DETAIL PRINT FILE

NUMBER 2

INDEX

MORE EFFICIENT REGENERATION.

Patrick Misteli, Texas, who recently bought our 1-tube kit (HB-4), has come up with a much smoother regeneration control. He uses the standard 50K ohm regeneration control as used in the standard kit. But he has replaced the .0001 regeneration condenser with a .00035 (365) variable condenser. By using a midget 365 he can place it above the present regeneration control knob on the panel.

In operation, he sets the 365 at about mid-position. Then the resistance-regeneration control is brought up to almost the regenerating point. Now the 365 is brought into play and the capacity slowly increased until the exact amount of regeneration is obtained. This works for a much smoother regeneration control, than with the fixed capacitor, as you can "sneak" up on them.

Patrick is a serious Shortwave listener and goes for SWL cards. He claims to have read the MRL HB-4 a hundred times! To date he has received 12 QSL cards of which 3 are from Japan (6400); ORU, Belgium (5200); and DMO, Deutsche Welle (5400).

This type of regeneration control is the combination of the center-tap resistance and the variable capacity feedback. The latter type, in efficiency, is attested to by many DX Fans. We especially refer to our reports in Boy's Life contest by David Kurtz and Gene Herrmann of Ohio. They won the 6th and 7th prizes in this nation-wide DX contest and received 2 Hallicrafter communication sets as prizes. See MRL RB's 37 and 38.

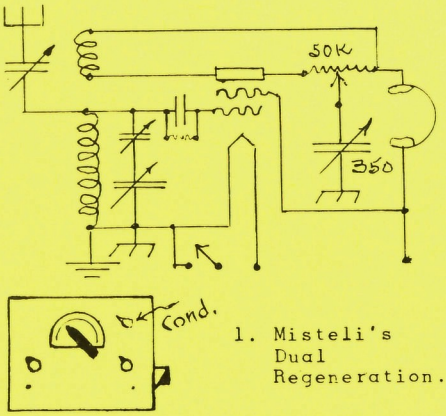
Regeneration involves the induction of some of the amplified RF energy from the plate circuit of the detector back into the grid circuit in such a way that it adds to the signal voltage. When the detector receives too much feedback, it breaks into oscillation - which we call regeneration. Then this regeneration reaches the oscillating point, the tube acts as a regenerative transmitter and produces a continuous whistle (as some of your neighbors may report!). This new generated whistle combines with the incoming modulated signal to produce a final distorted signal in the headphones.

Actually, the detector is most sensitive when operating just on the verge of oscillation, and this condition can be satisfied only by critical adjustment of the regeneration control, If not advanced far enough, tuning will be broad and the sensitivity and volume low. If turned too far, the set will whistle on every station and produce little, or no readable signal. If the control is placed at just the correct position, both selectivity and an increase in volume are obtained.

If a regeneration control appears to have little, or no effect on the signal strength, it may be due to one of two things. First, the connections to the tickler coil may be reversed. Secondly, not enough feedback is obtained. The latter condition may be due to several causes. A few more tickler turns may be needed. Or, regeneration is not sufficient, so more capacity of feedback may be desired. Also, it is possible your B-power supply should be raised a few volts to increase feedback induction.

In the early 20's, with the 201-A tubes, some regeneration control was accomplished by regulating the filament voltage by a rheostat. However, this was abandoned when the newer tubes came into existance. Another earlier regeneration control was by use of fixed plate voltage and regeneration feedback, but with a tickler coil that could be moved into and out of oscillation. While this method of control was most efficient and very smooth in operation- the designers went over to resistance and capacity control.

(OVER)

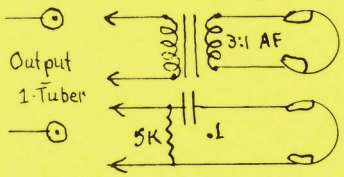


1. Misteli's Dual Regeneration.

In some of the more efficient Shortwave circuits a 2½ mhy. RF choke is placed between the tickler and output. Usually a .00025 mfd. condenser is placed from the front end of choke to ground for regeneration. A more efficient method is to use two .0001 mfd. condensers - one in front and one behind the choke. The Condenser-choke circuit bypasses the hi-frequency currents to ground instead of letting them pass into the output circuit. The proper method may be determined when tuned into DX stations around the 20 m. band. It is much easier to decide at these higher frequencies as very little difference can be noted near broadcast frequencies.

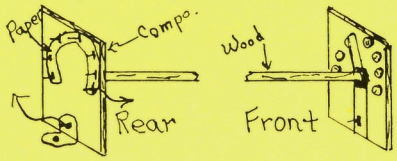
Occasionally, builders of our 1-tuber find the regeneration condenser was unnecessary - the set operating just as well without it. This shows the set is operating at highest efficiency. No doubt some RF energy is regenerated between the wiring. However, with the variable 365 condenser, as Patrick uses, the exact amount of capacity may be placed in the circuit.

Earphone cords may sometimes be "alive" - so that movements of the head may affect the regeneration adjustment. You can readily see how the capacity between each cord will add to the total capacity of the regeneration condenser. One way to overcome this is to place an output transformer between set and the phones. Another method, that we feel would work fine, is the one in Fig. 2. This form of output does not materially affect the regeneration capacity to ground.



2. Two Headphone Outputs.

Going back to the old days, we still believe that a variable grid condenser and leak are very important in ultra-sensitive detector circuits. The grid condenser may have a value between .0001 and .0005 mfd. We find, for shortwave work - the .0001 is best. As for the grid leak, .5 to 5 megs. may be used, depending on the tube and circuit. Usually the designers use 2.2 megs. in standard circuits. On my old ship receiver, in the early 20's, and with a 6 volt Audion tube detector, I got most efficient reception with a variable condenser of about .00025 mfd. This didn't seem to be too critical in adjustment. For a variable grid leak, I used a Chelsea ($3.50), which proved to be but a piece of paper with 10 switch points pressing onto a ¼"



3. A Variable Grid Leak.

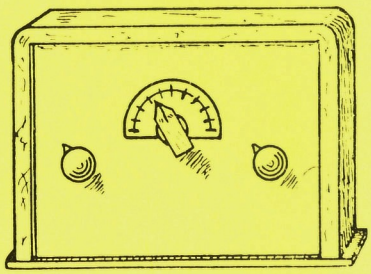
ships, often requested my circuit used because I could snag many stations they couldn't. Surprisingly, I used the conventional feedback, with honeycomb coils and adjustable coupling between primary, secondary and tickler. But, where my circuit differed most was the variable grid leak, for this did the job nicely on the weaker stations. With modern tubes so much more sensitive, we see no reason why this variable grid leak deal couldn't be used to advantage by the real DX Fan. From the diagram, it is easy to construct. A film of India ink forms the path for the leak. If too much resistance - brush on another coat or so, and letting each one dry. The whole assembly may be mounted on the baseboard, near the base of the detector tube. It is controlled by a wooden shaft to the front of panel. It has always been a good idea to keep the leads from the leak and condenser short as possible, in order to pick up less broadcast interference.

As you have probably found, the operation of a tube may be changed by varying the voltage to any of the single elements. Therefore, the correct filament voltage should also be used to get maximum sensitivity. As 10-20 ohm rheostats are either unobtainable, or too expensive, we cannot easily put one in the circuit. However, some resistance wire could be wound into a solenoidal spring and tapped at the correct point. As your battery runs down - this tap would necessarily have to be moved. If set at the correct voltage, as given in a tube manual, you won't be too far off.

There have been many arguments pro and con about shielding the coil or detector tube. While this shielding greatly reduces the amount of local interference - the added losses of the shield may cut out extreme DX reception of stations. However, some of this loss may be overcome by using a larger shield with possibly an inch, or so, clearance between the coil or tube and the shield. It will still cut down local broadcast interference.

SOME MRL HISTORY - MRL 1-TUBER.

From RB #19 (out of print), 1941, we find our first real DX report. Many hundreds of them since.



F. M., Durango, Mexico, "Feb. 13, 1941. On the first days of this week I had the pleasure of receiving your SW 1-tube set. To say it was **grand** is not enough, for it really was wonderful and such a surprise for everyone who put the earphones on and listened. I heard JAPAN (7000 miles) on the 20 meter coil; San Francisco (1500 miles) and New York (2000 miles) on the 80 m. coil, not mentioning the HI-Broadcast and LO-Broadcast coils—because on these I picked up so many stations I never dreamed I'd hear with an old rusty antenna 20' high. All this was in the vicinity of one of the biggest solid iron mountains in the world, the Cerro del Mercado, a famous mountain of solid iron ore.

"Mr. 'MRL' you certainly give a great deal more than you promise. Also I can highly praise the NO. 2 CRYSTAL SET I recently received"

And all we have sold test as good in the shop as this one did. Many other reports have come in, but this is the best so far. The price is also right. You may save 50c elsewhere on a 1-tube kit, but we have more stuff in ours to make it a practical kit—not a mere toy. It oscillates well on 20 m. band as well as others, which is more than most kits can boast. Plans are worked out to the 'Nth' degree, so anyone can build it, without previous radio experience.

ADVANTAGES OVER OTHERS

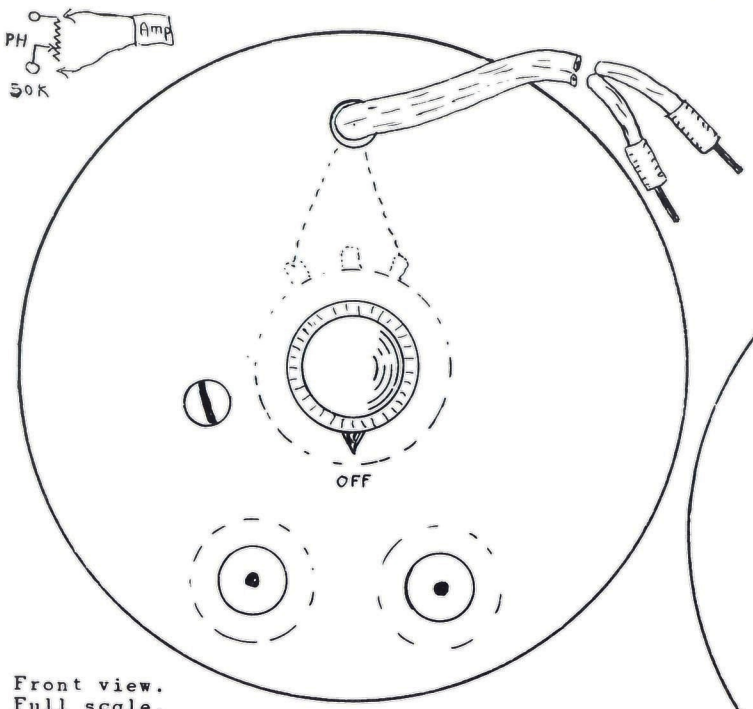
1. Special Ant. condenser not found elsewhere, gets down on SW.
2. 3 controls against usual 2.
3. Front panel composition-with shield.
4. Best parts for purposes used.
5. Husky oscillation clear down.
6. Any antenna & ground.
7. All-wave for little more than a crystal set in price.
8. Works anywhere; not dependable on house electricity.
9. May be used on bicycles, boats, camping, trips, etc.
10. Low drain on batts. Switch cuts A and B batts. off at once.
11. Light weight kit. Less cabinet weighs 1¾lb. Fits suitcase.
12. Uses 1 flashlight cell; 22½ v. of B (av. B life 6-12 months).
13. Easy to wire. 24 p. of full-size drawings and description.
14. Runs horn speaker (not furnished) on loud signals
15. Any kind of phones used — easy on phones due to type of circuit.
16. No line noises like AC sets.
17. Other kits cheaper—this one better.
18. Coils may be changed to different bands to be covered.
19. Terminal board shows batt. conn.
20. No hand capacity due to shielding.
21. All kit parts furnished, down to each lug, solder, etc.
22. Long tube life.
23. Clearer on phones than larger sets.
24. Easiest wiring plans known, you can't go wrong.

See CAT. and HB-4 for details.

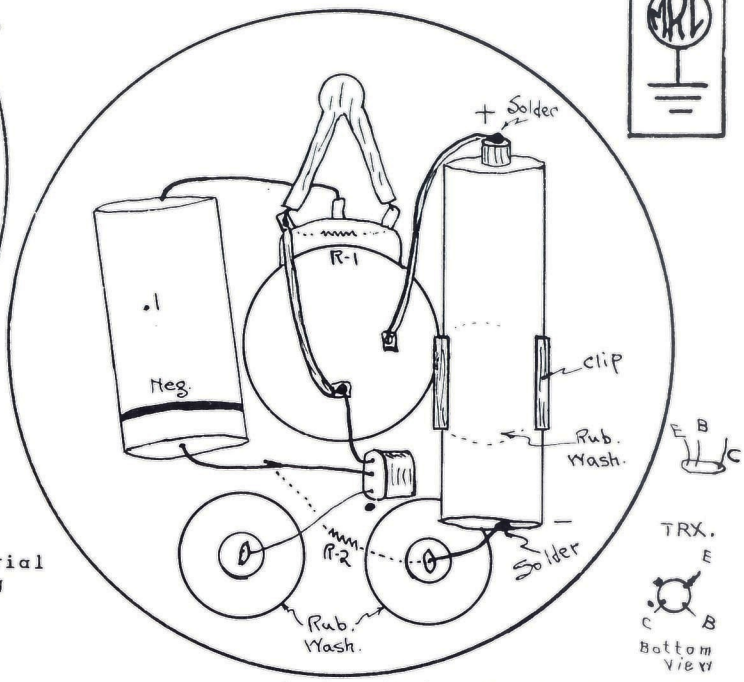
FOR 1-TUBER: # MRL PORTABLE TRANSISTOR AMPLIFIER.

DP 16

A Detail Print by Modern Radio Laboratories.



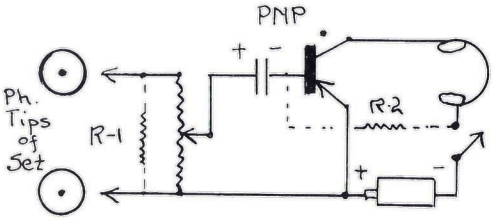
Front view. Full scale.



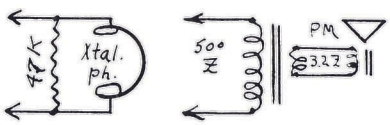
Rear pictorial wiring plan.

TRX.

Bottom View



Schematic wiring plan.



Optional outputs; Crystal phones or PM speaker.

PARTS LIST.

1 Plastic or wooden box.
1 500K volume control & switch.
1 .05x 600 v. bypass condenser.
2 Phone tip jacks.
1 Small pointer knob.
1 PNP Transistor.
2 Rubber washers, see text.
1 6-32 x ¼" BH machine screw.
1 6-32 nut to fit.
1 Large cartridge fuse clip.
1' Rip cord & 2 phone tips.
6" Plastic #22 hookup wire.
2" Rosin solder.
1 E.R. #915 pencell or equal.
R-1, 2 see text

For a long time the small set builder has needed an amplifier like this to bring in those weak DX stations. How often do we wish we had "just a little more" volume to get those elusive call letters. It can serve us well until we can build a more powerful, permanent amplifier to just "blast those neighbors!"

This is the simplest Transistor circuit available. It is called the common-emitter circuit - which is claimed to have the highest gain per stage.

