SHORT WAVE RADIO
Quiz Book and KINKS

LONG BOLT
4-PRONG SOCKET
DRILL HOLES FOR LEADS
4-PRONG TUBE BASE
NUT

0.25-MF, 400V
CONDENSERS

GND.
ONE LAYER
N9 14 OR 16 ENAM.
COPPER WIRE
TO POWER TRANS
IN PWR SUPPLY
110V AC →

GLASS DRAWER KNOB
LOCK NUTS
COIL FORM
LONG BOLT

100 QUESTIONS
AND ANSWERS
50 SHORT-WAVE KINKS

Lindsay Publications Inc.
S-W Radio Quiz Book and KINKS

Answers to Hundreds of S-W Questions and Problems

Short-Wave Receivers, Transmitters, Boosters, Pre-Amplifiers, Battery Sets, A. C. Sets, A. C. - D. C. Sets, Antennas, Converters, 5-Meter Sets, Power Supplies, Audio Amplifiers, Beat Oscillators, Code Practice Oscillators

PUBLISHED BY

SHORT WAVE AND TELEVISION

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PREFACE

The editors have tried to make this S-W-Radio Quiz Book a veritable gold-mine of information. Not only will the short-wave "fan" find answers to practically all of his questions on set-building and trouble shooting, but the "ham" has also been liberally provided for. Transmitter descriptions have been included as well as data on code-practice oscillators, and other auxiliary apparatus which the radio amateur frequently desires data on.

Dozens of short-wave Kinks for both "fans" and "hams" have been included and all in all, we are sure that every radio experimenter will find this book most valuable.—The Editors.

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S-W Receivers for 110 Vt. A. C. Operation

2-TUBE DIAGRAM
Walter Newton, St. Louis, Mo.
(Q) I would like to have a circuit diagram of two type 27 tubes in a receiver. One tube used as a detector and another as an audio amplifier. This is for A.C. operation, using a filament transformer; would you please print this in your Question Box?

(A) In the diagram shown employing two type 27 tubes, the heater voltage is furnished by a 2 ½-volt filament transformer. The B voltage may be supplied either by batteries or a B eliminator.

An eliminator delivering anywhere from 180 to 250 volts should be satisfactory. Of course, the "hum level" should be low, and this means that good filtering must be effected. Some of the older eliminators produced considerable hum.

WHAT VOLTAGE?
J. Cadone, Marshfield, Oregon.
(Q) Will you please tell me what the proper voltage would be for the plate of a 1-tube receiver employing a 6C5 tube?

(A) Normally, we would recommend about 65 volts on the plate. However, you may experiment with various voltages between 22½ and 45 in order to ascertain the particular voltage which will give the best results.

SEPARATE REGENERATION DETECTOR
Charles Braun, Rochester, N.Y.
(Q) I have become interested in the idea of using a separate regeneration stage and would appreciate it very much if you would show a diagram in your Question Box employing two type 27 tubes— one as a detector and the other for regeneration.

(A) The diagram shows a 27 detector and another 27 used as a "feed-back" tube. Smooth control of regeneration is obtained with this circuit. The transformer marked A.F.T. is connected to the usual audio amplifier.

TUNABLE HUM
Norman Keller, Knoxville, Tenn.
(Q) I am using a well filtered power supply in my short-wave receiver and still I experience hum, although this hum is not present in all parts of the short-wave band, but it seems that the hum is heard on just the bands in which I wish to receive. Adding filter condensers and choke to the power-supply does not help matters. Can this hum be eliminated?

(A) We suggest connecting .002 mf. condensers between the filament and the 2 plates of the 90 rectifier tube. Also, connect a similar condenser from each leg of the heater in the regenerative detector tube to the "B" minus.

T.R.F. WITH METAL TUBES
Chester Donson, Camden, N.J.
(Q) I have noted a number of excellent circuit arrangements in past issues of the Question Box. however most of them employ glass type tubes. I would like to build a receiver of the tuned R.F. variety, employing metal tubes. Will you kindly recommend a circuit in the coming issue of the Question Box.

I prefer one stage of tuned R.F. regenerative detector and one stage of audio.

(A) Any of the circuits published in previous issues of the Question Box may be used with metal tubes with no changes in the circuit values. It is only necessary to choose the metal equivalents to the glass type tubes. Our method of showing the tube symbols includes both the physical arrangement showing the prongs of the sockets and also the tube element symbols. When employing glass tubes disregard the socket connections around the outside of the tube symbol. For your benefit, and for those who wish to build a similar set we are printing the diagram.
3 TUBER
Malcom Stetell, Caldwell, N. J.
(Q) Will you please publish a diagram of a 57, 66, and 2A5 using either resistance or impedance coupling between the 57 and 66?
(A) The diagram requested is given here. Resistance coupling is shown, although the plate resistor of the 57 may be replaced with a high impedance A.F. choke. Something in the order of 600 to 1,000 henries will be entirely satisfactory.

2A5 and 2A6 as detector and two audios.

3-TUBE RECEIVER
Seymour Levine, N-Y.
(Q) I built a one-tube receiver using a 66 as a radio frequency amplifier, a 57 as regenerative detector, and a 2A6 audio amplifier. I would appreciate it very much if you would print the diagram showing the proper connections and the values of all parts required.
(A) The diagram using 57, 66, and 2A6 is shown. This set will operate a speaker on some of the stronger stations, but for full speaker volume the 57 should be connected to the 2A5 and the 57 detector.

RECEIVER QRM
A SWL, Wollaston, Mass.
(Q) I built a one-tube regenerative receiver using a 93-tube. I find that this set has a fierce output, audible for at least eight miles. The QRM was so noticeable that the "Ham" enquired by it notified the F. C. C. in Boston. When I found out how serious this was and that the set acted so, I tore it down and I will build a set that runs these tunes. Please print this in your magazine so that the innocent listeners will not get into hot water with the Radio Inspectors. Please give some causes for the terrific output parasitic regenerative circuits.

AMPLIFIER FOR METAL TUBE 2
Rodie Hartel, Comfort, Texas.
(Q) I would greatly appreciate it if you would print a diagram of a 6K7 R.F. amplifier which can be added to the "Metal Tube 1" receiver, described in the September issue of Short Wave Craft. This should use standard 6-prong...
2-TUBER
James Gregg, Chicago, Ill.

(Q) I would like to build a 2-tube receiver employing type 56 tubes. I would like to control regeneration with a variable condenser and have the A.F. amplifier resistance-coupled to the detector. Would you kindly print the diagram?

(A) The diagram requested is shown and regeneration is controlled by a 140 mmf. condenser. If you wish to incorporate "bandspread" in this receiver, merely connect a 25 mmf. condenser in parallel with the 140 mmf. grid tuning condenser and use the smaller condenser for tuning.

Circuit for a 2-tube S.W. receiver built around 56 tubes.

GETTING VERIS

(Q) Just how do I go about obtaining verification cards in order to enter the trophy contest?

(A) Merely make a note of the time, data and character of the program received. This, together with an International Postal Reply coupon should be sent to the station together with a request for verification.

2-TUBE HAM RECEIVER
Richard Lawrence, Kingston, Mass.

(Q) I would like to build a "Ham" receiver consisting of two tubes of the 6.3 volt variety. Would you please print the diagram showing "electron" coupling? I would also like "bandspread" and a potentiometer for regeneration control.

(A) We have shown the diagram and it employs a 6C6 and a 76 for 6.3-volt operation. By employing a 57 and a 56 you may use a 2.6-volt heater supply. Standard coil data may be employed.

However, the tickler should be reduced to three or four turns for the large coils (low freq.), and to two or three for the high frequency coil.

2-PENTODE BAND-SPREAD RECEIVER
John Sundstrom, Kansas City, Mo.

(Q) Please print the diagram of a 2-tube band-spread receiver employing pentode tubes, plug-in coils, and screen-grid regeneration control.

(A) The diagram shown illustrates a 51 pentode detector and a 2A5 pentode audio amplifier. This combination works out exceptionally well and is probably one of the most popular of the simple short-wave receivers. Band-spread is accomplished by connecting a 35 mmf. condenser in parallel with the main tuning condenser. Band-spread tuning is, of course, done with the smaller condenser.

3-TUBE DIAGRAM
Ralph Hadley, Dryden, Ont., Can.


(A) We have shown a diagram using a 65 as a T.R.F. amplifier ahead of a 67 regenerative detector which, in turn, is resistance coupled to a 56 audio amplifier. Coil data for this receiver may be found in the August, 1936 issue of the Question Box.

INSTALLING AN "R" METER
Francis Mulkern, Norwood, Mass.

(Q) Will you please tell me through your Question Box, how I am to add an "R" meter to a 3-tube regenerative receiver?

(A) An "R" meter cannot successfully be used in conjunction with such a simple receiver. You will find an "R" meter in the more elaborate superheterodyne.

A "Ham" receiver, using a 6C6 and a 76. It has Band-spread and electron-coupling.
Regenerative E.C. Detector and 1 Stage of Audio

2-TUBER WITH E.C. DETECTOR

Chas. Mourmouris, Denver, Colo.

(Q). Would you be kind enough to print in the forthcoming Question Box a circuit diagram of a receiver, using a 25 as an electron-coupled detector, and a 68 as a resistance-coupled audio. I would like to tune this set with 3 winding coils and a 150 mmf. variable condenser.

(A). In the diagram of the 5-tube receiver which we have illustrated, regeneration is controlled by the usual 50,000 ohm screen-grid resistor. The coils for this receiver can be constructed identical to the usual short-wave coils of the 4-prong, 3-winding variety, except that the grid coil should be tapped for the cathode connection. For the coils from 100 to 200 meters, this tap should include about 2 turns; from 10 to 100 meters, 1 turn; and from 10 to 25 meters, ½ turn and from 10 to ½ turn for coils from 10 to 25 meters. For band-spread connect a 35 mmf. condenser in parallel with the main tuning condenser.

T. R. F. receiver of the most popular design.

3-Tube T.R.F. Receiver for the Beginner

T.R.F. 3-TUBER

John Pellock, Singac, N. J.

(Q). I would like to build a T.R.F. receiver using a 25 r.f. stage, a 24 detector and a 27 audio amplifier. Please show the diagram in the Question Box employing 4-prong 3-winding coils.

(A). The diagram you request is shown on this page. Capacitive coupling between the T.R.F. and detector stages is employed in order that 4-prong coils may be used. Although we believe that more satisfactory results can be obtained with inductive coupling and 5-winding coils. This receiver should give satisfactory earphone volume.

B. C. INTERFERENCE

Jack Ericsson, Chicago, Ill.

(Q). I built the Doele 3-tube receiver which employs two 35's. When I use the 160 to 200 meter coil, all that I can receive is WJJD which operates on 500 kc. and when I tune, it comes in all around the dial. The set also has no regeneration. This set was designed for the Ham-marund coils, No. SWK-4. Will you please explain the reason why the set will not work.

(A). Undoubtedly the interference is due to too much winding between the antenna and grid of the detector tube. Regarding the regeneration. It is possible that the tickler connections may be reversed on this coil. Try reversing the tickler connections and reducing the antenna coupling capacity.

4-TUBE RESISTOR DIAGRAM

Charles Allen, Southington, Conn.

(Q). Please publish in the next issue of the Question Box a circuit for a "Ham" receiver using four 25 volt A.C. tubes. Two of them should be transformer-coupled in the audio amplifier. Also incorporate band-spread and 160 mmf. condensers.

(A). The diagram you request is shown and band-spread is accomplished by connecting 160 mmf. condensers in parallel with the large tuning condensers. We would not recommend transformer coupling.

as you are liable to run into considerable difficulties.

4-TUBE A.C. SET

John W. Smith, Baltimore, Md.

(Q). Would you be so kind as to illustrate a diagram in Short Wave and Television employing 4 tubes. This receiver should have a 58 tuned T.R.F. amplifier, a 57 regenerative detector and a 47 pentode power amplifier with an 80 in the power supply. Also show the connections for the power supply.

(A). We have shown a standard T.R.F. circuit; however, for loud-speaker operation, we believe there should be another audio amplifier, such as a 44, connected between the 47 and 44. This will enable you to obtain full speaker volume.
6C6-37—2 TUBER

Mr. Gerrano, San Leandro, Cal.
(Q) I have a set of 3 winding
plug-in coils covering a range of
from 17 to 500 meters. These are
6 prong coils. Kindly show a dia-
gram employing these coils with a
6C6 regenerative detector, resistance-
coupled to a 81 audio amplifier. Re-
generation in the detector stage
should be controlled with a 50,000
ohm potentiometer.
(A) We have shown the dia-
gram you request and have indi-
cated the separate winding which
has 3 connections on the coil base,
employed as the tickler. The re-
mainning end of winding which is
connected with the secondary is
shown employed as an antenna
coupling coil. A 100 mmf. variable
condenser is necessary in the an-
tenna circuit for the elimination
of “come-spots.”

2-Tube Receiver Using Pentode and Triode

WEAK SIGNALS ON SUPERHET

Richard Lindauer, Belleville, Ill.
(Q) I have constructed a 6-tube
superheterodyne but it is sensitive
only on one set of plug-in coils. On
the other coils I receive only one or
two stations very weakly. What do
you think is the trouble?
(A) We suggest that you look
for your trouble in the plug-in coils.
From what you state, it would seem
that these coils do not give satis-
factory performance and are not
tuning properly. You will find with
a superbet the oscillator coils should
have slightly less turns than the
detector coils, unless you have a very
large padder on the detector which
will permit constant readjustment
as the set is tuned.

R. F. DETECTOR CIRCUIT

Conrad Fowler, Phila., Penn.
(Q) Will you please print a dia-
gram in the Question Box of a short-
wave receiver having one stage of
R.F. and a detector which could be
employed with the audio amplifier
which I already have. The tubes
3 tube with type 45
output amplifier.

K.F. and a detector which could be
employed with the audio amplifier
which I already have. The tubes
rest that you use a type 35 in the
R. F. stage rather than the 24.
“Band-spread” is also indicated and
is accomplished by connecting two
30 mmf. condensers in parallel with
the largest tuning condensers.

S-W RECEIVER WITH
45 AMPLIFIER

E. C. Richards, Edmonton, Alta.,
Canada.
(Q) Please show a diagram in
the Question Box of a receiver us-
ing three tubes. I have a 24, 27,
and a 45 tube. Would these three
tubes make a good set?
(A) We have shown the diagram
requested in your letter, and it em-
ploys a type 45 in the output tube.
The 48 is noted for good quality
but has exceptionally low amplifi-
ation, and power output. In the av-
average regenerative receiver quality
should not really be important, and
the use of a pentode such as a 2A3.

R.F. and detector stages for a short-wave receiver.
Abel used power and 'fectly trouble shown and start and believe aiming nest est if wish in Sam 2 57, wish to build an all-electric receiver and believe this would be the best to start with.

(A) The complete diagram is shown and you should have no trouble in getting it to operate perfectly at the first try, if diagrams and connections are followed. This power-supply shown may also be used with a 14-2A5 amplifier shown elsewhere on this page.

2-TUBE "HAM" RECEIVER

Sam Rotondo, Manayunk, Pa.
(Q) I am very much interested in receiving amateur stations and wish to construct the best possible 2-tube receiver. I will appreciate it very much if you publish the diagram in one of the coming issues of the Question Box, also furnish the coil data.

(A) Undoubtedly the most popular receiver for the embryo ham consists of a screen-grid regenerative detector and a single stage of audio amplification. Of course, in the crowded ham bands a receiver must have bandspread. As the diagram shows this is accomplished by connecting a 20 or 56 mmf, variable condenser in parallel with the 146 mmf, tuning condenser. The large condenser is used for bandsetting, while the smaller one actually does the tuning. Coil data for this receiver can be found elsewhere in these pages.

57, 56, 80 SHORT-WAVE RECEIVER

Abel Martinez, New Orleans, La.
(Q) I would be very much obliged if you would print a diagram in the next issue of the Question Box consisting of a 2-tube receiver employing a 57, 56 and type 80. I would like to build an all-electric receiver and believe this would be the best to start with.

(A) The complete diagram is shown and you should have no trouble in getting it to operate perfectly at the first try, if diagrams and connections are followed. This power-supply shown may also be used with a 14-2A5 amplifier shown elsewhere on this page.

IMPROVING THE "DOERLE"

(Q) I have constructed the "Doerle" receiver using a 57 and a 2A5. However, I would like to obtain more volume, and would appreciate it very much if you would print a diagram of the same receiver using a 51, 56, and 2A5. I would also like to know if this receiver would be satisfactory for 10-meter operation.

(A) We have shown the Doerle circuit with the addition of a "56" first stage of audio amplification, but we do not think that you will obtain very good results on 10 meters. Past experiences have shown that a good super-heterodyne is necessary on the 10-meter band, unless you are only interested in local police calls, etc.

COMPLETE A.C. OPERATED RECEIVER

N. L. Leitch, N.S. Pittsburgh, Pa.
(Q) I have been a reader of your wonderful magazine, Short Wave & Television for two years, and also have a copy of your Short Wave Guide which I find very useful and interesting. I have a question to ask and hope you can help me. Will you publish a diagram using Hammarlund 6-prong coils and employing two 56's, one 38, and one rectifying tube. Thanks.

(A) The complete A.C. operated receiver as requested in your letter is shown in one of the diagrams on this page. This should give excellent performance and other experimenters who are interested in building a good short-wave receiver of simple design may well follow the layout provided.

Diagram of 2-tube set using 57, 56, and 2A5.

Complete A.C. receiver using 6.3 V. tubes.

2-Tube Set For The "HAM"
A. C. - D. C. Receivers

12A7 provides a 1-tube A.C.-D.C. receiver.

1-TUBE A.C.-D.C. SET
Arden Preer, Ancon, C.Z.

(Q) I would like to build a simple 1-tube receiver of the A.C.-D.C. variety and employing a 12A7 tube. I also desire to control regeneration with a 50,000 ohm potentiometer. I would appreciate it if you would publish the diagram in the Question Box.

(A) We have shown the diagram of the single 12A7 used as a rectifier and screen-grid detector, and excellent results may be obtained. However, there is most certainly going to be some hum in the earphone which cannot be eliminated.

USING PROPER TUBES
G. F. Moritz, Toronto, Ont., Can.

(Q) In past issues of Short Wave Craft I have seen many diagrams of A.C.-D.C. receivers using type 6J, 7B, or 6E6 tubes. I would like to use 3½ volt tubes in an A.C.-D.C. linew.

(A) We do not recommend 3½ volt tubes be employed in A.C.-D.C. circuits. The proper tubes to use are shown in the diagrams and we recommend that you adhere to those recommended.

4-TUBE A.C.-D.C. SET
Ray Murray, St. Marys, Kan.

(Q) I am confused in your Question Box a diagram of a 4-tube set using the following tubes: 6CS, regenerative detector; 5T, audio; 55, output; and 1228, rectifier. I would like to use transformer coupling between the 6CS and the 5T, and resistance coupling between the 5T and the 55.

(A) We have shown the diagram of the 4 tubes mentioned in your letter. However, we recommend resistance coupling between the detector and first audio stage. If you wish to employ the transformer, we suggest that you use only the secondary and connect it in place of resistor "R" in the sketch.

3 EQUALS 4 RECEIVER
Fred Elias, Reedley, Calif.

(Q) I would like to build an A.C.-D.C. receiver employing a 6F7, a 4A, and a 5Z2A. This receiver should be capable of operating a good magnetic speaker and operate on either A.C. or D.C. power lines.

(A) In the diagram shown the 6F7 functions as a regenerative screen-grid detector with the regeneration controlled by varying the screen-grid voltage. The triode portion of the 6F7 serves as the first audio amplifier and a 4A used in the output stage. This receiver will operate a magnetic speaker fairly well on signals of moderate strength.

VOLUME CONTROL
Hans Martin, B’klyn, N. Y.

(Q) I would like to know where I could connect a volume control to a 1-tube receiver.

(A) We do not believe a volume control is necessary on a 1-tube set, for remember a volume control only cuts volume down from the maximum obtainable amount, and does not increase volume. In other words, a volume control is merely an attenuator.

CHANGING TUBES
C. A. Deane, Jr., Marshfield, Ore.

(Q) In your August, 1936, issue of Short Wave Craft on page 236, you described a receiver using two 2A7s. I would like to know if type 37A’s or 76’s could be used, providing proper heating voltage is applied.

(A) Most certainly any of the heater tubes may be used in the circuit mentioned in your question, and no changes will be necessary in values or circuit connections.
A.C.-D.C. POWER-SUPPLY

Richard Watson, New York City.

(Q.) I would like to build an A.C.-D.C. power-supply delivering somewhere around 188 volts, also with various low voltage taps. Would you be kind enough to print a diagram of such a unit; the main idea is to reduce hum as much as possible.

