

Fig. 7

Battery connections used with UX-201A tubes, without "C" battery. Keeper bars are in same position as when sets are shipped. The results obtained with this hook-up are the same as with Fig. 1, except more "B" battery current is used; therefore connections shown in Fig. 1 are preferable.

### CONNECTING BATTERIES

**CAUTION**—When connecting "B" batteries, remove all tubes from the sockets and after the batteries are connected check the wiring over to make sure that it is correct, then try one tube in each socket to prevent burning out the whole set of tubes in case an error has been made.

The Arborphone is very simple to hook up. The connections depend upon the types of tubes used. Be sure to refer to the correct illustration, Figure 6, 7, 8, 9. In each instance note position of keeper bars. All sets are shipped with the keeper bars in the position shown in figure 7. However, sometimes these bars are removed or lost. In such an instance a piece of bare copper wire can be used to connect the proper binding posts instead of the bar.

If the operation of an Arborphone is intermittent and seems to load up and then work perfectly for a few seconds the trouble is usually due to the absence of keeper bar, or one incorrectly placed.

Note that the A+ and B- battery wires are connected to the same binding post. This connection can be made either at the binding post or between the battery terminals, whichever is most convenient.

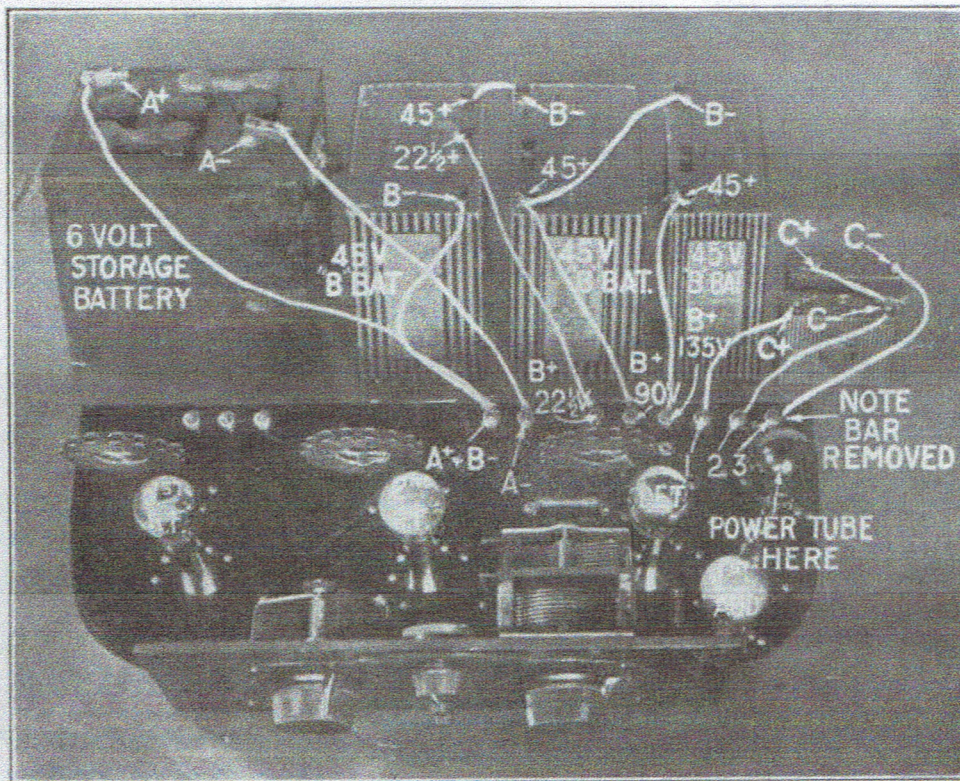


Fig. 8

Battery connections used with UX-201A tubes with UX-112 power tube in last stage of audio. Note that both keeper bars are removed and an additional 45 volt "B" battery is connected in place of the short keeper. Also 9 volts of "C" battery are now connected to post No. 3. Use this hook-up for greatest possible volume with large loud speakers.

If you are not acquainted with hooking up a radio set do not attempt it yourself. A wrong connection might cause not only the burning out of the tubes but burning out the coils and transformers.

### LOUD SPEAKER EQUIPMENT

The only recommendation we can make to you regarding the loud speaker is—Buy a good one.

No radio set, regardless how carefully designed, will overcome imperfections in a cheap loud speaker. As far as quality of tone is concerned, the Arborphone is no better than the loud speaker it is required to work. In buying a loud speaker remember that all of the good things that Radio has to offer necessarily come to you through the medium of the loud speaker and buy a speaker that sounds so good to your ears that you will be willing to live with it for years to come.

