XTAL

for the

radio amateur

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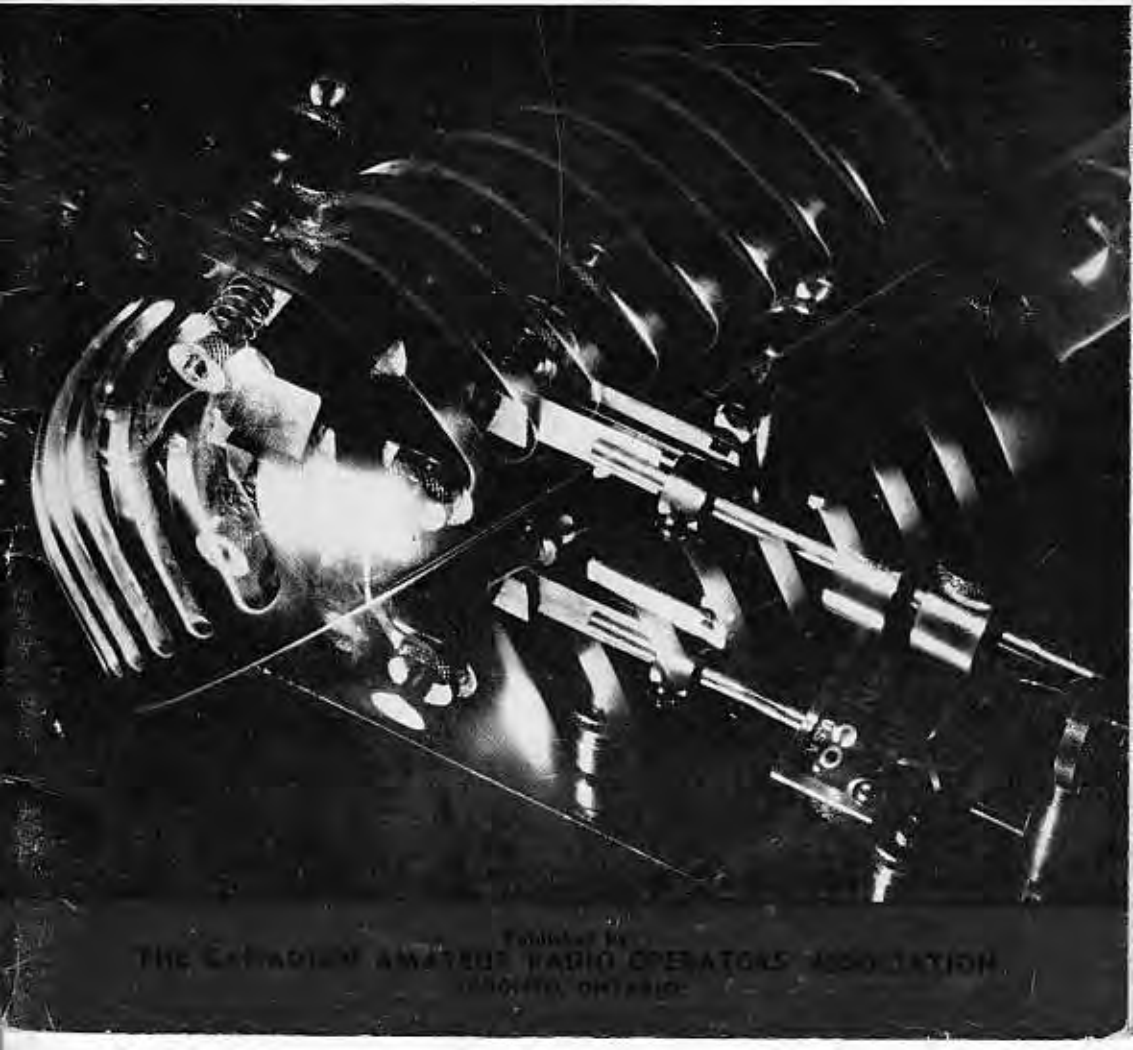

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30V300	300	30	23	4000	24
20V500	500	17		4000	40
		INPUT CHOKES			
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HILITES

Overleaf this page is CAROA proposal for all-Canadian Communications organization. Brasspounders will welcome chance to air views after reading this article. XTAL wants letters and volunteers.

On page 17 the new Air Force Amateur Radio System is explained in detail. Here is a fine example of Government co-operation. Don't miss it!

FLASH—Read page 25 and run for those 3.5 mc coils—page 39 will tell you who to look for!

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Authorized as second class mail, Post Office Department, Ottawa.

CQ TFC

AFTER a survey of many hundreds of letters requesting an All-Canadian Traffic Organization, CAROA Headquarters is taking steps to put a Communications Department into action. Here is a proposal.

We had hoped in the beginning—the pre-war days—to add such a branch to our programme of expansion but The Great Silence of 1939 dampened all dreams and we were forced to stow away plans along with our Trunk Line Xtals. Now with brightening prospects of an early return of the 3.5 mc band for brasspounding it is high time to haul out the old QSP machine and get it in working order.

Election of District Communications Managers as Field Representatives of CAROA's new Communications Department was, and still is our plan. They are to be nominated and finally elected by the popular vote of the members in their respective districts. Such a plan at the moment is impossible but we have given much thought to the next best thing to do. So we are asking for volunteers with experience in traffic and its finer control factors to form a nucleus for our system. They would hold office until the general election which will take place in September 1946. It is hoped that these volunteers will receive full co-operation from all concerned because their job of organizing will be difficult at its best.

At present eight districts would be represented by eight District Communications Managers. These volunteers would manage and correlate all activities in their respective districts connected with the workings of CAROA. The Eight Districts would be as follows:

Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick-Nova Scotia-P.E.I.

It is intended after operations assume a normal course that the districts would be further broken down into sections complimentary with activities. Directing all communications activities from Headquarters station Ve3CAR would be,

A Communications Manager who will be appointed by Headquarters Staff. He would be assisted and represented in the field by,

District Communications Managers who would direct organization and operation of traffic, emergency, and operating activities within their respective districts. They would also compile a monthly report of traffic and operational activities and forward to Headquarters. They would officiate for a period of one year. They would encourage and utilize correct deportment and operating procedure at all times. They will be members in good standing of the CAROA. They would appoint to assist them in operations,

Traffic Managers who would act as traffic controllers and test and endorse applicants for appointments in the Field Organization. They will be members in good standing of the CAROA and will utilize and encourage correct deportment and operating procedure at all times. Assisting the Traffic Managers would be,

District Relay Stations who would form the links in the traffic relaying system and would thusly be the backbone of the Communications Department. Reliable and efficient operators who observe correct operating procedure at all times they would conform to the standards set by the Communications Manager and his assistants. They will be members in good standing of the CAROA. Their appointments would become effective after a probationary period as determined by the District Communications Manager. Their counterpart in phone traffic operations would be,

District 'Phone Stations who would be subject to the same standards and duties as District Relay Stations. They would also assist with Official Broadcast features as detailed by Headquarters.

QSP to Page 39

CRYSTAL FACTS

By A. H. BLEVIS, VE3IJ*

When the communication frequency spectrum became crowded many years ago, the respective Governments passed laws demanding high stability frequency control to maintain a transmitting station on its assigned frequency. As these frequency ranges became more and more crowded, the tolerance of possible error in these assigned frequencies became less and less. An example of this can here be quoted in the increase of accuracy percentage requirements for commercial stations, within the past few years, of from .1 of 1 percent, to .05 of one percent and again from .05 of 1 percent to .01 of 1 percent; similarly in the case of broadcast stations, from an error of plus or minus 50 cycles to plus or minus 20 cycles.

While the amateur is not particularly concerned or interested in such close accuracy in his transmitting frequency; as more and more amateurs come on the air, this will become a very vital factor, particularly where weak signals are being received from a station which is being controlled by a crystal which has a medium, or high rate of frequency drift.

The original 'Y' cut crystal has many years ago been discarded because it had a drift of approximately 24 or more, cycles per megacycle, per degree centigrade, (C/MC/'C), similarily the X cut crystal has been abandoned for similar, though not quite so severe a drift. In their stead low frequency drift crystals, or so-called zero drift crystals were developed and have now become quite common and accepted fact. However, the frequency ranges of these new low drift crystal cuts are somewhat limited, insofar that it is physically impossible to manufacture them to take the rough handling of the average amateur and perform satisfactorily beyond certain frequency ranges.

In the past few years a large hue cry has been established about direct frequency control at frequencies of 14 megacycles and higher and the point has been over-advertised as regards the simplicity of such a transmitter, but the point that has not been over-emphasized, is the fact that in designing such a transmitter we are actually reverting to the instability of the old Y cut crystal which has been discarded so many years ago simply because it has a high degree of drift per C/MC/'C.

With modern beam power tubes, where the excitation in watts required, is so small compared with the available power output in watts, the amateur has apparently lost sight of these facts and still has the old 47 oscillator 210 doubler complex where terrific driving power was required in order to obtain output, and the fact that with modern beam power tubes it is just as easy to readily triple and quadruple frequencies in one stage and still have too much driving power has apparently not yet registered, but if the reader will glance at the tables compiled in this article, the result will be surely a tendency towards more stability of crystal operation if nothing else.

Direct frequency control of transmitters by well known cuts of crystals manufactured from Silicon Quartz, are limited in actual to 4.5 megacycles, approximately, in the case of the lowest drift C/MC/'C, to 7.5 megacycles, approximately, in the case of the next lowest drift cut per C/MC/'C, and that's where the crystal manufacturers stop as far as the price that the amateur is willing to pay for a crystal is concerned.