(A.) The diagram of the A.C.-D.C. circuit employing a 2525 rectifier tube is shown. The filter system consists of two 6 henry filter chokes, the current carrying capacity of which will depend upon the number of tubes you intend to operate from the power supply. The voltage divider and bleeder can be any type of tapped resistor; one having 10,000 ohms and a 20 volt rating, with 5 sliders should work satisfactorily. The taps should be adjusted with the aid of a voltmeter for desired voltage. Of course, these taps should be adjusted unloaded.

In receivers where adequate bypass condensers are not connected across the various input voltage terminals and the common, "B" negative, it is advisable to by-pass each one of the taps on the voltage divider with an 8 mf electrolytic condenser.

A.C.-D.C. PRE-SELECTOR

W. E. Skutt, B'lyn, N.Y.

(Q.) Kindly print a diagram of a 6-tube pre-selector using two 6D's and a 6A6 as a rectifier. This should be a self-powered amplifier which may be connected to the input terminals and ground posts of any short-wave receiver.

(A.) A 2-stage pre-selector of this type will present a tremendous increase in sensitivity. As shown, the two tuning condensers are operated separately. If they are staggered, then a trimming condenser having a capacity of around 50 mmf. should be connected across the 160 mmf tuning condenser in the first stage. That is the stage immediately following the antenna.

2-TUBE A.C.-D.C. RECEIVER

Oscar Jaime, Havana, Cuba.

(Q.) I have benefitted considerably from the various material published in the Question Box, and would like to see printed a diagram of a 2-tube A.C.-D.C. receiver employing a 637 regenerative detector, a 12A7 rectifier, and a 26Z6 tube. The coils should be of the 4-prong variety with only one tuning condenser.

(A.) We are glad you like the Question Box, and hope it will continue to be of benefit. What is your question?
Battery Type

S-W RECEIVERS

The "Prof-Doerle"—An Excellent 2-Tuber.

THE "PROF DOERLE"
Edwin L. Rowland, Brooklyn, N.Y.
(Q.) Could you furnish a diagram of the new Doerle 2-tube set using a 30 and a 19? Also I would like to know if another 38 could be added to increase the volume.
(A.) We have shown a diagram of the "Prof. Doerle" receiver using 30 detector and a 19 as two stages of audio amplification. We do not recommend that a type 33 receiver be added to the receiver as shown, because there would be entirely too much audio gain and a great possibility of feedback and motor-boating. If you desire to change the audio amplifier, we would advise substituting a 30 for the 19 so that the result will be only 2 stages of audio amplification. This will give you more satisfactory results.

A SIMPLE 2-TUBER
Harry Campbell, Portland, Me.
(Q.) Would you please print a diagram for a 2-tube receiver similar to the Globe Trotter. I would also like to have the list of parts, together with their values. This receiver is to be battery-operated and should employ two type 38 tubes.
(A.) We have shown a circuit diagram of a conventional 2-tube battery set. This would require two 1 1/2-volt dry cells for the filament supply and two 45-volt batteries for the plate supply. While the single 45-volt battery may be used, better results will be obtained with 90 volts applied to the plate of the amplifier tube.

TOO MUCH INTERFERENCE
A Bodnar, Hopewell, New Jersey.
(Q.) I have a 2-tube radio which gives satisfactory results except for the fact that I experience considerable interference in the broadcast band. For instance, WQR, WJZ, WABC, can be heard all at the same time. Could you please tell me how I might overcome this difficulty?
(A.) In the first place, there is not enough inherent selectivity in a 3-tube set for operation on the broadcast band where powerful stations are operating. You might try using a short piece of wire only four or five feet long in place of the regular antenna. Remember that it takes a good superheterodyne to cope with the powerful local stations of the broadcast band.

PENTODE AMPLIFIER
Joseph Folland, Weldon, Sask.
(Q.) I have recently constructed the 5-tube receiver using type 38 tubes and have obtained excellent results with it. However, I now desire to add a 38 pentode amplifier, in order to obtain speaker volume. Will you kindly print a diagram showing transformer coupling?
(A.) We have shown the diagram and have correctly marked the various terminals. The two primary connections of the transformer connect to the phone posts of your present receiver. The terminal marked "P" on the transformer should go to the plate of the first audio amplifier, while the other terminal marked "B" will go to the plate supply lead.

1 TUBER
Wm. Fuller, Pittsburgh, Penn.
(Q.) In order to get started in short-wave reception kindly illustrate in the form of a diagram how the type 30 tube can be employed.
(A.) We have shown the diagram of a 1-tube receiver employing a type 30. This will serve as an excellent starter.
A 3-tube battery receiver, using two 32's and a 30 type tube.

3-TUBE BATTERY OPERATED RECEIVER
Clay Boborh, Alexandria, Ind.
(Q) Would you please print a diagram of a receiver employing a 32 untuned R.F. amplifier, a 32 regenerative detector employing two winding coils, and a 30 resistance-coupled audio amplifier. Also show the regeneration control as a 60,000-ohm potentiometer.

(A) We have shown the diagram with the R.F. stage tuned. However, the grid coil may be replaced by a 2.5 mh. R.F. choke and the antenna connected directly to the grid, eliminating the 140 mmf. tuning condenser. A resistor having a value somewhere between 10 and 50,000 ohms may also be used in place of the choke. We recommend, though, that the R.F. stage be tuned, because considerable interference from powerful local stations may be encountered with the "untuned" affair. Also, a switch is incorporated in series with the 50,000-ohm regeneration control, so that there will be no drain on the battery when the set is not in use.

METAL TUBE 1-TUBER
George McEvenue, Ontario, Canada
(Q) I contemplate building a receiver using one metal tube. I do not know just which type tube will give best performance, and I trust that you will publish the necessary information in the coming issue of the "Question Box."

(A) There are two tubes which will serve very nicely as a regenerative detector when working into a pair of earphones. They are the 6F6 and the 6C5. The 6F6 is the high-mu tube, and the 6C5 is the low-mu tube. Regeneration is controlled by a 140 mmf. throttle condenser.

1-tube receiver using a 6C5 or 6F7 metal tube.

BOOSTER FOR BATTERY SET
Paul MacArthur, Toledo, Ohio.
(Q) I have a battery type receiver which performs excellently. However, I would like to boost the weaker signals so that they could be more comfortably distinguished. Would you please tell me how this can be done? I have been informed that another tube may be added. Also, will this increase the selectivity?

(A) We have shown a diagram of a type 34. This may be employed as a tuned R.F. booster stage for your receiver. While this will increase the sensitivity considerably, we doubt if it will effect the apparent selectivity. It might be advisable to incorporate a small variable condenser in series with the antenna connected to this stage.

TYPE 19 AS 2-TUBE RECEIVER
Harry M. McKirdy, Whiteland, Mont.
(Q) Would you please print a diagram of a short-wave receiver employing a type 19, 2-volt tube. Since reading Short Wave & Television, I have built 17 short-wave sets, 1- to 4-tube battery receivers, and have had fine results with my three Dakota and one Canadian receiver now in use. Have pulled in most of the regular foreign stations on my speaker with fair signal strength. Here's to Short Wave & Television and many more good sets.

(A) We have shown the circuit diagram of a 19 used as a regenerative detector and one stage of audio amplification. Resistance coupling is employed. The plate voltage, which seems to work out best is 80 volts. For low voltages it may be found necessary to use transformer coupling between the two stages.

PORTABLE USING NEW LOW DRAIN TUBES
John Hannafan, Brooklyn, N. Y.
(Q) I would like to build a 2-tube portable receiver employing the new RK-42 1.5 volt battery tubes and 90 volts of midget B batteries. Would you kindly print the diagram, showing plug-in coils and a throttle condenser for regeneration control?

(A) The advent of the RK-42 tube greatly simplifies portable receivers considerably. As an example, only one dry cell (1.5 volts at .06 amp.) is needed. The circuit diagram is conventional in all respects and if properly constructed together with the use of standard low-loss parts, excellent results will be obtained. We would suggest building the receiver in a small metal box; this greatly simplifies construction and tends to minimize hand-capacity effects.
A GOOD BATTERY SET
Lee Kaleski, West Union, W.Va.

(Q) I would like to have you print at your convenience in the Question Box, a diagram of a 15 tuned R.F. amplifier, type 80 detector, and a 2A pentode audio amplifier. The set should use 4-prong plug-in coils and 160 mmf. tuning condensers.

(A) We have shown the diagram you request. A fixed bias of 1.5 volts is applied to the grid of the 15 R.F. amplifier. A single filament dry cell will serve satisfactorily as bias and last a long time. Regeneration in the detector stage is controlled by a variable condenser.

STATIONARY SET USING OLD-STYLE TUBES
D. S. Miller, Jr., Altoona, Pa.

(Q) I would like to use the type 27, 26, and 71A tubes in a short-wave receiver. I have the necessary power pack and would like very much to have you print the diagram.

(A) We are printing a diagram of a 27 regenerative detector, a 26 first audio amplifier, and a 71A second audio amplifier. Excellent results should be expected from this receiver.

POCKET SET
Allen Clark, N.S.W., Australia.

(Q) I have read much comment on the 1-tube pocket set described in the December, 1934 issue. However, I have been unable to obtain that issue and would be pleased if you would print the diagram in your "Question Box."

(A) The 1-tube pocket receiver was very popular among our readers and excellent results have been obtained with this receiver.

CONVERTING R.C. RECEIVER

(Q) Would you please publish the information on how to convert 6-tube midget electric receiver into a long and short-wave set.

(A) As stated many times before in the Question Box, we do not advocate that fans or experimenters attempt to remodel broadcast receivers in order to obtain short wave reception. It is a most unprofitable proposition and in many cases the results will be entirely unsatisfactory. The best arrangement will be, of course, to build a short-wave receiver following the designs found in past issues of this magazine. Or you may build a converter, many of which have been also illustrated in the Question Box.

M.T. TUBE AMPLIFIER
John Ross, W. Toledo, Ohio

(Q) I built the 2-tube metal receiver described by Harry D. Hocking on Page 718 of the April, 1935 issue, and would now like to add a pentode amplifier using a metal tube. Please publish the diagram in the "Question Box."

(A) The addition of a 6F6 pentode amplifier to the 2-tube receiver should be profitable under taking in so far as results are concerned. The diagram is clearly shown. The two input terminals of the amplifier connect to the earphone posts of the 2-tube set.

Employing the type 15 as an R.F. amplifier in a battery set.

2-TUBE WITH 3-WINDING COILS
W. B. Anderson, Fernie, B.C.

(Q) Will you please print in a future issue of the Question Box a diagram of a receiver employing two type 26 tubes, with Hammarlund 3-winding plug-in coils.

(A) The diagram we have shown is conventional and the primary winding, that is the coil which is interwound with the grid coil, is employed for antenna coupling. In addition, we must employ a small variable condenser in series with the antenna, because the unwound coil provides too much antenna coupling.

The famous pocket set.

2-Tube Battery Set With 3-Winding Coils

www.americanradiohistory.com
2-tube receiver using 6C6 and 32 tubes.

6.3-VOLT SHORT-WAVE RECEIVER
Edward Daniels, Rochester, N.Y.

(Q) I would like to have you publish a diagram of a 2-tube 6.3-volt receiver using a 6C6 and a 6F.

Regeneration should be controlled by a potentiometer in the detector stage.

We have shown the diagram you request and the 60,000-ohm potentiometer controls regeneration by varying the screen-grid voltage. This set can be used with a 6-volt storage battery and "B" batteries for the plate supply.

RE: THREE TUBE DOERLE
Ted Kuhlt, Cleveland, Ohio

(Q) In regard to the improved 3-tube Doerle battery set, please tell me the reason for its tinuteness of operation. Also, may an A.C. power supply be used for the plate voltages of the receiver?

(A) Usually the battery set when operated from high-grade batteries is quiet because of the lack of disturbances usually communicated to the set through the power line. B batteries may be eliminated through the use of the so-called B-eliminator, which is really a power-supply intended to supply only the plate voltages.

2-TUBE DX'er
Kaye Palmer, New York City.

(Q) Would you please reprint the diagram of the 2-tube DX'er which was described in the July, 1934 issue of Short Wave Craft?

(A) The diagram of the "2-tube DX'er" is shown herewith. Regeneration is controlled by a 50,000 ohm variable resistor connected across the tickler winding. It may be well to experiment with the plate voltage applied to the detector inasmuch as some tubes may require different voltages. The voltage giving smoothest control of regeneration should be employed.

6.3V. 3-TUBER
Ham Reader, New York City.

(Q) Please print a diagram of a 2-tube T.R.F. receiver using a 6D8, 6C8, and 78. This should have electron coupling in both the R.F. and detector stages. Also, what size band-spread condensers should be used for 6-meter amateur work?

(A) We presume that by electron coupling in both stages you mean to employ regeneration in the r.f. stage. The diagram shows how this is accomplished. It will require two regeneration control potentiometers for proper results. We recommend a 20 mmf. condenser shunted across the 160 mmf. condenser. The smaller condensers are used for band spread tuning.

3-tube receiver using 6J tubes

RECEIVER FOR MOTORCYCLE
W. J. Rogers, Toronto, Ont., Canada.

(Q) I would like to know if I could get a diagram of a short-wave receiver which could be operated on a motorcycle, so as to pick up police calls. It should not be too expensive or bulky.

(A) Anyone of the many short-wave receivers described in past issues of Short Wave Craft may be used in conjunction with a motorcycle. However, we might add a word of warning—it is possible that local ordinances may prohibit the use of such a "police call" receiver. In the U.S. many municipalities have such laws and they probably exist in Canada as well.

It is well to look into this matter and avoid being lodged in the local boosow.

Two-Tube Battery set using a 30 and 33.

2-TUBE BATTERY SET
Raymond Bonner, West Los Angeles, Cal.

(Q) Please print the circuit diagram of the Short-Wave receiver employing a 33 detector tube and a 33 amplifier. This should use from 45 to 90 volts B battery and standard plug-in cells. Regeneration should be controlled by a variable condenser.

(A) We have shown a diagram using 30 and 33. However, we have employed the 33 as the audio amplifier, not as the detector. Regeneration is controlled by the 140 mmf. condenser and standard plug-in cells may be used. Data for the coils can be found in the February issue of the Question Box.

The famous 2-tube DX'er
2-Tubes do the work of three in this receiver

2-TUBE BATTERY SET
Agustin Ramirez, Havana, Cuba.

(Q) I am a constant reader of Short Wave Craft, and would appreciate it if you would publish a diagram of a 2-tube receiver using a 19 and a 33. This should be resistance-coupled in the entire audio position with a regenerative detector using standard two winding coils.

(A) The diagram you request using a 19 and a 33 has been shown, and it should make an excellent battery type receiver. The 19 serves as a regenerative detector and first stage of audio amplification. The second audio stage uses a 33 pentode and sufficient volume should be obtained for a sensitive speaker.

2-TUBE BATTERY SET
Fred Stynthe, Biloji, Min.

(Q) Please print in the short wave Question Box a diagram of an "all-wave" 2-tube receiver using two type 30 tubes. I would like to have this tuned down to 10 meters.

(A) We have shown a diagram of a 2-tube battery-operated receiver. However, we do not believe very good results will be obtained on 10 meters. The usual run of small receivers of the ordinary regenerative type do not perform well on the shorter wavelengths because it is difficult to make them stable.

AMPLIFIER FOR 1-TUBE RECEIVER
Will Rogers, Minneapolis, Min.

(Q) If possible, I would like to add another tube, an audio amplifier, to the 1-tube receiver which I already have. This receiver uses a type 30 r: a detector. Would you

be kind enough to print the necessary wiring diagram?

(A) We are showing a diagram of a type 30 audio amplifier.

Type 30 audio amplifier.

of a type 30 which may be transformer-coupled to your present receiver. The primary terminals of the 3 to 1 audio transformer connect to the terminals of the 1-tube set, which were formerly used as the earphone connections. This should give a considerable increase in volume.

201A AMPLIFIER
David Tobins, Dayton, Ohio.

(Q) I have constructed a 1-tube battery receiver and would like to build a 1-stage audio amplifier for it using a 201A tube. Would you kindly print the necessary diagram in your Question Box?

(A) We have shown the diagram requested. The input terminal of the amplifier (the primary terminals of the transformer) should be connected to the phone terminals of your present receiver. Adding this stage of amplification should improve results considerably.

HOW TO GET VERIS
Andrew Stoker, Memphis, Tenn.

(Q) I notice each month that a great number of Short Wave Craft readers submit a large total of verification cards for the Trophy Contest. I would like to know how to get these verification cards from the foreign short-wave stations.

(A) Simply make a note of the time, date, and character of the program received and submit these to the station heard. Naturally, the stations require that you send the postage and therefore it is necessary to include an International Postal Reply Coupon which may be obtained from your local post office.

RECEIVER USING TWO 30's
S. Lipshtiz, New York, N.Y.

(Q) I would like to construct a set using two type 30 tubes, using 22 1/2 volts on the plates. Would you kindly print the diagram?

(A) The diagram you request is shown. However, we believe more satisfactory results would be obtained with 40 volts on the plates of the tubes and probably the set would be less critical in operation.
2-VOLT RECEIVER

Archie Fleming, B. B. Canada.

(Q) Would you please print in the Question Box a diagram of the "Ham" receiver using a type 32 and any other audio amplifier which will provide good volume. This should also have band-spread.

(A) The 32 and 33 combination should make an excellent receiver for the "Ham" who wants a simple battery-operated set. Band-spread in the regenerative detector circuit is accomplished with a 35 mmf condenser. Regeneration is controlled by a 50,000 ohm potentiometer.

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6F7 and 37 used as detector and two A.F.

2-TUBE SET USING 76's

J. Bailey, Pittsburgh, Pa.

(Q) Would you be kind enough to print a diagram of a short-wave receiver using one 76 as a detector, regenerative, of course, and another 76 as a transformer coupled audio amplifier. This should use regular two-winding plug-in coils which were illustrated in the January, 1938 "Question Box".

(A) The diagram you requested is given and it should make an excellent short-wave receiver. It is advisable to try different voltages on the plate of the detector in order to determine what voltage would give maximum sensitivity and smooth regeneration with the particular coils used.

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2-TUBE OSCILLODYNE

Selden James, Pflueg, Texas.

(Q) Please publish a diagram in the Question Box of the "1-tube Oscillodyne" which appeared in the April, 1933 issue of "Craftsman".

(A) We are again printing the diagram of the "Oscillodyne" and trust that our readers will save this hook-up because it is requested a great many times. The coil data for this receiver is as follows:

<table>
<thead>
<tr>
<th>Cell</th>
<th>Secondary</th>
<th>Tickler</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>33</td>
<td>36</td>
</tr>
</tbody>
</table>

These coils are close wound on tube bases with No. 84 D.S.C. wire and the spaces between the two coils is ¼ in. (Range covered 14 to 200 meters.)
SCREEN-GRID BATTERY SET

Francis Medon, Yonkers, N.Y.

(Q) Please print a diagram in your Question Box showing how to change a 30 detector to a 6J or 8J.

(A) We have shown in the diagram how the screen-grid type detector type tube is connected as a regenerative detector. It will be a simple matter to change your present receiver. We have also shown the secondary of the audio transformer used as a plate impedance for the detector. Of course this may be replaced with a 1/2 megohm resistor to conserve space.

3-TUBE RECEIVER DIAGRAM

Chas. Louetshner, Toledo, Ohio.

(Q) Would you please publish a diagram in the Short-Wave Question Box of the short-wave receiver using a 6D4, 76, and a 277. regeneration should be controlled with a 50,000-ohm potentiometer in the screen-grid circuit of the detector.

(A) The diagram you request is shown and the different type 6J volt tubes which may be used are clearly indicated in the diagram.

2-TUBE USING TYPE 30’s

Jack Morales, Perth Amboy, N.J.

(Q) I have two type 30 tubes and an audio transformer. Please be kind enough to show a circuit diagram using these parts. I would also like to use -00225 mf condensers with plug-in coils.

(A) We have shown the conventional diagram employing type 30 tubes. Transformer coupling is employed between the two stages and regeneration is controlled with 100 multi-turn variable condensers.

EFFECT OF SHIELDED BUILDING

J. C. Niu, Depp, Alta, Can.

(Q) A short-wave transmitter and receiver is to be placed in a building which has metal sheathing on both outside and inside. This building is near a grain elevator which is 25 feet tall. There should be lightning arresters. What effect will this have on transmitting and receiving conditions?

(A) So long as the transmitting and receiving antenna is sufficiently clear of all of the outside of the shielded building, there should be no ill effects. Off hand, we believe there will be a considerable advantage in having the transmitter and receiver located in the shielded building. With the proper antenna lead-in system, you should experience a minimum of man-made interference.