No two people hear alike. One person may condemn a particular loud speaker while another may commend it simply because their own senses of hearing do not balance the same way with the reproduction properties of the speaker. Obviously, if one desires the greatest amount of satisfaction he must select a loud speaker that matches his own ears.

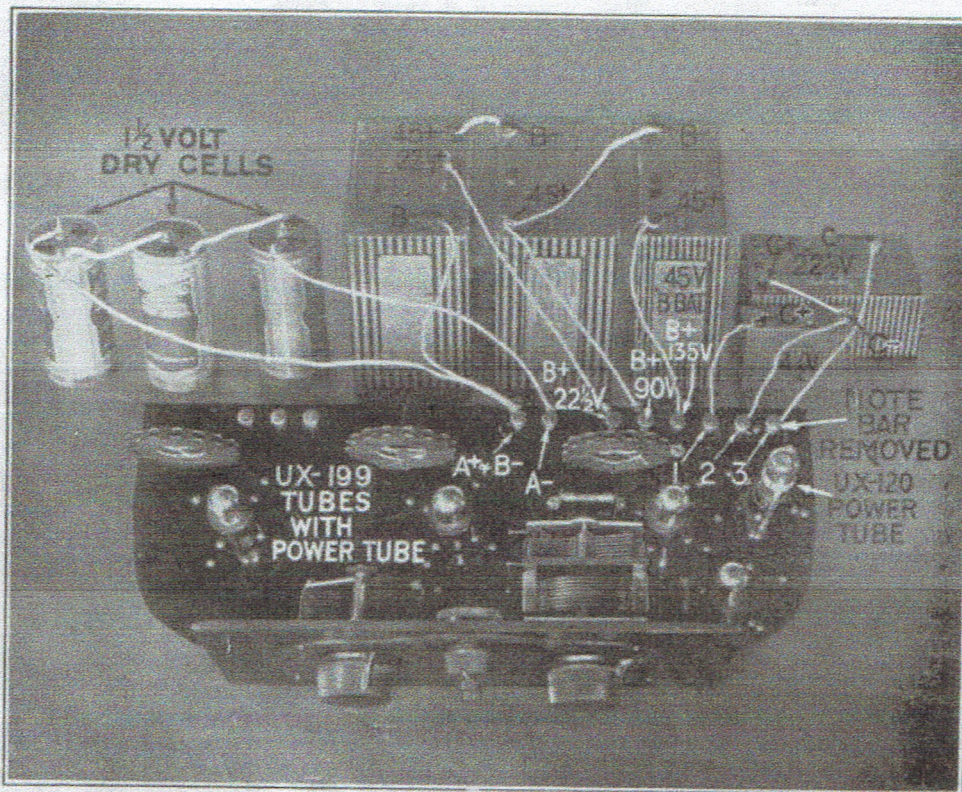


Fig. 9

Battery connections used with UX-199 tubes with UX-120 power tube in last stage of audio. This is the recommended hook-up for those who wish to use dry cell operated tubes. The smallest size of  $22\frac{1}{2}$  volt "B" batteries may be used for the "C" battery connected to post No. 3, but the large size with taps allows varying the voltage and is preferred

A person who hears the low frequencies unusually well prefers a loud speaker that to the normal ear is high pitched. On the other hand, and as is most usually the case, the ear may not be responsive to the low frequencies and therefore a low pitched loud speaker would be preferable.

The Arborphone will operate satisfactorily with either the horn or the cone type speaker. Usually the cone type speaker has a lower pitch, although horn speakers can and are built that will amplify the low notes just as well as any cone speaker. In choosing between the horn and the cone simply depend upon your ear, which ever sounds the best is the one for you.

If it is your intention to use a power tube in the last stage have the loud speaker demonstrated with this tube and the additional "B" and "C" batteries as very often there is considerable difference in loud speaker reproduction with the different tubes.

### CONNECTING LOUD SPEAKER

Insert the tips of the loud speaker cord in small jacks on sub-panel marked "SJ" in Figure 5. Usually the cord with the colored braid should be inserted in the jack marked +, as this is the positive battery connection.

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As some loud speaker units are very directional it is best to try switching the cord tips when the loud speaker is in operation, using the connection which gives the best and loudest results.

