



# The Magic Crystal

ALVA F. ALLEN  
Manufacturer and Distributor

DEVOTED TO CREATING INTEREST IN TUBELESS, BATTERYLESS, CRYSTAL RADIOS

CLINTON, MISSOURI  
U. S. A.

## Crystal Radios Require No Tubes or Batteries

No Static or Distortion is Reported in Reception Over Hundreds of Miles; No Expense to Operate Sets.

Crystal Radio Sets use no batteries or tubes yet are able to receive programs, in many cases over hundreds of miles. The sets are simple, practical and efficient. There is no expense to operate a Crystal Radio Set.

While the ordinary range is up to fifty miles, distance reception is not at all unusual. Many reports have been received telling of clear reception over hundreds of miles. Even with the most simple Crystal Radio Set long distance reception can be expected and obtained in practically any part of the country, under favorable conditions.

Extreme simplicity and ease of construction are responsible for the tremendous interest shown in crystal radios. In order to gain a fundamental knowledge of radio every boy should make and enjoy a radio set. In this day of super-powered broadcasting stations the world's best talent is available to the crystal user. Since no tubes or batteries are used, Crystal Radios have always been noted for their pure, undistorted tone qualities.

It should be remembered that the operating efficiency of crystal radios depends greatly upon the correct installation. The only current used by the set is the very small amount picked up by the aerial and a good aerial and ground is of utmost importance, especially where distance reception is desired.

"DISTITE"

### Midget Semi-Fixed Crystal Detector



Actual Size

No. D-125.....50c

Ideal for Smallest Pocket Type Sets; Semi-Fixed Converted Into Permanent Detector.

Midget Semi-Fixed Crystal Detector, No. D-125, is a super compact Crystal Detector especially designed for use with small size crystal sets. The midget size makes it easy to enclose inside the case of the smallest pocket type sets.

"Semi-Fixed" means that the catwhisker wire of this Crystal Detector, is of such a size and shape as to remain securely in place when adjusted, yet allowing it to be easily moved to readjust when necessary.

If a permanent type detector is desired it may be done by simply adjusting the catwhisker contact to place where signals are loudest and then apply a drop of colloidal cement, Du Pont Duco household cement or similar preparation, to the point of contact.

When this cement dries, the detector will stand considerable vibration without getting out of adjustment. This is recommended for pocket type sets.

## Natural Ores Provide The Most Efficient Radio Detection

Natural ores possess a rectifying quality which permits the passage of radio frequency currents in one direction only. Only superior quality natural ores are used in making Melomite Radio Crystals.

This ore must pass very rigid tests both before and after mounting in the soft metal holder. These Radio Crystals are given an actual reception test and must be able to bring in clear and distinct reception from broadcasting station located about seventy-five miles distant.

Lead galena, used in Melomite Radio Crystals, is smooth on fracture and has a tendency to break in cubes. Silver galena has a brilliant sparkling surface and will maintain a sensitive surface for a considerable length of time. Both lead and silver steel galena require a very sensitive contact for best results.

The function of a Crystal Detector as used in a Crystal Radio is to serve as a valve or rectifier allowing only a certain part of the current received from the transmitting station to pass into the ear phones, changing this current from an alternating to a pulsating direct current so that the headphones will respond to the varying intensity of the received signal.

Among these natural ores which possess this quality are lead galena, iron pyrites, silver steel galena and silicon. There are other minerals which must be used in combination to obtain this rectifying quality; among these are zincite used with bornite or rock crystal.

Carborundum and meledenum have also been used but they are used in combination with a battery and potentiometer to vary the current. They are stable in operation but not as sensitive as the minerals requiring a sensitive catwhisker contact.

Many attempts to produce a sensitive synthetic mineral have been made, however none have proven as successful as the natural mineral. The natural ores vary considerably in radio-sensitive qualities and in many cases ore of identical physical characteristics vary greatly in rectifying qualities.

For this reason only the best, most efficient, natural ores are used in making the Melomite Radio Crystals.

## Genuine "Melomite" Radio Crystals



25c each  
5 for \$1.00  
POSTPAID

## Melomite Crystals Famous for Tone and Distance Reception

Nationally Known for Distance and Tone, Melomite "Supersensitive" Crystals Give New Life to Old Radio Sets.

Melomite Crystals are nationally known for clearness of reception, tone, sensitiveness and long distance records. These crystals are made of carefully selected mineral.

There is no hunting for "hot" spots when the Melomite Crystal is used. Once the contact is made the granulated surface of this crystal eliminates all chance of contact disturbance.