CONSTRUCTION. We have found this mounting plan to be best & easiest to wire up. The full-sized drawings should give you all the details you need. We obtained small plastic boxes from Woolworth's stores- but any type of box is OK. When drilling the molded plastic boxes one must be very careful not to crack them. Drill tiny centering holes first and then full size later. If a burr forms - it may be trimmed off with a sharp knife. Cut the volume control shaft ½" long.

Before you mount anything - cut 2 soft rubber washers from an old inner tube. They may be cut with scissors or by leather punches like we use. By placing them under the phone tip jacks - you can cinch up pretty good without the shattering of the box.

BATTERY. A large cartridge fuse clip is used to hold the batt. in place. Due to added expense of a batt. holder - we decided to let the Fan solder the batt. in. Be sure to place it in the correct position or it will ruin your Transistor. Due to low drain - a batt. will last a long time with a Transistor. Besides, it has recuperative power when it is turned off. For this reason be sure to turn it off when not in use. The pointer should point downward when off.

TRANSISTOR. This uses a PNP Transistor. Be sure you follow the diagram, using the (dot) collector as a guide, when soldering it in. Getting it hooked wrong may wreck it. If using an NPN Transistor- just reverse the batt. polarity and the rest is OK. Most of the bias is obtained thru the volume control and the coupling condenser. Sometimes up to 10 mfd. x 25 v. is used, with deeper tones and more volume.

For certain Transistors you may find the addition of resistor (R-2) may help. It may be from 20 K to 500K. You may try a 0-1 meg. variable and then measure the best point. Then substitute a suitable resistor. As Transistor characteristics vary, you may find this may increase the volume and lower the tones.

USE ON 1-TUBERS. Plug tips into tip jacks, It is possible the 500K VC won't let enough voltage thru to give you the same regeneration as the phones. You may experiment with resistors from 250K to 500K across the phone tips and solder in. Don't use this resistor on Crystal sets.

USE ON XTAL SETS. As phones have about 2000 ohms DC resistance they are inclined to broaden the signal. For this reason the 500K is used, as it sharpens up the set and helps DX.

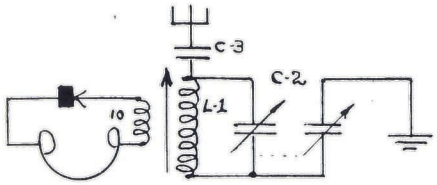
OPTIONAL OUTPUTS. One is for Xtal phones. Other a PM speaker. As 1 stage of Transistor is not too critical on output we suggest you use a 2000, or less, ohm impedance output transformer for most volume. It may be better to obtain a 500 ohm impedance Transistor output transformer in to a 3.2 secondary for most PM speakers. You may also try an Universal output transformer.

10 TESTED CRYSTAL SET CIRCUITS.

DP 21

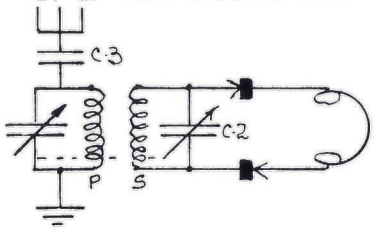
All following circuits have been shop-tested. Most have been altered from the original circuit for efficiency. Other different Xtal circuits may be seen in MRL Handbooks, Detail Prints, Data Sheets and other MRL literature described in our CATalog.

21-1. SELECTIVE LOOPSTICK XTAL.



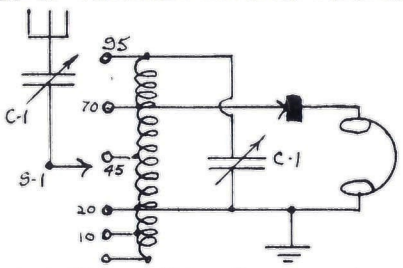
M. Bzowy, N.Y.C., sends this circuit for lots of selectivity. Use 10 Ts #32 Enam. over loopstick; more broadens stations. Pull core of loopstick out to tune below BC band. Uses 1N60 or 1N54 diode. More turns may be used if using Steel galana.

21-2. DUAL CRYSTAL SET.



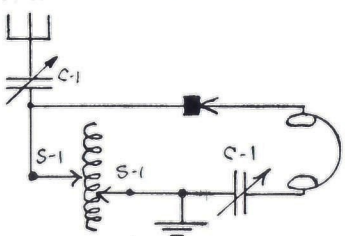
Stephen Rowe, N.Y., rigged a similar circuit. Two coils of 75 Ts #24 DCC, one over the other, and separated by paper, on 2" Cello. or Bak. form. Be sure to reverse Xtals. Primary circuit boosts and sharpens the signal.

21-3. VARIABLE ANTENNA TUNING.



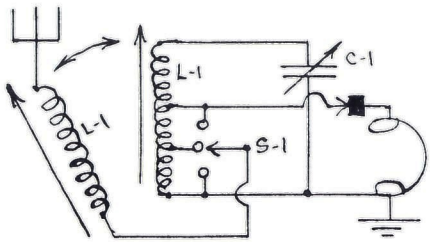
J.A.King, Md., has good results with a similar circuit. A coil of 95 Ts #22 DCC is wound on a 2" x 4½" Cello. form and taps taken off at 10-20-45-70-95 turns and run to switch lever. By varying Ant. cond. and taps U control Antenna selectivity. For more selectivity put Xtal on 45.

21-4. SIMPLE ALL-WAVE DX'er.



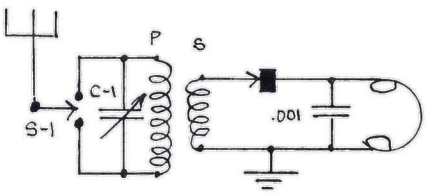
Paul Jenkins, Tenn., reports 750 miles daytime on 15 mc. and 2100 miles at night with nearest BC station 30 mi. No coil data but we suggest 100 turns #22 DCC tapped every 10, on 2 x 4½" Cello. form. We have added the Ant. cond. for more selectivity. Note there are 2 sets of switches, each with 10 switch points.

21-5. VAR. LOOPSTICK COUPLING.



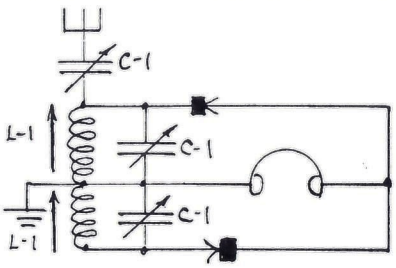
Wesley Lingley, R.I., has good results with a small set using 2 loopsticks. One is for tuning, while the other is for Antenna coupling. Degree of coupling is controlled by sw. lever. Angle of Ant. loopstick coupling may sharpen up reception.

21-6. REVERSED POLARITY CIRCUIT.



E.C.Hoffman, Minn., says this circuit produces amazing results for him. Wind pri. of 75 Ts #22 DCC on 2" x 4½" Cello. form. Put a pc. of wrapping paper over the windihg. Over this, wind 40 Ts same wire for secondary. SPDT toggle switch changes polarity for best results. Note ground is on the secondary circuit.

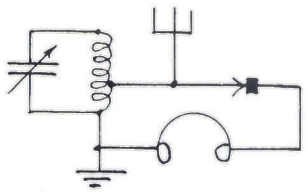
21-7. DOUBLE LOOPSTICK XTAL.



Bart McMurray, Calif., submitted this circuit that works good. The Ant. condenser helps in selectivity. Note the circuit on the ground end aids in boosting the signal of the Antenna. Be sure to reverse crystals.

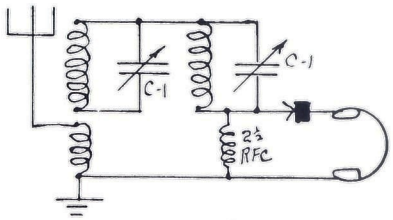
21-8. HIGH FREQUENCY XTAL SET.

H.S.Davis, Calif., sends in a pet Hi-F circuit that has worked good with him. Coil is 8 Ts #14 tinned busbar wound on ½" dia. form, and slightly spread apart.



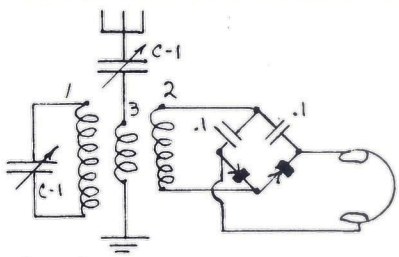
Take a tap at the 2nd turn. The tuning condenser may be a 35 - 50 mmfd. or what have you. Xtal is a 1N64, 1N295 or CK-706-A. Other types may be tried. About the simplest circuit one can get.

21-9. FREE TUNING XTAL CIRCUIT.



Mr. Ketterson, La., says this circuit cuts out all locals and no QRM from any. We call if Free Tuning because the two tank circuits are floating, with no Xtal or impedance across them. On a 2" x 4½" Cello. form wind 75 Ts #22 DCC. Next to this wind 15 Ts same wire for Ant. coil. Wind a separate coil the same as other, except no primary. We added the RF choke for better operation. Keep the coils separated.

21-10. FULL WAVE CRYSTAL SET.



Roy Davenport, Calif., claims very good results with this set. Besides being full-wave, it is also a voltage doubler, so you should increase the volume in phones. This principle may be applied to any Xtal set. You may get our #9 Xtal coil, or make it as follows: On a 2" x 4½" Cello. form wind (1) of 75 Ts #22 DCC. Place some wrapping paper over this and wind (2) 30 Ts same. More paper and (3) 15 Ts same. Diodes 1N35, but any type OK.

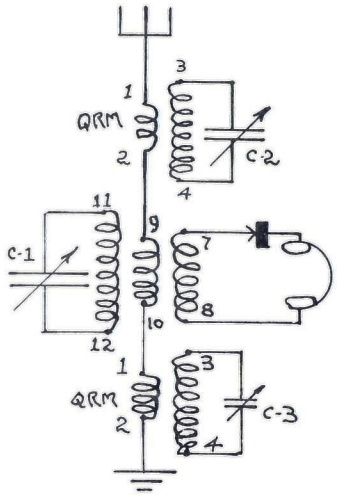
STANDARD PARTS LIST.

C-1. .00035 Variable condenser.
C-2. 2-gang .00035 var. cond.
C-3. .0001 mica condenser.
L-1. Standard BC Loopstick.
S-1. Switch lever and points.
S-2. SPDT Toggle switch.

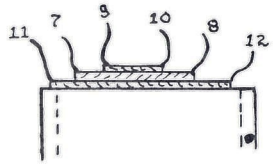
A Detail Print
by
Modern Radio Laboratories.

MRL Nº 9 SELECTIVE CRYSTAL SET.

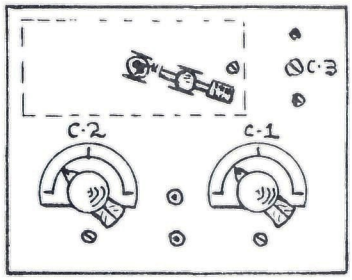
DP 24



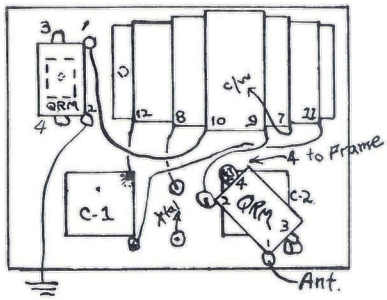
1. Schematic Diagram.



2. Coil Layout.



3. Panel layout.
Scale ¼'' - 1''



4. Rear Panel Layout.

A Detail Print
by
Modern Radio Laboratories.

PARTS LIST.

2 .00035 variable condensers.
1 25-280 Trimmer (C-3)
2 MRL QRM Coils.
2 1¼" bar knobs and scales.
1 Compo. panel 5½ x 7.
1 Crystal stand.
1 Steel galena or Diode.
2 Phone tip jacks.
1 MRL #9 coil.
1 6-32 x 1¼" machine screw.
3 6-32 nuts to fit.
Hardware, etc.

This circuit was originally a German Telefunken tuner. It is similar to our No. 4 circuit - except the latter doesn't use QRM coils. It is designed especially for cutting out local interfering stations. Around San Francisco, we can easily separate 14, or more stations and bring them in with good volume, on phones, up to 25 miles away. Also quite a bit of DX has been reported with a big Aerial.

Lay it out according to the panel diagram, altho this is not critical. A smaller panel may be used if desired. Mount condenser (C-3) in position as shown - so it may be adjusted from front of panel with a screwdriver.

TUNING COIL. The 3 windings are put over each other, with a piece of paper in between them to make it smooth. On an MRL 2XM Celluloid form, 2" x 4½" long, wind coil (11-12) of 75 turns of #22 DCC, and secure. W/S (winding space) is 2-7/8". Now cut a piece of wrapping paper 2x10" and fasten over this coil with Cello. tape. Then wind coil (7-8) of 30 turns #22 DCC (W/S - 1-1/8"). Then another piece of paper 1x10" over this. Now wind coil (9-10) of 15 turns #22 over the center of previous coil. (W/S - 5/8"). Cement edges of coils with Light coil cement. Mark the end terminals on paper, as shown in diagrams. Mount this coil parallel with the panel, with the 1¼" screw, so it will clear the condensers.

QRM COILS. On 1" fibre tubing, 1½" long, wind 110 turns #32 enameled wire and bring out to lugs (3-4). Paint with Light coil cement. When dry, wind 20 turns #30 DCC, close-wound, over the center of this winding, and run to terminals (1-2), and cement it down. Mount the QRM coils away from the main coil - preferably at right angles- to lessen coupling effects. Mount one coil right behind the trimmer condenser by means of terminals (3-4). Mount the other QRM coil with (4) lug soldered to the condenser frame, and lug (3) to the stator lug. Several QRM coils and condensers may be hooked in series if desired - with each tuned to an interfering station.

MRL Steel galena, Iron pyrites, Silicon or Carborundum and batt. may be used. Be sure to use fine catwhiskers. A manufactured fixed Diode may be used - but they always tune broadly.

Good phones are essential for good volume. Also, there isn't anything like a good Aerial and ground for good reception.

When operating - tune in your worst interfering station. Then, bring the trimmer condenser (C-3) around so it cuts this station out, or down as much as possible. If it is located on the low-frequency end of the dial - you may have to add a .00025 mica condenser across the 25-280 to reach it. You then may leave this condenser tuned to this station all the time.

Condenser (C-2) is used the same way as (C-3), except it is adjusted at will, for any little interfering station, as you come upon them. We prefer to tune (C-1) in good and loud - then bring (C-2) up until it knocks off the bothersome station near it.

Now, go ahead with condenser (C-1) and bring in the rest of your stations. You will find this is a very nice, simple little set, with no switch points, coil changes, etc. to operate.

There is a little story about how we got our first circuit. We owned Manchester Radio Electric Shop in Los Angeles, in the 20's - and C. D. Tanner came in with one of these built into a box, less QRMs. We snapped it up because it was unusually selective for Los Angeles. He hadn't passed the door before we had the back off and circuit traced.

It makes a good AM pickup for a Hi-fi set - and the crystal tone is excellent for this. The output may be fed into the audio output of a TV set - and will almost equal the FM signals you now receive on it.

We have not pushed this circuit too much - altho it has a lot of possibilities. The tuning circuit acts as a booster and may be placed ahead of any BC set to help in selecting stations - especially if you are in a congested Radio area. Due to its boosting effect - you might notice a great increase in signal strength.

SOME REPORTS ON MRL No. 9 XTAL.

PENN., McDonald, A. S.: "On #9 I separate all locals and receive about 20 others - most of which are 300 to 500 miles away. Have built most of HB-17 circuits and they all work good."