While in this day and age there is very little use for a headset, in case you wish to use one the cord tips should be inserted in the loud speaker jacks.

A hole is provided in the back of the cabinet at the extreme end for the loud speaker cord.

Place the loud speaker as far away from the set as convenient. Although, if all of the tubes are perfect, the vibration from the loud speaker will not cause any trouble even when the speaker is placed on top of the cabinet. However, if a howl develops and you can not correct the trouble by switching the tubes around in the sockets you will have to move the loud speaker away as it is feeding back into the set or vibrating the tubes.

In cases where a set howls, due to the effect of air vibration, the trouble can often be overcome by placing a weight on the detector tube. Coil up a length of round, soft solder into the form of a cap and try it. Lead and rubber caps are made for this purpose and should be used in stubborn cases.

To get the correct tone quality, if you are using a "C" battery, try various voltages. With the UX-112 power tube very often better quality can be had by using 12 volts of "C" battery, hooking three of the  $4\frac{1}{2}$  volt batteries in series, making the minus connection to the Number 3 post. Also try both the 3 volt and  $4\frac{1}{2}$  volt taps of the first "C" battery on the Number 2 post, but  $4\frac{1}{2}$  volts is about all that the first audio tube will require. Remember at all times that the "C" battery voltage used depends upon the amount of "B" battery voltage. If the "B" battery voltage drops, to maintain quality you will have to lower the "C" battery voltage as well. Failing to do this often results in shrill reception of high notes when the "B" batteries become partly discharged. Note, however, that this shrillness, which has a very penetrating effect on the ears, may also be caused by deterioration of any of the tubes and can then only be overcome by installing a new tube.

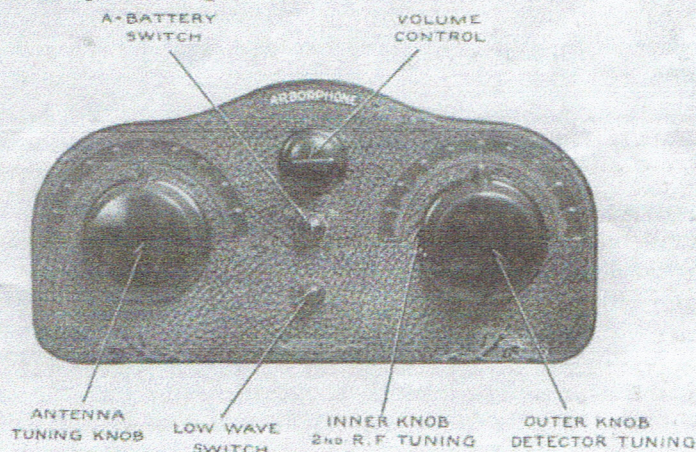


Fig. 10

## ARBORPHONE OPERATION

Having observed the foregoing instructions as to construction of aerial and ground and with all the tubes in the sockets and batteries connected, plug in the loud speaker and the set is ready to operate.

Throw the "A" battery switch, Figure 10, into the "ON" position,

*Don't turn the volume control all the way C.W. this applies more than the max. of 5 volts to 3 tubes (designed this way). About 80% is 5 volts.*

turn the "VOLUME" control knob until the arrow points straight up. In putting a new set in operation it would now be well to lift the lid of the cabinet and see if all of the tubes are lighted. If any of them do not light try another tube in the socket or move the tube slightly so that it makes contact. After the tubes are all lighted, to learn to tune, place the pointers of the two tuning knobs on about "50" and when the indicating line on the outer knob at the right coincides with the pointer you should hear some noise from the loud speaker. If atmospheric noise is heard you may feel sure that everything is connected right and the set is ready to tune. Start with both dials at "50" and move them a point or two in the same direction, grasping the split knob so that both sections are moving together and the indicating line always coincides. If any stations are on the air they should be heard in the loud speaker. If the signals are too faint turn the "Volume" control knob to the right. If nothing is heard turn the "Volume" control way up and go over the settings once again with the lower wave length switch turned to the "HIGH" position. The two dials will read approximately alike when the station is tuned properly, although the setting of the left hand dial depends upon the capacity of the aerial. If this dial runs consistently ahead or behind the other, tune in a station sharply and loosen the set screw on the knob and re-set so that the pointer reads the same as that on the other knob. This will make it easy to tune in other stations. The dials are set to read alike at the factory but they will vary slightly, depending upon location of the set.

### LOW WAVE SWITCH

In tuning stations below "35" on the dial turn the lower switch to "Low" position at the left. This will overcome any difficulty in adjusting the "Volume" control and give best reception on the lower wave lengths.