The reason for this stoppage is the fact that the crystal becomes too thin and too costly to manufacture if carried much beyond these limits, and even then, while with a much greater labour cost it can be carried to certain higher frequenices, even these higher frequencies are limited in the actual physical properties of the crystal, and until such time as Tourmaline or another type of radioactive mineral becomes commercially available, that is as far as the manufacturer can go. In order to overcome these physical limitations and obstacles and still maintain so-called frequency control to the amateur, the manufacturer has necessarily had to turn to a different cut of crystal, which instead of letting the tube do the work of doubling, tripling, quadrupling, as the case may be, has designed a crystal which performs this operation. In other words the crystal is

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actually operating at its second, third, fourth, fifth or even seventh harmonics.

In the construction of such a crystal, something must, through necessity, be sacrificed, this is frequency stability or drift, so that in the use of such a crystal we are actually back to the old Y cut crystal stage which has so long ago been discarded for this very reason.

The purpose of this article, is to give the reader a clearer idea and to explain why it is more practical, from a viewpoint of stability of operation, stability of frequency, ease of operation, cheaper design of equipment, etc., to operate a 56 m.c. or 28 m.c. output transmitter from an original 3.5 megacycle crystal than it is from a harmonic crystal operating at its third, fifth or seventh harmonic as the case may be.

In order to give a comparison between these various methods of operation, two tables have been drawn up. In both, the Y and X cut crystals are merely shown as a comparison factor. The other figures are approximate, but fairly accurate, with the view in mind of the prices what the amateur is willing to pay for crystal stability and what the manufacturer can supply at these prices.

Type	Oscillating tendency	Harmonic type	Reason for physical limit	Highest freq. constructional limit	Permissable crystal current	Stability of Operation	Drift in C/MC/°C	Ruggedness
Y	Exct.		too thin	5 MC	75 MA	Good	minus 12-20	Good
X	Exct.		burns	10 MC	125 MA	Exct.	plus 26-40	Good
A	Exct.		too thin	5 MC	200 MA	Exct.	± 1-4	Exct.
B	Exct.			6 MC	200 MA	Exct.	± 4-8	Exct.
B	Good		too thin	7.5 MC	150 MA	Good	± 6-10	Fair
C	Fair	3rd		15.0 MC	60 MA	Fair	plus 20	Good
D	Fair	5th		30.0 MC	40 MA	Fair	plus 40	Fair

Type	Xtal Fqcy.	Final transmitting frequency	Resulting drift in C/MC/°C	Ease of operation
Y	3.5 MC		plus 26-40	Excellent
Y	3.5 MC	7 MC	plus 52-80	Excellent
Y	3.5 MC	14 MC	plus 104-160	Excellent
X	3.5 MC		minus 12-20	Excellent
X	3.5 MC	7 MC	minus 24-40	Excellent
X	3.5 MC	14 MC	minus 48-80	Excellent
A	3.5 MC		± 1-4	Excellent
A	3.5 MC	7 MC	± 2-8	Excellent
A	3.5 MC	14 MC	± 4-16	Excellent
A	3.5 MC	28 MC	± 8-32	Excellent
B	3.5 MC		± 4-8	Excellent
B	3.5 MC	7 MC	± 8-16	Excellent
B	3.5 MC	14 MC	± 16-32	Excellent
B	3.5 MC	28 MC	± 32-64	Good
B	7.0 MC		± 6-10	Fair
B	7.0 MC	14 MC	± 12-20	Fair
B	7.0 MC	28 MC	± 24-40	Fair
C	14.0 MC		plus 20	Critical
C	14.0 MC	28 MC	plus 40	Critical
D	28.0 MC		plus 40	Very critical
D	28.0 MC		plus 80	Very critical

In order, not to associate any particular manufacturer and their crystal-cut trade-names, let Y and X represent the actual Y and X cuts, 'A' represents the lowest frequency drift type, 'B' represents the next highest frequency drift type, 'C' represents the first of the "harmonic" type of oscillating crystals, (generally operating at the crystal's third harmonic), and 'D' represents the next type of "harmonic" crystal, (generally operating at the crystal's fifth harmonic).

Chart 1 is intended to show the physical limitations of these various types, the reason in part for these limitations, and their ability to withstand punishment.

Chart 2 is intended to show the resultant frequency drift from these various crystals as well as their ease of operation under conditions shown in the chart.

In the above two charts it may readily be seen that from all viewpoints an 'A' type crystal operating at a fundamental frequency in the 3.5 m.c. band will give lower drift per C/MC/°C plus ease of operation, stability and ruggedness etcetera at an output of 28 megacycles, or even 56 megacycles than any other type of crystal, including the higher cost of the harmonic type and that as we try to adopt harmonic oscillators for outputs at high and ultra-high frequencies, operating at their 3rd, 5th, or 7th harmonies, we are more and more approaching the drift tendencies of the old discarded Y cut crystal, plus an added burden of critical operation.

VE5, VE6, VE8

In order to assist us in keeping the records up to date at HQ, please drop us a card giving any changes in your call letters as a result of the new call areas for Saskatchewan, Alberta, Yukon and N.W.T.

VAC-WAC

"Speaking of travelling during the war," writes VE5HC, from Vancouver, "here's an angle. With the R.A.F. Transport Command, I managed to visit all continents, thus obtaining my VAC. I was WAC in 1933, and VAC in 1943!" We wonder what 1953 will bring forth!!

CLUB DIRECTORY

Starting with this issue XTAL will carry a club directory. It has been suggested by some club secretaries for the purpose of acquainting local amateurs, or visitors, where they may contact a club. No attempt has been made in this list to show them alphabetically or provincially. All club secretaries are requested, please, to send in names of their executives, and the address of their club in order that the list may be up-to-date in future issues. A preliminary listing appears below with the club name followed by the secretary and his address:

Kitchener-Waterloo R.A.C., Kitchener, Ont., O. C. Boettger, 105 Elgin Street, Kitchener.

Key Klix Klub, Toronto, Sid. Prior, 11 Cedar Ave.

Royal City A.R.C., New Westminister, B.C., Fred Taylor, VE5HA, 221-11th St.

Loyalist City A.R.C., Saint John, N.B.

Wireless Ass'n of Ontario, Toronto, Arthur Potts, VE3MT, 33 Haddington Ave.

Cdn. Lakehead Wireless Experimenters, Ft. William, Ont., Ray Greer.

Moncton, (N.B.) A.R.C., R. Grant, VE3AML.

B.C.A.R.A., Vancouver, Fred Taylor, VE5HA, 221-11th St., New Westminster.

Victoria Short Wave Club, David Scholes, VE5DY, 1614 Pinewood Ave.

Clinton A.R.C., VE3BER, Clinton, Ont., T. A. Prest, VE4MX, R.C.A.F. School.

Frontier Radio Club, Windsor, Ont., Tom Hunter, VE3CP, 1774 Wescott Road.

Central Radio Club, Toronto, L. J. Kerswell, 48 Vermont Ave.

R.C.N.A.R.C., VE1HO, Halifax, L. W. Holmes, VE3HV, H.M.C. Signal School.

Hamilton A.R.C., Hamilton, Ont.

Totem A.R.C., Vancouver, B. C.

West End A.R.C., Vancouver, B.C.

Dawson Creek A.R.C., B.C., Stan Carnell, VE5ALG, Box 1143.

U. of B.C. A.R.O.A., Vancouver, Ralph Gordon, 6150 Carnarvon Street.

1000 Is. A.R.A., Brockville, Ont., H. Fairbourn, VE3WG, 176 Pearl South.

West Side Radio Club, Toronto, R. N. Gladstone, VE3APG, 165 Robert Street.

St. Maurice Valley A.R.A., Trois Rivieres, Que., C. E. Robert, Ptre., 1729 Boulevard des Forges.

Ottawa A. R. Transmitting Ass'n., Ottawa, Ont.

Halifax A.R.C., Halifax, N.S., E. S. MacLaughlin, 78 Harvard St.

Antenna Coupling Circuit Design - Part III

By J. C. R. Punchard, VE2KK*

Inductively Coupled Circuit Design—This type of coupling is perhaps the most popular of all methods of matching an amplifier to its load, and incidentally is the most difficult to calculate accurately. In Parts I and II of this article, the design of L and pi circuits was based primarily on impedance ratio methods. The design of an inductively coupled circuit is most easily handled by assuming a value of loaded circuit Qt which will be obtained when the correct component values are used to match the load resistance to the amplifier plate. Fig. 1 (a) shows a simple inductively coupled tank circuit connected to a resistive load. If the antenna circuit is resonated by means of condenser C, and the tank resonated by Ct, then the result of mutual inductance between Lp and Ls will be equivalent to introducing a pure resistance into the tank circuit.

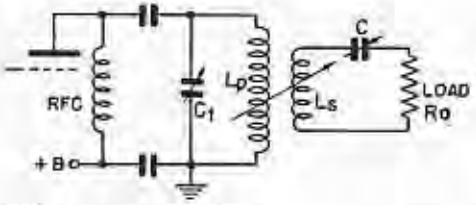
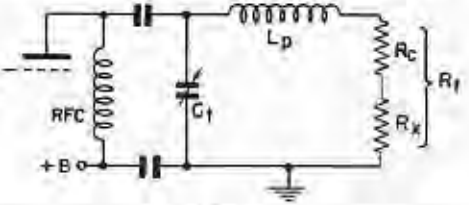


FIG. 1 (a)

The equivalent circuit is shown in Fig. 1 (b) where Rc is the R.F. resistance of the coil Lp and Rx is the resistance introduced by virtue of the mutual coupling. In other words, if the coil Ls is removed entirely, the amplifier can be loaded to the same value of plate current and will deliver the same output if a resistor of Rx ohms is connected directly in series with the tank coil. The design of this circuit evidently depends on finding the correct value of Rx for normal power output of the amplifier. It can be readily shown that if both primary and secondary circuits are in resonance, $RxRa = (2\pi f)^2 M^2$ where Ra is the secondary load in ohms, Rx is the introduced resistance in ohms and M is the mutual inductance between Lp and Ls in henries. For fixed values of Ra and frequency f we see that Rx varies directly as the square of the mutual inductance. If the mutual increased by tightening up the coupling, Rx will increase. Conversely, Rx decreases as the coupling is loosened off. From Part I we remember that if Rx increases, the impedance Rl across the tank decreases. This explains why the plate current of an amplifier increases as the coupling is tightened (with constant bias and drive).