CALIF., San Francisco, D. L.,: "Just finished #9 and logged 11 stations. Have Aerial 28 ft. long and 12 ft. high in the City."

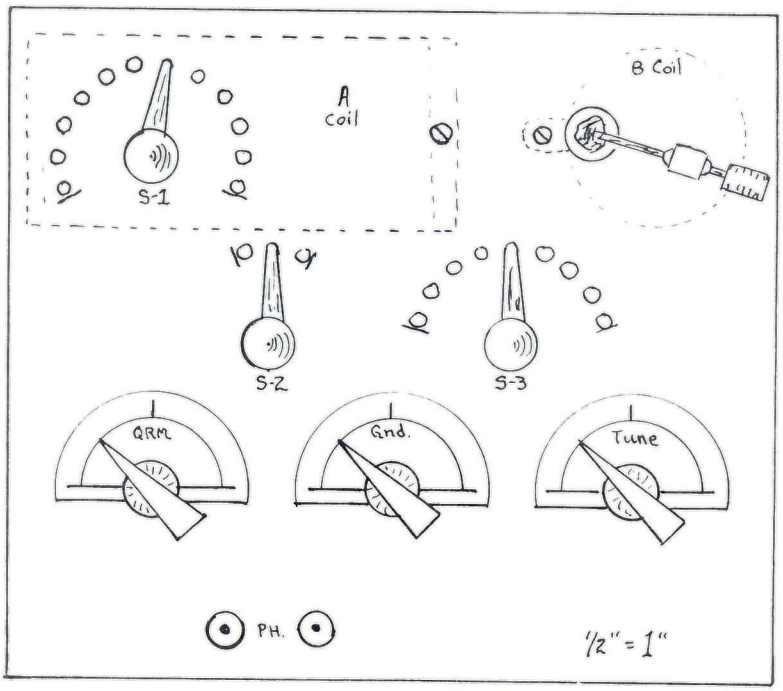
WASH., Yakima, V. C. C.: "Selected all the BC stations in Seattle, Police, etc. on #9, last winter. Did not use QRM coil in this particular set. I hooked a 6 watt amplifier and got noise-free reception from Seattle. Even the best Radio models could not cut out interference in this particular spot."

TEXAS, Gustine, T. D.: "On No. 9 which isn't supposed to be a DX set - I got KSL (1000); WGN, WLS WENR, WLW (900); WSB (800); WHO (700); KOA (650); KMOX (600); WWL (500); KTHS (375); KTUL, KVOO (300); KWKH (250); KOMA (200) & XEAW, XEMT, XERA in Mexico.'

NEW JERSEY, Clark, G. D.: "Your No. 9 is a great circuit for DX. Get wonderful reception."

THE FLEXTAL CRYSTAL SET.

DP 25



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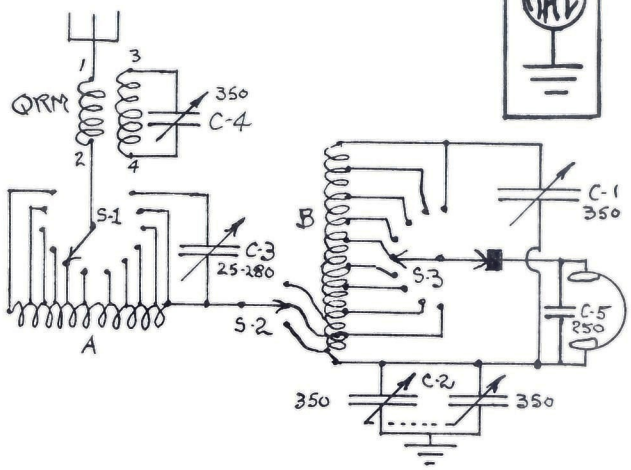


PARTS LIST.

2 .00035 variable condensers.
1 2-gang .00035 variable.
1 25-280 trimmer.
1 .00025 mica condenser.
3 Switch levers.
24 Switch stops or lugs.
1 MRL QRM Coil.
1 Compo. panel 7x8.
3 1¼" Bar knobs and scales.
2 Phone tip jacks.
1 K/D Crystal stand.
1 Steel galena Crystal.
(or Diode & 2 Fahnstock clips)
2 MRL 2XM Cello. form 2x4½.
100 Ft. #20 DCC wire.
2 Fahnstock clips for A-G.
1 ½x½ bracket for B coil.
1 1¼" screw and nuts for A coil.
5 ft. 18 stranded hookup wire.
3 ft. 22 " plastic wire for coil leads.

Milton M. Schuman, Maryland, designed the original circuit. It was first described in MRL literature in "Radio Builder" No. 33. He swears it is the best crystal circuit he ever used. The circuit is both selective and an excellent DX-getter - depending on adjustments that are made by the operator. Milton sez lots of Fans praise it - and it has even been written up in an Australian Radio magazine.

All these circuits can be found in MRL plans - but it took Mr. Schuman to "mix them up" in the right proportions to call it the "Flextal" - or flexible Xtal set. He also says our Celluloid coils are the best ever for Xtal sets, etc. Hundreds also agree.

You will note we made quite a few changes from our RB-33 description. In the first place- we have enlarged the panel to 7x8 - which prevents crowding, and allows all controls from the front of the panel.

Here is the principle of the circuit- starting from the front end. Signal enters the QRM coil, which traps out bad stations that interfere. Then we go into a loading coil (A), which is regulated according to your Aerial length, interference, stations, etc. - and helps bring the A-G circuit up near the frequency of incoming signals. Then we go into the coupling switch (S-2), which allows the required degree of RF energy to flow into the coil (B) - a form of step-up action. The 2-gang .00035 variable condenser (C-2) gives finer tuning for the A-G circuit - which brings up the volume. Selectivity of the secondary circuit (B) is controlled by means of the switch (S-3). The nearer to 90 turns, you have in, the broader the set tunes. By adjusting the switch - a certain balance between the impedance of the crystal, the circuit and local conditions is obtained. In Schuman's location and with his Aerial - the 30th turn seems to be best, but yours may differ. Previously we suggested a temporary contact on coil (B) - but we believe the switch (S-3) is more practical. In case your locals go off the air - you can open up to around 90 turns - and get more DX.

We believe the present layout to be the best yet. It is neat in appearance - but still gives all the controls you wish in order to have good operation.

Just measure on the panel diagram- and double it, and you get exact measurements. Cut a ¼" hole in a piece of heavy paper, and fit over a condenser shaft, to make a condenser template. Punch the mounting holes in the paper - and transfer to panel.

Note the 2-gang condenser has both stators hooked together - to make a large capacitor. Two small Fahnstock clips may be put behind the crystal stand screws for Diodes, if you wish. Because you control the selectivity - Diodes will work OK. We stress this because Steel galenas, Iron pyrites, Silicon and Carborundum tune sharper than manufactured Diode crystals.

Assemble and wire up all the set - except the coils, which U do last to keep them out of the way. Use #18 or 20 hookup wire for the set. When wiring up the coils to the switch points - use our #22 stranded plastic hookup wire for best results.

A-COIL. This is made of 90 Ts #20 DCC, wound on an MRL 2XM celluloid form - and tapped at 0-5-11-18-26-35-45-56-68-71-90 - making 11 taps. We add one more for the 25-280 trimmer - in case you want hi-frequency reception.

B-COIL. This is wound the same - but tapped at 5-10-15-20-30-40 50-60-70-80-90 - making 11 taps. For taps 5-10-15 - we go to the coupling switch (S-2). For the switch (S-3) we use the 10-20-30 etc. - every 10 up to 90 - making 9 taps in all. This is the selectivity switch. Other adjustments have very little effect on tuning of (C-1) which is a good characteristic.

Mount the QRM coil at the back of (C-4) - with lug 3 or 4 soldered to the frame of the condenser, to conserve space. QRM coil is 110 turns #32 enameled wire on 1" fibre tubing form 1½" long, and run to lugs 3-4. From 1-2 lugs - run 20 turns #30 DCC, closewound, over the other winding. The condenser (C-4) is set on the most bothersome station and left there. Then go ahead and tune the balance of the set.

When mounting the coils - note we have placed (A) parallel with the panel - and raised up far enough on the 1¼" screw to clear condensers. Mount (B) on bracket back of crystal stand - reason for mounting the coils last.

MRL 1-TUBE TRIODE D.C. SHORT WAVE RECEIVER.

VARIABLE CONDENSER REGENERATION - OPTIONAL TUBES

DP 29

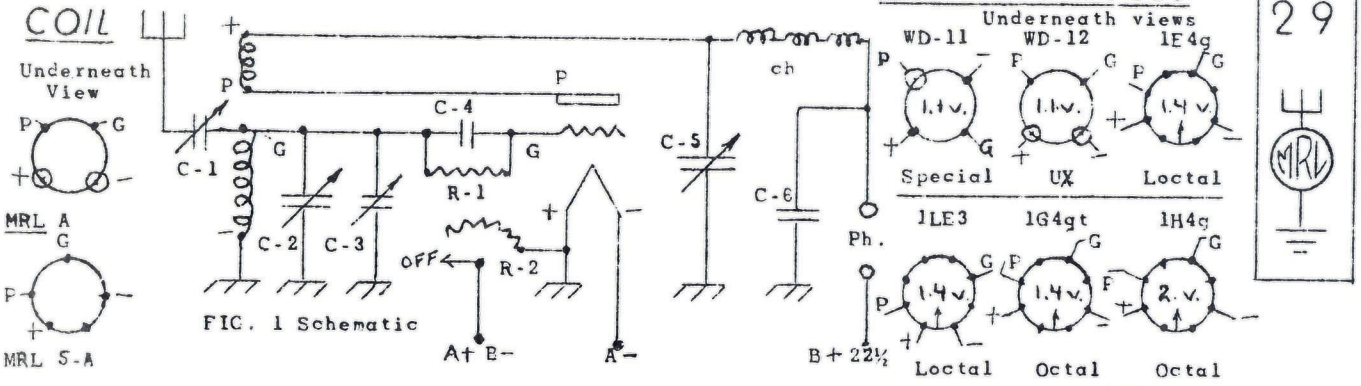


FIG. 1 Schematic

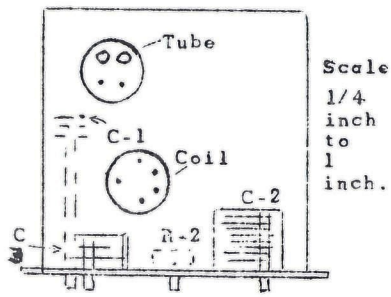


FIG. 2. Base layout

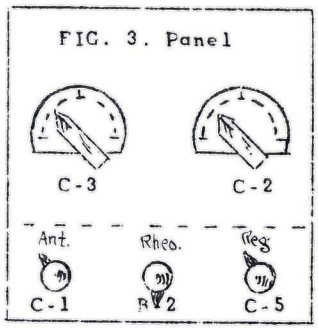


FIG. 3. Panel

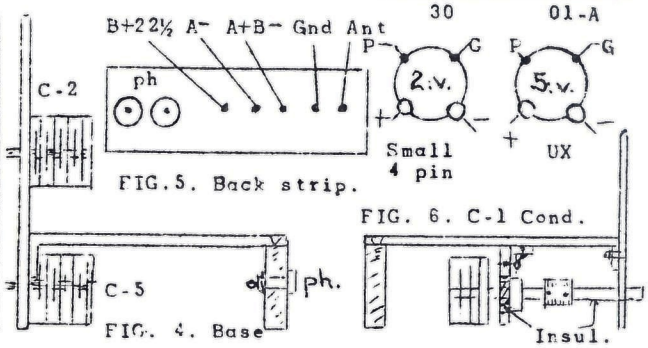


FIG. 4. Base

FIG. 5. Back strip.

FIG. 6. C-1 Cond.

PARTS LIST.

1 16 Guage Aluminum Panel, 6½ x 6½.
1 ditto Base, 6½ x 5 (including ½ " brack)
1 3/8 Plywood back strip, 5½ x 1-15/16.
1/4 " for ends, if desired.
2 1-1/4 Bar Knobs and scales to match.
3 Small Pointer Knobs for 1/4 inch shafts.
1 4 prong Wafer Socket (A coil); or 5 prong (5-A).
1 Tube Wafer socket, as per tube diagrams.
C-1 3 Pl. Midget Var. Cond.; Bracket with insulated shoulder bushing; insulated shaft Extender.
C-2 .00014 mfd. (19 plate) Midget Var. Tuning Cond.
C-3 2 plate Midget Var. Cond. for Vernier tuning.
C-4 .0001 mfd. Mica grid Condenser.
C-5 .0001 mfd. (14 plate) Midget Var. for regeneration.
C-6 .00025 or .0001 Mica regeneration Condenser.
R-1 2 meg. x 1/4 watt grid leak Resistor.
R-2 6 ohm Rheostat with off position. (20 ohm for 01-A)
ch 2½ mhy Radio Frequency Choke, or larger.
ph 2 Phone Tip Jacks, thru back strip.
1 Set MRL Hi-Q Celluloid Coils, type A or 5-A.
1 Tube, as per tube diagrams.
1 22½ volt B-Battery.
Filament Supply Battery.
#20 stranded Hookup wire.
Hardware, lugs, solder, lockwashers, etc.
1 2000 ohm Headset, or better.

For Amplifier stage details, see DP-63.
For Tuned Radio Frequency Stage, see DP-38.
For A.C. Power Supply, see DP-49.
For Coil specifications, see DP-63.

GENERAL. Thousands of our old DP-29 have been sold. Actually, we just wore the old stencil out. Originally designed for 5 optional tubes; this one has 8. A more modern chassis layout and better operation is obtained with new layout, altho old one played Europe on several occasions. Also, this DP allows ample space for another tube to be added later for more power. The insulated Antenna Cond. (C-1) working to the front panel is the secret of DX on this set, in lieu of the cheap trimmer cond. placed at the rear by most companies. The Rheostat (R-2) reduces voltage from new batteries, as well as cutting all power supply when in the "off" position. Phones come out the back for easy construction. Tube diagrams give connections, socket type and voltage to be used. Compare with schematic.

CHASSIS. Build Panel and Base to approx. sizes given. Bend ½" bracket on front of base and fit to panel with RH screws. Make top of base 2" up. Cut back strip of 3/8" Plywood and drill. Fasten on base with #2 FH wood screws. 1/4" Plywood ends may be used for stability if desired. Measurements to 1/4" scale. Mount socket prongs in position shown for short leads.

ASSEMBLING. Mount chassis, sockets and all parts and glue on dial scales. Leave latter set for awhile until dry. Make all parts rigid as you mount them, so you won't have trouble later.

CONDENSERS. Ant. Cond. (C-1) mounts on an Alum-bracket under chassis. Be sure to make hole large enough to take insulated shoulder washer to separate bushing from bracket. Use insulated shaft extender to front panel control. For vernier Cond. (C-3) take a 3 or 4 plate midget Cond. and remove all but 2 well-separated plates. This is essential on 20 m. band, for fine tuning. Experiment with (C-6) mica regeneration Cond. until you get good smooth regeneration on (C-5). If too much regeneration, use a smaller Cond. at (C-6). Test Condensers with battery and phone to see if the plates R shorted. **Note;** Don't let (C-1) touch chassis, or your set will be "dead."

WIRING. Use colored pencil to check off circuits on diagram as they are wired. Use soldering lugs and lockwashers to make all joints solid. Ground all chassis connections to nearest screw and lug. This plan shows bottom views of all sockets.

