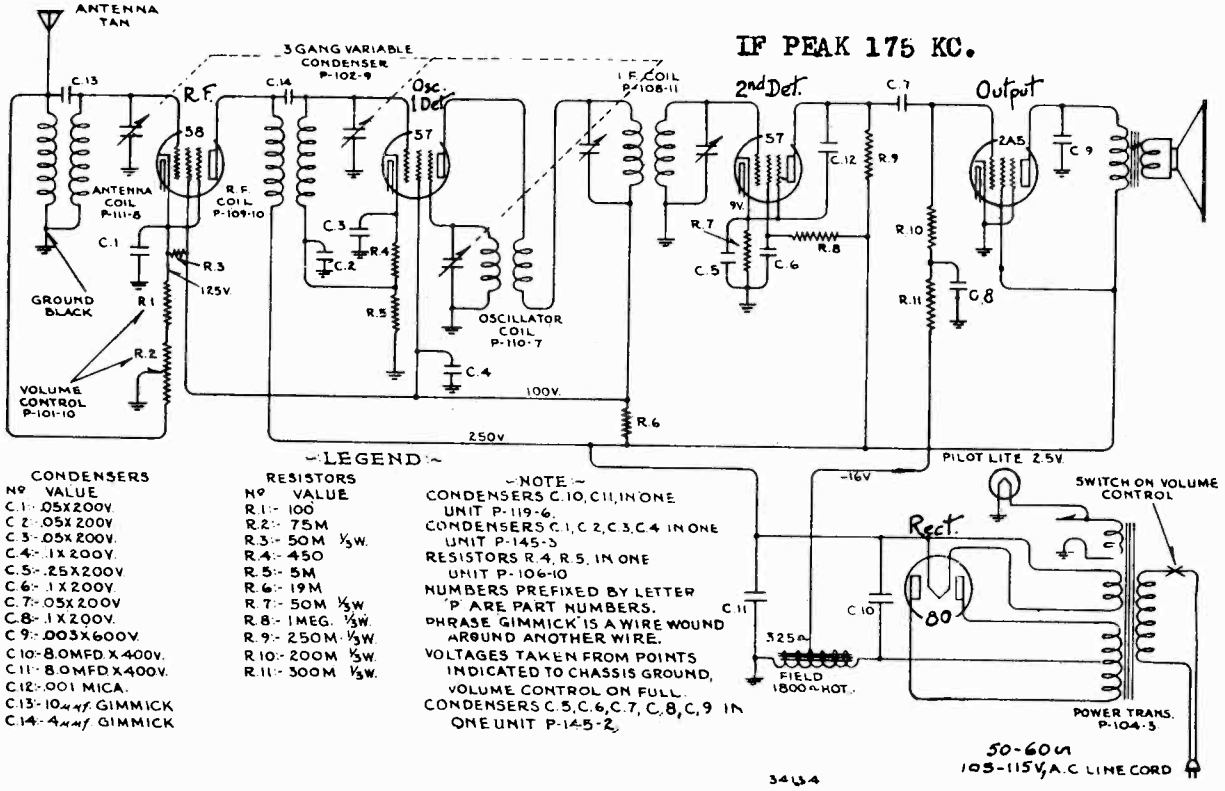
Fig. 2—Tube Arrangement & Location of Trimmers

Change in Early Models

In the early models of this receiver the side of the trimmer condenser C27 which is shown in Fig. 1 as connected to ground was connected to the B+ side of the 3rd I. F. coil primary.

MONTGOMERY-WARD & CO.

MODEL 62-140, 62-140X
62-148, 62-148X
Schematic, Socket



CONDENSERS

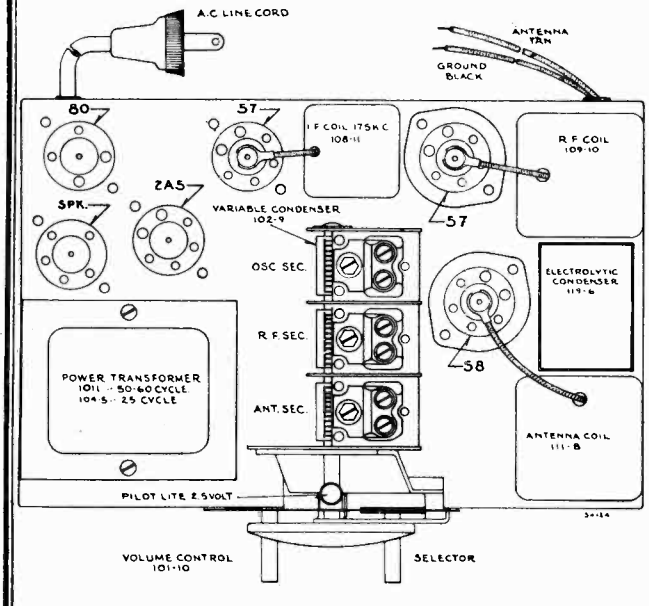
Nº	VALUE
C.1	.05 X 200V.
C.2	.05 X 200V.
C.3	.05 X 200V.
C.4	.1 X 200V.
C.5	.25 X 200V.
C.6	.1 X 200V.
C.7	.05 X 200V.
C.8	.1 X 200V.
C.9	.003 X 600V.
C.10	8.0 MFD. X 400V.
C.11	8.0 MFD X 400V.
C.12	.001 MICA.
C.13	10 μμf. GIMMICK
C.14	4 μμf. GIMMICK

RESISTORS

Nº	VALUE
R.1	100
R.2	75M
R.3	50M 1/5W.
R.4	450
R.5	5M
R.6	19M
R.7	50M 1/5W.
R.8	1 MEG. 1/3W.
R.9	250M 1/5W.
R.10	200M 1/5W.
R.11	300M 1/3W.

NOTE

CONDENSERS C.10, C.11, IN ONE UNIT P-119-6.
CONDENSERS C.1, C.2, C.3, C.4 IN ONE UNIT P-145-3
RESISTORS R.4, R.5, IN ONE UNIT P-106-10
NUMBERS PREFIXED BY LETTER 'P' ARE PART NUMBERS.
PHRASE GIMMICK IS A WIRE WOUND AROUND ANOTHER WIRE.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND, VOLUME CONTROL ON FULL.
CONDENSERS C.5, C.6, C.7, C.8, C.9 IN ONE UNIT P-145-2.



SERVICE SUGGESTIONS:

Make certain of the following: That all tubes are pushed firmly in their proper sockets and that the clips are securely fastened to the caps. That the aerial connection is good and not short-circuited to ground. (Pilot lights illuminate when set is turned on.)

PILOT LIGHT:

The pilot light used is 2.5 volt Mazda. No. T41-G3½. To replace, remove receptacle clipped to top of the variable condenser.

Part No. 145-2

Common Black to Brown	—.003	x 600 Volts
Common Black to Green	—.1	x 200 Volts
Common Black to Red	—.1	x 200 Volts
Common Black to Orange	—.25	x 200 Volts
Blue to Blue	—.05	x 400 Volts

Part No. 145-3

Common Black to Brown	—.1	x 200 Volts
Common Black to Green	—.05	x 200 Volts
Common Black to Orange	—.05	x 200 Volts
Common Black to Yellow	—.05	x 200 Volts

Service Notes

Voltages taken from different points of circuit to chassis are measured with volume control full on, using a voltmeter having a resistance of 1000 ohms per volt. These voltages are indicated on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of similar capacity which is known to be in good condition, until the defective unit is located. Part numbers 145-2 and 145-3 are by-pass condenser blocks and consist of the following condensers:

Should any section of either of these blocks fail, it is not necessary to replace the entire condenser. A small tubular condenser may be used to replace the defective section.

Excessive hum, low volume or reduction in all D. C. voltages is usually caused by open or shorted electrolytic filter condensers. Open by-pass condensers cause oscillation and distorted reproduction.

MODEL 62-140, 62-140X
62-148, 62-148X
Alignment, Parts List

MONTGOMERY-WARD & CO.

25 Cycle Chassis

The 25 cycle model 62-148X chassis may be used on a power supply of from 105 to 125 volts, 60 cycles, but the 60 cycle model 62-148 must not under any circumstances be operated on 25 cycles.

Alignment

The set should be thoroughly checked for all other possible causes of trouble, such as defective tubes, condensers, poor installations and low line voltages before any attempt is made at re-alignment.

Aligning I. F. Transformer

1. With volume control full on, at extreme right of its rotation, and with variable condenser at its maximum capacity position (extreme right of its rotation) make the following adjustments:

(a) Connect an external oscillator adjusted to 175 kilocycles, in series with a .1 mfd. condenser, to the control grid cap of the type 57 tube located between the R. F. coil (part numbers 109-10) and the I. F. transformer (part number 108-11) and chassis.

(b) Adjust trimming condensers of I. F. transformer (part number 108-11) to resonance. See top view of chassis. Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or between the plate and screen terminals of the type 2A5 tube, by means of an adapter. Maximum deflection of the meter indicates resonance. Care must be taken to use only enough signal to give a readily readable output, as excessive input will result in overload and a false resonance point.

NOTE: The two trimmer condensers which tune the primary and secondary of the I. F. transformer are adjusted by set screws accessible from the back of the chassis.

Aligning R. F. and Oscillator Circuits

1. Connect the external oscillator set at 1720 kilocycle and in series with a 200 Mfd. condenser, between the antenna (tan) and ground (black) leads.

(a) With volume control full on and variable condenser plates in minimum capacity position, plates entirely out of mesh (extreme left of its rotation), adjust trimmer of rear oscillator section of variable condenser to resonance.

(b) Shift external oscillator frequency from 1720 to 1400 kilocycles, pick up signal by rotating variable condenser and peak R. F. (center) and antenna (front) section trimmers of variable condenser to resonance.

(c) Check tracking at 1500, 1200, 1000, 800, 600 and 530 kilocycles by changing external oscillator frequency and rotating variable condenser to pick up signal. Adjust slotted end plates of R. F. (center) and antenna (front) sections to increase output, if necessary. DO NOT BEND OSCILLATOR PLATES.

Tubes

The tube complement of this chassis is as follows:

1 Type 58 remote cut-off pentode as an R. F. amplifier.
1 Type 57 pentode as an oscillator and first detector.
1 Type 57 pentode as second detector.
1 Type 2A5 pentode output A. F. amplifier.
1 Type 80 high vacuum rectifier.

All resistors are RMA color coded—specify value and/or resistor (per schematic diagram) and model number.

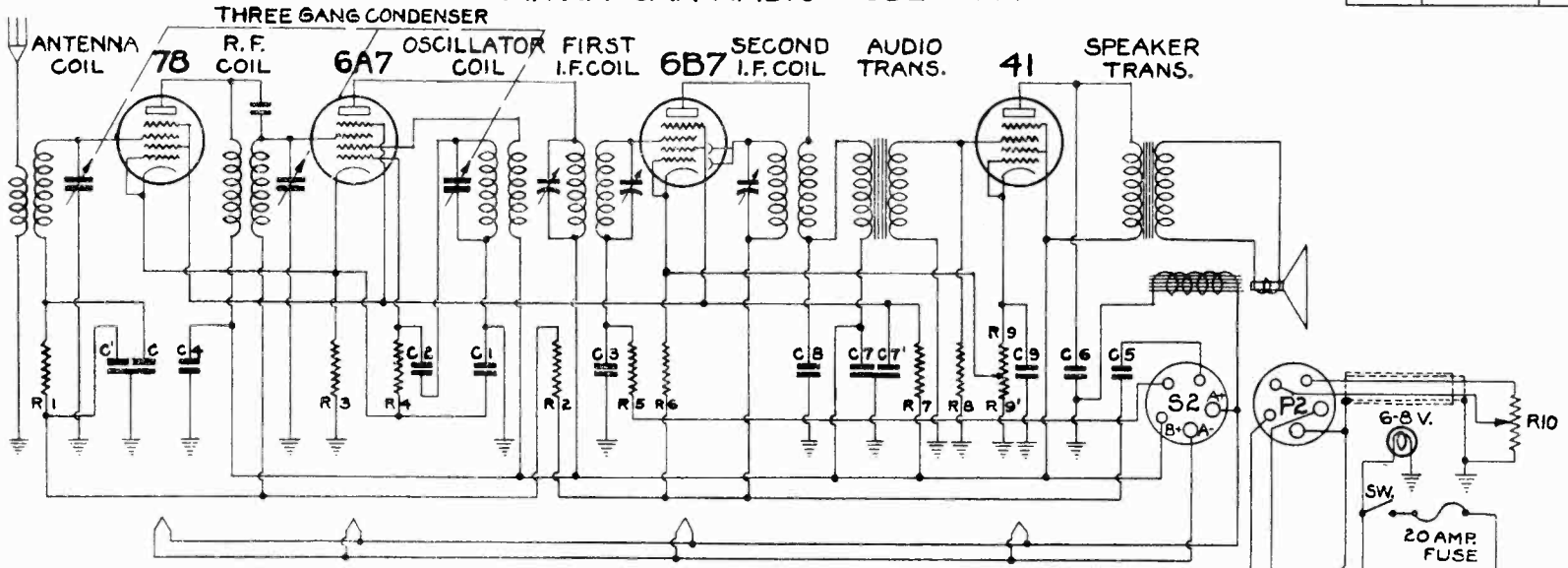
When ordering condensers, specify part number, model number and/or capacitor (per schematic diagram) and model number.

When ordering parts, always specify part and model number as well as serial number of chassis.