Melomite Crystals will give your old crystal set new life. This crystal, packed in glassine envelope or attractive individual display card, assures the user of the best possible results at all times.

Radio experts readily admit that programs received on crystal sets are more lifelike, natural and clearcut than those reproduced by the most expensive electric receivers. Despite the rapid development of the vacuum tube in recent years, the Crystal Radio has held its own and the demand for this type set has not fallen off to any appreciable extent.

All experimenters remember the almost perfect quality of speech and music obtained from a crystal set. This same fine quality of tone has not changed a bit; it is the same with even the most simple crystal hookup.

These Crystal Radio Sets may be made or purchased today. The cost in either case is so small the money will never be missed by the purchaser. Users of these sets say "The enjoyment that a Crystal Set will give will amply repay you for your efforts. It is a marvelous little radio!"

Rich awards await the person who perfects a simple method of amplifying a Crystal Radio. The volume obtained over a simple Crystal Set located close to a broadcasting station is ample to operate a loud speaker. With a long aerial and a good ground, these results can be considerably extended.

The advantages of having a Melomite Crystal in your set cannot be overemphasized.

## "Crystal Detector Superior"

Opinions Obtained from Leading Magazines 'Prove Practicability of Crystal Radios.'

"As every radio man knows," Radio-Craft magazine said, "there is nothing superior to the crystal detector when it comes to quality." This statement alone will eliminate any doubt as to the fact that a radio which uses no tubes or batteries is able to receive programs from broadcasting stations located miles away.

Presented herein are the opinions of leading magazines as shown by items which have appeared in their columns, in order to prove the practicability of Crystal Radios.

The editorial, by Hugo Gernsback, appearing in Radio-Craft said in part:

"Take for instance our present-day detector tube. It is woefully inadequate (with regard to quality) and compared to the crystal detector, it is exceedingly poor. This has led a Western experimenter to substitute a crystal for a detector tube in his television set, with astonishingly better results in the quality of the received image. The crystal detector is full of mysteries as yet unsolved by radio engineers. As every radio man knows, there is nothing superior to the crystal detector when it comes to quality. What all of them do not know, however, is that the crystal has frequently been an excellent distance getter,

and there have been many certifications of this. For no known reason at all, the crystal, whose limit is usually 15 to 25 miles, has been able to bring in signals from distances up to 300 miles. Of course, the 'wise' radio man will point out that this must be a 'freak' reception, and let it go at that, but when the same freak reception is duplicated hundreds of times they are no longer 'freaks' but become pretty normal.

"Believe it or not, but we have received more inquiries from beginners for crystal receivers than for any other type of set."

Popular Science Monthly, one of the most outstanding science magazines in the country says:

"Almost the first practical radio receivers, long before the days of modern vacuum tubes, used a sensitive crystal to detect and rectify the radio signals. Remember it was years before the tone quality obtainable from the loud speaker of a vacuum tube set equalled that obtainable from the simplest crystal hook-up.

"In these days of elaborate multitude radio receivers—it is well to remember that far simpler sets will meet the broadcast reception requirements of a certain class radio listeners. If, for example, you live within a mile or so of a broadcasting station and are willing to restrict your radio entertainment to the output of this station and use head-phones, a simple crystal set will meet your needs."

## Question and Answer Department

Below I am listing some of the common questions which crystal set fans have asked. These have been answered to the best of my ability. If you have a question regarding crystal sets which you would like answered please write me, enclosing stamped addressed envelope for reply. If you have any answers to Crystal Set problems which you think would be of interest to others, especially beginners, please send them in and will try to print them in next issue.

Q. Can I use phones of different resistance together?

A. Yes. They will give good results. Connect phones in series.

Q. What is there to wear out on a crystal radio?

A. The crystal is the only part which wears out and they will last from six months to several years.

Q. Do I have to be an expert to build or install a crystal radio?

A. No. Simply follow the direction sheet supplied with our products and you should have no trouble at all. Remember that since no batteries or tubes are required you do not have any complicated connections to bother with.

Q. Do big super-power transmitting stations hurt a crystal set?

A. No. The stronger the station

the farther away they can be heard.

Q. Can I use more than one pair of phones with a crystal set?

A. Yes. As many as five pair of good phones will give good results. Connect the phones in series. That is, hook one terminal of phone to set, connect other terminal to terminal of other phone, and other phone tip to set. This increases resistance of phones while connecting in parallel cuts down the resistance and lowers efficiency of phones.