COILS. For lack of space we cannot give coil details. (See DP-63).

OPERATION. Set Rheostat (R-2) at lowest position possible to operate the set, to conserve tube and filament battery. Hook B-battery. Insert tube and broadcast coil. Vernier Cond. (C-3) is not effective on BC or 160 meter bands. Raise Regeneration Cond. (C-5) until you get a squeal and reduce just below this point. Open Ant. Cond. (C-1) on BC in order to make set more selective. On 20-40 meter bands, set (C-1) at zero; 25 position for 80 meter band; 50 for 160 m. If too close to a strong BC station, remove the ground or use a shorter Aerial - or an MRL QRM Coil may be used in the ground circuit if desired. Set latter Cond. on station and leave it, while tuning balance of set as usual. A detector stage coupled to the Aerial has more efficiency than any other if built right. If your set is efficient, very little regeneration will be required, when tuning. This is the best test to see if you did a good job! Losses in the high-frequency stages will always cause one to use more regeneration to compensate for these losses.

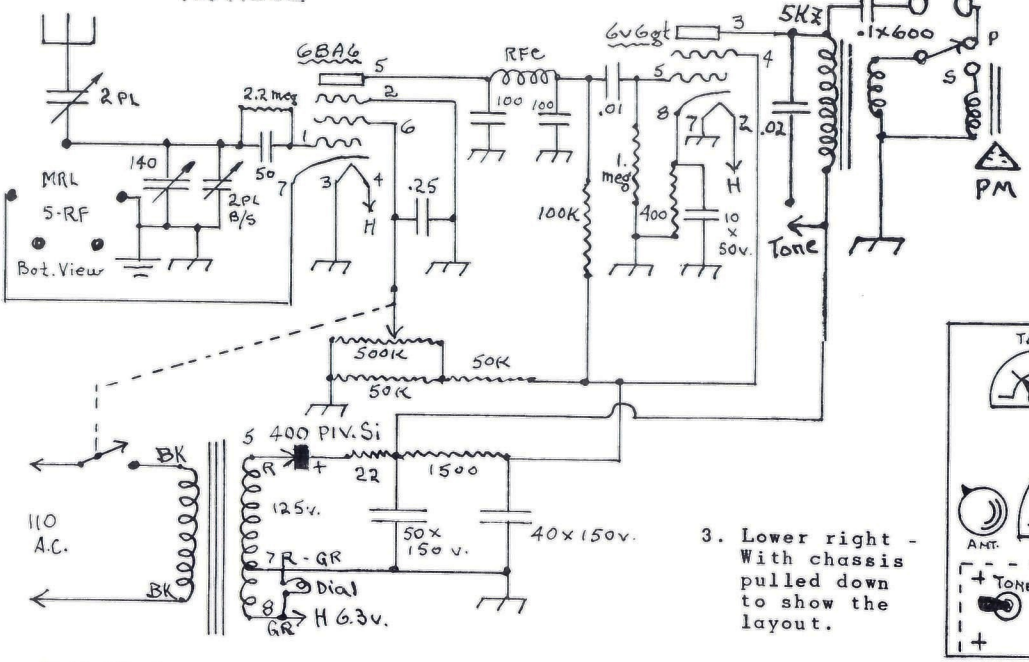
MRL 2-TUBE AC. ALL-WAVE RECEIVER.

Revised

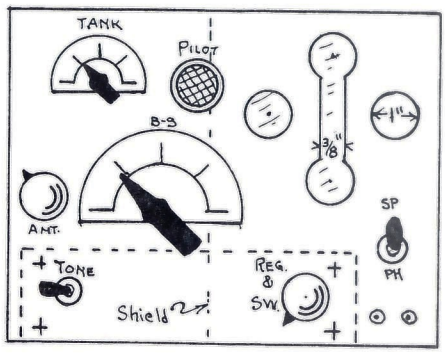
A Detail Print by Modern Radio Labs. 569

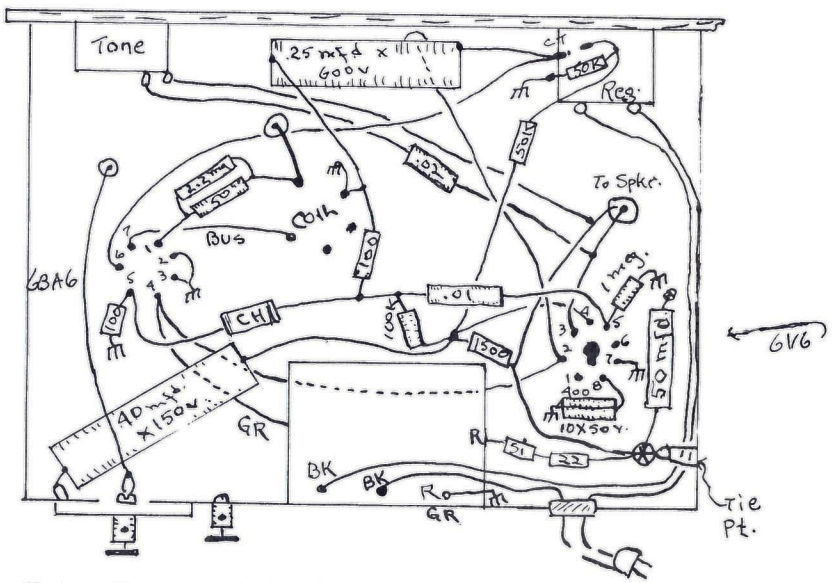
DP 31

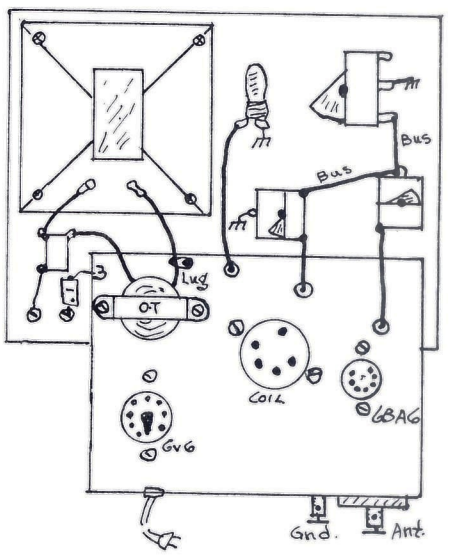
1. Schematic Diagram.
2. Below - Shows Panel layout. Scale ¼"-1"



3. Lower right - With chassis pulled down to show the layout.







4. Under Chassis wiring View. 50 mfd. filter removed at right to show parts. Cond. connects at (X). Scale ½" - 1".

PARTS LIST.

2 2-plate variable condensers.
1 .00014 do
1 50 mmfd. mica or ceramic cond.
2 .0001 do
1 .01 x 600 bypass condenser.
1 .02 do; (1) .1x600
1 .25 do
1 10 mfd. x 50 v. bypass cond.
1 40 " x 150 v. do
1 50 " x 150 v. do
1 Each ½ watt resistors 22-400-1500-100K-1 meg.-2.2 meg.
2 50K x ½ watt resistors.
1 500K vol. control and switch.
1 125 and 6.3 v. power transfr.
1 5K ohm imp. output transformer.
1 400 PIV Silicon Rectifier.
1 2½ mhy. RF choke.
1 4" PM speaker & grille cloth.
1 SPST; 1 SPDT toggle switches.
1 5 prong wafer socket.
1 Octal do
1 7 prong do
1 Bayonet dial socket & bracket.
1 1¼" bar knob and scale.
1 2" do
2 Small pointer knobs.
2 Phone tip jacks.
2 Binding posts.
1 6 ft. 110 v. cord & plug.
1 7 x 9 Compo. panel.
1 4½ x 7 tin shield.
1 2 x 7 x 5 Aluminum chassis.
3 ¼" Rubber grommets; 3 3/8".
1 6BA6 tube; 1 6V6; 1 #44 pilot.
1 1-terminal tie point.
Wire, hardware, etc.
MRL 5-C coils, types HF-BC, LF-BC and short wave set.

This is one of the most sensitive 2-tube circuits we have ever used. It uses the electron-coupling method of regeneration, which is superb.

During daytime, in our poor location, we easily play New Jersey, Montreal, etc. on the speaker. Our original circuit, using 6C6 and 42, with separate power supplies, has done exceptionally well on DX. With these modern tubes and layout - you should get lots of DX in a good location with high Aerial.

Due to so many details, we decided to draw more than explain. We don't believe you can improve on the layout. Note how chassis is bent down to show details. Parts are not critical in values but use a .00014 with wiping contacts. Selenium rectifier is mounted outside to keep heat from the condensers, etc.

One novel stunt is the switch to throw from speaker to phones. Tone is controlled by a switch.

The dial lamp is another item not used on most small SW sets.

See Handbook 6 for coil data.

A good high SW Aerial and a good ground are best for DX. With local BC stations, use a short Aerial and possibly take off the ground connection.

MRL POCKET RADIOS No's. 7-19-32.

DP 33 MRL

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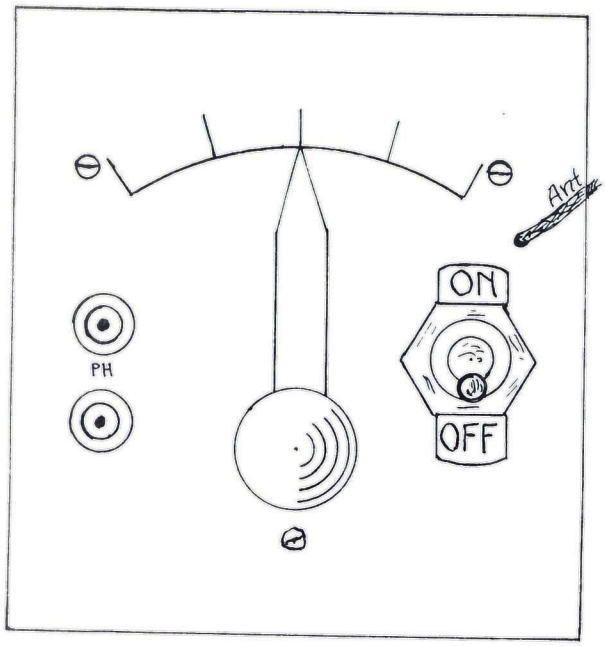
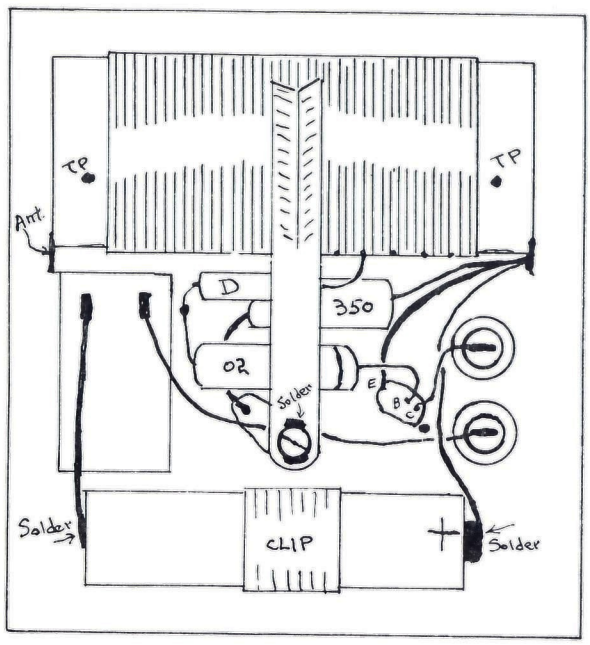
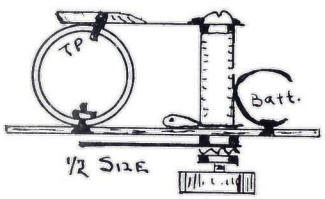


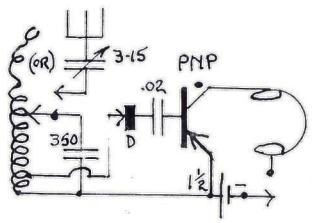
1. #19 Top View. Full size.



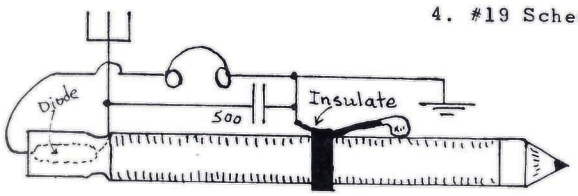
2. #19 Bottom View.



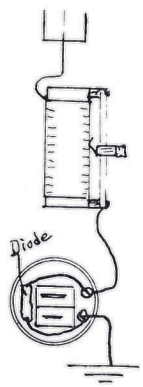
3. #19 Slider Mounting.



4. #19 Schematic.



5. #32 Pencil Radio.



6. #7 Earphone Set & Loading Coil.

#32 PENCIL SET PARTS.

1 Large novelty pencil.
1 Crystal diode.
1 .0005 mica or ceramic cond.
1 Pencil pocket clip.
50 ft. #32 enameled wire.

You might pick up a large novelty pencil about 3/8" in dia. at a dime store. Remove eraser and drill thru the end and solder the diode lead as shown.

Solder on the coil lead and wind it full of wire. Paint some Light Coil cement over the wire, except where the slider runs. File, or sandpaper lightly for the slider path. Insulate the clip with plastic tape, and solder a flexible lead. You should be able to get several locals.

#7 EARPHONE RADIO PARTS.

1 Single earphone.
1 Crystal diode.
1 #7 loading coil, or make:
60 ft. #22 enameled wire.
Bak. tubing 2" x 4" long.
1 Slider and rod 4" long.

Just mount a Diode inside a headphone, or on the back, if it is easier. Wind the loading coil of about 100 turns #22 enameled on the Bak. form. Start in about 3/8". Mount the slider and rod. Paint the coil with Light Coil cement, except where the slider runs. File, or lightly sandpaper the path. Try to make the slider touch but one turn at a time by making it "V" shaped at the end. A greater range of stations may be had if you put a .00025 mica condenser across the coil. You may use any light fixture, stove or telephone for pickup. If you want an outside Aerial - put a 3-15 trimmer in series with Ant. and coil. Often it works more selectively without a ground.

#19 PARTS LIST.

1 Compo. panel 3 x 3¼.
1 #19 coil, or make:
Bak. tubing 1" x 2½" long.
40 ft. #28 enameled wire.
1 SPST toggle switch.
2 Phone tip jacks.
1 .00035 mica (250 plus 100).
1 .02 bypass condenser.
1 Crystal diode.
1 PNP Transistor.
1 Pencell and clip.
1 Slider parts and knob.

Wind coil of about 140 turns #28 enameled. Make taps every 10 - up to 50, by running a paper strip under. Make them come to the rear. Paint Light Coil cement over all the coil - except where the slider runs. Drill 2 countersunk #4 holes to hold coil.

Lay the panel out exactly as shown to give plenty of room for parts. Make Phosphor bronze (3) slider. Bend lever to a "V" shape to make it run better and hook to one turn at a time. Use a metal bushing to hold it up. When slider is mounted - drill 2 tiny holes and force toothpicks (TP) into each and cement on each side. These make good stops.

Wire up the set- but mount the slider last. You may like a better positioning of parts. Be sure to get Batt. and Transistor in right, or "Pftt" goes a Transistor. Drain is very low.