Part No.	Description
BE 101-10	Volume Control with Switch
BE 102-9	Three Gang Variable Condenser
BE 106-10	5,450 Ohm Metal Clad Resistor
BE 108-11	I. F. Transformer Complete
BE 109-10	R. F. Coil Complete
BE 110-7	Oscillator Coil and Bracket
BE 111-8	Antenna Coil Complete
BE 112-9	Dial Bracket Drive Complete
BE 112-12	Dial Scale
BE 112-15	Dial Glass
BE 112-17	Dial Drive Disc
BE 112-34	Pilot Light Socket
BE 112-37	Bakelite Escutcheon Plate
BE 114-3	Dynamic Speaker
	Cabinet—Model 62-148
	Cabinet—Model 62-140
BE 115-15	Coil Cans
BE 115-22	Tube Shield—No. 01360
BE 116-1	2.5 Volt Pilot Lamp—41-G3½
BE 119-6	Dual 8 Mfd. Electrolytic Condenser
BE 129-1	.001 Mica Condenser
BE 130-5	300M Ohm—1/5 Watt Carbon Res.
BE 130-8	200M Ohm—1/5 Watt Carbon Res.
BE 130-11	250M Ohm—1/5 Watt Carbon Res.
BE 130-12	50M Ohm—1/5 Watt Carbon Res.
BE 130-19	1 Meg Ohm—1/5 Watt Carbon Res.
BE 130-25	19M Ohm—1.2 Watt Carbon Res.
BE 131-2	Bakelite Knobs (Inc. Springs)
BE 145-2	.503 Mfd. By-Pass Block
BE 145-3	.25 Mfd. By-Pass Block
BE 1011	Power Transformer—50-60 Cy.
BE 1019	Six Foot Cord and Plug
	All Sockets
BE 104-5	Power Trans.—25 Cycle

DIAGRAM	ISSUE NO.	DATE
		11-10-33

SCHEMATIC CIRCUIT DIAGRAM
ARVIN CAR RADIO MODEL 10A



CONDENSERS

C	.05	TWIN
C'	.05	
C1	.10	
C2	.0001	
C3	.0001	
C4	.50	
C5	.01	
C6	.002	
C7	.05	TWIN
C7'	.05	
C8	.00075	
C9	12.0	
C10	.50	
C11	.10	
C12	TWO .02 CENTER TAP	
C13	16.0	DUAL ELECTROLYTIC
C13'	8.0	
C14	1.0	TRIPLE UNIT
C15	12.0	
C15'	12.0	

RESISTORS

R1	65,000
R2	1,000,000
R3	260
R4	50,000
R5	450,000
R6	450,000
R7	40,000
R8	55,000
R9	800 CANDOHM
R9'	80
R10	200,000

CHOKES

L1	R.F. CHOKE "A" HOT (166 T.)
L2	R.F. CHOKE "A" HOT (166 T.)
L3	R.F. CHOKE "B+" (100 T.)

SOCKETS

S1	POWER UNIT OUTPUT
S2	REMOTE CONTROL CABLE

PLUGS

P1	INTER UNIT CABLE
P2	REMOTE CONTROL CABLE

For Alignment See Index

IF PEAK 175 KC.

NOBLITT-SPARKS INDUSTRIES, INC.
COLUMBUS, INDIANA.

MODEL 10-A SOCKET VOLTAGES

Make voltage tests with 1000 ohm per volt meter. Voltages given in table are only comparative due to variance in battery voltage. Plus or minus 20% on all voltages is acceptable.

Tube	Heaters	Plate	Screen	Cathode	Suppressor	Control	Anode Grid 1500 KC	Osc. Grid 1500 KC
78	6.3	220	85	2.0	2.0	*1.8	—	—
6A7	6.3	220	85	2.0	—	*1.8	220	*6
6B7	6.3	220	85	1.75	—	*1.75	—	—
41	6.3	205	220	16.5	—	*16.5	—	—
84	6.3	255 (AC)	—	225	—	—	—	—

* Measured with vacuum tube voltmeter only.

MODEL 10-A POINT TO POINT RESISTANCE CHECK

All readings taken to ground unless otherwise specified. Readings taken with all tubes removed from set and R. F. chassis and speaker disconnected from power pack unit.

78

+ Heater	Inf.
— Heater	0
Cathode	260
Suppressor (No. 3)	260
Plate to B+	100
Screen (No. 2) to B+	40,000
Control Grid (No. 1)	1,515,080

6A7

+ Heater	Inf.
— Heater	0
Anode Grid (No. 2) to B+	3.5
Osc. Grid (No. 1)	50,260
Screen (No. 3-5) to B+	40,000
Plate to B+	125
Cathode	260
Control Grid (No. 4)	1,450,080

6B7

+ Heater	Inf.
— Heater	0
Cathode	80
Plate to B+	75
Screen (No. 2) to B+	40,000
Diode	450,000
Control Grid (No. 1) to Grid Term S2	450,000

41

+ Heater	Inf.
— Heater	0
Screen (No. 2) to B+	0
Plate to B+	800
Cathode	800
Control Grid (No. 1)	1750

84

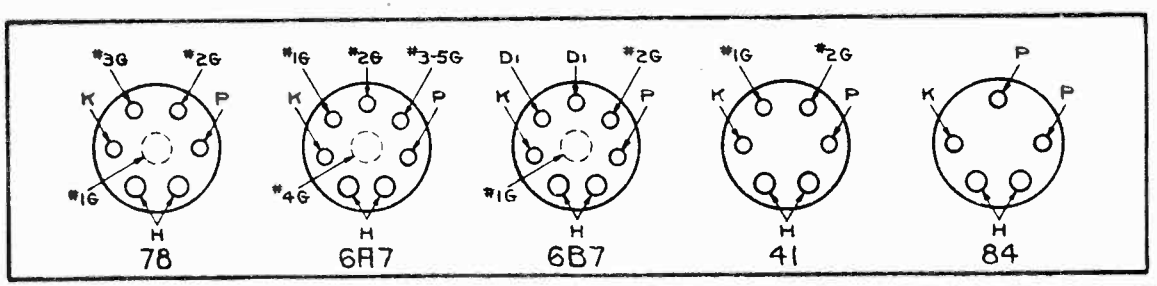
+ Heater	Inf.
— Heater	0
Plates	155
Plate to Plate	310
Cathode	Inf.†

†Reads leakage of electrolytic condenser.

COIL RESISTANCES

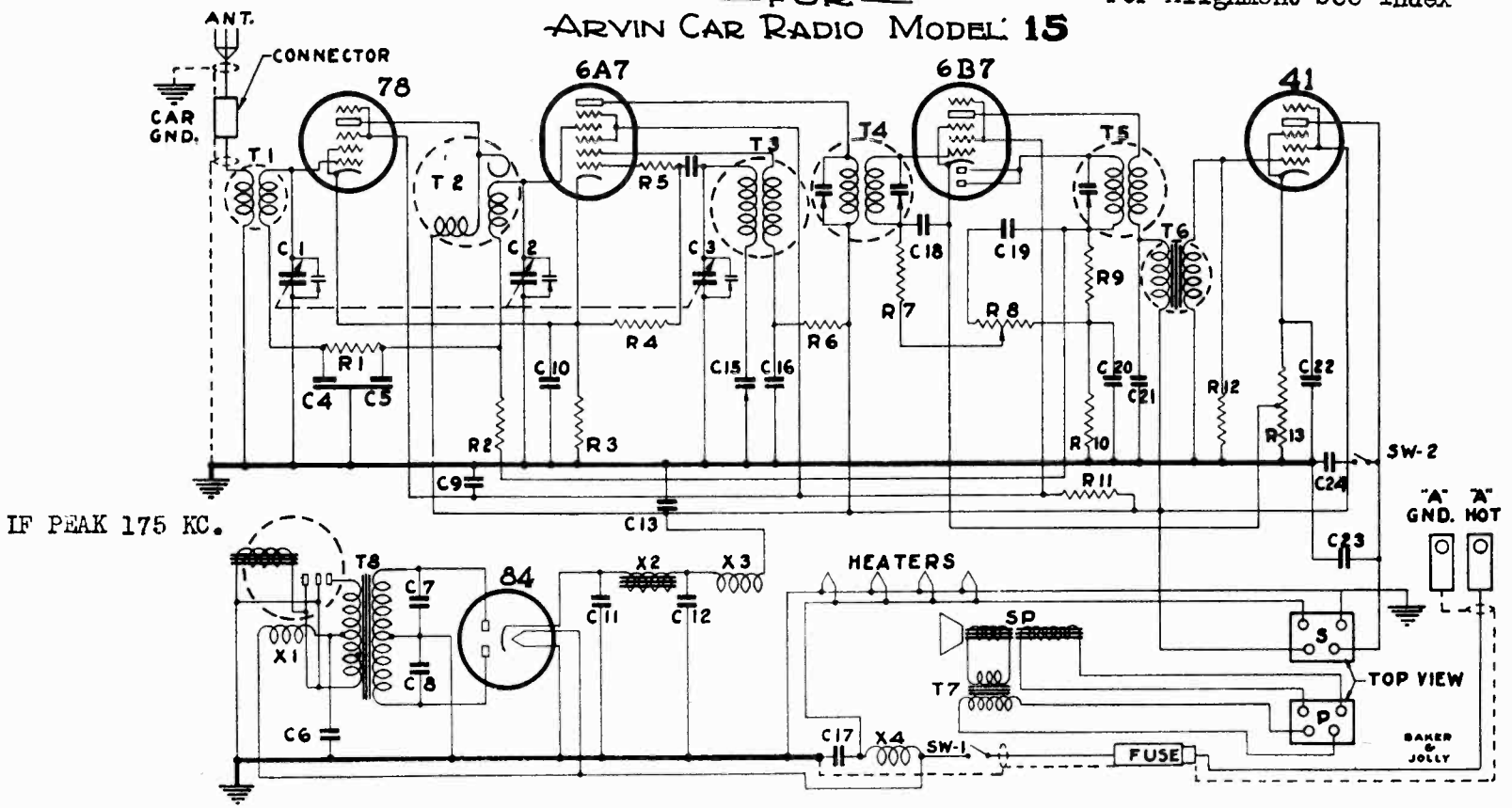
Ant. Primary	5
Ant. Secondary	5
R. F. Primary	100
R. F. Secondary	5
Osc. Primary	2.5
Osc. Secondary	3.5
First I. F. Primary	125
First I. F. Secondary	40
Second I. F. Primary	75
Second I. F. Secondary	75
Audio Transformer Primary	800
Audio Transformer Secondary	1800

LOOKING AT TOP OF TUBE SOCKETS



CIRCUIT DIAGRAM
—FOR—
ARVIN CAR RADIO MODEL 15

For Alignment See Index



IF PEAK 175 KC.

CAPACITORS

	Description		Part No.
C 1, C 2, C 3	3 Gang Variable		00-4452
C 4, C 5	.015 *uf*	50 V. Twin	17-3004
C 6	.5	15 V.	29-4284
C 7, C 8	.02 *uf*	1000 V. Twin	29-4193
C 9	.1 *uf*	200 V.	17-2097
C10	.1 *uf*	200 V.	17-2097
C11	12 *uf*	450 WVDC Dual Elec.	
C12	4 *uf*	500 PVDC	17-4184
C13	.5 *uf*	300 V.	17-3037
C14	100 *uuf*	600 V. Mica	17-2064
C15	Padder		17-4181-1
C16	.001 *uf*	600 V. Mica	17-4292

CAPACITORS

	Description		Part No.
C17	.5	15 V.	17-4284
C18	500 *uuf*	600 V. Mica	17-2211
C19	.01 *uf*	160 V. Tiny	17-4291
C20	.5 *uf*	10 V.	29-2224
C21	500 *uuf*	600 V. Mica	17-2211
C22	12 *uf*	20 V. Elec.	17-2082
C23	.005 *uf*	600 V.	17-2252
C24	.02 *uf*	400 V.	17-2214

MISCELLANEOUS

SW-1 Switch (Integral with R8)	17-4152
SW-2 Switch	17-4445
SP—Speaker	17-4226
S—Socket, Connector	17-4447
P—Plug, Connector	17-4448
V—Vibrator Unit	29-4186

RESISTORS

	Description		Part No.
R 1	100,000 Ω	¼ W.	17-2068
R 2	1,000,000 Ω	¼ W.	17-2080
R 3	200 Ω	¼ W.	17-4287
R 4	100,000 Ω	¼ W.	17-2068
R 5	1,000 Ω	¼ W.	17-2065
R 6	20,000 Ω	¼ W.	17-2072
R 7	500,000 Ω	¼ W.	17-2070
R 8	250,000 Ω Volume Control		17-4152
R 9	500,000 Ω	¼ W.	17-2070
R10	150,000 Ω	¼ W.	17-4283
R11	40,000 Ω	¼ W.	17-4282
R12	50,000 Ω	¼ W.	17-2060
R13	Tapped Candohm		17-3031

TRANSFORMERS

	Description	Part No.
T1	Antenna	00-3020-1
T2	Radio Frequency	00-3017-1
T3	Oscillator	00-3018-1
T4	1st Intermediate	00-2258-A
T5	2nd Intermediate	00-2259-2
T6	Audio	00-2261
T7	Output	00-4111
T8	Power	00-4102

CHOKES

X1	Center Tap Primary R. F.	00-4131-1
X2	Filter	00-4141
X3	"B" Radio Frequency	00-2181-1
X4	"A" Radio Frequency	00-4130-1

MODEL 15 SOCKET VOLTAGES

Make voltage tests with 1000 ohm per volt meter. Voltages given in table are only comparative due to variance in battery voltage. Plus or minus 20% on all voltages is acceptable.