1-TUBE POCKET SET

Herbert Schmitt, Port Townsend, Wn.

(Q) I have read much about the 1-tube pocket set which was described in the December, 1954, issue of Short Wave Craft and would like to see the diagram in your Question Box, together with the coil data.

(A) The 1-tube pocket set you were so enthusiastic about is shown in the diagram. The coil data is as follows: 40-meter band-grid, 18 turns, tickler 16 turns, 85-meter band-grid, 10 turns, tickler 10. 19 meter band grid, 5. tickler 5.

Diagram of the famous “pocket set.”

ONE STAGE AMPLIFIER FOR BATTERY SET

J. W. Huson, Cristobel, C. A.

(A) The addition of the 88 pentode should be well worth while and should provide “speaker” operation with the receiver previously using only type 30’s. Either a magnetic or a permanent dynamic speaker may be used.

An Excellent Receiver for the Beginner

17
ANTENNAS

RESONANT ANTENNA FOR S W L
Arthur Squires, Paducah, Ky.
(Q) I would like to know if there is any way which I can design an antenna which would give satisfactory results on the 40-meter band, or in fact any short-wave band. If you can print such information in the Question Box, I believe a great number of readers would be grateful for it.

(A) Most assuredly, any one can construct an antenna which is resonant at some particular frequency and one which will give excellent results. The one shown in the diagram is a single wire Hertz antenna the length of course, is equal to 1/4 wavelength. To find its length in feet, multiply the desired wavelength in meters by 1.66. The feeder is tapped on to the antenna a short distance from the center of the antenna. This distance D, is equal to 14% of the total length of the antenna. As an example the 40 meter antenna would be 76.44 feet long, and the distance, D, would be 10.7 feet. The directional effect of the antenna is at right-angles to its plane and is bi-directional. The lead-in would be brought away from the antenna at right-angles to it, for a distance equal to 10%, of the length of the antenna. For those who concentrate their activities on a single band, this antenna should provide excellent results.

Receiving Antenna

L (Feet) x W (Meters) x 1.56
D = 14% x L

Lea-N

Link-Coupling Arrangement for Transmitting Antennas

transmitters described in this magazine. It consists of a 76 turn coil with 2 adjustable clips and a two-turn link directly in the center of the coil. This link is coupled by a twisted pair, to a similar link on the plate coil of the amplifier. Three condensers are employed, two in series with the feeders and one in parallel, thus permitting proper adjustment under almost any feeder condition.

SMALL SPACE ANTENNA
Paul Edison, Los Angeles, Calif.
(Q) I would like to build an efficient transmitting antenna, however, on the 80-60-20 meter bands I find that I do not have space for a good antenna. I have tried many variations but do not seem to get out well on 80 with them. Will you kindly help us with this problem.

(A) The solution of your problem is a simple one, providing you have at least 65 to 75 ft. of space available for an antenna. If you refer to the August 1936 issue, page 111, you will find described an antenna system which works out very well. It is a 60 meter half-wave doublet with "spaced" tuned feeders. Experience has proven that it works exceptionally well on 80 meters and, of course, on 40 it is a conventional half-wave doublet and on 20 meters it operates as two half waves in phase.

COUPLING THE DOUBLET TO S-W RECEIVERS
(Q) I have recently purchased material to construct a doublet antenna and would like to know just how I can couple this to my receiver. The present method of antenna coupling makes use of a small variable condenser. I would also like to know if an electrostatic shield should be used.

(A) Coupling a doublet to a short wave receiver is very simple. The coil at the end of the lead-in wires should consist of from 2 to 4 turns. This small coil should be coupled inductively to the B neg-
TRANSMITTING ANTENNA

R. Kobayashi, Honolulu, T. H.

(Q.) I recently received your copy of the Short Wave Guide. I became immediately interested in the simplest Ham transmitter using an 856 kc. tube described in it. However, I will appreciate it very much if you will print in the coming issue on the Question Box page, the type of, and the dimensions of a possible, of an antenna system to be operated on the 85-6 mc. band, to go with the above transmitter.

(a.) We have shown data for an antenna which will work very nicely with the 1-tube transmitter described in the Short Wave Guide. This is a single wire flat top with a single wire feeder. The dimensions are given in the drawing. The feeder should run at right-angles to the antenna and be at the same length as the antenna for distance equal to at least 3/4 of the length of the antenna. The total length of the lead-in is not critical.

TRANSMITTING ANTENNA

B. J. Morton, Marshall, N. C.

(Q.) I would appreciate your answering the following question in your Question Box in an early issue: I would like to know the dimensions of an antenna, single wire fed Hertz, using No. 8 solid copper wire. This antenna should operate near 8856 kc. Also give the size of wire to use for a feeder on this antenna.

(A.) For all general purposes it has been found that No. 15 or 14 solid copper wire is entirely satisfactory for an antenna both for receiving and transmitting, and it would seem that it would be a waste of money to use a very much heavier wire. A number of formulas have been given in various publications covering the construction of antennas, and also various methods for calculating the position of the single feeder. However, none for the latter are exact. For instance, the size of the wire, the height and various other conditions required some adjustment of the formula. For 8856 kc., an antenna would be given good results would consist of a single wire 182 feet long with the single feeder tapped 18 feet. 8 inches one side of the center of the antenna. We suggest that various positions for the feeder be tried within a range of 8 or 10 inches either side of the approximate position given. There should be no standing waves on the feeder when the proper point is located. This can be determined by the use of a Neon bulb moved along the feeder for a distance of one-quarter wave. No change in the brilliance of the bulb will be noticed under perfect conditions. The feeder should also be turned down from 180 degrees right angles for a distance of at least one-third the total length of the antenna.

A Tuned 8-W Aerial

MUCH has been written about the advantages of using an aerial for short-wave reception which resonates near the band to be received. The signal strength resulting from such a practice may be many times greater than those received on aperiodic antenna systems.

Obviously, an aerial system which is tuned over a wide range of frequencies would be a vast improvement over most of the aerials which are used for reception by amateur listeners.

Such an aerial was described in a recent issue of The Australasian Radio World (Sydney). It consisted of stranded aerial wire of a length of 76 ft. between points A and B in the accompanying sketch. The ground lead is as short as possible—Cl is 250 mm.; C is 500 mm.; L consists of 20 turns of 20 D.C.C. and L1 of 1 turn of 20 D.C.C. wire on a 1 in. diameter form. A space of % inch between coils is needed.

This aerial operates as follows: On the 49 meter band the aerial is used as a Hertian aerial, tuned by setting condenser C to minimum capacity and tuning to resonance with Cl. On the 31 meter band the aerial functions as a %-wave Marconi aerial by setting C to half capacity and tuning to resonance with Cl. On the 26 meter band the aerial is used also as a %-wave Marconi system by setting Cl to minimum and tuning with C. On the 19 meter broadcast band the tuning set-up is the same as for the 25 meter band.

A Noise-Reducing Aerial

THE aerial shown in the accompanying sketch is taken from a late issue of The Australasian Radio World (Sydney). It is described as a good aerial for densely populated localities and noisy areas where man-made static is bad.

Here's a clever noise-reducing type of aerial and one that should have a very good signal pick-up.

The aerial can be swung between two poles, trees or walls and if the lower end of the grid of wires is kept 16 ft. or more above the ground, the action is undisturbed. If necessary, the length and number of wires can be increased to suit the space available. Also, as the insulators at top and bottom of the "grid" are slipped on the rope or wire before putting the aerial in place it is advisable to add an extra insulator or two to enable the number of wires to be increased if required.

The transposition blocks should be spaced not less than 2 ft. apart. Should rope be used to support the "grid aerial," it is advisable to use weights as shown. The principal qualities of the system are that it provides an excellent signal-to-noise ratio, far better than that given by the ordinary "L" aerial.

A simple, yet effective tuned short-wave aerial system.

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Antenna Hints

A Clever Way to Tune the Doublet
In Fig. 3 we have an interesting suggestion made by George Shuart, W2AMN, for adjustable wavelength doublet and here the length of the wire in the lead-in sections adjacent to the doublet are made variable.

Another idea which may be employed for adjusting the wavelength response of the doublet, especially those of the "V" type, is to vary the length of the top of the "V" as shown in Fig. 4. As the legs of the "V" are closed up more and more as shown by the dotted lines, the wavelength response of the antenna is decreased.

Fig. 3—Adjustable doublet; 4—variable "V" doublet; 5—lead-in detail;

Doublet may be tuned to different frequencies by motor-winches, which is shown in Fig. 1. A push-button control may easily be arranged. Fig. 2 shows "revolving" doublet.

Each arm of the doublet in practice is adjusted to one-quarter of the wavelength of the incoming signal or the two halves are made equivalent to the half wavelength. One of the simplest ways of applying the motor-driven winches to an adjustable wavelength doublet, is to use balance weights as shown in Fig. 1. Either solid or stranded wire can be used and as the wire is reeled in, it may be wound on metal drums of either threaded or smooth contour.

The revolving doublet is based on the principle that to receive a distant station the arms of the doublet should be presented broad-side to the distant transmitter.

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doublet installed in attic; 6—lightning arrester hook-up.

Connect these lightning arrester gaps across the insulators at the very ends of the doublet, and also across the main lead-in wires before they enter the transformer case at the upper end of the twin lead-in section.

Fig. 5 shows one method of bringing in the two wire lead-in from the doublet through porcelain tubes at either the first floor level, or just below it into the cellar of the house. The lightning arresters can be mounted on a beam inside the cellar wall or can be placed on the baseboard at the floor level. Some people prefer to place the lightning arresters on the outside of the building; the connection of the arresters to the twin lead-in cable is indicated in Fig. 6. An interesting installation of a doublet in a good size attic is also shown in Fig. 6A.

Fig. 7 shows how a lightning grounding switch may be connected to a doublet; gap arresters are also shown connected across the insulators, these arresters being connected to ground wires in each case.

Fig. 8 shows how a relay may be operated with a push-button and battery from inside the house, so as to ground the antenna during a thunderstorm or whenever the operator is away from the set.

Improving Reception With Doublet

Fig. 9 shows the connection of the G.E. "V" doublet and those who have complained of poor reception on certain wave bands when using a doublet may take a tip from this connection, and try a ground wire from the nearest water pipe to one terminal post on the set (to which the doublet twin lead-in is connected).

Fig. 10 shows an auxiliary aerial connected to the doublet and also a ground connection. In some cases one experimenter found that the signals from Europe, for example, were greatly enhanced (as much as 100 per cent) by connecting the auxiliary aerial and ground (either with a clip or else by means of a relay) once a station had been "picked up" on his doublet. The auxiliary aerial may be a single wire, 50 to 60 feet long, and should point in a different direction from the plane of the doublet.

Fig. 11 shows a simple method for providing a waterproof lead-in for the twin conductor, such as lamp-cord or light rubber-covered wire frequently used for doublets. The twisted-pair is placed inside of a rubber tube, which will cost but a few cents a foot, and the top of the "lead-in" where the wires enter is covered with rubber tape or else rubber cement.

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Fig. 7—Lightning "grounding" switch for doublet; 8—relay for "grounding" aerial; 9—"V" doublet connection. Fig. 10-Auxiliary aerial connected to doublet gives greater range in some cases; 11—homemade "proof" lead-in.
Short-Wave

CONVERTERS

1-TUBE CONVERTER

Floyd Simmons, Oakland, Calif.

(Q) I would like to construct a 1-tube converter using a type 80 tube. I have been told that such an arrangement works out very well.

(A) This 1-tube converter must necessarily be of the autodyne type. While it provides fair sensitivity the same station will be received in two places on the dial and both positions will provide the same signal strength. This is one reason why the 1-tube converter never became very popular.

8-W CONVERTER

Alex Brown, Tacoma, Wash.

(Q) I have an excellent broadcast receiver which does not cover the short-wave bands. Would you be kind enough to publish a diagram and explanation of a converter circuit which would give satisfactory results. This should not be too complicated.

(A) The diagram shown is one of a standard converter employing a 67 pentode as the detector and a 6B triode as an oscillator. The two output terminals of the converter should be connected to the antenna and ground posts of the receiver as indicated in the diagram. For best results the broadcast receiver should be tuned to a portion of the broadcast band which is comparatively clear of local interference, if such a thing is possible. In other words, do not tune on a strong station. It may be advisable to tune relatively close to one so that you desire the effect of a beat oscillator in this receiver, you can tune closer to one side of the station so that it heterodynes the same as a beat oscillator. Of course this method of heterodyning is only useful for code reception, where it is an easy matter to distinguish the voice of the weak broadcast station. We say weak broadcast station, because the antenna not being directly connected to the broadcast set, will reduce pick-up at the frequency to which the BC set is tuned.

SHORT WAVE CONVERTER

Edward Russell, Chicago, Ill.

(Q) I have a few 6 volt tubes such as the 6A7 and 87, and would like to build a converter which would work with my present broadcast receiver. Kindly specify all the values and give the diagram in the Question Box.

(A) We have shown a diagram of a simple but very efficient short-wave converter. The 6A7 is employed in the detector section and the 87 as the oscillator. But due to the method of injecting the oscillator-coupling, this system works out very well. It is stable in operation and the conversion gain is exceptionally good. We would advise the use of 2 separate controls for tuning, unless you wish to go to the trouble of arranging the code sender circuit for tracking.

BATTERY OPERATED CONVERTER

Leo Knight, W. Unlon, W. Va.

(Q) I have a broadcast receiver to which I would like to attach a short-wave converter employing 2-volt battery type tubes. I would very much like to see the diagram printed in Short Wave Craft. Kindly give all details showing connections to the broadcast set.

(A) In the diagram we have shown an 1C6 as the detector and a type 80 as the oscillator. This combination makes a very stable and efficient converter system and simplifies the matter of injecting the oscillator voltage into the detector circuit. The diagram also shows how the converter is coupled to the receiver.

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A "metal tube" short-wave converter, the output of which may be connected to practically any broadcast receiver.

CONVERTER WITH METAL TUBES
Henry Cordes, Brooklyn, N.Y.

(Q) I would like to construct a short-wave converter for my superhet. Would you please show a diagram of one using metal tubes with standard 6-prong coils and 14-mmf. tuning condensers?

(A) The converter diagram consists of a 6J7 first detector and a 6CS5 oscillator is shown. If glass tubes are used, the 6J7 should be replaced with a 67 or a 6CS, and the 6CS5 with a 76 or a 56. The two output terminals are connected to the antenna and ground posts of the receiver.

SHORT-WAVE CONVERTER
George Meyer, Whitefish, Wis.

(Q) I have a broadcast receiver to which I would like to attach a short-wave converter using two tubes. These should be a 6CS and a 87. Would you please print the necessary diagram?

(A) This converter may be attached to any broadcast receiver having a fairly good sensitivity. A 6CS is used as the first detector or mixer tube, and a 87, an oscillator. The output of the converter should be connected to the antenna and ground posts of the broadcast set.

Pre-Amplifiers

(A) We have shown the diagram you requested and have employed the type 15-tube. This should give excellent results when used in conjunction with a short-wave receiver. Standard 6-prong coils, data for which can be found in the February 1931 Question Box.

1-TUBE BOOSTER
Charles Sanford, Troy, N. H.

(Q) I am a constant reader of your Question Box and would like to have you print a diagram of an R.F. stage which can be added to my 4-tube battery operated receiver, in order that the radiated squealing of this receiver may be eliminated as other sets in the neighborhood are affected.

(A) The complete diagram of the R.F. stage is shown. Connection (A) should go to the antenna post of your present receiver. Since you are using a common set of B batteries for the two units, the ground connection will automatically be made. However, if an antenna coil is employed in your receiver, the binding post marked "ground" should be connected to the B negative terminal of the receiver if such a connection does not already exist. The coil "L" and condenser "C" should have the same dimensions as in your present receiver.

S I M P L E BOOSTER
Roman W. Waldemar, Wis.

(Q) Will you please print a diagram of a simple booster which appeared in the August 8, issue of Short Wave Craft, for battery operation.

2-STAGE BOOSTER

(Q) I have an All-Star Senior receiver which has given excellent results, however, I would like to add a 2-stage pre-selector employing 6BT7 tubes. Kindly show the diagram in the Question Box giving all values and coil data together with information as to how it should be connected to my receiver. Also what advantages and improvements will I experience with this addition?

(A) We have shown the diagram as you requested. Standard 6-prong plug-in coils are employed, data of which has been given in the February Question Box. The two output terminals marked antenna-ground position connect to the antenna and ground positions of the receiver. The antenna and ground will then be connected to the front of the converter as shown in the diagram. These two stage boosters should increase the sensitivity of your receiver considerably, also it should eliminate or nearly so, the images which you are bound to experience when receivers are played. All in all, we believe it would be a worth-while improvement.
2-TUBE PRE-SELECTOR

Merrill Weller, Reading, Pa.

(Q) I would like to construct a pre-amplifier or a pre-selector, using two type 6S tubes. I would like to know if this would improve the selectivity of my receiver; also show the various voltages required.

(A) We have shown a diagram of two 6S tubes employing 4 prong coils with 2 windings on each coil. The various voltages required are also shown. A pre-selector of this type when connected in front of a super heterodyne will increase the sensitivity tremendously, and if you are troubled with static, these will also be greatly reduced if not entirely eliminated. However, the actual selectivity will apparently remain unchanged, that is if you are listening in on the 40 meter band, you will experience nearly as much interference as before; providing this interference was not due to images. We do not believe you will benefit by connecting a two stage amplifier of this type to the regular regenerative detector.

56 R.F. AMPLIFIER

E. C. Pritchard, Birmingham, Ala.

(Q) Would you please publish in the “Question Box” a diagram of a radio frequency amplifier employing a 56 tube and standard 2-winding coils tuned with a 140 mmf. condenser? Also indicate how this amplifier may be connected to the power supply of my present receiver.

(A) The circuit requested is shown. The V and B minus connect to the power supply B plus and B minus terminals and the 24 volt connections go to the filament circuit. Connections are shown for either a double or Marconi type antenna system.

R.F. amplifier diagram

REVIEWING SELECTIVITY

An R.F. booster stage employing a 76 and a 76, or equivalent tubes, with plate-supply filter.

R.F. AMPLIFIER

B. Hillis, Ontario, Canada

(Q) I have just finished constructional work on the “12,600 mile” receiver and I would like to add a stage of tuned R.F. to it. Will you please print the diagram in the Question Box. This, of course, should use a 2-volt tube.

(A) The 1-stage of tuned R.F. added to the usual 3-tube battery receiver will improve results considerably. Not only will it provide a smoother control of regeneration, due to isolation of the antenna, but the R.F. gain will be greater, and especially beneficial on the weaker stations.

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R.F. Booster

A. T. Pritchard, Detroit, Mich.

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R.F. Booster

A. T. Pritchard, Detroit, Mich.
MISCELLANEOUS

CONNECTING EARPHONES TO COMMERCIAL ALL-WAVE RECEIVERS

Gerald Grandmason, Salem, Mass.

(Q.) I have a commercial all-wave receiver and would like to know if there is any simple method by which I may connect earphones to it. If so, will you be kind enough to print the diagram in the "Question Box?"

(A) We are showing a diagram of one method of connecting earphones to the output amplifier of the receiver. Merely connect a 1 mf. condenser in series with a pair of earphones. Then one side of the condenser is connected to the plates of the output tube and the other connection of the earphones to the B plus or B negative. It is ad-

POWER SUPPLY PROBLEM

(A) We presume that your power supply already has a bleeder resistor but it is not used as a voltage divider. What is received is a resistor with various taps on it such as illustrated in the diagram. This is known as a voltage divider and also serves as a bleeder. It may be found necessary in some cases to by-pass each tap on the voltage divider with a .1 mf condenser. Remove the present resistor from the power supply.

HOW TO GET VERIS

Ray Ward, Chicago, Ill.

(Q) Would you please tell me how I may obtain verification cards.

(A) Many of our readers have expressed the desire to obtain information regarding requests for veris. It is a very simple procedure. Merely make note of the time, date, and character of the program received, together with any other information which you feel may be of interest to the operators of the station, and send this to them accompanied by an International Postal Reply Coupon. Of course, there are a few stations which do not issue verification cards.

NOISE-SUPPRESSOR FOR RESISTANCE-COUPLED SUPER

Joseph Wittler, Dallas, Tex.

(Q.) I have been using a resistance-coupled type superheterodyne

Amplifier

3A A.F. AMPLIFIER

Reginald Pearson, Wallant, Ont., Can.

(Q) I would appreciate an answer to the following question in one of your coming issues of the Question Box. I am using at present a T.R.F. receiver with the following line-up, 6BA, 6Q8 and 87 Audio amplifier. I have a 38 tube and would like to have you print a diagram showing how this can be connected to my receiver in order to operate a speaker.