Q. Is anything to be gained by two or three crystals in series or in parallel?

A. No. Crystals have no amplifying property. They merely detect or rectify the incoming signals. A vacuum tube amplifier may be used to amplify the output of a crystal set and will

operate a loud speaker.

Q. If I leave a crystal set going all the time will it wear out the crystal or earphones?

A. There is no wear on the phones and hardly any on the crystal. Crystals are in most cases worn out by scraping the catwhisker wire over their surface. We advise lifting the catwhisker wire slightly when moving same and you will find that crystals will last much longer.

Q. How can I clean the surface of a crystal?

A. Use a soft cloth moistened with water or alcohol. Do not scrape the surface with a knife as this will render the crystal useless.

Q. What is the function of a crystal?

A. The radio crystal serves as  
(Continued on page 3)

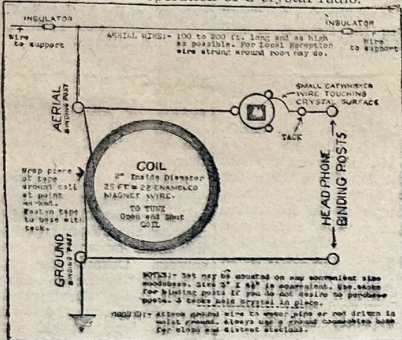
# LONG DISTANCE CRYSTAL RADIO SET IS EASY TO MAKE WHEN YOU FOLLOW THESE FEW SIMPLE INSTRUCTIONS

## "Distite" Crystal Radio Set No. 1 Is Recommended for Beginners Before Building More Elaborate Set.

The simple crystal set described below is very efficient and under favorable conditions is capable of receiving stations located many miles away. The ordinary range of 10 to 50 miles is greatly extended providing the broadcasting station is powerful and local conditions are favorable. Reception at night is always better than during the day. Greater distances can be covered in winter than in summer.

### "DISTITE" CRYSTAL RADIO No. 1

The "Distite" Crystal Radio set has been made by thousands of persons and will give fine results. We recommend that you make this set before building a more elaborate set, as you will thereby become familiar with the operation of a crystal radio.



### DISTITE CRYSTAL RADIO PROVES EFFICIENT

Pictured above is a Distite Crystal Radio Set using above circuit which proves very efficient. The size of the base is only 3 inches by 4 inches. This can be mounted on a wood base to make a very attractive set.

It is very easy to make a Crystal Radio Set to resemble this professional looking one. The printed front can be glued to a wood base with very little effort.

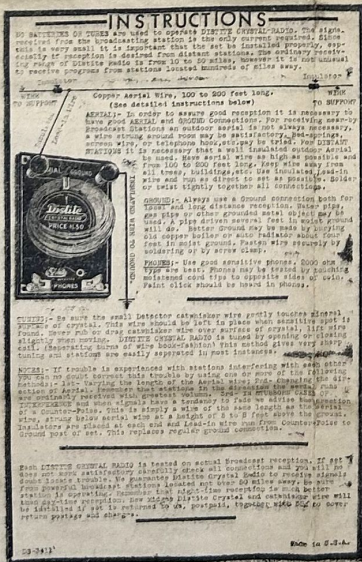
For this set a Panel No. FP-1 can be ordered. The price is only 10 cents each, or three for 25 cents.

### INSTRUCTION SHEET

Instructions for making one of these Distite Crystal Sets are very simple. The directions, along with diagrams, are printed on heavy paper so that it can be fastened to the bottom of the set.

This instruction sheet can be obtained by placing an order for "Instruction Sheet No. IS-1."

A picture of this instruction sheet is shown below to enable the reader to see just how simple it will be to follow the construction details.



You should have no trouble constructing this set as full instructions are printed in above drawing. The Coil is made of 25 ft. of No. 24 enameled magnet wire (other size wire may be used). Wind wire around form about 2 inches in diameter, slip wire from form and wrap a small piece of tape around edge of coil and tack tape to base. Leave wire ends about 3 inches long to fasten to Binding Posts. You can tune this set by opening and closing the coils of wire as you would a book, separating the various turns of wire. This varies the capacity (or wave length) to a surprising extent and allows separation of stations.

**DETECTOR**—Fasten crystal to base with 3 tacks or small nails or use crystal cup. Cut 1 1/2 inch length of fine wire for catwhisker. Fasten one end of wire to base with tack spaced about 3/4 inch from crystal, bend wire so that point gently touches surface crystal.