Tube	Heaters	Plate	Screen	Cathode	Suppressor	Control	Anode Grid 1500 KC	Osc. Grid 1500 KC
78	6.3	250	50	2.2	2.2	2.0*	—	—
6A7	6.3	250	50	2.2	2.2	2.0*	150	5-10
6B7	6.3	245	50	2.0	—	1.8*	—	—
41	6.3	245	250	18	—	14.0*	—	—
84	6.3	275 (AC)	—	260	—	—	—	—

* Measured with vacuum tube voltmeter only.

MODEL 15 POINT TO POINT RESISTANCE CHECK

All readings taken to ground unless otherwise specified. Readings taken with all tubes removed from set.

78

+ Heater	Inf.
— Heater	0
Plate to B+	100
Screen Grid to B+	40,000
Suppressor Grid	200
Cathode	200
Control Grid	1,750,000

41

+ Heater	Inf.
— Heater	0
Plate to B+	Inf.
Screen Grid to B+	0
Control Grid	1733
Cathode	692

6B7

+ Heater	Inf.
— Heater	0
Plate to B+	2000
Screen Grid to B+	40,000
Diode	650,000
Diode	650,000
Cathode	52
Control Grid:	
V. C. on	900,000
V. C. off	650,000

84

+ Heater	Inf.
— Heater	0
Plate	190
Plate	220
Plate to Plate	410
Cathode	Inf.†

†Reads leakage of electrolytic condenser.

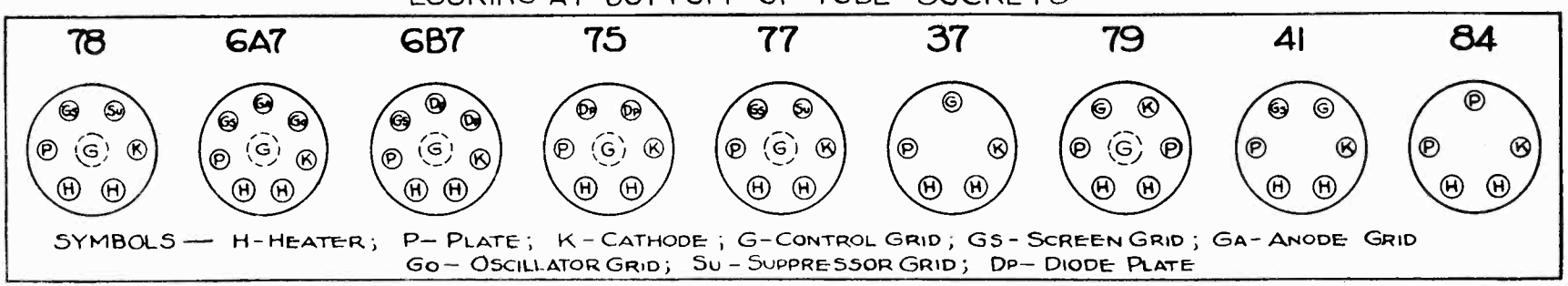
6A7

+ Heater	Inf.
— Heater	0
Plate to B+	104
Screen Grid to B+	40,000
Anode Grid to B+	20,000
Oscillator Grid	101,200
Cathode	200
Control Grid	1,650,000

COIL RESISTANCES

Ant. Primary	13
Ant. Secondary	5
R. F. Primary	100
R. F. Secondary	5
Osc. Primary	2
Osc. Secondary	4
1st I. F. Primary	82
1st I. F. Secondary	82
2nd I. F. Primary	120
2nd I. F. Secondary	120
Primary Output Transformer	650
Voice Coil	.35
Reflex Trans. Primary	1850
Reflex Trans. Secondary	1850

LOOKING AT BOTTOM OF TUBE SOCKETS



MODEL 20-A SOCKET VOLTAGES

Make voltage tests with 1000 ohm per volt meter. Voltages given in table are only comparative due to variance in battery voltage. Plus or minus 20% on all voltages is acceptable.

Tube	Heaters	Plate	Screen	Cathode	Suppressor	Control
78	6.3	180	60	0	0	*1.0
77	6.3	180	60	6	6	*5.8
78	6.3	180	60	2.4	2.4	*2.2
75	6.3	120	—	1.3	—	*1.3
41	6.3	175	180	16.0	—	*16.0
84	6.3	200 (AC)	—	190	—	—

* Measured with vacuum tube voltmeter only.

MODEL 20-B SOCKET VOLTAGES

Make voltage tests with 1000 ohm per volt meter. Voltages given in table are only comparative due to variance in battery voltage. Plus or minus 20% on all voltages is acceptable.

Tube	Heaters	Plate	Screen	Cathode	Suppressor	Control	Anode Grid 1500 KC	Osc. Grid 1500 KC
78	6.3	220	90	2.2	2.2	*2.0	—	—
6A7	6.3	220	90	2.2	—	*2.0	220	*6
77	6.3	220	90	1.3	1.3	*1.1	—	—
75	6.3	100	—	1.3	—	*1.1	—	—
41	6.3	215	225	16.0	—	*16.0	—	—
84	6.3	240 (AC)	—	—	—	—	—	—

* Measured with vacuum tube voltmeter only.

MODEL 20-B POINT TO POINT RESISTANCE CHECK

All readings taken to ground unless otherwise specified. Readings taken with all tubes removed from set and R. F. chassis and speaker disconnected from power pack unit.

78

+ Heater	Inf.
— Heater	0
Cathode	500
Suppressor Grid (No. 3)	500
Plate to B+	100
Screen (No. 2) to B+	40,000
Control Grid (No. 1)	2,000,000

6A7

+ Heater	Inf.
— Heater	0
Anode Grid (No. 2) to B+	3.5
Osc. Grid (No. 1)	
Screen (No. 3-5) to B+	40,000
Plate to B+	125
Cathode	500
Control Grid (No. 4)	1,500,000

77

+ Heater	Inf.
— Heater	0
Plate to B+	75
Screen (No. 2) to B+	40,000
Suppressor Grid (No. 3)	1000
Cathode	1000
Control Grid (No. 1)	40

75

+ Heater	Inf.
— Heater	0
Plate	100,000
Diode	500,000
Diode	500,000
Cathode	52
Control Grid (No. 1) to Grid Term S2	250,000

41

+ Heater	Inf.
— Heater	0
Plate to B+	Inf.
Screen (No. 2) to B+	0
Cathode	692
Control Grid (No. 1)	250,000

84

+ Heater	Inf.
— Heater	0
Plate	155
Plate	155
Plate to Plate	310
Cathode	Inf.†

†Reads leakage of electrolytic condenser.

COIL RESISTANCES

Ant. Primary	5
Ant. Secondary	5
R. F. Primary	100
R. F. Secondary	5
Osc. Primary	2.5
Osc. Secondary	3.5
First I. F. Primary	125
First I. F. Secondary	40
Second I. F. Primary	75
Second I. F. Secondary	75

MODEL 15
Installation Notes
MODEL 25
Installation Notes

NOBLITT SPARKS INDUSTRIES

SPECIAL INSTALLATION BULLETIN FOR THE MODEL 25 ARVIN CAR RADIO

1934 Models Plymouth and Dodge

The model 25 Arvin Car Radio will install very satisfactorily on these model cars in an *inverted* position directly above the accelerator pedal, leaving the entire right hand side of the dash for mounting an Arvin Heater.

First: Disconnect the free wheeling cable at the bottom, drill another hole in the dash 5 or 6 inches to the right and relocate the cable back through this hole. Connect the freewheeling cable again, making sure that this is done correctly so that it will engage and disengage. The oil pressure gauge tube should be moved to the left by disconnecting it at both ends and relocating it through another hole 4 or 5 inches to the left of its present location. The water temperature gauge tube does not have to be moved. A groove should be cut in the dash insulation for this tube to run in and then the set can be mounted over this. Make sure, however, that the tube is not bent nor pinched by the mounting bracket when the set is pulled up tight.

Now, to mount the set upside down, the mounting bracket is inserted, with the two mounting bolts in place, in the *horizontal* tapered slots in the back of the case. This bracket will then be in a horizontal position on the bulkhead when the set is mounted.

Locate the set just to the left of the cowl vent lever and as high as it will go. The flexible shafts and Bowden wire then enter at the bottom of the set. The tubes will operate satisfactorily in an inverted position. A special socket prevents them from falling out.

1933 Models Plymouth and Dodge

The same installation as explained above may be used on the 1933 models Plymouth and Dodge cars in which case it will not be necessary to relocate the oil pressure gauge tube.

Another way to install the Arvin No. 25 on the 1933 Plymouth and Dodge is as follows:

Relocate the free wheeling cable to either side of its present location. Then attach the radio to the right hand side of the dash directly under (or just to the left of) the glove compartment. The set is mounted in normal position with remote control connections at the top.

This location of the radio leaves room for an Arvin Hot Water Heater just above and to the right of the brake pedal.

SPECIAL INSTALLATION BULLETIN FOR THE MODEL 15 ARVIN CAR RADIO

NOTE: All parts of the model 15 Arvin Radio mentioned in this bulletin are fully described in the regular installation instruction sheet furnished with each set.

All Model V-8 Ford Cars

The model 15 Arvin Car Radio can be installed very satisfactorily on Ford V-8 Cars directly below the glove compartment on the right hand side of the dash.

Remove the glove compartment by taking out the six screws around its front edge and also remove the door by taking the two screws out of the hinges which hold it. Now, by means of a hammer and anvil, flatten out the turned up lip at the rear of the instrument panel flange so as to provide a wider flange on which to mount the front end of the radio. Bend up the ears on either side of the front mounting bracket to conform to the contour of the bottom of the instrument panel. Also spread this bracket apart so that it forms about a 105 degree angle instead of a 90 degree angle.

Now, hold the front mounting bracket up against the instrument panel flange with its shorter leg butting up against the flange, and the longer leg extending upward behind the dash. Locate this bracket so that the right hand edge of its longer leg is just to the left of the loop in the door spring, or in other words, so that this spring will just clear the radio when the door is shut.

Mark the location of the holes to be drilled in the flange by inserting a pencil through the tapped holes in the mounting bracket. Drill a 9/32″ hole at each of these two points. Now lift the bracket into place with the shorter leg underneath and against the instrument panel flange (the illustration in the model 15 installation instruction sheet erroneously shows this leg resting on top of the flange with the screw entering from the bottom) and insert the ¼-20 oval head screw from the top, first through the flange and then into the tapped holes in the bracket by reaching through the glove pocket door opening. Draw these screws up tight with a short screw driver.

Next remove the main mounting plate from the radio as explained in the regular installation instruction sheet and install the rear mounting bracket onto this plate with its longer leg extending horizontally to the rear. Insert the threaded studs extending from the front end of this plate through the oval shaped holes in the bracket just mounted and fasten with the proper washers and nuts.

The rear end of the set is supported by one carriage bolt through the square hole in the center of the rear mounting bracket and clamped to the step plate in the dash. Mark the location of this hole and drill one 11/32″ hole. Insert the carriage bolt and draw up tight with the proper washers and nuts.

You are now ready to replace the glove compartment. This can be pushed through the door opening in the dash from the front and bolted into place in exactly the same manner as it came out. The lower front edge, of course, will have to be bent down around the top of the radio. However, this can be done without great difficulty. Now slip the radio chassis and outer cover, with speaker attached, up into place in the main mounting plate and complete the installation exactly as explained in the regular installation instruction sheet.

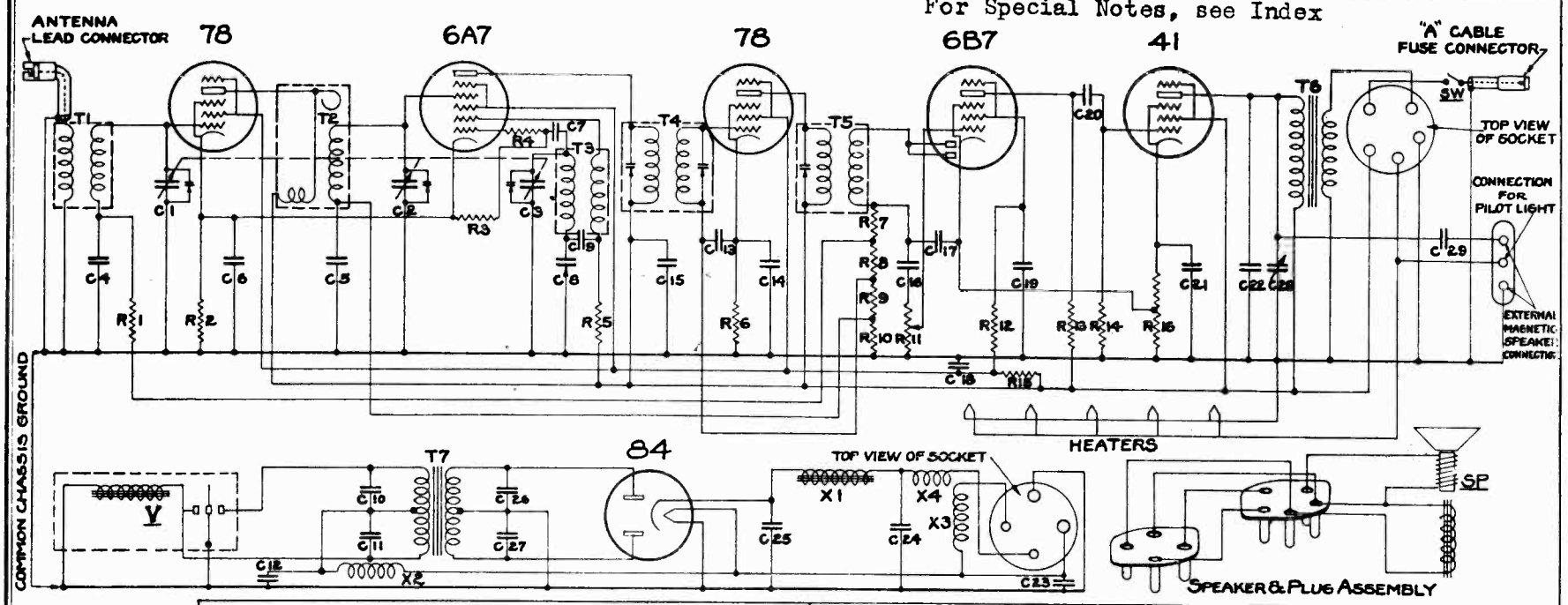
This procedure might appear to be a rather complicated and involved installation, however, it really is not at all difficult and in the end makes a very neat and workmanlike job.