While the set may be operated on the low wave lengths with the switch in the "High" position and the performance will be about the same as that can be had with other makes of sets, you will find that the adjustment of the "Volume" control is very critical and that before the volume is built up to full efficiency the tubes are liable to go into oscillation and choke the reception. However, by throwing the switch to the left the circuit is changed to one which, although highly efficient on low wave lengths, is nevertheless easily controlled and the set in most cases will not oscillate in the least or only do so when the filaments are turned up to their fullest brilliancy.

If a station is tuned in and is perfectly clear but the set goes into oscillation when one of the knobs is moved, the indications are that the set is not actually tuned to the station and that the "Volume" control is too far to the right, so turn the knob to the left slightly and re-adjust the dials. The station will then come in much louder and clearer.

Remember that if you hear a loud whistle that rises and falls with the movement of either dial you must throw the lower switch to the "Low" position or turn the "Volume" control back to the left. In some instances, however, two stations are so close together that their waves heterodyne, that is, the clashing of the waves creates a whistling sound which can not be remedied by adjustment of the set and it will persist until one of the two stations signs off. This sort of whistle is steady and at a single pitch that can not be varied by turning the dials. No radio set will separate stations which interfere in this way.

## HINTS ON OPERATION

While the Arborphone is very easy to tune, in attempting to receive weak stations from great distances, you will have to learn to set the "Volume" control correctly. Tune in a station at about "40" on the dials and starting with the "Volume" control arrow pointing to the left, where nothing is heard, turn the knob slowly to the right and note its action. Just the moment some life is heard in the loud speaker, tune in a station around "40" and note that the signal becomes louder and louder until a point is reached where there is a plopping noise caused by tubes going into oscillation and nothing can be received but the whistling of the station. This indicates that the "Volume" control has been turned up (to the right) too far, so turn back (to the left) and the station will be heard again clearly. If you try this around "70" on the dial you will find that the "Volume" control has to be turned further to the right to bring the station in with the same volume, and in working below "40" on the dial the set goes into oscillation a little quicker. Having the circuit arranged so that it ceases to operate when the tubes are turned up above the proper brilliancy forces the user to conserve battery current and makes the Arborphone very economical on battery consumption as the moment the tubes are allowed to draw more current than required for loudest reception the reception cuts off entirely and the only place where anything like the entire battery current is used is when working stations above "80" on the dial. But even in such instances the "Volume" control should not be turned up any more than necessary for the loudest reception as burning the tubes brightly at all times shortens their life and discharges the batteries.

While the Arborphone can be made to oscillate it does not necessarily follow that the set is re-broadcasting and interfering with your neighbor, although to a certain degree every radio set re-radiates. The arrangement of the circuit is such that the first tube connected to the aerial acts as a blocking tube, which prevents re-radiation almost entirely, and further, the operator can not receive stations on the Arborphone when set is in oscillation, while the regenerative sets that cause so much interference in the neighborhood are being operated unnecessarily in an oscillating condition and are not provided with any means to prevent the re-radiation such as in the Arborphone.

No set can operate at maximum efficiency which is so loaded down with resistance that it can not be made to oscillate. In the Arborphone you are able to get the full power of amplification from all of the tubes without disturbing your neighbors and great distances are being worked by carefully adjusting the dials and "Volume" control so that the tubes are operated at the point of their greatest efficiency, that is, just before they go into oscillation or make the plopping sound previously described.

The lower switch is connected to the "B" batteries and while it is thoroughly insulated from the rest of the set in some instances you may feel a little current when the switch is being thrown. This would be particularly noticeable if one hand is placed on the filament switch at the same time, but in practice this naturally would not be done. Should you get a shock from the lower switch do not figure that something is wrong with the set as this can easily be overcome by simply coating the metal parts with some radio insulating varnish and allowing it to dry thoroughly so that the fingers cannot come in contact with any of the metal.

If the "Volume" control becomes noisy so that an objectionable scraping noise is heard, simply rub the finger over the winding of the rheostat and by thus cleaning off the path of the contact arm the trouble will be instantly overcome.

If the two indicating lines on the split dial do not come together when a station is tuned correctly, simply re-set the outer knob, although as this outer knob is used as a vernier it will not exactly coincide on every station but it should not vary more than a sixteenth of an inch one way or the other.