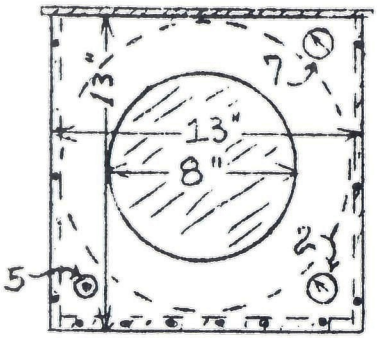
We find the #4 tap the best, but others may be tried for your location, for best selectivity. Note the unused part of the coil is part of the Ant. circuit. You will find plenty of selectivity in this little set. We play about 8 locals with good separation. Use a 3-15 trimmer in series to an Aerial. Otherwise, the same Aerials as noted for #7, etc.

You may fashion a paper dial scale for your location. Fit a plywood box around it for protection of parts.

.00035 seems to work the best for tuning condenser. You may use a .00025 and .0001 in parallel to get correct coverage.

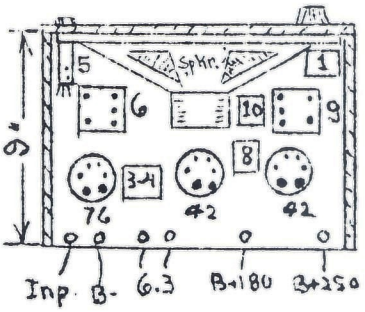
MRL 6-WATT CLASS B POWER AMPLIFIER.

DP 38 MRL



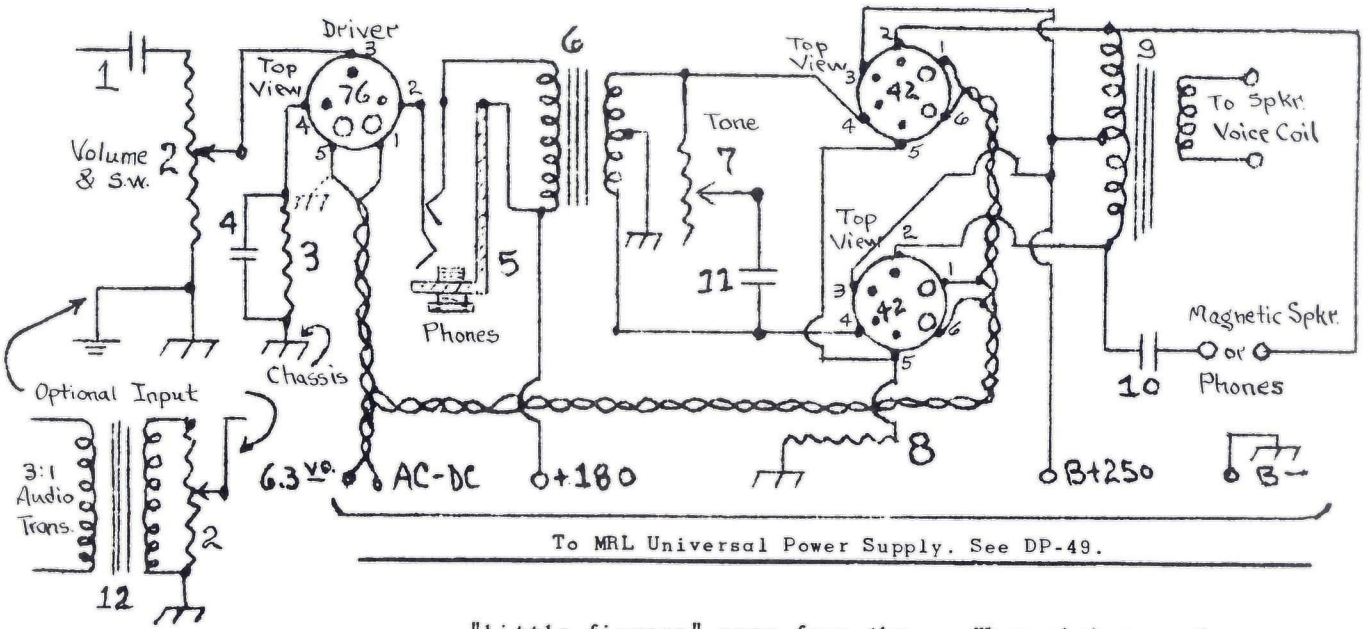
1. Panel View. 1/8" - 1"

A Detail Print by Modern Radio Labs.



2. Top View. Back is open.

3. Schematic.



To MRL Universal Power Supply. See DP-49.

PARTS LIST.

1 Box, as per dimensions.
1 3:1 audio trans. if desired. 12
1 Push-pull input transformer. 6
1 " output " 9
1 500K vol. control & switch. 2
1 50K tone control. 7
1 Dyn. or mag. speaker 12" pref.
2 .01 x 600 condensers. 1 - 11
1 .1 x " .10
1 25 x 50 v. " .4
1 200 ohm 1-watt resistor. 8
1 2K " " .3
1 Double phone jack. 5
1 5-prong base socket. 76
2 6-prong " .42's.
2 1" pointer knobs.
6 Binding posts or cable.
1 76 tube. 2 42 tubes.
Hookup wire, hardware, solder.

Details must be lacking, due so space, but if you follow layouts and diagrams - you should have no difficulty.

The panel forms the front of the box and is fastened to the base - that makes the bottom of the box. Make the panel 13" sq. and the base about 9" x 12½" if using ¼" plywood stock for box. Fasten the top of the box and ends together as one unit. When completed - the ends screw to the base and the panel to the front of the box- making it easy to get to the wiring if desired. Do not make a back - but a door may be made of screen to keep "little fingers" away from the hot stuff.

Cut as large a hole as possible for your speaker and cover it with grille cloth. If desired - you may use a piece of Cellotex, or other material, between speaker and panel to better the tone and cut down harmonic vibrations and rattles.

Mount the baseboard parts in approximate positions as shown. Trace the numbers back to the diagrams. Drill holes for the volume and tone controls and the jack. If you wish - you may add a jack, or tip jacks for phones on the output for magnetic spkr. but this won't do your phones any good! Use the two knobs on these controls.

Selection of speakers is optional, but as this has a 6-watt output - I'd get a big one, and you'll get "better acquainted with the neighbors!" We used to get RCA #100 magnetic speakers, but doubt if they may be obtained in salvage stores now. The dynamics have a much better tonal range and reproduction.

A PM speaker is a little easier to install, altho the external field dynamics give a better tone. In the latter - the field is energized by the power supply and acts as another filter choke to smooth out some hum.

The .01 condenser is about OK for tone control - but if you want lower tone - use a .1 mfd.

When wiring up the power supply filament - be sure to ground one side. Note we have grounded it at (5) on the 76 tube. This grounding gives a bias for the tubes and cuts down hum.

Note connections to sockets R top view - which has an advantage in top-base wiring here.

Our Universal Power Supply is ideal for this layout - altho any supply with 6.3 v. filament is alright.

Plugging in the phones cuts out the speaker - and shows you just how much the speaker amplifies in the push-pull stage.

For general use we prefer the 3:1 audio transformer as it has many advantages. It has less effect on the output of Crystal sets, Transistor rigs, etc. than the condenser-resistor input.

A microphone may be used on the front end - but the transformer should match the mike.

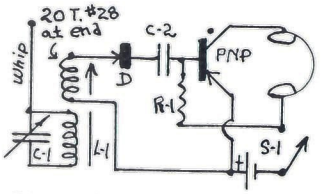
This amplifier makes a good public address system. You can have a lot of fun with it when you bring in those weak DX stations to room volume.

This was one of our original DPs - having sold hundreds of them over the years. We used to build these units up so these plans are authentic. Lots of Fans have reported good results.

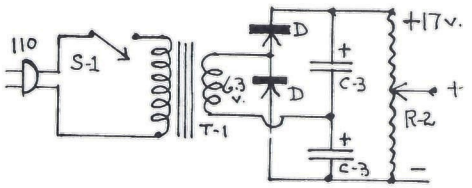
Build this rig up permanently, as it can make a good Hi-Fi unit as well as for DX. Other tubes may be substituted if desired.

16 TESTED TRANSISTOR CIRCUITS.

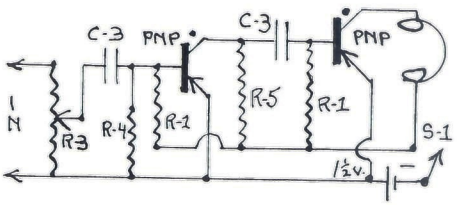
DP 39



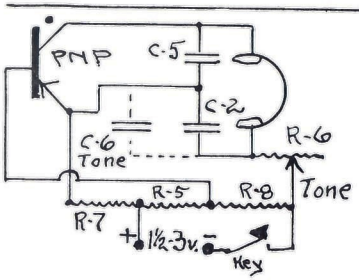
39-1. Simple Selective Receiver.



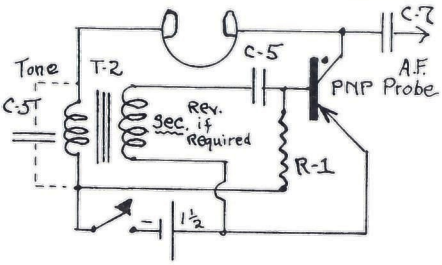
39-2. Transistor AC-DC Power Supply.



39-3. 2-stage Transistor Amplifier

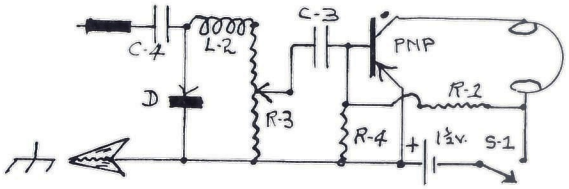


39-4. Code Oscillator.

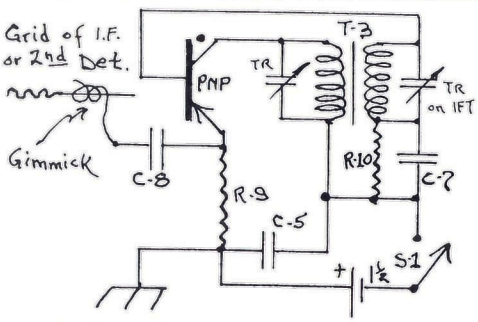


39-5. Another Code Oscillator.

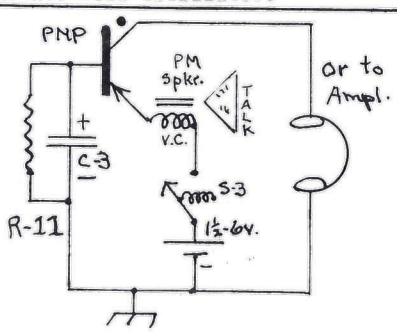
A Detail Print by Modern Radio Laboratories.



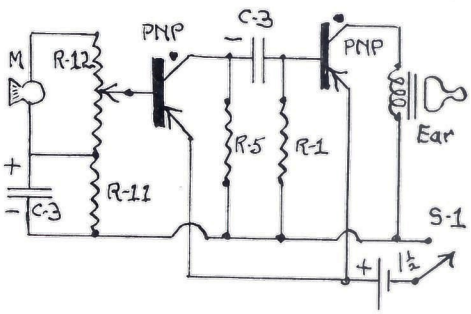
39-6. Signal Tracer.



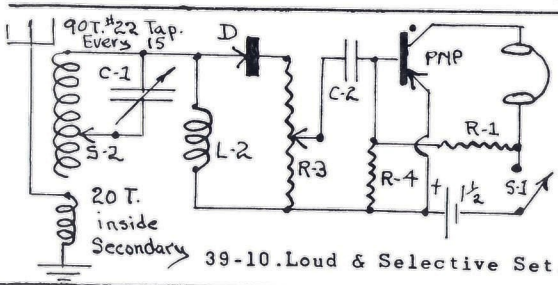
39-7. Beat Frequency Oscillator.



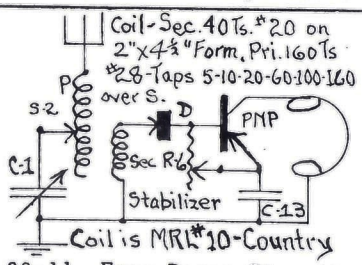
39-8. Microphone Pre-amplifier.



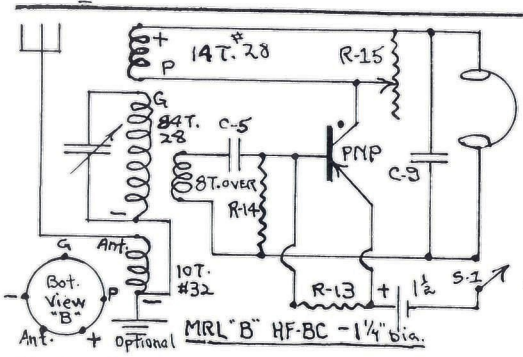
39-9. Hearing Aid.



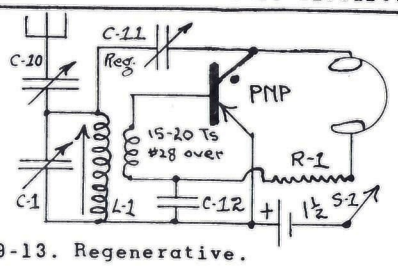
39-10. Loud & Selective Set.



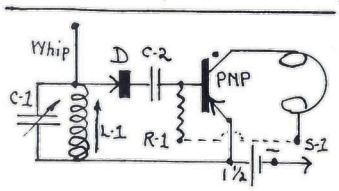
39-11. Free Power Circuit.



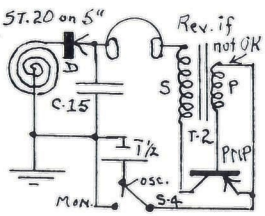
39-12. Regenerative Set.



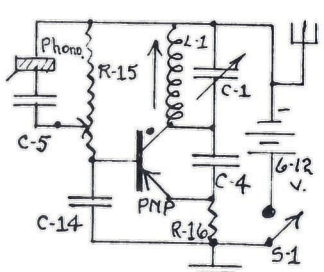
39-13. Regenerative.



39-14. Pocket Radio.



39-15. Osc. or Monitor.



39-16. Phonograph Xmtr.

PARTS LIST. (All standard.)

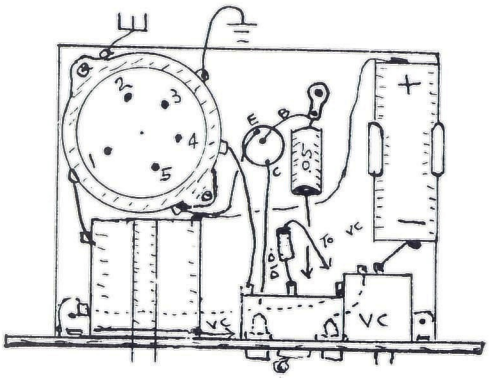
C-1 .00035 midget or stand. var.
C-2 .02 bypass. C-3 10. bypass
C-4 .0001 mica. C-5 .01 bypass.
C-6 .1 bypass. C-7 .001 mica.
C-8 .00005 mica. C-9 .0015 mica.
C-10 3-15 trimmer condenser.
C-11 .00014 variable condenser.
C-12 .01 mica. C-13 30. bypass
C-14 .0005 mica. C-15 .002 mica.
D-1 Any diode or crystal.
L-1 Loopstick or coil.
L-2 2½ mhy. RF choke.
R-1 470K x ½ watt resistor.
R-2 1K vol. control and switch.
R-3 500K same.
R-4 50K. R-5 2K.
R-6 50K vol. control no switch.
R-7 25K. R-8 2500. R-9 470.
R-10 270K. R-11 220K.
R-12 2K vol. control and switch.
R-13 22K. R-14 2.2 meg.
R-15 50K vol. control, no switch.
R-16 1500 ohm.
S-1 SPST toggle switch.
S-2 Switch lever.
S-3 SPST push switch.
S-4 SPDT toggle switch.
T-1 6.3 v. filament transformer.
T-2 3:1, or other ratio, audio.
T-3 Any IF transformer 456 Kc.