CIRCUIT DIAGRAM OF ARVIN CAR RADIO MODEL 25.

IF PEAK 175 KC.

For Special Notes, see Index

DIAGRAM	ISSUE NO.	DATE
D	1	2-1534



For Alignment See Index

CONDENSERS

	DESCRIPTION	PART NO.
C1 C2 C3	THREE GANG VARIABLE	19-3019
C4 C5	.015 μf 50 V. TWIN	17-3004
C6	.10 μf 200 V.	17-2097
C7	100 μμf	17-2064
C8	SERIES PADDER (400 μμf MAX)	17-4181
C9	.001 μf 600 V.	17-3005
C10	12 μf 15 V ELECTROLYTIC, TRIPLE UNIT	17-2253
C11	12 μf 15 V ELECTROLYTIC, TRIPLE UNIT	17-2253
C12	1. μf 15 V.	17-2253
C13	.02 μf 400 V.	17-2214
C14	.10 μf 200 V.	17-2097
C15	.25 μf 300 V.	29-4188
C16	.03 μf 300 V.	17-3008
C17	500 μμf	17-2211
C18	.10 μf 200 V.	17-2097
C19	.10 μf 200 V.	17-2097
C20	.05 μf 300 V.	17-3006
C21	12 μf 20 V. ELECTROLYTIC	17-2082
C22	.005 μf 800 V. SPECIAL	17-2252
C23	.50 μf 10 V.	29-2224
C24 C25	4 μf + 12 μf 450 V. DUAL ELECTROLYTIC	17-4201
C26 C27	.02 μf 1000 V. TWIN	29-4193
C28	.02 VARIABLE TONE CONTROL	17-4151
C29	.02 μf 400 V.	17-2214

NOTE: ON ORDERS FOR REPLACEMENT PARTS, STATE PART NUMBER AND QUANTITY DESIRED.

RESISTORS

	DESCRIPTION	PART NO.
R1	500000 Ω, ½ WATT	17-2070
R2	250 Ω, ½ WATT	17-2066
R3	100000 Ω, ½ WATT	17-2068
R4	1000 Ω, ½ WATT	17-2065
R5	20000 Ω, ½ WATT	17-2072
R6 *	2000 Ω, ½ WATT	17-4202
R7	250000 Ω, ½ WATT	17-3011
R8	100000 Ω, ½ WATT	17-2068
R9	100000 Ω, ½ WATT	17-2068
R10	50000 Ω, ½ WATT	17-4276
R11	250000 Ω, †	17-4152
R12	100000 Ω, ½ WATT	17-2068
R13	30000 Ω, ½ WATT	17-4276
R14	250000 Ω, ½ WATT	17-3011
R15	75000 Ω, ½ WATT	17-2067
R16	CANDOHM, 800 Ω TOTAL, TAPPED AT 100 & 120 Ω	17-4281

* THIS RESISTOR MAY VARY FROM 1000 Ω TO 3000 Ω, CONTROLLING SENSITIVITY.

† VOLUME CONTROL

TRANSFORMERS

DESCRIPTION	PART NO.
T1 ANTENNA	00-3020-1
T2 RADIO FREQUENCY	00-3017-1
T3 OSCILLATOR	00-3016-1
T4 FIRST INTERMEDIATE FREQUENCY	00-2258-A
T5 SECOND INTERMEDIATE FREQUENCY	00-2259
T6 OUTPUT	00-4111
T7 POWER	00-4102

CHOKES

DESCRIPTION	PART NO.
X1 FILTER CHOKE	00-4141
X2 CENTER TAP PRIMARY R.F.	00-2178-E
X3 FILAMENT R.F.	00-2178-F
X4 PLATE R.F.	00-2181-1

MISCELLANEOUS

DESCRIPTION	PART NO.
V VIBRATOR UNIT	29-2169-B
SW SWITCH INTEGRAL WITH R-11	17-4152
SP DYNAMIC SPEAKER	17-4226

NOBLITT-SPARKS INDUSTRIES, INC.
COLUMBUS INDIANA

NOBLITT SPARKS INDUSTRIES
MODEL 25
Schematic, Parts List

MODEL 25 SOCKET VOLTAGES

Make voltage tests with 1000 ohm per volt meter. Voltages given in table are only comparative due to variance in battery voltage. Plus or minus 20% on all voltages is acceptable.

Tube	Heaters	Plate	Screen	Cathode	Suppressor	Control	Anode Grid 1500 KC	Osc. Grid 1500 KC
78	6.3	250	70	2	2	1.8*	—	—
6A7	6.3	250	70	2	—	1.8*	150	5-10
78	6.3	250	70	2.5	2.5	2.3*	—	—
6B7	6.3	220	45	1.8	—	1.6*	—	—
41	6.3	245	255	20	—	20.0*	—	—
84	6.3	275 (AC)	—	255	—	—	—	—

* Measured with vacuum tube voltmeter only.

MODEL 25 POINT TO POINT RESISTANCE CHECK

All readings to ground unless otherwise specified. Readings taken with all tubes removed from set and R. F. chassis and speaker disconnected from power pack unit.

1st 78

+ Heater	Inf.
— Heater	0
Plate to B+	104
Screen Grid to B+	75,000
Suppressor Grid	260
Cathode	260
Control Grid	730,000

6B7

+ Heater	Inf.
— Heater	0
Plate to B+	30,000
Screen Grid to B+	175,000
Diode	480,000
Diode	480,000
Cathode	100
Control Grid:	
V. C. clear on	250,000
V. C. and switch off	0-5

2nd 78

+ Heater	Inf.
— Heater	0
Plate to B+	75
Screen Grid to B+	75,000
Suppressor Grid	2,000
Cathode	2,000
Control Grid	130,000

84

+ Heater	Inf.
— Heater	0
Plate	190
Plate	220
Plate to Plate	410
Cathode	Inf.†

†Reads leakage of electrolytic condenser.

41

+ Heater	Inf.
— Heater	0
Plate to B+	650
Screen Grid	0
Control Grid	250,000
Cathode	800

6A7

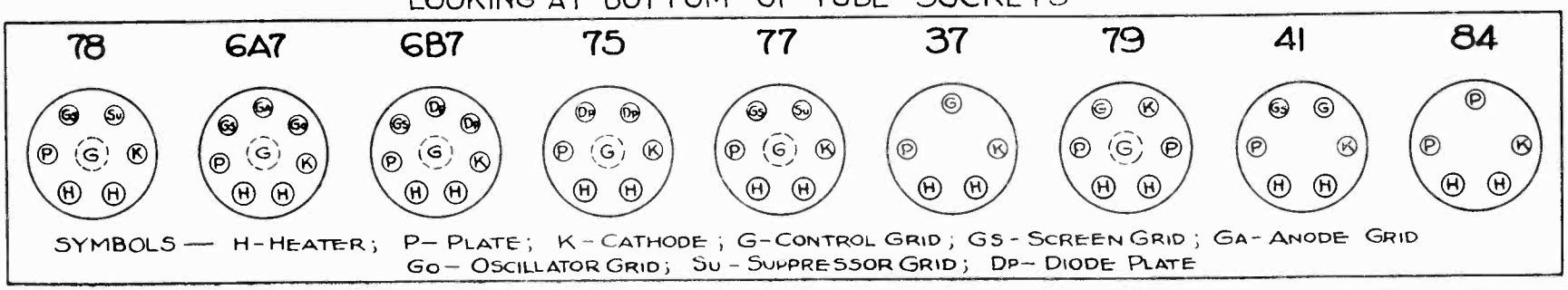
+ Heater	Inf.
— Heater	0
Plate to B+	104
Screen Grid to B+	75,000
Anode Grid to B+	20,000
Oscillator Grid	101,260
Cathode	260
Control Grid	30,100

COIL RESISTANCES

Ant. Primary	13	Osc. Primary	2
Ant. Secondary	5	Osc. Secondary	4
R. F. Primary	100	1st I. F. Primary	82
R. F. Secondary	5	1st I. F. Secondary	82

2nd I. F. Primary	120
2nd I. F. Secondary	120
Primary Output Transformer	650
Voice Coil	35

LOOKING AT BOTTOM OF TUBE SOCKETS



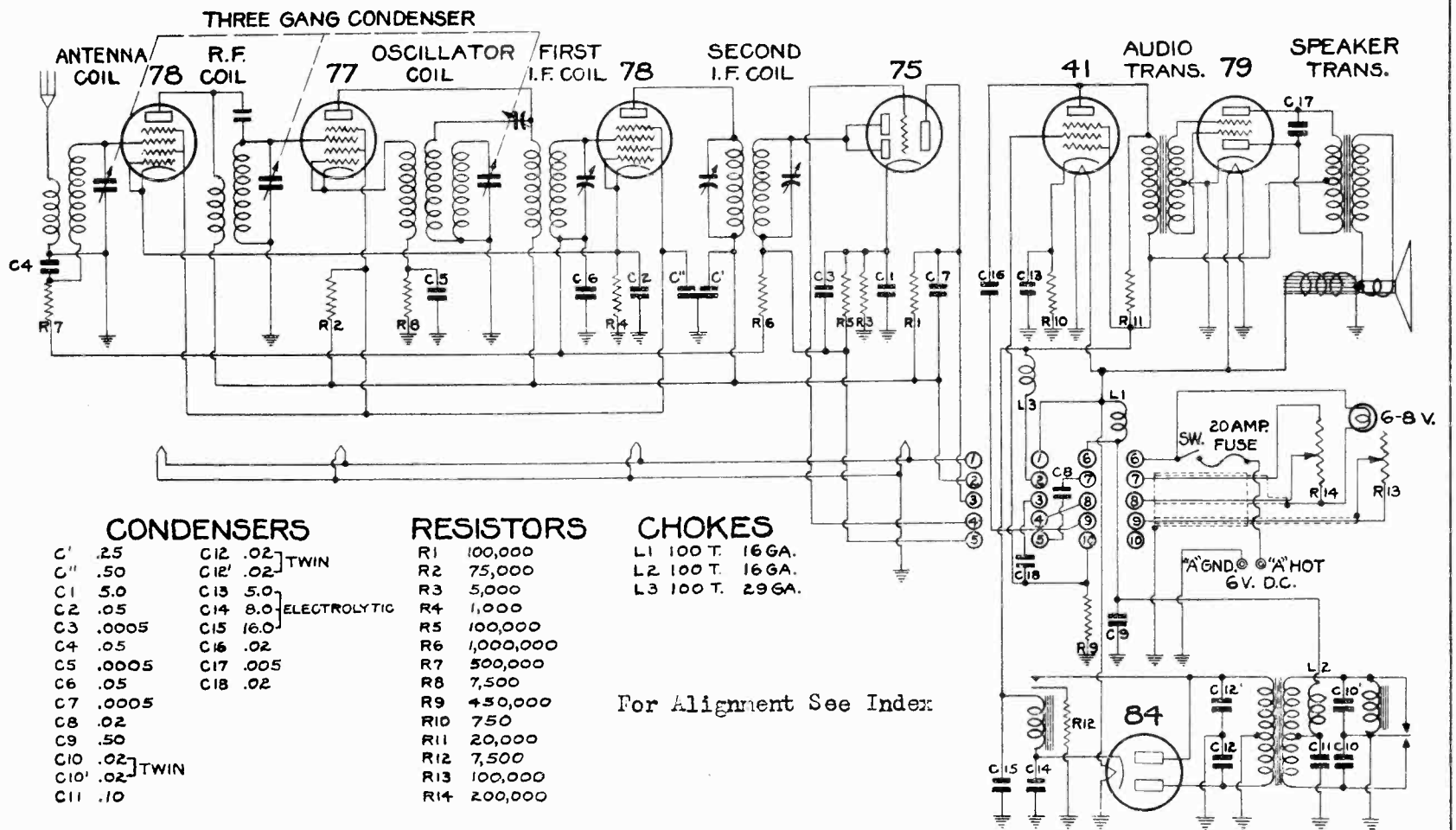
NOBLITT SPARKS INDUSTRIES

MODEL 30-A (3rd Type)
Schematic

DIAGRAM	ISSUE NO.	DATE
D	1	11-8-33

IF PEAK 175 KC.

SCHEMATIC CIRCUIT DIAGRAM
ARVIN CAR RADIO MODEL 30A



CONDENSERS

C'	.25	C12 .02	TWIN
C''	.50	C12' .02	
C1	5.0	C13 5.0	ELECTROLYTIC
C2	.05	C14 8.0	
C3	.0005	C15 16.0	
C4	.05	C16 .02	
C5	.0005	C17 .005	
C6	.05	C18 .02	
C7	.0005		
C8	.02		
C9	.50		
C10	.02	TWIN	
C10'	.02		
C11	.10		

RESISTORS

R1	100,000
R2	75,000
R3	5,000
R4	1,000
R5	100,000
R6	1,000,000
R7	500,000
R8	7,500
R9	450,000
R10	750
R11	20,000
R12	7,500
R13	100,000
R14	200,000

CHOKES

L1	100 T.	16 GA.
L2	100 T.	16 GA.
L3	100 T.	29 GA.