(A) We have shown the connections for the 38 amplifier. This is resistance-coupled to the 87 amplifier of the receiver.

for 5 and 10 meter operation, and would like to know why no one has ever attempted to incorporate a noise-suppressor in such a receiver.

(A) It must certainly be possible for we have been using a noise-suppressor in a resistance-coupled superhet at station WRAII for almost a year. The diagram is shown. It may be necessary to add another stage of audio amplification, if you desire the same output level as with the usual single second detector. The signal-level drops considerably with the diode second detector. However, the sensitivity of the receiver remains the same. The noise-suppressor does not work quite as effectively in the resistance-coupled superhet as in other types, but it does reduce the auto ignition interference at least 94%, which is a most remarkable improvement, we must admit.

Noise Silencer for Resistance-Coupled Superhet

www.americanradiohistory.com
P. A. CALLING SYSTEM
Richard Sweeney, San Leandro, Calif.
(Q) I would like to construct an amplifier system which can be used in an office for calling various members of the staff to the telephone. I would like to use two tubes and a rectifier, if necessary. I intend operating this from 110 volts A.C. and want to use a single-button microphone.
(A) The diagram published use a 6A and a 2A6 with an 80 in the power supply. Sufficient volume should be obtained to operate a dynamic speaker. A volume control is also incorporated in the first stage of amplification in order that the amplifier may be adjusted to the desired level. In the B negative circuit we have incorporated an on-and-off switch which is independent of the primary switch. This B negative switch is used for putting the amplifier into operation.

SEPARATE REGENERATION TUBE
John C. Wilson, Ontario, Canada.

CONNECTING EARPHONES AND SPEAKER
J.P.A. Terre Haute, Ind.
(Q) Please print in your Question Box as soon as possible, a phone adapter which will be used of headphones on a speaker set. It is to be used on a 1929 Crozley "Show-box-8."
(A) Connecting phones to a commercial receiver in commercial receiver. For speaker operation is not at all difficult. In the diagram you will find that the phone connected in series with a .1 mfd. condenser are connected between the plate of the tube and the "B" minus. If there is a first audio stage in the receiver, it is advisable to connect the phone in the plate circuit of the tube, rather than the output tube. In either case, the same procedure.

REGENERATION CONTROL GETS HOT
John Stadnick, Los Angeles, Calif.
(Q) I would like to build a power-supply delivering 250 watts for the plates of my receiver and 6.3 volts for the heater. Would you print the diagram?
(A) The power-supply diagram shown can be used with any type of receiver. We recommend that any one purchasing a transformer for this power-supply obtain one with a 2.5-volt winding as well.

A good Power-Supply for your short-wave set.

ELECTRICAL BAND-SPREAD
R. James Roby, Portland, Ore.
(Q) I would like to know how to install band-spread tuning in the "Louis Martin" short-wave receiver described in your manual "10 Most Popular Short-Wave Receivers" and also in the Sept. 1933 issue of Short Wave Craft. I am going to build the set and want to have band-spread electrical instead of mechanical. Please answer in your Question Box as soon as possible.
(A) It is a very simple matter to incorporate band-spread in any of the smaller receivers, either of the tuned R.F. or superhetodyne variety. The diagram clearly shows how a smaller condenser is connected in parallel with the present tuning condenser. The larger condenser will be used for band-setting and the smaller one for band-spreading.

How to Obtain Band-Spread

POWER-SUPPLY
R. W. Dourley, Richmond, Va.
(Q) I would like to build a power-supply delivering 250 watts for the plates of my receiver and 6.3 volts for the heater. Would you please print the diagram?
(A) The power-supply diagram shown can be used with any type of receiver. We recommend that any one purchasing a transformer for this power-supply obtain one with a 2.5-volt winding as well.

Amp Tube
How to Connect Earphones to Speaker Set.

Inter-office calling system.
ALL-ELECTRIC CODE OSCILLATOR

Building the "code pointer" oscillator has always been a problem. The one illustrated in the diagram operates from either A.C. or D.C. 110 volts. It is of the self-oscillating type and of course the potentiometer will be modulated by the A.C. Of course, approximately 110 volts will be supplied to the plate of the tube and the filament of the 50A receiver its power through the 35-watt lamp which serves as a potential dropping resistor. This is a simple arrangement where no selection may be operated, any place where the line voltage is available.

Ttregmd, arrantement 1141 either

HAPPY TESTER KINK

Having difficulty in finding a place for the "test point" on your home-made tester? I suggest the following idea: A spring-reel cigarette lighter was obtained and connected, as shown in the drawing. When the test lamp is to be used in the circuit, simply release them and they will wind up again directly in the spring-reel. -V. L. ring.

COIL WINDING SUGGESTION

Many times builders of short-wave receivers ask whether or not they could make the set oscillate around frequencies between 15 and 35 megacycles. The writer overcame this trouble by threading a portion of the tickler winding into the B negative side of the grid coil. The drawing will convey the idea more clearly. With this arrangement, there was absolutely no trouble in obtaining oscillation or oscillating at the very high frequencies. -Carl Seabolt.

AMPLIFIER USING 24

James Kaylor, Badin, N.C.

(Q) Kindly publish a diagram in the Question Box showing a 24 as an untuned R.F. amplifier. Also, what makes the set squelch only when the regeneration control is advanced too far?

(A) We have shown a diagram of a 24 in a tuned R.F. stage. Adding an untuned R.F. stage to your receiver would be of little benefit. We recommend the tuned stage as shown. The untuned stage would consist of a 2.5 m.h. choke in place of the grid coil and grid condenser. The antenna should be coupled directly to the grid of the two through a small variable condenser. Regarding the squeal, we believe this is due to the detector breaking into super-regeneration with the quenching frequency within the audible range. This would indicate that your tickler was entirely too large. We suggest that you decrease the number of turns until the proper results are obtained.

CANNOT UNDERSTAND DIAGRAM

J. A. Lawrence, Winnipeg, Man., Canada

(Q) In one of your Question Box diagrams I see that you have a 48-volt connection to the earphones on the plus side only, and the negative goes to the ground and filament of the tube. I would like to know how anything can be made by this set without being worked out by the positive voltage in the phones. Also, I cannot see any negative return to the battery.

(A) The battery circuit you refer to can easily be traced by starting with the battery at the negative connection, going through the filament of the tube, then through the tube to the plate via the electron stream and from the plate back through the earphones to the B plus. These are the proper connections and there would be no danger of the plate current of the tube affecting reception, in so far as the earphones are concerned. There is nothing wrong with the diagram we assure you.

In the phones, the signals would not be affected, even though it might shorten the life of the phones.

TUNING INDICATOR FOR X-METER

John Richardson, Kansas City, Mo.

(Q) Many times I have heard about using a crystal detector on a milliammeter as an aid in tuning and neutralizing transmitters. Will you be kind enough to illustrate in your Question Box just how this is accomplished?

(A) The diagram shows that the 0 to 1.6 ma. meter is connected in series with a .001 inch loop of wire and a carbon resistor. Merely couple the loop to the coil in the transmitter which you desire to analyze. Care should be taken not to have the coupling too close, otherwise it is possible for the meter to burn out. A device of this kind is exceptionally valuable when neutralizing various amplifier stages of a transmitter.

BAND-SPREAD

L. W. Parrish, Scranton, Pa.

(Q) Please advise me in the Question Box if bandspread can be used in the Space Explorer 6. Also, if I add the capacitance which you

specify, will I have to make any alterations in the plug-in-coils?

(A) We have shown how bandspread may be employed in the Space Explorer receiver. The system may be employed in any short-wave receiver of the type mentioned. The plan is simple enough. A small condenser is used for tuning, while a large condenser is employed for setting the particular band you wish to tune. Within the range of the smaller condenser. No alterations will be necessary in the plug-in coils when employing this system.

R.F. pickup meter

3" Dial, LOOP OF HEAVY WIRE

CARBON/UNDAM

DET

BAND SPREAD

C1 = BAND SPREAD COND. (20 OR 35 MFD)

C2 = BAND SETTING COND. (140 MFD)

Band-spreading.
BEAT OSCILLATORS

I. F. BEAT OSCILLATOR

Harry Scott, Dallas, Texas.

I have a superheterodyne receiver which does not employ a beat oscillator. As such an accessory makes it considerably easier to locate stations and also permits CW reception, I would like to add it to this set. Will you please print a diagram showing the necessary parts?

A. The diagram of a beat oscillator using a standard coil and condenser assembly is illustrated. The condenser CX depends upon the type of coupling used between the oscillator and the set. If the output of the oscillator is loosely coupled to the grid of either the second detector or the last I.F. stage, then condenser CX should have a capacity of about 100 mmf, and the insulated lead from it should be placed in the vicinity of the grid connected to the tube. By adjusting the spacing between the grid and the coupling wire, proper results will be obtained.

S. D. Terry, Jr., Great Salina, Texas.

I have constructed several short-wave receivers and have trouble with motor-boating in the audio amplifier. Will you please tell me how to overcome this?

A. Quite a few of our readers have written to us regarding the same subject. In the diagram we have shown a triode and pentode which is the usual combination of the audio system in the average short-wave receiver. Isolating resistors and by-pass condensers which may be used to overcome this difficulty are clearly shown. In all cases it is not necessary to employ the method illustrated in the diagram, but in some cases where a poor layout or crowding is present resort to the above methods may be necessary.

BEAT OSCILLATOR

Ralph I. Hansen, 80, Omaha, Nebr.

I would greatly appreciate it if you would publish a diagram of a beat frequency oscillator to be used with the Mitchell Superhet, described in the December, 1933 issue of Short Wave Craft. Thanks.

A. The beat oscillator diagram shown employs a standard beat frequency oscillator coil and condenser combination. This is available from any radio supply house. These have the same appearance as an ordinary I.F. transformer. This oscillator may be coupled to any receiver of the superheterodyne variety. Condenser "C" in the diagram may be a two plate midget condenser or may consist of the capacity due to wrapping an insulated wire around the plate lead to the tube. The lead is then merely placed near the grid lead of the last I.F. amplifier in the receiver.

Beat oscillator for superhets.

Beats Oscillator

BEAT OSCILLATOR FOR BATTERY TYPE SUPER

A. A. Pinero, Buenos Aires, Argentina.

In your December issue for 1938, page 470, there appeared a two-volt Super DX-4, which is a splendid receiver. However, I would like to add a beat oscillator to this receiver. The lead which goes to the beat oscillator is indicated in the diagram.

A. The beat oscillator diagram is shown. The connection from the plate of the type 80 oscillator goes to the lead indicated in the original diagram. A conventional beat oscillator transformer is used and is indicated by the dotted lines. This should respond to the same frequency as the I.F. transformers used in the receiver. A switch is located in the "B" lead for turning on and off the oscillator.

AMPLIFIER "MOTOR-BOATS"

The circuit above shows by-pass condensers and isolating resistors as employed for improving a circuit which "motor boats."

20
POWER SUPPLIES

400 VOLT POWER-SUPPLY
Firman Lopez, San Francisco, Calif.

(Q.) I have a 400 volt 100 ma. power transformer which I would
like to incorporate in a power-supply. Will you kindly print the
necessary diagram together with the data as to the ratings of the other
parts. This power-supply should be capable of delivering pure D.C.

(A.) We have shown the power-supply diagram which makes use of
the 400 volt transformer which you have. Two 30 henry filter chokes
and three 8 mf. electrolytic condensers are used in the filter portion
and should result in a hum-free power-supply. We suggest that you
use good electrolytic condensers, such as the wet 500-volt variety.
If the input condenser, that is, the one nearest to the 83V rectifier tube
sparks over, evidenced by a crackling or buzzing sound, we suggest
that you connect another one of similar value in series with it. We
have put no value on the heater or filament winding. This depends
upon the particular type of transformer employed.

400 Volt Power Supply

CONVERTING TERMS
Homer Hartley, Morgantown, W. Va.

(A) One megohm is a million ohms. 0.1 megohm will naturally be
1/10 million. The number being too large to write, it is designated as
a decimal or part of a megohm. 0.01 megohm is 100,000 ohms,
etc. If we had a condenser value indicated as 100 mmf, we merely
place a decimal six places to the left of this number. We would
then have a 0.001001 or .0001 mf. Zeros to the right of the number
are, of course, of no consequence. The reverse procedure is followed in
converting the decimal back into a whole number. Moving the decimal
six places to the right we again have 100 mmf.

POWER SUPPLY FOR S.G.3 TRANSMITTER
John Walsh, Oak Lane, Phila., Penn.

(Q) I would like to have you print the diagram of a power-supply
which could be used with the "S.G. 3" Transmitter

(A) We have shown a diagram of a power-supply suitable for the
"S.G. 3" Transmitter and any reliable radio parts house can furnish a
satisfactory transformer. With condenser input in the filter, the trans-
former should be rated at about 400 volts and be capable of supplying
around 200 milliamperes.

Power Supply Diagram for S-W Receivers

POWER SUPPLY DIAGRAM
L. E. Sandidge, Jr., Pocahontas, Miss.

(Q) I intend to construct a power supply which will operate on
110 volts, 60 cycle A.C. The output voltages should be as fol-
loows: 45, 90, 135, 189, 250 volts. Would you be kind enough to print
the diagram in a coming issue of the Question Box?

(A) In the diagram shown we have indicated a 15,000 ohm, 35
watt voltage divider with 4 sliders. These balancing resistors should
be adjusted with the aid of a D.C. voltmeter, in order to obtain proper
output voltages. The rectifier tube shown is an 83V, although an
80 may be used satisfactorily.

Power supply for the SG-3 transmitter.

29
POWER SUPPLY WITH BH RECTIFIER
Carl Charles, Merrimac, Mass.
(Q) I have a type BH rectifier tube and would appreciate it if you would publish a diagram for it when used in a power-supply.

(A) A diagram for the BH rectifier is shown. The BH tube is one of the gaseous type, not requiring a filament. Therefore, the transformer need not have the usual 6-volt filament winding. If it has, this winding may be used for some other purpose.

POWER SUPPLY DIAGRAM
John Loughlin, San Francisco, Cal.
(Q) Would you please print a diagram for a power supply in your Question Box. I must supply a "B" voltage of 250 volts; filament voltage of 1.0, 2 volts, 4.5 volts, and 6 volts. Also, it should use a type 60 tube.

(A) We have shown the diagram of the power supply. However, we have only indicated a single 2½-volt winding. The odd voltages you require, such as 1.6, 4.4, and 6, we do not believe are readily obtainable on standard manufactured transformers. We suggest that you get in touch with transformer manufacturers.

POWER SUPPLY QUERY
Daniel Murray, New Rochelle, N.Y.
(Q) In one of the diagrams in a past issue of the Question Box I see that you have a 250-volt transformer and the output of the power-pack is also rated at 250 volts. No allowance seems to have been made for a voltage drop in the chokes, which I presume would have a resistance of around 400 ohms. Would this not reduce the output voltage?

(A) Offhand, it may seem peculiar that the output of the power-pack is designated as 250 volts with a 250-volt transformer, but remember, we have condenser-input which boosts the voltage considerably above 250. The two chokes do provide a voltage drop but even this is not sufficient to drop the voltage below 250. In fact, the voltage under operating conditions may be greater than 250 volts. For instance, as a specific example, a transformer having around 650 volts output, when fed through a rectifier and a condenser input filter delivered 600 volts with a 300 ma. load. The voltage of course without the 300 ma. load was well over 700.

BRIDGE RECTIFIER
Alvin Nichols, Pawtucket, R. I.
(Q) I have a power-supply which, at the present time delivers 600 volts. The transformer used is a center-tap affair and has 600 volts each side of the center-tap. I would like to use a bridge rectifier arrangement whereby I could obtain 1,000 volts from the same transformer. Will you please print the necessary diagram in the Question Box?

(A) We have shown the diagram of a power-supply employing three type 63 rectifiers. The filament transformer must have three separate 2.5 volt windings. If your transformer is rated at 600 volts at 100 ma. with a full-wave rectifier system, the output of the system will then be rated at 1,000 volts at approximately 125 ma.
Audio Amplifiers

2-STAGE A.F. AMPLIFIER
Frank Caggiano, Bronx, N.Y.
(Q) Please print in your Question Box the diagram of an audio amplifier consisting of a 56, driving a pair of 2A5's in push-pull. I would like to connect this to my 2 tube regenerative set.

(A) In the diagram the 56 and 2A5's are shown, transformer coupling in the input circuit is indicated. This will serve satisfactorily if the output tube of the receiver is a triode such as a 56, 87, or 78.

6FS AMPLIFIER
Edward Auncell, Higbee, Missouri.
(Q) I intend to build a high-gain "Metal 2" receiver described in the August, 1936 issue. Will you please be kind enough to print in the "Question Box" a diagram of a pentode amplifier using a metal tube, which would be added to the above receiver? This must be simple and inexpensive.

(A) We have shown in diagram requested and have carefully indicated all the values and shown all the connections. If care is used in laying out this amplifier, it should give excellent results. However crowded or "bunched" connections may result in serious feedback or motorboating. Lay out the parts so that wiring is as direct as possible. Also grid and plate leads should be kept short. The power-supply diagram connections will be the same as that shown for the 87, 56 receiver, elsewhere on this page.

AUDIO AMPLIFIER
Glen Attrill, Puente, Calif.
(Q) Please print in your Question Box a hookup of an amplifier using four or five glass tubes. The output should be five to seven watts. There should be separate controls for mike and phonograph pick-up so they can be blended. The distortion should be as low as possible. The quality should be the best possible.

(A) We have shown in diagram a very useful amplifier. This will have an output of seven or eight watts and can be built in very compact form. Choose the proper "output" transformer for the particular condition under which the amplifier is to be operated.

30,000 OHMS 6FS
0.5 MF 0.1 MF
(P) We have shown in diagram a very useful amplifier. This will have an output of seven or eight watts and can be built in very compact form. Choose the proper "output" transformer for the particular condition under which the amplifier is to be operated.

Pentode A.F. Amplifier
"Metal 2" receiver is shown. Resistance coupling is employed. This should permit speaker operation when used with the 2-tube receiver.

A. F. AMPLIFIER
F. C. Fong, Sacramento, Calif.
(Q) I would like to build an audio amplifier employing a 66-2A5, resistance-coupled combination. Will you please show the diagram and the necessary parts and their values in the Question Box. I would also appreciate a power-supply diagram for this amplifier. The power-supply should use a type 80 tube.

(A) We have showed the diagram requested and have carefully indicated all the values and shown all the connections. If care is used in laying out this amplifier, it should give excellent results. However crowded or "bunched" connections may result in serious feedback or motorboating. Lay out the parts so that wiring is as direct as possible. Also grid and plate leads should be kept short. The power-supply diagram connections will be the same as that shown for the 87, 56 receiver, elsewhere on this page.

Complete Audio Amplifier, Using Class B 79.
Easily made audio amplifier stage for the "DX-ER."

A.F. AMPLIFIER FOR "DX-ER."
Clifton Colaman, Owens, W.Va.

(Q) Please show a diagram of an A.F. amplifier consisting of a type 30 and an audio transformer which may be added to the "DX-ER."

(A) The type 30 A.F. amplifier requested is shown in the diagram and should increase the volume of the "DX-ER" considerably.

2-Stage Audio Amplifier
Robert Skar, Cedar Falls, Iowa.

(Q) Kindly publish a diagram in the Question Box of a 2-stage audio amplifier using a 76 and a 42. This should be resistance-coupled in both stages.

(A) The 2-stage amplifier shown should make an excellent accessory for the short-wave experimenter's shop, inasmuch as it can be used as an amplifier for a receiver or other experiments such as phonograph reproductions and public-address experiments.

COMPLETE L.F. AMPLIFIER
Morton Nelson, Cedar Falls, Iowa.

(Q) I should appreciate it very much if you would publish a diagram of two L.F. stages using 6K's. This should be suitable for the Victor E-tube superhet, described in one of your preceding issues.

(A) We have shown a complete diagram of the two stages of intermediate frequency amplification, together with the diode second detector. The input to the L.F. amplifier, of course, is connected to the plate of the first detector, while the output from the diode goes to the audio amplifier, as indicated in the diagram. Any variable-mu pentodes can be used in the L.F. portion, and the second detector may consist of a combination diode and triode.

1-TUBE AMPLIFIER

(Q) I would like to add a pentode amplifier to a short-wave receiver.

(A) We have shown the diagram of a 12A7 which is a combination pentode and rectifier, both in a single glass envelope. This may be connected to the output of any short-wave receiver which does not already have a power pentode output stage. The input circuit consists of two 0.1 mf. condensers. These are both necessary because the B negative side of the circuit connects directly to the lighting circuit, and if a ground were used on the receiver, the house fuses would very likely "blow." Resistor R for the ordinary triode should be about 40,000 ohms. The two terminals "X" connect to the receiver phone posts.