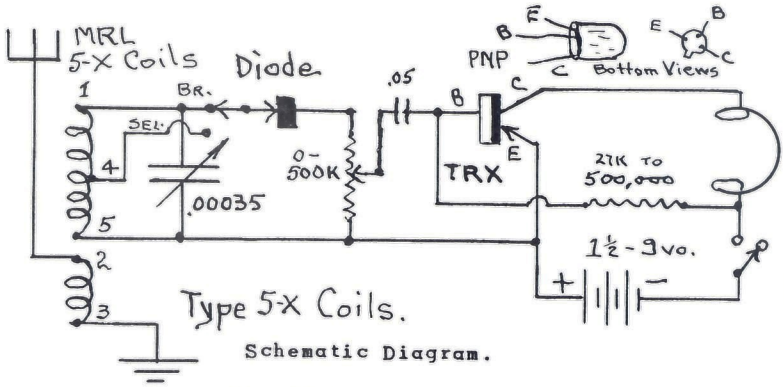
All resistors ½ watt.
Mica or ceramic condensers.
Bypass condensers low voltage.
PNP Transistors not critical.
Be sure to observe polarities to prevent ruining Transistors.
See DP-28 for "Radio Symbols."
See MRL Catalog index for parts.

MRL Nº 26 - SINGLE-DIAL ALL-WAVE CRYSTAL SET

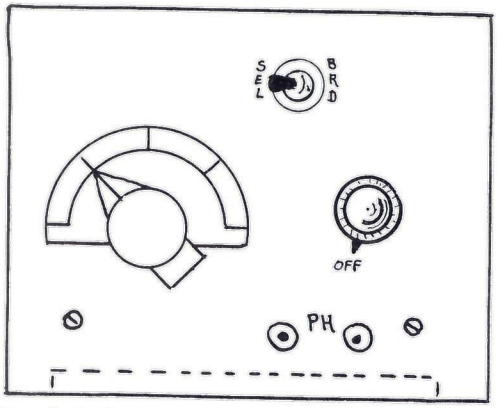
Rev. June, 1963

DP 43





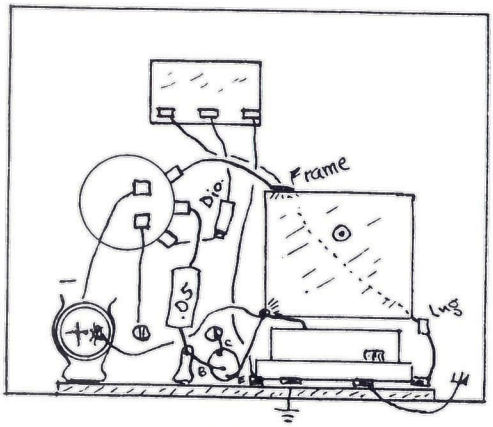
Schematic Diagram.



Panel & Base Wiring. Scale ½'' - 1''

MRL TYPE X or 5-X PLUG-IN COIL DATA.

Band	Megs (.00014 cond)	Secondary Up to	Turns	W/S	Primary Turns	Wound
20	21.5 -12.7	1"	1 3/16"	3/16"	3-24 DCC	over
40	13. - 6.	1"	1 7/16"	7/16"	5 "	"
80	6.2 - 2.7	7/8"	end	Close	10-28 DCC	end
160	2.8 - 1.25	½"	"	"	12-28 En.	"
HF-BC	2.1 - .95	½"	"	"	13- "	1/8" end
BC	1.35- .6	½"	"	"	15-32 En.	¼" end
LF-BC	1. - .436	½"	"	"	15- "	¼" "
Long	.6 - .29	½"	"	"	20- "	1/8" end

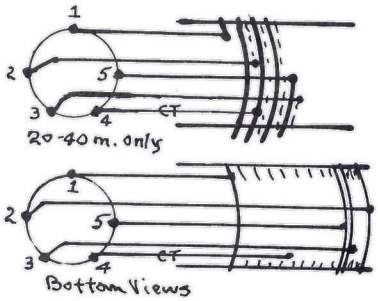


PARTS LIST.

1 .00035 variable condenser.
1 .05 x 600 bypass condenser.
1 500K vol. control and switch.
1 Crystal or Xtal diode.
1 PNP Transistor.
1 5-prong base socket.
1 SPDT toggle switch.
2 Phone tip jacks.
1 1½-9 v. TRX battery.
1 1/8 x 4 x 5 compo. panel.
1 1/8 x 3 x 4 " base.
2 ½ x ½ angle brackets.
1 1¼" bar knob and scale.
1 Small pointer knob.
1 Battery clip.
2 Fahnstock clips for A-G.
1 27K to 500K carbon resistor. (if needed).
1 MRL Type 5-X HF BC Coil. Set 5-X SW coils, if desired. Hookup wire, hdw., solder.

We have revised this circuit several times, from our original Interflex, to get this most efficient one. It is about as compact as one could make a set of this type. Because we needed to control the volume - we replaced the original choke with a volume control. We also added a SEL-BRD switch at top. It has very good tone, for such a small set, and much better than most TRX speaker compacts we hear around.

A Detail Print
by
Modern Radio Laboratories.



By experimenting, we have found the above panel and base layouts to be best. Lay them out according to scale. Mount parts on the panel and base, but mount the TRX and .05 condenser last. Be sure to get the battery in right position- as reversing it to the TRX will ruin the latter. (If using NPN TRX - reverse batt.)

Wire up neatly, using short leads. Be sure solder sticks OK. When soldering TRX - hold leads with pliers to provide a "heat sink" to cut down damage to TRX. Be sure to check TRX leads, as shown in upper right of plan. Put Fahnstock clips on A-G.

As for battery - you may use from 1½-9 - or more volts - for greater volume. A PM speaker may be added if you use a 500 ohm impedance output transformer to it. (See DP-14) As TRX draws but .25 to 1. amp. of current - your batts. will last a long time. They always recuperate power if they are idle. Be sure to turn off when not in use.

Coil Winding Details.

CRYSTAL DETECTOR. You may use any Diode, Steel galena, Silicon or any other Xtal. Or, even a Carborundum and battery in series. Try different ones on your DX stations for best detecting power. On DX stations, you may also try reversing polarity of Diode for best results, altho this isn't usually too important with this circuit.

COILS. We now use MRL 5-X type coils - which are the same as our 5-RF, except the center-tap. You may wish to change this tap, on some coils, to fit your location. The closer you place it to (5) - the more selective. If far away from strong stations - you may want to put switch on BRD and eliminate the tap. Hooking a .0001 mica condenser in series with Aerial may sharpen it, too.

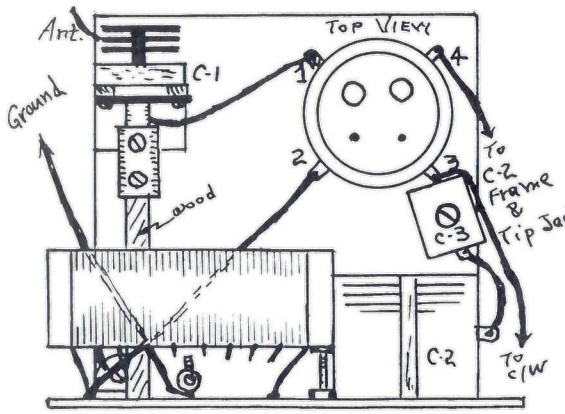
Coil ranges are for .00014 cond., altho a trimmer in series with a .00035 will give this capacity range. If using the HF-BC - it will cover most of BC band with .00035. This new tapping makes set very selective. Note coils show bottom views.

This set is getting some good DX records across Oceans. It is ideal if you are in a good location, and have a good Aerial and ground. Hams, Police, airports, foreign DX, etc. have been received on it good. As a crystal won't receive cw - you won't be bothered with "chirps!"

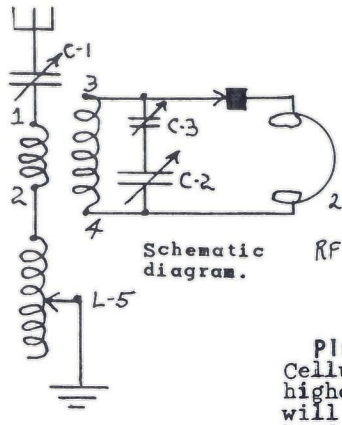
For more protection of your TRX - do not remove phones, or make changes in the circuit unless you throw batt. switch off. The efficiency of a TRX may be lowered if it is required to take a sudden surge of current.

When finished, try the bias resistor as shown. Some TRX do not require a bias resistor, or work better without one.

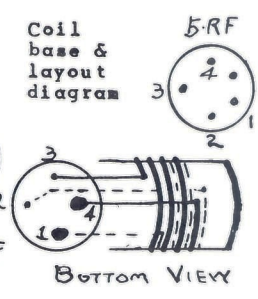
MRL Nº 28 - ALL-WAVE PLUG-IN COIL CRYSTAL SET

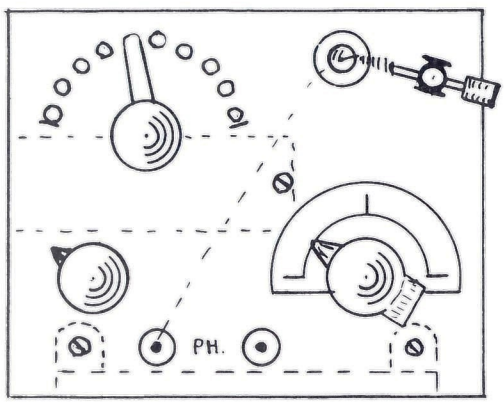


Base panel & wiring layout. - - - Scale ½" - 1"



Schematic diagram.





A Detail Print by Modern Radio Laboratories

Plug-in Coils. We prefer MRL Celluloid coils or forms for the highest efficiency, altho others will work OK. Wire sizes should be followed as much as possible. "Up" means distance up from base of the form. "To" is the end of winding, and used only for 20-40 m. spaced secondaries. The form is punched for end of the other windings. "W/S" means winding space. Primary of 20-40 m. bands is wound between turns of the secondary as shown, in order to get closer coupling and greater transference of energy at HF. On last 4 coils the primary is separated a little to increase the selectivity. If interference is still prevalent use a greater separation between windings. Use a little MRL Light Coil Cement to hold windings in place.

MRL TYPE RF or 5-RF PLUG-IN COIL DATA.

		Secondary				Primary	
Band	*Megs.*	*Up*	*to*	*Turns*	*W/S*	*Turns*	*Wound*
20	21.5 -12.7	1"	1¼"	4-22 En.	¼"	3-24 DCC	over
40	13. - 6.	1"	1½"	10-24 En.	½"	5 "	"
80	6.2 - 2.7	7/8"	end	22- "	Close	10-28 DCC	end
160	2.8 - 1.25	½"	"	65- "	"	12-28 En.	"
HF-BC	2.1 - .95	½"	"	84-28 En.	"	13- "	1/8" end
BC	1.35- .6	½"	"	120-32 En.	"	15-32 En.	¼" end
LF-BC	1. - .436	½"	"	170-34 "	"	15- "	¼" "
Long	.6 - .29	½"	"	350- "	"	20- "	1/8" end

PARTS LIST.

C-1 2 or 3 plate variable
1 Bracket for same.
1 ¼" metal shaft coupling.
1 ¼" x 3" wooden shaft.
1 Small pointer knob.
C-2 .00035 variable condenser.
1 1¼" Bar knob & scale.
C-3 25-280 (or near) trimmer.
1 UX base socket.
1 1" switch lever.
10 Switch points & 2 stops.
2 Phone tip jacks.
1 Knocked down Xtal stand.
1 Steel galena or Diode Xtal.
2 ½" x ½" steel brackets.
1 Compo. panel 4 x 5 inches.
1 ¼" plywood base 4 x 4 in.
1 Set MRL RF or 5-RF Coils.
1 L-5 loading coil (text).
2 Fahnstock clips for A-G.
1 6-32 x 1¼" FH & 3 nuts.
5' #18 Str. Hookup for wiring.
2' #22 " " " taps.
Hardware, lugs, etc.

This is one of our best crystal sets. It has many reports equal to our #2 and 2-A. Because extreme distances are covered on the short wave bands, this set should be more effective than the other two circuits.

Unused coil sections, found in the usual tapped coil, tend to deter a set's DX possibilities to quite an extent. For this reason the plug-in coil principle is used in this receiver. The DX results of the #2 and 2-A sets is due to the direct aerial connection, so offsets some dead-end effects of the tapped #2 coil.

This DP changes the #28 very little from **HB-25**, altho some minor improvements have been made. We have added 10 more turns to the L-5 loading coil for more coverage and to use 10 taps instead of 9. Also, because .00014 variable condensers are hard to get, we use our .00035 and the trimmer combination to get the same capacity.

You can see we cut the panel and base sizes down considerably - resulting in a very compact unit. Even so, the parts are not crowded.

As the layout is fairly simple - from the ½" scale, it is very easy to build. We place the Antenna trimmer and plug-in coil at the extreme rear. The drawing shows the best position for the coil socket connections.

Mount the parts on the panel first. Then, fasten the base and mount its parts. Do not mount the loading coil until last.

Be sure to wire the set up with the larger hookup wire for best efficiency on short waves. After the set is all wired up, mount L-5 coil at the back of panel. Tin the switch points and tap wires before attempting to wire up the coil. Use the smaller hookup wire for the coil leads as it is better in such a small space. You may bunch them neatly.

The **L-5 Loading Coil is** wound on a 1" Bakelite form 3" long. Start the #26 DCC wire about ¼" from end and drill 2 tiny holes to hold wire in place. Wind 90 turns and tap it every 10, by letting a ¼" strip of light card board lay under each tap wire. Drill another #6 hole at one end so taps are uppermost. This makes it easier to wire up. Be sure all joints are tight- by giving each a good jerk.

Diodes tune broadly in crystal sets, but this isn't too important in this set unless you are too close to powerful stations. It may be necessary to use a shorter Aerial for BC stations.

Tune very slowly on 20-40 m. coils. You will soon find the best position of C-1 and L-5 for resonance. Due to the absence of unused turns, you will find very little BC interference on the HF coils. Local Police bands cover about 3-4 points on the scale.

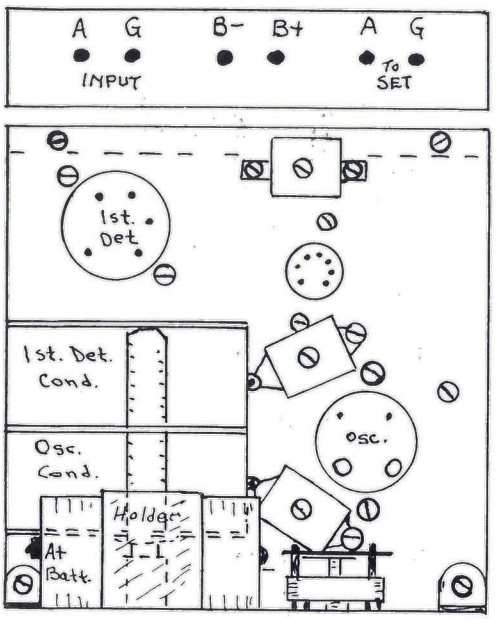
The crystal receiver is a boon to anyone not desiring code - as it cannot receive CW. It will pick up some modulated stations as coastal ship transmitters as most of them use modulated cw. If near a transmitter, it may be possible to hear key clicks.