For Alignment See Index

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COLUMBUS. INDIANA.

MODEL 30-A SOCKET VOLTAGES—C SERIES

Make voltage tests with 1000 ohm per volt meter. Voltages given in table are only comparative due to variance in battery voltage. Plus or minus 20% on all voltages is acceptable.

Tube	Heaters	Plate	Screen	Cathode	Suppressor	Control
78	6.3	180	60	2.4	2.4	*2.2
77	6.3	180	60	6	9	*5.8
78	6.3	180	60	2.4	2.4	*2.2
75	6.3	120	—	1.3	—	*1.3
41	6.3	175	180	16.0	—	*16.0
79	6.3	180	—	0	—	0
84	6.3	700 (AC)	—	190	—	—

* Measured with vacuum tube voltmeter only.

MODEL 30-A POINT TO POINT RESISTANCE CHECK

All readings to ground unless otherwise specified. Readings taken with all tubes removed from set and R. F. chassis and speaker disconnected from power pack unit.

1st 78
+ Heater ..... Inf.
— Heater 0
Cathode ..... 1000 some 500
Suppressor Grid (No. 3) .. 1000 some 500
Plate to B+ 35
Screen (No. 2) to B+ 75,000
Control Grid (No. 1) 2,005,000

77
+ Heater ..... Inf.
— Heater 0
Plate to B+ 50
Screen (No. 2) to B+ 75,000
Suppressor Grid (No. 3) 7,500
Cathode 7,500
Control Grid (No. 1) 8

2nd 78
+ Heater ..... Inf.
— Heater 0
Cathode ..... 1000 some 500
Suppressor Grid (No. 3) .. 1000 some 500
Plate to B+ 50
Screen (No. 2) to B+ 75,000
Control Grid (No. 1) 1,505,000

75
+ Heater ..... Inf.
— Heater 0
Plate to B+ 100,000
Diode 505,000
Diode 505,000
Cathode 5000
Control Grid (No. 1) ..... Inf.

41
+ Heater ..... Inf.
— Heater 0
Plate to B+ 590
Screen (No. 2) to B+ 0
Cathode 750
Control Grid (No. 1) 250,000

79
+ Heater ..... Inf.
— Heater 0
Plate (PL) to B+ 500
Control Grid (GR) 150
Cathode 0
Plate (PR) to B+ 500
Control Grid (GL) 150

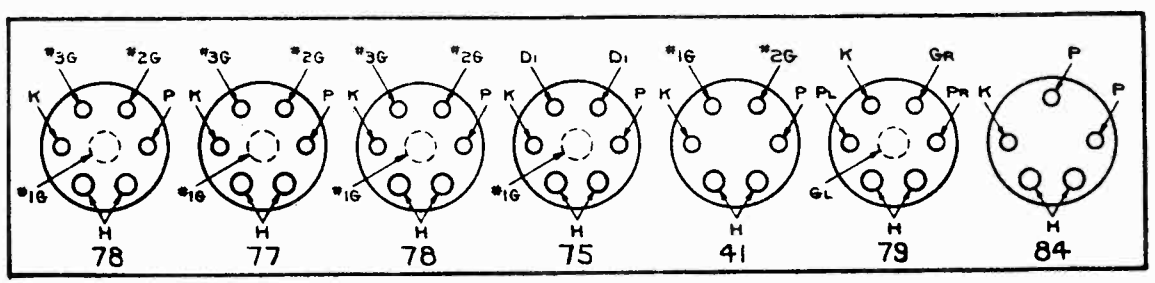
84
+ Heater ..... Inf.
— Heater 0
Plate 125
Plate 140
Plate to Plate 265
Cathode ..... Inf.†

COIL RESISTANCES

†Reads leakage of electrolytic condenser.

Ant. Primary	2
Ant. Secondary	8
R. F. Primary	35
R. F. Secondary	8
Osc. Primary	11
Osc. Secondary	6
First I. F. Primary	50
First I. F. Secondary	50
Second I. F. Primary	50
Second I. F. Secondary	50
Audio Transformer Primary	600
Audio Transformer Sec.	150 per half
Speaker Trans. Primary	500 per half

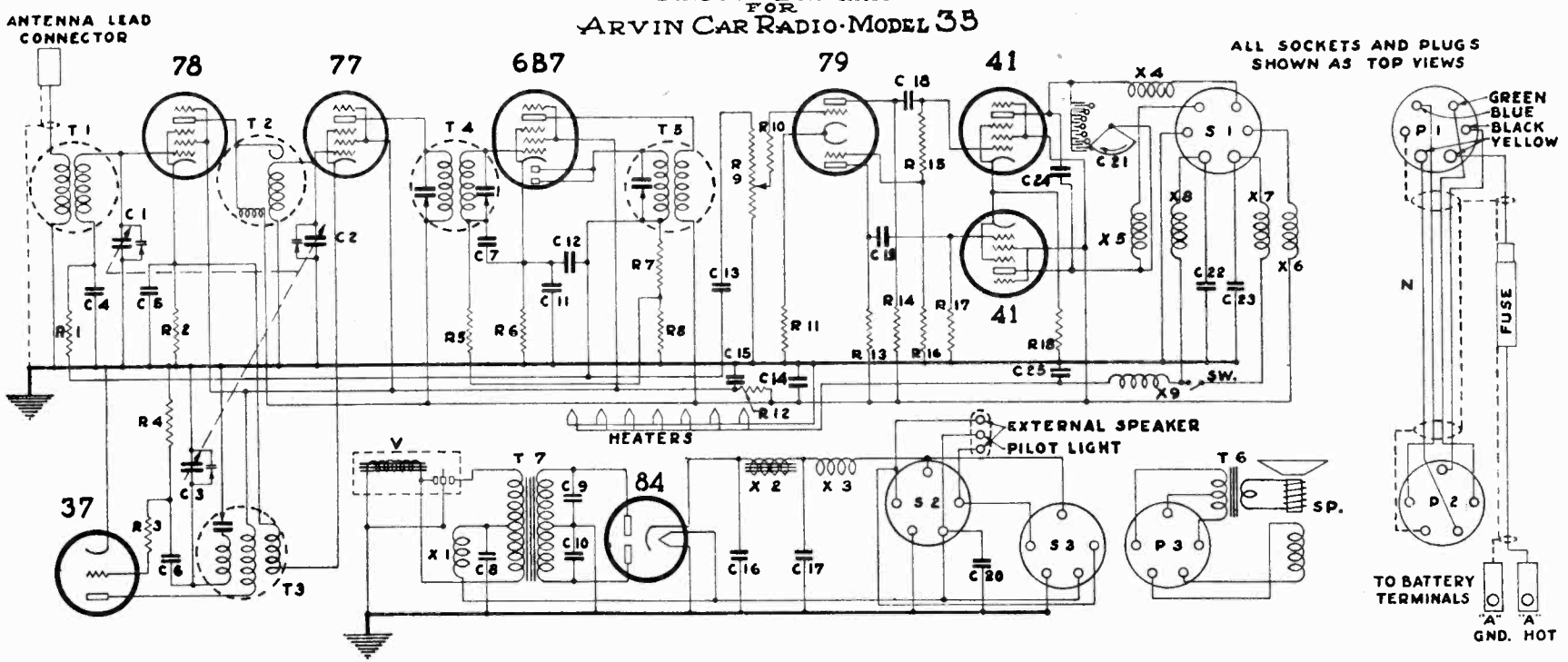
LOOKING AT TOP OF TUBE SOCKETS



For Alignment See Index

IF PEAK 175 KC.

CIRCUIT DIAGRAM FOR ARVIN CAR RADIO-MODEL 35



CAPACITORS

	Description		Part No.
C 1, C 2, C 3	3 Gang Variable		00-4182-1
C 4	.01 *uf*	160 V.	17-4291
C 5	.1 *uf*	200 V.	17-2097
C 6	100 *uuf*	600 V. Mica	17-2064
C 7	.01 *uf*	160 V.	17-4291
C 8	.5 *uf*	10 V.	29-2224
C 9, C10	.02 *uf*	1000 V. Twin	29-4193
C11	.1 *uf*	200 V.	17-2097
C12	500 *uuf*	600 V. Mica	17-2211
C13	.01 *uf*	160 V.	17-4291
C14	.5 *uf*	300 V.	17-3037
C15	.1 *uf*	200 V.	17-2097
C16	12 *uf*	450 WVDC) Dual Elec.	
C17	4 *uf*	500 PVDC)	17-4184
C18	.01 *uf*	400 V.	17-2189
C19	.01 *uf*	400 V.	17-2189

CAPACITORS

	Description		Part No.
C25	.002 *uf*	600 V. Mica	17-2063
C20	.5 *uf*	10 V.	29-2224
C21	Tone Control		17-4151
C22	.5 *uf*	10 V.	29-2224
C23	.5 *uf*	10 V.	29-2224
C24	.005 *uf*	600 V.	17-2252

MISCELLANEOUS

N—Interconnecting Cable, Complete	00-4180
SP—Speaker	00-4227
SW—Switch (Integral with R9)	17-4152
V—Vibrator	29-4186

Socket S1 Receives Plug P1
Socket S2 Receives Plug P2
Socket S3 Receives Plug P3

NOTE: On orders for replacement parts, state part number and quantity desired. See price list for hardware replacements.

RESISTORS

	Description		Part No.
R 1	1,000,000 Ω	¼ W.	17-2080
R 2	260 Ω	¼ W.	17-2066
R 3	10,000 Ω	¼ W.	17-4275
R 4	50,000 Ω	¼ W.	17-2075
R 5	1,000,000 Ω	¼ W.	17-2080
R 6	500 Ω	¼ W.	17-2088
R 7	30,000 Ω	¼ W.	17-4276
R 8	500,000 Ω	¼ W.	17-2070
R 9	250,000 Ω Volume Control		17-4152
R10	250,000 Ω	¼ W.	17-3011
R11	1,000 Ω	¼ W.	17-2065
R12	60,000 Ω	½ W.	17-4190
R13	100,000 Ω	¼ W.	17-2068
R14	100,000 Ω	¼ W.	17-2068
R15	500,000 Ω	¼ W.	17-2070
R16	15,000 Ω	¼ W.	17-4191
R17	500,000 Ω	¼ W.	17-2070
R18	400 Ω	½ W.	17-4189

TRANSFORMERS

	Description	Part No.
T1	Antenna	00-4134-1
T2	Radio Frequency	00-4132-1
T3	Oscillator	00-4133
T4	1st Intermediate Freq.	00-2258-A
T5	2nd Intermediate Freq.	00-2259
T6	Output	00-4112
T7	Power	00-4101

CHOKES

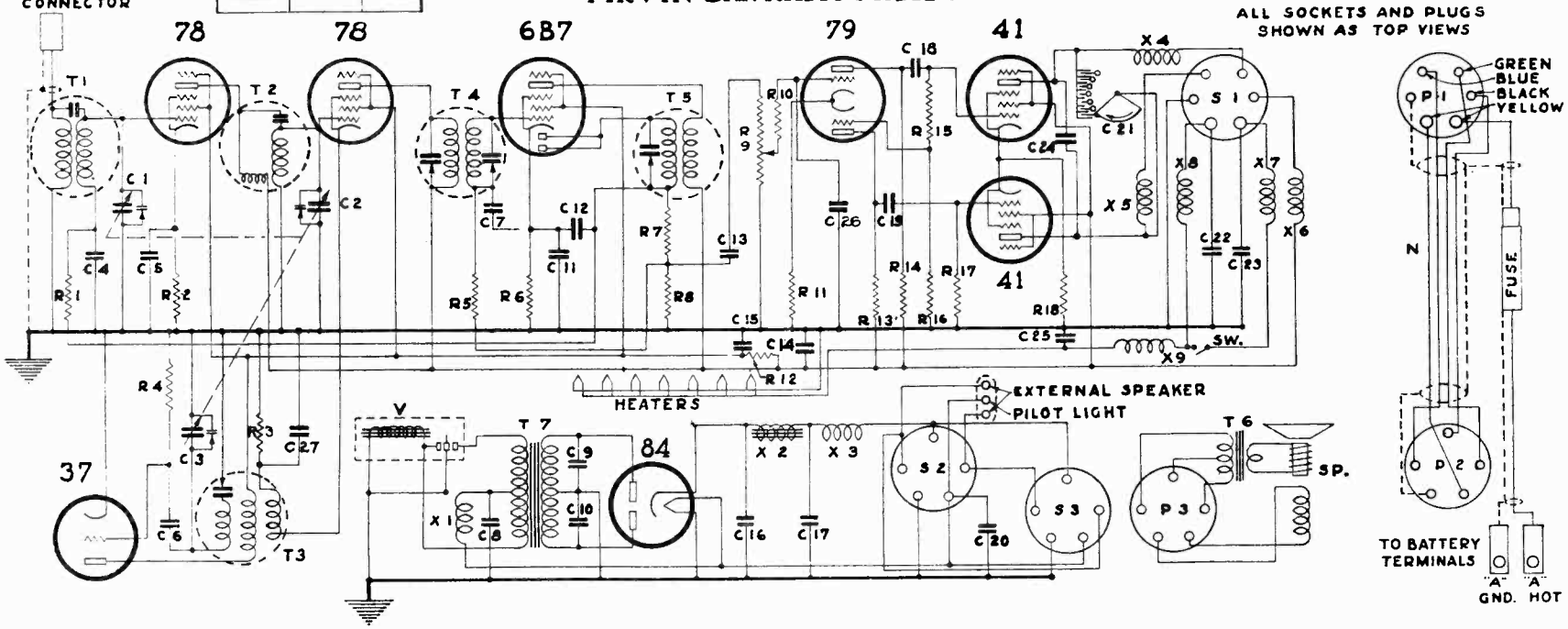
X1	Center Tap Primary R. F.	00-4131
X2	Filter	00-4141
X3	"B" Radio Frequency	00-2181-1
X4	Plate Radio Frequency	00-2181-1
X5	Plate Radio Frequency	00-2181-1
X6	"B" Radio Frequency	00-2181-1
X7	"A" Radio Frequency	00-4130-1
X8	"A" Radio Frequency	00-4130-1
X9	"A" Radio Frequency	00-4131

NOBLITT SPARKS INDUSTRIES MODEL 35 Below E31577H Schematic, Parts List

DIAGRAM	ISSUE NO.	DATE
G	1	2-28-34
H	1	5-21-34

CIRCUIT DIAGRAM FOR ARVIN CAR RADIO-MODEL 35

IF PEAK 175 KC.