PUSH-PULL A.F. AMPLIFIER

(Q) I would be very grateful if you would print a 4-tube amplifier in your Question Box. This amplifier should use two type 27's transformer-coupled to a pair of 46's in push-pull.

(A) We have shown the diagram of an amplifier which includes two type 27's transformer-coupled to a pair of 46's. If high-quality transformers are used, real high-fidelity should be obtained with this amplifier. The output transformer should be designed to couple the two 46's in Class "A" to the speaker you intend to use.

Hidden Music
Leslie Clark, Warwick, Mass.

(Q) I recently installed a well-known commercial receiver and find that when the speaker is disconnected the music can still be heard.

(A) There is nothing unusual in your particular case. This may be caused by loose elements in the tubes, or some other part in the receiver which is carrying audio frequency current, and which are capable of vibrating such as loose laminations or windings in an audio transformer, or even a fixed condenser may be causing the program to be heard, even though the speaker is disconnected.
A "Folded Doublet" Saves Space

It is a well-known fact that if properly constructed and mounted, the doublet antenna will greatly reduce general background noise and "hash" caused by various electrical apparatus in the immediate vicinity of the receiver.

In the drawings we find that two Englishmen G2IS and G6DT have constructed a folded doublet. The reason for the peculiar shape of the antenna was the lack of available mounting space for the usual doublet. We can not vouch for the technical assets of this antenna. However, the claims of the designers of this folded doublet are substantial arguments in its favor.

The four drawings show the various mechanical details and its construction is very simple. Of course, the usual rules applying to doublet antennas apply to this one. The antenna proper, or the folded section, should be located outside the field of the noise, and the signal from the antenna thus conducted through the field with a twisted feed-line. If, for any reason, it is impossible to locate the antenna outside of the range of the noise its benefits will be very few in number.

Coupling between the receiver and the feed-line consists of the usual coil. The coupling between the two coils, that is the coil at the receiving end of the feed-line, and the tuned input coil of the receiver should be variable; if one wants to go to the trouble, a further precaution against noise can be brought about by the use of a Faraday shield placed between the two coils. The material used for the construction of the mast which supports the antenna are reasonably low-priced and easily obtainable. The mast is made up of 15 ft. lengths of 1-inch square straight grain pine. A length of this material is used to form each of the 4 corners of the mast. Cross-pieces of this same material are placed every 2 ft. as bracing in order to strengthen the mast and even the spacing, as shown in Television and Short Wave World (London).

The physical dimensions of the antenna allow most efficient operation on 20 meters, however, its dimensions may be changed so that efficient operation may be obtained on any particular frequency.
The writer has heard many favorable reports on the special antenna tuning system shown in Fig. 1. This method of tuning out interfering stations was devised by G. W. Shuart, W2AMN. Reports on this antenna transformer show greater sensitivity afforded by this circuit, the strength of distant weak signals being boosted considerably.

maximum activity or reception range for a doublet aerial, is at right-angles to the arms of the doublet as shown in Fig. 2. This is important where the maximum receiving range is desired. Some listeners experience difficulty in poor selectivity and here, providing the receiver has a fairly large number of tubes and satisfactory amplification, the length of the aerial may be reduced, and in fact stations several thousand miles away can be picked up on an aerial but a few feet in length, on a good receiver of the modern super-het type. First, the experiment may, be tried of connecting a small fixed condenser of about .001 mf. in series with the aerial, where it connects onto the antenna post on the set. Some prefer to connect a small variable condenser of about 30 to 50 mmf. in series with the antenna, so that the degree of selectivity may be changed. If interfering stations still bother you after cutting down the length of the antenna, try disconnecting the ground connection. This will sharpen up the selectivity considerably.

Eliminating "Code" Interference

In some locations trouble is experienced with code interference. One of the remedies for this is to connect a filter or trap circuit in series with the receiving set as shown in Fig. 3, and several different makes of these code eliminator receivers are available on the market. They usually consisted of an i.f. transformer of about 465 kc. rating arranged as a wave trap.

Pre-Amplifiers to Boost "Weak" Signals

Diagram Fig. 4, shows the principle of connecting a pre-amplifier. The pre-amplifier picks up the weak signals from the antenna circuit and amplifies or strengthens them before they are fed into the receiving set proper, where they are rectified.

To Hear 5 and 10 Meter "Sigs"

The real DX "Fan" will therefore be interested in the 10 meter band, and a simple way to hear the stations on this region is to connect a 10 meter converter ahead of the ordinary S-W receiver which does not tune this low.

Headphones—How to Connect

The aspirant who listens frequently desires to operate head-phones from a loud-speaker set, and one method of doing this is shown in the diagram Fig. 5.
SIMPLE 1-TUBE BOOSTER AIDS “DX” FAN

By George W. Shuart, W2AMN

Did you ever attempt to tune in a distant short-wave station, and finally give up in disgust, because your set could not bring in the voice loud enough? This very simple 1-tube booster will solve the problem for you, and greatly increase the range of the average short-wave receiver.

- THERE are undoubtedly many short-wave “fans,” amateurs, or experimenters who now possess receivers which can well make use of additional amplification. The booster or preamplifier about which we are presently concerned offers a method of improving the operation of certain types of receivers in many ways. For instance, the main advantage is in the additional amplification made possible through its use. The greatest difference will be noticed in the strength of the very weak signals. Also there will be a somewhat better ratio of signal-to-noise. In certain types of superheterodynes the addition of the preselector of this type goes a long way toward reducing, or eliminating images. Then again, receivers not provided with coupling arrangements suitable for doublet anten-

The 1-tube R.F. booster viewed from the front.

nas will benefit in that a doublet may easily be used with this instrument.

The main consideration was whether or not regeneration should be used in the booster. The addition of regeneration provides an extra control, however, its cost is very small and its addition provides greatly increased selectivity and sensitivity. In fact, the regeneration control may be set at a point where it need not be changed over the entire tuning range of the booster or it may be adjusted to a more critical point for maximum sensitivity. The flexibility in this regard favored its being incorporated. The method of obtaining regeneration is via the conventional cathode tap commonly referred to as electron coupling.

In the photograph we note that the antenna coupling coil is mounted so that it may be varied with respect to the grid coil. This adjustable coupling is really essential for maximum efficiency. In the diagram we find that there are two methods of coupling this booster to the present receiver, that is, the one

A rear view of the “weak signal” booster.
with which it is to be used. Most receivers of later design employ a separate antenna coil in the input stage, while others employ the capacitive method which means that the antennas are coupled through a very small capacity connected directly to the grid side of the input circuit. In either case, the connection "A" from the converter will go to the antenna position on the receiver, and the "B" negative side of the converter should go to the ground position. In the case of a receiver having doublet input connections, one side of the antenna coil should be grounded when the booster is employed. This connection will be the same when a common antenna and ground are used with the original receiver.

There are a number of antenna systems which may be used with this booster, four of the most prominent and effective ones are shown in the diagram; one is a half-wave doublet with spaced feeders. The other employs a twisted pair for feeders or lead-in. The twisted lead-in arrangement is more convenient, although its electrical operation is not as flexible as the other.

In another sketch, we have shown the Zeppelin or single wire with antenna having spaced feeders at the end. Twisted feeders should not be used with this type of antenna. While they will work to some extent, they will not provide as efficient operation as the spaced pair. The spacing of the type of antenna may be from two to six inches. The two-inch type insulator or transposition block would seem to be the best arrangement. The remaining antenna shown in the diagram is a half-wave antenna with a single-wire feed system. The distance between the center of the antenna and the point at which the lead-in is attached should be equal to 14% of the total length of the antenna.

COIL DATA
No. 1 — 5 turns No. 24 osc. close wound, tap at 1 turn
No. 2—10 turns No. 24 osc. close wound, tap at 1 turn
No. 3—20 turns No. 24 osc. close wound, tap at 2 turns
No. 4—45 turns No. 24 osc. close wound, tap at 2 turns
The antenna coil is not critical and may consist of 2-5 turns, the smaller number used with the twisted feeders and the larger with the spaced feeders.

Diagram of pre-amplifier and improved antenna connections.
For the BEGINNER

A Twin-Pentode Receiver

G. W. Shuart, W2AMN

We have had twin diodes, twin triodes, and many other types of twin combinations of tubes, around which various receivers have been built by the short-wave experimenter. The tube engineers have now presented us with the 1E7G which is a twin-pentode battery type tube. This tube is similar to the type 33, except that there are two sets of pentode elements in the one couple.

Bearing in mind the excellent results thousands of readers obtained with the Twinplex receiver using the type 19 tube, we believe this set will be destined to attain great popularity, inasmuch as it provides considerably more volume than the one using the type 19.

The circuit diagram of the new twin-pentode receiver is essentially the same as the Twinplex, and should offer no difficulty in construction or operation to even the most inexperienced beginner.

Referring to the diagram we find that the conventional pentode detector circuit is employed, with plate feed-back for regeneration and a screen-grid potentiometer for controlling regeneration. The audio stage is resistance-coupled to the detector. However, should the experimenter desire to employ transformer

A rear view of the Twin-Pentode receiver showing "band-setting" and "band-spread" tuning condensers, as well as the "antenna tuner" at the right.
coupling, one may be incorporated with a slight increase in over-all volume. The screen-grid regeneration control provides the smoothest operation, although it necessitated the use of quite a low voltage on the screen of the audio stage, due to the fact that the screen-grids of the two-tubes are connected in parallel within the tube, and are represented by a single prong in the base.

By employing 15 mm f. conde. for band-spread, it is possible to use a straight dial which has no vernier attachment. When wiring up this condenser the rotors should be grounded independent of the chassis; do not depend upon the chassis for connections in the R.F. circuit. All connections in the diagram which go to the B negative or A negative side of the chassis should be connected to one point, preferably to a lug on one of the screws holding the tube socket. This will eliminate all signs of body-capacity and will improve the stability of the receiver.

Standard Hammarlund plug-in coils are employed, and for the benefit of those who wish to construct their own coils, we refer them to the February 1937 issue of the Question Box.

The antenna employed with this receiver should be one preferably 75 ft. long, that is the over-all length from the receiver to the far end. However, if a long lead-in is used, it should be as much in the clear as possible, for remember this also counts as part of the antenna. For those interested in extreme DXing in a certain direction, we might offer the suggestion that they employ a long antenna, one 150 to 200 ft. long or even longer providing space is available; point this antenna right at the section of the globe from which reception is desired. This is the simplest form of directional antenna that one can erect and it has proved to be surprisingly effective.

**Parts List**

**HAMMARLUND**

1—.05 mmf. condenser, HF style  
1—.15 mmf. condenser, HF style  
1—.20 mmf. condenser, HF style  
1—.1 m.f. R.F. choke  
1—sociol socket, isolantite  
1—.4-prong socket, isolantite  
1—set of plus-in coils

**CORNELL-DUBILIER**

1—.0001 mf. mica condenser  
1—.0005 mf. mica condenser  
1—.5 mf. by-pass condenser 100 or 200 V. rating  
1—.1 mmf. by-pass condenser 100 or 200 V. rating  
1—.006 mf. mica condenser  
1—.1500 ohm resistor  
1—.500 ohm potentiometer with switch  
1—.500 ohm .5 watt resistor

**RAYTHEON**

1—1E7G Twin-Pentode tube

**MISCELLANEOUS**

The set was constructed on a 6" x 8" chassis, with a 6" x 8" panel. There are two dials, plain non-vernier type and one twin-binding post assembly for earphones.

1—20 ohm rheostat

Under-side of the Twin-Pentode 1-tube receiver.
KINKS for the S-W "FAN"

HOME-MADE LINE FILTER

I am submitting the following "Kink" for your very interesting "Kinks." Larin in the neighborhood where line-solar interference is exceptionally high, I tried the following in order to eliminate the trouble. I was very much surprised to find that it overcame the majority of the noise and made reception more satisfactory. The drawing shows, two 1/4 mf. 100-volt condensers are connected in series across the line and the center tap grounded. Over each of these tubular condensers a layer of No. 14 or 16 enamelled wire is wound; these windings form the chokes. Any one trying this will undoubtedly experience fine results as I have.—Clay C. Gould.

COIL HANDLE

I wound coils on tube bases and in order to provide a handle for them, invested a glass knob. A long screw holds the glass knob on the tube base. Of course, there may be some slight loss due to the screw running through the coil. However, practical tests showed no appreciable difference with or without the screw.—John Janvist.

PERMANENT IRON HOLDER

During my experiment on construction, I found that this soldering iron holder gave the greatest satisfaction. As can be seen in the drawing, I merely form No. 15 boxhead iron around the iron. This will fall downward and always be in the correct position when you lay the iron down.—D. K. T. Strike.

ANTENNA SPRING

While this "Kink" is not original or new, by any means, I have not seen it printed for a long time, and feel that reprinting it would do no harm. I use a 19-turn wire spring connected to one end of my antenna, to allow for absorbing a tree, to which the other end of my antenna is connected. This allows the antenna to be tour at all times, reduces strength of the antenna wire and prevents breaking during a wind-storm when the tree usually sways considerably.—A. D. Hargrave.

COIL ADAPTER

The experimenter may have coils that are not wired for the particular set in which he wants to use them. By making a simple adapter, as shown in the drawing, and wiring one for such set of coils that are wired differently, no change in the wiring of the receiver will be necessary.—Harold Holman.

USING 19 IN PLACE OF TWO 30'S

In the drawing I have endeavored to clearly show how I used a single 19 to replace two 30's with no clipping bar wiring in the receiver. A 4-turn bobbin base is cemented to a socket into which the 19 fits. This serves as one triode connector. Then two wires are connected to another 4-prong tube base connecting the grid and plate to the grid and plate of the second triode. The second socket is plugged into the audio stage of the receiver.—Adwin Whiteman.

REVAMPING POWER TRANSFORMER

To determine the number of turns required for a new winding, use a small A.C. voltmeter of about 0-15 volts. Wind about 13 or 30 turns of thin wire or cotton-covered 1 line gage on one 1/4 of the turn, as shown, and connect the voltmeter across the wire. Now connect the primary of the transformer to the 110-volt A.C. line and with the A.C. voltmeter, measure as accurately as possible the voltage developed in the secondary 15 or 20 turns winding. Suppose our winding consists of 31 turns and the voltmeter read 7, then the turns per volt would be 3. Then for a 23 volt winding in the same place on the transformer core, approximately 169 turns will be required.—Harry D. Rooton, W1FZP.
TESTER WITH HEADLIGHT

Here is a hint which I find much more useful than a regular work-light lamp. With an old Christmas tree light-set (small size), a thin strip of metal, a small nut and bolt, a few feet of wire, one can make a very useful test-prod light. The diagram shows clearly how this is done. The task need may be from a flashlight, with batteries as the source of current. If a brighter light is desired, a metal "branch" may be soldered to the base connections. Get your set of metal alphabet and numbers and tube end these letters: "F", for elements; "H", for battery; "O", for "H", "B", "D". The "F" may be "P" etc. Follow your heart, but avoid such words marked, not all the inscriptions in their respective places. A little effort will make the impression with white lead or tooth-paste. The wire labeling will have a better looking job. The markings can be put on after the lamp is used except metal tubes.—Louis Buflch Jr.

TIME SAVER

As ideal prod marker. Many experimenters use a little marking pencil to identify the metal alphabet letters; it is handy, but not always marked on the tubes. With an "F" or "H" marking pencil, one can write in all the letters, using any number of."—J. A. Vita.

WAVE TRAP

Every wave trap I have used for the purpose of eliminating interference caused by a neighboring "Ham"'s" transmitter, also reduced the volume of reception of certain stations as much. Here is a "Kink" which solves this problem. Sometimes in the vicinity of receiving stations, put on another antenna similar to the others. With a coil and condenser you can tune this antenna to the frequency of the interferomer, then redirect it, since the coil can be put on without an additional reduction in the desired signals. This is done even when they are on the same frequency. The diagram will give you the idea; a clearly labeled page will show this is accomplished.—Wm. F. Dyer.

CIGAR BOX CHASSIS AND PANEL

Here is a "hint" that should be of interest to the "I" and 2-tube "Pan" who do not like to spend money for a metal chassis every time they try a new circuit. This chassis is made from a cigar box. Cut the lid to fit the cigar box and use as a panel.—L. Smith.
MOUNTING THE "LINE"

Here is a hint that will save time and patience for Hams building small wire feed coupling where the B.F. wires are on the same rod-pen or base. The coupling is accomplished by means of two turns of copper tubing held up by small stand-off insulators about 1" to 1½" apart. The coil of tubing should be large enough to allow about 25 between turns and the paste in all around. The sketch explains it better.—Howard Jones.

A SIMPLE RESISTOR BOARD

This resistor board is a very handy unit that comes in 52 different values between 0.5 and 1200 ohms. For example, for 123 ohms, two connections are tied to terminal 1 and the other to terminal 3. J. L. Knight.

BATTERY "WRINKLE"

Those who use dry cells can readily appreciate the value of this idea. It consists of a narrow band cut from an old automobile inner-tube and placed around the battery. With this arrangement, the batteries may be tipped over willy-nilly and still the connections will not be jarred. In fact, it is rather difficult to pull the Batteries over when they are securely bound with this heavy rubber band. This is a simple hint, but it should find favor among the battery set owners.—John Nelson, NE8U, U8W.

PRESERVING THE DESK TOP

I am submitting this hint which I have found very useful in regard to small things. I take our small radios apart about half-way down from the small end at each end. Then I place one of these coils on each corner of the receiver chassis.—Harry L. Young.

JIFFY CONNECTOR

It seems that there are no end to uses for the "old faithful" paper clip. I found that it serves excellently as a connector that would not have quite the same flex resistance. This was easily overcome by inserting a resistor in series with the clip. The resistor, of course, should be equal to the difference between the two loads. This only works when the field resistance of the new speaker is less than the one used.

The diagram clearly illustrates the idea. This procedure will result in adding the same voltage to the tubes as with the original speaker.—El R. Riker.

FORMING SMALL COILS

I wish to submit a hint that should meet the short wave experimenter that builds his own coils. I find this method very useful on the ultra-high frequencies. Obtain a piece of scrap spiral tubing (HS.

CROSS INDEX FOR SW&T'S

Your's is absolutely the best radio maga- zine ever to enter this country. I have a complete list up-to-date, from January 1934, bound in passing reference. I have just completed "indexing" the last set. Each copy is separated and in a special book, then bound in another bound the whole lot for the year is alphabetically set out. This is surely worth a few in your wonderful "Kink" pages.—B. L. Leman.

INDEXED BY LETTERS

INDEXED BY YEAR

www.americanradiohistory.com
**SMALL WOODEN WEDGE BETWEEN CORE AND WINDING**

**POWER TRANSFORMER**

**STopping TRANSFORMER HUM**

I believe many short-wave "Pete" will be interested in knowing that it is possible to quiet a "noisy" transformer or choke; the method is very simple, especially in instances where the transformer is not used in some sort of combiner. A wedge is made of a small piece of wood and is placed between the core and the winding of the transformer. This should be hammered tighter till all signs of hum have been eliminated. This hum, vertically or very vibration, cannot be eliminated in this manner.

—Harrald Bruce Jr.

**Iron Heat Controlled by Holder**

Here is a simple soldering iron rest that not only holds the iron solely, but automatically rests in the cutout of a lamp when the iron is laid on it. Thus the iron is kept hot enough for instant use, yet preventing it from wired and power in metal. The size of the lamp to use is determined by the voltage your particular iron. The wiring of the holder is shown and can easily be followed. The upper center is a spring leaf taken from an old radio jack and the lower center is a screw through a strip of balete, 1/18 inch in thickness and 1/16 inch wide; the length is determined by the weight of the iron. The stiffness of the balete holds the contacts of the switch closed until the iron is placed on the rest. —W. F. D. Morris.

**COIL-WINDING KINK**

It also is difficult to prevent the wires from kinking when winding a coil. Usually three hands are used. The arrangement shown in the drawing simplifies spooling considerably. —W. R. Crenshaw.

**Jewel Light Substitute**

The ordinary colored glass marbles in place of the jewel panel must be of some material other than metal. Here an iron core is, drilled in the panel, then cast out with a muffle. The core is then soaked in water,长效 preferably, removed from the heat slightly earlier in shape, allowing the marble to fit in on one side. The marble is then finshed, with ordinary household or "civic" enamel. Any source of heat can be used. Rockets, Penn, Xmas tree, etc., are ideal. Marbles of one color make the best "lights." Although a number of a marked structure are not distinguishable in appearance. —James F. Hamme. (1922).

**Tube Number Printed Below Tube**

**Wire Loops Tacked to Board**

**Number 16 Copper Wire**

**Tubes Used to Form Loops**

one run for the large tubes and one for the small ones. —Donald Greer.