When the tank circuit is unloaded (no coupling between Lp and Ls) the only resistance in the tank circuit is Rc, which is normally small. The impedance across the tank will then be high and the plate current will be low. The unloaded Q of the circuit will be the coil Qc. Since the loss in the circuit is caused by the loaded tank circulating current flowing through the coil resistance Rc, it is obvious that for high tank efficiency Qc must be as high as



(b)

possible and the loaded Qt as low as is practical. The tank efficiency will be

$$\frac{Qc - Qt}{Qc} \times 100$$

The complete theory of tank circuit operation is quite involved but it will be sufficient to state here that the tank receives energy from the power supply through the plate of the amplifier tube in pulses, and must deliver energy to the load in a continuous sinusoidal flow. When a pulse of plate current occurs, the instantaneous voltage on the plate drops from the D.C. supply potential to a minimum value due to the impedance drop across the tank circuit. During this period energy is stored in the tank coil. As the plate current falls again to zero, the instantaneous plate voltage increases to the D.C. supply potential and continues to increase to a maximum value beyond this voltage by

*99 King's Road, Valois, Que.

virtue of the oscillating or fly-wheel action of the coil and condenser. This maximum voltage occurs while the instantaneous plate current is zero. At the maximum positive plate voltage point, all of the energy is stored in the condenser. The stability of the tank, and its ability to produce a nearly sinusoidal output, (reasonably low harmonic content) depends upon the ratio of the energy stored per cycle to the energy lost per cycle. It can be readily shown that

$$\frac{\text{Energy stored per cycle}}{\text{Energy lost per cycle}} = \frac{E_s}{E_l} = \frac{VI_t}{2\pi W_o}$$

Where V = R.M.S. R.F. voltage across tank

It = R.M.S. tank circulating current

Wo = Carrier power output.

Now since tank current =

$$= I_t = \frac{V}{X_l}$$

$$\frac{E_s}{E_l} = \frac{V.V}{2\pi W_o X_l} = \frac{1}{2\pi} \bullet \frac{V^2}{W_o X_l}$$

But

$$R_l = \frac{V^2}{W_o} = \frac{X_l^2}{R_c} = X_l Q_t$$

$$\text{Therefore } Q_t = \frac{V^2}{W_o X_l}$$

Then

$$\frac{E_s}{E_l} = \frac{1}{2\pi} \bullet Q_t$$

It has been found from experience that this ratio should not be less than about 2 for stable operation and reasonably low harmonic content.
Then

$$\text{Then } \frac{Q_t}{2\pi} = 2$$

or minimum Qt = 4π = 12.6.

In practice Qt values vary from about 12 to 25, with 12 as a good all around value for amateur work.

For highest tank circuit efficiency it might seem best to use the lowest possible value of Qt (by introducing the highest value of resistance Rx by coupling) so that the ratio $\frac{R_l}{R_c}$ will be large. This condition requires a very small condenser and a large coil, which results in distortion of the tank circuit current due to insufficient storage capacity in the condenser and a relatively high value of tank impedance at harmonic frequencies. The net result is that if the Qt is made too low, excessive harmonic generation will result.

On the other hand, a high value of Qt, which requires a relatively large capacity and a small coil, will reduce harmonic generation to a minimum, but a high order of selectivity results. On phone operation, the higher audio frequencies will be seriously attenuated. The compromise value of Qt = 12 is widely accepted for design purposes.

Knowing the Qt and the dynamic load impedance R_l of the tube, we can find the correct value of tank capacity to use in our amplifier as follows:

$$R_l = \frac{L}{R_c C} = \frac{2\pi f L}{R_c} \bullet \frac{1}{2\pi f C}$$

But

$$Q_t = \frac{2\pi f L}{R_c}$$

therefore

$$R_l = \frac{Q_t}{2\pi f C}$$

$$C = \frac{Q_t}{2\pi f R_l}$$

$$= \frac{Q_t \times 10^6}{6.28 \times f \times R_l} \text{ mmfds.}$$

Where f is frequency in megacycles.

This is the well known basic tank circuit design formula. For convenience, it has been plotted in Fig. 2 for a Qt of 12. To use it, we first estimate Rl as shown in Part I, then follow this value on the ordinate until the particular frequency line is intercepted. We then read the required capacity on the abscissa. For example, an 812 running Class C at 1250 volts has a rated output of 116 watts C.W. Its R.F. plate voltage would be 0.56 x 1250 = 700 volts.

Then $R_l = \frac{(700)^2}{116} =$ 4220 ohms. From Fig. 2 this amplifier would require a tank condenser of 16 mmfds at 28 MC, 42 mmfds at 14 MC and 64 mmfds at 7 MC. Since the plate-filament capacity of the 812 is only 0.8 mmfd, we would expect it to perform well at 28 MC with a 16 mmfd tank condenser.

Now let's work out a practical example. Suppose we wish to couple a 600 ohm single wire feeder to the tank of a 14 MC CW amplifier using an 807 running hard at 750 volts on the plate per Fig. 1(a).

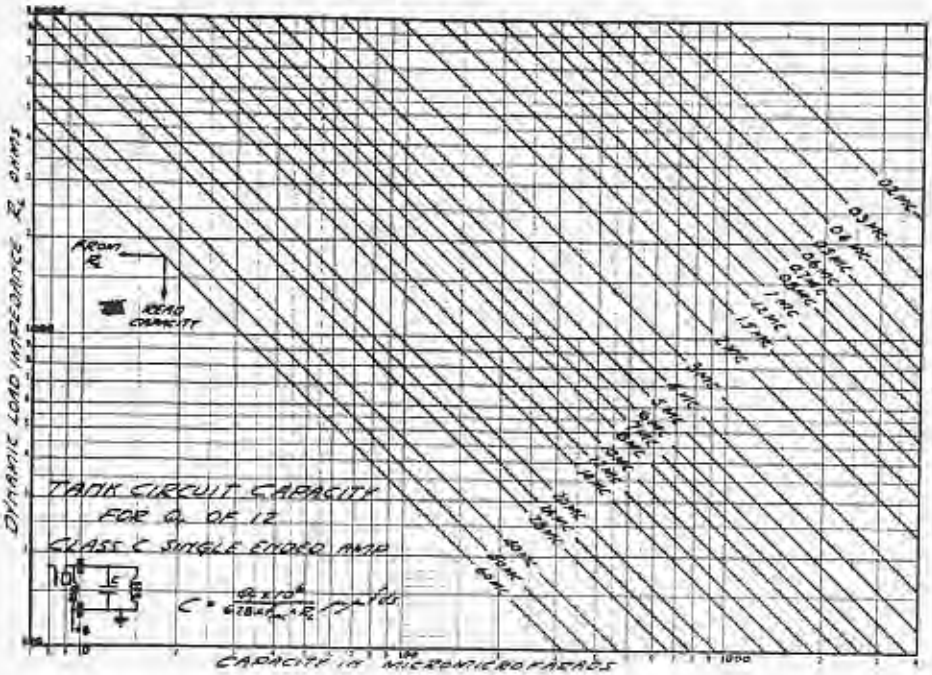


Fig. 2

The rated output of the tube is 50 watts. Note that this is the nominal output of the tube, not the tank. The actual power output from the tank will be less by the tank loss, which in good designs amounts to 5 or 10%. The R.M.S. R.F. voltage across the tank is Eac=0.56 x 750=420 volts, and

$$R_t = \frac{(420)^2}{70} = 3535 \text{ ohms.}$$

From Fig. 2 we find we require a tank capacity of 38.5 mmfd, including strays, for a Qt of 12. For resonance Lp will be approximately 3.3 microhenries. Then

$$X_t = \frac{6.28 \times 14 \times 10^6 \times 3.3}{10^6} = 291 \text{ ohms.}$$

The total tank circuit resistance will be

$$R_t = \frac{X_t}{Q_t} = \frac{291}{12} = 24.2 \text{ ohms.}$$

Assuming a coil Qc of 275, the coil resistance Rc will be $\frac{291}{275}$ =1.06 ohms, say 1 ohm.

Then Rx=24.2—1=23.2 ohms, say 23 ohms. The mutual inductance required to introduce this resistance is

$$M = \frac{\sqrt{R_x R_t}}{2\pi f} = \frac{\sqrt{23 \times 600}}{6.28 \times 14} = 1.33 \text{ microhenries}$$

A reasonable value for Ls is about 1 microhenry, so the coefficient of coupling is given by

$$K = \frac{M}{\sqrt{L_p L_s}} \times 100 = \frac{1.33}{\sqrt{3.3 \times 1}} \times 100 = 73\%$$

A coefficient of coupling greater than 50% is considered tight coupling and is sometimes difficult to obtain. If we used a 50 ohm coaxial cable to feed the antenna the mutual required would be

$$M = \frac{\sqrt{23.2 \times 50}}{6.28 \times 14} = 0.397 \text{ microhenries}$$

and the coefficient of coupling would be

$$K = \frac{0.397}{\sqrt{3.3 \times 1}} \times 100 = 21\%$$

This is a much better value and therefore we would expect less trouble coupling in a 50-ohm cable than would be experienced with a 600 ohm line. The above computations also show that high values of antenna load circuit resistance require high values of mutual, in other words tight coupling.

On all but the lowest amateur frequencies, it is not practical to calculate the mutual inductance between tank and coupling coils from the dimensions and spacing of the coils. The standard formulas are not only tedious to work with, but the accuracy of the results on small coils at high frequencies is always doubtful. The mutual can always be

checked by using a Q meter and the method described by Richards in **Xtal** for December 1945. However, since Q meters are scarce, the best procedure is to find the proper value of tank capacity as described above, then adjust the inductance of the tank coil until (unloaded) resonance is obtained with this capacity (allowing 10 to 30 mmfd stray capacity). The coupling is then adjusted until the amplifier draws rated plate current at resonance dip when the antenna circuit is tuned to resonance. This will indicate that the correct amount of resistance is being coupled into the tank circuit, which in turn produces the required load impedance for the tube. If the correct value of tank capacity has been used, the Qt will then closely approximate 12. If the amplifier plate current is low when both condensers are properly tuned, the mutual must be increased by tighter coupling between Lp and Ls or by increasing the inductance of Ls.