CAPACITORS

	Description		Part No.
C 1, C 2, C 3	3 Gang Variable		00-4182-1
C 4	.05 *uf*	160 V.	17-4329
C 5	.1 *uf*	200 V.	17-2097
C 6	100 *uuf*	600 V. Mica	17-2064
C 7	.01 *uf*	160 V.	17-4291
C 8	.5 *uf*	10 V.	29-2224
C 9, C10	.02 *uf*	1000 V. Twin	29-4193
C11	.1 *uf*	200 V.	17-2097
C12	500 *uuf*	600 V. Mica	17-2211
C13	.01 *uf*	160 V.	17-4291
C14	.5 *uf*	300 V.	17-3037
C15	.1 *uf*	200 V.	17-2097
C16	12 *uf*	450 WVDC	Dual Elec.
C17	4 *uf*	500 PVDC	17-4184
C18	.01 *uf*	400 V.	17-2189
C19	.01 *uf*	400 V.	17-2189

CAPACITORS

	Description		Part No.
C25	.002 *uf*	600 V. Mica	17-2063
C20	.5 *uf*	10 V.	29-2224
C21	Tone Control		17-4151
C22	.5 *uf*	10 V.	29-2224
C23	.5 *uf*	10 V.	29-2224
C24	.001 *uf*	600 V. Mica	17-4292
C25	.002 *uf*	600 V. Mica	17-2063
C26	100 *uuf*	600 V. Mica	17-2064
C27	.1 *uf*	200 V.	17-2097

MISCELLANEOUS

N—Interconnecting Cable, Complete	00-4180
SP—Speaker	00-4227
SW—Switch (Integral with R9)	17-4152
V—Vibrator	29-4186

Socket S1 Receives Plug P1
Socket S2 Receives Plug P2
Socket S3 Receives Plug P3

NOTE: On orders for replacement parts, state part number and quantity desired. See price list for hardware replacements.

RESISTORS

	Description		Part No.
R 1	1,000,000 Ω	¼ W.	17-2080
R 2	500 Ω	¼ W.	17-2088
R 3	3,000 Ω	¼ W.	17-2090
R 4	50,000 Ω	¼ W.	17-2075
R 5	1,000,000 Ω	¼ W.	17-2080
R 6	500 Ω	¼ W.	17-2088
R 7	30,000 Ω	¼ W.	17-4276
R 8	500,000 Ω	¼ W.	17-2070
R 9	250,000 Ω Volume Control		17-4152
R10	250,000 Ω	¼ W.	17-3011
R11	1,000 Ω	¼ W.	17-2065
R12	25,000 Ω	1 W.	17-3010
R13	100,000 Ω	¼ W.	17-2068
R14	100,000 Ω	¼ W.	17-2068
R15	500,000 Ω	¼ W.	17-2070
R16	15,000 Ω	¼ W.	17-4191
R17	500,000 Ω	¼ W.	17-2070
R18	400 Ω	½ W.	17-4189

TRANSFORMERS

	Description	Part No.
T1	Antenna	00-4134-1S
T2	Radio Frequency	00-4132-1S
T3	Oscillator	00-4133S
T4	1st Intermediate Freq.	00 4489
T5	2nd Intermediate Freq.	00-4488
T6	Output	00-4112
T7	Power	00-4101

CHOKES

X1	Center Tap Primary R. F.	00-4131
X2	Filter	00-4141
X3	"B" Radio Frequency	00-2181-1
X4	Plate Radio Frequency	00-2181-1
X5	Plate Radio Frequency	00-2181-1
X6	"B" Radio Frequency	00-2181-1
X7	"A" Radio Frequency	00-4130-1
X8	"A" Radio Frequency	00-4130-1
X9	"A" Radio Frequency	00-4131

For Alignment See Index

NOTE: The above circuit diagram is effective for all Model 35 Arvin Car Radios, beginning with and including that bearing the Serial No. E31577H.

Make voltage tests with 1000 ohm per volt meter. Voltages given in table are only comparative due to variance in battery voltage. Plus or minus 20% on all voltages is acceptable.

Tube	Heaters	Plate	Screen	Cathode	Suppressor	Control
78	6.3	250	60	2.2	2.2	*2.0
77	6.3	250	60	2.2	2.2	*2.2
6B7	6.3	250	60	1.6	—	*1.4
79	6.3	135	—	1.6	—	*1.6
41	6.3	245	250	18	—	*18
41	6.3	245	250	18	—	*18
37	6.3	60	—	0	—	*6—1500 KC
84	6.3	275 (AC)	—	255	—	—

* Measured with vacuum tube voltmeter only.

MODEL 35 POINT TO POINT RESISTANCE CHECK

All readings to ground unless otherwise specified. Readings taken with all tubes removed from set and R. F. chassis disconnected from power pack unit.

78

+ Heater	Inf.
— Heater	0
Plate to B+	50
Screen Grid to B+	60,000
Suppressor Grid	260
Cathode	260
Control Grid	1,530,000

41

+ Heater	Inf.
— Heater	0
Plate to B+	Inf.
Screen Grid to B+	2
Control Grid	500,000
Cathode	400

77

+ Heater	Inf.
— Heater	0
Plate to B+	100
Screen Grid to B+	60,000
Suppressor Grid	260
Cathode	260
Control Grid	6

41

+ Heater	Inf.
— Heater	0
Plate to B+	Inf.
Screen Grid to B+	2
Control Grid	500,000
Cathode	400

6B7

+ Heater	Inf.
— Heater	0
Plate to B+	90
Screen Grid to B+	60,000
Diode	530,000
Diode	530,000
Cathode	500
Control Grid	1,500,000

79

+ Heater	Inf.
— Heater	0
Plate to B+	100,000
Control Grid	15,000
Cathode	1000
Plate to B+	100,000
Control Grid (Cap):	
V. C. on	500,000
V. C. off	250,000

37

+ Heater	Inf.
— Heater	0
Plate to B+	60,000
Control Grid	60,000
Cathode	0

84

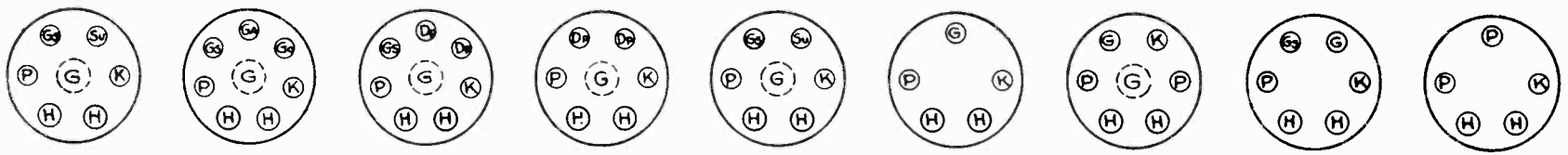
+ Heater	Inf.
— Heater	0
Plate	190
Plate	160
Plate to Plate	350
Cathode	Inf.†

†Reads leakage of electrolytic condenser.

COIL RESISTANCES

Ant. Primary	2	1st I. F. Primary	100
Ant. Secondary	6	1st I. F. Secondary	100
R. F. Primary	50	2nd I. F. Primary	82
R. F. Secondary	6	2nd I. F. Secondary	82
Osc. Primary	2	Primary Output Transformer	600
Osc. Secondary	7	Voice Coil	.35

LOOKING AT BOTTOM OF TUBE SOCKETS



SYMBOLS — H-HEATER; P- PLATE; K - CATHODE; G-CONTROL GRID; GS - SCREEN GRID; GA - ANODE GRID
GO - OSCILLATOR GRID; SU - SUPPRESSOR GRID; DP - DIODE PLATE

NOBLITT SPARKS INDUSTRIES

MODEL 35
Voltage, Test Data
Coil Resistance

ALIGNMENT PROCEDURE FOR ARVIN CAR RADIOS

Models 10-A, 20-A, 20-B and 30-A

NOTE: All adjustments in the following instructions should be made with an output meter or some indicating device connected with the output of the radio receiver to insure maximum sensitivity and selectivity.

Remove the radio chassis from the case. Connect grounding wire from the radio chassis to the power pack. Connect the output of the oscillator to the grid cap of the 77 or 6A7 tube after removing the grid clip and adjust the oscillator to 175 kilocycles. Set the output to the lowest amount giving a satisfactory deflection of the output meter. Adjust with a Bakelite screwdriver the first and second I. F. transformer for a maximum output. Replace the grid clip, connect the output of the oscillator to the antenna terminal of the radio set through a .0001 mfd mica condenser and set the oscillator to 1510 kilocycles. Rotate the variable condenser fully out of mesh, then back until the rotor plates begin to enter the stator. Adjust the oscillator padder condenser until the maximum signal is attained. Then readjust the oscillator input to 1400 kilocycles, rotate the variable condenser until the signal is again heard.

Now adjust the antenna and R. F. padders until the output is again at the peak. With the Model 10A, 20A and 30A Radios further adjustment is made at other frequencies by bending the split plates on the R. F. and antenna sections either in or out, depending upon whether more or less capacity is needed to bring the set into resonance.

On the 20B receiver, set the oscillator output to 600 kilocycles and rotate the variable condenser until a signal is heard and then adjust the oscillator series padder condenser located on the right hand condenser back and forth until a point is found where the setting of the padder gives maximum deflection on the output meter. Setting of the padder and variable condenser are both variable, each dependent upon the other, there being one point on the setting of the variable condenser where a maximum deflection will be obtained.

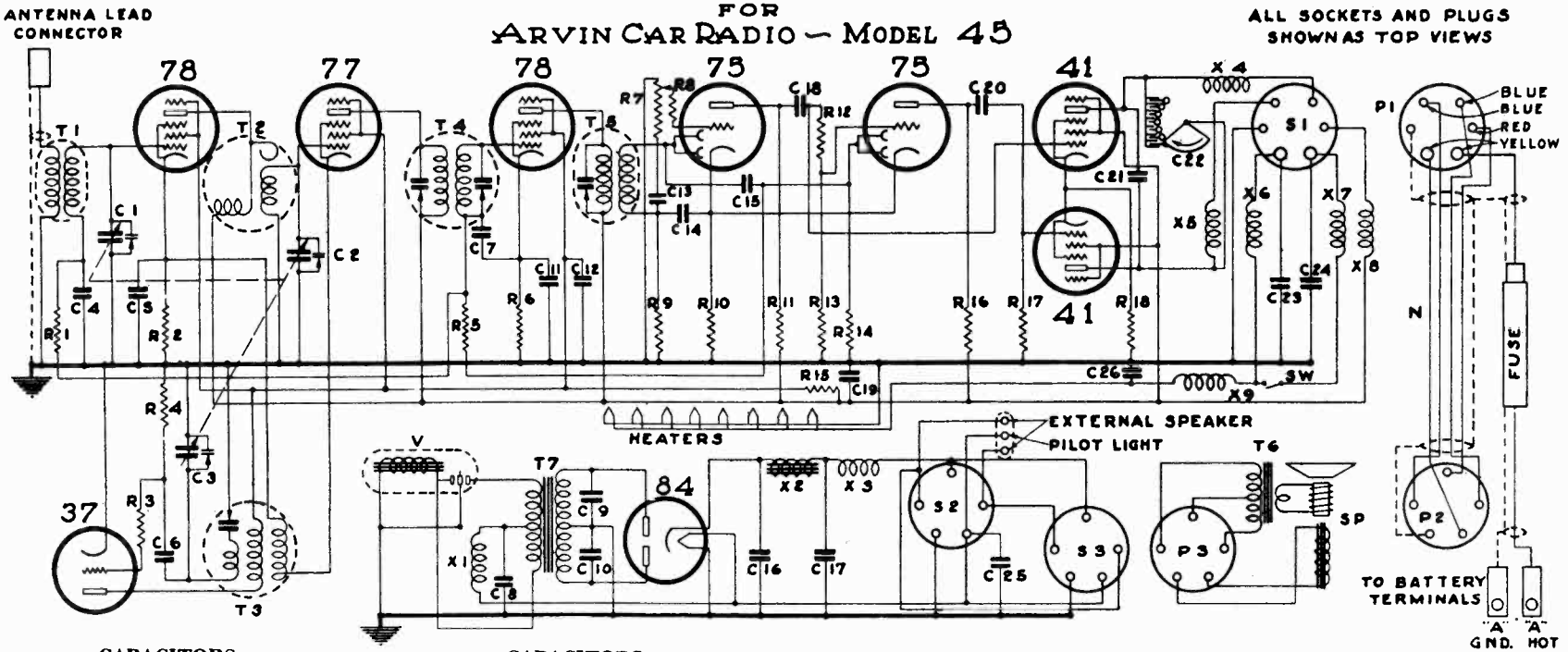
After the 600 kilocycle adjustment has been made return to the 1400 kilocycle position and recheck slightly the adjustment of the radio frequency and the antenna padders to insure no change has been made.