## STATIC AND OTHER DISTURBANCES

In going over the full setting of the dials on any radio set there may be points in the broadcasting band where reception is very noisy and objectionable. If some stations are perfectly clear you will know instantly that the trouble is not in the set but is due to causes beyond your control.

If you hear a jumbled group of stations that whistle badly the trouble is that the Government has been forced to assign as many as fourteen stations to one wave length. The whistling noise is caused by their interference and unless one of the stations is very close so that it can be received with very little power, thus, dimming the other interfering stations into the background, you will not be able to receive any of these stations. The only thing you can do is to move on to some other station that can be heard clearly. It is hoped that laws will soon be passed to remedy this situation, but in the meantime you will have to grin and bear it. Fortunately there are plenty of stations at all times that will come in clearly and supply you with any variety of entertainment that you may desire.

If two stations are heard at one time but do not heterodyne or whistle the trouble can usually be overcome by using a shorter aerial or your batteries are discharged so that the tuning is too broad.

Static is responsible for most of the cracking sounds that are so objectionable. Static is simply electrical disturbances in the atmosphere that set up radio waves the same as the broadcasting station, although they are so broad that they can not be tuned out at any position of the dials. Radio reception depends almost entirely upon static conditions and there is no telling when the static will be bad nor how long a bad static condition will last. You can always test whether or not the noise heard is static by simply tuning in a station and then turning the left hand dial off the setting. If the noise stops and everything is quiet you are then sure that the noise is being brought in by the aerial and that it is not originating in the set itself.

When the static is louder than the station you are trying to receive it is useless to try to get clear reception. It is not the fault of the receiver and there is nothing you can do to overcome it. Under bad static conditions it is best to tune only the local stations which usually can be received pleasantly, unless a very violent local thunder shower is in process.

Owing to these uncontrollable atmospheric disturbances do not try to judge your radio set by one night's trial. Tune in the next night and everything may be perfectly clear. Usually these disturbances are very short in the winter time and of longer duration in the summer, although occasionally we will have a summer when the static is very light.

## MAN-MADE STATIC

Very often noise which sounds like static is human made. Interference is caused by any electrical device which produces an electrical spark. Vacuum cleaners, motors attached to washing machines, oil burners, elevators, street cars, X-Ray machines—all are apt to cause very loud and objectionable disturbances. Noises from electric motors can be overcome by installing large capacity condensers across the brushes but this work should be done by an electrician.

Sharp clicks in the receiver are caused by telephones, electric door bells, the switching on and off of house lamps, in fact the throwing of any switch in the neighborhood is apt to cause a clicking noise.

Usually disturbances of this kind can be located and remedied by a competent service man. In some instances power lines cause a humming noise. Faulty electric light transformers, leakage of power lines—all can ruin radio reception for miles around. In such instances the Electric Company appreciates the calling of such cases to their attention as they can locate the leak and save the electricity that is being wasted.

A loose electric bulb in a lamp socket will often set up an intermittent noise that is very difficult to locate. If you are having trouble of this kind one of the first things to do is to tune the set so that the noise is coming in loudly and then have someone pull the master lighting switch to cut off the house current entirely. If the noise stops when the switch is pulled you will know that the interference is right in your house. You can then pull the separate circuit switches and get closer to the cause. Sometimes you will find that it is an electric toaster, heater, or an electric iron. Noises of this kind do not vary with the weather but are constant as long as the current is on the interfering device. People who live in the downtown sections are subjected to a great deal more interference of this kind than those who live out in the less congested districts. There are many locations where a radio set should not be installed as it is simply impossible even for the best equipped service man to overcome all interference. But in a residential section if you are bothered from noises of this kind get the service man and he will find a way to remedy the trouble for you.