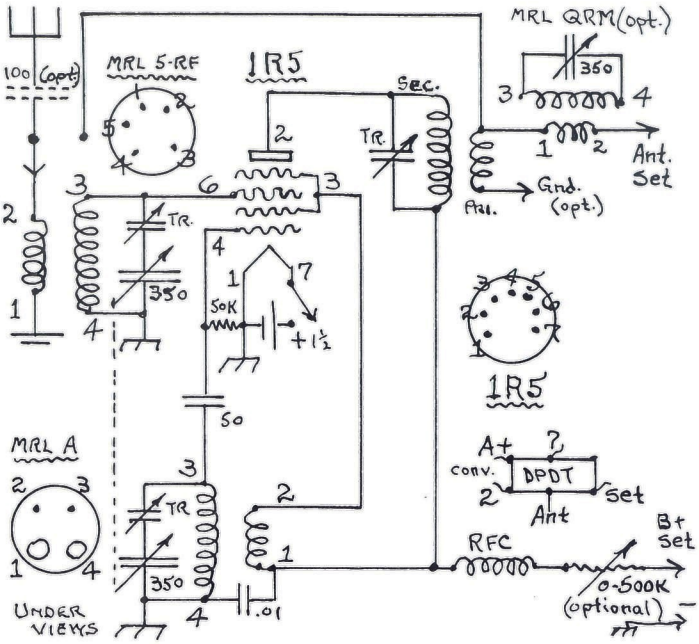
When you get a weak station, readjust the Steel galena Xtal for maximum volume. It will then be good on all DX stations.

One may feed the output of the set into the Aerial-Ground posts of a receiver by hooking the latter where the phones were connected. It will make a short wave receiver out of a midget BC receiver.

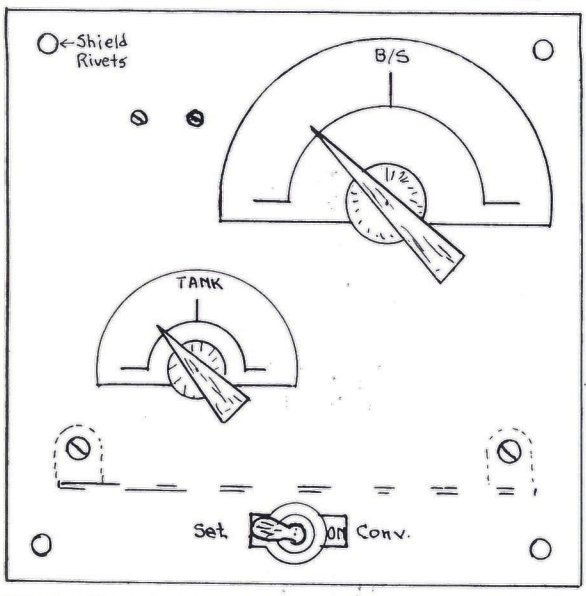
MRL 1-TUBE SHORT WAVE CONVERTER

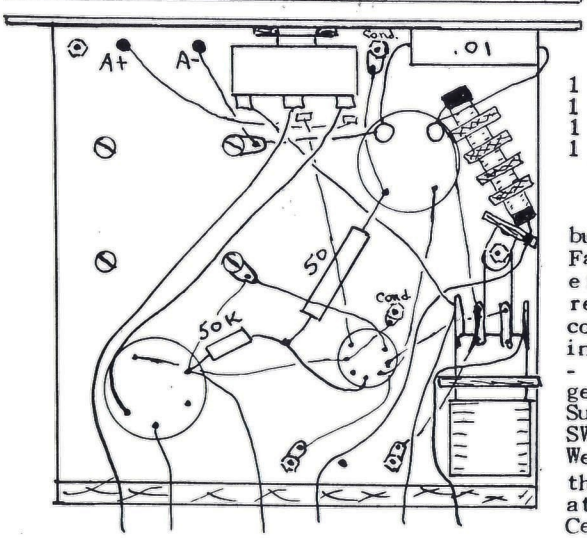
DP 57





A Detail Print by Modern Radio Labs.





A Projection Drawing showing Top Chassis View, Front Panel and Under Chassis Views.

½" = 1"

PARTS LIST.

1 2-gang .00035 variable
1 ¼x¼ extender if needed
1 1¼ bar knob and scale.
1 2-plate bandspreader.
1 2" bar knob and scale.
3 25-280 trimmers.
1 .00005 mica condenser.
1 .01 x 600 bypass.
1 AC-DC detector coil.
1 2½ mhy. RF choke.
1 Set MRL 5-RF 20-40-80.
1 Set MRL A same.
1 50K carbon resistor.
1 DPDT toggle switch.
1 4 prong wafer socket.
1 5 same
1 7 prong min. same.
1 1-lug tie point.
1 Compo. panel 6x6.
1 Tin shield 6x6.
1 Compo. base 5x5.
2 ½ x ½ angle brackets.
1 Ply. back strip 1x5.
1 #2 flashlite cell.
1 Battery holder (make)
1 1R5 tube.

OPTIONAL.

1 .0001 mica Ant. Cond.
1 MRL QRM Coil.
1 .00035 variable cond.
1 500K volume control.
Hardware, etc.

This unit can be easily built by the more advanced Fan. It is well worth his efforts - as it packs a real wallop when operated correctly. It may be fed into the A-G of any BC set - TRF or Superhet. but you get a double-change into a Superhet. We have banged in SW stations all over the Western hemisphere with this rig. You'll be amazed at its efficiency with MRL Celluloid Hi-Q plug-ins.

Altho not critical in layout - we found arrangements shown are preferred. Drawings are half/size so very easy to follow.

The 2-plate band-spreader is the heart of the set. With the larger knob you can sneak up on elusive stations. Be sure to use the tin shield in back of panel, if you are not using a metal panel. Ground frames of the two tuning condensers to it.

Make a bracket to hold the filament battery in place. Note that when the DPDT switch is OFF - it throws off the battery but puts the BC set on. When ON - it throws in the converter and the battery - but BC set is off. Because the tube draws but .05 A., the battery lasts a long time.

Use about 45-100 v. of B from your BC set. Mount single phone jack on chassis. Try 0-500 K. in series and substitute fixed resistor for correct voltage drop.

You can use our standard 5-RF and A coils without making special ones. The series trimmers overcome tracking problems.

Try setting BC dial as near 1600 Kc. for more amplification. Set controls oscillation. Adjust trimmers on 40 m. coils with an insulated screwdriver. Adjust output trimmer. Adjust on other coils for open and closed cond. By working back and forth on the dial and adjusting the 2 series trimmers - top efficiency is obtained. Once you determine BC setting - the output trimmer may remain permanent.

Separate converter about 2 ft. from the set. A coaxial line may help. We found very few harmonics on it- even near 20 BC stations.

We had no luck with the 160 m. coils due to local QRM. In the country it will be OK.

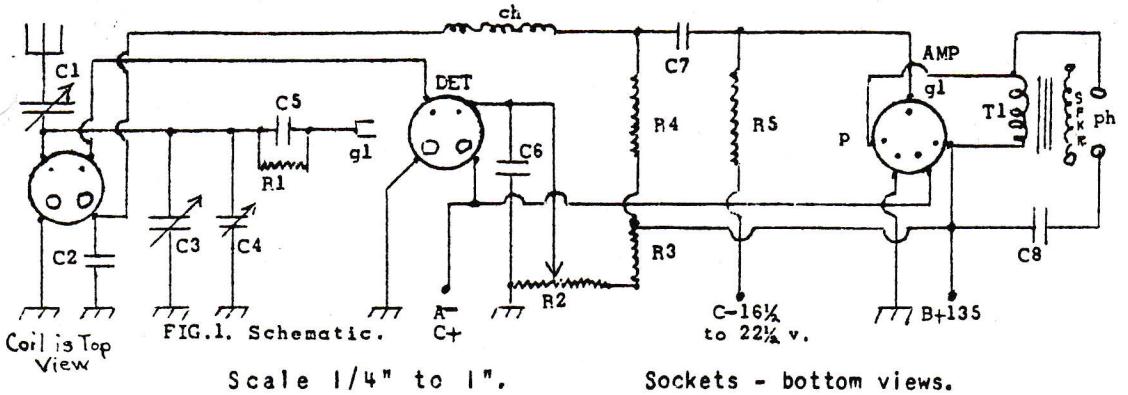
An excellent place for our QRM coil is between converter output and set, as shown. It will reduce, or eliminate, any BC station near the I.F. chosen.

Various Aerial lengths all appeared to work good. You may try different ones. Also a .0001 mica may help in the Aerial circuit.

Let's have some good DX.

MRL 2-TUBE ALL-WAVE DX RECEIVER. 32,(34), 33 TUBES

DP 63



Coil is Top View

FIG.1. Schematic.

Scale 1/4" to 1". Sockets - bottom views.

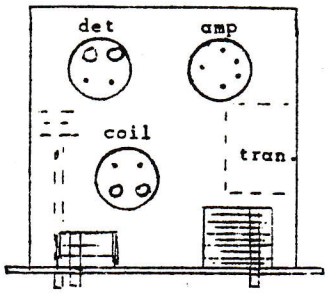


FIG.2. Base layout.

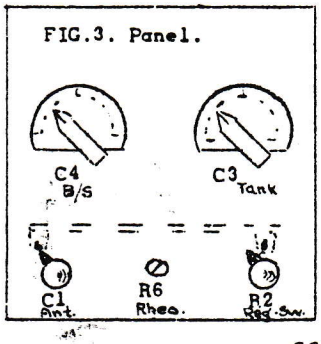


FIG.3. Panel.

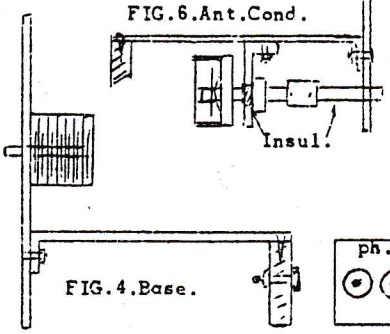


FIG.6.Ant.Cond.

FIG.4.Base.

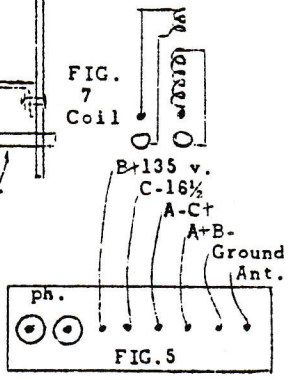


FIG. 7 Coil

FIG.5

PARTS LIST.

1	16 guage Aluminum Panel, 6½ x 6½.
1	do Base, 5½ x 6 (including ½" Brack)
1	3/8 Plywood back strip, 5½ x 1-15/16.
	1/4 " ends, if desired.
2	1-1/4 Bar Knobs and scales to match.
2	Small Pointer Knobs for 1/4" shaft.
2	4 prong Wafer Sockets.
1	5 do
C1	3 pl.Midget Var. cond.; Bracket with insulated shoulder bushings; insulated extender to panel.
C2	.00025 mfd. Mica Fixed condenser.
C3	.00014 " (19 plate) Midget Variable Condenser
C4	2 plate Midget Variable Cond. for Vernier tuning.
C5	.0001 mfd. Mica Fixed Grid Condenser.
C6	.25 " x 600 volt tubular Bypass Condenser.
C7	.01 " x " do
C8	.1 " x " do
R1	2½meg. x 1/4 watt grid leak resistor.
R2	50,000 ohm Volume Control with Switch (S1).
R3	50,000 " x 1/2 watt Carbon Resistor.
R4	100,000 do
R5	75,000 do
R6	6 ohm Rheostat, with slot adjustment.
ch	2½ mhy Radio Frequency Choke. (or larger)
S1	SPST switch on back of Volume Control.
T1	7000 ohms Impedance Output Transformer.
DET	32 or 34 tube and large grid cap.
AMP	33 Power Tube.
ph	2 phone tip jacks at rear, in back strip.
	#18 solid Hookup wire or busbar for R.F.Circuit.
	#22 stranded Hookup wire for balance of set.
	Hardware, lugs, solder, lockwashers, etc.
1	PM Speaker, if desired, to match T1.
2	#6 Dry Batteries in series for filament.
135	Volts B-Batteries or Power Supply.(DP-49).
1	22½ volt C-Battery or approximate.
1	set MRL Celluloid Coils type A, 4 prong.
1	2000 ohm Headset, or better.

GENERAL. The Ant. Cond. (C1) used to tune Aerial for SW stns. is the secret of DX, instead of the trimmer Cond. mounted at rear by most designers. Rheostat (R6) used to reduce volt. of new Batts. Vernier dial in left hand; regeneration in right. Phones come out behind to prevent shocks. When (S1) is off; all Batts. are off. Reports of many European and other Foreign stations received.

CHASSIS. Cut Panel and Base to approx. sizes given. Alum. sheet may be scored heavily on both sides and broken; smoothed with file. Bend ¾" bracket on front of Base and fit to Panel with FH screws, countersunk. Make top of Base 2" up. Cut back strip of 3/8" plywood and drill. Fasten on with #2 FH wood screws. 1/4" plywood ends may be used but not required. Place parts as shown for best results. Scale is 1/4" to 1". Punch or drill holes for Coil and Sockets. Mount Socket holes as shown for short leads.

ASSEMBLING. Mount Chassis, Sockets and all the parts. Be sure Trans. (T1) base clears 33 socket. Cut Rheostat (R6) shaft off and slot with hack-saw for screwdriver adjustment. Cut shaft of Volume Control to take pointer knob. Cut Dial Scales and mount under washer and nut. Glue or rivet on.

CONDENSERS. For Vern.Cond.(C4) use a 4 plate Midget Var. but take off #2-3 plates, so rotor & stator are far apart. Very essential for 20 meter band. For Ant. Cond.(C1) make an Alum. bracket. Drill hole large enough to take a shoulder insulated washer to prevent grounding. Use an insulated shaft extender to front of panel. Test with an Ohmmeter or Batt. and Phone for short to chassis.

WIRING. Use colored pencil to check off circuits on plan as they are wired. Use soldering lugs and lockwashers. Make all joints tight as U go along. Use heavy hookup wire up to Grid Cond. (C5) and small hookup wire from there on. Ground all chassis connections direct as possible with a lug and lockwasher. Note that plan shows all bottom views for sockets, except Coil.

COILS. Using 1½" forms, all windings closewound except 20-40 m. secondaries. Other kinds and sizes of wire may be substituted. Cover windings with a good Light Coil Cement. Clean prongs well.