NOTE: After installation on some cars slight readjustment of the antenna padder on all Radios—except model 10A—materially improves the sensitivity of the receiver.

For Alignment See Index

IF PEAK 175 KC.

CIRCUIT DIAGRAM FOR ARVIN CAR RADIO — MODEL 45



CAPACITORS

	Description		Part No.
C 1, C 2, C 3	3 Gang Variable		00-4182-1
C 4	.01 *uf*	160 V.	17-4291
C 5	.1 *uf*	200 V.	17-2097
C 6	100 *uuf*	600 V. Mica	17-2064
C 7	.01 *uf*	160 V.	17-4291
C 8	.5 *uf*	10 V.	17-2224
C 9, C10	.02 *uf*	1000 V. Twin	17-4193
C11	.1 *uf*	200 V.	17-2097
C12	.1 *uf*	200 V.	17-2097
C13	.01 *uf*	160 V.	17-4291
C14	500 *uuf*	600 V. Mica	17-2211
C15	500 *uuf*	600 V. Mica	17-2211
C16	12 *uf*	450 WVDC Dual Elec.	
C17	4 *uf*	500 PVDC	17-4184
C18	.01 *uf*	400 V.	17-2189
C19	.5 *uf*	300 V.	17-3037
C20	.01 *uf*	400 V.	17-2189

CAPACITORS

	Description		Part No.
C21	.005 *uf*	600 V.	17-2252
C22	Tone Control		17-4151
C23	.5 *uf*	10 V.	17-2224
C24	.5 *uf*	10 V.	17-2224
C25	.5 *uf*	10 V.	17-2224
C26	.002 *uf*	600 V.	17-2063

MISCELLANEOUS

N—Interconnecting Cable, Complete	00-4180
SP—Speaker	19-4228
SW—Switch (Integral with R7)	17-4152
V—Vibrator	29-4186
Socket S1 Receives Plug P1	
Socket S2 Receives Plug P2	
Socket S3 Receives Plug P3	

NOTE: On orders for replacement parts, state part number and quantity desired. See price list for hardware replacements.

RESISTORS

	Description		Part No.
R 1	1,000,000 Ω	¼ W.	17-2080
R 2	260 Ω	¼ W.	17-2066
R 3	10,000 Ω	¼ W.	17-4275
R 4	50,000 Ω	¼ W.	17-2075
R 5	1,000,000 Ω	¼ W.	17-2080
R 6	500 Ω	¼ W.	17-2088
R 7	250,000 Ω Volume Control		17-4152
R 8	250,000 Ω	¼ W.	17-3011
R 9	500,000 Ω	¼ W.	17-2070
R10	2,500 Ω	¼ W.	17-2087
R11	250,000 Ω	¼ W.	17-3011
R12	500,000 Ω	¼ W.	17-2070
R13	8,000 Ω	¼ W.	17-4290
R14	500,000 Ω	¼ W.	17-2070
R15	60,000 Ω	½ W.	17-4190
R16	250,000 Ω	¼ W.	17-3011
R17	500,000 Ω	¼ W.	17-2070
R18	400 Ω	½ W.	17-4189

TRANSFORMERS

	Description	Part No.
T1	Antenna	00-4134-1
T2	Radio Frequency	00-4132-1
T3	Oscillator	00-4133
T4	1st Intermediate Freq.	00-2258-A
T5	2nd Intermediate Freq.	00-2259
T6	Output	00-4112
T7	Power	00-4101

CHOKES

X1	Center Tap Primary R. F.	00-4131
X2	Filter	00-4141
X3	"B" Radio Frequency	00-2181-1
X4	Plate Radio Frequency	00-2181-1
X5	Plate Radio Frequency	00-2181-1
X6	"A" Radio Frequency	00-4130-1
X7	"A" Radio Frequency	00-4130-1
X8	"B" Radio Frequency	00-2181-1
X9	"A" Radio Frequency	00-4131

NOBLITT SPARKS INDUSTRIES MODEL 45 Below E40356L Schematic, Parts List Type 1

MODEL 45 Above E40356L
Schematic, Parts List
Type 2

NOBLITT SPARKS INDUSTRIES

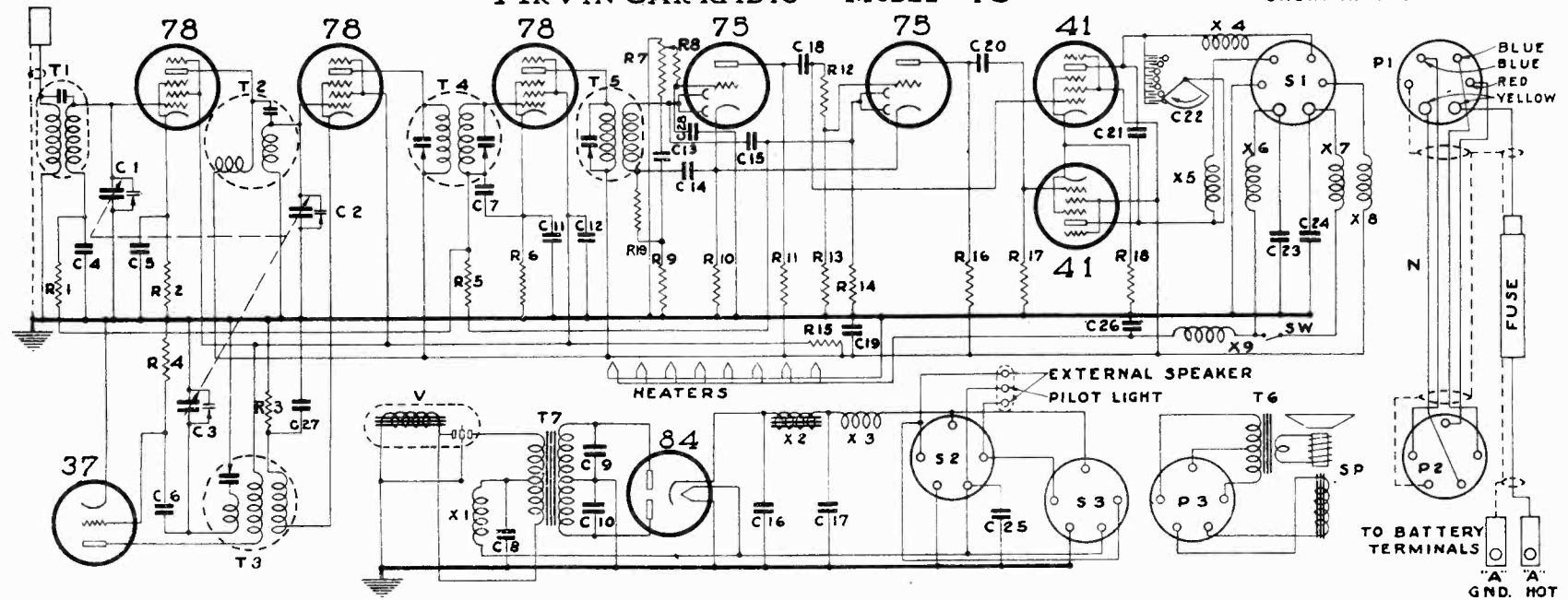
IF PEAK 175 KC.

DIAGRAM	ISSUE NO.	DATE
K	1	2-26-34
L	1	5-21-34

ALL SOCKETS AND PLUGS SHOWN AS TOP VIEWS

For Alignment See Index

CIRCUIT DIAGRAM FOR ARVIN CAR RADIO — MODEL 45



CAPACITORS

	Description		Part No.
C 1, C 2, C 3	3 Gang Variable		00-4182-1
C 4	.05 *uf*	160 V.	17-4329
C 5	.1 *uf*	200 V.	17-2097
C 6	100 *uuf*	600 V. Mica	17-2064
C 7	.01 *uf*	160 V.	17-4291
C 8	.5 *uf*	10 V.	17-2224
C 9, C10	.02 *uf*	1000 V. Twin	17-4193
C11	.1 *uf*	200 V.	17-2097
C12	.1 *uf*	200 V.	17-2097
C13	.01 *uf*	160 V.	17-4291
C14	500 *uuf*	600 V. Mica	17-2211
C15	500 *uuf*	600 V. Mica	17-2211
C16	12 *uf*	450 WVDC	Dual Elec.
C17	4 *uf*	500 PVDC	17-4184
C18	.01 *uf*	400 V.	17-2189
C19	.5 *uf*	300 V.	17-3037
C20	.01 *uf*	400 V.	17-2189

CAPACITORS

	Description		Part No.
C21	.001 *uf*	600 V. Mica	17-4292
C22	Tone Control		17-4151
C23	.5 *uf*	10 V.	17-2224
C24	.5 *uf*	10 V.	17-2224
C25	.5 *uf*	10 V.	17-2224
C26	.002 *uf*	600 V. Mica	17-2063
C27	.1 *uf*	200 V.	17-2097
C28	100 *uuf*	600 V. Mica	17-2064

MISCELLANEOUS

N—Interconnecting Cable, Complete	00-4180
SP—Speaker	19-4228
SW—Switch (Integral with R7)	17-4152
V—Vibrator	29-4186

Socket S1 Receives Plug P1
Socket S2 Receives Plug P2
Socket S3 Receives Plug P3

NOTE: On orders for replacement parts, state part number and quantity desired. See price list for hardware replacements.

RESISTORS

	Description		Part No.
R 1	1,000,000 Ω	¼ W.	17-2080
R 2	500 Ω	¼ W.	17-2088
R 3	3,000 Ω	¼ W.	17-2090
R 4	50,000 Ω	¼ W.	17-2075
R 5	1,000,000 Ω	¼ W.	17-2080
R 6	500 Ω	¼ W.	17-2088
R 7	250,000 Ω Volume Control		17-4152
R 8	250,000 Ω	¼ W.	17-3011
R 9	500,000 Ω	¼ W.	17-2070
R10	2,500 Ω	¼ W.	17-2087
R11	250,000 Ω	¼ W.	17-3011
R12	500,000 Ω	¼ W.	17-2070
R13	8,000 Ω	¼ W.	17-4290
R14	500,000 Ω	¼ W.	17-2070
R15	25,000 Ω	1 W.	17-3010
R16	250,000 Ω	¼ W.	17-3011
R17	500,000 Ω	¼ W.	17-2070
R18	400 Ω	½ W.	17-4189
R19	30,000 Ω	¼ W.	17-4276

TRANSFORMERS

	Description	Part No.
T1	Antenna	00-4134-1S
T2	Radio Frequency	00-4132-1S
T3	Oscillator	00-4133S
T4	1st Intermediate Freq.	00-4489
T5	2nd Intermediate Freq.	00-4488
T6	Output	00-4112
T7	Power	00-4101

CHOKES

X1	Center Tap Primary R. F.	00-4131
X2	Filter	00-4141
X3	"B" Radio Frequency	00-2181-1
X4	Plate Radio Frequency	00-2181-1
X5	Plate Radio Frequency	00-2181-1
X6	"A" Radio Frequency	00-4130-1
X7	"A" Radio Frequency	00-4130-1
X8	"B" Radio Frequency	00-2181-1
X9	"A" Radio Frequency	00-4131

NOTE: The above circuit diagram is effective for all Model 45 Arvin Car Radios, beginning with and including that bearing the Serial No. E40356L.

Make voltage tests with 1000 ohm per volt meter. Voltages given in table are only comparative due to variance in battery voltage. Plus or minus 20% on all voltages is acceptable.

Tube	Heaters	Plate	Screen	Cathode	Suppressor	Control
78	6.3	250	60	2.2	2.2	*2.0
77	6.3	250	60	2.2	2.2	*2.2
78	6.3	250	60	1.6	1.6	*1.4
37	6.3	60	—	0	—	*6—1500 KC
75	6.3	135	—	1.3	—	*1.3
75	6.3	135	—	1.3	—	*1.3
41	6.3	245	250	18	—	*18
41	6.3	245	250	18	—	*18
84	6.3	275 (AC)	—	255	—	—

* Measured with vacuum tube voltmeter only.

MODEL 45 POINT TO POINT RESISTANCE CHECK

All readings to ground unless otherwise specified. Readings taken with all tubes removed from set and R. F. chassis disconnected from power pack unit.

1st 78
+ Heater ..... Inf.
— Heater 0
Plate to B+ 50
Screen Grid to B+ 60,000
Suppressor Grid 260
Cathode 260
Control Grid 2,500,000

75
+ Heater ..... Inf.
— Heater 0
Plate to B+ 250,000
Diode 500,000
Diode 500,000
Cathode 2500
Control Grid 8000

84
+ Heater ..... Inf.
— Heater 0
Plate 190
Plate 160
Plate to Plate 350
Cathode ..... Inf.†

†Reads leakage of electrolytic condenser.