**Tube Rack**

This tube rack is easy to make and very useful. My rack is thirty inches square and runs around almost all tubes. In making the wire loops, I used only one layer or five inches in diameter. The eighteen inch wide iron, on one end of the board near the top. There pleased with the second in the same way. The loops, being in the same manner. Don't forget that some tubes have large bases and some small, so make

**Workshop Kink**

It is always a problem, finding a place for jars and containers of screws. Here is a simple but practical, holder found at the work bench. I used a small jar with a screw jar cap to shelf with a wood screw jar with small parts.

**A Retriever**

One sometimes tries in vain to remove stray pieces of solder from the chassis with either a sharp pin or a pair of long-nose pliers. Especially is this a nuisance when the solder is hard and covered with a network of wires. One may have to resort to turning the chassis upside down and shaking it. A short length of friction tape wrapped around the tip of a stiff wire will do the work better and faster. —M. C. Leducos.

**Insulator Grommet**

Many short-wave and amateurs have found the need for an insulating grommet, when running wires through metal or insulators. By cutting a piece of rubber tubing, tubing installed in a standard rubber insulator may be made. This is placed over the outside of the hole in a metal chassis, so that the wire just goes. Complete details are shown in the sketch. —Robert Wanst.
PLACE FOR UNUSED TUBES

A good place for tubes around the work shop has always been quite a problem. I would like to submit a method which use to store up the unused tubes. A heavy piece of corrugated cardboard is pinned over a wood frame, as shown in the diagram. Then the tubes are pressed gently against the cardboard, making marks. After the cardboard is thus marked, holes are punched and tubes inserted in the proper places. This method always holds them firmly in place and the result is a lot of tubes which are always to place and which have "one-piece" glass envelopes.—Robert Dwyer Norton.

“SLIPSTICK” TRICK

Any slide rule may be used for this purpose. If the rule has no CI scale, reverse the slide and use the C scale in the reverse position. Opposite a D scale index, place I on the CI scale. Read off the digit of the D scale index depends upon which half of the scale the known frequency or wavelength lies. These two examples clearly show bow the desired conversion is made. (1) What is the wavelength of 1600 kr.? Opposite 160 on D scale is 15 on CI. (A.) 1000 meters. (2) What is the frequency of a 10 meter transceiver? Opposite 5 on CI and 6 on D. (A.) 60,000 kr. The following equations will be helpful in determining the location of the decimal point in your answer:

Kiloycles

<table>
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<th>Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1000</td>
<td>1000</td>
</tr>
</tbody>
</table>

—Frederick A. Mason.

INSULATING PAINT

I have not seen this trick in print before so I pass it on to the “Ham” fraternity. Obtain a black or brown, if brown paint is desired) photograph record and remove all the paper. Then brush it on in a thin coat. It is in the smallest places possible and never with alcohol. Let it stand over night then stir this with more alcohol and it is ready to use. It makes a good commercial-like finish.—Robert Tripel.

SOLDERING IRON STAND

This idea is not original but it is practical. The stand is made from a strip of iron (2 x 1 x 14). It is easily made and economical. There are, of course, other ways to hold the soldering iron to get one's hand if necessary. The stand on any position is made by standing on the length of the frame. The stand should be so mounted as to permit the iron to be swung away from the grasp and vice versa. For getting into right places the holder is still better toward the handle. —Carl Boden Jr.

HEADPHONE CONNECTION

I am submitting my "favorite Knick" for the benefit of those who desire to connect earphones to a receiver while a loudspeaker is operating. As most speakers have transformers which are reenter-tipped, I usually connect the earphones to one side of the transformer input winding. This is, of course, where single-ended earphones are used. In this manner, there is no danger from shorting through the earphone. If one does not want the receiver to connected directly to the K plug, as in this diagram, then a .1 mf. condenser should be mounted to serve with each lead. This will isolate them and prevent any danger of shorting. A method which could be employed by connecting by one leg of the phone to the coil on the transformer, and the other side of the coil could be connected directly to the B minus. —Devin E. Harvey.

SUBSTITUTE FOR C.T. RESISTOR

A 5-volt filament transformer may be used with two 6.3 volt tubes with the filaments in series. The reenter-tipped filament resistors may be eliminated as illustrated. The drawing clearly shows how this is done.—F. H. Helton, W8PNE.

A GOOD IDEA

In battery-operated radios, I use the pencil-type flashlight cells as "C" batteries. These are inserted instead of the usual D size with suitable clips to hold them in place; this method eliminates extra lead leads. The end of the batteries should be insulated so as to avoid unwanted contact with the metal rails. I am enclosing a diagram showing how they can be fastened to the chassis.—Frank Anderson.
A GREAT HELP

Many experimenters, home, and shop-workers who use pliers consistently, will find that this hint speeds work as well as making it far easier. It keeps the pliers sharp. — R. Ballard.

HOME-MADE TEST PRODS

I am an experimenter and consequently have made use for test probes. I am submitting to you my favorite and most useful gizmo: a combination test prod. The test prod is a combination of a straight pin and an alligator test prod. To make this you merely drill a small hole in the lower jaw of an alligator clip, and cut off the end of the pin, leaving it about three-quarters of an inch long. Now let the pin-point protrude through the hole about % inch. Place a drop of solder on the rest of the pin to hold it in place, and you have a gizmo test prod. The diagram illustrated will help to explain although it is simple. I believe this is original and I know it is very useful. — Q. Koosah.

CUT HOLES WITH SCISSORS

An old pair of scissors will come in handy when a regular circle cutter is not available. Simply remove machine screw, place large fiber washer between the two blades, then screw an inside washer over the tip of the screw and with the tips of the blades as close together as the desired radius and lighted firmly. Drill small hole to act as center through the material to be cut; then place suitable metal washer over point of narrower blade. Insert to center hole and "strike," letting down on cutting blade. This works best with soft metals such as aluminum. — Walter Grosshein.

VARIABLE SELECTIVITY

On the high frequencies I usually find that standard I.F. transformers, for 10 c. s. to 28 c. s., are rather broad. I cut a section out of the wooden dowel between the exits, which leaves one coil without support. This coil is then supported by a short piece of fiber or balsaite to which it is fastened by wax. The other end of the fiber is drilled and tapped to admit the end of a 6-32 machine screw. This machine screw passes through a hole in the side of the can, with a spring washer and nut on the inside. This assembly is clearly shown in the accompanying sketch. By turning the screw on the outside of the can, the coupling between the two coils can be varied. — Clarence H. Crater.

SAFETY PIN CUT OFF HERE

REGULAR ALLIGATOR CLIP

DRILL SMALL HOLE FOR PIN

INSIDE % LENGTH OF PIN SOLDERED TO LOWER JAW

METER SWITCH

This blind replaces one D.P.D.T. switch, and a milliammeter. It is to be used in a push-pull circuit to measure the plate current on each tube, by the use of the milliammeter and the D.P.D.T. switch. It will be

CLIP MADE FROM SAFETY PIN

While experimenters often run out of small clips it is almost certain that such a clip can be found around the house. The one illustrated here for making a clip may be made from a safety pin. The shepherd's hook is removed and the ends bent and twisted as per diagram. At first glance one might not understand the effectiveness of such a clip, however, it is surprising how well it works. It can be fastened in almost any article from the smallest wire to a large screw. — Edward McKenna. W1200E.

A.C. OSCILLATOR

The diagram depicts the hook-up for an A.C. oscillator, thus providing another use for old 2BA's. The 2BA can be used in "line" with the grid coil of a vacuum-tube condenser C. It is also possible to use it for tuning various stages. The 200-1200 Hertz lamp (2BA) nicely and plug-in coil are used. — Alan Harris.

LOW-LOSS COIL

I constructed my own low-loss coil forms with material frequently found in the

www.americanradiohistory.com
A VERY USEFUL IDEA

I have found this hint very useful for soldering in "tight places," where the soldering iron tip will not reach, such as broken wire roll-leads on speaker cones. This will save the time of taking off the speaker cones. The show is a copper wire to feed around the tip and then back the outer length of a wire Kennel length. Flow solder an end of this so it will form a ground wire, the thin tips of wire to feed is soldered to the connection—Laoon Weden.

COPPER WIRE TWISTED AROUND THE TIP, END WIRE 1 INCH TIN-TIP WIRE SOLDERING IRON

SOLDERING TIP

VERNIER KINK

I found this to be a handy "Kink" and a simple one to make. The brass strip can be used on any common large pliers. It is connected by means of a wire to the grid line of the vacuum tube condenser. The wire used for the movable plate is 5-22 AWG. A piece of wire 6' long is made available by threading a piece of the through a nut which is soldered to the plate. The brass strip may be slipped from the panel to avoid a short-circuit.—Donald Grewal.

COIL OF 100 TURN OF NR. 34 WIRE

PHONE JACK

The sketch shows a method which automatically connects the ear-phones to the speaker output. This is an addition to your

IMPROVING MAP

Here is a hint that I found very useful and saw other amateurs use. I prepare a map of the United States, then with a compass, draw a circle with a radius of 100 miles with the Amateurs or 4172 NHX location as the center. The next circle will be the same radius of 200 miles, the next 300 miles, and so on until the map is covered. The circles can be marked at 100 miles, 200 miles, etc., then the amateur or NHX can tell at a glance how far the station to which he is listening is. I also have a large map of the world with circles with a radius of every 1000 miles.—Kenneth Trier.

LIDY. 40 WATT A.C. LAMP 76

SIMPLE HALF-WAVE RECTIFIER

I am submitting a simple half-wave rectifier which I find very useful for experimental work. The following description will assist in it. Connect a 50-inch line in series with the cathode and filament of a 78 tube, connect the grid and plate together as shown in sketch. Shunt a 5 mf. condenser across the 71 C. output end of the rectifier which will deliver about 10 volts and not exceed 50 milliamperes, try different condensers of different values for different

HOME-MADE GALVANO-METER

Although this "kink" is not original by any means, though there are undoubtedly a great number of "kinks" to radio who are not familiar with this idea, and therefore, I think it should be published in the "kink" department. It consists merely of winding wire around a small compass. It will serve to check continuity. It is only necessary to use a small battery for operating the meter. When in current passes through the coil the needle will show a deflection depending upon the amount of the current.—Jack Chancellor.

SOLDERING IRON

It is a simple matter to construct an efficient soldering iron holder from a discarded tin-can. The drawing clearly illustrates just how the holder is formed. This is a very simple arrangement and easy to construct, and will provide a convenient rack for the soldering iron, which is most precarious last used by a short-wave "fan." This holder may be mounted in some out of the way place underneath a bench, which means that the iron will always be held, but not in the way when not being used.—John Barrow.

TIN CAN CUT AND FORMED AS SHOWN

COIL WINDING KINK

To prevent the drill from going through the coil turn too forcefully and damaging the form, make a hole in a 1/2" dowel just large enough for the drill to go through. The drill should proceed about 1/4. I hope these hints will prove of some use to your readers.—Art Crick.

WIRE DRILL
DOUBLE LIGHTNING ARRESTOR

Many "Yans" have attempted to construct their own "double" antenna lightning arresters and have not been successful. Therefore I am passing on my idea which has worked out very nicely. It consists of two discarded spark-plugs, which should be thoroughly cleaned, eliminating all traces of carbon and corrosion. Three are then placed into the two ends of a 7" connector which in turn is screwed into the ground pipe. In my particular case a ground pipe 5 ft. long proves to be sufficient. However, the length of this pipe will depend upon the type of earth it is embedded in, and in some cases a pipe as long as 10 feet may be required.—Wolfer.

SPARK HOOK FOR CLOTHES HANGER FASTENED IN BENCH

MULLION

SPARK PLUG

PIPE "T" CONNECTION

IRON HOLDER

I wish to submit the following link to your column. This consists of a single hook that is to be found in almost any home and used for supporting clothes hangers. Due to the shape of the hook it is possible to use it in various positions and at different angles by merely screwing the threaded section into a wooden bench, or, any other location desired. Examination of one of these hooks will readily show its adaptability to the store use.—Joseph Schott.

NEW USE FOR WIRE CLIP

Here is another use for the old standby, the Faberstock clip of which every experimenter has quite a collection. As the accompanying sketch shows they may be used to keep the usual arrangement of socket wrenches and other small tools off the bench and within easy grasp.—Jack Hall.

PAGE THE COAT HOOK!

Once more the old wire coat hook goes to work for the radio "Yan." I have used it as a mounting place for the antenna in order to keep them off the operating desk or table. This ordinary coat hook is screwed into the side of the desk in some position where it will not be in the way. The illustration shows how this is done.—Watkins.

WIRE COAT HOOK

USED AS PHONE HANGER

PHONES-TO SPEAKER SWITCH

Here is a link which I am sure will come in handy to anyone wishing to install phones on any commercial type receiver having a dynamic speaker. Although the phones may be of much higher quality than the voice coil, the output transformer furnishes plenty of output. A "so-called" dynamite phone jack should be used, as this completely silences the speaker when the phones are plugged in. This also aids in tuning into the channels of the radio.—Cleveland Hall.

COLOR CODE CHART

Although this isn't original, I feel that few know about it. It is a chart for identi-fying colored resistors. Three pieces of cardboard, when made and painted in the colors indicated in the sketch, make the handy chart. The three pieces of cardboard are fastened with an elastic or by some cardboard and means so that they can be lined up in accordance with the colors on the resistors.—Wyrick Sonoko.
HANDY LIGHT

I hope some of your readers will get some use out of my kick. It is very simple to construct and will prove very useful. I have been a constant reader of your blind box and have finally decided to submit one of my own. The drawing closely shows the necessary constructional details.—Philip G. Petersen.

LEAD-IN PLUG

A neat and convenient antenna lead-in may be had by using a socket and a plug-in type battery. A hole is drilled in the wall to accommodate one end of the socket. The plug end is then taped to the wall and the leads brought out through the hole. This method looks a better explanation of this system.—Byron Buddington.

PAGE RUBE GOLDBERG!

I believe that I have solved one of the biggest problems in radio. That is what to do when you have the iron in one hand and wire in the other? When the ring is pulled the iron touches the point and it melts. It is best to use steel wire for the construction, as it doesn't conduct the heat as readily as copper or brass.—Orwin K. Blasmar.

PLUG-IN ANTENNA CONDENSER

In my opinion much time can be saved with this kick, so I am passing it along to your readers. I mount the antenna trimmers on the plug-in ends. If you use 3-prong coils, the extra prong for the antenna connection will do. After the coils are wound and the trimmers are mounted, curls should be plugged in one by one and the trimmers adjusted. I got tired of hunting up the old screw driver every time I adjusted the trimmers, so I hit upon this method of getting away from it.—Norman V. Bax.

TIME SAVER

I wish to submit the following kick. The most ordinary things are worthwhile if you search for the other day when I found a set of antenna trimmers to manipulate the pilot light in a set with two ever-shy figures. It was in over-mated quarters and after several tries he said: "Give me a piece of gum and I'll pull the chafes." I suggested that it was unnecessary. I took a piece of gummed paper such as they use in sealing cartons and placed it into a spiral tube. There was enough to fit over the pilot light. The old light came out with no trouble at all, and the new one was put in the same way. I got the idea from one of these little tricks that the more you pull, the tighter they get.—Donald World.

PHONE JACK

Recently I have made use of two kicks that I think are worth passing on to other experimenters. The first is a simple jack to be used between two stages of an audio amplifier and the second is a "dead" jack frame and elimination of "earth" potential from the audio circuits. Practically, it has not been very safe to have an audio jack on a grounded panel. Crystal amplifiers can be used in this circuit. The second converts a wire of connecting a "stand by" or "hand-wavine" switch to a pilot. If the switch is rocked on the detector and R.F. stage (if any) it is a jet soldered on the antenna. Also, if the power-supply has no bleed resistor, it becomes channels of condenser breakdown.—Gay Bick.

NEW USE FOR SOCKET

I am submitting a kick which I have found 197 useful when building sets. The sets consist of a tube, a pair of sockets and "two nuts and bolts. This will serve as a diode, a jack and only a few cents. The inside may be either 5, 6 or 7 inches. I am sure that this set-builders and "Stamps" can use this little kick.—Motion Gottshah.

TUNING AID

Here is my favorite tuning aid kick. I have found it very helpful in tuning from one band to another, to that it speeds the tuning, and makes it easier to keep the wrist (as temperate). The drawing is easy to understand, and there are probably a few other ways to draw it. The hole should be drilled 1½ in. from the edge about a ½ deep depending on the band. About 1½ deep depending on the band. It should then be tipped 45°. A ½" bushing was placed on a 1½ screw and the assembly was screwed on the knob. This assembly has a piece of the broken fast speed on my receiver. I hope that you will find this acceptable.—James David.
PREVENT BLOW-UPS!

Here is a block that I have used with great success in building low-power valve supplies. In case of an accidental "short," unless a protective device is used, the power-supply will most likely "blow up." A block that I have found to be useful is to insert an 81-X tube element between the power supply transformer and the ground. The drawing clearly shows this.

REPAIRING SOLDERING IRON

Many times soldering irons are discarded without much thought. In the majority of cases the only fault with the iron is the deteriorated or broken insulation. I have repaired my own iron in the fashion shown in the drawing. Small glass beads are threaded on the bare wire element and provide excellent insulation; the iron is then good for many more years of service.—O. J. Harman.

HOME-MADE BUSHING

The following is a method of remounting high-tension leads through a metal chassis. The insulators are the composition tape from tubes of toothpicks and the like. My diagrams aren't wonderful, but I hope that they're understandable.—Warren Preeshall.

POWER SUPPLY FOR SPEAKER

This block is very useful, and I believe your readers would benefit by it. It is, as you see, a small a.c. power supply, useful of giving 150 volts. The scope figure was obtained by measurement while in operation. It is remounted of 6-strong tube sockets, tube, pentode transformer and a 500 ohm resistor, of tantalum in line cord. The tube may be a 12AS or metal 22DE. The output is increased by increasing the condenser value. This small power supply may be used as a field supply for a dynamic speaker.—Robert McElroy, Jr.
CONDENSER COUPLING

Here is a sketch of a condenser coupler which you may use in extension work. It may be used temporarily or permanently. The condenser coupler is a rubber tube. The inside diameter of the rubber tube should be a little smaller than the condenser shaft, so that when the condenser shaft is inserted in the rubber tube it will fit snugly. The rubber tube should be about 1/4 inch of an inch. The condenser shall fit perfectly in line. I used a small piece from a rubber stove for my experiments.\n
CUTS DOWN BOOT-LEGGING

I have been experimenting with a great many telephone circuits but found this one to be the simplest and most efficient in fact they may be put for me that I am installing several in my home. The circuit consists of just a length of earphones, or as much as you wish, and one battery. This kind ought to keep the 5-cent boot-legger problems a little. -L. W. Clark. (Well said. -Ed.)

PLUG FOR ANTENNA

Here is a plug which I have found very helpful whenever it becomes necessary of convenient to remove the doublet antenna from my set. The need rests in the ease of inserting the wires from around a pair of awires which is not only cumbersome but often causes the wires to break off. With this inexpensive "plug receptacle" arrangement, one can quickly and conveniently disconnect the antenna from the set for any purpose, such as moving the set, installing it during a severe thunderstorm, etc. -W. H. Fox.

TIME SAVER

Placing a light underneath the work bench may seem an off-hand like a foolish idea; however, when one pays a great number of small salaries that are dropped on the floor, the value of such a light is clearly apparent. The illustration will save a fair idea as to just how it can be arranged. We do not mean to infer that the sole light in the workbench should be placed under the table. Hi! -Bob Hibs.

MAKE YOUR OWN QSL's

This kind ought to be welcomed by practically everyone's "Ham" and "Chef". The very inexpensive QSL's can be made as follows: First a simple printed card must be designed. Second, have your local printer or local newspaper set up the printing on the Linotype (this shouldn't cost over 50c). The type will consist of bars of metal, one bar to a line. Third, place these "bars" in a hand stamp. Fourth, ink your stamp pad in bottle of ink, etc. Fifth, after practicing on some old paper you are ready to start printing. Your cards (if postal cards are fine). -Jack Alexander.

CONSTRUCTION HINT

Recent while constructing a set with a broadcast chassis, I did not have to install a type for the antenna; only the water spout. In order to use them, I cut small blocks of wood about one inch long and mounted them with a line to these blocks to the board. -Walker Fernnman.

BENCH-LIGHT KINK

These experimenters confronted with the problem of lighting a lamp with a beam will find this kind of installation to their taste. While the drawing shows porcelain spool mounted, one could use a spool or any kind of a board, of course. The arrangement of the spool mount and the drawing illustrates how the extension cord is used. After you have once used an adjustable light of this kind you'll never use it without it. -H. W. Comer.