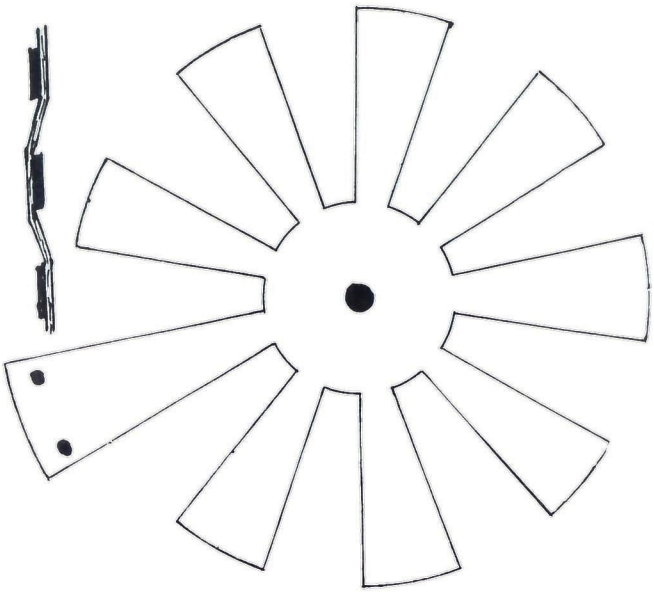
Band	Up	To	Secondary	Tickler. Close
20 m.	1"	1-1/4"	4 T 24 Enamel	5 T 28 Enam.
40 —	1"	1½"	10 "	6 "
80 —	1"	end	22 "	6 "
160 —	7/8 "	—	65 "	12 "
HFBC —	5/8 "	—	84 T 28 Enamel	20 T 32 Enam.
BC —	5/8 "	—	120 T 32 "	20 "
LFBC —	5/8 "	—	170 T 34 "	25 T 34 Enam.
Long —	¼" "	—	350 "	30 "

OPERATION. Set Rheo.(R6) to lowest voltage; insert tubes and coil; turn on (S1). Set Ant.Cond. (C1) at zero for 20-40 m.; 25 for 80 m.; 50 for 160 and up. Raise vol. control until you get a rush or whistle. Adjust Vernier (C4) for 20-40 m. stations. Not used on BC bands. Readjustment of (C1) may be necessary later for more sensitivity. As A-Batt. runs down, advance (R6). 50 ft. Aerial and ground.

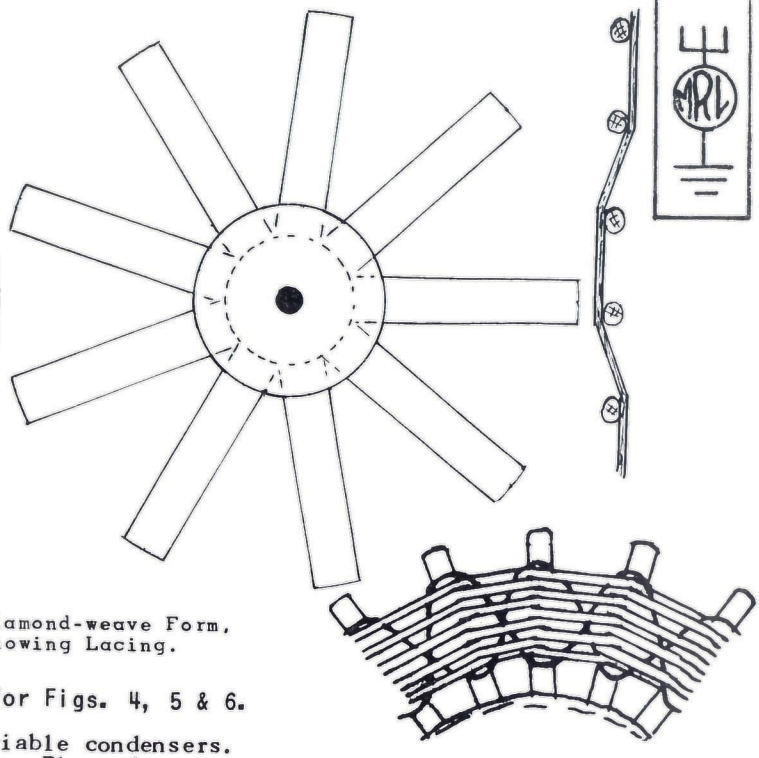
Modern Radio Laboratories.

MRL N° 3 - SELECTO-DYNE CRYSTAL SET

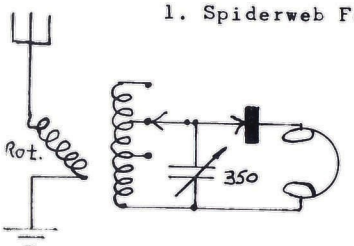
DP 64



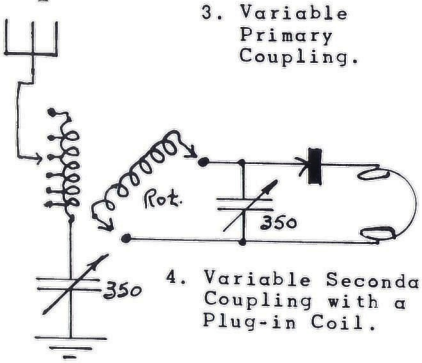
1. Spiderweb Form.



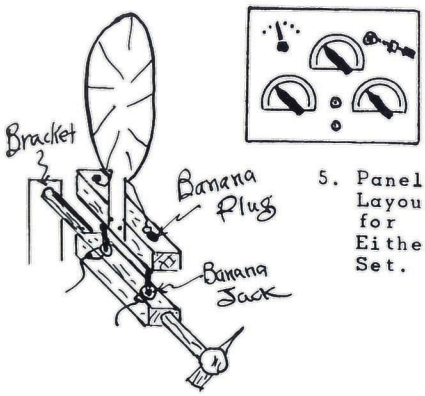
2. Diamond-weave Form, showing Lacing.



3. Variable Primary Coupling.



4. Variable Secondary Coupling with a Plug-in Coil.



5. Panel Layout for Either Set.

6. Coupling Arrangement for a Plug-in Secondary Coil.

A Detail Print by Modern Radio Laboratories.

PARTS LIST for Figs. 4, 5 & 6.

2 .00035 variable condensers.
2 Spiderweb or Diamond-weave coils (see text.)
1 Compo. panel 5½ x 7.
1 Crystal stand and Catwhiskers.
1 Steel galena or Diode.
3 1¼" bar knobs and scales.
1 Switch lever.
6 Switch points; 2 stops.
2 Phone tip jacks.
2 Banana Jacks.
2 '' plugs for each coil.
Coil fittings, etc. (text).

While you may use a Vario-coupler for this circuit - let's make it a Pancake set.

There are 2 kinds of Pancake coils, e.g., Spiderweb and the more efficient Diamond-weave. The spaced turns of the Pancake coils reduce distributed capacities. However, the inductance is very low - due to a concentrated field. But, if 2 are connected in series, to assist each other, the inductance is 3 to 4 times as much as for one. Larger coils are also more efficient, so don't make them small. They are also easy to tap. (See HB-6 for data.)

Spiderweb coils (Fig. 1) are usually stamped from Fibre and are hi-loss. They may be improved by making the form from heavy Celluloid, Plexiglass or stiff cardboard. When making Spiderwebs - make one leg longer to mount.

(Fig. 2) is the Diamond-weave Pancake - and is much more efficient than the flat Spiderweb. Use an uneven number of ¼" wooden dowels, spaced around a wooden center. Wind over 2: under 2. Lace with string as shown. The cross-overs may be painted with Light coil cement if desired. When pegs are removed - you have a real "hot" coil - due to no dielectric of a coil form.

(Fig. 3) we use a coupled primary of about 20 turns #20 DCC, fastened to a wooden shaft thru panel. Secondary may be 75 turns of No. 22 DCC wire.

(Fig. 4) - Selectodyne, is a most efficient circuit. When you tune the Aerial, coil, condenser and ground - you have a terrific driving force. Make the primary of about 150 turns #28 enameled wire and tap at every 25. If you wish - you may make the coil with larger wire - but 2 coils in series - and slapped up close together. For an efficient secondary, use heavy DCC wire - about #20 up to 80 meters. For 160-BC bands, use #22 DCC. Experiments will show what turns are best for your form, condenser, etc.

It is easy to make the taps, Use flexible Loop wire with the ends tinned. If they are bunched up together - they last longer.

While we prefer the gadget for swinging the rotor - they may be slid back and forth - the effect is the same. The mountings may be of dry wood, or other insulating material. Use Banana plugs for each coil. But be sure to use separate coils for each band - to lessen dead-end effects.

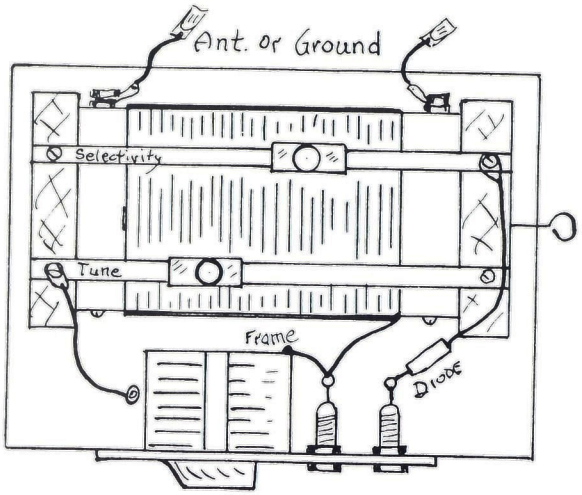
The selective switch, of our original Selectodyne has been eliminated as the coupling produces the same effect.

This is one of the best rigs we know - to help a Fan understand tuning, coupling, selectivity, etc. And, with a little patience- lots of DX may result.

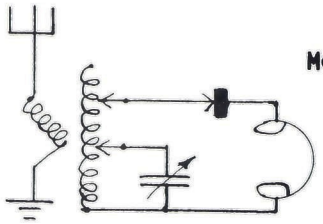
MRL N° 12 IMPROVED SLIDER CRYSTAL SET

DP 69 MRL

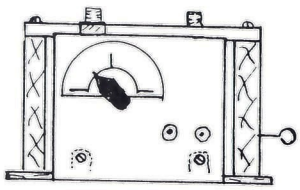
A Detail Print by Modern Radio Laboratories.



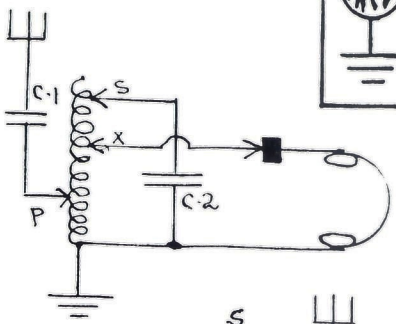
3. Top View. ½"-1".



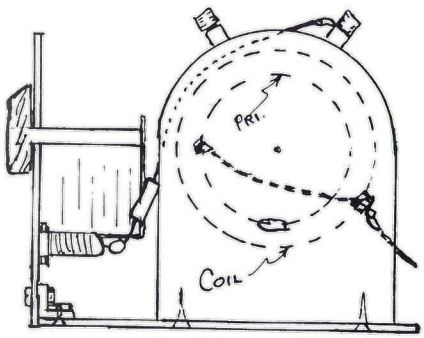
1. New Improved Circuit.



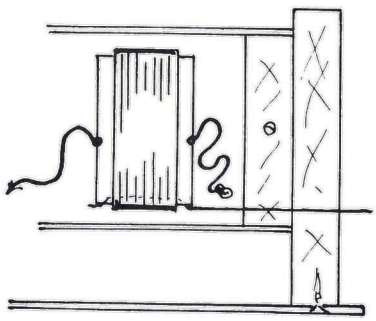
2. Front Panel View. ¼"-1".



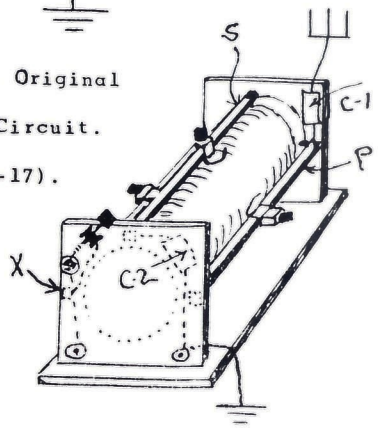
6. Original Circuit. (HB-17).



4. End View Showing Coils. ½"-1".



5. Primary Coil Layout. ½"-1".



PARTS LIST.

1	.00035 variable condenser.
1	1¼" Bar knob and scale.
1	Crystal diode.
2	Phone tip jacks.
1	Bak. tubing 2" dia. x 4" long.
1	" " 1½ " x 1" "
75 Ft.	#20 Enameled magnet wire
2	sliders; 2 5" slider rods.
1	Soft wood block ½" thick by 1-7/8" in diameter.
2	Wood ends ½ x 2½ x 2-3/4"long
1	Compo. base 4 x 4.
1	" panel 3 x 3½.
2	½ x ½ single brackets.
2	6-32 x 5/16" FH mach. screws.
2	4-40 x 3/8" FH mach & 4 nuts
2	6-32 x 3/8" BH mach. screws.
4	6-32 x ¼ nuts.
8	#2 x 3/4" FH wood screws.
2	#2 x ½" RH do
	Lugs, hookup wire, etc.

We have made quite a few experiments during the construction of this 2-slider set. You may gain a small Radio education by its operation.

Due to our local Radio-congested district and a large Aerial, we had to eliminate the third slider. Instead, we inserted a 15-turn primary coil inside, and controlled by a "plunger." This, along with the selectivity control for the Crystal - gave us all the selectivity we needed.

Because the primary and secondary circuits are out of phase - you can control it better with a primary than 3 sliders. More data on the 3-sliders in Handbook 17.

SEC. COIL. On the large form, go in about ½" and make 2 tiny holes. No lead comes from here so anchor it down. Wind on 85 Ts #20 Enamel and to two more tiny holes, but bring lead out 6". Put heavy Coil cement on the edges.

PRI. COIL. Wind 15 Ts #20 En. on the small form by starting in about 1/8". More turns if you are away from stations. Cut two pieces of phone cord about 4" long and pull back insulation from ends. Wrap with fine wire and solder. Run these to the two 4-40 screws in the rear of form. Fashion a piece of stiff #16 wire to the coil and let it go out thru a tiny hole as shown. This gives variable coupling.

Cut 2 wooden blocks 1-7/8" in dia. with a coping or keyhole saw - so they fit snugly in each end. Round off the tops of the other large pieces so they are ¼" from the coil. Nail them together, mount the coils and fasten the whole assembly on the base with long wood screws. Next mount the 2 sliders and rods. With a file and sandpaper clear a path for the sliders. Some wood alcohol may help in getting off the enamel. Face sliders to the left as greater space is at the right. Mount the panel with brackets and wire it up.

In operating, be sure that the sliders make a good contact on top of each turn. The nearest slider is the wave band. The rear controls the selectivity. In our location we had to place it almost to the right as interference was so bad. Adjust the pri. in and out for best volume and selectivity for your location. You may mark edges of sliders with a pencil for best points.

You may get better results by reversing Aerial and ground connections. Try it on a weak station for best results.

A Steel galena, Silicon or an Iron pyrites may be more selective than a Diode, but as we have control of selectivity this may not make much difference.

PARTS LIST:

1	MRL #12 Bakelite Xtal coil.
C-1,2..	.00015 mica condensers.
3	Slider rods 3/16" sq. x 4½"
3	Sliders.
6	Fibre bushings ¼" high.
6	4-40 x ¾" B.H. Machine sc.
6	4-40 nuts for same.
1	Knocked/down Xtal stand.
1	Steel galena or other.
2	Phone tip jacks.
2	Fahnstock clips for A-G.
3 ft.	#18 stranded hookup wire.
2	Ply end blocks ¼ x 3 x 3.
2	Rnd blocks 3/8 x 1-7/8 dia.
1	Ply base ¼ x 3½ x 5½.
6	2 x ½ R.H. wood sc. (form).
6	2 x ¾ F.H. " " (base).