In the above example, the 600 ohm feeder could of course be tapped directly on the tank coil through a variable condenser, but this arrangement can produce excessive harmonic radiation and is not recommanded for outputs above about 20 watts. The preferred circuit is the link coupled arrangement per Fig. 3(a) using link coupling to an auxiliary tank. It might be well to point out here that all inductively coupled circuits should be equipped with a Faraday shield for effective harmonic suppression.

Fig. 3(b) gives a very popular arrangement for coupling to an open wire balanced transmission line, usually 500 or 600 ohm characteristic impedance. To make this circuit function efficiently, using variable coupling between Lp and Ls, the impedance looking into the pi section from the transmitter end must be made quite low. Otherwise, very tight coupling will be required as shown above. For example, if we assume that the impedance Rl looking into the pi is to be 400 ohms and a 600 ohm open wire line is used so that Ra=Rx=600, then from Fig. 10 Part II, we find Lb =5.4 microhenries and Ca=Cc=22 mmfd. at 14 MC. In order to introduce Rx=23 ohms as before the mutual must be

$$M = \frac{\sqrt{23 \times 400}}{6.28 \times 14} = 1.09 \text{ microhenries.}$$

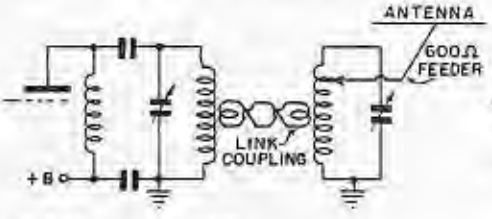
For the same inductance values and Qt as before, the coefficient of coupling will be

$$K = \frac{1.09}{\sqrt{3.3 \times 1}} \times 100 = 60\%$$

This will likely be hard to realize without interwinding the coils. On the other hand, if we try Rl'= 50 ohms and Ra=Rx=600 ohms as before, Fig. 10 Part II gives Lb=1.9 microhenries and Ca=Cc=62 mmfd. The mutual required is 0.387 microhenries as before and K= 21%. The answer is obviously the use of a relatively small inductance at Lb and relatively large capacity values at Ca and Cc.

It is to be noted that the above calculations do not take into consideration the capacity required to resonate Ls. We can easily design a coupling coil to have about one third the inductance of Lp (which in most cases will give the required mutual if it is wound over Lp). The capacity required to anti-resonate this inductance at the operating frequency is then found and added to the value of Ca as found above. At 14 MC, 1 microhenry resonates with 130 mmfd. Then Ca=62+130=192 mmfd. In general, the capacity of Ca in Fig. 3(b) will be four or five times that required for the tank condenser for reasonable values of coupling.

It is to be remembered that calculations of this nature at these frequencies are only a guide. The actual values



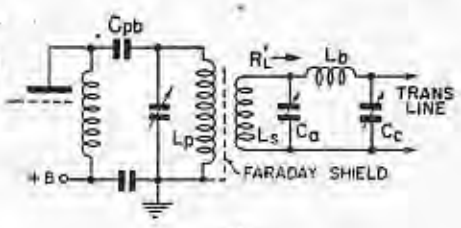


FIG. 3 (a) (b)

which give best results may vary somewhat from the calculated values because of stray capacity and inductance, reactive components in the input impedance of the line, etc. In general, it is safe to say that the use of high impedance couplings at high frequencies (above about 7 MC) should be avoided where possible.

Efficient coupling at 28 MC has always been a tricky problem and it is hoped that these examples will illustrate the reasons why we sometimes run into difficulties. Here's something that may happen to any well meaning amateur. An 813 running Class C plate modulated phone on 28 MC is to use the circuit of Fig. 3(b). From the tube book we find

Edc =1600 volts
Idc =150 ma.
Wo =175 watts
Esc =400 volts

The maximum allowance R.F. plate voltage swing will be 1600—400=1200 volts at carrier. To play safe we decide to use 1175 volts. Then Eac=0.707× 1175=832 volts R.M.S. The dynamic plate load impedance required will be

$$R_L = \frac{(832)^2}{175} = 3960 \text{ ohms.}$$

From Fig. 2 for a Qt of 12 at 28 MC we find we need a tank condenser capacity of 17 mmfds. We note immediately that the plate-filament capacity of an 813 is 14 mmfd, and since the capacity of the blocking condenser Cpb is relatively large, this 14 mmfd will appear directly across the tank coil, to say nothing of the strays. It means, in effect, that a tank condenser is not required at all; and if we try to use one, it will not be possible to realize the full output power of the tube without distortion. The inductance of Lp will be approximatey 1.9 microhenries (3" dia., 3" long, 2 turns per inch, say 6 turns ¼" dia. copper tubing spaced ¼"). This should either be a roller type coil or equipped wth a varable shorted turn tuning ring or copper tuning disc. The circuit, per Fig. 4(a), is tuned by applying reduced plate voltage and varying the coil inductance for resonance dip, with no load. Coil Ls is then coupled in and adjustments are made until the plate current is 150 ma. at resonance dip as described before. During this procedure Lp is not changed, but may be readjusted slightly as a final check.

For safe operation, the shunt fed arrangement per Fig. 4(a) is recommended, but the series fed circuit per Fig. 4(b) may also be used. It has the advantage that the R.F. choke is connected at a point of low R.F. potential and thus it has much less work to do.

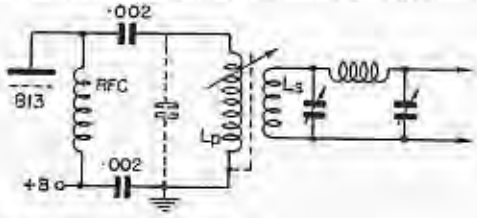
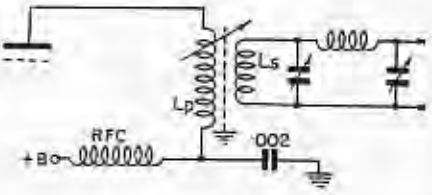


FIG 4— (a)



(b)

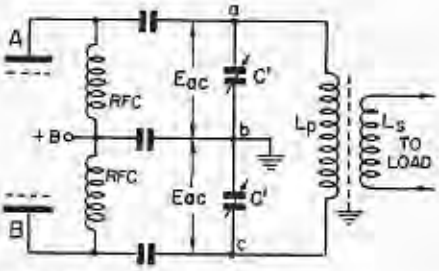
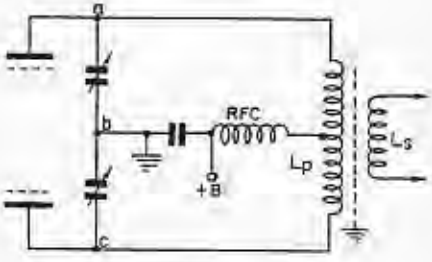


FIG.5— (a)



(b)

All other circuits in this article have been drawn for shunt fed, but series feed may be applied to any of them if preferred.

Now, what about push-pull circuits? In Fig. 5(a) and (b) the load impedance for tube A is that between a and b, and the load for tube B is that between c and d. Each tube develops its normal R.F. voltage Eac from plate to ground just as if it were working independently. The total voltage across the tank coil will then be 2 Eac. The power output will be approximately twice the output of one tube, working under the same conditions of plate voltage, bias, drive, etc. The total load impedance a to c will then be

$$R_1'' = \frac{(2E_{ac})^2}{2W_o} = \frac{2E_{ac}^2}{W_o} = 2R_1$$

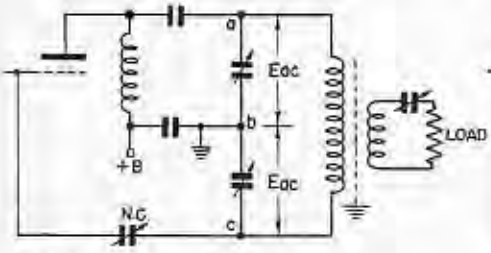
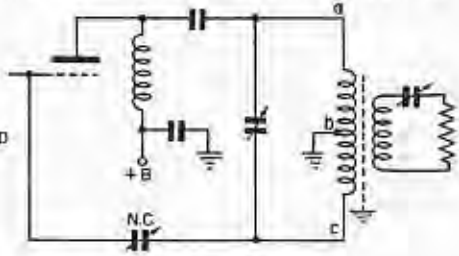


FIG. 6 (a)



(b)

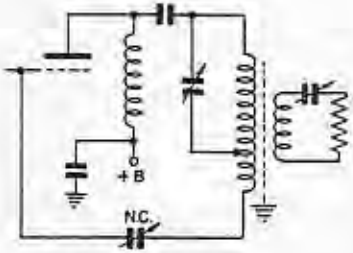
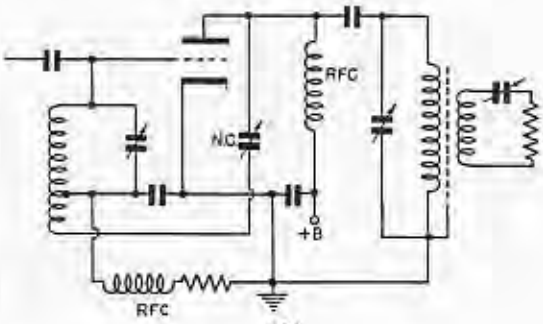


FIG 7 (a)



(b)

Where Wo=output of one tube and Rl is load required for one tube. The total capacity a to c will be

$$C = \frac{Q_1}{2\pi f.2R_1} = \frac{1}{2} \bullet \frac{Q_1}{2\pi fR_1} = \frac{1}{2} C$$

required for one tube in a single ended circuit. This means that each section of the condenser must be made equal to C mmfds. (the capacity calculated for one tube delivering its nominal power output). Now, if the push-pull stage has the same power output which can be obtained from a single ended amplifier, then

$$R_1'' = \frac{(2E_{ac})^2}{W_o} = 4R_1$$

Where Wo=power output of the two tubes.