### PARTS LIST

- Coil—25 feet No. 24 enameled wire wound on form 2 inches in diameter.
  - Binding Posts.—4 Spring type or any convenient type may be used. Tacks or small nails may be used or wire ends connected directly to lead in from aerial, ground and to the phone tips.
  - Crystal Holder—Use our spring clip type No. CC-1 or fasten to base with small tacks or nails.
  - Catwhisker Wire—Short length small size brass wire or order our CW-1 which is a length of specially selected wire for this purpose.
  - Aerial and Ground—See detailed illustrations elsewhere in this circular.
  - Headphones—Any type phone may be used. If you do not have phones you may be able to obtain a set from some person in your neighborhood.
- See price list for prices and description of all available parts.

### To Crystal Set Fans

I have been making radio crystals since 1920. The simple Crystal Radio Set has been the first set made by many present day radio experts. I will certainly welcome any suggestions which will improve "The Magic Crystal" and make it more interesting and instructive.

In the next issue of "The Magic Crystal" I would like to publish more names and addresses of crystal fans who wish to exchange ideas with others. If you would like your name and address to appear, send me a letter with your name and address written plainly with request that it appear.

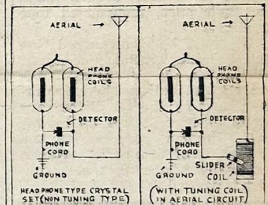
Sincerely yours,  
Alva F. Allen.

### Pocket Type Radio In Headphone Case

Pocket type radio sets have been very popular and thousands of these sets were sold at prices ranging from \$3.95 up. This is the most simple type crystal set possible to make, as no tuning arrangement is used.

For this reason this type set is suitable for reception from close-by stations and will rarely work for distances over five miles.

Figure P-4 shows the circuit used for this pocket type set. The detector used can be mounted either inside or outside the case

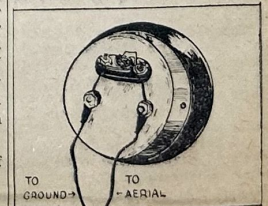


or can be connected across the cord terminals at the end of the cord. The easiest method is to use phones with outside terminals and simply connect a small size detector across these.

Midget Semi-Fixed Detector No. D-125 (shown on page 1, column 1) is very well adapted for this purpose and it is a simple matter to make the set with it.

If it is desired to mount the detector inside the case, No. 985 Midget Crystal (column 2 of this page) can be readily adapted for this use, using a brass wire for contact. This wire is furnished with the crystal.

To use the pocket type radio merely connect one phone cord to aerial and the other cord to the ground. Then adjust catwhisker contact until signals are loudest. If the user is very close to a broadcasting station it is sometimes possible to receive programs using either the ground



or aerial connection alone. Results with this type set can be considerably improved by connecting a tuning coil in the aerial circuit. The coil shown in Figure MK-1 can be used for this purpose and will make possible a certain amount of tuning.

### Midget Crystal No. 985 Ideal for Small Sets

Available in Choice of Three Selected Natural Ores; Size Does Not Affect Quality.

Midget Crystal No. 985, ideally suited for making detectors for small size sets and headphone contained crystal sets, comes in a choice of three selected natural ores. The small size of this Crystal does not detract from its efficiency in the least since a small piece of mineral is just as sensitive as a large Crystal.

The sensitive qualities of a Crystal depend entirely upon the chemical formation of the ore and not on the size. This Crystal is made of the best ore. It can be obtained of silver steel galena, iron pyrites or lead galena, depending upon the user's preference.

Each Midget Crystal No. 985, the same as all other Crystals obtained from Alva F. Allen is of the highest quality and is given complete testing before shipping.

Even though the Midget Crystal is small it may be easily held in place with a small wood or machine screw. The catwhisker contact wire should be fastened in place and bent so as to gently touch the surface of the mineral.

A small piece of suitable catwhisker wire is included free with each No. 985 Crystal.

When ordering ask for one of the following:

- MIDGET CRYSTAL No. 985S Selected Silver Steel Galena.....Price 35c
- MIDGET CRYSTAL No. 985L Selected Iron Pyrites.....Price 35c
- MIDGET CRYSTAL No. 985P Selected Lead Galena.....Price 35c

# "MELODY KING" CRYSTAL SET No. 2

## Questions and Answers

For Crystal Users

(Continued from page 1)

a valve and allows to pass into the head phones only a certain part of the radio wave, changing its character from an alternating current so that the headphone will respond.

Q. Can I use a fire escape as a ground for my crystal set?

A. In many cases fire escapes are not grounded and for this reason would be worthless as a ground. However, on very close stations it might be used as an aerial.