"NUT-STARTER"

This kind is for starting nuts in the most difficult places; we have used this method for some time and find it highly satisfactory. First procure a length of No. 14 but wire and slide an nut on the end, this nut will be inserted after the wire on extension cord, which nut is to be the nut which will be mounted with wire while you are not around using another plug. Fasten the nut to a small screwdriver. 

SPIN NUT TO A START FINISH TIGHTENING WITH A SOCKET WRENCH.
Easy - to - build
Short - Wave Transmitters

1-TUBE CRYSTAL XMITTER
Leolad Fossen, Yerina, Minn.

(Q) Is it possible to construct a low-powered transmitter using a 58 tube and a crystal? This is to be used for C.W. operation on the amateur bands. If such an arrangement is practicable kindly print the diagram in the Question Box.

(A) If you live in a rural district where A.C. is not available, the low-powered crystal transmitter such as shown in the diagram should work out very nicely. On the 80 and 40-meter bands, of course, you will have to contend with the higher powered stations, but in the early hours of the morning when few are on and during the day, DX may be quite easily accomplished. With the new 20-meter crystals now being available, operation on 20 meters with a 1-tube crystal controlled transmitter proves very satisfactory.

1-TUBE TRANSMITTER USING 01A
Bud Brady, Senea, Mo.

(Q) I would like to build a transmitter using a type 01A tube. Will you be kind enough to print a simple diagram?

(A) We are showing the circuit diagram of a T.N.T. oscillator using a 01A tube. Remember, of course, that a license is necessary in order to operate any type of transmitter. Many of the uninitiated are under the impression that for very low power a license is not necessary. As we have stated many times, this is not true, and we endeavor to discourage our readers in entertaining any such idea that it may be permissible to operate a very low-powered transmitter without a license.

SIMPLE 6L6 TRANSMITTER
Frank Little, Jr., Greynull, Wyo.

(Q) I would like to use a single 6L6 transmitter, crystal controlled, of course. Will you please print the diagram together with values of the parts.

(A) We have shown the conventional circuit employing the beam tetrode. It is keyed in the cathode circuit and it becomes necessary to employ a voltage divider to obtain screen voltage. Do not use a simple series dropping resistor for screen voltage when keying the oscillator.

LICENSE FOR 5 METERS?
Ed. Douglas, Cincinnati, Ohio.

(Q) I am under the impression that a license is not needed for 5-meter transmission.

(A) As we have said over and over again, a license is necessary to operate any type of transmitter.

160-METER TRANSMITTER
Sam Terante, Chicago, Ill.

(Q) I would like to build a small transmitter, something fairly simple with an output of around 16 to 20 watts. This should be crystal controlled and operated on 160 meters. Would you be kind enough to print the necessary details together with coil data.

(A) In the diagram we have shown a 41 pentode crystal oscillator and a 6L6 beam tube amplifier. Various types of tubes may be employed in the final amplifier as well as the oscillator. For instance the 4P6, 6V6, or the 42 may be substituted for the 41. The 6L6G, 807 or 8739 may be substituted for the 6L4 amplifier. The oscillator plate coil L1 should be wound on a ½" diameter form and consists of 60 turns of No. 24 wire close wound, and tapped at ½" the total number of turns from the B end. L2 should be identical to L1. The antenna coil L3, will depend upon the particular antenna system employed.

6L6 Transmitter

6L6 on 6L6-G

6L6 on 6L6-G

160-Meter M.O.P.A.
**ELECTRONIC KEYING**

Paul Robinson, San Francisco, Calif.  
(Q.) I am interested in a really fool-proof method of eliminating key-clicks in a transmitter; I have heard much of the electronic method of keying. Would you kindly print what you feel would be the most suitable arrangement.  
(A.) Electronic or vacuum tube keying works outstandingly well and in most cases key clicks are entirely absent. The method shown makes use of 3 types of triodes connected in parallel. We suggest building this into a complete separate unit employing its own power-supply and we have shown the complete circuit. The two tubes marked "diode circuit" connect as shown in the diagram; this method is used when keying is employed in the cathode or filament return lead. When the key is closed, the grids are at zero potential, permitting the tubes to pass current and turn the transmitter on. When the key is open, bias is applied to the grid through the 1/4-meg. 8-watt resistor. The output voltage of the transformer-rectifier system should be approximately 400 volts for use with small transmitters. Remember that the voltage drop across this keying circuit forms a grid bias for your keyed stage. Therefore, the external bias which is employed should be cut down. If a grid-leak is used, its size should be reduced until the grid current of the keyed amplifier reaches the same value as before when a new keying system was installed. The plate current was negligible less than with the other keying tubes, because in reality the tubes are in series with the R circuit. The voltage drop across the keying tubes should be extracted from the plate supply voltage in order to determine the voltage being applied to the amplifier.  

**SUPPRESSOR GRID MODULATOR**

Alfred Winton, Pawtucket, R.I.  
(Q.) I would like to build in the final amplifier of my transmitter and have been using it for CW operation. I desire to include an inductive coupling to phone and would like to have data on a suitable modulator which can be used in conjunction with a double-button carbon microphone. Of course, I intend to use suppressor grid modulation.  
(A.) We have shown the diagram of a two-stage amplifier consisting of a triode and pentode. Either the 2S or 5S type tubes may be employed, and of course either metal or glass tubes may be used. In the input circuit of the triode we have a zero control as this is quite necessary in order to obtain proper percentage of modulation. The output transformer is one designed to match a pentode into a suppressor grid. These are readily obtainable from any radio supply house.  

**"PUSH-PULL" BEAM-TUBE TRANSMITTER**

Roger Parsons, Massillon, Ohio.  
(Q.) I am interested in a simple crystal control transmitter using two beam tubes. Would you be kind enough to show the diagram of such a transmitter.  
(A.) The only one-hand operation is desired with a single crystal. Most efficient arrangement would be one employing two tubes in push-pull. It should be comparatively easy to obtain two crystals from such a transmitter. In some cases there may be a tendency toward high-frequency parasitic oscillation and therefore we recommend a 6 or 8 turn coil to be placed in series with one of the plate leads. While this coil will not affect the circuit appreciably, it will in a majority of cases eliminate all tendencies toward ultra high-frequency oscillation.  

**LICENSE NEEDED**

Nearly every mail brings a request from someone desiring to know whether a license is needed for this or that particular type of transmitter. For instance, a number of inquiries have been received from persons wishing to perform feats of magic on the stage or before a gathering of friends. Regardless of whose transmitter is used to cover a distance of a few feet, or a distance of a thousand miles, a license is necessary.
LOW-POWER MODULATOR

Richard Gulseth, Jr., Mt. Vernon, N.Y.

(Q.) Kindly print in the coming issue of the Question Box a diagram of a suitable modulator for the "W2AMN"-Meter" amplifier, as appeared in the September, 1936, issue of Short Wave & Television. A double-motion crystal microphone will be used, so please show input connections for this mike. This modulator should have an audio output of at least 18 watts. I leave the choice of tube to you.

(A.) We have shown a diagram of a simple modulator which may be used with the "5-Meter Mop." This modulator will have an output of slightly over 10 watts and will be thoroughly capable of modulating the 5-meter transmitter. All metal tubes are used. The design of the amplifier is extremely simple; its cost should be relatively small. The gain control is located in the first tube, this control should be adjusted for best quality as indicated by the sound of the transmitted signal. The output winding of the class "B" transformer should be designed to work into an impedance of approximately 6,000 ohms, although anywhere from 3,000 to 6,000 ohms will work satisfactorily.

TUNING TRANSMITTER

R. Johnson, New York City, N.Y.

(Q.) Would you kindly explain the procedure for tuning a crystal-controlled MOPA transmitter, including neutralization? Some simple methods which can be easily followed and is agree to work properly.

(A.) Assuming a transmitter to have a 50 period crystal-controlled oscillator and a 210 amplifier, the proper procedure would be (with the filaments already heated) to apply plate voltage to the oscillator only, and then the oscillator tuning dial until a dip occurs in the plate current. The condenser should be set slightly toward the low capacity side of this dip, we assume here that grid-leak bias is employed in the 47 circuit. The next procedure is to measure the grid current in the final amplifier, without the plate voltage applied, but with the driving circuits closed. If capacity coupling is employed between the output of the oscillator and the grid of the amplifier, the grid current would be already indicated by the meter, however, if link coupling is employed then the amplifier grid condenser should be adjusted for maximum grid current. If at this point the oscillator plate current rises too high or the oscillator stops functioning, coupling should be reduced by spacing the link coil farther away from either the grid or plate coil. In the case of capacity coupling the connection from the oscillator to the amplifier should be at a point 1/4 of the total number of turns from the B- or cold end of the oscillator plate coil. For neutralizing merely rotate the amplifier tank condenser until a change in grid current is noted. Then adjust the neutralizing condenser, starting at minimum capacity, until the amplifier condenser can be tuned to resonance.

1-TUBE XTAL TRANSMITTER

Bob Langley, Larkspur, Calif.

(Q.) I would like to build a 1-tube crystal controlled transmitter using a type 10 tube. Would this be suitable for CW operation or the 50-meter band? Please print the diagram if it will work out o.k.

(A.) We recommend that you use a 47 in place of the 10, although this is a receiving tube and considerably lower priced than a 10, it will make a very much better oscillator. The diagram is shown together with all the data necessary for operation on the 50-meter band. The crystal, of course, would be resonant in that band.

6L6 MOPA FOR C.W.

WW1YM, Fairfield, Conn.

(Q.) Please print a circuit in your Question Box of a MOPA utilizing the new 6L6 metal tubes. The oscillator must be electron-coupled as an xtal is not available.

(A.) I would appreciate this data and any further information you could give me regarding a 6L6 as C.C. oscillator, or what have you, will be appreciated.

(A.) Although we encourage the use of crystal-controlled transmitters for the C.W. bands, we are complying with your request and showing a 6L6 MOPA employing two tubes. In all cases, the oscillator should be used as a combination oscillator and detector. Resistor will not be classify if the plate and grid circuits are tuned to the same frequency in the oscillator stage, as have indicated. The grid circuit tuned to 80 meters, the plate circuit to 40, and the electron-coupled amplifier to 40. We have also shown a neutralizing circuit in the final amplifier. In most cases, this has not been found necessary but may be incorporated as a precautionary measure, by tapping the B plus on the plate coil approximately 1/4 of the total number of turns.

6L6 MOPA FOR C.W. transmission.
CARRIER SHIFT METER


(Q.) I would like to build an instrument to check my phone transmitter. I want to make sure that there is no carrier shift or over-modulation. Would you please print the necessary diagram in the Question Box.

Carrier Shift Indicator.

(A) We have shown a diagram of a suitable checking instrument for indicating over-modulation frequency modulation, the method of operation is very simple. Place the clip of "A" in a position so that it will pick up R.F. from the antenna of the transmitter. The meter M, will show some reading, the value depending upon the coupling between the wire "A" and the transmitter. During modulation no change in the meter reading should be noticeable. A variation in the reading will indicate frequency shift or over-modulation. This instrument can also be used for tuning the transmitter, the highest reading of the meter indicating the greatest amount of output.

PRE-AMPLIFIER FOR MICROPHONE

Joseph Cameron, Fort Worth, Tex.

(Q.) I have an audio amplifier which is designed for the usual crystal microphone. For better quality I intend to use a crystal microphone and find that I must increase the amplification in order to obtain proper results.

(A) We have shown the diagram of a single resistance coupled amplifier stage which may be coupled to the grid circuit of your present amplifier. Of course, if a microphone transformer is already incorporated in the amplifier this will have to be disconnected.

SINGLE WIRE ANTENNA

Harry Prescott, Indianapolis, Ind.

(Q.) I live in a dwelling which will not permit the erection of a conventional antenna system and can at best only erect a small antenna consisting of a single wire around 40 or 50 feet long. Will you please illustrate in your Question Box just how this might be used as a transmitter antenna.

(A) We have shown the familiar impedance matching network consisting of a coil and two condensers. The method of adjusting is quite simple if you follow instructions carefully. For instance, the amplifier tuning condenser should be adjusted to resonance as indicated by a minimum of plate current with the antenna clip "C" disconnected. After this is done attach the clip to the final amplifier tank coil almost % way from the cold end. With condenser C set about mid-scale, adjust condenser CI for minimum plate current of the amplifier. If the plate current is too high or too low, re-adjust condensers C and CI.

Matching Network for Single Wire Antenna.

The last adjustment should be made with CI for the lowest plate current which indicates resonance. The final amplifier tuning condenser should not be touched after the first adjustment.

RADIO LAWS

K. Morl, Sanger, Calif.

(Q.) The rule No. 850 states—An amateur radio station shall not be located upon premises controlled by an alien. This is the rule which appeared on the F. C. C. pamphlet regarding this rule, is it lawful to buy a premises of an alien and build a station on it, or is it lawful to build a station on a premises of a citizen?

(A) You practically answered your own question when you stated that you're buying premises from an alien. Although we are not lawyers, we believe that so long as you, being a citizen, remain in control of the property, and being the rightful owner, that the alien's property is no longer considered. With the law refers to cases wherein aliens own the property or have a controlling interest in it in the absence of a lease which would, of course, violate rule No. 850.

ANTENNA NETWORK

Buddy Yarkow, New York, N.Y.

(Q.) I would like to have information on an antenna coupling arrangement which may be used to couple any antenna to a transmitter. I understand this eliminates the necessity of putting up a special aerial.

(A) It is quite true that with the impedance matching network shown in the diagram, any type of antenna may be coupled to a transmitter and a fairly efficient match obtained. However, better results may be experienced if the conventional antenna is used in conjunction with this network.

For push-pull amplifier circuits two coils will be used with the condensers in the same position as shown in the two coil arrangement with the push-pull stage, it is much easier to feed any for your operation. No power supply diagram or oscillator unit is shown; these can be found in past issues of the Question Box.

UNITY-COUPLED OSCILLATOR

Corinthus Sarody, Pittsburgh, Pa.

(Q.) I have on hand the tube 685 and would like to construct a unity-coupled oscillator. I would greatly appreciate you printing the diagram together with the values. This is for 6 meter operation.

(A) The popular unity-coupled oscillator diagram is shown. This is one of the simplest oscillators to get going that anyone can choose. The large coil is a single turned affair, 3½ in diameter. It is constructed of copper tubing. The grid coil is threaded inside the copper tube and the grid return lead is taken from the copper tubing. Make sure the grid wire of your choice goes to the copper tube at the plate terminal of the other tube. This cross-over connection is necessary for proper operation. No power supply diagram or oscillator unit is shown; these can be found in past issues of the Question Box.

www.americanradiohistory.com
Code Practice
Oscillators

2-WAY CODE PRACTICE SET

Edward Kutwics, Chicago, Ill.

(Q) I would like to construct a code practice set which can be used in the same manner as the regular telegraph circuits, 2-way communication with "break-in."

(A) We have shown a diagram using a conventional one-tube audio oscillator. By employing two sets of earphones and two keys, two-way communication and break-in may be had. The operator standing by should close his key, the message will then be heard by both operators. Should the operator standing by wish to break the other operator, it is only necessary to open his key, then nothing will be heard in either set of earphones and the transmitting operator will know that the receiving operator has opened the circuit in order to break him.

"CODE-PRACTICE" OSCILLATOR

Thomas O'Connell, Chicago, Ill.

(Q) I would appreciate it very much if you would print a diagram of a code practice oscillator using a 20A, an audio transformer and a rheostat to control the pitch.

(A) We constantly receive requests for diagrams of code-prac-

Code-practice oscillator.

THE CODE

A B C D E F G H I J K L M

0 1 2 3 4 5 6 7 8 9 0

The radio code.

SIMPLE MONITOR

John Evans, Nome, Alaska.

(Q) I would like to build a simple monitor in order to check my CW signals. Would you be kind enough to print the diagram?

Here is a simple Monitor circuit, using a single 30 tube.

A Neon tube may be used to make the "code practice" oscillator shown above.

Code-practice oscillator.

CODE PRACTICE


(Q) Recently I had plans for building a code-practice oscillator using a type 30 tube. After obtaining the necessary parts, I found that I had misplaced the diagram.

(A) We have had a number of requests for a code practice oscillator diagram and the one shown is the old standby. It consists of a type 30 tube and an audio transformer.

NEON CODE OSCILLATOR

John Keaton, New York, N.Y.

(Q) I would like to know how to construct a Neon tube oscillator for learning the code. Will you please show the diagram and values of the various parts in a coming issue of the Question Box.

(A) The Neon tube oscillator is quite economical, inasmuch as the only requirement is a high-voltage supply. In the diagram we have shown the method of connecting it. The value of the resistor and condenser greatly effect the tone heard in the earphones. Choose the values which give the most pleasing tone.
PORTABLE 5-METER RECEIVER
Kenneth Richfield, Olympia, Wash.
(Q.) I would like to build a portable 5-meter receiver using 2 tubes, something that will give fairly good results and still not be too complicated. I would like to use a 1A6 and a 1F4. Kindly print the diagram showing the values of parts.
(A.) We have shown the diagram of the simple super-regenerative receiver, employing an 1A6 combination high frequency oscillator. The output of this arrangement should be sufficient to operate a small speaker, if one is desired. For earphone operation a volume control must be employed. This has been shown in the diagram. Some juggling of the grid coil may be necessary in order to place the tuning range of the receiver in the 5-meter band; this can be accomplished by merely compressing or spreading the turns.

BEST SET FOR FIVE METERS
(Q.) I would like to know if it is possible to use a straight regenerative receiver for 5-meter operation. If so, will satisfactory results be obtained.
(A.) In the early stages of 5-meter radio straight regenerative receivers were used but were replaced by the super-regenerator because of the greater stability. A straight regenerative detector is not recommended for five meters.

WHAT VOLTAGE CONDENSERS?
Joe Rononi, Greensburg, Pa.
(Q.) I have three 8-mfd. electrolytic condensers rated at 450 volts each. I would like to know if I could use a 700-volt center-tapped transformer with these condensers. Also, should the filter chokes be mounted at right angles to each other?
(A.) With a 15,000 ohm bleeder resistor on the output of your power supply, the 450-volt condensers should work satisfactorily. It might be advisable to use choke input to the filter rather than condenser input. It is not necessary to mount the chokes at right angles to each other.

5 METER RECEIVER
William L. Cox, Youngstown, Ohio.
(Q.) Would you please print in the Question Box a diagram of a 5-meter super-regenerator using a 56 detector, a 56 first stage of audio, and a 2AS pentode output amplifier. Regeneration is to be controlled with a potentiometer.
(A.) We have shown the famous 56-2AS, 5-meter receiver and have omitted the 56 audio amplifier as it has been found entirely unnecessary because enough volume can be obtained with the single 2AS. We have shown a 600,000 ohm potentiometer in the grid circuit of the 2AS for A.F. gain control. This will be found very useful.

1-TUBE 5-METER RECEIVER
Jack Carberry, Buffalo, N.Y.
(Q.) I have heard much of the 56-U.S.W. receiver and would like you to print a diagram of the detector which could be used as a 1-tube, 5-meter set.
(A.) We are showing the diagram of a 56 super-regenerative detector as requested.

Hookup above shows a 5-meter receiver, using a 56 or equivalent type tube.

BEST SET FOR FIVE METERS
(Q.) I would like to know if it is possible to use a straight regenerative receiver for 5-meter operation. If so, will satisfactory results be obtained.
(A.) In the early stages of 5-meter radio straight regenerative receivers were used but were replaced by the super-regenerator because of the greater stability. A straight regenerative detector is not recommended for five meters.

One of the Best Five Meter Receivers
“HAM” KINKS

CRYSTAL HOLDER FROM EARPHONE

Recently, needing a crystal holder, I constructed one from an old earphone tuning set forth in the drawing. The electrodes of the holder must be ground perfectly even on a glass bar, using carbonized Asbestos as the abrasive.—Bob Miller.

Mounting-Rack for Veris

Providing a place for the great number of "veri" cards received has always presented quite a problem. Also, a number of good suggestions have been given in your "Kink" department. Mine consists of a nearly finished board, shaped as shown in the drawing, with two large hooks. On these hooks I have placed a number of ordinary paper clips which are used to support the veri cards. At any time a card may be removed without disturbing the apparatus. This idea has worked very satisfactorily and I am passing it along to other readers of the "Kink" page.—Frank Stein, Jr.

Soldering Iron "Pilot"

I have originated a simple reminder for turning off my soldering iron. All that is necessary is to connect a 9-volt pilot lamp to your iron. A 20-gauge wire is connected between one side of the lamp and one side of the iron prong. A 9-volt plug lamp is inserted across the resistance.—Robert H. Shupert, Jr.

Coil Hint

After much difficulty in constructing plug-in coils, I found that it is not easier to use a separate piece of wire to thread the coil lead through the grommets. In most cases it is almost impossible to get the fingers into a coil form.—Robert C. Hinz.