The total capacity required from a to c would be

$$C = \frac{Q_1}{2\pi f.4R_1} = \frac{1}{4} \bullet \frac{Q_1}{2\pi fR_1} = \frac{1}{4} C$$

required for one tube capable of delivering the same power. Each section would then be made $\frac{1}{2}$ C mmfds.

To avoid confusion in our thinking about push-pull circuits, simply calculate Eac for one tube per Part 1, or as illustrated here for pentodes and tetrodes, and make Wo'=total power output of the two tubes. Then find

$$R_1'' = \frac{4E_{ac}^2}{W_o}$$

Total capacity a to c will be $\frac{Q_1}{2\pi fR_1''}$ and each section will be

$$C' = \frac{2Q_1}{2\pi fR_1''} = \frac{Q_1 \times 10^6}{3.1416 \times f_{mc} \times R_1''} \text{ mmfds.}$$

Fig. 2 can be used to find the capacity per section required if we use the

(QSY to page 25)

SPEAKING of PICTURES

XTAL needs pictures, send 'em in.

Above: Ve4RO's sky-hook is good reason why he is heard from corner to corner of this old globe. Splits the clouds at 102 feet!

Right: Ve3ANB in Strathroy was completely destroyed by fire in 1942. Its op, Wilf Rogers, is torn between erecting new layout and buying new suit of clothes with what savings remain!

W9WZE—Chicago, Hallicrafter's Michigan Boulevard Showroom Station is a Ham's paradise. The boys are invited to drop in and pound brass with the stars of the Hallicrafters line. Dioramas of radio's part in peace and war furnish interesting features and exciting displays.

Above is an exterior shot of W9WZE showing high frequency rotatable array used on the ham rig.

Right is the operating position with the famous HT4E transmitter and the SX28A receiver visible.

Air Force Amateur Radio System

Many of you old-timers will recall the efforts put forth by many Canadian amateurs, and organizations, for years before the war to have set up in Canada some service-amateur operations. We are indeed pleased that this effort had not been forgotten, and are grateful to announce that with the co-operation of the Royal Canadian Air Force, and several prominent amateurs such an operation is now approved by our government.

Approval has been given by the Minister of National Defence for Air, and the Air Council, R.C.A.F., for an organization to be known as the Air Force Amateur Radio System (AFARS) to be formed by the R.C.A.F., and certain qualified amateurs throughout Canada.

The purpose is to set up a trans-Canada chain of amateur radio stations operated by qualified radio operators, who will be trained in R.C.A.F. procedure, both for cw and phone operation, and who will operate on regular times during the year with other members of the net. The idea of the scheme is: (a) to have a backlog of qualified radio amateurs which may be useful to Canada in the event of a sudden emergency, national or international, (b) to keep these radio amateurs acquainted with the latest developments in service communications and radar, (c) to provide a service for localized emergency operations, and (d) to foster mutual interests between the amateurs and the R.C.A.F.

The organization, similar to the A.A.R.S. in the U.S.A., will require no reserve status on the part of any member nor will there be any liability for service or call. Full membership is open to any Canadian citizen over the age of seventeen. The organization is aimed at encouraging good operating between AFARS members and amateur clubs located at R.C.A.F. stations.

Throughout Canada, in some fifteen areas, there will be set up Net Control Stations. Each of these "squadrons" will be broken down into one or more "flights" consisting of not more than twenty radio amateurs each. Each "flight" will operate on a spot frequency between 3505 kc. and 3825 kc. with crystals loaned the members by the R.C.A.F. The frequency 3625 kc. is assigned as the general AFARS frequency for inter-squadron working and for the transmission of official broadcasts. The "flights" will be associated with local R.C.A.F. Auxiliary Units to improve their technical knowledge, and operating ability, and will have one parade, or "roll call" night, on the air, each week for each "flight".

The organization of the system on behalf of the Canadian amateurs is being undertaken by A/C Keith Russell, VE3AL, (now retired), who needs no introduction, having been a most active figure in Canadian amateur circles for the past twenty-eight years. At his request certain amateurs have already volunteered to get things started in the areas in which they reside. The fifteen areas, and the volunteers follow:

Halifax, N.S., E. S. MacLaughlin, VE1JH, 78 Harvard Street.

Quebec City, P.Q.

Montreal, P.Q., (2), J. L. Walker, VE3JI, 5000 Grosvenor Street; K. R. Patrick, 1001 Lenoir Street.

Ottawa, Ont., Victor Williams, VE3KE, 25 Russell Road, Eastview.

Toronto, Ont., (2), H. M. Reid, VE3ADR, 371 Willard Avenue; S. B. Trainer Jr., VE3GT, 46 Dunvegan Road.

Hamilton, Ont., Noel Eaton, VE3CJ, Oakville, Ont.

London, Ont., R. Hunt, VE3WX, 103 Garfield Street.

Winnipeg, Man., A. W. Morley, VE4AAW, 26 Lennox Ave., St. Vital.

Regina, Sask., Don Leitch, VE4FS, 2450 Broder Street.

Calgary, Alta., Jas. Smalley Jr., VE4GD, 523-8th Ave. West.

Edmonton, Alta., W. Butchart, VE4LQ, 10740-107th Street.

Vancouver, B.C., J. E. Good, VE5ND, 770 E. 41st Street.

Victoria, B.C., Stephen Jones, VE5XX, 2382 Lincoln Road.

It is requested that those interested contact the organizer in their area as listed above. At the outset, operations will be restricted to cw, but radiophone will be used later also.

As mentioned above, although the idea of instituting an AFARS has been considered for many years, its present fruition is largely due to the untiring efforts of Noel Eaton, VE3CJ, (ex Wing Commander, R.C.A.F.). Others who assisted in the early planning of the

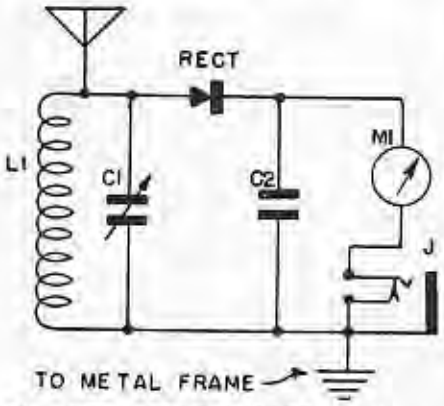
(Continued on page 36)

FIELD STRENGTH METER

By C. W. BOUGHNER, VE3IM*

Many amateurs who possess a field strength meter have experienced the disappointment of finding a dead tube, or dead batteries, in their meter just when time, and the weather, permits some concentrated work on the new beam antenna.

The unit described herein eliminates the tube and battery which means it will go to work any old time. This is accomplished by means of contact rectifiers. Rectifiers of this type have been common in England for some time, but seem to be only just getting popular over here. The General Radio wavemeter, type 1140, covering 240-1200 mc. uses such a rectifier as illustrated. Careful survey will show that this unit, dialless, was constructed from the local junk box, with no thought given to appearance or finish. This instrument was constructed to be held in one hand and tuned with the other. The meter can be built into the instrument, or if it is used elsewhere, can be plugged in when required. Further a pair of headphones may be plugged into the jack to give an aural check on hum and modulation quality.



C1 - .0001 STAR MIDGET COND.
C2 - .001 OR .002 MFD. MICA COND.
J - CLOSED CIRCUIT JACK
RECT - CONTACT TYPE RECTIFIER
L1 - FOR FREQUENCY DESIRED
M1 - 0-500 MICROAMPS OR 0-1 M.A.

The unit is also used, when calibrated, for locating harmonics of various transmitter stages, and for neutralizing amplifier triodes. The pick up for field strength measurements is merely a piece of wire plugged into the socket located above the variable condenser. The circuit diagram gives values used in this unit, but none of them would appear to be too critical.

RE 80 METERS

If you have read page 25 in this issue, or if you have been listening to W1AW, you will know that we VEs have all of the old 80 meter band commencing April 1st. Please note, however, that from 3500 to 3700 kc. we are limited to 50 watts output with the further understanding that we do not interfere with U.S. military services. Judging from the QRM on ten, these days, we anticipate further bedlam on eighty, it being the first of the lower frequency bands to be released. The average VE is much lower powered than our W friends, and as the Ws will not be in the 3.5 to 3.7 mc. band for the time being it will give us an opportunity to renew seven year old acquaintances through our own QRM. However, please bear in mind we must cause NO interference to existing stations. LISTEN before you send, or get your frequency established!! Any interference will cause a loss of our special privileges.

WANTED

Your XTAL needs photos, hints and kinks, articles, or anything of interest to us all. Let us know how you got the bugs ironed out, especially the ones in that E.C.O. or V.F.O. Yes, and don't forget the 25 year club of old-timers. See April XTAL for No. 1. We would like a photo of yourself, and rig, if possible, as well as a brief story.

DEAR OM

Editor, XTAL:

Well, I just feel like sitting down and dropping someone a line and this time you're the luck one—or are you?

I think XTAL is good and I enjoy the features. They're tops. Much midnite oil must be burned by the Gang at Headquarters to compile all the gen and present it so attractively. Which brings me to the subject I would like to see featured at some future date. It's an honest-to-goodness Emergency Transmitter. The requirements of the xmtr I have in mind are so exacting I believe it will tax the Gray Matter of many an OM. Here they are:

1. It must be, come Fire, Flood, a real substitute stand-by with a punch. Now anyone can design a complicated rig and many of these have been published which I doubt would stand up when old Dame Nature goes on a rampage to test both man and machine, especially when power lines are down and all kinds of transportation is paralysed. These conditions seldom come about but when they do human life often hangs in the balance.