Q. I have made my crystal set and all I can get is a humming sound. What is the cause of this?

A. This sometimes denotes a poor connection. Be sure to check your set completely, be sure that connections are perfectly made. If enamel wire is used remove the insulation with sand paper or by scraping with a knife. Also a humming sound may be caused by your aerial running parallel to a power line. In that case place your aerial at right angles to the power line.

Q. May a loud-speaker be used with a crystal set?

A. Only in very unusual cases. Sometimes when located within a few blocks of a powerful broadcasting station signals are strong enough to operate a sensitive speaker with fair volume. A regular tube type amplifier may be used by connecting the output or phone terminals to the input terminals of amplifier.

Q. Is it absolutely necessary to insulate an aerial?

A. In dry weather an uninsulated aerial may be used without much leakage. In damp weather, however, it is necessary to have the aerial insulated at all points of support. Ordinary porcelain insulators are satisfactory.

Q. Is it necessary to solder the joints in aerial?

A. It is advisable to do so, particularly if the aerial is to be more or less permanent. The corrosion of the wire at the joints will increase the resistance at those points unless the joints are soldered.

Q. Is it necessary to have the aerial far removed from metallic objects and buildings?

A. It is best to keep the aerial as far away from metallic structures as possible. It is not absolutely necessary to have it any great distance away, but in general, the further away the better the results.

(Continued on page 4)

### CONSTRUCTION INFORMATION

**COILS**—The No. C-1 Coil is that of the flat type and is single layer, wound with No. 30 enameled copper magnet wire on heavy fiber board form. Coil is 1/4 inch thick by 3 inches long by 1 1/2 inches wide. The wire is wound within 1/4 inch of each end, leaving wire space 2 1/2 inches. Two small holes are punched in end for mounting. Due to the small size of this coil, it can be used in making many different style sets.

No. C-2 Coil is of slightly heavier construction, being 3/4 inch thick by 3 inches long and 1 1/2 inches wide. This coil is single layer wound, holes are drilled in the ends. Due to the larger size of this coil, you will find it a very practical size for all small sets.

The size of coil can be changed to suit your purpose and different size wire can be used if desired. However, we do not recommend using wire smaller than No. 30 or larger than No. 26 for pocket sets. If you desire to make large size sets, No. 24 or No. 22 wire will be satisfactory. Enameled copper magnet wire should always be used for coils due to the ease of handling. Wire should always be wound carefully so that the turns will be tight and close to each other, so the slider arm will move smoothly over the surface. After the set is assembled and slider arm is in place, move slider back and forth, holding the contact end tightly against wire until the enamel insulation is cut through and bright copper shows. This allows slider to make contact with the various turns so that more or less turns of wire are in the circuit. This varies the capacity of the coil and tunes the set to the various wave lengths necessary.

For connecting the various parts of your set together, use small size copper wire. The same size as used in your coil will be satisfactory. Small wire is just as efficient as large wire for this purpose and is a lot easier to handle. The insulation should be removed completely at points where connections are to be made. Sandpaper or a knife may be used. Lots of beginners forget to remove insulation at connections and consequently their sets refuse to work. If connections are not carefully made your set will not work. It is always best to solder wires together. However, if tightly twisted they should give no trouble.

Pocket Radios are connected to the Aerial and Ground in exactly the same manner as larger crystal radios. Complete detailed instructions are given elsewhere in this catalog.

While many crystal radios have been sold as "pocket radios," these sets are pocket radios only in that they are of such a size as to be easily carried in the pocket. As far as being able to give satisfactory reception while the user is walking or riding, it must be stated that such results are not to be expected.

All pocket radios which do not require tubes or batteries are dependent upon the crystal detector for their operation and are crystal radios in every respect. They use a standard crystal set circuit with coil, detector and binding posts for the connection to aerial, ground and phones. The simplicity of design and construction of the crystal radio makes it an easy matter to make parts of a suitable size as to be easily enclosed in a small case.

Single slide tuning coil circuit. Especially recommended for small pocket sets.

Figure MK-1 shows a very efficient little set and the circuit used can be employed with any size coil or detector desired. This circuit is the standard single slide tuning coil circuit used by practically all makers of commercial crystal sets. It has proven very practical and efficient and is considered best for small crystal sets.