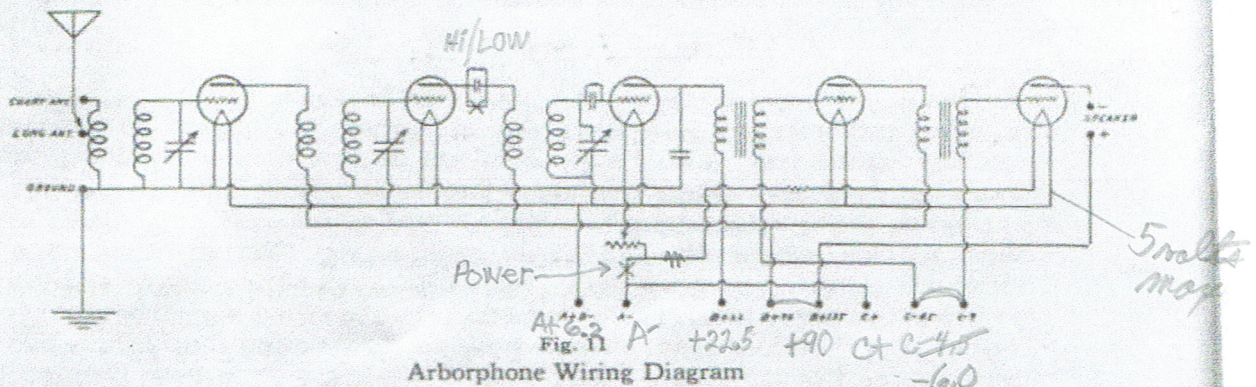
## WHISTLING NOISES

Sometimes when you are listening to very clear reception you will hear a whistling noise that rises and falls on a musical scale and comes and goes. This whistling is due to interference from regenerative sets in the neighborhood. A small boy with a one tube regenerative radio set can simply ruin radio reception for everyone miles around. It is simply ignorance on the part of the set operator and the only thing that can be done is to locate the set and instruct the owner as to the disturbance which he is causing. Sometimes two or three regenerative sets will tune in on the station to which you are listening and reception will be blurred and fade, ruining reception as long as the other fellows stay on the wave. Fortunately modern sets do not cause this trouble and those using old sets do not listen to a station for any great length of time but move on and interfere with someone else after a few moments.

## FADING

Fading is a phenomena not understood by the engineers at the present time. You will hear a station loud and clear for a few moments and then it will completely or almost completely die out and in a few moments





or so will come in again loud and clear. This is undoubtedly due to certain atmospheric conditions and can not be overcome by adjusting the set.

### DAYLIGHT RECEPTION

All in all, remember that radio reception varies greatly from time to time. Stations that are heard clearly at night very often can not be heard in the day time. In fact day-light reception has only about 1/5 the range of that which can be had after the sun has set. This is due to the absorbing of the radio waves by sunlight. Reception differs from hour to hour, day to day, and season to season but there is no time when plenty of stations can not be heard with wonderful clarity and volume, although of course this may not be just the station you particularly want to hear. You will have to compromise with radio in this respect.

### SET NOISES

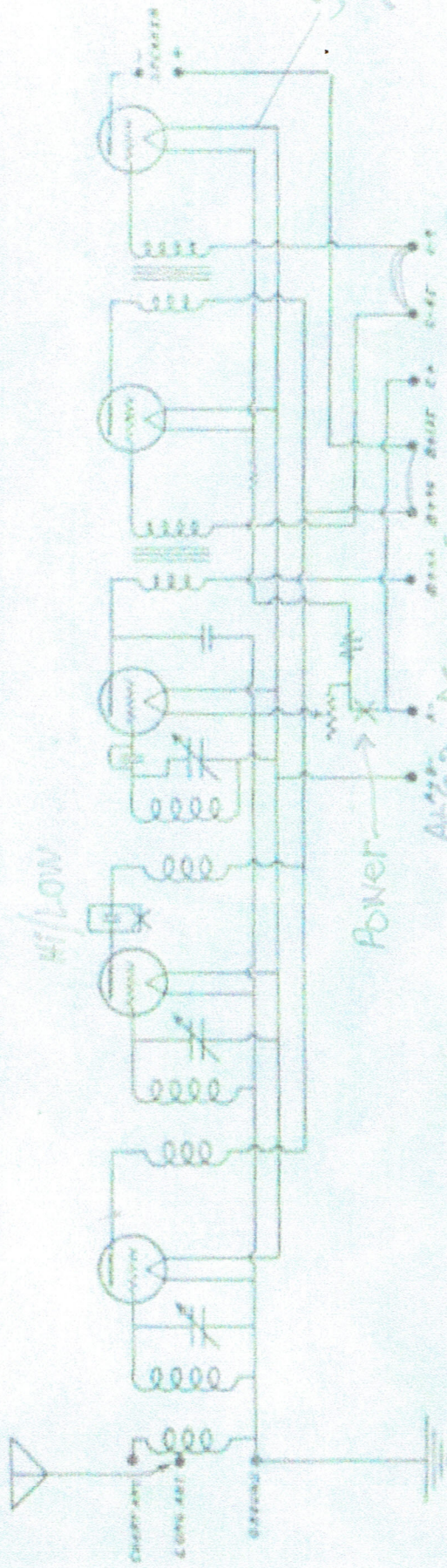
If noises are heard when the aerial is disconnected or the dials thrown out of tune it is then quite evident that some part of the radio equipment is at fault.