2. In such an idea I sincerely believe that a large number of Hams from the beginner to the California KW boys would find real interest.

3. As for the mechanical and electrical set-up I would have it strong and electrically simple. This would include protection from the weather such as is found in Marine sets. The power supply must be 6 volt for naturally when all Hydro lines are out every car and truck is a potential power supply. Of course a plug could be provided to use on power mains if so desired.

Well, I think this is enough rambling for one letter but before I close I must tell you that I enjoyed your feature entitled, Power, Dollars and Cents.

Ve4NG, R. S. Ford
Readlyn, Sask.

Editor, XTAL:

. . . I figure I was one of the original members of the VEOPs (although not one of the organizers) because I believed with the organizers, that it was time Canada had its own Association to negotiate with its own Government the affairs of Canadian Hams, and to promote and encourage such activities that are of interest to Canadian Hams and have our own magazine.

I used to sit at home and ponder over these things but Sam, Fred, Erich, Tommy, etc., got busy and did some work and when I heard about it I was very pleased, and all for it, and sure put in my dollar and glad to do it. I say Good Luck to those boys and may their efforts prosper. I am happy in the thought that I have been associated with them so long, spent many happy hours in their company and in QSO, for that is why I am now as I am, still able to put a sig on the air (not very loud on ten) but wait till forty and eighty open up. HI!

VE3IE
Wally Hainge
Weston P.O., Ont.

Editor, XTAL:

. . . had an experience while Overseas that might be of interest . . . this was November, 1940, the Jerry Hams were still on the air. I was on our squadron point-to-point station and we were using 3590 kc as one of our frequencies. One evening I heard a CQ coming in R9, and the fellow signed D4AMF. He then called again; well, I couldn't stand it so I touched my key. He immediately stopped calling, then after a short pause resumed calling CQ, well after a dit or two from me the poor guy was calling CQ pse break! Can ya tie that?

Ve3AZH
Dundalk, Ont.

LOST AND FOUND

Digby, N.S., Nov. 27 (CP).—Maritime Telephone and Telegraph radio station at Point Prim, three miles from here, was entered tonight and the equipment for an entire transmitting station stolen. The equipment, difficult to replace, was valued at between $30,000 and $40,000.

A. M. Mackay, general manager of the company, said that men experienced in radio work must have aided in the theft as nothing was torn from the walls, but was removed skilfully.

The Point Prim station provided three channels between Nova Scotia and Saint John, N.B., and its loss has seriously affected the service.

Halifax, Nov. 28 (CP).—Losing its compass bearings on unfamiliar land, the Royal Canadian Navy, it was disclosed today, staged an action against a civilian radio station at Point Prim, N.S., and not only carried the day but carried away the whole station in the belief it was an R.C.N. radar installation.

Although faces in naval circles are slightly red, the Maritime Telegraph and Telephone Co. was satisfied the case was solved. Police investigation that started last night with the discovery that the company's station had vanished into thin air has been called off.

The solution came this morning to climax a search by Royal Canadian Mounted Police and telephone company employees, who scoured the highways and byways for the equipment, without which the Point Prim station would have been useless for more than a year.

"Some time yesterday, the navy received a signal to dismantle its radar station, located on the same lonely, deserted road as the M.T. and T. station," A. M. Mackay, general manager of the telephone company, said today.

Through an error, the sailors assigned to the job went to the wrong station. When they found the building housing the expensive and delicate equipment locked, they are reported to have forced an entry, dismantled the radio set and drove off to the nearby H.M.C.S. Cornwallis naval base.

Company officials were greatly relieved today but admitted the mistake would cause a tie-up.

DX-28 mc.

One learns gradually how to work that elusive DX. You put more power into the antenna; you stick up a rotary; or you get yourself a super-duper receiver; or you await short skip conditions and get pointers from the guys that get 'em. Take VE3KE, for instance. He reports working VE4RO on short skip. They compare notes where they hear the stuff (we guess) and here's what they get: 3KE got W2KMZ/EL (Liberia), VK3HT, 28020 kc., W6MBA/KB6 on Tinian Island near Guam, ZS's 5CK, 6AH, 2X, 6EU, 6EQ, 4AF, 2AL and 4H. Europeans snagged are G's 2MI, 2KG, 6GN, 5XX, 3SU, 2OL, 2PL, 4AP, 8MX, 5SR, 6ZO/I, HB9AZ, W7DRF/I, PA0P, I1GD, P1X, KC5C (Balkans — said he'd QSL), D4AUU, F8ABC and F8RSO. All these on cw. Phone contacts were G2IB, G8WL and ZS6EU. Furthermore KE reports he is using an 80 meter zepp as the snow's too deep to get near the rotary until spring. KE's XYL, 3BEO, Lucy, snagged G8II, G5CY and D2XZ. KE's brother, 3BCO got LX1B, G6ZO/I, F8ABC and F8BCA and heard W9QMD/KE6 on Johnston Island, 28085 kc. Now, let's turn to Manitoba and we see 4RO sends in this fine list of stuff to go after:

VO2KJ, 28200, cw-fone,
HK3AB 28002 fone,
VK2AHP, 28100 cw,
VK2NP, 28140 cw,
VK2QR, 28090 cw,
W9KLE/K6 28120 fone,
LU7AK, 28020 cw,
LU7AZ, 28020 cw,
LU9AX, 28075 cw,
W2KGW/VO, 28200 fone,
W2KTS/K6, 28110 cw,
W2NBT/K6, 28100 cw,
W4EPT/K6 28085 cw, 28150 fone,
W9TQD/J, Tokyo 28080 cw,
W7EGN/K7 28145 cw,
W6NFH/KB6, Guam, 28350 fone,
W9JMG/KB6, Guam, 28050 cw,
W2LRI/J9, 28095 cw,
CO2RG, 28090 fone,
LU3DH, fone and cw,
CE2CE, 28085 fone.

LU7AZ is also on 28150 fone, and PY2AC on 28100 fone. European DX that has been worked by VE3s is not getting past the head of the lakes, but 4AAV heard a G, and 4TJ a ZS. 4AJT, without ac but with lots of antenna room just dreams he works SU, ZS, and ZP,

VE2PF bagged G's 6CJ, 5BM and LU7AK, as well as D4AAU. 5AGT reports the /W's pounding in from the Pacific Isles. Many of the Torontonians bagged LU7AZ in the first week of the BW contest.

FLEXIBLE COUPLING

VE2AY, Les Newton, sends in sketch of an ingenious coupling, as illustrated. It is made from brass rod. Holes are drilled merely clearance for pieces of drill rod, 3/16", or as convenient. If a

FLEXIBLE COUPLING

90° angle is required each piece of drill rod should be bent as closely as possible to 90°. If other degrees are required just make sure the drill rods are bent all alike. The coupling is backlash free.

APPLICATION FORM

I hereby make application for (renewal) (new) membership in the Association. One dollar is enclosed which entitles me to membership and subscription to XTAL for one year from date of application.

NAME .....

ADDRESS .....

.....

CALL ..... DATE .....

PROF. CERTIFICATE NO. .....

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MARLUND Communications Equipment

TORONTO 4, CANADA

Inspecting the first Hammarlund HQ129X at Stromberg-Carlson Company, Limited, from l. to r. are S. B. Trainer Jr. Ve3GT, Monty Johnson Ve3ZF, and F. H. R. Pounsett, Chief Engineer. Mr. Johnson's long experience as an active amateur since 1921 and his personal supervision of production of Hammarlund Communication products in Canada assure the ham fraternity of excellent results.

50-54 NET

The first high frequency network in the Toronto Area is now in operation. This is good indication of activity on this band and the following members of the network will welcome all hams interested in getting up to 5 meters VeSATP — AWP — AIA — ADU — AEM — BDS — APN — AFG — ANY —AID — TH — AVW — and 3 Hamilton hams whose calls we have yet to learn.

ANTENNA CIRCUIT DESIGN

(Continued from page 15)

Rl calculated for one tube and reduce Qt to 6 for push-pull circuits. This gives the same results as the foregoing formula.

Knowing the capacity per section, we get the total capacity across the coil by again dividing this value by two. The coil inductance is found from resonance formula or a Lightning Calculator for the operating frequency. If desired, the mutual inductance required between Lp and Ls for a circuit Qt of 12 can be found as before from $M = \frac{\sqrt{R_s R_s}}{6.28 \times f_{mc}}$ microhenries, but this is not necessary if we follow the tuning procedure already outlined for inductive circuits.

In a plate neutralized single ended amplifier per Fig. 6(a) using a split tank condenser, or 6(b) using a center tapped tank coil, the impedance a to b must be equal to Rl for the tube. Thus, the impedance a to c=

$$R_{l}'' = \frac{(2E_{ac})^2}{W_o} = \frac{4E_{ac}^2}{W_o} = 4R_l$$

where Wo=output from the single tube. Total capacity from a to c will then be

$$C = \frac{Q_t}{2\pi f R_l''} = \frac{1}{4} \cdot \frac{Q_t}{2\pi f R_l} = \frac{1}{4} C$$

for simple single ended amplifier (with no neutralizing). In 6(a), the capacity per section will then be ½ the value obtained from Fig. 2. In 6 (b) the total capacity will be ¼ the value obtained from Fig. 2.

The single ended plate neutralized circuit per Fig. 7(a) and grid neutralized circuit per Fig. 7(b) both require a tank capacity C as found directly from Fig. 2.

MARCH 13TH

50 — 54 mc.
27.185 — 27.455 mc.
235 — 240 mc.

APRIL 1st

3,500 — 4000 kc.

Ottawa, Ont., Feb. 28th, 1946. Effective tomorrow, March 1st, the five meter band is altered from 56-60 mc. to 50-54 mc. All amateurs are requested to take note and govern themselves accordingly.