77
+ Heater ..... Inf.
— Heater 0
Plate to B+ 100
Screen Grid to B+ 60,000
Suppressor Grid 260
Cathode 260
Control Grid 6

41
+ Heater ..... Inf.
— Heater 0
Plate to B+ ..... Inf.
Screen Grid to B+ 2
Control Grid 508,000
Cathode 400

2nd 78
+ Heater ..... Inf.
— Heater 0
Plate to B+ 100
Screen Grid to B+ 60,000
Suppressor Grid 500
Cathode 500
Control Grid 1,500,000

75
+ Heater ..... Inf.
— Heater 0
Plate to B+ 250,000
Diode 500,000
Diode 500,000
Cathode 2500
Control Grid:
V. C. on 500,000
V. C. off 250,000

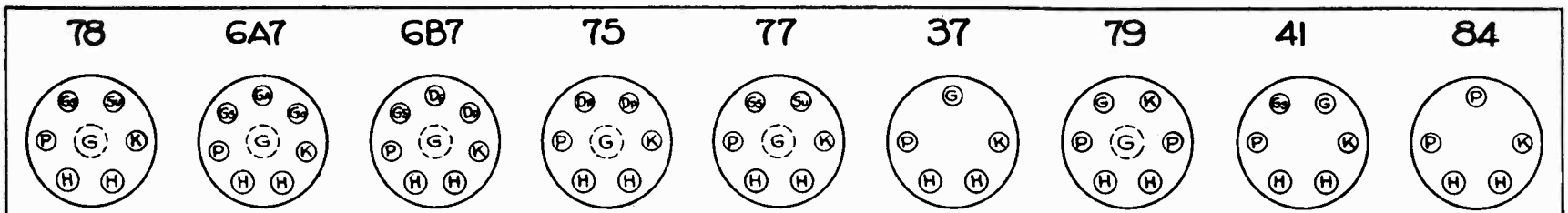
37
+ Heater ..... Inf.
— Heater 0
Plate to B+ 60,000
Control Grid 65,000
Cathode 0

41
+ Heater ..... Inf.
— Heater 0
Plate to B+ ..... Inf.
Screen Grid to B+ 2
Control Grid 508,000
Cathode 400

COIL RESISTANCES

Ant. Primary 2	1st I. F. Primary 100
Ant. Secondary 6	1st I. F. Secondary 100
R. F. Primary 50	2nd I. F. Primary 82
R. F. Secondary 6	2nd I. F. Secondary 82
Osc. Primary 2	Primary Output Transformer 600
Osc. Secondary 7	Voice Coil ..... .35

LOOKING AT BOTTOM OF TUBE SOCKETS



NOBLITT SPARKS INDUSTRIES

MODEL 45
Voltage, Test Data
Coil Resistance

ALIGNMENT PROCEDURE FOR ARVIN
Models 15, 25, 35, and 45

NOTE: All adjustments in the following instructions should be made with an output meter or some indicating device connected with the output of the radio receiver to insure maximum sensitivity and selectivity: Output meter may be connected to external speaker jack on all models.

Remove the radio chassis from the case. Connect the output of the oscillator to the grid cap of the 78 detector (2nd tube in set) or 6A7 tube after removing the grid clip and adjust the oscillator to 175 kilocycles. Set the output of the oscillator to the lowest amount giving a readable deflection of the output meter. Adjust with a Bakelite screwdriver the first and second I. F. transformer for maximum output. Replace the grid clip, connect the output of the oscillator to the antenna terminal of the radio set through a .0001 mfd mica condenser and set the oscillator to 1530 kilocycles. Rotate the variable condenser fully out of mesh, then back until the rotor plates begin to enter the stator. Adjust the oscillator padder, which is the section opposite shaft end, until the maximum signal is attained. Then readjust the oscillator input to 1400 kilocycles, rotate the variable condenser until the signal is again tuned in.

Now adjust the antenna (shaft end) and R. F. (middle) padders until the output is again at maximum.

Then adjust the oscillator series padder condenser (located by the 6B7 tube in the Model 15; on the left-hand side in the Model 25; in the top of the oscillator coil can in the compartment with the 37 tube in the Models 35 and 45) until a maximum deflection is obtained at 550 to 600 kilocycles (condenser plates almost in full mesh). At 600 kilocycles the adjustment of the series padder condenser are both variable; each dependent on the other. However, there is only one point where the relation between their settings will give maximum sensitivity.

NOTE: After installation to car antenna slight readjustment of antenna padders, through holes provided on all models (see installation notes) will improve sensitivity and performance. Always adjust at about ten to twenty dial setting.

SPECIAL SERVICE BULLETIN
for Models 35 and 45

Motor Noise Elimination

The Model 35 and 45 Arvin Car Radios have been especially designed for ease of elimination of motor noise.

The Chassis case is well shielded to prevent chassis pick-up and a special motor noise suppression system has been built into the set to block out "feed-back" through the "A" line. With these two sources of entry of motor noise blocked any such interference present must be picked up by the antenna and carried into the set exactly as a station signal. This type of motor noise is the easiest to eliminate and can usually be suppressed by standard suppression.

In rare cases, however, where a car is exceptionally "hot" it has been found that a slight amount of "chassis-pick-up" is present in the Model 35 and 45 Arvin sets—and the purpose of this bulletin is to suggest a method of eliminating this.

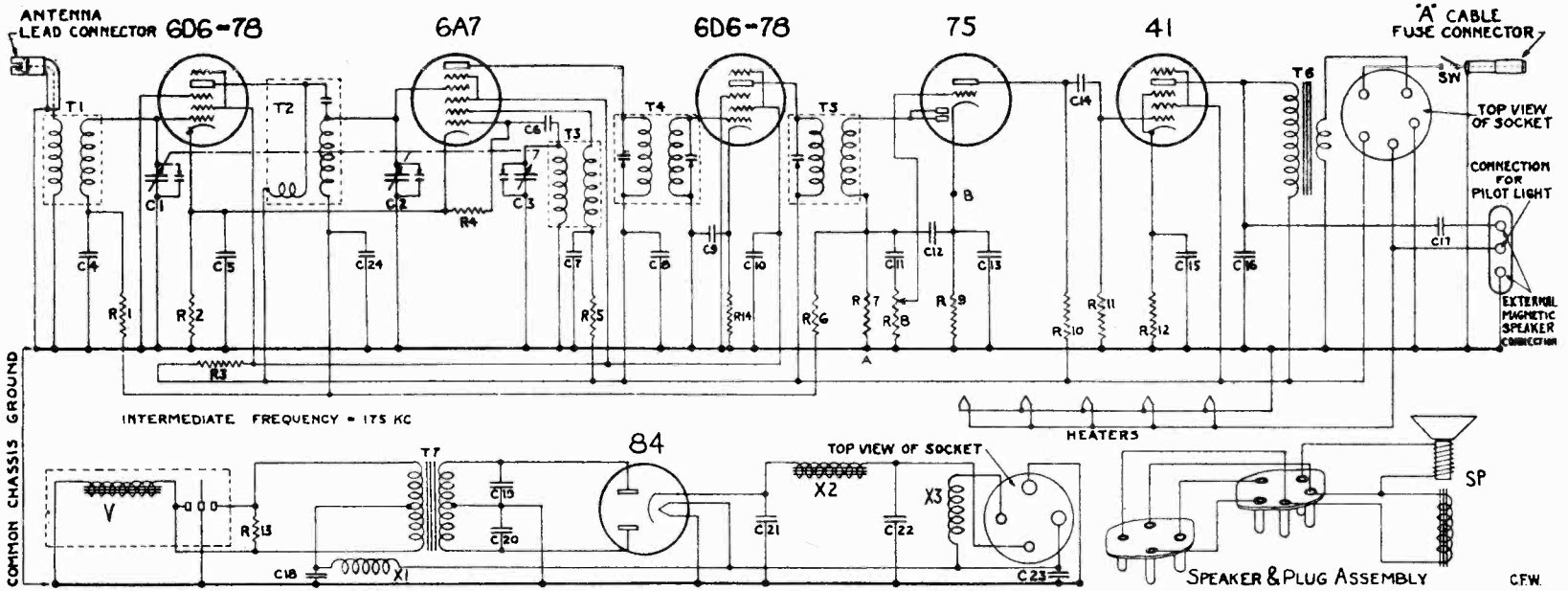
Solder one end of a 3½" length of shielding to the underneath side of the condenser pulley mounting bracket directly between the two 6-32 screws which hold the Bowden wire housing clamp onto this bracket.

The other end of this piece of shielding is then hung over the edge of the chassis case on top of the copper case ground shim, and when the cover is put on the set, it automatically bonds the condenser pulley assembly to the outer case.

It has been found that this extra ground eliminates the last trace of "chassis-pick-up" motor noise interference from the Model 35 and 45 Arvin Car Radios.

CIRCUIT DIAGRAM OF ARVIN CAR RADIO MODEL 16

DIAGRAM	ISSUE NO.	DATE
B	1	7-23-34



CAPACITORS

	Description		Part No.
C 1, C 2, C 3	3 Gang Variable		19-2248
C 4	.05 *uf*	160 V.	17-4329
C 5	.1 *uf*	100 V.	17-4393
C 6	100 *uuf*	600 V.	17-2064
C 7	.001 *uf*	600 V.	17-4292
C 8	.25 *uf*	300 V.	29-4188
C 9	.02 *uf*	100 V.	17-4394
C10	.1 *uf*	200 V.	17-2097
C11	.05 *uf*	160 V.	17-4329
C12	500 *uuf*	600 V.	17-2211
C13	.5 *uf*	10 V.	29-2224
C14	.05 *uf*	300 V.	17-3006
C15	12. *uf*	25 V.	17-2082
C16	.007 *uf*	600 V.	17-4392
C17	.02 *uf*	400 V.	17-2214
C18	1. *uf*	10 V.	17-4395
C19, C20	.02 *uf* Twin	1000 V.	29-4193

CAPACITORS

	Description		Part No.
C21, C22	12. *uf* 4. *uf* Twin	450 V.	17-4201
C23	.5 *uf*	10 V.	29-2224
C24	.05 *uf*	160 V.	17-4329

MISCELLANEOUS

SP—Dynamic Speaker	17-4226
SW—Switch, Part of R8	17-4152-1
V—Vibrator Unit	29-2169C

In districts where signal strength is abnormally low, a slight increase in sensitivity may be obtained by removing the inter-channel noise suppression feature. Disconnect R7 at A and reconnect at B.

RESISTORS

	Description		Part No.
R 1	100,000 Ω	¼ W.	17-2068
R 2	260 Ω	¼ W.	17-2066
R 3	30,000 Ω	¼ W.	17-4276
R 4	100,000 Ω	¼ W.	17-2068
R 5	20,000 Ω	¼ W.	17-2072
R 6	1 Megohm	¼ W.	17-2080
R 7	150,000 Ω	¼ W.	17-4283
R 8	250,000 Ω	Pot.	17-4152-1
R 9	5,000 Ω	¼ W.	17-2071
R10	250,000 Ω	¼ W.	17-3011
R11	500,000 Ω	¼ W.	17-2070
R12	800 Ω	½ W.	17-4273
R13	200 Ω	¼ W.	17-4287
R14	2,000 Ω	¼ W.	17-4202

R14 NOTE: This resistor may be varied to control sensitivity.

TRANSFORMERS

	Description	Part No.
T1	Antenna	00-3020-1
T2	Radio Frequency	00-3017-1
T3	Oscillator	00-4482-1
T4	First I F	00-2258A
T5	Second I F	00-4476
T6	Output	00-4111
T7	Power	00-4102-2

CHOKES

X1	C T Primary	00-2178E
X2	Filter	00-4141
X3	Filament	00-2178F

NOTE: On orders for replacement parts, state part number and quantity desired.

MISCELLANEOUS GENERAL INFORMATION RELATIVE TO REMOVING MOTOR NOISE

When primary wires to the coil run through the same conduit as the secondary or spark plug wire run—remove this wire from the conduit and shield it if necessary, grounding the shielding at both ends to some part of the motor block or the bulkhead between the passenger's compartment and the motor.

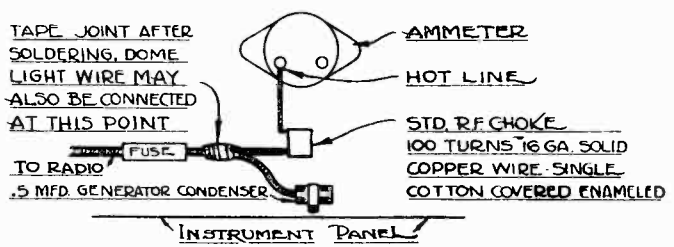
Also, be sure when shielding the secondary lead from the coil to the distributor to ground both ends of this shield, either to the motor or to the bulkhead. On some few cars the hood over the engine appears to be ungrounded or at least is a very high resistance ground and should be grounded with pigtails of shielding cable soldered to both sides of the hood and also to the motor bulkhead or motor block.

On cars equipped with co-incidental lock on the steering post an extra generator condenser should be installed from one switch terminal to ground. The exact terminal on which to install this condenser can be determined only by experiment. The condenser body should be grounded to the dash or to the motor bulkhead. On some Ford V-8's it is necessary to install an extra generator condenser on the generator to the other terminal of the cutout relay, thus making two condensers on the same relay—one on each terminal to ground.

On some Chevrolets, generally of the older models, it is necessary to install an extra condenser from the primary of the ignition coil to ground. The exact terminal to connect this condenser to can only be determined by experiment. Be sure that the grounding of this condenser is solid, preferably to the motor block or to the motor bulkhead.

On all cars equipped with "Electrolock" it may be found necessary to remove the primary return wire from the switch to the coil and replace it with a new wire run through a piece of shielding loom grounded near the switch and also to the metal bulkhead on the motor side of the dash. This lead should be brought out through the dash as far as possible from the rest of the electrical wiring of the car.

It may be pointed out that loose connections anywhere in the electrical circuit of the car will cause motor noise or what appears to be motor noise. If this condition exists it is wise to check the entire electrical circuit of the car and make sure that all connections are tight before trying any other extreme methods of motor noise elimination.



The use of a choke and condenser at the ammeter with the 10A has proven to be a great help in the elimination of motor noise. (See illustration above.)