To trace noises of this kind, with the set turned on, disconnect both aerial and ground. A cracking noise is usually due to a faulty battery connection, so clean the battery terminals of all corrosion and be sure of metal to metal contact. Go over the wires where they are connected to the binding posts on the set. If the noise still persists, move the tubes slightly in their sockets as corrosion may have taken place on the tube prongs or there might be a faulty contact at the base. Corroded connections inside of "B" batteries will sometimes make the set noisy. If the batteries are practically discharged this is undoubtedly the cause of the trouble. A tube that is just in its last gasps will often be very noisy. You should have a spare tube, so remove one tube and try the spare. Do this with each socket and you can thus locate a noisy tube. If all connections are clean and the batteries are fully charged and the set is still noisy the next thing would be to replace the grid leak as sometimes after a time grid leaks become noisy.

If the foregoing does not locate the noise the trouble must be in one of the set connections, although usually this noise only shows itself when the set is jarred. As a last resort have a service man go over the connections in the set very carefully and this should locate the trouble. With the Arborphone, however, most of the connections are solidly riveted in place so they will never come loose of their own accord.

ARBORPHONE INSTRUCTIONS

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Arborphone Wiring Diagram

## TROUBLE SHOOTING

## TROUBLE

## CAUSES

## No Reception

1. Disconnected or broken battery wires.
2. Corroded battery terminals.
3. Batteries discharged.
4. Burned out tube.
5. Tube not making contact in socket.
6. Loud speaker not connected or loud speaker cord broken.
7. Defective "A" Battery switch so tubes do not light.
8. Audio tubes not lighted account of burned out cartridge resistance.

## Weak Reception

1. Discharged "A" or "B" batteries.
2. Aerial blown down.
3. Aerial or ground wire disconnected.
4. Corroded ground connection.
5. Defective or worn out tube.
6. Tubes paralyzed by excessive voltage (Can be rejuvenated).
7. Loud speaker connections reversed.
8. Battery connections reversed.
9. Keeper bars not in proper position.
10. Knob slips so condensers are out of tune.
11. Trying to tune high wave length stations with switch in "Low" position.
12. Aerial too long.
13. Not using brand of tubes recommended.

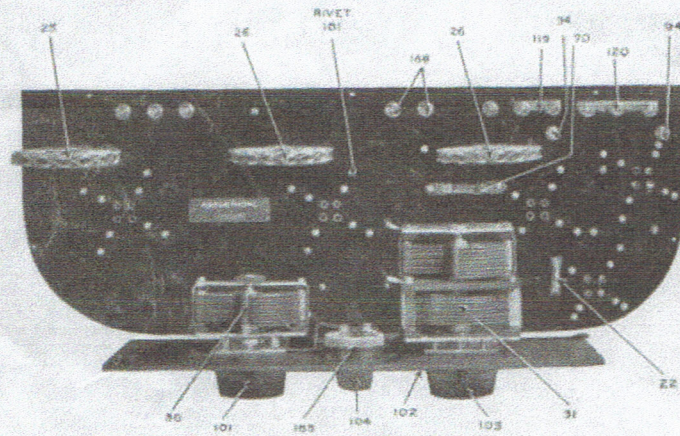
## APPROXIMATE DIAL SETTINGS BY WAVE LENGTH

The following dial settings are only an average as the tuning of each set will vary two or three degrees on the dials, depending upon the particular tubes used and location of the set and aerial. By referring to the Arborphone Log you can ascertain the wave length of the station you wish to hear and by use of the following table learn the approximate dial setting for the station. You should start immediately, however, to fill in the settings in your log book so that after a station is once heard you can listen to it again at will. Always record the reading of both dials and in tuning set the two dials on these figures and swing the outer knob back and forth to position of best reception.