Ottawa, Ont., March 13th, 1946. Effective immediately additional frequency bands 235-240 mc. with no restrictions on type of emission and 27.185-27.455 mc., type of emission A1 and A3 released to amateurs on temporary basis. Effective April 1st whole of band 3500-4000 kc. also released to Canadian amateurs subject to the following operating conditions: 3500-3700 kc. limited to maximum power of fifty watts, cw only, with no interference to be caused existing United States military radio services using this portion of the band; phone, type A3 emission, between 3900-4000 kc. ONLY pending United States later releasing whole band to their amateurs, at which time qualified Canadian amateurs will be authorized use of A3 on 3800-4000 kc., same as pre-war.

Both for the new-comers, and the old-timers we wish to elucidate on some of the rules and regulations pertaining to phone operations. Firstly, special endorsation of licences is required for operation on 3.5 mc., from the Radio Inspector or the Department. Secondly, a station must have held a licence for a period of two years, and have been active on cw during that time, before endorsation may be granted for 3.5 mc. phone. Separate endorsation, or authorization is required for 28 mc. and 3.5 mc. phone. This means that those phones now authorized for 28 mc. require further endorsation before going on 3.5 mc. No special endorsation is required for 27.185-27.455 mc.

April 1st is the date our annual transmitting licence fee of $2.50 is due for 1946-47. In order to be sure of retaining your old call, and assisting the Department in expediting their records, we suggest you send in your renewal fees immediately.

Report From The Nation

Now that the Ides of March are past, Spring Fever's got us and thoughts lightly turn to Field Days and Golf and new antenna arrays instead of six o'clock reveilles and the dullness of a wartime existence. Yessir, the clean air shines and sparkles as the World goes wheeling into the first Peaceful Spring in seven years and what fun it is to think again of HAM RADIO UNLIMITED!!! The Clinton gang up at the RCAF Radar and Communications School are ankle deep in a new shack and a thriving club with PP 813's socking the ether . . . Ve3AIU and 3AWI in the Goderich area are going concerns . . . Ve4MM awaits a brand new Ve3 call, and about fifteen guys are waiting for the local Radio Inspector to show up and conduct examinations in that neck of the woods! . . . Oh QRM where is thy sting! . . . Ve4MX is on at Clinton working from Ve3BER which is the new call of the Club . . . other displaced fellers QRX for Ve3 calls are 2GR, 2YO, 4AU, 4ABD, 4AJF, and 2QL expects to return to civvy street and hightail it for home to get on the air . . . 3SY, 3BRU, 3BCV, 3BDV are all members of the 730 Club at the CARC too . . . whatta beehive . . . Away out in British Columbia at the University of B.C. are 32 hams known as the U of B.C. Amateur Radio Operators' Association . . . a new 250 watt club transmitter and an RME 45 will be used by the members . . . nice letter from Ralph Gordon, secretary of the UBCAROA, sez that most of the boys trained at Clinton, Montreal, or Barriefield and have not forgotten the warm hospitality extended by the people of our province when they were so far away from home . . . wasn't it Voltaire that said: 'by appreciation we make excellence in others our own property' . . . thanks, Ralph! . . . The West Side Radio Club in Toronto had fourteen members at their first post-war meeting . . . fun for the evening was provided by their old constitution and by-laws outmoded and outdated they brought forth gushes of guffaws and many chuckles . . . after a decision to establish a club station and headquarters the evening trailed off into reveries of the past and shades of days gone by and lads such as 3LR, LF, XR, and Bob Sangster flashed before the enquiring memories of the gang . . . Back out to the west coast again where we find the Victoria gang at the V.S.W.C. making big plans as usual . . . Ve5DY reports that the UGANDA has four hams aboard now, three 5's and a 3 . . . 5ZM has 400 watts at the end of a rotary beam and shoots for VK and J and gets! . . . Ve5s EP and QH are among RCCS unit lads near Sydney . . . 5NG sez that 5ZM is best Ve at VK2TI and VK2DI, VK2RA, VK2ADV are all listening for us in Sydney-Down-Under . . . 5NG gets above dope from his OM who is Ve5EP in the Sigs unit there . . . Over in Quebec the St. Maurice Valley Amateur Radio Association is about to begin perking again . . . nucleus is 2AQ, 2OD, 2CZ, 2EC . . . Dean Robert, who is Aumonier-Directeur at Patronage St. Charles in Les Trois Rivières is our correspondent and is doing a FB job in organizing the gang . . . Ve5HE in Port Alberni, B.C., is enjoying 30 day discharge leave and sez that XTAL was on reception committee when he returned from O/S . . . Ve4APP (America's Proud Papa) is QRX 7mc. to tell his tall tall stories of the Golden West again . . . Ve2RU is cooking up a FB article on Speech Clippers for near future issue of XTAL . . . Ve5QS back from the wars has big plans and is busily rebuilding . . . Ve3ACL is doing some on-the-beam Skyriding . . . for bread and butter too! . . . Ve3FT just arrived in Pacific coast and RCNVR in time to join CAROA and the ranks of the benedicts . . . Ve5KR took pix of the nuptials and doubled in ushering . . . 3FT sez he met 5LI in Prince George while there and ran into 3AYE soon's he returned east . . . Ve4NG wants dope emergency rigs and writes dandy letter about the trials and tribulations of hamming in the wild west . . . Ve3ADD is on 28088 in Whitby . . . Ve5RI hears 3AML with FB sig . . . RI is in Trail, B.C. . . . Ve3EK is opping under call Ve5TC on 28092 on Sat. and Mon. PMs after 2 . . . 3AGR reports that 5AKS is coming thru on 28208 and 28024 daily . . . this dope from Harv. Reid 3ADR . . . mani tnx OM . . . Chas. Chappell in Nelson, B.C., is awaiting call meantime commercial ops at CKLN . . . Ve3NX up at Wingham is back on . . . howdy, Bill . . . Ve5AFL is just back from a two year stint with

Merchant Marine . . . Ve3AHB has T-55s and an SX28A to play with . . . ex3VI/3YX is getting QSLs and wishes to advise the present holder of his old call to drop him a line if he wants some wallpaper . . . Ve3VI and Ve3YX please note that his QTH is S. T. Ogden, 94½ Essa Road, Allandale, Ontario . . . Ve3AWV wants dope (along with hordes of others) on the release of War Assets equipment used in Communications Branch during the war . . . Ve1EY is all set to get teeth into tfc and wishes us to QSP his 73 to 3SG and all the chickens out there . . . Ve1KQ was a Toronto visitor during January and was QSO some of the local gang via land-line . . . Ve3ACY is now Ve5WL in Victoria . . . Ve4LB wants hints and kinks department in XTAL . . . see "flexible coupling" . . . Ve3HV knocks at our door again and sez his son Bud is about to branch out in Halifax with a rig of his own . . . Ve5US in Chilliwack, B.C., is on 250 watt fone 28344 kc daily from 12 to 2 PM PST . . . Ve3ZO in Windsor introduces new associate, Geo. Walker, and sez to watch the Border gang's smoke . . . howdy, Johnny . . . and from Ve3RO comes a FB letter all about plans for a QSY to Ve2 . . . wishes to be remembered to 3BD, 3NX, 2GP . . . which reminds us where is 3KR? . . . 5RX is new member from Vancouver Island . . . 3BC's XYL hopes to get her ticket soon . . . Ve5HC is having QRA troubles and plays with 5FC's rig in meantime . . . Ve4AY in Lancer, Sask., writes nice note about what he'll be ether-busting with . . . Ve3ATR is Sgt. in Army and looks longingly at discharge day . . . Ve1LO in Glace Bay is planning some 56 and 112 meggie work with 1IO and asks to QSP/ex4TK's 73 to the gang he used to know in the west he'll be looking for them on the air about the time this issue reaches em . . . sez to look for a feeble sig signing Ve1LO on CW . . . Ve1NA in Mahone Bay is cranking up the old rig . . . Ve3XJ is trying to find all the parts to his rig, seems that sumpin happened to them at the beginning of the war MIM . . . Ve1JJ back after five year trick with Army hopes to be going soon . . . Ve3ARE is in Newfie signing VO2RM and will be QSO his wife in Ve4 come this reading . . . Ve3DN is at Gander NF and shots pix for RCAF when not hamming . . . XTAL WANTS PIX FROM VEOPS FOR COVERS AND PLEASE SEND NEGATIVES IF POS-

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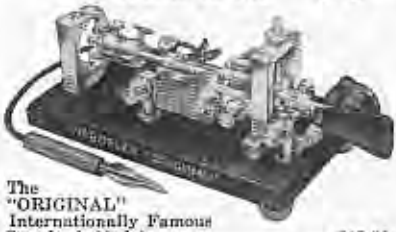