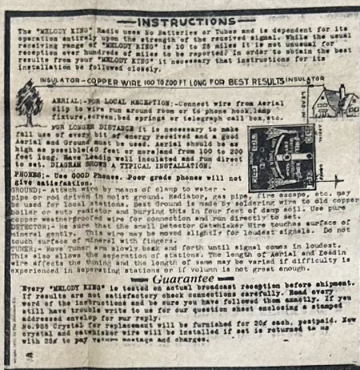
Optional method of wiring single slide tuning coil circuit. Same parts as used in Figure MK-1.

Figure MK-2 shows a different method of wiring, using the same parts. This arrangement also gives good results and in some localities may be more selective than the first mentioned circuit.

Both these drawings show Midget Semi-Fixed Detector No. D-125.

Cutaway view of "Melody King" Crystal Set showing simplicity of construction. This set uses the circuit shown in MK-1.

### INSTRUCTION SHEET NO. IS-2



This very complete instruction sheet covering installation of Crystal Sets available printed on heavy paper, size 3 by 3 inches.

## Installation Suggestions for Simple Crystal Radio Sets

Since a Crystal Radio uses no tubes or batteries and is dependent for its operation upon the signal transmitted by the Broadcasting Station, it is necessary that care be exercised in installing so as to take full advantage of the received signal.

### AERIAL

For best results and especially when distant reception is desired, the aerial should be as high as possible (40 feet or more) and from 100 to 200 feet long. Before proceeding with the erection of aerial, study the various locations available. If possible run your aerial in the direction of station you are most anxious to receive. Keep in mind the location of set in the house so that lead-in wire can be easily run to a window near the set. Be sure to do the work in a workmanlike manner and remember that the aerial wire is sometimes subjected to severe strains.

After selecting the location cut the aerial wire to a length equal to the straightaway length desired. Fasten the insulators to each end. To the other end of insulators fasten lengths of wire necessary to fasten the anchorages. Before hoisting the wire in place, strip six inches of insulation from lead-in wire and securely twist around aerial wire. Best connection is made by soldering. If a tree is used at either end of aerial for support the insulator should be placed beyond branches and it's well to insert a spring between insulator and tree to accommodate for sway of tree.

Bring the insulated lead-in wire down to the window, fastening to the house at intervals by means of nail-it knobs. Place a window lead-in strip under the sash, strip the insulation from end of lead-in wire and fasten it to outside end of strip. The unused portion of lead-in wire can be used to connect the inside terminal of strip to set.

### GROUND

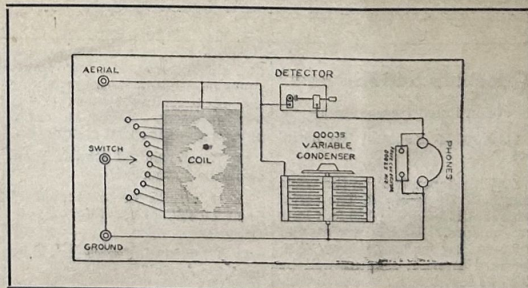
As a good ground connection is very important, too much care cannot be taken to assure this being satisfactory. Attach wire by means of clamp to water pipe or rod driven several feet in moist earth. Best ground is made by soldering wire to old copper boiler or auto radiator and burying this in several feet of moist soil. Sometimes several rods spaced several feet apart and connected together will improve reception. Use insulated copper wire (stranded preferred) and run as direct to set as possible.

(Continued on page 4)

# CRYSTAL SET No. 3

For those who desire a more elaborate and efficient set we recommend the set described below. These instructions should enable you to make a very satisfactory set and one which under favorable conditions will receive programs from stations a considerable distance away.

If you will follow the hook-up carefully no difficulty should be encountered either in making or installing the set. A cigar box may be used to house the parts and if stained or painted will make a very attractive case. Best connections are made by soldering. If this is not convenient be sure to twist the wire together securely. In either case the insulation must be removed at point of connection. Sandpaper or scrape enamel until bright copper shows.



Circuit Diagram for Set No. 3

The COIL can be wound on any convenient form. We recommend using a paper tube 3 inches in diameter by 4 or 5 inches long. Wind with 55 turns No. 24 enamel wire, single layer, and tap at every fifth turn to switch points. Length of coil wire may be varied and spacing of taps may be changed. You will find by experience the best combination for stations you wish to receive. Size of wire is not of great importance and if you have different size wire on hand this may be used. Brackets may be used to mount the coil either in an upright or lengthwise position. If you have a different capacity Variable Condenser on hand it will no doubt give good results, at least it will pay you to give it a trial. Phone Condenser is not absolutely necessary, but sometimes will improve reception.