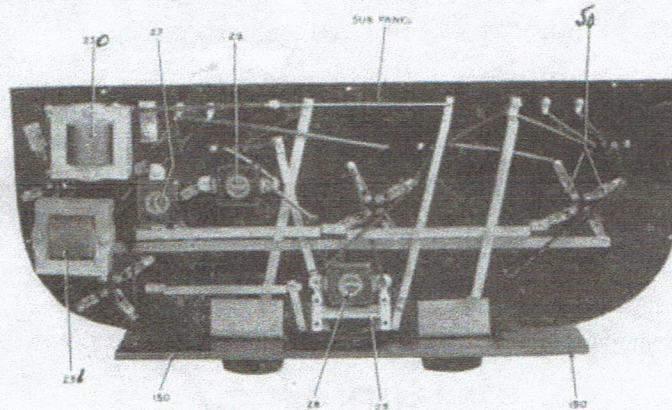
Wave Length	Call Letters	Location	Dial Setting	Wave Length	Call Letters	Location	Dial Setting
214	WCLS	Joliet, Ill.	8	300	WPG	Atlantic City, N. J.	27
226	WBBM	Chicago, Ill.	10	309	KDKA	Pittsburg, Pa.	29
232	WJBK	Ypsilanti, Mich.	13	319	WSMB	New Orleans, La.	31½
250	WMBB	Chicago, Ill.	16	322	KOA	Denver, Colo.	32
256	WRVA	Richmond, Va.	17½	333	WBZ	Springfield, Mass.	34
266	KFNF	Shenandoah, Ia.	20	337	KNX	Los Angeles, Cal.	35½
270	WGHP	Detroit, Mich.	21	341	KFAB	Lincoln, Nebr.	36
286	WREO	Lansing, Mich.	25	345	WLS	Chicago, Ill.	37 34

Wave Length	Call Letters	Location	Dial Setting	Wave Length	Call Letters	Location	Dial Setting
350	CZE	Mexico City, Mexico	38½	448	WQJ	Chicago, Ill.	63
353	WWJ	Detroit, Mich.	39	454	WJZ	New York, N. Y.	65
361	KGO	Oakland, Cal.	44	469	KFI	Los Angeles, Cal.	68½
380	WGY	Schenectady, N. Y.	45	476	WPAB	Fort Worth, Tex.	71
389	WTAM	Cleveland, O.	46	484	WOC	Davenport, Ia.	73
395	WFI	Philadelphia, Penna.	47½	492	WEAF	New York, N. Y.	75
400	PWX	Havana, Cuba	49½	500	WMC	Memphis, Tenn.	78
416	WCCO	Minneapolis, Minn.	54	508	KLX	Oakland, Cal.	80
422	WLW	Cincinnati, O.	56	517	WJR	Detroit, Mich.	83
428	WSB	Atlanta, Ga.	57	526	WOAW	Omaha, Nebr.	86
434	CFCN	Calgary, Alta.	58½	535	KYW	Chicago, Ill.	91
441	WOS	Jefferson City, Mo.	60	545	KSD	St. Louis, Mo.	93

*W.H.A.S. 2-7-37*



Top View



Bottom View

Repair Part Numbers

## REPAIR PARTS LIST

The following is a list of the most important parts of the Arborphone. All Arborphone Distributors carry a stock of service parts and are in a position to furnish your Dealer with anything needed for repairs at the list prices given. When ordering always use the part number. **BE SURE TO GIVE SERIAL NUMBER OF SET.**

Part No.	Part Name	List Price Each
30	Single Tuning Condenser.....	\$ 3.25
31	Dual Tuning Condenser.....	6.75
25	Antenna Coil.....	1.00
26	R. F. Transformer Coil.....	1.00
209	Switch with Knob Complete.....	.65
230	Audio Transformer 2 to 1 (2nd Stage).....	3.50
231	Audio Transformer 4 to 1 (1st State).....	3.50
22	Audio Resistance Cartridge (2 Ohm).....	.25
70	Grid Leak (2 Megohm).....	.25
27	Fixed Condenser .002 Mf.....	.40
28	Fixed Condenser .0005 Mf.....	.35
29	Fixed Condenser .00025 Mf.....	.35
101	Single Tuning Knob with Set Screw.....	.50
102	Inner Tuning Knob with Set Screw.....	.50
103	Outer Tuning Knob with Set Screw.....	.50
104	Rheostat Knob.....	.20
94	Speaker Tip Jack.....	.15
166	Binding Post.....	.05
185	Rheostat Complete.....	.85
50	Contact Spring.....	.02
181	Contact Spring Rivet.....	.01
119	"B" Battery Jumper Bar.....	.02
120	"C" Battery Jumper Bar.....	.02
23	1000 Ohm Ballast Resistance.....	.55
150	Front Panel—Wood.....	2.50
20	Cabinet Complete with No. 150.....	19.00
	Cabinet Lid.....	4.50

*Part numbers shown on illustrations on page 24*