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SIBLE — WE WILL RETURN THEM IN GOOD CONDX AND WILL USE ALL WE FIND SUITABLE—WE ALSO WANT EM FOR INSIDE XTAL BECUZ WE STILL BELIEVE THAT ONE GOOD PIC IS WORTH THOUSAND WORDS . . . at least that is what OM Confucius say! . . . Ve3AKY in Ingersoll will be reaching with PP HK-54s by the time XTAL gets to you . . . Ve3EN is vintage 1925 and joins the ranks of the famous in CAROA . . . Ve5LM has had big trip with Army for past few years and wants to settle down to hamming again . . . The 1,000 Island Amateur Radio Association in Brockville report a beehive of activities along the St. Lawrence waterways! . . . 3AOQ is on and worked a feller first shot . . . when he puts soup into his antenna . . . cuz when 3WG and 3EJ go around to see the heap it doesnt' work! . . . no souppee, no clickee . . . Bill Andrews at CFRB has 6L6 and 807 going FB . . . Ve3AM has new electro-bug and permission from the OW to use a room for a shack . . . Ve3AAB looks after police gear in Brockville . . . Ve3ZB is still overseas with RCAF as F/L . . . exVe3PI is chief op at CJAD in Montreal awaiting Ve2 call . . . Ve4AIJ in St. James, Manitoba, will be up in Lac du Bonnet by this reading operating for the Dept. of Mines and Natural Resources . . . expects to see 4GJ and others with CPA . . . tnx for letter Pere . . . Ve1IO wants to hear from 1CW and 1FR . . . Ve4AJB, Ed Jackson, formerly of Transcona, Man., is now working in the Personnel office at Steep Rock Mines and hopes to be back on the air shortly . . . Ve3AVZ has been all over the globe with RCAF and is aching to get back on again . . . Ve4AJT is in Hamton, Sask. . . . Ve3LR is awaiting a Ve2 call . . . Oh, by the way . . . Ve4AJT wants to know where Ve4ASH, 4FM, and 4IM can be located . . . Ve4BC adds his to list of famous names . . . Ve4AEO wants war surplus tubes handled by western outlets so he and Flin Flon hams can get 'em before they're all gone . . . Ve3AZH is newcomer in Dundalk . . . Ve3ADE reports XTAL is coming through to Germany RST599 . . . he hopes to be back on this side of the pond soon . . . Ve3BCE, old 3AR is at CHEX in Peterborough and is ready to chew a chunk out of 80 soon as they hand it back to us . . . recalls old days of OFB operating in the Northcountry

and asks about Bud Punchard 2KK, George Stiff, and Jerry Lawrence 3ET, and sez further that there is no hobby that can give so much in return for so little effort expended . . . we concur Bert . . . Ve5ACW shadowed 5IO and wheedled a buck from him for renewal in CAROA . . . DON'T FORGET TO SLIP THAT RENEWAL DOLLAR IN AN ENVELOPE and BE SURE of getting XTAL . . . From The Pas comes word from Ve4GS ex3ABJ asking about communicat recvrs from War Assets . . . J. A. Wade of Windsor was F/O in Air Force and met many hams in the Old Country while O/S . . . got around to a hamfest in the city of Lincoln and was a member of RSGB for a year . . . Ve4ALN is in Yarmouth, N.S., now with RCAF and would like some portable power articles in XTAL . . . you betcha Ray we're lining up some dope now preparatory to CAROA Field Day next summer . . . Ve1BH writes to 'The OM who writes Rpt from the Nation' and tells us about Ve4ZB . . . here's the story: after cutting his teeth on a spark coil as 5AJ, S. L. Young became in order Ve1EO - Ve2NS - Ve3AVT - and is now 4ZB . . . bit of a record having held all 5 District calls . . . put that in your pipe and smoke it, Grant . . . 3AJP in London is only one district behind him . . . he's been in four of 'em now! . . . Ve3ANE has QSYed from Whitehorse, Y.T., to Dorval, Quebec, and is going after Ve2s to become members of CAROA . . . thanks, Stroyan . . . Ve2 is a poor fifth in the district representation . . . and dawggone if here isn't a letter from Wally Hainge, 3IB . . . golly if we're half as spry as Wally after we've pounded brass as long as he has we'll sure take on Superman . . . Wally threatens to take the ether apart once 80 opens up . . . and we'll bet that the Atomic bomb will cower in the corner when 3IB appears on the 3.5 horizon . . . Ve3AQ landed in France on D-Day working a set in a Spotter Tank and stuck with it all the way through France, Belgium, Holland and Germany pitchin' stuff at Heinies R9 . . . VO2KJ over in Gander Newfie is going great guns when not fighting with Teletype guys at Torbay and with Tom Tyson is burning up the 28 mc band everytime it opens the gate . . . howdy, Johnny, and keep the FB letters coming . . . try and wheedle a Cover shot out of 3DN for XTAL . . . Ve3CP in Windsor is warming up the old Frontier

Club for action this Spring . . . Ve3AJE, Ve3HI, Ve3DU, Ve3ADC, Ve3GB, Ve3WX, Ve3AOO, Ve3AJP, Ve3ALE, get into the darndest nine-way QSOs ya ever heard over in London . . . With the St. Thomas gang they are forming a progressive radio club to meet between the two cities . . . We look for great things from London this coming term and hope to hear from club secretaries shortly . . . from Sault Ste. Marie writes Ve3JH that the 28 mc diet is too thin for him and he is waiting to gorge upon the lower freqs when they open . . . sez that 3AIE is building big rig but is having trouble reconciling his XYL to aluminum chips in her cooking while he shares the kitchen table with her in process of constructing big rig MIM . . . Ve2PF burns up the DX with Gs, LUs, Ds, etc., and sez that the best time for Gs is around the hours of 10 to 12 noon EST . . . he gets awful mad at guys tuning up their ECOs all day . . . so do we, Al . . . they should know better . . . so far as we can determine D4AAU is a GI station who signed W4AAU in the USA . . . we haven't heard his QTH yet . . . Ve5AGT up in Whitehorse, Y.T., sez that the fellas in Whitehorse are QRX for parts, etc., and he and 5AKK are standing by for permission to operate on the airport . . . 5TC is rebuilding . . . 5AFE is coming to life . . . 5XN is on at Teslin, Y.T. . . . Ve3AWW is at Aishthik, Y.T., and will be on with low power soon as a Ve5 call is assigned . . . the boys in The Horse are hearing booming signals on Ten every day and if wishing could help, sez 5AGT, they would stop fiddling and work Rome . . . By the way, we haven't heard any more from the YLs, the XYLs and the OWs . . . Seems that some organization work was afoot little while ago . . . and Ve3CAR is on the air from CAROA Headquarters and will be listening for your calls . . . elsewhere in this issue will be found the Station operating schedule, hours and frequencies . . . until next month, CU on the Air from Ve3CAR, 73.

CANADIAN LEGION RADIO BRANCH

April XTAL will carry a full story on the formation of a Radio Section of the Canadian Legion across Canada. All veterans whether members of the Canadian Legion or not are requested to contact their nearest Legion Branch Secretary or D. H. Leitch, VE4FS, 2450 Broder Street, Regina, Sask.

AMATEUR RADIO SYSTEM

(Continued from page 17)

system are Sam Trainer, VE3GT; Harv Reid, VE3ADR (ex Flight Lieutenant, R.C.A.F.); SCM Ontario, Don Gunn, VE3EF (ex Wing Commander, R.C.A.F.); and much help from permanent R.C.A.F. officers has been received, notably A/C "Brandy" Godwin, G/C Max Hendrick, and S/L A. A. Stephens.

AFARS Allocation of Areas

MARITIME—All Ve1's.

QUEBEC CITY—All Ve2's East of Megantic, Three Rivers, La Touque, Roberville.

MONTREAL EAST—All Ve2's South of St. Lawrence River, City East of St. Laurent Blvd.

MONTREAL WEST—All Ve2's North of St. Lawrence River, City West of St. Laurent Blvd.

OTTAWA—All Ve3's East of Kingston-Mattawa Line.

TORONTO EAST—All Ve3's Between Toronto-Mattawa line and Kingston-Mattawa line. All Ve3's in City of Toronto east of Yonge St.

TORONTO WEST—All Ve3's Between Mimico, Waterloo, Owen Sound, Sudbury, Cochrane, Toronto-Mattawa line and those West of Yonge St.

HAMILTON—All Ve3's South and East of Mimico, Waterloo, Port Burwell Line.

LONDON—All Ve3's Between Port Burwell, Waterloo, Owen Sound, Sudbury, Cochrane, Fort William-Armstrong Line.

WINNIPEG—All Ve3's West of Fort William-Armstrong Line and all Ve4's.

REGINA—All Ve5's.

CALGARY—All Ve6's south of Red Deer.

EDMONTON—All Ve6's North of Red Deer, All Ve8's along the Alaskan Highway, Yukon and N.W.T.

VANCOUVER—All Ve7's on mainland in B.C.

VICTORIA—All Ve7's NOT on mainland of B.C.

CONTESTS?

Have you some ideas for contests? We're planning now for doings on the lower frequency bands. Please let's hear from you.

CRYSTAL FACTS

(Continued from page 6)

In addition to these appointments, the Communications Manager would appoint assistants for liaison with DX, Radiophone, and Armed Forces Reserve operations. These appointees would specialize in each of these phases. Competitions and citation awards for outstanding accomplishments by Canadian Amateurs would be directed by the Communications Manager.

In all likelihood we will be on part of the 3.5 mc band by the time this is read and as it is desirous of having communications in operation as quickly as possible we would appreciate comments and suggestions from all Canada. In order to assist in forming a final Communications Department it is expected that Headquarters Station Ve3CAR will be on the air with regular operating periods just as soon as traffic bands are released. Times and frequencies will be announced shortly, either in XTAL or on 3760 kc. Listen for Ve3CAR. Meantime, let's hear from you.

FLASH

Ve3CAR OPERATING SKED 3760 KC

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Mon., Wed., Fri.	7:00-8:00 p.m.
Tues and Thurs.	8:00-12 midnight
Sat. and Sun.	Open Times

Other frequencies will be used on Saturdays and Sundays for general work. Effective with opening of 80 meters.

LOST MEMBERS

XTALs sent to the following members have been returned to HQ as the P.O. has no forwarding addresses. We would appreciate having the address of the following:—Ve2MP, OF, OR, PR, 3AGD, AGG, ACQ, ALT, ANY, ASU, AWI, AVB, CE, DA, DT, GG, MS, OD, QF, ST, VA, YF, 4AAI, AEM, AF, AGM, BF, 5ADN, AEM, AHU.

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XTAL

MARCH
1946
Vol. 7 No. 2

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METERS
(QSY To Page 25)

complete coverage on Canadian amateur activities, technical and operating information, hints and kinks, the best and most reliable sources for ham gear, the best manufacturers in the radio world . . . it keeps you informed of what's what in official circles and regulations, and, in general brings you much closer to your brother VE than you've ever been before . . . it speaks for you . . . The Canadian Radio Amateur.

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