Vernier for S-W Set

Vernier tuning may be easily installed on a receiver equipped with a large circular tuning disk. By running a hole through a small brass, as shown in the diagram (a cork works on very well for this purpose), and fastening it to the panel beside the large disk so that the knob will bear firmly against the edge of the disk.—Keith Willard.

New Use for Toothbrush

In building a low-loss plate tank coil for my transmitter, I encountered difficulties in obtaining material for the insulated strips which support the wire. Finally, I decided to use the celluloid tooth-brush handle which served the purpose admirably. I used insulated to secure the wire in the celluloid and after construction, this made a very air-tight piece of apparatus. If the toothbrush is bent it may be straightened by soaking in hot water until pliable, then left to cool between weighted flat surfaces.—Sidney Stephanoff.

Reducing Tunable Hum

I was troubled with a low-frequency hum of great intensity of the tunable hum variety in my receiver. This only occurred between 40 and 80-meters. I had tried every thing I could think of to eliminate this difficulty, and finally overcame it by connecting two by-pass condensers across the power line and grounding the center connection as shown in the diagram. This worked out remarkably well and for those who cannot eliminate the trouble by usual methods should find this one satisfactory.—Don Levey.
HOMEMADE HIGH-FREQUENCY BUZZER

A high-frequency buzzer can be easily made from any old vacuum tube and a few wire parts. The apparatus is mounted in a typical position with a very heavy bracket. A reflector point is soldered to the diaphragm. The other bracket point is mounted on another bracket in front of the speaker. The base of this bracket must be made very thick and the diaphragm kept as tight as possible. The base closely resembles that of the buzzers on the market.—Ormond Blumhanger.

ELECTRIC CODE SET

As I haven't seen an A.C. Noon Code Oscillator published here yet, I am submitting the following circuit with the hope that it will be accepted. The diagram is self-explanatory, it might be added, however, that if the tone is "hissed" it is advisable to reverse the line plug of these lines, one of insulated wire around the top of the box, connected as shown for the dotted line, should also reduce this. I mounted my unit on a piece of plywood 8 x 11", and therefore assumes that the slight ripple in the tone, without the neutralizing wire, is due to the close proximity of the 25 watt bulb. The power-plug and switch may be covered by a square tin, leaving only the phone clips and key exposed.—Harbert R. Booth.

UNIVERSAL PROD

I found this hank very valuable to me when I wanted to make different tests quickly. The picture of the test lead will explain the construction of it. This gear can be used in any test with the switch flip, so that one page or or the pin which may be opened up is closed in the same position. The switch may also be used.—Edward Medved.

NEW CLOCK IDEA

As you know, most annuities give schedules of programs in Eastern standard time and on the West Coast. Just add on an extra hand to your present clock, a piece of black paper and a few stamps and you will be able to work the time the programs are on or look at the clock twice.—Herald A. Looking.

FOR BETTER DOUBLE-SPACING

Ordinarily, when a certain condenser is double-spaced, one has great difficulty in aligning the rotor in relation to the stator plates. A great deal of time is spent searching for the correct position, either to the stator plates or the rotor will occur sometimes the ends of the rotor plates are hall. For this reason, all the trouble and labor can be saved by using an electrically driven by placing the two together. The screwing diagram will show this clearly.—Floyd B. Pasco, WAFOP.

DUAL CODE PRACTICE SET

It is much easier to learn the code if you are communicating with some one. I have arranged this by connecting two keys and two pair of phones with one oscillator, as shown in the diagram. If you will follow the wire parts and the diagram you will understand it. If the sender operates on a mistake, or if you miss a word, merely open the key and the line goes "dead". You hear the tone in the phone, he will correct as to the error.—William Clark.
MIKE CURRENT FROM PLATE SUPPLY

Many readers will be interested in learning the method I use to obtain mike current directly from my power supply. The method is very simple. A 20-ohm resistor is connected in series with the 12 volt and mike. The other side of the resistor is grounded. The 2 m. telefunken coupler shown in the drawing, inserted with the resistor, insures a minimum of hum. The mike current in this case will be approximately 1 ma. depending on the resistance of the microphone.—George Walden.

MIKE STAND

My mike is a single-button mike taken from a receiver. First take the mike out of its two shells. The one which rests on the floor of the mike is inverted and four bolts are drilled in held in position so that it may be mounted on a frame of some kind. The frame which I am using at the present time is a steel framing bracket so that the mike can be mounted on it. Refer to the drawing for further details.—Elden Miller.

A GREAT IDEA FOR SOLDER

I am sure that the following idea will be found useful by amateur, experimenters and performers. Make a 1/8-inch rod or lead pencil and winding the wire solderer to whatever length you want the handle; then put the solderer off the rod. Punch one end of the rod inside the cating. With a pair of pliers cramp the other end around the straight piece of solder and it is finished. Jars the solder out as you use it. —Elden Cline.

3/16" PLYWOOD ANGLES

It is shown in such a position that the 6 or 7 turns of insulated wire wrapped around the antenna leaf from the mounting arm, to the coupling arm, which is in series with the receiver antenna transformer. When the mike is shown in the other position, the antenna is grounded directly in the output transformer.—Joseph Bray.

A PLACE FOR THOSE LOOSE PARTS

I have constructed three of these and have them hanging on the walls in convenient places. Fingers may be fit to these but are not necessary.—Philip Steele.

ANTENNA SPREADERS

I made a number of antenna spreaders from an old heliometer hub to mounting a 1/2" wire and shaping the ends in the manner shown in the drawing. The main advantage of this type of spreader of course, is its light weight and easy installation. However, the earth much better than hard felter.—L. Castro.

ATTRACTIVE PANEL FINISH

I use a wire grinding machine. By cutting a slot into a square blank of wood and giving a small piece of cloth to the bottom of the wood, the 'wist 'effect' can be accomplished in a few moments.—John Westworth.

ANTENNA SWITCH

It is well known that the average short-wave receiver of the tube type is not selective enough to cope with the crowded conditions in the broadcast bands, especially when operated in the vicinity of strong local stations. This difficulty is overcome in many cases by the simple blank shown in the drawing. The idea of course, is to apply extremely thin antenna coupling, on the broadcast band and the directional capacitive coupling on the short waves. For the broadcast band the switch

5-METER ANTENNA CONNECTOR

Obtain two brass couplings of the type used for connecting variable condensers together, put both in two with a hank-tube, take the bolt out of each coupling, put a solder lug on each of them and then take them with a bolt. The brass tubing can be bent by slipping the strong with the half coupling onto the bolt right in the center. Tighten it by turning the stem-of insulator. The lead-in wire can be soldered to the other two coupling bolt ends after the coupling is slipped on the center tubing where they should be. The lead-in coupling can be easily adjusted by merely

INDOOR ANTENNA

Here is my blank that should interest 5- and 10-meter fans. In the sketch is shown my own cutout on antenna on which I have received the 8th and 7th districts on 18 and 20 meters.—Very often my 3-tube super-regenerative receiver with good volume. The antenna is made of two radius rods (four lengths) that are tubed. Two of the lengths that have copper on one end and must each have the copper cut off, thus eliminating the current metal using the straight pieces.

(Please see page for diagrams.)
WIRE-TINNING TIP FOR FOR IRON

Recently, I had a task requiring the use of a great deal of tinned wire. I hit upon an idea which I consider very practical and is certainly a time-saver. I am submitting the idea to those who would like to try it, and you will be smart enough for the little trouble you have in making the tip. I made my tip from a brass rod, having the same diameter as the upper tip of my iron. The design is side fared as you can see from the sketch. Make the tip as shown, and when complete use a small roll-back tool to make the groove, as indicated. When finished, tin the tip, including the groove and allow the groove to fill with solder. To tie your wire, have it thoroughly cleaned and lightly coated with a small amount of soldering paste.—Alfred H. Turner.

ANOTHER IRON HOLDER

Many “Fans” and experimenters purchase solder in one pound moons and probably discard each of the spots when emptied. By saving these spots and handling them as shown in the drawing, an efficient iron stand may be had. One or two of these spots on the work bench will provide convenient iron rests. They may be permanently anchored to the bench with small nails or screws.—Nicholas G. Kenne.

BIAS FOR TRANSMITTER

By adding an extra tube and filter system to the power-supply a device of “C” bias can be had and will retain full-wave rectification. The “C” voltage will determine the amount of “C” voltage.—Alphonse Benson.

PHOTO MONITOR

I would like to submit this idea for a “Sun” phone monitor. To operate, simply place the tube in the ray of the modulated amplifier of the transmitter or the microphone. In most cases sufficient pickup will be obtained at considerable distances from the antenna or transmitter. A small antenna, two or three feet in length attached to one side of the coil will add considerable in picking up weak signals from the transmitter. Any type of tube with a needle may be used, and the length of the tube to all that signal to be fed. Every phone man should have a monitor of this type in his stack.—W. W. Esterhazy.

MAST ANCHOR

The following “Kink” will save considerable time when fastening mast masts to installations with slating roofs. The base of the mast is cut on the proper angle to fit the roof. To this a flattened plate sufficiently large is cut and fastened to the bottom of the mast with long screws. When the mast is erected the base may be fastened to the roof with screws or nails. Naturally, the awnings or masts should also be extended. This method is by far the best I have found and it provides a permanent structure.—Richard R. Butler.
ANTENNA CHANGE OVER SWITCH

Most short-wave "Fans" have found that for best results two antennas are necessary— one for the broadcast and one for the short wave. There is a simple way of connecting the two to give you the most efficient antenna. The diagram directly shows a method of connecting a double pole double throw switch between the two antennas. You can use a similar switch in the receiver. In one position the "A" type antenna is connected to one side of the receiver, while the ground is connected to the ground post on the receiver and the other side of the double throw switch. Then, in the other position the antenna is connected to the ground, and the current is carried to the "A" type antenna. This system works out very well. —Glenn Crabbe.

NEON TUBE OSCILLATOR

This kit may not be original but I have no way to prove it. Short Wave Craft. It makes an excellent "مرة" for the amateur who has a limited budget. The kit cost about $1.00. The current flow through the grid is around 1/10 ma. Therefore, the lamp will last a long time and the lamp can be controlled conveniently and effectively with a 6 to 9 volt variable voltage regulator. The tube must have enough voltage on it to make it glow before it will oscillate.—Terry Herrman.

F.B. OSCILLATOR

Herein you will find the circuit of a tube-less oscillator which I have used for quite some time. The tube used is a type 6J with the grid and cathode fused together. Different tubes may have to be tried. I used a "B" eliminator on this oscillator, with about 50 volts on the plate and 60 volts on the screen. The tone control is a 10100 ohm control or a fixed condenser may be used; with the control the pitch can be varied over a wide range. The control in the screen mesh is not absolutely necessary, but I used it to control the volume.—William Felix.

CHANGING PITCH OF A.F. OSCILLATOR

The use of a single audio frequency tone when listening in is only desirable to say the least. A simple method of varying the tone of the tone oscillator over two octaves of the musical scale is illustrated. The vowel sound depends upon the voltage applied across the potentiometer and the adjustment of the tone control. The pitch increases at low voltage and decreases when the tone is increased. Either of these positions can be heard in the positive side of the circuit. A 45volt B battery and the tone oscillator will give 1000 cycles when used in the control. This instrument can be used with either a ordinary hand-kerchief of a code microphone. Estimated that output of the knob will enable any decimal tone to be heard easily at will.—Henry D. Beston, W6GRP.

COIL WINDER

I am submitting the following winder which I believe will be helpful to radio amateurs and experimenters. It shows a way to wind simple coils while holding them. I first took a water outlet and fastened it to an iron bar and put a piece between bar and socket by means of bushe-
**Antenna Coupling**

Here is a method of obtaining automatic antenna coupling. The axis should be of brass. The loud speaker, or should be placed approximately one-eighth inch from the coil. Over adjusted, it is automatic. Due to the fact that the grid coil deters with the wavelength and so relives the condenser as such coil is used.

--- H. Hoffman

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**Code Practice Trick**

It is not necessary to go to all the trouble of building a special code oscillator if one is satisfied with a low frequency tone. Simply wrap one wire around the outside of the new word, attaching it in superposition, and connect the two ends, The light does not have to be in during operation, but will straighten the signal.

--- Ferrell Turner

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**Portable Antenna**

Perhaps this isn't exactly a new window but it is still a good idea. This is a portable antenna constructed of stable used rope. When not in use, it can be relied on into a light, inconspicuous bundle. This is a particularly attractive feature for portable nets used out of doors. The drawing will illustrate the idea and its practicability on the boat.

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**Lead-in Insulators**

These are a type of our favorite short-wave dust, which has found great favor among some of the other amateurs in the country with valuable.

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**F.B. Grid Clip**

The sketch herewith shows my emergency grid clip and it works so well that I use it most of the time. The coil should be slightly smaller than the grid cap on the tube so that it will fit tightly, putting the spring on, twist it slightly and it will go on easily and fit tightly. This clip can be made part of the grid lead, thus eliminating the necessity for a side-tongued connection.---Billy Green.
PLUG-IN 5-METER COIL

I am submitting the following kink which I believe will prove both economical and helpful. I remove the ends from a burned out tube and then employ it as a 5-meter plug-in coil. I wrap wire around any round object about 1/2 to 3/4 inch in diameter.

CLEVER SWITCH IDEA

The following kink has proved helpful in my own operation although it was found described in a recent issue of your magazine. A 2-position, 4-pole, DPSP switch is made by plowing two toggle switches end to end and connecting the handles with a rod. This requires but little space. Two sets of extra contacts are necessary.—Frank W. Harte, W7XBE.

USEFUL ANTENNA KINK

I am sure that the following idea will be found useful to all radio amateurs. The materials used for this kink are very simple and inexpensive. They consist of two clothes-pins, a long wire and two insulators. Placing one end of the wire in the knob-end of a clothes-pin. Fasten the clothes-pin to the clothes-line, which of course, every home has and push the line out as far as possible. Then let the wire hang down loosely and again fasten the other end to the other clothes-pins and again fasten it to the clothes-line. This temporary antenna (which may also be used as a permanent antenna) is very useful when one is needed in a "jiffy." This arrangement can be made to prevent the lightning hazard as the antenna can be hauled in in a few seconds time.

COIL SUGGESTION

Instead of drilling holes in coil forms I and it saves time an is much easier. If a slot is cut in the form with a small hack saw, as shown in the accompanying sketch. Wire ends are brought through the slot.—J. E. Buhl.

SPLITTING CONDITIONER STATOR

I am submitting a kink which shows how to make a split station change from single bearing anode R-W condensers. Simply make the stator plates as indicated in the illustration, and ground the lower plate—Drake Long.

FUSE KINK

Here's a idea for an efficient fuse holder. Not taking up too much space, it does the job nicely. The box metal is split grid-clip. Just fit the wire in small 5 and 10 amp. fuse and the No. 13 and 15 amp. auto fuse type. When clipped on the fuse, they can be held in a position so that the ends of the fuse holder will be handy and will encourage the use of fuses as "trick fuses" to short-wave set work.—N. C. Miller.

ANTENNA SWITCH

I have found this system to be one of the best when using two antennas of different lengths. The switch is a single-pole, double-throw type. The proper connections to where the antenna condenser is connected is shown in the sketch. When tuning, switch first from one antenna and tune its condenser; then, and then do likewise with the other antennas.

RELAY FROM GENERATOR CUT-OUT

To make a relay from a generator "cut-out," remove the original windings and rewound with about No. 18 magnet wire. The original terminals can be used or it is necessary to ground the one opposite to the contacts to the cut-out. These relays may be used for tuning circuits "on and off," and for relays the transmitter etc.—Pay9plaint.
SIMPLIFYING WINDING

Although the following kink isn't original, I feel that it is known only to a few. It greatly simplifies coil winding and this...

[Diagram of a coil being wound]

know will be appreciated by those radio experimenters who "wind their own" coils. Wind the coil wire on a tin spoon and slip over a wooden shaft mounted between the poles of a magnetic magnet. This magnet provides perfect tension.—Jim Curry.

ANOTHER CODE PRACTICE KINK

By joining the earphones a boy and two 320 m.m.f. condensers in series and connect them across the A.C. line, we have a simple code oscillator. However, extreme care should be exercised in order to avoid coming in contact with the A.C. line.—Donald Rose.

[Diagram of a coil with two earphones and two condensers connected]

CODE KINK

Many times when learning the code, two "Eames" will construct a telegraph set between their houses. Now and then it is desirable to change from the buzzer system to the "clicker" system used in regular railroad telegraphy. To do this in a hurry the circuit given is very helpful.—Warren Harding Wilson.

[Diagram of a circuit with a buzzer, battery, and key]

OLD TRICK STILL GOOD

I've found it convenient to use a red tee pick to make lead-in coil holes in old tube bases. To protect the finger they use a pick with a wood handle. The holes can be made any size desired, by the pressure applied to the pick. This is a handy method when you haven't a drill.—Dean K. McDade.

[Diagram of a tee pick and a tube base]

PORTABLE TRANSMITTERS

For portable transmitters that require a 1-4-watt transmission line of a definite impedance this arrangement proves quite effective. The two wires are spaced accurately in formulating. A piece of rubber cloth a bit wider than the spacing between wires is used at the medium of separation. One half inch of cloth is laid over each wire and then taped down on a sewing machine. The whole assembly is treated with No. 56 bakelite varnish when

[Diagram of a portable transmitter with a metal chassis and a speaker]

is an excellent high-frequency insulator. This transmission line may be pulled up when not used. Other material may be used such as fine rubber stock wrapped with leatherette. Bins are cut in the same serve to brown wind resistance.—H. F. Boever.

GOOD FOR 5-METER TRANSMITTERS

A radio frequency transmitter employing a microphone and microphone transformer in conjunction with a special transformer tube providing the modulator, the use of a condenser of suitable value and a G.P. D.T. switch will produce tone-modulated telegraphy, thus making the transmitter versatile without the addition of separate audio-oscillators. The microphone normally used to control "gait" is also used with the I.C.W. circuit addition to vary the tone or frequency of the audio modulation appearing. There will be a definite increase in audio current for different positions of the same condenser, due to an approximately inductive match of all components at that particular audio frequency. The diagram shows the wiring for this circuit.—A. E. Bone, Mountain Lake, N. J.
**MAP LOG**

Procure a map of the United States and show small straight lines of varied colors, such as red for the "airplane" stations, blue for the "radio" stations, and so forth. By mounting the map on a sheet of cardboard and sticking colored pins in the proper locations, you can drill a plume by the color of the hole you have drilled in the map. —Frank Ev. Jr.

**FILE AS REAMER**

Here is a file for all who often handle for small holes in plaster walls. The file is made of a small piece of metal with a punch about 1/8 inch in diameter and you use an old knife with 1/8-inch

**GOOD USE FOR OLD KNOBS**

I am a radio "fan" and build a great number of radio sets and find that the following is a simple, but useful idea, for drivers with a lid about 1/8 inch in diameter and I use an old knife with 1/8-inch

**KINK FOR SET-BUILDERS**

Many beginners in building radio sets mixup wires or leave them out entirely. This is a difficulty which has been met by the addition of a fuse and circuit breaker to the circuit. This will be extremely easy to build if you have a pair of terminals. —Alfred M. J. K. T.

**FUSE KINK**

Because of the many fuses which are constantly blowing in my "kink," I had to devise a new and more economical method of replacing one that was burned out. By taking a terminal out of a plug and inserting a piece of wire between the fuse terminals, by means of a pair of pliers, I was able to replace the fuse and use this trick on your fuse socket. —Julius K. T.

**RIVET REMOVER**

Occasionally I have found it necessary to remove some tightly riveted bakellite condenser bases from the chassis. In order to accomplish this feat without scratching or marring either the bakellite or the frame, I used this trick to advantage. Select a drill bit large enough to enable it to turn freely when placed in the rivet and carefully remove the rivets from the frame. —Jack Stiller.

**ANTENNA MOUNTING**

While trying to find a good way to mount my 5-meter antenna, I came up with the idea of using plate insulators. Two 3-inch plate insulators are spaced about 20 in. apart. Two large insulators are then fastened to the harp by means of a machine bolt which has a number of rubber washers cut from an inner tube. The hole in the insulator may be too large to pass the bolt through. For the insulator: —Charles Gab.

**CLEVER KEY MOUNTING**

I am a radio "fan" and build a great number of radio sets and find that the following trick is useful. It is made of a small piece of metal with a punch about 1/8 inch in diameter and I use an old knife with 1/8-inch

**PRESERVING QSL CARDS**

Here is a "kink" which keeps my QSL cards clean and free from dust. This will also prevent the cards from becoming warped and the lettered sections, which have the appearance of your listening ear.

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